



**CITY OF NORTH MIAMI BEACH**  
City Hall, Commission Chambers, 2nd Floor  
17011 NE 19th Avenue  
North Miami Beach, FL 33162  
**Tuesday, January 21, 2025**  
**6:00 PM**

Mayor Michael Joseph

Vice Mayor Lynn Su

Commissioner Jay R. Chernoff

Commissioner McKenzie Fleurimond

Commissioner Daniela Jean

Commissioner Phyllis S. Smith

Commissioner Fortuna Smukler

City Manager Mario A. Diaz

City Attorneys Greenspoon Marder LLP

City Clerk Andrise Bernard, MMC

Notice to All Lobbyists

Any person who receives compensation, remuneration or expenses for conducting lobbying activities is required to register as a Lobbyist with the City Clerk prior to engaging in lobbying activities before City Boards, Committees, or the City Commission.

**City Commission Meeting Agenda**

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- 1. ROLL CALL OF CITY OFFICIALS**
  - 2. INVOCATION**  
**Pastor Greg Williams (Holy Family Missionary Baptist Church)**
  - 3. PLEDGE OF ALLEGIANCE**
  - 4. REQUESTS FOR WITHDRAWALS, DEFERMENTS AND ADDITIONS TO THE AGENDA**
  - 5. PRESENTATIONS / DISCUSSIONS**
    - 5.1. Legislative Priorities (Ronald L. Book and Rana Brown, Office of Ronald L Book, P.A)**
    - 5.2. Solid Waste & Recycling Updates (John Casagrande, Senior Vice President, Coastal Waste & Recycling of Florida)**
  - 6. PUBLIC COMMENT**

## **To All Citizens Appearing Under Public Comment**

The Commission has a rule which does not allow discussion on any matter which is brought up under Public Comment. We are, however, very happy to listen to you. The reason for this is that the Commission must have Staff input and prior knowledge as to the facts and figures, so that they can intelligently discuss a matter. The Commission may wish to ask questions regarding this matter, but will not be required to do so. At the next or subsequent Commission meeting you may have one of the Commissioners introduce your matter as his or her recommendation. We wish to thank you for taking the time to bring this matter to our attention. Under no circumstances will personal attacks, either from the public or from the dais, be tolerated.

### **Speaking Before the City Commission**

There is a three (3) minute time limit for each speaker during public comment and a three (3) minute time limit for each speaker during all public hearings. Your cooperation is appreciated in observing the three (3) minute time limit policy. If you have a matter you would like to discuss which requires more than three (3) minutes, please feel free to arrange a meeting with the appropriate administrative or elected official. In the Commission Chambers, citizen participants are asked to come forward to the podium, give your name and address, and the name and address of the organization you are representing, if any. If you are speaking on a public hearing item, please speak only on the subject for discussion. Thank you very much, in advance, for your cooperation.

### **Pledge of Civility**

A resolution was adopted by the Mayor and City Commission of the City of North Miami Beach recognizing the importance of civility, decency, and respectful behavior in promoting citizen participation in a democratic government. The City of North Miami Beach calls upon all residents, employees, and elected officials to exercise civility toward each other. (Resolution Nos. R2007-57, 11/06/07 and R2011-22, 4/26/11)

### **Unattended Personal Items Notice**

Please be advised that personal belongings and electronic devices cannot be left unattended. All unattended personal belongings and electronic devices will be confiscated.

#### **7. ANNOUNCEMENTS**

#### **8. CITY COMMISSION REPORTS**

#### **9. CONSENT AGENDA**

##### **9.1. Regular Commission Meeting Minutes of December 17, 2024 (Andrise Bernard, MMC, City Clerk)**

##### **9.2. Resolution No. R2025-01 Change Order for Austin Tupler Trucking**



**Inc. for Sand and Gravel Delivery for Road Maintenance (Samuel Zamacona, Public Works Director)**

**A RESOLUTION OF THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA, APPROVING AND AUTHORIZING A CHANGE ORDER TO THE CONTRACT WITH AUSTIN TUPLER TRUCKING, INC. INCREASING THE CONTRACT AMOUNT BY \$50,000.00; AUTHORIZING THE CITY MANAGER OR DESIGNEE TO DO ALL THINGS NECESSARY TO EFFECTUATE THIS RESOLUTION; PROVIDING FOR CONFLICTS; PROVIDING FOR SCRIVENER ERRORS; PROVIDING FOR SEVERABILITY; SUBJECT TO THE BUDGET APPROPRIATION AND AVAILABILITY OF FUNDS; AND PROVIDING FOR AN EFFECTIVE DATE.**

- 9.3. Resolution No. R2025-02 Change Order for Advanced Environmental Laboratories, Inc. for Laboratory Testing Services (Hamid Nikvan, NMB Water Director)**

**A RESOLUTION OF THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA, APPROVING AND AUTHORIZING A CHANGE ORDER TO THE CONTRACT WITH ADVANCED ENVIRONMENTAL LABORATORIES, INC. INCREASING THE ESTIMATED ANNUAL EXPENDITURE BY \$60,000.00 FOR THE PURCHASE OF LABORATORY TESTING SERVICES; AUTHORIZING THE CITY MANAGER OR DESIGNEE TO DO ALL THINGS NECESSARY TO EFFECTUATE THIS RESOLUTION; PROVIDING FOR CONFLICTS; PROVIDING FOR SCRIVENER ERRORS; PROVIDING FOR SEVERABILITY; SUBJECT TO THE BUDGET APPROPRIATION AND AVAILABILITY OF FUNDS; AND PROVIDING FOR AN EFFECTIVE DATE.**

- 9.4. Resolution No. R2025-03 Change Order for AMI Engineering for Reviewing, Grading and Drainage Plan Services (Samuel Zamacona, Public Works Director)**

**A RESOLUTION OF THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA, APPROVING AND AUTHORIZING A CHANGE ORDER TO THE CONTRACT WITH AMI ENGINEERING, INCREASING THE CONTRACT AMOUNT BY \$75,000 FOR THE PURCHASE OF PROFESSIONAL ENGINEERING SERVICES; AUTHORIZING THE CITY MANAGER OR DESIGNEE TO DO ALL THINGS NECESSARY TO EFFECTUATE THIS RESOLUTION; PROVIDING FOR CONFLICTS; PROVIDING FOR SCRIVENER ERRORS; PROVIDING FOR SEVERABILITY; SUBJECT TO THE BUDGET APPROPRIATION AND AVAILABILITY OF FUNDS; AND PROVIDING FOR AN EFFECTIVE DATE.**

- 9.5. Resolution No. R2025-04 Approving an Agreement with Gilson Engineering, Inc. to Purchase Various Digital Displays for NMB Water Production (Hamid Nikvan, NMB Water Director)**

**A RESOLUTION OF THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA, APPROVING AND AUTHORIZING A PURCHASE ORDER WITH GILSON ENGINEERING, INC FOR THE PURCHASE OF VARIOUS 'DIGITAL PRECISION' PRODUCTS SUBJECT TO ANNUAL BUDGET APPROPRIATION; AUTHORIZING THE CITY MANAGER OR DESIGNEE TO DO ALL THINGS NECESSARY TO EFFECTUATE THIS RESOLUTION; PROVIDING FOR CONFLICTS; PROVIDING FOR SCRIVENER ERRORS, PROVIDING FOR SEVERABILITY; AND PROVIDING FOR AN EFFECTIVE DATE.**

- 9.6. Resolution No. R2025-05 Approving an Agreement with Info-Tech Research Group for Research and Advisory Services (Ricardo Castillo, Chief Information Officer)**

**A RESOLUTION OF THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA, APPROVING A PIGGYBACK CONTRACT BETWEEN THE CITY AND INFO-TECH RESEARCH GROUP, INC. FOR RESEARCH & ADVISORY SERVICES; IN AN ESTIMATED ANNUAL BUDGETED AMOUNT OF \$60,000.00; AUTHORIZING THE CITY MANAGER OR DESIGNEE TO DO ALL THINGS NECESSARY TO EFFECTUATE THIS RESOLUTION; PROVIDING FOR CONFLICTS; PROVIDING FOR SCRIVENER ERRORS; PROVIDING FOR SEVERABILITY; SUBJECT TO THE BUDGET APPROPRIATION AND AVAILABILITY OF FUNDS; AND PROVIDING FOR AN EFFECTIVE DATE.**

- 9.7. Resolution No. R2025-06 Approving an Agreement with MKI Services, Inc. to Purchase Sludge Pumps, Mixers and Replacement Parts for NMB Water Production (Hamid Nikvan, NMB Water Director)**

**A RESOLUTION OF THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA, APPROVING AND AUTHORIZING A PURCHASE ORDER WITH MKI SERVICES, INC FOR THE PURCHASE OF SLUDGE PUMPS, MIXERS AND REPLACEMENT PARTS SUBJECT TO ANNUAL BUDGET APPROPRIATION; AUTHORIZING THE CITY MANAGER OR DESIGNEE TO DO ALL THINGS NECESSARY TO EFFECTUATE THIS RESOLUTION; PROVIDING FOR CONFLICTS; PROVIDING FOR SCRIVENER ERRORS, PROVIDING FOR SEVERABILITY; AND PROVIDING FOR AN EFFECTIVE DATE.**

- 9.8. Resolution No. R2025-07 Approving an Agreement with Musco Sports Lighting LLC, for the Purchase and Install of Sports Lighting at Kevin R. Sims Aquatic Center (Andrew Plotkin, Assistant City Manager/Parks and Recreation Director)**

**A RESOLUTION OF THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA, APPROVING A PIGGYBACK CONTRACT BETWEEN THE CITY AND MUSCO SPORTS LIGHTING, LLC, FOR THE PURCHASE AND INSTALL OF SPORTS LIGHTING AT KEVIN R. SIMS AQUATIC CENTER; IN A BUDGETED AMOUNT OF \$125,000.00; AUTHORIZING THE CITY MANAGER OR DESIGNEE TO DO ALL THINGS NECESSARY TO EFFECTUATE THIS RESOLUTION; PROVIDING FOR CONFLICTS; PROVIDING FOR SCRIVENER ERRORS, PROVIDING FOR SEVERABILITY; AND PROVIDING FOR AN EFFECTIVE DATE.**

- 9.9. Resolution No. R2025-08 Approving an Agreement with Sun-Star Electric Inc., to Purchase Hitachi Submersible Motors and Replacement Parts for NMB Water Production (Hamid Nikvan, NMB Water Director)**

**A RESOLUTION OF THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA, APPROVING AND AUTHORIZING A PURCHASE ORDER WITH SUN-STAR ELECTRIC, INC FOR THE PURCHASE OF HITACHI SUBMERSIBLE MOTORS AND REPLACEMENT PARTS SUBJECT TO ANNUAL BUDGET APPROPRIATION; AUTHORIZING THE CITY MANAGER OR DESIGNEE TO DO ALL THINGS NECESSARY TO EFFECTUATE THIS RESOLUTION; PROVIDING FOR CONFLICTS; PROVIDING FOR SCRIVENER ERRORS, PROVIDING FOR SEVERABILITY; AND PROVIDING FOR AN EFFECTIVE DATE.**

- 9.10. Resolution No. R2025-09 Change Order for The Engineering Company, LLC for City Streetlight Repair Management, Upgrade Services and Development of City Traffic Calming Standards (Samuel Zamacona, Public Works Director)**

**A RESOLUTION OF THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA, APPROVING AND AUTHORIZING A CHANGE ORDER TO THE CONTRACT WITH THE ENGINEERING COMPANY, LLC FOR THE PURCHASE OF TRANSPORTATION PROJECT ENGINEERING SERVICES; INCREASING THE ESTIMATED ANNUAL EXPENDITURE BY \$50,000.00; AUTHORIZING THE CITY MANAGER OR DESIGNEE TO DO ALL THINGS NECESSARY TO EFFECTUATE THIS RESOLUTION; PROVIDING FOR CONFLICTS; PROVIDING FOR SCRIVENER ERRORS; PROVIDING FOR SEVERABILITY;**

**SUBJECT TO THE BUDGET APPROPRIATION AND AVAILABILITY OF FUNDS; AND PROVIDING FOR AN EFFECTIVE DATE.**

- 9.11. Resolution No. R2025-10 Change Order for Wright Express Financial Services Corporation D/B/A Wex Bank for Fuel Card Services (Juan Pinillos, Interim Chief of Police)**

**A RESOLUTION OF THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA, APPROVING AND AUTHORIZING A CHANGE ORDER TO THE CONTRACT WITH WRIGHT EXPRESS FINANCIAL SERVICES CORPORATION D/B/A WEX BANK, FOR FUEL CARD SERVICES; INCREASING THE CONTRACT AMOUNT BY \$30,000.00; AUTHORIZING THE CITY MANAGER OR DESIGNEE TO DO ALL THINGS NECESSARY TO EFFECTUATE THIS RESOLUTION; PROVIDING FOR CONFLICTS; PROVIDING FOR SCRIVENER ERRORS, PROVIDING FOR SEVERABILITY; AND SUBJECT TO THE BUDGET APPROPRIATION AND AVAILABILITY OF FUNDS; AND PROVIDING FOR AN EFFECTIVE DATE.**

- 9.12. Resolution No. R2025-11 Approving an Agreement with Florida Bullet, Inc. for the Sole Purchase of Ammunition (Juan Pinillos, Interim Chief of Police)**

**A RESOLUTION OF THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA, APPROVING AND AUTHORIZING A PURCHASE ORDER WITH FLORIDA BULLET, INC. FOR THE SOLE SOURCE PURCHASE OF AMMUNITION IN AN ESTIMATED BUDGETED AMOUNT OF \$110,000.00, AUTHORIZING THE CITY MANAGER OR DESIGNEE TO DO ALL THINGS NECESSARY TO EFFECTUATE THIS RESOLUTION; SUBJECT TO THE BUDGET APPROPRIATION AND AVAILABILITY OF FUNDS; PROVIDING FOR CONFLICTS; PROVIDING FOR SCRIVENER ERRORS, PROVIDING FOR SEVERABILITY; AND PROVIDING FOR AN EFFECTIVE DATE.**

- 9.13. Resolution No. R2025-12 Approving an Agreement with TriNova, Inc. for the Purchase of Pumps, Flow Meters, Pressure Sensors and Transmitters and more for NMB Water Production (Hamid Nikvan, NMB Water Director)**

**A RESOLUTION OF THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA, APPROVING AND AUTHORIZING A PURCHASE ORDERS WITH TRINOVA, INC FOR THE SOLE SOURCE PURCHASE OF PUMPS, PARTS, SPARES AND SERVICES SUBJECT TO ANNUAL BUDGET APPROPRIATION; AUTHORIZING THE CITY MANAGER OR DESIGNEE TO DO ALL THINGS NECESSARY TO EFFECTUATE**

**THIS RESOLUTION; PROVIDING FOR CONFLICTS; PROVIDING FOR SCRIVENER ERRORS, PROVIDING FOR SEVERABILITY; AND PROVIDING FOR AN EFFECTIVE DATE.**

- 9.14. Resolution No. R2025-13 Approving a Mutual Aid Agreement with Miami Dade County Association of Chiefs of Police (Juan Pinillos, Interim Chief of Police)**

**A RESOLUTION OF THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA, APPROVING THE MDCACP MUTUAL AID AGREEMENT BETWEEN THE SIGNATORY LAW ENFORCEMENT AGENCIES, INCLUDING THE CITY OF NORTH MIAMI BEACH, AND THE CONSTITUTIONAL SHERIFF'S OFFICE; AUTHORIZING THE CITY MANAGER OR DESIGNEE TO DO ALL THINGS NECESSARY TO EFFECTUATE THIS RESOLUTION; PROVIDING FOR CONFLICTS; PROVIDING FOR SCRIVENER ERRORS, PROVIDING FOR SEVERABILITY; AND PROVIDING FOR AN EFFECTIVE DATE.**

- 9.15. Resolution No. R2025-14 Change Order for Rechten International Trucks, Inc. for the Purchase of a Trash Dump Truck (Samuel Zamacona, Public Works Director)**

**A RESOLUTION OF THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA, APPROVING AND AUTHORIZING A CHANGE ORDER TO THE CONTRACT WITH RECHTIEN INTERNATIONAL TRUCKS, INC. FOR THE PURCHASE OF A 22 FT TRASH DUMP TRUCK; INCREASING THE ESTIMATED EXPENDITURE BY \$142,115; AUTHORIZING THE CITY MANAGER OR DESIGNEE TO DO ALL THINGS NECESSARY TO EFFECTUATE THIS RESOLUTION; PROVIDING FOR CONFLICTS; PROVIDING FOR SCRIVENER ERRORS; PROVIDING FOR SEVERABILITY; SUBJECT TO THE BUDGET APPROPRIATION AND AVAILABILITY OF FUNDS; AND PROVIDING FOR AN EFFECTIVE DATE.**

- 9.16. Resolution No. R2025-15 Accepting the Request to Amend the Second Amendment to the Development Agreement for the Soleste Project aka North Miami Beach Village located at 16375 Biscayne Boulevard (Zafar Ahmed, Community Development Director)**

**A RESOLUTION OF THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA, ACCEPTING THE REQUEST FROM THE DEVELOPER TO AMEND THE SECOND AMENDMENT TO THE DEVELOPMENT AGREEMENT BY REPLACING EXISTING EXHIBIT "K" WITH EXHIBIT "1," INDICATING THE ALTERNATE REVISED SIGN EASMENT LOCATION FOR THE MONUMENT SIGN FOR THE SOLESTE PROJECT (AKA NORTH MIAMI BEACH VILLAGE); PROVIDING**

**FOR IMPLEMENTATION; AND PROVIDING FOR AN EFFECTIVE DATE.**  
**9.17. Resolution No. R2025-16 Supporting the 2025 Florida League of Cities Legislative Platform (Commissioner Fortuna Smukler)**

**A RESOLUTION OF THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA, URGING MEMBERS OF THE FLORIDA LEGISLATURE TO SUPPORT THE 2025 FLORIDA LEAGUE OF CITIES' LEGISLATIVE PLATFORM; AUTHORIZING THE CITY MANAGER OR DESIGNEE TO DO ALL THINGS NECESSARY TO EFFECTUATE THIS RESOLUTION; PROVIDING FOR CONFLICTS; PROVIDING FOR SCRIVENER ERRORS, PROVIDING FOR SEVERABILITY; AND PROVIDING FOR AN EFFECTIVE DATE.**

**10. QUASI-JUDICIAL LEGISLATION - None**

**11. LEGISLATION**

**11.1. Ordinance No. 2024-15 (Second Reading) Permanent Irrigation Ordinance (Sam Zamacona, Public Works Director)**

**AN ORDINANCE OF THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA, AMENDING THE CODE OF ORDINANCES OF THE CITY OF NORTH MIAMI BEACH, FLORIDA 2008, AMENDING CHAPTER XIX ENTITLED "WATER AND SEWERS" AMENDING ARTICLE II "WATER", SECTION 19-24 "EMERGENCY WATER CONSERVATION RATES", REMOVING THE SURCHARGE FOR WATER USAGE BASED ON CUSTOMER TYPE; ADDING LANGUAGE THAT PROVIDES UNIFORM STANDARDS FOR WATER SHORTAGE EMERGENCIES, ENFORCEMENT ACTION, AND PENALTIES; AMENDING ARTICLE II "WATER", INCLUDING SECTION 19-25 "IRRIGATION", PROVIDING FOR SPECIFIC DEFINITIONS AND PERMANENT, YEAR-ROUND IRRIGATION REQUIREMENTS; PROVIDING FOR UNIFORM STANDARDS FOR IRRIGATION PRACTICES; AND PROVIDING FOR APPLICABLE VARIANCES, ENFORCEMENT ACTION, AND PENALTIES; AMENDING CHAPTER XXIV ENTITLED "ZONING AND LAND DEVELOPMENT" AMENDING ARTICLE XI "LANDSCAPE ORDINANCE", PROVIDING FOR SPECIFIC DEFINITIONS AND REQUIREMENTS; PROVIDING FOR UNIFORM STANDARDS FOR LANDSCAPING DESIGN, APPLICATION, INSTALLATION, AND MAINTENANCE PROCESSES; PROVIDING FOR CONCISE LANGUAGE THROUGHOUT THE ORDINANCE; PROVIDING FOR REFERENCE TO CURRENT REFERENCE LITERATURE AND MANUALS; ESTABLISHING TRAINING REQUIREMENTS FOR COMMERCIAL FERTILIZER APPLICATORS; REMOVING LANGUAGE RELATING TO XERISCAPING; AND ADDING**

**SECTION 124-126 WHICH DEFINES THE REQUIREMENTS FOR A SITE SURVEY AND ASSESSMENT.**

**11.2.Resolution No. R2025-17 Ordering an End to Fluoridation of the City of North Miami Beach's Water (Vice Mayor Lynn Su)**

**A RESOLUTION OF THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA, ORDERING AN END TO FLUORIDATION OF THE CITY OF NORTH MIAMI BEACH'S WATER; AUTHORIZING THE CITY MANAGER OR DESIGNEE TO DO ALL THINGS NECESSARY TO EFFECTUATE THIS RESOLUTION; PROVIDING FOR CONFLICTS; PROVIDING FOR SCRIVENER ERRORS, PROVIDING FOR SEVERABILITY; AND PROVIDING FOR AN EFFECTIVE DATE.**

**11.3.Resolution No. R2025-18 Approving Task Order for Chen Moore and Associates for Engineering Services for Design of Traffic Calming Projects (Samuel Zamacona, Public Works Director)**

**A RESOLUTION OF THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA, APPROVING MULTIPLE TASK ORDERS FOR PROFESSIONAL ENGINEERING SERVICES FOR THE STUDY & DESIGN OF TRAFFIC CALMING PROJECTS IN AN ESTIMATED AMOUNT OF \$470,455.00, WITH CHEN MOORE AND ASSOCIATES UNDER THE "CONTINUING SERVICES AGREEMENT" FOR PROFESSIONAL CONSULTING SERVICES; AND AUTHORIZING THE CITY MANAGER OR DESIGNEE TO DO ALL THINGS NECESSARY TO EFFECTUATE THIS RESOLUTION; PROVIDING FOR CONFLICTS; AND SUBJECT TO THE BUDGET APPROPRIATION AND AVAILABILITY OF FUNDS; AND PROVIDING FOR AN EFFECTIVE DATE.**

**11.4.Resolution No. R2025-19 Approving Firms Responding to Request for Qualifications RFQ-24-026-SG Recreational Complex Redevelopment Project Phase One (Shereece George Depusoir, Chief Procurement Officer)**

**A RESOLUTION OF THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA, APPROVING THE QUALIFIED SHORTLISTED FIRMS THAT RESPONDED TO REQUEST FOR QUALIFICATIONS RFQ-24-026-SG RECREATIONAL COMPLEX REDEVELOPMENT PROJECT PHASE ONE: DEVELOPER PRE-QUALIFICATION; AND APPROVING THEIR EXCLUSIVE PARTICIPATION IN PHASE TWO OF THE PROJECT.**

**11.5.Resolution No. R2025-20 Approving the Transfer of the Singer Building to the North Miami Beach Community Redevelopment Agency (Adam Old, CRA Executive Director)**

**A RESOLUTION OF THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA, AUTHORIZING THE CITY MANAGER AND CITY ATTORNEY TO NEGOTIATE AND FINALIZE AN INTERLOCAL AGREEMENT PURSUANT TO SECTION 163.01, FLORIDA STATUTES, WITH THE NORTH MIAMI BEACH CRA FOR THE TRANSFER OF THE PROPERTY LOCATED AT 16501 N.E. 15TH AVENUE, NORTH MIAMI BEACH KNOWN AS THE SINGER BUILDING FOR AN AMOUNT NOT TO EXCEED \$1,135,028 AND A PERPETUAL PARKING EASEMENT OR SIMILAR ACCESS TO 25 PARKING SPACES FOR AN AMOUNT NOT TO EXCEED \$23,000 PER PARKING SPACE ON THE ADJACENT CITY-OWNED PARKING LOT; AUTHORIZING THE CITY MANAGER TO EXECUTE THE INTERLOCAL AGREEMENT AND PERPETUAL PARKING EASEMENT WITH THE NMBBCRA; AUTHORIZING THE CITY MANAGER TO TAKE ALL ACTION NECESSARY TO IMPLEMENT THE TERMS OF THE INTERLOCAL AGREEMENT AND PERPETUAL PARKING EASEMENT WITH THE NMBBCRA; AUTHORIZING THE CITY MANAGER OR DESIGNEE TO DO ALL THINGS NECESSARY TO EFFECTUATE THIS RESOLUTION; PROVIDING FOR CONFLICTS; PROVIDING FOR SCRIVENER ERRORS, PROVIDING FOR SEVERABILITY; AND PROVIDING FOR AN EFFECTIVE DATE.**

**12. BUSINESS TAX RECEIPTS - None**

**13. APPOINTMENTS**

**13.1.Reappointing Geraldine Lazarre to the Economic Development Commission (Andrise Bernard, MMC, City Clerk)**

**13.2.Appointing Whitney Padote to the Redevelopment Advisory Board (Andrise Bernard, MMC, City Clerk)  
Nominated by Vice Mayor Lynn Su**

**13.3.Appointing Patricia Miller to the Commission on Aging / Senior Citizens Advisory Board (Andrise Bernard, MMC, City Clerk)**

**13.4.Appointing Ketley Joachim to the Beautification Committee (Andrise Bernard, MMC, City Clerk)**

**13.5.Appointing Whitney Padote to the Public Utilities Commission (Andrise Bernard, MMC, City Clerk)  
Nominated by Vice Mayor Lynn Su**

**13.6.Appointing Ruth Ogen to the Planning and Zoning Board (Andrise Bernard, MMC, City Clerk)  
Nominated by Vice Mayor Lynn Su**

**13.7.Appointing Phyllis Poulos to the Code Enforcement Board**



**(Andrise Bernard, MMC, City Clerk)**  
Nominated by Vice Mayor Lynn Su

**13.8.Appointing Bruce Lamberto to the Eastern Shores Security Guard  
Special Taxing District (Andrise Bernard, MMC. City Clerk)**

**14. MISCELLANEOUS ITEMS - None**

**15. DISCUSSION ITEMS**

**15.1.Trolley (Commissioner Phyllis Smith)**

**16. CITY MANAGER'S REPORT**

**16.1.Miami Gardens v. North Miami Beach - Weekly Settlement Claims  
Administration Progress Update (December 2024)**

**16.2.NMBPD Monthly Report (December 2024)**

**16.3.NMB Water Updates & Highlights (December 2024)**

**16.4.Washington Park Update**

**16.5.Capital Improvement Program (CIP) Portfolio Dashboard**

**17. CITY ATTORNEY'S REPORT- None**

**18. CITY COMMISSION REPORTS**

**19. MAYOR'S DISCUSSION**

**20. NEXT REGULAR CITY COMMISSION MEETING**

**Tuesday, February 18, 2025**

**21. ADJOURNMENT**



**Presentations  
5.1.**

City of North Miami Beach  
17011 NE 19 Avenue  
North Miami Beach, FL 33162  
305-947-7581  
www.citynmb.com

**MEMORANDUM**

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<b>TO:</b>	Mayor and City Commission
<b>FROM:</b>	
<b>VIA:</b>	
<b>DATE:</b>	January 21, 2025

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**RE:** Legislative Priorities (Ronald L. Book and Rana Brown, Office of Ronald L Book, P.A)

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**Description**

**BACKGROUND**

**ANALYSIS:**

**RECOMMENDATION:**

**FISCAL/ BUDGETARY**

**IMPACT:**


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**ATTACHMENTS:**

Description

- ▣ Legislative Updates Presentation

# 2025 FLORIDA LEGISLATIVE APPROPRIATIONS REQUEST



Mario Díaz, MPA  
City Manager

Ronald L. Book  
Rana Brown  
Ronald L. Book, P.A.

Tuesday, January 21, 2025



# Discussion with Ronald L. Book, P.A.

# 2024 Florida Legislative Appropriations Request

## APPROPRIATED

### Emergency Generator Replacement for Water Treatment Facility

- Requested: \$250,000.00
- Appropriated: \$125,000.00

## VETOED

### Emergency Response Technology Upgrades Project Phase 1

- Requested: \$431,500.00

### Solving Cold Case - Investigate & Solving Cold Cases using DNA

- Requested: \$125,000.00

### Traffic Calming Projects

- Requested: \$1,400,000.00

# 2025 Florida Legislative Funding Request

# Police Marine Vessel

**Priority  
Public Safety**

- Total Project Cost:**  
\$600,000.00
- Requested:** \$300,000.00;  
Match 50%
- Match Funding Source:**  
Florida Inland Navigation  
District

## REQUEST SUMMARY

The Marine Patrol Unit ensures public safety, enforces maritime laws, and responds to emergencies on our waterways. However, the current vessel no longer meets operational demands. A new vessel will enhance emergency response, law enforcement, and community safety while reducing maintenance costs. We plan to apply for a 50% match grant in January 2025 to offset costs, making this a vital investment in our community's safety and security.

## SPECIFIC TO NORTH MIAMI BEACH

North Miami Beach's unique waterways, high boating traffic, and storm vulnerabilities require a specialized marine patrol vessel. A new vessel, capable of handling seas up to 8-9 feet and accommodating 12-15 occupants, will support law enforcement, emergency evacuations, and multi-agency operations, addressing the City's specific challenges and ensuring safety in our vibrant waterfront community.

# Public Safety Technology Upgrade Phase 1

**Priority  
Public Safety**

- Total Project Cost:**  
\$600,000.00
- Requested:** \$300,000.00;  
Match 50%
- Match Funding Source:** FY  
25-26 CIP Budget Request  
and Federal Appropriations  
Request

## REQUEST SUMMARY

The funding request is for a Public Safety Technology Upgrade to enhance public safety, emergency response, and proactive policing. Phase 1 will involve the buildout of the center and the integration of advanced technologies, such as public safety cameras, license plate readers, gunshot detection systems, and predictive analytics. The center will centralize data from 911 calls, CAD systems, and other sources, enabling faster response times, higher crime resolution rates, and improved officer safety.

## SPECIFIC TO NORTH MIAMI BEACH

The Public Safety Technology Upgrade will transform public safety in North Miami Beach by reducing response times, improving crime prevention, and streamlining resource deployment. Its advanced tools and real-time situational awareness will enable data-driven decision-making and stronger interagency collaboration during critical



# Traffic Calming Projects

Priority  
Public Safety

- ❑ **Total Project Cost:**  
\$1,600,000.00
- ❑ **Requested:** \$800,000.00;  
Match 50%
- ❑ **Match Funding Source:**  
Local Transportation and  
Transit Taxes

## REQUEST SUMMARY

This project involves permitting, and construction of traffic calming measures in areas with high incidences of accidents and speeding within the City of North Miami Beach. The initiative aims to enhance public safety by implementing engineered solutions such as speed humps, roundabouts, and enhanced signage to reduce vehicular speeds and improve pedestrian safety.

## SPECIFIC TO NORTH MIAMI BEACH

The City of North Miami Beach will undertake the design and permitting of traffic calming solutions for identified high-risk areas. Licensed General Contractors will execute the construction of these traffic calming measures, directly contributing to improved safety and quality of life for residents and visitors.

# Sewer Lines Inflow & Infiltration Correction Phase 1

Priority  
Environmental

- ❑ **Total Project Cost:**  
\$600,000.00
- ❑ **Amount Requested:**  
\$300,000.00; Match 50%
- ❑ **Match Funding Source:** FY  
25-26 CIP Budget Request

## REQUEST SUMMARY

Funds requested will rehabilitate 4 miles of cracked and broken clay pipes, part of the remaining 50 miles in the city's wastewater system, which currently leak raw sewage into the groundwater. This project will improve community health and environmental quality by reducing sewage leaks, preventing raw sewage from surfacing through manholes and lift stations, and enhancing surface water quality, all contributing to a cleaner, safer environment for residents.

## SPECIFIC TO NORTH MIAMI BEACH

The project will benefit North Miami Beach by reducing sewage overflows and their mixing with floodwaters, thereby improving groundwater and surface water quality. This will enhance public health by minimizing waterborne disease risks, protect local ecosystems by preserving fish and wildlife habitats, and reduce infrastructure strain through decreased pump run times at lift stations.



**Consent Agenda  
9.1.**

City of North Miami Beach  
17011 NE 19 Avenue  
North Miami Beach, FL 33162  
305-947-7581  
www.citynmb.com

**MEMORANDUM**

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<b>TO:</b>	Mayor and City Commission
<b>FROM:</b>	
<b>VIA:</b>	
<b>DATE:</b>	January 21, 2025

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**RE:** Regular Commission Meeting Minutes of December 17, 2024 (Andrise Bernard, MMC, City Clerk)

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**Description**

**BACKGROUND**

**ANALYSIS:**

**RECOMMENDATION:**

**FISCAL/ BUDGETARY**

**IMPACT:**

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**ATTACHMENTS:**

Description

- Regular City Commission Meeting Minutes of December 17, 2024
- Attachment



**CITY OF NORTH MIAMI BEACH**  
City Hall, Commission Chambers, 2<sup>nd</sup> Floor  
17011 N.E. 19th Avenue  
North Miami Beach, FL. 33162  
**Tuesday, December 17, 2024**

Mayor Michael Joseph  
Vice Mayor Phyllis S. Smith  
Commissioner Jay Chernoff  
Commissioner McKenzie Fleurimond  
Commissioner Daniela Jean  
Commissioner Fortuna Smukler  
Commissioner Lynn Su

City Manager Mario A. Diaz  
City Attorney Greenspoon Marder  
City Clerk Andrise Bernard, MMC

**City Commission Meeting Minutes**

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**ROLL CALL OF THE CITY OFFICIALS**

The Regular Commission Meeting was called to order at 6:02pm.

Present at the meeting were Mayor Michael Joseph, Vice Mayor Phyllis Smith, Commissioner Jay Chernoff, Commissioner McKenzie Fleurimond, Commissioner Daniela Jean, Commissioner Fortuna Smukler, and Commissioner Lynn Su.

**INVOCATION** by Pastor Dwayne Fudge of New St. Mary's Missionary Baptist Church.

**PLEDGE OF ALLEGIANCE** was led by the Mayor and Commission.

The Mayor and Commission recognized the recent passing of Sandra Douglas, James Campbell, and former North Miami Beach Mayor Jeff Mishcon.

**REQUESTS FOR WITHDRAWALS, DEFERMENTS AND ADDITIONS TO THE AGENDA**

City Clerk Andrise Bernard announced the following:

- Per the request of Vice Mayor Smith, a presentation regarding the MOCA partnership will be added.
- Per the request of Vice Mayor Smith, Resolution R2024-136 will be deferred.
- Per the request of Mayor Joseph, Resolution R2024-137 will be deferred.
- Per the request of the City Manager's Office, an item regarding the FDOT Public Transportation Development Program will be added to legislation as Resolution R2024-139.
- Per the request of Commissioner Su, a discussion regarding CRA Transportation will be added.

**Motion to approve** the agenda made by Vice mayor Smith, seconded by Commissioner Chernoff.  
Voice Vote: **MOTION PASSED 7-0.**

## **PRESENTATIONS/DISCUSSIONS**

Senior Policy and Legislative Strategist Oliver Telusma represented Miami-Dade County Commissioner Marleine Bastien and provided updates regarding District 2.

Executive Director of the Museum of Contemporary Art (MOCA) Chana Sheldon and Chairman Rudolph Moise discussed a partnership between the City of North Miami Beach and MOCA.

A Solid Waste Collection and Recycling Insource study was provided on behalf of Hill International.

Interim Chief of Police Juan Pinillos presented an overview and highlights of the North Miami Beach Police Department and discussed vehicles, equipment, technology, training, recruitment and hiring, crime statistics, arrests and citations, and key priorities.

City Manager Mario Diaz introduced Chief Financial Officer Tarik Rahmani and Utilities Director Hamid Nikvan.

Commissioner Fleurimond recognized Jean Monestime, Karen Andre, and Farah Juste for attending the meeting.

Mayor Joseph opened the meeting for **PUBLIC COMMENT**.

City Clerk Andrise Bernard read the rules of public comment and the pledge of civility into the record.

The following person(s) made comments on the record:

1. Stacy Roskin
2. Mireille Edouard
3. Ketley Joachim
4. Jeb Handwerger
5. Janice Coakley
6. Barbara Kramer
7. Bruce Lamberto
8. Karen Andre
9. Melissa Winchester
10. Mubarak Kazan
11. Roland Jerome
- 12.

The meeting was closed for **PUBLIC COMMENT**.

## **ANNOUNCEMENTS**

Communications Manager Jennifer Torna announced an upcoming Economic Development Commission kick-off meeting, Farm Share food distribution event, senior luncheon, menorah

lighting ceremony, and Hanukkah, Kwanzaa, New Year's Eve, Lego, and Martin Luther King Jr. events at the library.

### **CITY COMMISSION REPORTS**

**Commissioner Chernoff** congratulated the newly elected and re-elected members of the Commission, expressed condolences regarding former Mayor Jeff Mishcon, discussed septic to sewer conversions, praised the Snow Fest event, wished happy holidays, and expressed condolences regarding Sandra Douglas and James Campbell.

**Commissioner Jean** congratulated the newly elected and re-elected members of the Commission, wished happy holidays, thanked staff for the citywide events, expressed condolences to the Mishcon, Douglas, and Campbell families, and requested updates regarding City projects.

**Commissioner Fleurimond** expressed condolences to the Mishcon, Douglas, and Campbell families and congratulated the newly elected and re-elected members of the Commission.

**Commissioner Smukler** expressed condolences to the Mishcon, Douglas, and Campbell families, congratulated the newly elected and re-elected members of the Commission, praised the Snow Fest event, thanked all for reaching out following her incident/injury, and wished happy holidays.

**Commissioner Su** expressed condolences to the Mishcon, Douglas, and Campbell families, congratulated the newly elected and re-elected members of the Commission, praised the swearing-in ceremony and Snow Fest event, discussed her commitment to be in contact and communicate with residents, and wished happy holidays.

**Vice Mayor Smith** expressed condolences to the Mishcon, Douglas, and Campbell families, discussed the senior luncheon, praised employees Andrew Plotkin, Ian Fors, and Edenia Hernandez, recognized Winnie regarding her 200<sup>th</sup> radio show, talked about the Eastern Shores homeowner's association meeting, congratulated the newly elected and re-elected members of the Commission, praised the Snow Fest event and turkey giveaway, and wished happy holidays.

**Mayor Joseph** congratulated the newly elected and re-elected members of the Commission, discussed having Sunshine meetings with his colleagues, expressed condolences to the Mishcon, Douglas, and Campbell families, and wished happy holidays.

### **CONSENT AGENDA**

**Commission Conference Minutes of October 15, 2024**

**Regular Commission Meeting Minutes of October 15, 2024**

**Special Commission Meeting Minutes of November 7, 2024**

**Special Commission Meeting Minutes of November 26, 2024**

**Resolution R2024-127 Approving a Task Order for Engineering Services With Corollo Engineers for the Norwood Oeffler Water Treatment Plant Corrosion Control Study Compliance Assessment (Hamid Nikvan, NMB Water Director)**

A RESOLUTION OF THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA, APPROVING A TASK ORDER FOR ENGINEERING SERVICES FOR THE NORWOOD OEFFLER WATER TREATMENT PLANT CORROSION CONTROL STUDY COMPLIANCE ASSESSMENT TASK ORDER NO. 1, IN AN ESTIMATED AMOUNT OF \$358,220.00, UNDER THE “CONTINUING SERVICES AGREEMENT” WITH CAROLLO ENGINEERS, INC. FOR PROFESSIONAL CONSULTING SERVICES; AND AUTHORIZING THE CITY MANAGER OR DESIGNEE TO DO ALL THINGS NECESSARY TO EFFECTUATE THIS RESOLUTION; PROVIDING FOR CONFLICTS; PROVIDING FOR SCRIVENER ERRORS, PROVIDING FOR SEVERABILITY; SUBJECT TO BUDGET APPROPRIATION AND AVAILABILITY OF FUNDS; AND PROVIDING FOR AN EFFECTIVE DATE.

**Resolution R2024-128 Approving Federal Justice Law Enforcement Trust Fund (Fund 172) Request (Juan Pinillos, Interim Chief of Police)**

A RESOLUTION OF THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA, APPROVING FEDERAL JUSTICE LAW ENFORCEMENT TRUST FUND (FUND 172) REQUEST; PROVIDING FOR CONFLICTS; PROVIDING FOR SCRIVENER ERRORS, PROVIDING FOR SEVERABILITY; AND PROVIDING FOR AN EFFECTIVE DATE.

**Resolution R2024-129 ROK Technologies Purchase Agreement for Geographic Information System (GIS) Hosting Services (Ricardo Castillo, Chief Information Officer)**

A RESOLUTION OF THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA, APPROVING AN AGREEMENT BETWEEN THE CITY AND ROK TECHNOLOGIES, LLC. FOR A CLOUD BASED GIS (GEOGRAPHIC INFORMATION SYSTEM) HOSTING SERVICES; AND AUTHORIZING THE CITY MANAGER OR DESIGNEE TO DO ALL THINGS NECESSARY TO EFFECTUATE THIS RESOLUTION; PROVIDING FOR CONFLICTS; PROVIDING FOR SCRIVENER ERRORS, PROVIDING FOR SEVERABILITY; SUBJECT TO BUDGET APPROPRIATION AND AVAILABILITY OF FUNDS; AND PROVIDING FOR AN EFFECTIVE DATE.

**Resolution R2024-130 LSTA Grant Approval (Edenia Hernandez, Library Director)**

A RESOLUTION OF THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA, ACCEPTING THE LIBRARY SERVICES AND TECHNOLOGY ACT (LSTA) GRANT AND CONSENT STATE AID GRANT; PROVIDING FOR CONFLICTS; PROVIDING FOR SCRIVENER ERRORS, PROVIDING FOR SEVERABILITY; AND PROVIDING FOR AN EFFECTIVE DATE.

**Motion to approve** the Consent Agenda made by Commissioner Chernoff, seconded by Vice Mayor Smith.

Voice Vote: **MOTION PASSED 7-0.**

## QUASI-JUDICIAL

### Resolution R2024-131 Central Subdivision (Aura) Final Plat (Zafar Ahmed, Community Development Director)

A RESOLUTION OF THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA, APPROVING/DENYING THE PROPOSED FINAL PLAT ENTITLED "CENTRAL SUBDIVISION", THE SAME BEING A REPLAT OF LOTS ONE (1) THRU TWELVE (12), INCLUSIVE, BLOCK 5 AND TRACT "B", AND A SUBDIVISION OF A PORTION OF TRACT "A" GREYNOLDS PARK GARDENS, PLAT BOOK 55, PAGE 57, TOGETHER WITH THAT PORTION OF THE 20 FOOT PUBLIC ALLEY WITHIN THE LIMITS OF SAID PLAT (AS FURTHER DESCRIBED IN THE ATTACHED EXHIBIT "A") FOR THE PARCELS LOCATED AT 16955 – 17071 WEST DIXIE HIGHWAY, AND SPECIFICALLY IDENTIFIED BY MIAMI-DADE FOLIO NUMBERS 07-2209-002-0010, 07-2209-002-0060, 07-2209-002-0090, 07-2209-002-0120, AND 07-2209-002-0130 AND IN ACCORDANCE WITH CHAPTER XXIV, ARTICLE XV, SECTION 24-178 OF THE CITY OF NORTH MIAMI BEACH CODE OF ORDINANCES, LAND DEVELOPMENT REGULATIONS, CHAPTER 28, SECTION 28-8 OF THE MIAMI-DADE COUNTY CODE OF ORDINANCES, AND CHAPTER 177, PART I, SECTIONS 177.071 THROUGH 177.091, FLORIDA STATUTES; PROVIDING FOR FINDINGS OF FACT; CONFIRMING EXPIRATION AND LIMITATION OF APPROVAL; PROVIDING FOR CONFLICTS; AND PROVIDING FOR AN EFFECTIVE DATE.

City Clerk Andrise Bernard announced that the subject matter of any ex-parte communication together with the identity of the person, group, or entity making the communication shall be disclosed and made part of the record on file prior to final action on the matter and stated that she received a Jennings Disclosure form from Commissioner Jean and Commissioner Su.

Commissioner Chernoff, Commissioner Fleurimond, Commissioner Smukler, Vice Mayor Smith, and Mayor Joseph disclosed the names of the individuals (if any) that they communicated with regarding the item and confirmed that they can make a decision based on the information presented at the meeting.

City Clerk Andrise Bernard asked anyone who will be providing testimony regarding the item to raise their right hand and be sworn in.

Director of Community Development Zafar Ahmed provided an explanation regarding the proposed resolution and Vanessa Madrid appeared on behalf of the applicant/developer and presented additional information.

Motion to approve Resolution R2024-131 made by Commissioner Fleurimond, seconded by Vice Mayor Smith.

Roll Call Vote: Chernoff - **Yes**, Fleurimond - **Yes**, Jean - **Yes**, Smukler - **Yes**, Su - **Yes**, Smith - **Yes**, Joseph - **Yes**

**MOTION PASSED 7-0.**



## **LEGISLATION**

### **Ordinance No. 2024-15 (First Reading) Permanent Irrigation Ordinance (Sam Zamacona, Public Works Director)**

AN ORDINANCE OF THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA, AMENDING THE CODE OF ORDINANCES OF THE CITY OF NORTH MIAMI BEACH, FLORIDA 2008, AMENDING CHAPTER XIX ENTITLED “WATER AND SEWERS” AMENDING ARTICLE II “WATER”, SECTION 19-24 “EMERGENCY WATER CONSERVATION RATES”, REMOVING THE SURCHARGE FOR WATER USAGE BASED ON CUSTOMER TYPE; ADDING LANGUAGE THAT PROVIDES UNIFORM STANDARDS FOR WATER SHORTAGE EMERGENCIES, ENFORCEMENT ACTION, AND PENALTIES; AMENDING ARTICLE II “WATER”, INCLUDING SECTION 19-25 “IRRIGATION”, PROVIDING FOR SPECIFIC DEFINITIONS AND PERMANENT, YEAR-ROUND IRRIGATION REQUIREMENTS; PROVIDING FOR UNIFORM STANDARDS FOR IRRIGATION PRACTICES; AND PROVIDING FOR APPLICABLE VARIANCES, ENFORCEMENT ACTION, AND PENALTIES; AMENDING CHAPTER XXIV ENTITLED “ZONING AND LAND DEVELOPMENT” AMENDING ARTICLE XI “LANDSCAPE ORDINANCE”, PROVIDING FOR SPECIFIC DEFINITIONS AND REQUIREMENTS; PROVIDING FOR UNIFORM STANDARDS FOR LANDSCAPING DESIGN, APPLICATION, INSTALLATION, AND MAINTENANCE PROCESSES; PROVIDING FOR CONCISE LANGUAGE THROUGHOUT THE ORDINANCE; PROVIDING FOR REFERENCE TO CURRENT REFERENCE LITERATURE AND MANUALS; ESTABLISHING TRAINING REQUIREMENTS FOR COMMERCIAL FERTILIZER APPLICATORS; REMOVING LANGUAGE RELATING TO XERISCAPING; AND ADDING SECTION 124-126 WHICH DEFINES THE REQUIREMENTS FOR A SITE SURVEY AND ASSESSMENT.

Director of Public Works Sam Zamacona provided an explanation regarding the proposed ordinance.

**Motion to amend** Ordinance No. 2024-15 to include language notifying the public about regulations and restrictions made by Vice Mayor Smith, seconded by Commissioner Smukler.

**MOTION PASSED 7-0.**

**Motion to approve** Ordinance No. 2024-15 on first reading made by Vice Mayor Smith, seconded by Commissioner Smukler.

Roll Call Vote: Fleurimond - **Yes**, Jean - **Yes**, Smukler - **Yes**, Su - **Yes**, Chernoff - **Yes**, Smith - **Yes**, Joseph - **Yes**

**MOTION PASSED 7-0.**

### **Ordinance No. 2024-16 (First Reading) Abandonment and Vacation Right of Ways and Easements (Zafar Ahmed, Community Development Director)**

AN ORDINANCE OF THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA, AMENDING THE CITY OF NORTH MIAMI BEACH CODE BY AMENDING CHAPTER XVII, ENTITLED “STREETS AND SIDEWALKS,” BY CREATING A NEW SECTION, SECTION 17-7 ENTITLED “ABANDONMENT AND VACATION OF

RIGHT OF WAYS AND EASEMENTS”; TO PROVIDE A UNIFORM PROCEDURE FOR ABANDONMENTS AND VACATIONS OF CITY STREETS, ALLEYS, EASEMENTS, AND OTHER FEE OR NON-FEE PROPERTY INTEREST OF SIMILAR CHARACTER; PROVIDING FOR CODIFICATION, CONFLICTS, SCRIVENER’S ERRORS, SEVERABILITY; AND PROVIDING FOR AN EFFECTIVE DATE.

Director of Community Development Zafar Ahmed provided an explanation regarding the proposed ordinance.

Vice Mayor Smith suggested amendments regarding appraisal costs, a time limit to purchase the property, and segments of the property being continuous.

**Motion to approve** Ordinance No. 2024-16 on first reading by title only made by Vice Mayor Smith, seconded by Commissioner Smukler.

Roll Call Vote: Jean - **Yes**, Smukler - **Yes**, Su - **No**, Chernoff - **Yes**, Fleurimond - **Yes**, Smith - **Yes**, Joseph - **Yes**

**MOTION PASSED 6-1** with Commissioner Su opposed.

**Resolution R2024-119 Approve City Events, Fee Waiver, and Facility Usage Policy (Phyllis Smith, Vice Mayor)**

A RESOLUTION OF THE CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA, ADOPTING THE CITY EVENTS, FEE WAIVER, AND FACILITY USAGE POLICY; PROVIDING FOR CONFLICTS, SEVERABILITY, AND AN EFFECTIVE DATE.

Vice Mayor Smith introduced the proposed resolution and the Mayor and Commission discussed the item.

**Motion to approve** to remove 501(c)(6) organizations from the resolution made by Vice Mayor Smith, seconded by Mayor Joseph.

**MOTION PASSED 5-2** with Commissioner Chernoff and Commissioner Jean opposed.

**Motion to approve** the Mayor and each Commissioner to organize and sponsor up to 4 community scale events per fiscal year without seeking formal Commission approval made by Commissioner Fleurimond, seconded by Mayor Joseph.

**MOTION FAILED 3-4** with Vice Mayor Smith, Commissioner Chernoff, Commissioner Smukler, and Commissioner Su opposed.

**Motion to approve** the Mayor and each Commissioner to organize and sponsor up to 3 community scale events per fiscal year without seeking formal Commission approval made by Commissioner Fleurimond, seconded by Mayor Joseph.

**MOTION PASSED 6-1** with Commissioner Jean opposed.

**Motion to approve** Resolution R2024-119 as amended made by Commissioner Fleurimond, seconded by Vice Mayor Smith.

**MOTION PASSED 6-1** with Commissioner Jean opposed.

**Resolution R2024-120 Approve Coastal Waste and Recycling of Florida Contractual Obligation Donation Allocations (Marline Monestime, Chief of Staff)**

A RESOLUTION OF THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA, APPROVING ADDITIONAL CONTRACTOR OBLIGATIONS OF THE AGREEMENT BETWEEN THE CITY OF NORTH MIAMI BEACH AND COASTAL WASTE & RECYCLING OF FLORIDA; PROVIDING FOR CONFLICTS; PROVIDING FOR SCRIVENER'S ERRORS, PROVIDING FOR SEVERABILITY; AND PROVIDING FOR AN EFFECTIVE DATE.

Chief of Staff Marline Monestime provided an explanation about the proposed resolution regarding a \$50,000 allocation for rental and utility assistance and a \$60,000 allocation for scholarships and community initiatives.

**Motion to approve** to change the language from 'income 120% of AMI' to 'income 100% of AMI' made by Commissioner Su, seconded by Vice Mayor Smith.

**MOTION PASSED 7-0.**

**Motion to approve** to change the language from 'General Scholarship Fund' to 'Mayor Jeffrey A. Mishcon Scholarship Fund' made by Commissioner Smukler, seconded by Mayor Joseph.

**MOTION PASSED 7-0.**

**Motion to approve** to allocate \$15,000 from the community initiatives fund specifically towards the senior citizen program made by Vice Mayor Smith, seconded by Commissioner Fleurimond.

**MOTION FAILED 3-4** with Commissioner Chernoff, Commissioner Jean, Commissioner Smukler, and Commissioner Su opposed.

**Motion to approve** to allocate \$10,000 from the community initiatives fund specifically towards the senior citizen program made by Vice Mayor Smith, seconded by Commissioner Chernoff.

**MOTION PASSED 7-0.**

**Motion to approve** to add language regarding the requirement of non-resident police cadets receiving scholarship funds to stay for three years made by Commissioner Smukler, seconded by Vice Mayor Smith.

**MOTION PASSED 7-0.**

**Motion to approve** Resolution R2024-120 as amended made by Commissioner Fleurimond, seconded by Vice Mayor Smith.

**MOTION PASSED 7-0.**

**Resolution R2024-124 External Audit Services (Tarik Rahmani, Chief Financial Officer)**

A RESOLUTION OF THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA, APPROVING THE ENGAGEMENT AGREEMENT BETWEEN THE CITY AND MARCUM, LLP. PURSUANT TO REQUEST FOR PROPOSALS RFP-24-018-SG EXTERNAL AUDITING SERVICES; AND AUTHORIZING THE CITY MANAGER OR DESIGNEE TO DO ALL THINGS NECESSARY TO EFFECTUATE THIS RESOLUTION; SUBJECT TO ANNUAL BUDGET APPROPRIATION; PROVIDING FOR CONFLICTS;

PROVIDING FOR SCRIVENER’S ERRORS, PROVIDING FOR SEVERABILITY; AND PROVIDING FOR AN EFFECTIVE DATE.

Chief Procurement Office Shereece Depusoir provided an explanation regarding the proposed resolution.

**Motion to approve** Resolution R2024-124 made by Commissioner Chernoff, seconded by Commissioner Smukler.

Tony Brunson appeared before the Mayor and Commission and represented the Anthony Brunson firm and discussed the evaluation process.

Mo Ariza appeared before the Mayor and Commission and represented the Marcum firm and discussed the evaluation process.

**Motion to approve** an engagement agreement with the Anthony Brunson firm made by Commissioner Fleurimond, seconded by Mayor Joseph.

**MOTION FAILED 3-4** with Vice Mayor Smith, Commissioner Chernoff, Commissioner Smukler, and Commissioner Su opposed.

**Motion to approve** an engagement agreement with the Marcum firm (as recommended in Resolution R2024-124) made by Commissioner Fleurimond, seconded by Vice Mayor Smith.

**MOTION PASSED 7-0.**

**Resolution R2024-132 Ratification of the Collective Bargaining Agreement Between the City of North Miami Beach and International Union of Police Associations (IUPA) Bargaining Unit (Babette Friedman, Human Resources Director)**

A RESOLUTION OF THE MAYOR AND COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA, RATIFYING THE COLLECTIVE BARGAINING AGREEMENT (“AGREEMENT OR CBA”) BETWEEN THE CITY OF NORTH MIAMI BEACH AND THE INTERNATIONAL UNION OF POLICE ASSOCIATIONS, AFL-CIO, LOCAL 6005, BARGAINING UNIT; PROVIDING THE CITY MANAGER WITH THE AUTHORITY TO EXECUTE THE AGREEMENT PROVIDED THAT THE AGREEMENT IS REVIEWED FOR FORM AND LEGAL SUFFICIENCY BY THE CITY ATTORNEY; AND PROVIDING FOR AN EFFECTIVE DATE.

Director of Human Resources Babette Friedman provided an explanation regarding the proposed resolution.

**Motion to approve** Resolution R2024-132 made by Commissioner Fleurimond, seconded by Commissioner Smukler.

**MOTION PASSED 7-0.**

**Resolution R2024-133 Approve Black & Veatch Corporation to Provide Program Management and Staff Augmentation for the Washington Park Redevelopment Project Phase 1 Pump Station and Forcemain Installation (Hamid Nikvan, NMB Water Director)**

A RESOLUTION OF THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA, APPROVING AND AUTHORIZING BLACK & VEATCH CORPORATION TO PROVIDE PROGRAM MANAGEMENT AND STAFF AUGMENTATION FOR THE WASHINGTON PARK REDEVELOPMENT PROJECT PHASE ONE: PUMP STATION AND FORCE MAIN INSTALLATION IN AN AMOUNT NOT TO EXCEED \$280,000; AUTHORIZING THE CITY MANAGER OR DESIGNEE TO DO ALL THINGS NECESSARY TO EFFECTUATE THIS RESOLUTION; PROVIDING FOR CONFLICTS; PROVIDING FOR SCRIVENER ERRORS; PROVIDING FOR SEVERABILITY; SUBJECT TO THE BUDGET APPROPRIATION AND AVAILABILITY OF FUNDS; AND PROVIDING FOR AN EFFECTIVE DATE.

City Manager Mario Diaz and Director of NMB Water Hamid Nikvan provided an explanation regarding the proposed resolution.

**Motion to approve** Resolution R2024-133 made by Commissioner Chernoff, seconded by Mayor Joseph.

**MOTION PASSED 6-1** with Commissioner Su opposed.

**Resolution R2024-134 Jackson North Medical Center Right of Way Abandonment and Vacation Request (Zafar Ahmed, Community Development Director)**

A RESOLUTION OF THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA APPROVING THE VACATION AND ABANDONMENT OF A PORTION OF N.W. 171<sup>ST</sup> STREET (FULFORD BOULEVARD), A PORTION OF EAST DRIVE (STATE ROAD 9 EAST DRIVE), AND A PORTION OF A 5-FOOT PLANTING STRIP AS SHOWN ON PARKWAY ESTATES ACCORDING TO THE PLAT THEREOF AS RECORDED IN PLAT BOOK 64 AT PAGE 37 AND AS SHOWN ON COMMERCIAL ARLINGTON ACCORDING TO THE PLAT THEREOF AS RECORDED IN PLAT BOOK 30 AT PAGE 39 ALL OF THE PUBLIC RECORDS OF MIAMI-DADE COUNTY, FLORIDA LYING IN SECTION 12, TOWNSHIP 52 SOUTH, RANGE 41 EAST AND BEING IN THE CITY OF NORTH MIAMI BEACH, FLORIDA FOR THE EXPANSION OF THE JACKSON NORTH MEDICAL CENTER; PROVIDING FOR CONFLICTS; AND PROVIDING FOR AN EFFECTIVE DATE.

**Motion to approve** Resolution R2024-134 made by Vice Mayor Smith, seconded by Mayor Joseph.

**MOTION PASSED 7-0.**

**Resolution R2024-135 American Rescue Plan Act (ARPA) Final Allocations (Marline Monestime, Chief of Staff)**

A RESOLUTION OF THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA, AUTHORIZING THE REALLOCATION OF AMERICAN RESCUE PLAN ACT (ARPA) STATE AND LOCAL FISCAL RECOVERY FUNDS (SLFRF) FROM TRANCHE ONE AND TRANCHE TWO; AUTHORIZING THE CITY MANAGER TO MAKE ADDITIONAL ALLOCATIONS; AND FURTHER AUTHORIZING THE CITY MANAGER TO ESTABLISH PROGRAMS AND GUIDELINES AS NEEDED TO ENSURE

THE TIMELY DISBURSEMENT OF GRANT FUNDS; PROVIDING FOR AN EFFECTIVE DATE AND ALL OTHER PURPOSES.

Chief of Staff Marline Monestime provided an explanation regarding the proposed resolution.

**Motion to approve** Resolution R2024-135 made by Commissioner Chernoff, seconded by Commissioner Smukler.

**MOTION PASSED 6-0** with Commissioner Jean off the dais.

Chief of Staff Marline Monestime stated that the exhibit to this resolution should be attached to the minutes of the meeting.

**Motion to approve** made by Vice Mayor Smith, seconded by Commissioner Smukler.

**MOTION PASSED 6-0** with Commissioner Jean off the dais.

**Resolution R2024-136 Approve Policy and Procedures for Issuance of Ceremonial Awards (Phyllis Smith, Vice Mayor)**

A RESOLUTION OF THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA, ADOPTING POLICY AND PROCEDURE FOR THE ISSUANCE OF CEREMONIAL DOCUMENTS, INCLUDING CERTIFICATES OF APPRECIATION, PROCLAMATIONS, AND KEYS TO THE CITY; PROVIDING FOR CONFLICTS; PROVIDING FOR SCRIVENER'S ERRORS; PROVIDING FOR SEVERABILITY; AND PROVIDING FOR AN EFFECTIVE DATE.

Resolution R2024-136 was deferred.

**Resolution R2024-137 Approve Trolley Route and Stop Optimization Study (Samuel Zamacona, Public Works Director)**

A RESOLUTION OF THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA, APPROVING A TASK ORDER FOR ENGINEERING SERVICES FOR THE PROJECT MANAGEMENT OF A TROLLEY ROUTE OPTIMIZATION STUDY IN AN ESTIMATED AMOUNT OF \$107,330.00, UNDER THE "CONTINUING SERVICES AGREEMENT" WITH CHEN MOORE AND ASSOCIATES FOR PROFESSIONAL CONSULTING SERVICES; AND AUTHORIZING THE CITY MANAGER OR DESIGNEE TO DO ALL THINGS NECESSARY TO EFFECTUATE THIS RESOLUTION; PROVIDING FOR CONFLICTS; AND SUBJECT TO THE BUDGET APPROPRIATION AND AVAILABILITY OF FUNDS; AND PROVIDING FOR AN EFFECTIVE DATE.

Resolution R2024-137 was deferred.

**Resolution R2024-138 Approving Multiple Piggyback Contracts for the Purchase of City Vehicles from Alan Jay Fleet Sales (Sherece Depusoir, Chief Procurement Officer)**

A RESOLUTION OF THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA, APPROVING THE UTILIZATION OF MULTIPLE PIGGYBACK CONTRACTS FOR THE PURCHASE OF CITY VEHICLES FROM ALAN JAY AUTOMOTIVE MANAGEMENT, INC. DBA ALAN JAY FLEET SALES; SUBJECT TO ANNUAL BUDGET APPROPRIATION; AUTHORIZING THE CITY MANAGER OR

DESIGNEE TO DO ALL THINGS NECESSARY TO EFFECTUATE THIS RESOLUTION; PROVIDING FOR CONFLICTS; PROVIDING FOR SCRIVENER'S ERRORS; PROVIDING FOR SEVERABILITY; AND PROVIDING FOR AN EFFECTIVE DATE.

**Motion to approve** Resolution R2024-138 made by Vice Mayor Smith, seconded by Commissioner Smukler.

**MOTION PASSED 7-0.**

### **Resolution R2024-139**

A RESOLUTION OF THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA, APPROVING AND AUTHORIZING THE CITY MANAGER OR DESIGNEE TO EXECUTE AN AGREEMENT WITH THE FLORIDA DEPARTMENT OF TRANSPORTATION (FDOT); PROVIDING THE TERMS AND CONDITIONS FOR THE PUBLIC TRANSIT SERVICES DEVELOPMENT PROGRAM GRANT TO PROVIDE ON-DEMAND TRANSIT SERVICE VIA FREEBEE AND REIMBURSEMENT OF SUCH ON-DEMAND TRANSIT SERVICES FROM THE FDOT TO THE CITY; PROVIDING FOR CONFLICTS; PROVIDING FOR SCRIVENER'S ERRORS; PROVIDING FOR SEVERABILITY; AND PROVIDING FOR AN EFFECTIVE DATE.

City Manager Mario Diaz provided an explanation regarding the proposed resolution.

**Motion to approve** Resolution R2024-139 made by Vice Mayor Smith, seconded by Commissioner Smukler.

**MOTION PASSED 7-0.**

### **APPOINTMENTS**

**Motion to approve** the appointment of Commissioner Su as Vice Mayor effective January 1, 2025 made by Commissioner Chernoff, seconded by Vice Mayor Smith.

**MOTION PASSED 7-0.**

### **DISCUSSION**

Commissioner Smukler discussed relocating the gun mount and the Mayor and Commission directed staff to provide a report regarding the cost and process.

Commission meetings and CRA transportation will be discussed at the next Commission Conference.

### **CITY MANAGER'S REPORT**

City Manager Mario Diaz provided an update regarding the Miami Gardens settlement claims.

### **ADJOURNMENT**

The meeting was adjourned at 11:33pm.

**ATTEST:**

(SEAL)

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Andrise Bernard, MMC, City Clerk



**Assessment of Eligible Use Category Selection for North Miami Beach's ARPA-SLFRF Projects**

*Compiled and reviewed by DRS as of December 10, 2024*

	<b>TASK</b>	<b>NAME</b>	<b>BUDGET</b>
1	CMO	AT-HOME TESTING KITS (COVID)	24,999.99
2	CMO	COMMUNITY ENGAGEMENT	72,304.50
3	CMO	PUBLIC OUTREACH	77,124.74
4	CMO	GROCERY GIFT CARD DISTRIBUTION	166,414.08
5	CMO	TURKEY DISTRIBUTION PROGRAM	29,967.64
6	CMO	MORTGAGE & RENT ASSISTANCE	271,960.36
7	CMO	BUSINESS ASSISTANCE GRANT	50,000.00
8	CMO	GENERAL FUND REVENUE LOSS	1,939,999.60
9	CMO	STRATEGIC PLANNING	150,000.00
10	CMO	ARPA ADMIN FEES- DRS, INC.	11,000.00
11	CMO	ECONOMIC DEVELOPMENT STUDY AND	40,000.00
12	CMO	ECONOMIC DEVELOPMENT PROGRAMMING	14,000.00
13	CMO	WORKFORCE TRAINING & SCHOLARSH	75,000.00
14	CMO	FAÇADE GRANT	100,000.00
15	CMO	HOME REHABILITATION	1,200,000.00
16	CMO	COLLEGE SCHOLARSHIP PROGRAM	100,000.00
17	CMO	HUMAN SERVICES PROGRAMS	259,748.75
18	CMO	SANITATION SUPPLEMENT	1,174,621.00
19	COMM DEV	FEE STRUCTURE ANALYSIS	15,000.00
20	COMM DEV	PUBLIC ARTS ORDINANCE	10,000.00
21	COMM DEV	PUBLIC BENEFITS ORDINANCE	15,000.00
22	COMM DEV	TEMPORARY USE ORDINANCE	10,000.00
23	COMM DEV	151 TOD PLAN-BRIGHTLINE	45,000.00
24	COMM DEV	AFFORDABLE HOUSING STUDY	2,708.00
25	COMM DEV	COMPREHENSIVE PLAN OVERHAUL	350,000.00
26	COMM DEV	HOUSING ANALYSIS REPORT	50,000.00
27	COMM DEV	PARKING STUDY	65,000.00
28	COMM DEV	RAPID TRANSIT ZONE COUNTY RQM	55,000.00
29	COMM DEV	STREET TREE MASTER PLAN	42,292.00
30	COMM DEV	SUSTAINABILITY MASTER PLAN	132,401.25
31	COMM DEV	VULNERABILITY STUDY	100,000.00
32	COMM DEV	WATER PLAN UPDATE	25,000.00
33	COMM DEV	ZONING REVIEW AND UPDATES	50,000.00
34	COMM DEV	COMMUNITY DEVELOPMENT VEHICLES	85,000.00
35	ECON DEV	MORTGAGE & RENTAL ASSISTANCE	200,000.00
36	ECON DEV	BUSINESS GRANT ASSISTANCE	300,000.00
37	INFO TECH	BACKUP SOLUTIONS	45,600.00
38	INFO TECH	CISCO SWITCHES UPGRADE CITYWID	57,000.00
39	INFO TECH	PROJECT MANAGEMENT SOFTWARE	85,500.00
40	INFO TECH	REAL TIME CLOSED CAPTIONING	34,200.00
41	INFO TECH	CLEAR TOUCH	5,700.00
42	INFO TECH	COMPUTER EQUIP (NON-CAPITAL)	171,946.71
43	INFO TECH	COMPUTER EQUIP. (NON CAPITAL)	185,000.00
44	INFO TECH	CONFERENCING MONITOR (CMO)	19,045.55

45	INFO TECH	DOCUSIGN ELECTRONIC SIGNATURES	6,730.80
46	INFO TECH	ELECTRONIC MARQUEE	-
47	INFO TECH	HARDWARE PURCHASES (CAPITAL)	29,066.72
48	INFO TECH	LASERFICHE LICENSING SOFTWARE	24,751.06
49	INFO TECH	LEGACY SYST. CONVERT TO LASER	57,000.00
50	INFO TECH	LICENSING SOFTWARE	394,904.00
51	INFO TECH	MUNIS SYS.BUS. AUTOMATIONS	195,096.00
52	INFO TECH	OTHER CONTRACTUAL SERVICES	24,000.00
53	INFO TECH	SERVER EQUIPMENT (CAPITAL)	124,428.89
54	INFO TECH	SOFTWARE (CAPITAL)	17,486.72
55	INFO TECH	VIDEO SYSTEM REPLACE/COMM CHAM	60,089.15
56	LIBRARY	BOOK SCANNER FOR HISTORIC RE	31,350.00
57	LIBRARY	GENERATOR	160,000.00
58	LIBRARY	IMPACT WINDOWS	330,000.00
59	LIBRARY	FINANCIAL LITERACY COURSES/SES	19,847.98
60	LIBRARY	BATHROOM REMODEL	100,000.00
61	LIBRARY	LAPTOP SELF CHECKOUT	14,250.00
62	LIBRARY	LED LIGHTING IN PARKING LOT	42,000.00
63	LIBRARY	RFID-IMPLEMENT SELF CHECKOUT	18,000.00
64	PARKS	FOOD DISTRIBUTION	139,750.00
65	PARKS	4 DOGGIE STATIONS	2,500.00
66	PARKS	BUS PURCHASE	19,402.00
67	PARKS	BUS PURCHASE	100,000.00
68	PARKS	CHALLENGER PARK SHADE STRUCTUR	126,000.00
69	PARKS	FURNITURE TVS, ELECTRONIC	10,000.00
70	PARKS	HIGHLAND VILLAGE SPLASHPAD DES	240,000.00
71	PARKS	NEW VICTORY POOL REPLACEMENT H	30,000.00
72	PARKS	PARK RESTORATION (ARBOR DAY)	60,000.00
73	PARKS	PLAYGROUND PARTS, DECK EQUIPME	25,000.00
74	PARKS	PLAYGROUND SURFACE RECOATING	10,000.00
75	PARKS	SIMS AQUATIC CENTER NEW OUTDOO	6,000.00
76	PARKS	TAYLOR PARK/AQUA BOWL FOUNTAIN	14,000.00
77	PARKS	VICTORY POOL DECK FURNITURE	10,000.00
78	PARKS	BASKETBALL COURT SPRUCE UP (BEHIND PD)	10,000.00
79	PARKS	BUFFER-STRIPPER PURCHASE	2,500.00
80	PARKS	GENERAL PARK AMENITIES	50,000.00
81	PARKS	INCREASED BEAUTIFICATION- WP, HV	27,335.00
82	PARKS	LITTMAN THEATER OVERHEAD STAGE	35,000.00
83	PARKS	MISHCON PARK -PHASE 11 PER MA	145,000.00
84	PARKS	NEW PARK SIGNS	25,000.00
85	PARKS	PARKS & REC VEHICLES	123,000.00
86	PARKS	PORTABLE MISTING FANS	25,000.00
87	PARKS	PUBLIC ART IN PARKS	75,000.00
88	PARKS	REPLACE POOL PUMPS	9,450.00
89	PARKS	SIMS AQUATIC CENTER LITTLE LAG	75,000.00
90	PARKS	UPDATED SIGNAGE	2,500.00
91	PARKS	ICE MACHINES	16,000.00
92	PARKS	SENIOR FACILITY-BUILDING EXPEN	-
93	PARKS	SENIOR FACILITY-LAND PURCHASE	-

94	POLICE	MENTAL HEALTH WORKSHOPS/EMPL	23,102.32
95	POLICE	BEAR CAT - CRITICAL INCIDENT RESPONSE VEHICLE	380,000.00
96	POLICE	ELEVATOR REPLACEMENT -PD LOBBY	150,000.00
97	POLICE	POLICE ACADEMY TRAINING, TUITI	31,754.00
98	POLICE	BALLISTIC SHIELDS- ROAD PATROL	362,198.00
99	POLICE	BODY ARMOR REPLACEMENT	60,000.00
100	POLICE	CRIMEVIEW ANALYTICS	40,000.00
101	POLICE	LICENSE PLATE READER	150,000.00
102	POLICE	MARINE VESSEL AND MOTOR VEHICLES	280,000.00
103	POLICE	NEW BODY CAMERAS	60,000.00
104	POLICE	OFFICE FURNITURE	30,000.00
105	POLICE	OVERTIME FOR CRIME TREND DETAI	-
106	POLICE	POLICE RADIOS	66,000.00
107	POLICE	POLICE VEHICLES	369,000.00
108	POLICE	REPLACE K-9	18,700.00
109	POLICE	SHIPPING CONTAINERS	-
110	POLICE	SHOTSPOTTER RENEWAL AND NEW PU	100,000.00
111	POLICE	TASER REPLACEMENT	54,000.00
112	POLICE	TRAINING INSTRUCTURE	14,750.00
113	POLICE	VESTS, HELMETS, ASP PADS	90,000.00
114	PUB WORKS	AHU REPLACEMENTS CITY WIDE	190,400.00
115	PUB WORKS	FACILITIES AIR PURIFIERS	102,131.00
116	PUB WORKS	CITY WIDE EXTERIOR FACILITIES	526,500.00
117	PUB WORKS	CITY WIDE ROOF REPLACEMENTS	799,000.00
118	PUB WORKS	ELEVATOR COMPLIANCE UPGRADE	63,854.00
119	PUB WORKS	FACILITIES MANAGEMENT VEHICLES	45,000.00
120	PUB WORKS	FLEET MANAGEMENT VEHICLES	110,000.00
121	PUB WORKS	H/R OFFICE RENOVATION	141,032.71
122	PUB WORKS	HIGHLAND VILLAGE DRAINAGE IMPR	750,000.00
123	PUB WORKS	NE 151 ST/14TH AVE ROUNDABOUT	294,165.96
124	PUB WORKS	NE 153 ST DRAINAGE IMPROVEMENT	351,698.58
125	PUB WORKS	NE 154 ST ROADWAY IMPROVEMENT	410,000.00
126	PUB WORKS	ONE MAN AERIAL LIFT	15,000.00
127	PUB WORKS	WASHINGTON PARK DESIGN/CONSTRU	807,019.24
128	PUB WORKS	165TH STREET PAVING	250,000.00
129	PUB WORKS	AIR PURIFIERS FOR CTY BUILDINGS	146,716.00
130	PUB WORKS	BRIDGE IMPROVEMENTS	227,810.00
131	PUB WORKS	BUS SHELTERS	46,716.00
132	PUB WORKS	CITY HALL 1ST FLOOR CNSTRN	429,000.00
133	PUB WORKS	CITY HALL RESTROOM REMODEL (3R	-
134	PUB WORKS	COUNTY - ILA SIGN REPLACEMENT	10,000.00
135	PUB WORKS	FLEET MANAGEMENT SOFTWARE	42,750.00
136	PUB WORKS	GENIE ELECTRIC SCISSOR LIFT	28,000.00
137	PUB WORKS	OPERATIONS CENTER DRAINAGE IMP	350,000.00
138	PUB WORKS	PAVEMENT CONDITION INDEX (PCI)	60,000.00
139	PUB WORKS	ROAD RESURFACING PROJECTS	109,000.00
140	PUB WORKS	ROADWAY RESURFACING	196,024.00
141	PUB WORKS	TWO PORTABLE LIGHT TOWERS	28,000.00
142	PUB WORKS	VAC TRUCK & SWEEPER	567,390.00

143	UTILITIES	SUBSIDIZE UTILITY INCREASE	250,000.00
144	UTILITIES	WE CARE TO SHARE	250,000.00
145	WATER FUND	WE CARE PROGRAM	29,557.70
146	WATER FUND	SEPTIC TO SEWER CONVERSION	400,000.00
147	WATER FUND	VAC TRUCK PURCHASE	275,000.00
<b>TOTAL</b>			21,557,242.00



**Consent Agenda  
9.2.**

City of North Miami Beach  
17011 NE 19 Avenue  
North Miami Beach, FL 33162  
305-947-7581  
www.citynmb.com

**MEMORANDUM**

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<b>TO:</b>	Mayor and City Commission
<b>FROM:</b>	Samuel Zamacona, Public Works Director
<b>VIA:</b>	Mario A. Diaz, City Manager
<b>DATE:</b>	January 21, 2025

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**RE:** Resolution No. R2025-01 Change Order for Austin Tupler Trucking Inc. for Sand and Gravel Delivery for Road Maintenance (Samuel Zamacona, Public Works Director)

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**Description**

City of North Miami Beach utilizes the services of Austin Tupler Trucking, Inc for the furnishing and delivery of essential materials, including sand, gravel, lime rock and other aggregates required for daily operations and the maintenance and restoration of roads and swales. Austin Tupler Trucking, Inc is the largest transporter, buyer and seller of road building and construction aggregates in South Florida.

**BACKGROUND  
ANALYSIS:**

The City of North Miami Beach is currently utilizing the City of Margate's Cooperative (COOP) contract, which allows for more competitive pricing through volume purchases alongside other municipalities.

As the current contract term extends through November 14, 2025, an additional \$50,000 is required to cover the ongoing purchase of materials for the continued maintenance and restoration needs of the City's infrastructure.

**RECOMMENDATION:**

The NMB Water Department and the Chief Procurement Officer recommend the City Commission to approve and authorize the City Manager or designee, to approve a change order to the contract with Austin Tupler Trucking, Inc. for an additional \$50,000. This will allow for the continued purchase of materials through the remainder of the contract term.

**FISCAL/ BUDGETARY**

**IMPACT:**

As approved in the adopted budget appropriation.

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**ATTACHMENTS:**

**Description**

- ▣ Austin Tupler\_Resolution
- ▣ Austin Tupler\_Contract Award

**RESOLUTION NO. 2025-**

**A RESOLUTION OF THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA, APPROVING AND AUTHORIZING A CHANGE ORDER TO THE CONTRACT WITH AUSTIN TUPLER TRUCKING, INC. INCREASING THE CONTRACT AMOUNT BY \$50,000.00; AUTHORIZING THE CITY MANAGER OR DESIGNEE TO DO ALL THINGS NECESSARY TO EFFECTUATE THIS RESOLUTION; PROVIDING FOR CONFLICTS; PROVIDING FOR SCRIVENER ERRORS; PROVIDING FOR SEVERABILITY; SUBJECT TO THE BUDGET APPROPRIATION AND AVAILABILITY OF FUNDS; AND PROVIDING FOR AN EFFECTIVE DATE.**

**WHEREAS**, pursuant to Chapter 166, *Florida Statutes* and Section 1.4 of the Charter of the City of North Miami Beach (“City”), the City shall have all available governmental, corporate, and proprietary powers and may exercise them except when prohibited by law; and

**WHEREAS**, City of Margate awarded COOP Contract 2022-006 Aggregates, Topsoils and Sand to Austin Tupler Trucking, Inc. (“Austin Tupler”) for a period of one (1) year effective November 15, 2022 through November 14, 2023 with the option to renew for two (2) additional one-year terms. The Contract has been renewed through November 14, 2025; and

**WHEREAS**, under the City Manager authority, a budgeted amount of \$50,000 was previously approved. An additional \$50,000 expenditure (Change Order) is required with Austin Tupler Trucking, Inc. to furnish and deliver various materials like sand, gravel and limestone necessary for the maintenance and restoration of roads; and

**WHEREAS**, Section 3-3.20 of the Code of Ordinances City of North Miami Beach, Florida, 2008 (“Code”) requires that change orders exceeding 10% or \$50,000.00, whichever is less, shall be approved by the City Commission; and

**WHEREAS**, the City Manager and Chief Procurement Officer recommend that the City Commission approve and authorize the City Manager or designee to execute a Change Order to the previously approved contract with Austin Tupler to increase the previously approved expenditure by \$50,000, thereby increasing the total to \$100,000; and

**WHEREAS**, the Mayor and City Commission believe it is in the best interests of the City approve and authorize the City Manager or designee to execute a Change Order to the previously approved contract with Austin Tupler to increase the previously approved expenditure by \$50,000, thereby increasing the total to \$100,000 to furnish and deliver various materials for the maintenance and restoration of roads.

**NOW, THEREFORE, BE IT RESOLVED BY THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA, THAT:**

**Section 1.** The foregoing whereas clauses are true and correct and adopted as the

**RESOLUTION NO. R2025-XX**

legislative and administrative findings of the City Commission and made a specific part of this Resolution; all exhibits attached hereto are made a specific part of this Resolution.

**Section 2.** The Change Order, in substantially the form attached as Exhibit “A,” to the previously approved contract with Austin Tupler Trucking, Inc. to increase the expenditure by \$50,000 for a total expenditure of \$100,000, to furnish and deliver various materials for the maintenance and restoration of roads, subject to budget appropriation and availability of funds is hereby approved.

**Section 3.** The City Manager or designee is authorized to do all things necessary to effectuate this Resolution.

**Section 4.** All Resolutions or parts of Resolutions in conflict with this Resolution are repealed to the extent of such conflict.

**Section 5.** Any scrivener or typographical errors that do not affect intent may be corrected with notice to, and the authorization of the City Attorney and City Manager without further process.

**Section 6.** If any provision of this Resolution or the application thereof to any person or circumstance is held invalid, such invalidity shall not affect other provisions or applications of this Resolution that can be given affect without the invalid provision or application, and to this end the provisions of this Resolution are declared to be severable.

**Section 7.** This Resolution shall take effect immediately upon adoption.

**[THE REMAINDER OF THIS PAGE INTENTIONALLY LEFT BLANK]**

**RESOLUTION NO. R2025-XX**



**APPROVED AND ADOPTED** by the City of North Miami Beach City Commission at the regular meeting assembled this **21<sup>st</sup> day of January 2025**.

ATTEST:

\_\_\_\_\_  
ANDRISE BERNARD, MMC  
CITY CLERK

\_\_\_\_\_  
MICHAEL JOSEPH  
MAYOR

(CITY SEAL)

APPROVED AS TO FORM AND LEGAL SUFFICIENCY FOR THE USE  
AND RELIANCE OF THE CITY OF NORTH MIAMI BEACH ONLY:

GREENSPOON MARDER, LLP.

By: \_\_\_\_\_  
CITY ATTORNEYS

Sponsored by: Mayor & Commission

**RESOLUTION NO. R2025-XX**



Southeast Florida Governmental Purchasing  
Cooperative Group

CONTRACT AWARD

Please complete each of the applicable boxes and submit with bid documents, award notices and tabulations to [rwhitcomb@greenacresfl.gov](mailto:rwhitcomb@greenacresfl.gov) for placement on the NIGP SEFL website Cooperative contract page.

PAGE 1 OF 2

BID/RFP No. 2022-006

Description/Title: Aggregates, Top Soils and Sand

Initial Contract Term: Start Date: 11/15/2022 End Date: 11/14/2023

Renewal Terms of the Contract: 2 (No. of Renewals) Renewal Options for 1 year (Period of Time)

Renewal No. 1 Start Date: 11/15/2023 End Date: 11/14/2024

Renewal No. 2 Start Date: 11/15/2024 End Date: 11/14/2025

Renewal No.      Start Date:                      End Date:                     

Renewal No.      Start Date:                      End Date:                     

SECTION #1 VENDOR AWARD

Vendor Name: Austin Tupler Trucking, Inc.

Vendor Address: 6570 SW 47th Court Davie, FL 33314

Contact: Glen D. Tupler

Phone: 954-583-0801 Fax: 954-583-0844

Cell/Pager:                      Email Address: tupler@bellsouth.net

Website:                      FEIN: 59-1426412

VENDOR AWARD

Vendor Name: Florida Superior Sand, Inc.

Vendor Address: 6801 Lake Worth Rd Suite 124 Greenacres, FL 33467

Contact: Marion A. Jefferson

Phone: 800-741-8258 Fax: 561-969-3114

Cell/Pager:                      Email Address: fss5901@aol.com

Website:                      FEIN: 65-0085242

**VENDOR AWARD**

Vendor Name: True Hall Transport, LLC  
 Vendor Address: 255 NE 3rd Drive Homestead, FL 33030  
 Contact: Kevin Perez  
 Phone: 786-610-0330 Fax: \_\_\_\_\_  
 Cell/Pager: \_\_\_\_\_ Email Address: kevin@truehaul.net  
 Website: truehall.net FEIN: 82-076-5180

**VENDOR AWARD**

Vendor Name: Green Dream International, LLC  
 Vendor Address: 32 W 8th St Suite 607 Erie, PA 16501  
 Contact: Pierre Giroux  
 Phone: 469-706-9097 Ext.107 Fax: 202-204-8444  
 Cell/Pager: \_\_\_\_\_ Email Address: info@gdicompany.org  
 Website: greendreammgr.com FEIN: 46-0522758

**SECTION #2**

**AWARD/BACKGROUND INFORMATION**

Award Date: 08/31/2022 Resolution/Agenda Item No.: 22-072  
 Insurance Required: Yes 08/31/2022 No \_\_\_\_\_  
 Performance Bond Required: Yes \_\_\_\_\_ No \_\_\_\_\_

**SECTION #3**

**LEAD AGENCY**

Agency Name: City of Margate  
 Agency Address: 5790 Margate Blvd Margate, FL 33063  
 Agency Contact: Wylene Sprouse Email purchase@margatefl.com  
 Telephone: 954-935-5346 Fax: 954-935-5258

CITY OF MARGATE, FLORIDA

RESOLUTION NO. 22-072

A RESOLUTION OF THE CITY OF MARGATE, FLORIDA, APPROVING MULTIPLE AWARDS OF BID NO. 2022-006, "AGGREGATES, TOP SOILS AND SAND," TO AUSTIN TUPLER TRUCKING, INC., FLORIDA SUPERIOR SAND, INC., GREEN DREAM INTERNATIONAL, LLC, AND TRUE HAUL, LLC; PROVIDING FOR CITY OF MARGATE ACTING AS LEAD AGENCY FOR PURCHASING COOPERATIVE; PROVIDING FOR INITIAL AND RENEWAL TERMS; PROVIDING FOR EFFECTIVE DATE.

BE IT RESOLVED BY THE CITY COMMISSION OF THE CITY OF MARGATE, FLORIDA:

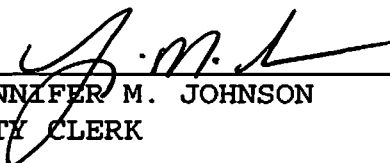
SECTION 1: That the City Commission of the City of Margate, Florida, approves multiple awards of Bid No. 2022-006 "Aggregates, Top Soils and Sand," to Austin Tupler Trucking, Inc., Florida Superior Sand, Inc., Green Dream International, LLC and True Haul, LLC, for an initial one-year term beginning November 15, 2022, and two (2) one-year renewal options, with the City of Margate to act as lead agency for the Southeast Florida Governmental Purchasing Cooperative Group.

SECTION 2: That the Mayor and City Manager are authorized and directed to execute contracts for the above, or the administration is authorized to issue purchase orders to implement the purpose and intent of this Resolution.

SECTION 3: That this Resolution shall become effective immediately upon its passage.

PASSED, ADOPTED AND APPROVED THIS 31<sup>ST</sup> day of AUGUST 2022.

ATTEST:

  
JENNIFER M. JOHNSON  
CITY CLERK

  
MAYOR ANTONIO V. ARSERIO

<u>RECORD OF VOTE</u>	
Simone	<u>YES</u>
Schwartz	<u>YES</u>
Ruzzano	<u>YES</u>
Caggiano	<u>ABSENT</u>
Arserio	<u>YES</u>

Southeast Florida Governmental Purchasing Cooperative

Bid Tabulation Sheet

Bid #2022-006

AGGREGATES, TOP SOILS AND SAND

Group	Item Description	Estimated Annual Quantity	Unit	Austin Tupler Trucking, Inc.		Florida Superior Sand, Inc.		True Haul, LLC		Green Dream International	
				Price Per	Total Price	Unit Price	Total Price	Unit Price	Total Price	Unit Price	Total Price
<b>Group 1A - Aggregates</b>											
1.	Road Rock - Crushed Limerock	1,016	Tons	\$ 29.65	\$ 30,124.40	n/b	\$ -	\$ 27.05	\$ 27,482.80	\$ 37.86	\$ 38,465.76
	*Charge for double crush, if requested			\$ 1.50		n/a	\$ -	n/a	\$ -	n/a	\$ -
2.	Three-quarter inch Wash Rock	800	Tons	\$ 39.40	\$ 31,520.00	n/b	\$ -	\$ 36.05	\$ 28,840.00	\$ 90.00	\$ 72,000.00
3.	Fill as per Attached Special Specifications	600	Tons	\$ 24.90	\$ 14,940.00	n/b	\$ -	\$ 24.65	\$ 14,790.00	\$ 33.06	\$ 19,836.00
4.	Stabilizer Material	20	Tons	\$ 26.90	\$ 538.00	n/b	\$ -	\$ 27.05	\$ 541.00	\$ 37.86	\$ 757.20
5.	Concrete Screenings	20	Tons	\$ 38.70	\$ 774.00	n/b	\$ -	\$ 36.05	\$ 721.00	\$ 47.16	\$ 943.20
6.	Crushed Limerock 70%	100	Tons	\$ 29.65	\$ 2,965.00	n/b	\$ -	\$ 27.05	\$ 2,705.00	\$ 37.86	\$ 3,786.00
7.	Pea Rock	320	Tons	\$ 39.40	\$ 12,608.00	n/b	\$ -	\$ 36.05	\$ 11,536.00	\$ 47.16	\$ 15,091.20
8.	Rice Rock	20	Tons	\$ 39.40	\$ 788.00	n/b	\$ -	\$ 36.05	\$ 721.00	\$ 47.16	\$ 943.20
9.	#57 Rock	200	Tons	\$ 39.40	\$ 7,880.00	n/b	\$ -	\$ 36.05	\$ 7,210.00	\$ 47.16	\$ 9,432.00
					\$ 102,137.40		\$ -		\$ 94,546.80		\$ 161,254.56
<b>Group 1B - Top Soils - Non- Sterile</b>											
10.	Top Soil Mix 90/10	1	Tons	\$ 105.80	\$ 105.80	\$ 49.85	\$ 49.85	n/b	\$ -	n/b	\$ -
11.	Top Soil Mix 80/20	20	Tons	\$ 114.78	\$ 2,295.60	\$ 57.35	\$ 1,147.00	\$ 42.00	\$ 840.00	n/b	\$ -
12.	Top Soil Mix 70/30	450	Tons	\$ 89.41	\$ 40,234.50	\$ 47.60	\$ 21,420.00	\$ 42.00	\$ 18,900.00	n/b	\$ -
13.	Top Soil Mix 50/50	50	Tons	\$ 41.00	\$ 2,050.00	n/b	\$ -	\$ 32.10	\$ 1,605.00	\$ 37.20	\$ 1,860.00
14.	Top Soil Mix 100%	72	Tons	\$ 32.00	\$ 2,304.00	n/b	\$ -	\$ 24.60	\$ 1,771.20	\$ 30.60	\$ 2,203.20
15.	Ortona Sand	30	Tons	\$ 60.70	\$ 1,821.00	\$ 37.00	\$ 1,110.00	\$ 43.80	\$ 1,314.00	n/b	\$ -
16.	Florida Lawn Sand	60	Tons	\$ 60.70	\$ 3,642.00	n/b	\$ -	\$ 18.90	\$ 1,134.00	\$ 48.00	\$ 2,880.00
17.	Mason Sand	100	Tons	\$ 59.75	\$ 5,975.00	\$ 35.20	\$ 3,520.00	\$ 57.00	\$ 5,700.00	n/b	\$ -
18.	Trap Sand #70	632	Tons	\$ 61.75	\$ 39,026.00	\$ 37.00	\$ 23,384.00	\$ 45.00	\$ 28,440.00	n/b	\$ -
					\$ 97,453.90		\$ 50,630.85		\$ 59,704.20		\$ 6,943.20
<b>Group 1C - Top Soils - Sterilized</b>											
19.	Top Soil Material 90/10 Sterilized	20	Tons	n/b	\$ -	\$ 49.85	\$ 997.00	n/b	\$ -	n/b	\$ -
20.	Top Soil Mix 80/20 sterilized	60	Tons	n/b	\$ -	\$ 57.35	\$ 3,441.00	n/b	\$ -	n/b	\$ -
21.	Top Soil 70/30 sterilized	20	Tons	n/b	\$ -	\$ 64.85	\$ 1,297.00	n/b	\$ -	n/b	\$ -
22.	Nursery Mix sterilized	20	Tons	n/b	\$ -	n/b	\$ -	n/b	\$ -	n/b	\$ -
23.	Exotic Mix sterilized	20	Tons	n/b	\$ -	n/b	\$ -	n/b	\$ -	n/b	\$ -
<b>CODE:</b>											
	Yellow (Primary)				\$ -		\$ 5,735.00		\$ -		\$ -
	Green (Secondary)										
	Non-Responsive- Changed UOM to Yards										
	<b>Total Zone 1</b>				\$ 199,591.30		\$ 56,365.85		\$ 154,251.00		\$ 168,197.76

Zone 1 Includes: Coconut Creek, Coral Springs, Margate and Tamarac

Southeast Florida Governmental Purchasing Cooperative

Bid Tabulation Sheet

Bid #2022-006

AGGREGATES, TOP SOILS AND SAND

Group	Item Description	Estimated Annual Quantity	Price Per	Austin Tupler Trucking, Inc.		Florida Superior Sand, Inc.		True Haul, LLC		Green Dream International	
				Unit Price	Total Price	Unit Price	Total Price	Unit Price	Total Price	Unit Price	Total Price
<b>Group 2A - Aggregates</b>											
24	Road Rock - Crushed Limerock <i>*Charge for double crush, if requested</i>	600	Tons	\$ 30.65	\$ 18,390.00	n/b	\$ -	\$ 27.35	\$ 16,410.00	\$ 43.86	\$ 26,316.00
				\$ 1.50		n/a		n/a		n/a	
25	Three-quarter inch Wash Rock	20	Tons	\$ 40.40	\$ 808.00	n/b	\$ -	\$ 36.35	\$ 727.00	\$ 96.00	\$ 1,920.00
26	Fill as per Attached Special Specifications	20	Tons	\$ 25.90	\$ 518.00	n/b	\$ -	\$ 25.25	\$ 505.00	\$ 39.06	\$ 781.20
27	Stabilizer Material	20	Tons	\$ 27.90	\$ 558.00	n/b	\$ -	\$ 27.65	\$ 553.00	\$ 43.86	\$ 877.20
28	Concrete Screenings	1	Tons	\$ 39.70	\$ 39.70	n/b	\$ -	\$ 36.35	\$ 36.35	\$ 53.16	\$ 53.16
29	Crushed Limerock 70%	20	Tons	\$ 30.65	\$ 613.00	n/b	\$ -	\$ 27.35	\$ 547.00	\$ 43.86	\$ 877.20
30	Pea Rock	10	Tons	\$ 40.40	\$ 404.00	n/b	\$ -	\$ 36.35	\$ 363.50	\$ 53.16	\$ 531.60
31	Rice Rock	20	Tons	\$ 40.40	\$ 808.00	n/b	\$ -	\$ 36.35	\$ 727.00	\$ 53.16	\$ 1,063.20
32	#57 Rock	100	Tons	\$ 40.40	\$ 4,040.00	n/b	\$ -	\$ 36.35	\$ 3,635.00	\$ 53.16	\$ 5,316.00
					\$ 26,178.70		\$ -		\$ 23,503.85		\$ 37,735.56
<b>Group 2B - Top Soils - Non- Sterile</b>											
33	Top Soil Mix 90/10	10	Tons	\$ 110.30	\$ 1,103.00	\$ 50.85	\$ 508.50	n/b	\$ -	n/b	\$ -
34	Top Soil Mix 80/20	10	Tons	\$ 119.28	\$ 1,192.80	\$ 58.35	\$ 583.50	\$ 42.60	\$ 426.00	n/b	\$ -
35	Top Soil Mix 70/30	10	Tons	\$ 93.91	\$ 939.10	\$ 48.60	\$ 486.00	\$ 42.60	\$ 426.00	n/b	\$ -
36	Top Soil Mix 50/50	50	Tons	\$ 42.00	\$ 2,100.00	n/b	\$ -	\$ 32.40	\$ 1,620.00	\$ 49.20	\$ 2,460.00
37	Top Soil Mix 100%	10	Tons	\$ 33.00	\$ 330.00	n/b	\$ -	\$ 25.20	\$ 252.00	\$ 42.60	\$ 426.00
38	Ortona Sand	50	Tons	\$ 60.70	\$ 3,035.00	\$ 38.00	\$ 1,900.00	\$ 44.40	\$ 2,220.00	n/b	\$ -
39	Florida Lawn Sand	50	Tons	\$ 60.70	\$ 3,035.00	n/b	\$ -	\$ 19.50	\$ 975.00	\$ 60.00	\$ 3,000.00
40	Mason Sand	20	Tons	\$ 59.75	\$ 1,195.00	\$ 36.20	\$ 724.00	\$ 57.60	\$ 1,152.00	n/b	\$ -
41	Trap Sand #70	20	Tons	\$ 61.75	\$ 1,235.00	\$ 38.00	\$ 760.00	\$ 45.60	\$ 912.00	n/b	\$ -
					\$ 14,164.90		\$ 4,962.00		\$ 7,983.00		\$ 5,886.00
<b>Group 2C - Top Soils - Sterilized</b>											
42	Top Soil Material 90/10 Sterilized	20	Tons	n/b	\$ -	\$ 50.85	\$ 1,017.00	n/b	\$ -	n/b	\$ -
43	Top Soil Mix 80/20 sterilized	20	Tons	n/b	\$ -	\$ 58.35	\$ 1,167.00	n/b	\$ -	n/b	\$ -
44	Top Soil 70/30 sterilized	20	Tons	n/b	\$ -	\$ 65.85	\$ 1,317.00	n/b	\$ -	n/b	\$ -
45	Nursery Mix sterilized	20	Tons	n/b	\$ -	n/b	\$ -	n/b	\$ -	n/b	\$ -
46	Exotic Mix sterilized	20	Tons	n/b	\$ -	n/b	\$ -	n/b	\$ -	n/b	\$ -
<b>CODE:</b>											
	Yellow (Primary)				\$ -		\$ 3,501.00		\$ -		\$ -
	Green (Secondary)										
	Non-Responsive- Changed UOM to Yards										
	<b>Total Zone 2</b>				\$ 40,343.60		\$ 8,463.00		\$ 31,486.85		\$ 43,621.56

Zone 2 Includes: Deerfield Beach and Pompano Beach

Southeast Florida Governmental Purchasing Cooperative

Bid Tabulation Sheet

Bid #2022-006

AGGREGATES, TOP SOILS AND SAND

Group 3A - Aggregates	Estimated Annual Quantity	Price Per	Austin Tupler Trucking, Inc.		Florida Superior Sand, Inc.		True Haul, LLC		Green Dream International	
			Unit Price	Total Price	Unit Price	Total Price	Unit Price	Total Price	Unit Price	Total Price
47 . Road Rock - Crushed Limerock	2,097	Tons	\$ 28.65	\$ 60,079.05	n/b	\$ -	\$ 26.15	\$ 54,836.55	\$ 28.26	\$ 59,261.22
<i>*Charge for double crush, if requested</i>			\$ 1.50		n/a		n/a		n/a	
48 . Three-quarter inch Wash Rock	427	Tons	\$ 38.40	\$ 16,396.80	n/b	\$ -	\$ 35.15	\$ 15,009.05	\$ 80.40	\$ 34,330.80
49 . Fill as per Attached Special Specifications	450	Tons	\$ 23.90	\$ 10,755.00	n/b	\$ -	\$ 23.75	\$ 10,687.50	\$ 23.46	\$ 10,557.00
50 . Stabilizer Material	100	Tons	\$ 25.90	\$ 2,590.00	n/b	\$ -	\$ 25.15	\$ 2,515.00	\$ 28.26	\$ 2,826.00
51 . Concrete Screenings	500	Tons	\$ 37.70	\$ 18,850.00	n/b	\$ -	\$ 35.15	\$ 17,575.00	\$ 37.56	\$ 18,780.00
52 . Crushed Limerock 70%	330	Tons	\$ 28.65	\$ 9,454.50	n/b	\$ -	\$ 26.15	\$ 8,629.50	\$ 28.26	\$ 9,325.80
53 . Pea Rock	594	Tons	\$ 38.40	\$ 22,809.60	n/b	\$ -	\$ 35.15	\$ 20,879.10	\$ 37.56	\$ 22,310.64
54 . Rice Rock	20	Tons	\$ 38.40	\$ 768.00	n/b	\$ -	\$ 35.15	\$ 703.00	\$ 37.56	\$ 751.20
55 . #57 Rock	570	Tons	\$ 38.40	\$ 21,888.00	n/b	\$ -	\$ 35.15	\$ 20,035.50	\$ 37.56	\$ 21,409.20
				\$ 163,590.95		\$ -		\$ 150,970.20		\$ 179,551.86
<b>Group 3B - Top Soils - Non- Sterile</b>										
56 . Top Soil Mix 90/10	20	Tons	\$ 113.80	\$ 2,276.00	\$ 49.85	\$ 997.00	n/b	\$ -	n/b	\$ -
57 . Top Soil Mix 80/20	570	Tons	\$ 122.78	\$ 69,984.60	\$ 57.35	\$ 32,689.50	\$ 40.80	\$ 23,256.00	n/b	\$ -
58 . Top Soil Mix 70/30	20	Tons	\$ 97.41	\$ 1,948.20	\$ 47.60	\$ 952.00	\$ 40.80	\$ 816.00	n/b	\$ -
59 . Top Soil Mix 50/50	60	Tons	\$ 40.00	\$ 2,400.00	n/b	\$ -	\$ 30.90	\$ 1,854.00	\$ 37.20	\$ 2,232.00
60 . Top Soil Mix 100%	240	Tons	\$ 31.00	\$ 7,440.00	n/b	\$ -	\$ 23.40	\$ 5,616.00	\$ 30.60	\$ 7,344.00
61 . Ortona Sand	20	Tons	\$ 60.70	\$ 1,214.00	\$ 37.00	\$ 740.00	\$ 32.40	\$ 648.00	n/b	\$ -
62 . Florida Lawn Sand	20	Tons	\$ 60.70	\$ 1,214.00	n/b	\$ -	\$ 18.00	\$ 360.00	\$ 48.00	\$ 960.00
63 . Mason Sand	20	Tons	\$ 59.75	\$ 1,195.00	\$ 35.20	\$ 704.00	\$ 45.60	\$ 912.00	n/b	\$ -
64 . Trap Sand #70	20	Tons	\$ 61.75	\$ 1,235.00	\$ 37.00	\$ 740.00	\$ 33.60	\$ 672.00	n/b	\$ -
				\$ 88,906.80		\$ 36,822.50		\$ 34,134.00		\$ 10,536.00
<b>Group 3C - Top Soils - Sterilized</b>										
65 . Top Soil Material 90/10 Sterilized	80	Tons	n/b	\$ -	\$ 49.85	\$ 3,988.00	n/b	\$ -	n/b	\$ -
66 . Top Soil Mix 80/20 sterilized	1,350	Tons	n/b	\$ -	\$ 57.35	\$ 77,422.50	n/b	\$ -	n/b	\$ -
67 . Top Soil 70/30 sterilized	80	Tons	n/b	\$ -	\$ 64.85	\$ 5,188.00	n/b	\$ -	n/b	\$ -
68 . Nursery Mix sterilized	30	Tons	n/b	\$ -	n/b	\$ -	n/b	\$ -	n/b	\$ -
69 . Exotic Mix sterilized	30	Tons	n/b	\$ -	n/b	\$ -	n/b	\$ -	n/b	\$ -
<b>CODE:</b>										
Yellow (Primary)				\$ -		\$ 86,598.50		\$ -		\$ -
Green (Secondary)										
Non-Responsive- Changed UOM to Yards										
<b>Total Zone 3</b>				\$ 252,497.75	\$ 123,421.00		\$ 185,104.20		\$ 190,087.86	

Zone 3 Includes: Davie, Lauderhill, Plantation and Sunrise



Southeast Florida Governmental Purchasing Cooperative

Rfd Tabulation Sheet

Rfd #2022-006

AGGREGATES, TOP SOILS AND SAND

Group	Description	Quantity	Unit	Austin Tupler Trucking, Inc.		Florida Superior Sand, Inc.		True Haul, LLC		Green Dream International	
				Unit Price	Total Price	Unit Price	Total Price	Unit Price	Total Price	Unit Price	Total Price
<b>Group 4A - Aggregates</b>											
70	Road Rock - Crushed Limerock <i>*Charge for double crush, if requested</i>	4,565	Tons	\$ 29.65	\$ 135,352.25	n/b	\$ -	\$ 26.45	\$ 120,744.25	\$ 28.26	\$ 129,006.90
				\$ 1.50		n/a	\$ -	n/a	\$ -		\$ -
71	Three-quarter inch Wash Rock	4,006	Tons	\$ 39.40	\$ 157,836.40	n/b	\$ -	\$ 35.45	\$ 142,012.70	\$ 80.40	\$ 322,082.40
72	Fill as per Attached Special Specifications	6,560	Tons	\$ 24.90	\$ 163,344.00	n/b	\$ -	\$ 24.05	\$ 157,768.00	\$ 23.46	\$ 153,897.60
73	Stabilizer Material	20	Tons	\$ 26.90	\$ 538.00	n/b	\$ -	\$ 26.45	\$ 529.00	\$ 28.26	\$ 565.20
74	Concrete Screenings	25	Tons	\$ 38.70	\$ 967.50	n/b	\$ -	\$ 35.45	\$ 886.25	\$ 37.56	\$ 939.00
75	Crushed Limerock 70%	3,000	Tons	\$ 29.65	\$ 88,950.00	n/b	\$ -	\$ 26.45	\$ 79,350.00	\$ 28.26	\$ 84,780.00
76	Pea Rock	20	Tons	\$ 39.40	\$ 788.00	n/b	\$ -	\$ 35.45	\$ 709.00	\$ 37.56	\$ 751.20
77	Rice Rock	20	Tons	\$ 39.40	\$ 788.00	n/b	\$ -	\$ 35.45	\$ 709.00	\$ 37.56	\$ 751.20
78	#57 Rock	60	Tons	\$ 39.40	\$ 2,364.00	n/b	\$ -	\$ 35.45	\$ 2,127.00	\$ 37.56	\$ 2,253.60
					\$ 550,928.15		\$ -		\$ 504,835.20		\$ 695,027.10
<b>Group 4B - Top Soils - Non-Sterile</b>											
79	Top Soil Mix 90/10	20	Tons	\$ 116.30	\$ 2,326.00	\$ 49.85	\$ 997.00	n/b	\$ -	n/b	\$ -
80	Top Soil Mix 80/20	100	Tons	\$ 125.28	\$ 12,528.00	\$ 57.35	\$ 5,735.00	\$ 41.40	\$ 4,140.00	n/b	\$ -
81	Top Soil Mix 70/30	120	Tons	\$ 99.91	\$ 11,989.20	\$ 47.60	\$ 5,712.00	\$ 41.40	\$ 4,968.00	n/b	\$ -
82	Top Soil Mix 50/50	10	Tons	\$ 41.00	\$ 410.00	n/b	\$ -	\$ 31.50	\$ 315.00	\$ 37.20	\$ 372.00
83	Top Soil Mix 100%	6,500	Tons	\$ 32.00	\$ 208,000.00	n/b	\$ -	\$ 24.00	\$ 156,000.00	\$ 30.60	\$ 198,900.00
84	Ortona Sand	200	Tons	\$ 60.70	\$ 12,140.00	\$ 37.00	\$ 7,400.00	\$ 43.80	\$ 8,760.00	n/b	\$ -
85	Florida Lawn Sand	7,510	Tons	\$ 60.70	\$ 455,857.00	n/b	\$ -	\$ 18.60	\$ 139,686.00	\$ 48.00	\$ 360,480.00
86	Mason Sand	140	Tons	\$ 59.75	\$ 8,365.00	\$ 35.20	\$ 4,928.00	\$ 57.00	\$ 7,980.00	n/b	\$ -
87	Trap Sand #70	120	Tons	\$ 61.75	\$ 7,410.00	\$ 37.00	\$ 4,440.00	\$ 45.00	\$ 5,400.00	n/b	\$ -
					\$ 719,025.20		\$ 29,212.00		\$ 327,249.00		\$ 559,752.00
<b>Group 4C - Top Soils - Sterilized</b>											
88	Top Soil Matenal 90/10 Sterilized	20	Tons	n/b	\$ -	\$ 49.85	\$ 997.00	n/b	\$ -	n/b	\$ -
89	Top Soil Mix 80/20 sterilized	20	Tons	n/b	\$ -	\$ 57.35	\$ 1,147.00	n/b	\$ -	n/b	\$ -
90	Top Soil 70/30 sterilized	100	Tons	n/b	\$ -	\$ 64.85	\$ 6,485.00	n/b	\$ -	n/b	\$ -
91	Nursery Mix sterilized	10	Tons	n/b	\$ -	n/b	\$ -	n/b	\$ -	n/b	\$ -
92	Exotic Mix sterilized	20	Tons	n/b	\$ -	n/b	\$ -	n/b	\$ -	n/b	\$ -
<b>CODE:</b>											
	Yellow (Primary)			\$ -	\$ -	\$ 8,629.00	\$ 8,629.00	\$ -	\$ -	\$ -	\$ -
	Green (Secondary)										
	Non-Responsive- Changed UOM to Yards										
	<b>Total Zone 4</b>				\$ 1,269,953.35	\$ 37,841.00	\$ 37,841.00	\$ 832,084.20	\$ 832,084.20	\$ 1,254,779.10	\$ 1,254,779.10

Zone 4 Includes: Fort Lauderdale, Oakland Park and Wiltom Manors



Southeast Florida Governmental Purchasing Cooperative

Bid Tabulation Sheet

Bid #2022-002

AGGREGATES, TOP SOILS AND SAND

Group	Item Description	Quantity	Unit	Austin Tupler Trucking, Inc.		Florida Superior Sand, Inc.		True Haul, LLC		Green Dream International			
				Estimated Annual	Price	Unit Price	Total Price	Unit Price	Total Price	Unit Price	Total Price	Unit Price	Total Price
				Quantity	Per								
<b>Group 5A - Aggregates</b>													
93	Road Rock - Crushed Limerock <i>*Charge for double crush, if requested</i>	100	Tons	\$ 29.65	\$ 2,965.00	n/b	\$ -	\$ 25.55	\$ 2,555.00	\$ 25.86	\$ 2,586.00		
				\$ 1.50		n/a		n/a		n/a			
94	Three-quarter inch Wash Rock	50	Tons	\$ 39.40	\$ 1,970.00	n/b	\$ -	\$ 34.55	\$ 1,727.50	\$ 78.00	\$ 3,900.00		
95	Fill as per Attached Special Specifications	20	Tons	\$ 24.90	\$ 498.00	n/b	\$ -	\$ 23.45	\$ 469.00	\$ 21.05	\$ 421.20		
96	Stabilizer Material	20	Tons	\$ 26.90	\$ 538.00	n/b	\$ -	\$ 25.85	\$ 517.00	\$ 25.86	\$ 517.20		
97	Concrete Screenings	200	Tons	\$ 38.70	\$ 7,740.00	n/b	\$ -	\$ 34.55	\$ 6,910.00	\$ 35.16	\$ 7,032.00		
98	Crushed Limerock 70%	25	Tons	\$ 29.65	\$ 741.25	n/b	\$ -	\$ 25.55	\$ 638.75	\$ 25.86	\$ 646.50		
99	Pea Rock	25	Tons	\$ 39.40	\$ 985.00	n/b	\$ -	\$ 34.55	\$ 863.75	\$ 35.16	\$ 879.00		
100	Rice Rock	20	Tons	\$ 39.40	\$ 788.00	n/b	\$ -	\$ 34.55	\$ 691.00	\$ 35.16	\$ 703.20		
101	#57 Rock	25	Tons	\$ 39.40	\$ 985.00	n/b	\$ -	\$ 34.55	\$ 863.75	\$ 35.16	\$ 879.00		
					\$ 17,210.25		\$ -		\$ 15,235.75		\$ 17,564.10		
<b>Group 5B - Top Soils - Non- Sterile</b>													
102	Top Soil Mix 90/10	20	Tons	\$ 119.30	\$ 2,386.00	\$ 49.85	\$ 997.00	n/b	\$ -	n/b	\$ -		
103	Top Soil Mix 80/20	300	Tons	\$ 128.28	\$ 38,484.00	\$ 57.35	\$ 17,205.00	\$ 40.50	\$ 12,150.00	n/b	\$ -		
104	Top Soil Mix 70/30	300	Tons	\$ 102.81	\$ 30,873.00	\$ 47.60	\$ 14,280.00	\$ 40.50	\$ 12,150.00	n/b	\$ -		
105	Top Soil Mix 50/50	20	Tons	\$ 41.00	\$ 820.00	n/b	\$ -	\$ 30.00	\$ 600.00	\$ 31.20	\$ 624.00		
106	Top Soil Mix 100%	20	Tons	\$ 32.00	\$ 640.00	n/b	\$ -	\$ 23.10	\$ 462.00	\$ 24.60	\$ 492.00		
107	Ortona Sand	20	Tons	\$ 60.70	\$ 1,214.00	\$ 37.00	\$ 740.00	\$ 32.40	\$ 648.00	n/b	\$ -		
108	Florida Lawn Sand	50	Tons	\$ 60.70	\$ 3,035.00	n/b	\$ -	\$ 17.70	\$ 885.00	\$ 42.00	\$ 2,100.00		
109	Mason Lawn Sand	20	Tons	\$ 59.75	\$ 1,195.00	\$ 35.20	\$ 704.00	\$ 45.60	\$ 912.00	n/b	\$ -		
110	Trap Sand #70	120	Tons	\$ 61.75	\$ 7,410.00	\$ 37.00	\$ 4,440.00	\$ 33.60	\$ 4,032.00	n/b	\$ -		
					\$ 86,057.00		\$ 38,366.00		\$ 31,839.00		\$ 3,216.00		
<b>Group 5C - Top Soils - Sterilized</b>													
111	Top Soil Material 90/10 Sterilized	100	Tons	n/b	\$ -	\$ 49.85	\$ 4,985.00	n/b	\$ -	n/b	\$ -		
112	Top Soil Mix 80/20 sterilized	100	Tons	n/b	\$ -	\$ 57.35	\$ 5,735.00	n/b	\$ -	n/b	\$ -		
113	Top Soil 70/30 sterilized	100	Tons	n/b	\$ -	\$ 64.85	\$ 6,485.00	n/b	\$ -	n/b	\$ -		
114	Nursery Mix sterilized	20	Tons	n/b	\$ -	n/b	\$ -	n/b	\$ -	n/b	\$ -		
115	Exotic Mix sterilized	20	Tons	n/b	\$ -	n/b	\$ -	n/b	\$ -	n/b	\$ -		
<b>CODE:</b>													
	Yellow (Primary)			\$ -	\$ -	\$ -	\$ 17,205.00	\$ -	\$ -	\$ -	\$ -		
	Green (Secondary)			\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		
	Non-Responsive- Changed UOM to Yards			\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		
	<b>Total Zone 5</b>			\$ -	\$ 103,267.25	\$ -	\$ 55,571.00	\$ -	\$ 47,074.75	\$ -	\$ 20,780.10		

Zone 5 Includes: Cooper City and Miramar

Southeast Florida Governmental Purchasing Cooperative

Bid Tabulation Sheet

Bid #2022-005

AGGREGATES, TOP SOILS AND SAND

Group	Item Description	Quantity	Unit	Austin Tupler Trucking, Inc.		Florida Superior Sand, Inc.		True Haul, LLC		Green Dream International			
				Estimated Annual	Price Per	Unit Price	Total Price	Unit Price	Total Price	Unit Price	Total Price	Unit Price	Total Price
				Quantity									
<b>Group 6A - Aggregates</b>													
116	Road Rock - Crushed Limerock <i>*Charge for double crush, if requested</i>	1,430	Tons	\$ 30.65	\$ 43,829.50	n/b	\$ -	\$ 26.45	\$ 37,823.50	\$ 25.86	\$ 36,979.80		
				\$ 1.50		n/a	\$ -	n/a	\$ -	n/a	\$ -		
117	Three-quarter inch Wash Rock	375	Tons	\$ 40.40	\$ 15,150.00	n/b	\$ -	\$ 35.45	\$ 13,293.75	\$ 78.00	\$ 29,250.00		
118	Fill as per Attached Special Specifications	325	Tons	\$ 25.90	\$ 8,417.50	n/b	\$ -	\$ 24.05	\$ 7,816.25	\$ 21.05	\$ 6,844.50		
119	Stabilizer Material	175	Tons	\$ 27.90	\$ 4,882.50	n/b	\$ -	\$ 26.45	\$ 4,628.75	\$ 25.86	\$ 4,525.50		
120	Concrete Screenings	150	Tons	\$ 39.70	\$ 5,955.00	n/b	\$ -	\$ 35.45	\$ 5,317.50	\$ 35.16	\$ 5,274.00		
121	Crushed Limerock 70%	325	Tons	\$ 30.65	\$ 9,961.25	n/b	\$ -	\$ 23.00	\$ 7,475.00	\$ 25.86	\$ 8,404.50		
122	Pea Rock	25	Tons	\$ 40.40	\$ 1,010.00	n/b	\$ -	\$ 35.45	\$ 886.25	\$ 35.16	\$ 879.00		
123	Rice Rock	20	Tons	\$ 40.40	\$ 808.00	n/b	\$ -	\$ 35.45	\$ 709.00	\$ 35.16	\$ 703.20		
124	#57 Rock	25	Tons	\$ 40.40	\$ 1,010.00	n/b	\$ -	\$ 35.45	\$ 886.25	\$ 35.16	\$ 879.00		
					\$ 91,023.75		\$ -		\$ 78,836.25		\$ 93,739.50		
<b>Group 6B - Top Soils - Non- Sterile</b>													
125	Top Soil Mix 90/10	150	Tons	\$ 124.55	\$ 18,682.50	\$ 49.85	\$ 7,477.50	n/b	\$ -	n/b	\$ -		
126	Top Soil Mix 80/20	131	Tons	\$ 133.53	\$ 17,492.43	\$ 57.35	\$ 7,512.85	\$ 41.40	\$ 5,423.40	n/b	\$ -		
127	Top Soil Mix 70/30	6	Tons	\$ 108.16	\$ 648.96	\$ 47.60	\$ 285.60	\$ 41.40	\$ 248.40	n/b	\$ -		
128	Top Soil Mix 50/50	156	Tons	\$ 42.00	\$ 6,552.00	n/b	\$ -	\$ 31.50	\$ 4,914.00	\$ 31.20	\$ 4,867.20		
129	Top Soil Mix 100%	150	Tons	\$ 33.00	\$ 4,950.00	n/b	\$ -	\$ 24.00	\$ 3,600.00	\$ 24.60	\$ 3,690.00		
130	Ortona Sand	500	Tons	\$ 60.70	\$ 30,350.00	\$ 37.00	\$ 18,500.00	\$ 43.80	\$ 21,900.00	n/b	\$ -		
131	Florida Lawn Sand	45	Tons	\$ 60.70	\$ 2,731.50	n/b	\$ -	\$ 18.60	\$ 837.00	\$ 42.00	\$ 1,890.00		
132	Mason Sand	20	Tons	\$ 59.75	\$ 1,195.00	\$ 35.20	\$ 704.00	\$ 57.00	\$ 1,140.00	n/b	\$ -		
133	Trap Sand #70	50	Tons	\$ 61.75	\$ 3,087.50	\$ 37.00	\$ 1,850.00	\$ 45.00	\$ 2,250.00	n/b	\$ -		
					\$ 85,689.89		\$ 36,329.95		\$ 40,312.80		\$ 10,447.20		
<b>Group 6C - Top Soils - Sterilized</b>													
134	Top Soil Material 90/10 Sterilized	275	Tons	n/b	\$ -	\$ 49.85	\$ 13,708.75	n/b	\$ -	n/b	\$ -		
135	Top Soil Mix 80/20 sterilized	256	Tons	n/b	\$ -	\$ 57.35	\$ 14,681.60	n/b	\$ -	n/b	\$ -		
136	Top Soil 70/30 sterilized	100	Tons	n/b	\$ -	\$ 64.85	\$ 6,485.00	n/b	\$ -	n/b	\$ -		
137	Nursery Mix sterilized	50	Tons	n/b	\$ -	n/b	\$ -	n/b	\$ -	n/b	\$ -		
138	Exotic Mix sterilized	50	Tons	n/b	\$ -	n/b	\$ -	n/b	\$ -	n/b	\$ -		
<b>CODE:</b>													
	Yellow (Primary)			\$ -	\$ -	\$ -	\$ 34,875.35	\$ -	\$ -	\$ -	\$ -		
	Green (Secondary)			\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		
	Non-Responsive- Changed UOM to Yards			\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		
	<b>Total Zone 6</b>				\$ 176,713.64		\$ 71,205.30		\$ 119,149.05		\$ 104,186.70		

Zone 6 Includes: Dania Beach, Hallandale Beach, and Hollywood

Southeast Florida Governmental Purchasing Cooperative

Bid Tabulation Sheet

Bid #2022-008

AGGREGATES, TOP SOILS AND SAND

Group	Item Description	Quantity	Unit	Austin Tupler Trucking, Inc.		Florida Superior Sand, Inc.		True Haul, LLC		Green Dream International	
				Estimated Annual Price	Total Price	Unit Price	Total Price	Unit Price	Total Price	Unit Price	Total Price
				Per							
<b>Group 7A - Aggregates</b>											
139	Road Rock - Crushed Limerock <i>*Charge for double crush, if requested</i>	500	Tons	\$ 35.65	\$ 17,825.00	n/b	\$ -	\$ 25.85	\$ 12,925.00	\$ 25.86	\$ 12,930.00
				\$ 1.50		n/a		n/a		n/a	
140	Three-quarter inch Wash Rock	20	Tons	\$ 45.40	\$ 908.00	n/b	\$ -	\$ 34.85	\$ 697.00	\$ 78.00	\$ 1,560.00
141	Fill as per Attached Special Specifications	20	Tons	\$ 30.90	\$ 618.00	n/b	\$ -	\$ 23.45	\$ 469.00	\$ 21.06	\$ 421.20
142	Stabilizer Material	20	Tons	\$ 32.90	\$ 658.00	n/b	\$ -	\$ 25.85	\$ 517.00	\$ 25.86	\$ 517.20
143	Concrete Screenings	20	Tons	\$ 44.70	\$ 894.00	n/b	\$ -	\$ 34.85	\$ 697.00	\$ 35.16	\$ 703.20
144	Crushed Limerock 70%	20	Tons	\$ 35.65	\$ 713.00	n/b	\$ -	\$ 25.85	\$ 517.00	\$ 25.86	\$ 517.20
145	Pea Rock	20	Tons	\$ 45.40	\$ 908.00	n/b	\$ -	\$ 34.85	\$ 697.00	\$ 35.16	\$ 703.20
146	Rice Rock	20	Tons	\$ 45.40	\$ 908.00	n/b	\$ -	\$ 34.85	\$ 697.00	\$ 35.16	\$ 703.20
147	#57 Rock	500	Tons	\$ 45.40	\$ 22,700.00	n/b	\$ -	\$ 34.85	\$ 17,425.00	\$ 35.16	\$ 17,580.00
					\$ 46,132.00		\$ -		\$ 34,641.00		\$ 35,635.20
<b>Group 7B - Top Soils - Non- Sterile</b>											
148	Top Soil Mix 90/10	20	Tons	\$ 131.80	\$ 2,636.00	\$ 50.85	\$ 1,017.00	n/b	\$ -	n/b	\$ -
149	Top Soil Mix 80/20	20	Tons	\$ 140.78	\$ 2,815.60	\$ 58.35	\$ 1,167.00	\$ 40.80	\$ 816.00	n/b	\$ -
150	Top Soil Mix 70/30	20	Tons	\$ 115.41	\$ 2,308.20	\$ 48.60	\$ 972.00	\$ 40.80	\$ 816.00	n/b	\$ -
151	Top Soil Mix 50/50	600	Tons	\$ 47.00	\$ 28,200.00	n/b	\$ -	\$ 30.00	\$ 18,000.00	\$ 25.20	\$ 15,120.00
152	Top Soil Mix 100%	20	Tons	\$ 38.00	\$ 760.00	n/b	\$ -	\$ 23.40	\$ 468.00	\$ 18.60	\$ 372.00
153	Ortona Sand	20	Tons	\$ 65.70	\$ 1,314.00	\$ 38.00	\$ 760.00	\$ 43.80	\$ 876.00	n/b	\$ -
154	Florida Lawn Sand	20	Tons	\$ 65.70	\$ 1,314.00	n/b	\$ -	\$ 18.00	\$ 360.00	\$ 36.00	\$ 720.00
155	Mason Sand	600	Tons	\$ 64.75	\$ 38,850.00	\$ 36.20	\$ 21,720.00	\$ 57.00	\$ 34,200.00	n/b	\$ -
156	Trap Sand #70	20	Tons	\$ 66.75	\$ 1,335.00	\$ 38.00	\$ 760.00	\$ 45.00	\$ 900.00	n/b	\$ -
					\$ 79,532.80		\$ 26,396.00		\$ 56,436.00		\$ 16,212.00
<b>Group 7C - Top Soils - Sterilized</b>											
157	Top Soil Material 90/10 Sterilized	20	Tons	n/b	\$ -	\$ 50.85	\$ 1,017.00	n/b	\$ -	n/b	\$ -
158	Top Soil Mix 80/20 sterilized	100	Tons	n/b	\$ -	\$ 58.35	\$ 5,835.00	n/b	\$ -	n/b	\$ -
159	Top Soil 70/30 sterilized	20	Tons	n/b	\$ -	\$ 65.85	\$ 1,317.00	n/b	\$ -	n/b	\$ -
160	Nursery Mix sterilized	20	Tons	n/b	\$ -	n/b	\$ -	n/b	\$ -	n/b	\$ -
161	Exotic Mix sterilized	20	Tons	n/b	\$ -	n/b	\$ -	n/b	\$ -	n/b	\$ -
<b>CODE:</b>											
	Yellow (Primary)				\$ -		\$ 8,169.00		\$ -		\$ -
	Green (Secondary)										
	Non-Responsive- Changed UOM to Yards										
	<b>Total Zone 7</b>				\$ 125,664.80		\$ 34,565.00		\$ 91,077.00		\$ 51,847.20

Zone 7 Includes: North Miami Beach

Southeast Florida Governmental Purchasing Cooperative

Bid Tabulation Sheet

Bid #2022-006

AGGREGATES, TOP SOILS AND SAND

Group	Item Description	Quantity	Unit	Austin Tupler Trucking, Inc.		Florida Superior Sand, Inc.		Tru Haul, LLC		Green Dream International			
				Estimated Annual	Price	Unit Price	Total Price	Unit Price	Total Price	Unit Price	Total Price	Unit Price	Total Price
				Quantity	Per								
<b>Group 8A - Aggregates</b>													
162	Road Rock - Crushed Limerock <i>*Charge for double crush, if requested</i>	419	Tons	\$ 40.65	\$ 17,032.35	n/b	\$ -	\$ 41.15	\$ 17,241.85	\$ 49.86	\$ 20,891.34		
				\$ 1.50		n/b		n/a		n/a			
163	Three-quarter inch Wash Rock	55	Tons	\$ 50.40	\$ 2,772.00	n/b	\$ -	\$ 50.15	\$ 2,758.25	\$ 102.00	\$ 5,610.00		
164	Fill as per Attached Special Specifications	100	Tons	\$ 35.90	\$ 3,590.00	n/b	\$ -	\$ 39.05	\$ 3,905.00	\$ 45.06	\$ 4,506.00		
165	Stabilizer Material	210	Tons	\$ 37.90	\$ 7,959.00	n/b	\$ -	\$ 41.45	\$ 8,704.50	\$ 49.86	\$ 10,470.60		
166	Concrete Screenings	20	Tons	\$ 49.70	\$ 994.00	n/b	\$ -	\$ 50.15	\$ 1,003.00	\$ 59.16	\$ 1,183.20		
167	Crushed Limerock 70%	70	Tons	\$ 40.65	\$ 2,845.50	n/b	\$ -	\$ 41.15	\$ 2,880.50	\$ 49.86	\$ 3,490.20		
168	Pea Rock	70	Tons	\$ 50.40	\$ 3,528.00	n/b	\$ -	\$ 50.15	\$ 3,510.50	\$ 59.16	\$ 4,141.20		
169	Rice Rock	20	Tons	\$ 50.40	\$ 1,008.00	n/b	\$ -	\$ 50.15	\$ 1,003.00	\$ 59.16	\$ 1,183.20		
170	#57 Rock	50	Tons	\$ 50.40	\$ 2,520.00	n/b	\$ -	\$ 50.15	\$ 2,507.50	\$ 59.16	\$ 2,958.00		
					\$ 42,248.85		\$ -		\$ 43,514.10		\$ 54,433.74		
<b>Group 8B - Top Soils - Non- Sterile</b>													
171	Top Soil Mix 90/10	5	Tons	\$ 110.30	\$ 551.50	\$ 50.85	\$ 254.25	n/b	\$ -	n/b	\$ -		
172	Top Soil Mix 80/20	80	Tons	\$ 119.28	\$ 9,542.40	\$ 58.35	\$ 4,668.00	\$ 59.10	\$ 4,728.00	n/b	\$ -		
173	Top Soil Mix 70/30	102	Tons	\$ 93.91	\$ 9,578.82	\$ 48.60	\$ 4,957.20	\$ 59.10	\$ 6,028.20	n/b	\$ -		
174	Top Soil Mix 50/50	60	Tons	\$ 52.00	\$ 3,120.00	n/b	\$ -	\$ 49.20	\$ 2,952.00	\$ 61.20	\$ 3,672.00		
175	Top Soil Mix 100%	8	Tons	\$ 43.00	\$ 344.00	n/b	\$ -	\$ 41.70	\$ 333.60	\$ 54.60	\$ 436.80		
176	Ortona Sand	1,460	Tons	\$ 60.70	\$ 88,622.00	\$ 38.00	\$ 55,480.00	\$ 46.20	\$ 67,452.00	n/b	\$ -		
177	Florida Lawn Sand	65	Tons	\$ 60.70	\$ 3,945.50	n/b	\$ -	\$ 33.00	\$ 2,145.00	\$ 72.00	\$ 4,680.00		
178	Mason Sand	200	Tons	\$ 59.75	\$ 11,950.00	\$ 36.20	\$ 7,240.00	\$ 58.40	\$ 11,880.00	n/b	\$ -		
179	Trap Sand #70	1,325	Tons	\$ 61.75	\$ 81,818.75	\$ 38.00	\$ 50,350.00	\$ 47.40	\$ 62,805.00	n/b	\$ -		
					\$ 209,472.97		\$ 122,949.45		\$ 158,323.80		\$ 8,788.80		
<b>Group 8C - Top Soils - Sterilized</b>													
180	Top Soil Material 90/10 Sterilized	25	Tons	n/b	\$ -	\$ 50.85	\$ 1,271.25	n/b	\$ -	n/b	\$ -		
181	Top Soil Mix 80/20 sterilized	50	Tons	n/b	\$ -	\$ 58.35	\$ 2,917.50	n/b	\$ -	n/b	\$ -		
182	Top Soil 70/30 sterilized	25	Tons	n/b	\$ -	\$ 65.85	\$ 1,646.25	n/b	\$ -	n/b	\$ -		
183	Nursery Mix sterilized	20	Tons	n/b	\$ -	n/b	\$ -	n/b	\$ -	n/b	\$ -		
184	Exotic Mix sterilized	20	Tons	n/b	\$ -	n/b	\$ -	n/b	\$ -	n/b	\$ -		
<b>CODE:</b>													
	Yellow (Primary)				\$ -		\$ 5,835.00		\$ -		\$ -		
	Green (Secondary)												
	Non-Responsive- Changed UOM to Yards												
	<b>Total Zone 8</b>				\$ 251,721.82		\$ 128,784.45		\$ 201,837.90		\$ 63,222.54		

Zone 8 Includes: Boca Raton and Boynton Beach



**Consent Agenda  
9.3.**

City of North Miami Beach  
17011 NE 19 Avenue  
North Miami Beach, FL 33162  
305-947-7581  
www.citynmb.com

**MEMORANDUM**

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<b>TO:</b>	Mayor and City Commission
<b>FROM:</b>	Hamid Nikvan, NMB Water Director
<b>VIA:</b>	Mario A. Diaz, City Manager
<b>DATE:</b>	January 21, 2025

---

**RE:** Resolution No. R2025-02 Change Order for Advanced Environmental Laboratories, Inc. for Laboratory Testing Services (Hamid Nikvan, NMB Water Director)

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**Description**

City of North Miami Beach Water Department utilize the services of Advanced Environmental Laboratories, Inc. for Environmental Sampling and Analytical Laboratory Services through the City of Jacksonville's Piggyback Contract No. RFP 05-2122 for five-year term effective April 18, 2022, through April 18, 2027.

**BACKGROUND ANALYSIS:**

The service is necessary to provide testing from a National Environmental Laboratory Accreditation Program (NELAP), certified laboratory for different parameters which the Utilities Laboratory of North Miami Beach does not perform. Regular testing and monitoring are essential to ensure that drinking water meet the Federal, State, and County standards, free of chemical and microbiological contaminants, and be in compliance with regulatory drinking water standards.

**RECOMMENDATION:** The NMB Water Director and Chief Procurement Officer recommend that the City Commission approve and authorize the City Manager or designee to approve a change order to the contract for an annual expenditure of \$60,000 with Advanced Environmental Laboratories, Inc.

**FISCAL/ BUDGETARY**

**IMPACT:** As approved in the adopted budget appropriation.

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**ATTACHMENTS:**

**Description**

- ▣ Advanced Environmental Lab\_Resolution
- ▣ Advanced Environmental Lab\_Change Order Form



**RESOLUTION NO. 2025-**

**A RESOLUTION OF THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA, APPROVING AND AUTHORIZING A CHANGE ORDER TO THE CONTRACT WITH ADVANCED ENVIRONMENTAL LABORATORIES, INC. INCREASING THE ESTIMATED ANNUAL EXPENDITURE BY \$60,000.00 FOR THE PURCHASE OF LABORATORY TESTING SERVICES; AUTHORIZING THE CITY MANAGER OR DESIGNEE TO DO ALL THINGS NECESSARY TO EFFECTUATE THIS RESOLUTION; PROVIDING FOR CONFLICTS; PROVIDING FOR SCRIVENER ERRORS; PROVIDING FOR SEVERABILITY; SUBJECT TO THE BUDGET APPROPRIATION AND AVAILABILITY OF FUNDS; AND PROVIDING FOR AN EFFECTIVE DATE.**

**WHEREAS**, pursuant to Chapter 166, *Florida Statutes* and Section 1.4 of the Charter of the City of North Miami Beach (“City”), the City shall have all available governmental, corporate, and proprietary powers and may exercise them except when prohibited by law; and

**WHEREAS**, City of Jacksonville awarded Contract RFP No. 05-2122 Environmental Sampling and Analytical Laboratory Services to Advanced Environmental Laboratories, Inc. for a five-year term effective April 18, 2022, through April 18, 2027.

**WHEREAS**, under the City Manager’s authority, a budgeted amount of \$50,000 was previously approved. An additional \$60,000 for continual laboratory testing services and materials are needed for daily operations, maintaining the City’s compliance with Federal, State and County water standards; and

**WHEREAS**, Section 3-3.20 of the Code of Ordinances City of North Miami Beach, Florida, 2008 (“Code”) requires that change orders exceeding 10% or \$50,000.00, whichever is less, shall be approved by the City Commission; and

**WHEREAS**, the City Manager and Chief Procurement Officer recommend that the City Commission approve and authorize the City Manager or designee to execute a Change Order to the previously approved Contract to increase the previously approved expenditure by \$60,000, thereby increasing the annual expenditure to \$110,000; and

**WHEREAS**, the Mayor and City Commission believe it is in the best interests of the City to approve and authorize the City Manager or designee to execute a Change Order to the previously approved Contract to increase the previously approved expenditure by \$60,000, thereby increasing the annual expenditure to \$110,000 for the purchase of laboratory testing services and materials.

**NOW, THEREFORE, BE IT RESOLVED BY THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA, THAT:**

**RESOLUTION NO. R2025-XX**

**Section 1.** The foregoing whereas clauses are true and correct and adopted as the legislative and administrative findings of the City Commission and made a specific part of this Resolution; all exhibits attached hereto are made a specific part of this Resolution.

**Section 2.** The Change Order, in substantially the form attached as Exhibit “A,” to the previously approved Contract with Advanced Environmental Laboratories, Inc. to increase the annual expenditure by \$60,000 thereby increasing the annual expenditure to \$110,000 for the purchase of laboratory testing services and materials, subject to budget appropriation and availability of funds is hereby approved.

**Section 3.** The City Manager or designee is authorized to do all things necessary to effectuate this Resolution.

**Section 4.** All Resolutions or parts of Resolutions in conflict with this Resolution are repealed to the extent of such conflict.

**Section 5.** Any scrivener or typographical errors that do not affect intent may be corrected with notice to, and the authorization of the City Attorney and City Manager without further process.

**Section 6.** If any provision of this Resolution or the application thereof to any person or circumstance is held invalid, such invalidity shall not affect other provisions or applications of this Resolution that can be given effect without the invalid provision or application, and to this end the provisions of this Resolution are declared to be severable.

**Section 7.** This Resolution shall take effect immediately upon adoption.

**[THE REMAINDER OF THIS PAGE INTENTIONALLY LEFT BLANK]**

**RESOLUTION NO. R2025-XX**



**APPROVED AND ADOPTED** by the City of North Miami Beach City Commission at the regular meeting assembled this **21<sup>st</sup> day of January 2025**.

ATTEST:

\_\_\_\_\_  
ANDRISE BERNARD, MMC  
CITY CLERK

\_\_\_\_\_  
MICHAEL JOSEPH  
MAYOR

(CITY SEAL)

APPROVED AS TO FORM AND LEGAL SUFFICIENCY FOR THE USE  
AND RELIANCE OF THE CITY OF NORTH MIAMI BEACH ONLY:

GREENSPOON MARDER, LLP.

By: \_\_\_\_\_  
CITY ATTORNEYS

Sponsored by: Mayor & Commission

**RESOLUTION NO. R2025-XX**

# EXHIBIT A



## CHANGE ORDER FORM

PROCUREMENT MANAGEMENT DIVISION

(Revised 5.1.23)

Title:	Contract No.: _____
	Purchase Order No.: _____
Vendor:	Change Order No.:
Contract Award Date:	Completion Date:
Revised Completion Date (prior to this change):	Extension(s) of Time Previously Approved:        days
Revised Completion Date (including this change):	

<b>Summary of Amount</b>	
<i>Original Amount</i>	\$
Change Orders Previously Approved	\$
Adjusted Value Prior to this Change Order	\$
Cost of Changes in this Change Order	\$
<i>Adjusted Amount Including this Change</i>	\$
Percentage Increase this Change Order	%
Total Percent Increase to Date	%
Extension of Time Allowed by this Change -	days

Description of Change:

Procurement Notes:

Account Number: \_\_\_\_\_

**Code of Ordinances – Chapter III Purchasing, 3-3.20 Change Orders**

*The City Manager may approve any change orders so long as the total sum of all change orders does not exceed the total amount awarded by the City Commission by more than either ten percent of the contract cost or \$50,000.00, whichever is less. The scope of any project may not be changed without prior approval of the City Commission. No increase in contract price shall be approved unless there are sufficient funds available for such purpose.*

***This change order is hereby incorporated into and becomes a part of the Contract.***

RECOMMENDED:

\_\_\_\_\_  
(Project Manager / Preparer)

By:

\_\_\_\_\_  
(Division Approval)

\_\_\_\_\_  
(Signature) (Date)

By:

\_\_\_\_\_  
(Department Head) (Date)

APPROVED:

By:

\_\_\_\_\_  
(Finance Department) (Date)

By:

\_\_\_\_\_  
(Procurement Department) (Date)

By:

\_\_\_\_\_  
(Mario A. Diaz, City Manager) (Date)

CONTRACT AGREEMENT for Bid No. 05-2122

TITLE: Environmental Sampling and Analytical Laboratory Services

City of Jacksonville Beach, Public Works Dept.

Effective Date: 04/18/2022

Term: 5 years

End Date: 04/18/2027

## CONTRACT AGREEMENT

THIS AGREEMENT made and entered into this 05 day of May, 2022 by and between the CITY OF JACKSONVILLE BEACH, FLORIDA, a municipality organized and existing under the laws of the State of Florida, hereinafter called the CITY, and Advanced Environmental Laboratories, Inc., hereinafter called CONTRACTOR:

WITNESSETH:

CITY and CONTRACTOR, in consideration of the mutual covenants hereinafter set forth, agree as follows:

### Article 1: Scope of Services

CONTRACTOR shall complete all work as specified or indicated in the Contract Documents. The Work is generally described as follows:

**RFP No. 05-2122 ENVIRONMENTAL SAMPLING AND ANALYTICAL  
LABORATORY SERVICES for  
THE CITY OF JACKSONVILLE BEACH, FLORIDA,**

**for a period of five (5) years from the effective date of this agreement.**

All services shall be performed in accordance with the Specifications prepared by the City of Jacksonville Beach, Beaches Energy Services, and the proposed services will be awarded as one (1) Contract. Services shall be for all materials, equipment and services, including labor to perform Marketing Services, of which the requirements and scope of services is detailed in:

**Attachment "A": RFP No. 05-2122 ENVIRONMENTAL SAMPLING AND  
ANALYTICAL LABORATORY SERVICES**

### Article 2: CITY'S Responsibility

Access to Work Area: The CITY shall provide the CONTRACTOR access to all areas in which services are to be performed.

### Article 3: Terms of Agreement

This Agreement shall be effective from the date of, **April 18, 2022**. And will continue in effect through five (5) years ending on **April 18, 2027**.

### Article 4: Nonexclusive Contract

Nothing herein is intended nor shall be construed as creating any exclusive arrangement with the CONTRACTOR. This Contract shall not restrict the CITY from acquiring similar, equal or like goods and/or services from other entities or sources.

### Article 5: Payment To Contractor

The CONTRACTOR agrees to provide services as described in the CONTRACT DOCUMENTS and comply with the terms therein.

5.1 For Basic Services: CITY shall pay CONTRACTOR for Contractual Services performed or furnished under the

RFP No. 05-2122 ENVIRONMENTAL SAMPLING AND ANALYTICAL LABORATORY SERVICES (Attachment "A"),

As set forth in the Contractor's Proposal Packet (Attachment "B") submitted by the Contractor in response to: RFP No. 05-2122 ENVIRONMENTAL SAMPLING AND ANALYTICAL LABORATORY SERVICES and associated PROPOSAL TENDER FORM.

5.2 For Additional Services: Notwithstanding the scope of work enumerated in

Attachment "A": RFP No. 05-2122 ENVIRONMENTAL SAMPLING AND ANALYTICAL LABORATORY SERVICES

the CONTRACTOR will, upon written request from the CITY, provide any and all other services normally falling within the services offered by the CONTRACTOR. In advance of performance of additional services, CITY and CONTRACTOR shall agree in writing to the additional services and negotiated price, consistent with the type of services requested.

5.3 Invoices.

- A. Preparation of Invoices: Invoices will be prepared in accordance with CONTRACTOR'S standard invoicing practices and will be submitted to the CITY by CONTRACTOR, unless otherwise agreed. The amount billed in each invoice will be calculated as set forth herein. Invoices are to be issued by the 10<sup>th</sup> of the month for services rendered in the previous month.
- B. Payment of Invoices: Invoices are due and payable within 30 days of receipt.
- C. Disputed Invoices: In the event of a disputed or contested invoice, only that portion so contested may be withheld from payment, and the undisputed portion will be paid.

5.4 Payment Upon Termination: In the event of termination, CONTRACTOR will be entitled to be paid for all services performed or furnished through the effective date of termination.

5.5 Records of CONTRACTOR'S cost: Records of CONTRACTOR'S cost pertinent to CONTRACTOR'S compensation under this Agreement shall be kept in accordance with generally accepted accounting practices. Upon the CITY'S request, copies of such records will be made available by the CONTRACTOR to the CITY, at no cost to the CITY.

CONTRACT AGREEMENT for Bid No. 05-2122

TITLE: Environmental Sampling and Analytical Laboratory Services

City of Jacksonville Beach, Public Works Dept.

Effective Date: 04/18/2022

Term: 5 years

End Date: 04/18/2027

### Article 6: Standards of Performance

CONTRACTOR and CITY shall comply with applicable Laws, Regulations, and CITY mandated standards. This Agreement is based on these requirements as of its Effective Date and includes the attached:

Attachment "A": RFP No. 05-2122 ENVIRONMENTAL SAMPLING AND ANALYTICAL LABORATORY SERVICES

Changes to these requirements after the Effective Date may be the basis for modifications to CONTRACTOR'S scope of work, times of performance, or compensation.

### Article 7: Contractor as Independent Contractor

It is expressly agreed and understood that the CONTRACTOR is in all respects, an independent contractor as to the WORK and is in no respect an agent, servant, or employee of the CITY. This Agreement specifies the WORK to be done by the CONTRACTOR, but the method to be employed to accomplish the WORK shall be the responsibility of the CONTRACTOR.

### Article 8: Subcontracting

CONTRACTOR may subcontract services to be performed hereunder with prior approval of the CITY. No such approval will be construed as making the CITY a party of or to such subcontract, or subjecting the CITY to liability of any kind to any subcontract. No subcontract shall, under any circumstances, relieve the CONTRACTOR of its liability and obligation under this Agreement; and despite any such subcontracting, the CITY shall deal through the CONTRACTOR, and subcontractors will be dealt with as workers and representatives of the CONTRACTOR.

### Article 9: Authorized Project Representatives

Upon the execution of this Agreement, CONTRACTOR and CITY shall designate specific individuals to act as representatives with respect to the services to be performed or furnished by CONTRACTOR and responsibilities of CITY under this Agreement. Such individuals shall have authority to transmit instructions, receive information, and render decisions relative to the WORK on behalf of each respective party.

### Article 10: Inspection of Work

The CONTRACTOR shall furnish the CITY or the CITY'S representative with every reasonable opportunity for determining whether or not the WORK is performed in accordance with the requirements of this Agreement. The CITY may appoint persons to inspect the CONTRACTOR'S operations, equipment, and performance, and the CONTRACTOR shall permit these persons to make such inspections.

CONTRACT AGREEMENT for Bid No. 05-2122

TITLE: Environmental Sampling and Analytical Laboratory Services

City of Jacksonville Beach, Public Works Dept.

Effective Date: 04/18/2022

Term: 5 years

End Date: 04/18/2027

### Article 11: Right To Require Performance

The failure of either the CITY or CONTRACTOR at any time to require performance by the other party of any provisions hereof shall in no way affect the right of the performing party thereafter to enforce the same. Nor shall waiver by such party of any breach of any provision hereof be taken or held to be a waiver of any succeeding breach of such provision or as a waiver of any provision itself.

### Article 12: Extraordinary Occurrences

It is agreed that in no event shall the CITY or CONTRACTOR be liable or responsible to each other or to other persons for damages resulting from deficiencies or delays in the work herein provided for, where such deficiencies or delays result from Acts of God, fire, natural disaster, or any other cause not within reasonable control of the CITY or the CONTRACTOR. The CONTRACTOR recognizes the essential nature of the services to be performed hereunder and will use its best efforts to discharge its functions despite such extraordinary occurrences.

### Article 13: Insurance

13.1 Hold Harmless: The CITY shall be held harmless against all claims for bodily injury, disease, death, personal injury, and damage to property or loss of use resulting there from, to the extent caused by the CONTRACTOR, unless such claims are a result of the CITY'S sole negligence.

13.2 Payment on Behalf of the CITY: The CONTRACTOR agrees to pay on behalf of the CITY, the CITY'S legal defense, for all claims described herein. Such payment on behalf of the CITY shall be in addition to all other legal remedies available to the CITY and shall not be considered to be the CITY's exclusive remedy.

13.3 Loss Control/Safety: Precaution shall be exercised at all times by the CONTRACTOR for the protection of all persons, employees, and property. The CONTRACTOR shall comply with all laws, regulations and ordinances related to safety and health, shall make special efforts to detect hazardous conditions, and shall take prompt action where loss control and safety measures should reasonably be expected.

13.4 Proof of Carriage of Insurance & Naming CITY as Additional Insured. The CONTRACTOR shall furnish the City with satisfactory proof of carriage of insurance required herein. The CONTRACTOR shall name the City of Jacksonville Beach (CITY) as additional insured on the CONTRACTOR's, and any sub-consultant or subcontractor's Public Liability, Property Damage and Comprehensive Automobile Liability Insurance Policies. The additional insured shall be provided the same coverage as the primary insured for losses arising from work performed by the CONTRACTOR or its sub consultant's or subcontractor's. The proof of carriage or a copy of all policies shall be required prior to commencement of any work under this Contract.

The CITY may order work to be stopped if conditions exist that present immediate danger to persons or property. The CONTRACTOR acknowledges that such stoppage will not shift responsibility for any damages from the CONTRACTOR to the cry.

13.5 Insurance Requirements. Basic Coverage's required: During the term of this contract, the CONTRACTOR shall procure and maintain the following-described insurance and/or self-insurance except for coverage's specifically waived by the CITY. All policies and insurers must be acceptable to the CITY.

These insurance requirements shall not limit the liability of the CONTRACTOR. The CITY does not represent these types of amounts of insurance to be sufficient or adequate to protect the CONTRACTOR'S interests or liabilities, but are merely minimums.

A. Workers Compensation Coverage is required.

The CONTRACTOR and all subcontractors shall purchase and maintain worker's compensation insurance for all workers compensation obligations imposed by state law with employers' liability limits of at least \$ 100,000 each accident, \$ 100,000 each employee and \$500,000 policy limit for disease.

The CONTRACTOR and all subcontractors shall also purchase any other coverage's required by law for the benefit of employees.

B. General Liability Coverage is required for all Contractors and Subcontractors.

Commercial General Liability in Occurrence Form.

Coverage A shall include Bodily Injury and Property Damage coverage for liability. claims arising from premises, operations, contractual liability, independent Contractors, products and complete operations and including but not limited to coverage for claims resulting from explosion, collapse, or underground (x,c,u) exposures (if any).

Coverage B shall include personal injury and is required

Coverage C, medical payments is not required.

Amounts:	\$1,000,000	Bodily Injury:	each
	\$1,000,000	occurrence aggregate	
	\$1,000,000	Property	Damage:each occurrence
	\$1,000,000	aggregate	

C. Products and Completed Operations are required for Contractor and all Subcontractors.

Amounts: \$ 1,000,000 aggregate

D. Business Auto Liability Coverage is required for Contractor and all Subcontractors.



Business Auto Liability coverage is to include bodily injury and property damage arising out of ownership, maintenance, or use of any vehicle, including owned, non-owned and hired vehicles, and employee non-ownership use.

Amounts:	Bodily Injury:	<b>\$1,000,000</b>	each occurrence
		<b>\$1,000,000</b>	aggregate
	Property Damage:	<b>\$1,000,000</b>	each occurrence
		<b>\$1,000,000</b>	aggregate

D. Professional Liability is not required.

E. Pollution Liability required of all Contractors and Subcontractors.

The CITY requires Pollution/Environmental Liability insurance covering cleanup costs including on-site discovery and third party liability, on-site and off-site third party pollution liability coverage, natural resources damage coverage.

Limits of Liability: \$1,000,000 each pollution event limit

\$1,000,000 aggregate policy limit

F. Excess or Umbrella Liability Coverage.

Umbrella Liability insurance is preferred, but an Excess Liability equivalent may be allowed. Whichever type of coverage is provided, it shall not be more restrictive than the underlying insurance policy coverage.

F. Claims Made Coverage No Gap

If any of the required liability insurance is provided on a "claims made" form, such coverage shall extend for a period of not less than 36 months following completion of the contract. In the event of termination of a claims made policy, extended coverage may be provided by assurance that extended discovery coverage of at least 36 months will be purchased from the expiring insurer, or by assurance that the succeeding insurer will provide retroactive coverage with an inception date of at least on or before the effective date of this contract.

G. Certificates of Insurance

Required insurance shall be documented in Certificates of Insurance which provide that the CITY shall be notified at least thirty (30) calendar days in advance of cancellation, non-renewal, or adverse change.

New Certificates of Insurance are to be provided to the CITY at least fifteen (15) calendar days prior to coverage renewals.

If requested by the CITY, the CONTRACTOR shall furnish complete copies of the CONTRACTOR's insurance policies, forms, and endorsements.

CONTRACT AGREEMENT for Bid No. 05-2122

TITLE: Environmental Sampling and Analytical Laboratory Services

City of Jacksonville Beach, Public Works Dept.

Effective Date: 04/18/2022

Term: 5 years

End Date: 04/18/2027

For Commercial General Liability coverage, the CONTRACTOR shall at the option of the CITY, provide an indication of the amount of claims, payments, or reserves chargeable to the aggregate amount of liability coverage. NQIE: Any sub-contractors approved by the CITY shall be required to provide proof of insurance identical in amounts as required by the contract to perform related services. All coverage's shall name the CITY as "additional insured".

Receipt of certificates or other documents of insurance or policies or copies of policies by the CITY, or by any of its representatives, which indicate less coverage than required will not constitute a waiver of the CONTRACTOR's obligation to fulfill the insurance requirements herein.

#### Article 14: Termination

The obligation to provide further services under this Agreement may be terminated:

14.1 For cause. By either the CITY or CONTRACTOR upon 30 days written notice in the event of substantial failure by the other party to perform in accordance with the terms hereof through no fault of the terminating party.

14.2 For convenience. By the CITY, effective upon the receipt of notice by CONTRACTOR. The CITY'S performance and obligation to pay under this Agreement is contingent upon an annual appropriation by the City Council.

#### Article 15: Indemnification

A: General Indemnity. To the fullest extent permitted by law, CONTRACTOR shall hold harmless, indemnify and pay on behalf of the CITY, CITY's officers, directors, partners, agents, contractors, and employees from and against any and all costs, losses, and damages, including claims for bodily injury, disease, death, personal injury and damage to property or loss of use resulting therefrom, and for professional liability, (including, but not limited to all fees and charges of contractors, architects, attorneys, and other professionals, and all court, arbitration, or other resolution costs) caused by the negligent acts or omissions of CONTRACTOR or CONTRACTOR's officers, directors, partners, agents, contractors, employees, and CONTRACTOR's consultants, agents, and contractors in the performance and furnishing of CONTRACTOR's services under this Agreement, unless such claims are a result of the CITY's sole negligence. Such payments on behalf of the CITY shall be in addition to all other legal remedies available to the CITY and shall not be considered to be the CITY's exclusive remedy.

B: Copyright and Intellectual Property Rights. At CONTRACTOR's expense as described herein, CONTRACTOR shall indemnify, defend and hold CITY and its affiliates and their respective directors, officers, employees, and contractors and agents harmless from and against any claims that any of the professional services allegedly infringe a patent, copyright, trademark, trade secrets or other intellectual property right by defending against such claim and paying all amounts that a court awards or that CONTRACTOR agrees to in settlement of such claim. CONTRACTOR shall also reimburse the CITY for all reasonable expenses incurred by the CITY in respect of each claim. To qualify for such defense and payment, CITY must: (i) give CONTRACTOR prompt written notice of such claim; and

(ii) allow CONTRACTOR to control, and fully co-operate with CITY in the defense and all related negotiations. CONTRACTOR's obligation under this Section is conditional upon CITY's agreement that, if the professional services become, or in CONTRACTOR's opinion (as stated in writing to CITY by CONTRACTOR) is likely to become the subject of an infringement claim, then CITY shall permit CONTRACTOR, at CONTRACTOR's expense, either to procure the right for CITY to continue to use such intellectual property contained in the professional services or to replace or modify it so that it becomes non-infringing and retains in all material respects comparable functionality in the CITY's environment. CONTRACTOR shall have no obligation with respect to any claim to the extent it is based on (i) CITY's use of the intellectual property contained in the professional services in violation of this Agreement; (ii) modifications or user controlled features not authorized by CONTRACTOR; (iii) custom programming for which CONTRACTOR does not develop the specifications or where the code at issue is supplied by CITY. This subsection states CONTRACTOR's entire obligation regarding intellectual property right infringement.

#### Article 16: Notices

Any notice required under this Agreement will be in writing, addressed to the appropriate party at its address on the signature page and given personally, or by registered or certified mail postage prepaid, or by a commercial courier service. All notices shall be effective upon date of receipt.

#### Article 17: Survival

All express representations, indemnifications, or limitations of liability included in this Agreement will survive its completion or termination for any reason.

#### Article 18: Severability

Any provision or part of the agreement held to be void or unenforceable under any Laws or Regulations shall be deemed stricken, and all remaining provisions shall continue to be valid and binding upon the CITY and CONTRACTOR, who agree that the Agreement shall be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.

#### Article 19: Waiver

Non-enforcement of any provision by either party shall not constitute a waiver of that provision, nor shall it affect the enforceability of that provision or of the remainder of this Agreement.

#### Article 20: Headings

The headings used in this Agreement are for general reference only and do not have special significance.

#### Article 21 : Contract Documents

The Contract Documents which comprise the entire Agreement between the CITY and CONTRACTOR consist of the following, which are made a part thereof:

CONTRACT AGREEMENT for Bid No. 05-2122

TITLE: Environmental Sampling and Analytical Laboratory Services

City of Jacksonville Beach, Public Works Dept.

Effective Date: 04/18/2022

Term: 5 years

End Date: 04/18/2027

21.1 Contract Agreement (pages I to 14, inclusive).

21.2 Attachment RFP No. 05-2122 ENVIRONMENTAL SAMPLING AND ANALYTICAL LABORATORY SERVICES in total.

21.3 Addendum numbers 1 through 3 inclusive to RFP No. 05-2122.

21.4 Attachment "B": Bid Proposal Packet submitted by Contractor in response to Attachment "A", RFP No. 05-2122 ENVIRONMENTAL SAMPLING AND ANALYTICAL LABORATORY SERVICES, including, but not limited to:

A. Contractor's PROPOSAL TENDER FORM

B. Contractor's DRUG-FREE WORKPLACE COIOLIANCE FORM

c. Contractor's NON-COLLUSION STATEMENT

21.5 Attachment "C": RFP No. 05-2122 Council Approved Memo

There are no Contract Documents other than those listed above in this Article 21. The Contract Documents may only be altered, amended, or repealed in accordance with the Terms and Conditions.

#### Article 22: Governing Law

This agreement shall be governed by the laws of the State of Florida. Both parties agree that the courts of the State of Florida shall have jurisdiction of any claim arising in connection with this agreement. In the event of litigation arising out of this agreement, the prevailing party shall be entitled to the award of attorney's fees and costs at both the trial and appellate level.

#### Article 23: Materials and Services

The professional fees for the CONTRACTOR's services are set forth on the "Fee Schedule" as contained in the CONTRACTOR's submitted proposal and made part hereof.

#### Article 24: General Terms

The Contractor shall hold harmless and defend the City, its officers, agents, and employees from and against all losses and all claims, demands, payments, suits, actions, recoveries, and judgments of every nature and description and all costs, including attorney fees, arising under this Agreement, including claims for property damage and claims for injury to or death of persons arising out of or occurring as a result of any act or omission of the City, its officers, agents, or employees in the performance of its obligation to the City, other than claims arising from the intentional or negligent acts or omissions of the City, its officers, agents, or employees.

The Contractor without exception shall indemnify and hold harmless the City, its officers, agents, and employees from liability of any nature or kind, including costs and expenses for, or on account of, any copyrighted, patented, or unpatented invention, process, or article manufactured or used in the performance of this Agreement, including use by the City.

CONTRACT AGREEMENT for Bid No. 05-2122

TITLE: Environmental Sampling and Analytical Laboratory Services

City of Jacksonville Beach, Public Works Dept.

Effective Date: 04/18/2022

Term: 5 years

End Date: 04/18/2027

The City is a government agency, therefore, the City is exempt from any sales tax. The City, however, agrees to reimburse the Contractor for any other taxes, duties, or other fees that the Contractor may be required to pay when performing services or producing material on behalf of the City.

It is agreed that all materials and information furnished to the Contractor by the City or to the City by the Contractor shall remain confidential, except to the extent that such materials and information have become a matter of public record, and such materials and information shall not be divulged except as required under this Agreement or by the Laws of the State of Florida.

#### Article 25. Public Records Law Chapter 119 Florida Statutes

The Parties acknowledge that the CITY is a governmental entity subject to the Florida Public Records Law, as governed by Chapter 119, Florida Statutes. In accordance with Section 119.0701, Florida Statutes, the following provisions are included in this contract:

**IF THE CONTRACTOR HAS QUESTIONS REGARDING THE APPLICATION OF CHAPTER 119, FLORIDA STATUTES, TO THE CONTRACTOR'S DUTY TO PROVIDE PUBLIC RECORDS RELATING TO THIS CONTRACT, CONTACT THE CUSTODIAN OF PUBLIC RECORDS AT THE CITY OF JACKSONVILLE BEACH, CITY CLERK'S OFFICE:**

**TELEPHONE NUMBER: 904-247-6250 EXT # 11**

**EMAIL ADDRESS: CITYCLERK@JAXBCHFL.NET**

**MAILING ADDRESS: 11 NORTH THIRD STREET**

**JACKSONVILLE BEACH, FL 32250**

The CONTRACTOR must keep and maintain public records required by the CITY to perform the service. The CONTRACTOR acknowledges that upon request from the CITY, the CONTRACTOR must provide the CITY with a copy of the requested records or allow the record to be inspected or copied within a reasonable time at a cost that does not exceed the cost provided in Chapter 119, Florida Statutes, or as otherwise provided by law. The CONTRACTOR must ensure that public records that are exempt or confidential and exempt from public records disclosure requirements are not disclosed except as authorized by law for the duration of the contract term and following completion of the contract if

The CONTRACTOR does not transfer the records to the CITY. Upon completion of the contract, The CONTRACTOR shall transfer, at no cost to the CITY, all public records in their possession OR keep and maintain all public records required by the CITY to perform the service contemplated herein. If The CONTRACTOR transfers all public records to the CITY upon completion of the contract, The CONTRACTOR shall destroy any duplicate public records that are exempt or confidential and exempt from public records disclosure requirements. If The CONTRACTOR keeps and maintains the public records upon completion of the contract, The CONTRACTOR shall meet all applicable requirements for retaining public records. All records stored electronically must be provided to the CITY, upon

CONTRACT AGREEMENT for Bid No. 05-2122

TITLE: Environmental Sampling and Analytical Laboratory Services

City of Jacksonville Beach, Public Works Dept.

Effective Date: 04/18/2022

Term: 5 years

End Date: 04/18/2027

request from the CITY, in a format that is compatible with the CITY's information technology systems.

The CONTRACTOR acknowledges that a request to inspect or copy public records relating to a CITY's contract for services must be made directly to the CITY. If the CITY does not possess the requested records, the CITY shall immediately notify The CONTRACTOR of the request, and The CONTRACTOR must provide the records to the CITY or allow the records to be inspected or copied within a reasonable time. If The CONTRACTOR fails to provide the public records to the CITY within a reasonable time it may be subject to penalties under s. 119.10, Florida Statutes. The CONTRACTOR acknowledges its potential liability pursuant to Section 119.0701 (4), Florida Statutes, if the CITY has to seek legal action to compel The CONTRACTOR to produce public records relating to a CITY's contract for services.

----- NOTHING ELSE FOLLOWS ON THIS PAGE -----

CONTRACT AGREEMENT for Bid No. 05-2122  
City of Jacksonville Beach, Public Works Dept.  
Effective Date: 04/18/2022

TITLE: Environmental Sampling and Analytical Laboratory Services  
Term: 5 years End Date: 04/18/2027

IN WITNESS WHEREOF, the parties hereto have signed this Agreement in triplicate. One counterpart each has been delivered to CITY and CONTRACTOR. All portions of the Contract Document have been signed or identified by CITY and CONTRACTOR on their behalf.

This agreement was made and entered into as of the last signature date shown below and has Effective Date of 04/18/2022 (Article 3).

CITY: CITY OF JACKSONVILLE BEACH, FLORIDA

BY: [Signature]  
Christine Hoffman, Mayor

BY: [Signature]  
Michael Staffopoulos, City Manager

ATTEST: [Signature]  
Sheri Gosselin, City Clerk

Approved as to form and legal sufficiency:  
[Signature]  
City Attorney

Date Signed: 05/10/2022

CONTRACTOR: Advanced Environmental Laboratories Inc.

BY: [Signature]

PRINTED NAME: CHARLES GED

TITLE: President

(CORPORATE SEAL)



ATTEST: [Signature]

PRINTED NAME: Stacie Weber

Date Signed: 5.6.2022

CONTRACT AGREEMENT for Bid No. 05-2122

TITLE: Environmental Sampling and Analytical Laboratory Services

City of Jacksonville Beach, Public Works Dept.

Effective Date: 04/18/2022

Term: 5 years

End Date: 04/18/2027

**AGENT FOR SERVICE OF PROCESS**

**CITY:**

**CONTRACTOR:**

Address for Giving Notices:

Address for Giving Notices:

City of Jacksonville Beach

Advanced Environmental Laboratories Inc.

Public Works Dept.

ATTN: Charles M. GED

1460A Stetter Avenue

6681 Southpoint Parkway

Jacksonville Beach, Florida 32250

Jacksonville, FL 332216

Designated Representative (Article 9):

Designated Representative (Article 9):

Name: Dennis Barron

Name: \_\_\_\_\_

Title: Public Works Director

Title: \_\_\_\_\_

Phone Number: 904-247-6219

Phone Number: \_\_\_\_\_





**Consent Agenda  
9.4.**

City of North Miami Beach  
17011 NE 19 Avenue  
North Miami Beach, FL 33162  
305-947-7581  
www.citynmb.com

**MEMORANDUM**

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<b>TO:</b>	Mayor and City Commission
<b>FROM:</b>	Samuel Zamacona, Public Works Director
<b>VIA:</b>	Mario A. Diaz, City Manager
<b>DATE:</b>	January 21, 2025

---

**RE:** Resolution No. R2025-03 Change Order for AMI Engineering for Reviewing, Grading and Drainage Plan Services (Samuel Zamacona, Public Works Director)

---

**Description**

**BACKGROUND  
ANALYSIS:**

The City's Public Works Department has enlisted the assistance of AMI Engineering, LLC to provide review services for the grading and drainage plans in compliance with City Codes and standards. AMI Engineering will also assist for Technical Review of Applications for Development (TRAD) and construction inspections. AMI is a certified small business with Miami Dade County, providing Complete Civil Engineering and Design Consulting Services from Planning through the Construction Close-Out of Infrastructure Projects.

The City is utilizing these services through City of Sweetwater's Contract-RFQ 2021-21 for a five-year term effective January 19, 2022, through January 19, 2027.

An Additional expenditure of \$75,000 is required to continue the successful completion of the City's pending application and plan reviews.

**RECOMMENDATION:** NMB Public Works Director and Chief Procurement Officer recommend that the City Commission approve and authorize the City Manager or designee to approve a change order to the contract, for an additional annual expenditure of \$75,000 with AMI Engineering, thereby increasing the annual expenditure to \$125,000.

**FISCAL/ BUDGETARY**

**IMPACT:**

As approved in the adopted budget appropriation.

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**ATTACHMENTS:**

**Description**

- ▣ AMI\_Resolution
- ▣ AMI Exhibit A\_Change Order Form

**RESOLUTION NO. 2025-**

**A RESOLUTION OF THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA, APPROVING AND AUTHORIZING A CHANGE ORDER TO THE CONTRACT WITH AMI ENGINEERING, INCREASING THE CONTRACT AMOUNT BY \$75,000 FOR THE PURCHASE OF PROFESSIONAL ENGINEERING SERVICES; AUTHORIZING THE CITY MANAGER OR DESIGNEE TO DO ALL THINGS NECESSARY TO EFFECTUATE THIS RESOLUTION; PROVIDING FOR CONFLICTS; PROVIDING FOR SCRIVENER ERRORS; PROVIDING FOR SEVERABILITY; SUBJECT TO THE BUDGET APPROPRIATION AND AVAILABILITY OF FUNDS; AND PROVIDING FOR AN EFFECTIVE DATE.**

**WHEREAS**, pursuant to Chapter 166, *Florida Statutes* and Section 1.4 of the Charter of the City of North Miami Beach (“City”), the City shall have all available governmental, corporate, and proprietary powers and may exercise them except when prohibited by law; and

**WHEREAS**, City of Sweetwater awarded Contract RFQ No. 2021-21 “Continuing Professional Services Agreement” to AMI Engineering for a period of five (5) years effective January 19, 2022 through January 19, 2027, with an option to renew for two additional one-year terms; and

**WHEREAS**, under the City Manager’s authority, a budgeted amount of \$50,000 was previously approved. An additional \$75,000 is required to ensure continuity of the service and adequately manage the City’s needs; and

**WHEREAS**, Section 3-3.20 of the Code of Ordinances City of North Miami Beach, Florida, 2008 (“Code”) requires that change orders exceeding 10% or \$50,000.00, whichever is less, shall be approved by the City Commission; and

**WHEREAS**, the City Manager and Chief Procurement Officer recommend that the City Commission approve and authorize the City Manager or designee to execute a Change Order to the previously approved Piggyback Contract to increase the previously approved expenditure by \$75,000 annually for a total expenditure of \$125,00.00; and

**WHEREAS**, the Mayor and City Commission believe it is in the best interests of the City to approve and authorize the City Manager or designee to execute a Change Order to the previously approved Contract to increase the previously approved expenditure by \$75,000, thereby increasing the annual expenditure to \$125,00.00 for professional engineering services; and

**NOW, THEREFORE, BE IT RESOLVED BY THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA, THAT:**

**Section 1.** The foregoing whereas clauses are true and correct and adopted as the legislative and administrative findings of the City Commission and made a specific part of this

**RESOLUTION NO. R2025-XX**

Resolution; all exhibits attached hereto are made a specific part of this Resolution.

**Section 2.** The Change Order, in substantially the form attached as Exhibit “A,” to the previously approved contract with AMI Engineering to increase annual expenditure by \$75,000, thereby increasing the annual expenditure to \$125,000 for the purchase of Professional Engineering Services, subject to budget appropriation and availability of funds is hereby approved.

**Section 3.** The City Manager or designee is authorized to do all things necessary to effectuate this Resolution.

**Section 4.** All Resolutions or parts of Resolutions in conflict with this Resolution are repealed to the extent of such conflict.

**Section 5.** Any scrivener or typographical errors that do not affect intent may be corrected with notice to, and the authorization of the City Attorney and City Manager without further process.

**Section 6.** If any provision of this Resolution or the application thereof to any person or circumstance is held invalid, such invalidity shall not affect other provisions or applications of this Resolution that can be given affect without the invalid provision or application, and to this end the provisions of this Resolution are declared to be severable.

**Section 7.** This Resolution shall take effect immediately upon adoption.

**[THE REMAINDER OF THIS PAGE INTENTIONALLY LEFT BLANK]**

**RESOLUTION NO. R2025-XX**

**APPROVED AND ADOPTED** by the City of North Miami Beach City Commission at the regular meeting assembled this **21<sup>st</sup> day of January 2025**.

ATTEST:

\_\_\_\_\_  
ANDRISE BERNARD, MMC  
CITY CLERK

\_\_\_\_\_  
MICHAEL JOSEPH  
MAYOR

(CITY SEAL)

APPROVED AS TO FORM AND LEGAL SUFFICIENCY FOR THE USE  
AND RELIANCE OF THE CITY OF NORTH MIAMI BEACH ONLY:

GREENSPOON MARDER, LLP.

By: \_\_\_\_\_  
CITY ATTORNEYS

Sponsored by: Mayor & Commission

**RESOLUTION NO. R2025-XX**



# EXHIBIT A

## CHANGE ORDER FORM

PROCUREMENT MANAGEMENT DIVISION  
(Revised 5.1.23)

Title:	Contract No.: _____ Purchase Order No.: _____
Vendor:	Change Order No.:
Contract Award Date:	Completion Date:
Revised Completion Date (prior to this change):	Extension(s) of Time Previously Approved:     days
Revised Completion Date (including this change):	

<b>Summary of Amount</b>	
<i>Original Amount</i>	\$
Change Orders Previously Approved	\$
Adjusted Value Prior to this Change Order	\$
Cost of Changes in this Change Order	\$
<i>Adjusted Amount Including this Change</i>	\$
Percentage Increase this Change Order	%
Total Percent Increase to Date	%
Extension of Time Allowed by this Change -	days

Description of Change:

Procurement Notes:

Account Number: \_\_\_\_\_

**Code of Ordinances – Chapter III Purchasing, 3-3.20 Change Orders**

*The City Manager may approve any change orders so long as the total sum of all change orders does not exceed the total amount awarded by the City Commission by more than either ten percent of the contract cost or \$50,000.00, whichever is less. The scope of any project may not be changed without prior approval of the City Commission. No increase in contract price shall be approved unless there are sufficient funds available for such purpose.*

***This change order is hereby incorporated into and becomes a part of the Contract.***

RECOMMENDED:

\_\_\_\_\_  
(Project Manager / Preparer)

By:

\_\_\_\_\_  
(Division Approval)

\_\_\_\_\_  
(Signature) (Date)

By:

\_\_\_\_\_  
(Department Head) (Date)

APPROVED:

By:

\_\_\_\_\_  
(Finance Department) (Date)

By:

\_\_\_\_\_  
(Procurement Department) (Date)

By:

\_\_\_\_\_  
(Mario A. Diaz, City Manager) (Date)

REQUISITION #258  
Vendor # 529106



October 16, 2024

Samuel Zamacona, E.I.  
Public Works Director  
City of North Miami Beach  
17050 NE 19<sup>th</sup> Avenue  
North Miami Beach, Florida 33162  
Phone: 305-948-2932

**RE: Professional Services Proposal  
Public Works Assistance**

Dear Mr. Zamacona,

On behalf of A.M.I. Engineering, LLC (AMI), we appreciate the opportunity to provide this proposal for Engineering Services to support the City's Public Works Department. We look forward to working with you on this project.

#### Scope of Services

AMI will assist the City with reviewing paving, grading, and drainage plans on an as-needed basis. Plans will be reviewed for conformance with City details, standards, and codes. Plans are typically required to be reviewed and approved by Miami-Dade County DERM for drainage and environmental.

It is anticipated that our staff will review the plans at the office of Public Works; therefore, our time will be charged including up to 1-hour total travel time per visit. Plan review comments will be typed into the system for distribution on the City platform.

It is also anticipated that we will assist with monthly Technical Review of Applications for Development (TRAD). We will be available to provide comments and attend these meetings on a monthly basis.

We also anticipate supporting the department with field inspections. The inspections will be coordinated through the building department and will follow the typical progress inspections required as part of the permit conditions.

#### Fee Proposal

For this assignment, we proposed an **hourly not to exceed amount of \$49,000** to be billed at the rates shown below. All Terms and Conditions shall be per our contract for Continuing Professional Services.

STAFF CATEGORY	HOURLY RATE
Project Manager	\$170.00
Senior Engineer	\$150.00
Inspector	\$115.00





Exclusions

- Environmental Reviews
- Traffic Study Reviews
- Utility Review including water and sewer

Closing

Our Project Manager for this assignment will be **Sean Compel, P.E., LEED AP**. Sean is familiar with the City and their standards and is ready to begin working on this assignment immediately.

We sincerely appreciate this opportunity and look forward to working with you on this project. We hope you find the above proposal acceptable for us to proceed with the work described. If so, please indicate your approval by signing where indicated below and returning an executed copy of this proposal to our office.

Thank you,

Francisco A. Alonso, P.E  
A.M.I. Engineering, LLC  
12850 N. Calusa Club Dr  
Miami, FL 33186  
(305) 803-2569

Accepted City of North Miami Beach:

Gregory Christian  
Print Name

10/18/24  
Date

Signature



[REQUEST FOR QUALIFICATIONS PROFESSIONAL GENERAL  
ENGINEERING AND ARCHITECTURAL SERVICES RFQ # 2021-01]

**CONTINUING PROFESSIONAL SERVICES AGREEMENT  
BETWEEN CITY OF SWEETWATER, FL**

**And**

**A.M.I. Engineering, LLC**

**THIS AGREEMENT** is made between CITY OF SWEETWATER, FLORIDA, a Florida municipal corporation, (hereinafter referred to as the "CITY") and **A.M.I. Engineering**, a Limited Liability corporation authorized to do business in the State of Florida, (hereinafter referred to as the "CONSULTANT"), whose principal place of business is Miami-Dade County, Florida. CITY and CONSULTANT may be referred to individually as "Party" or collectively as "Parties."

**RECITALS**

**WHEREAS**, pursuant to Section 287.055, Florida Statutes, the CITY requested qualifications from qualified engineers and selected the CONSULTANT to provide professional engineering services with respect to; and

**WHEREAS**, the CONSULTANT is willing and able to perform such professional, services for the CITY within the basic terms and conditions set forth in this agreement (hereinafter referred to as "Continuing Services Agreement or Agreement"); and

**WHEREAS**, the purpose of this Continuing Services Agreement is not to authorize the Consultant to perform a Specific Project, but to set forth certain general terms and conditions, which shall govern the relationship between CITY and CONSULTANT and which shall be incorporated into subsequent supplemental agreements/work orders for Specific Projects or services when required.



[REQUEST FOR QUALIFICATIONS PROFESSIONAL GENERAL  
ENGINEERING AND ARCHITECTURAL SERVICES RFQ # 2021-01]

AGREEMENT

**NOW THEREFORE**, in consideration of the foregoing recitals, which are incorporated herein and made a part hereof by this reference, the mutual terms, conditions, promises and covenants set forth below, and other good and valuable consideration, the sufficiency of which the Parties hereby acknowledge, the CITY and CONSULTANT agree as follows:

**SECTION 1. DEFINITIONS**

The following definitions and references are given for the purpose of interpreting the terms as used in this Agreement and apply unless the context indicates a different meaning:

1.1 **Compensation**: The total amount paid by the CITY for the CONSULTANT'S professional services for a specific project, exclusive of reimbursable expenses.

1.2 **Reimbursable Expenses**: the direct non-salary expenses directly attributable to the Project. Reimbursable expenses include long-distance communications, application and permit fees paid for securing approval of authorities having jurisdiction over the Specific Project; actual cost of reproduction, printing, binding and photocopying of drawings, specifications, renderings and other documents; postage; travel expenses; and Subconsultant's fees.

1.3 **Specific Project Agreement or Project Agreement**: an agreement to provide services for a particular Project.

1.4 **Subconsultant Fee**: the direct and actual cost of the Subconsultant with no markup, as reflected by actual invoices of the Subconsultant.

1.5 **Travel Expenses**: Travel expenses, whether within or outside of Miami-Dade County, and whether to the Specific Project or otherwise, shall not be reimbursed unless CONSULTANT has secured advance written authorization for such travel from the Mayor. All approved travel expenses will be reimbursed in accordance with the CITY'S adopted travel policy.

**SECTION 2. SPECIFIC PROJECTS/SCOPE OF SERVICES**

2.1 In accordance with the Consultants' Competitive Negotiation Act, the CONSULTANT may provide professional services to the CITY for Specific Projects as authorized from time to time by either the CITY Commission or Mayor as authorized by subsection 2.6. The services shall be for the following types of Projects or similar disciplines:

PROFESSIONAL GENERAL ENGINEERING AND ARCHITECTURAL SERVICES AND RELATED SERVICES AS DESCRIBED IN ATTACHED EXHIBITS \_\_\_\_\_.



**[REQUEST FOR QUALIFICATIONS PROFESSIONAL GENERAL  
ENGINEERING AND ARCHITECTURAL SERVICES RFQ # 2021-01]**

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2.2 When the need for services for a Specific Project occurs, the Mayor may enter into negotiations with the CONSULTANT for that Specific Project under the terms and conditions of this Agreement. The CITY shall initiate said negotiations by providing the CONSULTANT with a "Scope of Services Request," requesting from the CONSULTANT a proposal to provide professional services for the Specific Project. The CONSULTANT shall prepare a proposal which includes those subjects specified in subsection 2.3 (a) through (g). The Mayor and CONSULTANT shall negotiate the terms of the Specific Project in accordance with the provisions of Subsection

2.3 The CITY and CONSULTANT shall utilize as the agreement for each Specific Project a Standard Project Agreement ("Project Agreement"), a copy of which is attached and incorporated into this Agreement as Exhibit "A". Each supplemental agreement for a Specific Project will, by mutual agreement, set forth, among other things, the following:

- a. The Scope of Services;
- b. The Deliverables;
- c. The Time and Schedule of Performance and Term;
- d. The amount of Compensation;
- e. The Personnel assigned to the Specific Project;
- f. Any additional contractual requirements of Section 287.055, Florida Statutes, for consultant agreements; and
- g. Any modifications to the Project Agreement, if mutually agreed upon by the parties.

2.4 If the Mayor determines that the Consultant's services in its capacity as an engineering consultant for a particular project are needed on an hourly basis, in lieu of a lump sum compensation package, the Consultant shall charge the CITY for professional services at those hourly fees as specified in Exhibit "B." The Project Agreement shall specify that the Consultant's services shall be provided on an hourly basis with a maximum amount of compensation that may not be exceeded without additional approval.



[REQUEST FOR QUALIFICATIONS PROFESSIONAL GENERAL  
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2.5 The professional services to be rendered by the CONSULTANT shall commence subsequent to the execution of each Project Agreement. Performance of work by CONSULTANT prior to execution of a Project Agreement shall be at Consultant's sole risk.

2.6 The Mayor is authorized to negotiate and execute a Project Agreement for Projects in which the CONSULTANTS' services do not exceed \$3,000.00.

2.7 The Contract Documents for each Specific Project shall incorporate this Continuing Services Agreement. In the event that any of the terms or conditions of this Agreement conflict with the Project Agreement, the provisions of the Project Agreement shall apply.

**SECTION 3. TERM/TERMINATION**

3.1 **Term of Agreement.** – This Continuing Agreement shall commence on the date this instrument is fully executed by all parties and shall continue in full force and effect for a period of five (5) years, unless extended by option or renewal and/or until terminated pursuant to Section 3.2 or other applicable sections of this Agreement. Each Project Agreement shall specify the period of service agreed to by the CITY and CONSULTANT for services to be rendered under said Project Agreement. Agreement shall automatically renew for two additional one (1) year periods if not terminated by either party.

3.2 **Termination for Convenience** – This Continuing Services Agreement may be terminated by the CITY for convenience upon thirty (30) calendar days written notice to the CONSULTANT or on seven (7) days' notice with cause, which cause shall be defined as substantial failure by the other party to perform in accordance with the terms hereof through no fault of the terminating party.

3.3 **Effect on Project Agreement** – Nothing in this section shall be construed to create a right by either party to terminate any ongoing Project Agreement(s). Termination of a Project Agreement shall be exclusively through the termination provisions of the specific Project Agreement.

3.4 **Non-Exclusive Agreement** - Notwithstanding the provisions of Subsection 3.1, the Mayor may issue requests for proposals for this professional discipline at any time and may utilize the services of any other consultants retained by the CITY under similar continuing services agreements. Nothing in this Agreement shall be construed to give the CONSULTANT a right to perform services for a specific project.



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**SECTION 4. ADDITIONAL SERVICES AND CHANGES IN SCOPE OF SERVICES**

4.1 **Changes Permitted.** Changes in the Scope of Services of a Project Agreement consisting of additions, deletions, revisions, or any combination thereof, may be ordered by the CITY by Change Order without invalidating the Project Agreement.

4.2 **Change Order Defined.** Change Order shall mean a written order to the CONSULTANT executed by the CITY, issued after execution of a Project Agreement, authorizing and directing a change in the Scope of Services or an adjustment in the Contract Price or the Contract Time, or any combination thereof. The Contract Price and/or the Contract Time may be changed only by Change Order.

4.3 **Effect of Executed Change Order.** The execution of a Change Order by the CITY and the CONSULTANT shall constitute conclusive evidence of the Consultant's agreement to the ordered changes in the Scope of Services or an adjustment in the Contract Price or the Contract Time, or any combination thereof. The CONSULTANT, by executing the Change Order, waives and forever releases any claim against the CITY for additional time or compensation for matters relating to or arising out of or resulting from the Services included within or affected by the executed Change Order.

**SECTION 5. SURVIVAL OF PROVISIONS**

5.1 Any terms or conditions of either this Agreement or any subsequent Project Agreement that require acts beyond the date of the term of either agreement, shall survive termination of the agreements, shall remain in full force and effect unless and until the terms or conditions are completed and shall be fully enforceable by either party.

**SECTION 6. CITY'S RESPONSIBILITIES**

6.1 Assist CONSULTANT by placing at its disposal all available information as may be requested in writing by the CONSULTANT and allow reasonable access to all pertinent information relating to the services to be performed by CONSULTANT.

6.2 Furnish to CONSULTANT, at the CONSULTANT'S written request, all available maps, plans, existing studies, reports and other data pertinent to the services to be provided by CONSULTANT, in possession of the CITY.

6.3 Arrange for access to and make all provisions for CONSULTANT to enter upon public property as required for CONSULTANT to perform services.





**[REQUEST FOR QUALIFICATIONS PROFESSIONAL GENERAL  
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**SECTION 7. CODE OF ETHICS**

7.1 The code of ethics of the Florida Engineering Society shall be incorporated in this Agreement by this reference.

7.2 CONSULTANT warrants and represents that its employees shall abide by the Code of Ethics for Public Officers and Employees, Chapter 112, Florida Statutes.

**SECTION 8. POLICY OF NON-DISCRIMINATION/WAGES**

8.1 The CONSULTANT shall comply with all federal, state, and local laws and ordinances applicable to the work or payment for work and shall not discriminate on the grounds of race, color, religion, sex, age, marital status, national origin, physical or mental disability in the performance of work under this Agreement.

8.2 If the project is subject to federal and grant funding that requires specific wage and non-discrimination provisions, CONSULTANT shall be required to comply with the same.

**SECTION 9. OWNERSHIP OF DOCUMENTS/DELIVERABLES**

9.1 All finished or unfinished documents, including but not limited to, detailed reports, studies, plans, drawings, surveys, maps, models, photographs, specifications, digital files, and all other data prepared for the CITY or furnished by the CONSULTANT pursuant to any Project Agreement, shall become the property of the CITY, whether the Project for which they are made is completed or not, and shall be delivered by CONSULTANT to the CITY within five (5) calendar days after receipt of written notice requesting delivery of said documents or digital files. The CONSULTANT shall have the right to keep one record set of the documents upon completion of the Project, however, in no event shall the CONSULTANT, without the CITY'S prior written authorization, use, or permit to be used, any of the documents except for client or educational presentations or seminar use.

9.2 All subcontracts for the preparation of reports, studies, plans, drawings, specifications, digital files or other data, entered into by the CONSULTANT for each Specific Project shall provide that all such documents and rights obtained by virtue of such contracts shall become the property of the CITY.

9.3 All final plans and documents prepared by the CONSULTANT shall bear the endorsement and seal of a person duly registered as a Professional Engineer, Architect,



**[REQUEST FOR QUALIFICATIONS PROFESSIONAL GENERAL  
ENGINEERING AND ARCHITECTURAL SERVICES RFQ # 2021-01]**

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Landscape Architect, Professional Geologist, or Land Surveyor, as appropriate, in the State of Florida and date approved and/or sealed.

9.4 All deliverables should be provided in hard copy format as well as electronic format to the CITY. Drawings should be provided in CADD, spreadsheets in Excel, and written documentation should be provided in Microsoft Word. The date of submittal to the CITY shall be deemed to be the later of delivery of hard copies and delivery of electronic copies as applicable.

**SECTION 10. RECORDS/AUDITS**

10.1 CONSULTANT shall maintain and require Sub consultants to maintain, complete and correct records, books, documents, papers and accounts pertaining to the Specific Project. Such records, books, documents, papers and accounts shall be available at all reasonable times for examination and audit by the Mayor or any authorized CITY representative with reasonable notice and shall be kept for a period of three (3) years after the completion of each Project Agreement. Incomplete or incorrect entries in such records, books, documents, papers or accounts will be grounds for disallowance by or reimbursement to the CITY of any fees or expenses based upon such entries. Disallowed fees will be paid when incomplete or incorrect entries are remedied to the satisfaction of the CITY.

10.2 The CONSULTANT shall comply with Chapter 119, Florida Statutes, as applicable.

10.3 Refusal of the CONSULTANT to comply with the provisions of Sections 10.1 or 10.2 shall be grounds for immediate termination for cause by the CITY of this Agreement or any Project Agreement.

**SECTION 11. NO CONTINGENT FEE**

11.1 CONSULTANT warrants that it has not employed or retained any company or person, other than a bona fide employee working solely for CONSULTANT, to solicit or secure this Agreement and that it has not paid or agreed to pay any person, company, corporation, individual or firm, other than a bona fide employee working solely for CONSULTANT, any fee, commission, percentage, gift, or other consideration contingent upon or resulting from the award or making of this Agreement. In the event the CONSULTANT violates this provision, the CITY shall have the right to terminate this Agreement or any Project Agreement, without liability, and at its sole discretion, to deduct from the contract price, or otherwise recover, the full amount of such fee, commission, percentage, gift or consideration.





**[REQUEST FOR QUALIFICATIONS PROFESSIONAL GENERAL  
ENGINEERING AND ARCHITECTURAL SERVICES RFQ # 2021-01]**

**SECTION 12. INDEPENDENT CONTRACTOR**

12.1 The CONSULTANT is an independent contractor under this Agreement and any Project Agreements. Personal services provided by the CONSULTANT shall be by employees of the CONSULTANT and subject to supervision by the CONSULTANT, and not as officers, employees, or agents of the CITY. Personnel policies, tax responsibilities, social security, health insurance, employee benefits, purchasing policies and other similar administrative procedures applicable to services rendered under this Agreement or any Project Agreements shall be those of the CONSULTANT.

**SECTION 13. ASSIGNMENT; AMENDMENTS**

13.1 This Agreement shall not be assigned, transferred or otherwise encumbered, under any circumstances, by CONSULTANT, without the prior written consent of the CITY.

13.2 No modification, amendment or alteration in the terms or conditions of this Agreement shall be effective unless contained in a written document executed with the same formality as this Agreement.

**SECTION 14. INDEMNIFICATION/HOLD HARMLESS**

14.1 Pursuant to Section 725.08, Florida Statutes, the CONSULTANT shall indemnify and hold harmless the CITY and its officers and employees, from liabilities, damages, losses, and costs, including, but not limited to, reasonable attorneys' fees, to the extent such liabilities, damages, losses, and costs are caused by the negligence, recklessness, or intentionally wrongful conduct of the CONSULTANT or any persons employed or utilized by the CONSULTANT in the performance of this or any Project Agreement.

**SECTION 15. INSURANCE**

The CONSULTANT shall secure and maintain throughout the duration of this Agreement and any Project Agreement, insurance of such type and in such amounts necessary to protect its interest and the interest of the CITY against hazards or risks of loss as specified below. The underwriter of such insurance shall be qualified to do business in Florida and have agents upon whom service of process may be made in the State of Florida. The insurance coverage shall be primary insurance with respect to the CITY, its officials, employees, agents and volunteers. Any insurance maintained by the CITY shall be in excess of the CONSULTANT'S insurance and shall not contribute to the CONSULTANT'S insurance. The insurance coverage shall include a minimum of: See Insurance Requirements.



**[REQUEST FOR QUALIFICATIONS PROFESSIONAL GENERAL  
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**SECTION 16. REPRESENTATIVE OF CITY AND CONSULTANT**

16.1 **CITY Representative.** It is recognized that questions in the day-to-day conduct of this Agreement will arise. The CITY designates the Mayor or his designee, as the person to whom all communications pertaining to the day-to-day conduct of this Agreement shall be addressed.

16.2 **CONSULTANT Representative.** CONSULTANT shall inform the CITY Representative, in writing, of the representative of the CONSULTANT to whom all communications pertaining to the day-to-day conduct of this Agreement shall be addressed.

**SECTION 17. COST AND ATTORNEY'S FEES/WAIVER OF JURY TRIAL**

17.1 If either the CITY or CONSULTANT is required to enforce the terms of this Agreement or any Project Agreement by court proceedings or otherwise, whether or not formal legal action is required, the prevailing party shall be entitled to recover from the other party all costs, expenses, and attorney's fees in any state or federal administrative, circuit court and appellate court proceedings.

17.2 In the event of any litigation arising out of this Agreement or Project Agreement, each party hereby knowingly, irrevocably, voluntarily and intentionally waives its right to trial by jury.

**SECTION 18. PRIORITY OF AUTHORITY OF INSTRUMENTS**

18.1 The relationship between the Parties shall be governed by several contract documents, all of which, when read together, shall constitute one agreement between the Parties. The contract documents include this Agreement, one or more ensuing Project Agreements, and the City solicitation documents. In the event of conflict between or amongst the contract documents, priority shall be as follows: Project Agreements, then this Agreement, and followed by the City's solicitation documents, including any addenda thereto. Otherwise, there are no commitments, agreements or understandings concerning the subject matter of this Agreement that are not contained in the contract document. Accordingly it is agreed that no deviation from the terms of the Agreement shall be predicated upon any prior representations or agreements whether oral or written.



**[REQUEST FOR QUALIFICATIONS PROFESSIONAL GENERAL  
ENGINEERING AND ARCHITECTURAL SERVICES RFQ # 2021-01]**

**SECTION 19. CONSULTANT'S RESPONSIBILITIES**

19.1 Any and all drawings, plans, specifications, or other construction or contract documents prepared by the CONSULTANT shall be accurate, coordinated and adequate for construction and shall comply with all applicable CITY Codes, state and federal laws, rules and regulations.

19.2 The CONSULTANT shall exercise the same degree of care, skill and diligence in the performance of the services for each Project Agreement as is ordinarily provided by a professional engineer, architect, landscape architect, surveyor or mapper under similar circumstances. If at any time during the term of any Project Agreement or the construction of the Project for which the CONSULTANT has provided engineering, architectural landscape architectural, surveying or mapping services under a prior Project Agreement, it is determined that the CONSULTANT'S documents are incorrect, defective or fail to conform to the Scope of Services of the particular Project, upon written notification from the CITY, the CONSULTANT shall immediately proceed to correct the work, re-perform services which failed to satisfy the foregoing standard of care, and shall pay all costs and expenses associated with correcting said incorrect or defective work, including any additional testing, inspections, and construction and reimbursements to the CITY for any other services and expenses made necessary thereby, save and expect any costs and expenses which the CITY would have otherwise paid absent the CONSULTANT'S error or omission. The CITY'S rights and remedies under this section are in addition to, and are cumulative of, any and all other rights and remedies provided by this Agreement, the Project Agreement, by law, equity or otherwise.

19.3 The Consultant shall, all times during the term of the Agreement, maintain in good standing all required licenses, certifications and permits required under federal, state, and local laws necessary to perform the services.

19.4 The CONSULTANT'S obligations under Paragraph 19.2 of this Agreement shall survive termination of this Agreement or any Project Agreement.

**SECTION 20. SUBCONSULTANTS**

20.1 In the event the CONSULTANT requires the services of any Subconsultants or other professional associates in connection with services covered by any Project Agreement, the CONSULTANT must secure the prior written approval of the Mayor. The CONSULTANT shall use his/her best efforts to utilize Subconsultants whose principal place of business is located within the CITY or Miami-Dade County, Florida.



**[REQUEST FOR QUALIFICATIONS PROFESSIONAL GENERAL  
ENGINEERING AND ARCHITECTURAL SERVICES RFQ # 2021-01]**

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20.2 Any subcontract with a Subconsultant shall afford to the CONSULTANT rights against the Subconsultant which correspond to those rights afforded to the CITY against the CONSULTANT herein, including but not limited to those rights of termination as set forth herein.

20.3 No reimbursement shall be made to the CONSULTANT for any subconsultants that have not been previously approved by the CITY for use by the CONSULTANT.

**SECTION 21. NOTICES**

Whenever either party desires to give notice to the other, it must be given by hand delivery or written notice, sent by certified United States mail, with return receipt requested or a nationally recognized private mail delivery service, addressed to the party for whom it is intended, at the place last specified, and the place for giving of notice in compliance with the provisions of this paragraph. For the present, the parties designate the following as the respective places for giving of notice, to-wit:

**FOR CONSULTANT:**

Francisco J. Alonso, PE, President

A.M.I. Engineering, LLC

12850 N Calusa Club Dr.

Miami, FL 33186

**FOR CITY:**

CITY of Sweetwater

Attention: Orlando Lopez, Mayor

500 SW 109 Avenue, 3rd

Floor Sweetwater, FL

33174

**WITH A COPY TO:**

Ralph Ventura, Esq.



**[REQUEST FOR QUALIFICATIONS PROFESSIONAL GENERAL  
ENGINEERING AND ARCHITECTURAL SERVICES RFQ # 2021-01]**

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500 SW 109 Avenue, 3rd Floor

Sweetwater, FL 33174

**SECTION 22. TRUTH-IN-NEGOTIATION CERTIFICATE**

Signature of this Agreement by CONSULTANT shall act as the execution of a truth-in-negotiation certificate stating that wage rates and other factual unit costs supporting the compensation of this Agreement or any Project Agreement are accurate, complete, and current at the time of contracting. Each Project Agreement's contract prices and any additions shall be adjusted to exclude any significant sums by which the CITY determines the Project's contract price was increased due to inaccurate, incomplete, or noncurrent wage rates and other factual unit costs. All such adjustments shall be made within one year following the end of each Project Agreement.

**SECTION 23. CONSENT TO JURISDICTION**

The parties submit to the jurisdiction of any Florida state or federal court in any action or proceeding arising out of relating to this Agreement or any Project Agreement. Venue of any action to enforce this Agreement or any Project Agreement shall be in Miami-Dade County, Florida.

**SECTION 24. GOVERNING LAW**

This Agreement and any Project Agreement shall be construed in accordance with and governed by the laws of the State of Florida.

**SECTION 25. HEADINGS**

Headings are for convenience of reference only and shall not be considered in any interpretation of this Agreement.

**SECTION 26. EXHIBITS**

Each Exhibit referred to in this Agreement forms an essential part of this Agreement. The Exhibits, if not physically attached, should be treated as part of this Agreement, and are incorporated by reference.



**[REQUEST FOR QUALIFICATIONS PROFESSIONAL GENERAL  
ENGINEERING AND ARCHITECTURAL SERVICES RFQ # 2021-01]**

**SECTION 27. SEVERABILITY**

If any provision of this Agreement or any Project Agreement or the application thereof to any person or situation shall to any extent, be held invalid or unenforceable, the remainder of this Agreement, and the application of such provisions to persons or situations other than those as to which it shall have been held invalid or unenforceable shall not be affected thereby, and shall continue in full force and effect, and be enforced to the fullest extent permitted by law.

**SECTION 28. COUNTERPARTS**

This Agreement may be executed in several counterparts, each of which shall be deemed an original and such counterparts shall constitute one and the same instrument.

**IN WITNESS WHEREOF**, the parties execute this Agreement on the respective dates under each signature: The CITY, signing by and through its Mayor, attested to by its CITY Clerk, duly authorized to execute same and by CONSULTANT whose representative has been duly authorized to execute same through a resolution of the corporation or partnership.

**ATTEST:**

Carmen Garcia, City Clerk:

Orlando Lopez, Mayor:

Date:

1-19-2022

Approved as to form and legality for the sole use and reliance of the City of Sweetwater:

Ralph Ventura, Esq., City Attorney:





[REQUEST FOR QUALIFICATIONS PROFESSIONAL GENERAL  
ENGINEERING AND ARCHITECTURAL SERVICES RFQ # 2021-01]

ATTEST: CONSULTANT

By: Francisco J. Alonso, PE 

Title: President

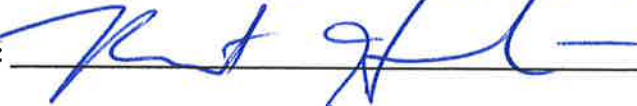
Date: 1/25/22

WITNESS:

Print Name:

ROBERT HERRADA

Signature:





**Consent Agenda  
9.5.**

City of North Miami Beach  
17011 NE 19 Avenue  
North Miami Beach, FL 33162  
305-947-7581  
www.citynmb.com

**MEMORANDUM**

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<b>TO:</b>	Mayor and City Commission
<b>FROM:</b>	Hamid Nikvan, NMB Water Director
<b>VIA:</b>	Mario A. Diaz, City Manager
<b>DATE:</b>	January 21, 2025

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**RE:** Resolution No. R2025-04 Approving an Agreement with Gilson Engineering, Inc. to Purchase Various Digital Displays for NMB Water Production (Hamid Nikvan, NMB Water Director)

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**Description**

The City of North Miami Beach, through its Water Department, seeks to procure a range of essential digital display indicators for water treatment systems. The required equipment includes flow digital display indicators for membrane skids, temperature digital display indicators, chemical level digital display indicators, and a multivariable controller display indicator. Gilson Engineering, Inc. is the exclusive distributor in Florida for Precision Digital Corporation's products, which are the preferred brand for the specified equipment. As such, all purchases must be made through this sole distributor.

**BACKGROUND ANALYSIS:**

A Notice to Sole Source (Ref: NTS-24-045-AS), was published on the Periscope E-Procurement portal on December 9, 2024, through December 16, 2024. The notice, outlined the City's intention to proceed with a sole-source procurement methodology for the purchase of various digital display meters and controllers through Gilson Engineering Inc.

The Sole Source procurement is justified based on Gilson Engineering Inc.'s exclusive distribution rights in Florida for the required equipment, ensuring compatibility and reliability.

**RECOMMENDATION:** The NMB Water Works Director and Chief Procurement Officer recommend that the City Commission approve and authorize the City



Manager, or designee, to proceed with a Sole Source purchase with Gilson Engineering, Inc. in an annual amount subject to budget appropriation.

**FISCAL/ BUDGETARY**

**IMPACT:** As approved in the adopted budget appropriation.

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**ATTACHMENTS:**

**Description**

- ☐ Gilson\_Resolution
- ☐ Gilson\_Sole Source Justification

**RESOLUTION NO. R2025**

**A RESOLUTION OF THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA, APPROVING AND AUTHORIZING A PURCHASE ORDER WITH GILSON ENGINEERING, INC FOR THE PURCHASE OF VARIOUS ‘DIGITAL PRECISION’ PRODUCTS SUBJECT TO ANNUAL BUDGET APPROPRIATION; AUTHORIZING THE CITY MANAGER OR DESIGNEE TO DO ALL THINGS NECESSARY TO EFFECTUATE THIS RESOLUTION; PROVIDING FOR CONFLICTS; PROVIDING FOR SCRIVENER ERRORS, PROVIDING FOR SEVERABILITY; AND PROVIDING FOR AN EFFECTIVE DATE.**

**WHEREAS**, pursuant to Chapter 166, *Florida Statutes* and Section 1.4 of the Charter of the City of North Miami Beach (“City”), the City shall have all available governmental, corporate, and proprietary powers and may exercise them except when prohibited by law; and

**WHEREAS**, Section 3-4.5 of the Code of Ordinances City of North Miami Beach, Florida 2008 (“Code”) provides that purchases of the following material and services shall be exempt from the bidding process and subject to the spending limitation provided in subsection 3-3.14a. “Sole Source Purchase”, which states “sole source supplies and services, such as unique, patented, or franchised supplies or services are exempt if the Purchasing Agent determines, after conducting a good faith review of available sources, that the particular supply or service is available from one (1) source;” and

**WHEREAS**, A Notice to Sole Source (Ref: NTS-24-045-AS), was published on the Periscope E-Procurement portal outlining the City’s intention to proceed with a sole-source procurement methodology for the purchase of various digital display meters and controllers through Gilson Engineering Inc. During that period, the City did not receive and/or could not substantiate the same products or services from alternate vendors.; and

**WHEREAS**, the NMB Water Department requests to purchase various precision digital products used to monitor flow and indicate corrective actions needed. Sensors are essential to the water treatment process as they aid in monitoring the level of chemicals in the tanks at the Norwood Water Plant; and

**WHEREAS**, Gilson Engineering Sales of Florida, Inc. is the sole and exclusive distributor in the State of Florida for Precision Digital Corporation Products and Services.; and

**WHEREAS**, Section 3-3.14 of the City’s Code of Ordinances provides that contracts in excess of fifty thousand dollars (\$50,000.00) shall be awarded by the City Commission; and

**WHEREAS**, the City Manager and the Chief Procurement Officer recommend that the City Commission approve the sole source purchase of various Digital Precision products with Gilson Engineering Sales of Florida, Inc., subject to annual budget appropriation; and

**WHEREAS**, the Mayor and City Commission believe it is in the best interests of the City

**RESOLUTION NO. R2025-X**

to approve a sole source purchase of various Digital Precision products with Gilson Engineering Sales of Florida, Inc., subject to annual budget appropriation; and

**NOW, THEREFORE, BE IT RESOLVED** by the Mayor and City Commission of the City of North Miami Beach, Florida, that:

**Section 1.** The foregoing whereas clauses are true and correct and adopted as the legislative and administrative findings of the City Commission and made a specific part of this Resolution; all exhibits attached hereto are made a specific part of this Resolution.

**Section 2.** The sole source purchase, in substantially the form attached as Exhibit “A”, for the purchase of various digital precision products with Gilson Engineering Sales of Florida, Inc., subject to annual budget appropriation and availability of funds is hereby approved.

**Section 3.** The City Manager or designee is authorized to do all things necessary to effectuate this Resolution.

**Section 4.** All Resolutions or parts of Resolutions in conflict with this Resolution are repealed to the extent of such conflict.

**Section 5.** Any scrivener or typographical errors that do not affect intent may be corrected with notice to, and the authorization of the City Attorney and City Manager without further process.

**Section 6.** If any provision of this Resolution or the application thereof to any person or circumstance is held invalid, such invalidity shall not affect other provisions or applications of this Resolution that can be given affect without the invalid provision or application, and to this end the provisions of this Resolution are declared to be severable.

**Section 7.** This Resolution shall take effect immediately upon adoption.

**[THE REMAINDER OF THIS PAGE INTENTIONALLY LEFT BLANK]**

**APPROVED AND ADOPTED** by the City of North Miami Beach City Commission at the regular meeting assembled this **21<sup>st</sup> day of January 2025**.

ATTEST:

\_\_\_\_\_  
ANDRISE BERNARD, MMC  
CITY CLERK

\_\_\_\_\_  
MICHAEL JOSEPH  
MAYOR

(CITY SEAL)

APPROVED AS TO FORM AND LEGAL SUFFICIENCY FOR THE USE  
AND RELIANCE OF THE CITY OF NORTH MIAMI BEACH ONLY:

GREENSPOON MARDER, LLP.

By: \_\_\_\_\_  
CITY ATTORNEYS

Sponsored by: Mayor & Commission



SOLE SOURCE REQUEST FORM

PROCUREMENT MANAGEMENT DIVISION

TO: Mario A. Diaz
City Manager

VIA: Chief Procurement Officer

Karim Rossy 11/1/24

FROM: (Name)

(Department)

DATE:

RE:

Annual Expenditure not to Exceed: \$ Vendor #

Section 3-4.5 Exemptions for Bidding, Purchase of the following materials and services shall be exempt from the bidding process and subject to the spending limitations provided in subsection 3-3.14, unless otherwise provided by State law: a. Sole source purchases. Sole-source supplies and services, such as unique, patented, or franchised supplies or services, are exempt if the Purchasing Agent determines, after conducting a good faith review of available sources, that the particular supply or service is available from only one (1) source.

Sole Source Justification: 3-4.8 Sole Source Purchasing. Department heads may recommend purchase of a part, commodity, or service from a sole source supplier after a reasonable search has been made to find other suppliers. The recommendation shall include a written justification documenting the potential vendors contacted, and the results. The Purchasing Agent shall either confirm the lack of additional suppliers or inform the Department of potential suppliers.

Large empty rectangular box for justification details.

Approved Date

Chief Procurement Officer (Up to \$25,000)

Mario A. Diaz, City Manager (Up to \$50,000)

Purchases exceeding \$50,000.00 will be placed on the next Commission Agenda pending Procurement review.





**Consent Agenda  
9.6.**

City of North Miami Beach  
17011 NE 19 Avenue  
North Miami Beach, FL 33162  
305-947-7581  
www.citynmb.com

**MEMORANDUM**

---

<b>TO:</b>	Mayor and City Commission
<b>FROM:</b>	Ricardo Castillo, Chief Information Officer
<b>VIA:</b>	Mario A. Diaz, City Manager
<b>DATE:</b>	January 21, 2025

---

**RE:** Resolution No. R2025-05 Approving an Agreement with Info-Tech Research Group for Research and Advisory Services (Ricardo Castillo, Chief Information Officer)

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**Description**

**BACKGROUND  
ANALYSIS:**

The City of North Miami Beach Information Technology Department utilizes the services of Info-Tech Research Group, Inc. to provide essential information technology research and advisory services. These services include frameworks for smart city initiatives, development of cybersecurity policies, and advising on software contracts.

The contract is facilitated through State of Florida Contract 81141902-VITA-18-ACS, which is designed for Information Technology Research and Advisory services. The estimated annual budget for these services is \$60,000 and the term of the contract is May 1, 2018, through March 13, 2025.

**RECOMMENDATION:** The NMB Chief Information Officer and Chief Procurement Officer recommend that the City Commission approve and authorize the City Manager or designee to approve a contract with Info-Tech Research Group, Inc. in an estimated annual budgeted amount of \$60,000.

**FISCAL/ BUDGETARY**

**IMPACT:** As approved in the adopted budget appropriation.

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## ATTACHMENTS:

### Description

- ☐ Info-Tech\_Resolution
- ☐ Info-Tech\_Piggy Back Request Form



**RESOLUTION NO. 2025-**

**A RESOLUTION OF THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA, APPROVING A PIGGYBACK CONTRACT BETWEEN THE CITY AND INFO-TECH RESEARCH GROUP, INC. FOR RESEARCH & ADVISORY SERVICES; IN AN ESTIMATED ANNUAL BUDGETED AMOUNT OF \$60,000.00; AUTHORIZING THE CITY MANAGER OR DESIGNEE TO DO ALL THINGS NECESSARY TO EFFECTUATE THIS RESOLUTION; PROVIDING FOR CONFLICTS; PROVIDING FOR SCRIVENER ERRORS; PROVIDING FOR SEVERABILITY; SUBJECT TO THE BUDGET APPROPRIATION AND AVAILABILITY OF FUNDS; AND PROVIDING FOR AN EFFECTIVE DATE.**

**WHEREAS**, pursuant to Chapter 166, *Florida Statutes* and Section 1.4 of the Charter of the City of North Miami Beach (“City”), the City shall have all available governmental, corporate, and proprietary powers and may exercise them except when prohibited by law; and

**WHEREAS**, Section 3-2.2 of the City of North Miami Beach Code of Ordinances (“Code”) provides that the Chief Procurement Officer has the authority to join with other governmental entities in cooperative purchasing plans, when the best interests of the City would be served

**WHEREAS**, The State of Florida awarded Contract 81141902-VITA-18-ACS Information Technology Research and Advisory Services to Info-Tech Research Group, Inc. effective August 11, 2021 through March 13, 2025; and

**WHEREAS**, pursuant to Section 3-3.14 of the City Code, the City Manager has the authority to approve purchases and awards up to fifty thousand dollars (\$50,000), and any expenditures above this amount need to be presented to the Mayor and City Commission for approval; and

**WHEREAS**, the City Manager and the Chief Procurement Officer recommend that the City Commission approve a Piggyback Contract in an estimated annual budgeted amount of \$60,000 for Research and Advisory Services with Info-Tech Research Group, Inc.; and

**WHEREAS**, the Mayor and City Commission determine it is in the best interests of the City to approve a Piggyback Contract in an estimated annual budgeted amount of \$60,000 for Research and Advisory Services with Info-Tech Research Group, Inc.; and

**NOW, THEREFORE, BE IT RESOLVED BY THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA, THAT:**

**Section 1.** The foregoing whereas clauses are true and correct and adopted as the legislative and administrative findings of the City Commission and made a specific part of this Resolution; all exhibits attached hereto are made a specific part of this Resolution.

**RESOLUTION NO. R2025-XX**

**Section 2.** The contract with Info-Tech Research Group, Inc. in substantially the form attached as “Exhibit A” for the purchase of research and advisory services in an estimated annual budgeted amount of \$60,000 subject to budget appropriation and availability of funds, is hereby approved.

**Section 3.** The City Manager or designee is authorized to do all things necessary to effectuate this Resolution.

**Section 4.** All Resolutions or parts of Resolutions in conflict with this Resolution are repealed to the extent of such conflict.

**Section 5.** Any scrivener or typographical errors that do not affect intent may be corrected with notice to, and the authorization of the City Attorney and City Manager without further process.

**Section 6.** If any provision of this Resolution or the application thereof to any person or circumstance is held invalid, such invalidity shall not affect other provisions or applications of this Resolution that can be given effect without the invalid provision or application, and to this end the provisions of this Resolution are declared to be severable.

**Section 7.** This Resolution shall take effect immediately upon adoption.

**[THE REMAINDER OF THIS PAGE INTENTIONALLY LEFT BLANK]**

**RESOLUTION NO. R2025-XX**

**APPROVED AND ADOPTED** by the City of North Miami Beach City Commission at the regular meeting assembled this **21<sup>st</sup> day of January 2025**.

ATTEST:

\_\_\_\_\_  
ANDRISE BERNARD, MMC  
CITY CLERK

\_\_\_\_\_  
MICHAEL JOSEPH  
MAYOR

(CITY SEAL)

APPROVED AS TO FORM AND LEGAL SUFFICIENCY FOR THE USE  
AND RELIANCE OF THE CITY OF NORTH MIAMI BEACH ONLY:

GREENSPOON MARDER, LLP.

By: \_\_\_\_\_  
CITY ATTORNEYS

Sponsored by: Mayor & Commission

**RESOLUTION NO. R2025-XX**



**EXHIBIT A**

**PIGGYBACK/COOPERATIVE PURCHASE REQUEST FORM**

Revised 3.23.23

*PROCUREMENT MANAGEMENT DIVISION*

Requesting Department: \_\_\_\_\_  
Primary Contact Name: \_\_\_\_\_  
Primary Contact E-mail: \_\_\_\_\_  
Secondary Contact Name: \_\_\_\_\_  
Secondary Contact E-mail: \_\_\_\_\_  
Department Phone: \_\_\_\_\_  
Department Fax: \_\_\_\_\_

Company Name: \_\_\_\_\_  
Contact Name: \_\_\_\_\_  
Company Address: \_\_\_\_\_  
\_\_\_\_\_  
Company Phone: \_\_\_\_\_  
Company Fax: \_\_\_\_\_  
Company E-mail: \_\_\_\_\_  
Vendor Registration #: \_\_\_\_\_

**Piggyback Contract Details**

1. Contract Title: \_\_\_\_\_  
  - a. Awarding Agency \_\_\_\_\_ b. Solicitation # \_\_\_\_\_
  - c. Solicitation included? Yes  Awarded Letter included? Yes  Proposal/Quote from Company included? Yes
2. Description of the Scope of Service of This Contract: \_\_\_\_\_
3. Total Value of Contract: \$ \_\_\_\_\_
4. Account Number(s): FY \_\_\_\_\_ FY \_\_\_\_\_

**Contract Verification Information**

5. Were alternative contracts evaluated to determine that the City is obtaining the most advantageous contract pricing for the required product / service? Yes  No  \_\_\_\_\_
6. Would this purchase(s) result in the potential of future purchases for related products/ services being restricted to a particular vendor or create a specific vendor as sole source provider for the related items? Yes  No
7. Would this purchase(s) result in any future maintenance costs which are not included in the initial purchase? Yes  No   
If yes, please attach a draft maintenance plan which includes cost estimates and funding sources(s).

**Required Documents Checklist**

- Contract Explanation Memo       Solicitation       Award Letter       Proposal/Quote
- Renewal Letter       Risk Manager Approved Insurance Certificate       Vendor Registration Form

**Grant Information (only applicable if grant related purchase)**

11. Provide details (expiration dates, special requirements, etc). \_\_\_\_\_
12. Will this require matching funds? Yes  No
13. Grant source? \_\_\_\_\_ Grant (dollar) amount? \_\_\_\_\_
14. Complete an advanced search of the vendor recommended for award on the federal governments system for Award Management at [www.sam.gov](http://www.sam.gov). Attach a copy of the results.

**Approved**

**Date**

Form Prepared By: \_\_\_\_\_

Department Director: \_\_\_\_\_

Chief Procurement Officer: \_\_\_\_\_  
(Purchases/Contract up to \$25,000.00)

City Manager: \_\_\_\_\_  
(Purchases/Contracts up to \$50,000.00)

Purchases/Contracts exceeding \$50,000.00 will be placed on the next Commission Agenda pending Procurement review

**3-4.3 Use of Other Governmental Entities' Contracts**

*Subject to the spending limitations in Section 3-3.14 and upon a determination that the supplies, materials, equipment or contractual services needed by the City are comparable to solicitation procedures substantially equivalent to the requirements of the North Miami Beach Purchasing Code, the Purchasing Agent may procure, without following formal contract procedure, all supplies, materials, equipment and contractual services which are the subject of contracts with the State of Florida, its political subdivisions, the United States government, other governmental entities, or a corporation not for profit whose members are governmental entities, public officers, or any combination thereof; provided, however, that this section shall apply only if (i) the supplies, materials, equipment or contractual services are the subject of a price schedule negotiated by the State of Florida or the United States government, or (ii) the supplies, materials, equipment or contractual services are the subject of a contract with another governmental entity or a corporation not for profit whose members are governmental entities, public officers, or any combination thereof, which contract is based strictly on competitive bids or competitive proposals and not on any preference.*



**PROCUREMENT EXPLANATION MEMO**

*PROCUREMENT MANAGEMENT DIVISION*

TO: **Mario A. Diaz**  
City Manager

VIA: **Sherece George**  
Chief Procurement Officer

FROM: \_\_\_\_\_  
Name  
\_\_\_\_\_  
Title/Department

DATE: \_\_\_\_\_

RE: \_\_\_\_\_

Fiscal Amount not to Exceed: \$ \_\_\_\_\_ Vendor # \_\_\_\_\_

**Purpose (How does it align with City NMB Strategic Plan?):**

**Background:**

**Recommendation:**

**Fiscal Impact / Account Number(s):**

**Contact Person(s):**



**CONTRACT AMENDMENT NO.: 3**

Contract No.: 81141902-VITA-18-ACS

Contract Name: Information Technology Research and Advisory Services

**This Contract Amendment** to Alternate Contract Source No. 81141902-VITA-18-ACS (“Contract”) to the State of Virginia Master Agreement No. VA-180315-ITRG (“Master Agreement”) is made by the State of Florida, Department of Management Services (“Department”) and Info-Tech Research Group, Inc. (“Contractor”), with its principal place of business located at 3960 Howard Hughes Parkway, Ste 500, Las Vegas, NV, 89169, collectively referred to herein as the “Parties.”

**WHEREAS** the Parties entered into the Contract which became effective on August 11, 2021, for the provision of information technology research and advisory services;

**WHEREAS** the Master Agreement was renewed for a period of one year, with a new Master Agreement expiration date of March 13, 2025, and;

**WHEREAS** the Parties agree to renew the Contract as provided for in Exhibit B, Special Contract Conditions (Florida), subsection 2.2, Renewal; and

**WHEREAS** the Parties agreed that the Contract may be amended by mutual agreement as provided in Exhibit B, Special Contract Conditions (Florida), subsection 6.9, Modification and Severability.

**ACCORDINGLY**, and in consideration of the mutual promises contained in the Contract documents, the Parties agree as follows:

**I. Contract Amendment.** Exhibit A, Additional Special Contract Conditions (Florida), is hereby deleted and replaced in its entirety with the attached Exhibit A, Additional Special Contract Conditions (Florida).

**II. Contract Renewal.** The Contract is renewed for a period of one year pursuant to the same terms and conditions of the contract and any executed written amendments, with a new Contract expiration date of March 13, 2025.

**III. Warranty of Authority.** Each person signing this Amendment warrants that he or she is duly authorized to do so and to bind the respective party.

**IV. Conflict.** To the extent any of the terms of this Amendment conflict with the terms of the Contract, the terms of this Amendment shall control.

**V. Effect.** Unless otherwise modified by this Amendment, all terms and conditions contained in the Contract shall continue in full force and effect. This Amendment is effective when signed by both Parties.



**CONTRACT AMENDMENT NO.: 3**  
 Contract No.: 81141902-VITA-18-ACS  
 Contract Name: Information Technology Research and Advisory Services

**IN WITNESS WHEREOF**, the Parties have executed this Amendment by their duly authorized representatives.

**State of Florida:**  
**Department of Management Services**

**Contractor:**  
 Info-Tech Research Group, Inc.

By: DocuSigned by:  
*Pedro Allende*  
C94713329499465...

By: DocuSigned by:  
*Ryan Huggett*  
D26A6B29C2E7461...

**Name:** Pedro Allende  
**Title:** Secretary  
**Date:** 3/6/2024 | 10:07 PM EST

**Name:** Ryan Huggett  
**Title:** General Counsel  
**Date:** 3/6/2024 | 3:32 PM EST





## ADDITIONAL SPECIAL CONTRACT CONDITIONS

The Contractor and agencies, as defined in section 287.012, Florida Statutes acknowledge and agree to be bound by the terms and conditions of the Master Contract except as otherwise specified in the Contract, which includes the Special Contract Conditions and these Additional Special Contract Conditions.

- A. Orders: Contractor must be able to accept the State of Florida Purchasing Card and MyFloridaMarketPlace (MFMP) purchase orders.
- B. Contractor and Subcontractors, Affiliates, Partners, Resellers, Distributors, and Dealers: By execution of a Contract, the Contractor acknowledges that it will not be released of its contractual obligations to the Department or state agencies because of any failure of an affiliate, partner, subcontractor, reseller, distributor, or dealer. The Contractor is responsible for ensuring that its affiliates, partners, subcontractors, resellers, distributors, and dealers providing commodities and performing services in furtherance of the Contract do so in compliance with the terms and conditions of the Contract. The Contractor is fully responsible for satisfactory completion of all work performed under the Contract.
- C. Preferred Pricing: It is the responsibility of the Contractor to provide a completed Preferred Pricing Affidavit upon Contract execution and annually thereafter throughout the Contract term in accordance with the Special Contract Conditions.
- D. Purchases Prerequisites: Contractor must ensure that entities receiving payment directly from Customers under this Contract must have met the following requirements:
  - Have an active registration with the Florida Department of State, Division of Corporations ([www.sunbiz.org](http://www.sunbiz.org)), or, if exempt from the registration requirements, provide the Department with the basis for such exemption.
  - Be registered in the MFMP Vendor Information Portal (<https://vendor.myfloridamarketplace.com>).
  - Have a current W-9 filed with the Florida Department of Financial Services (<https://flvendor.myfloridacfo.com>)
- E. Punchout Catalog and Electronic Invoicing.

The Contractor is encouraged to provide a MFMP punchout catalog. The punchout catalog provides an alternative mechanism for suppliers to offer the State access to Products awarded under the Contract. The punchout catalog also allows for direct communication between the MFMP eProcurement System and a supplier's Enterprise Resource Planning (ERP) system, which can reflect real-time Product inventory/availability information.

Through utilization of the punchout catalog model, a Florida buyer will "punch out" to a

supplier's website. Using the search tools on the supplier's Florida punchout catalog site, the user selects the desired Products. When complete, the user exits the supplier's punchout catalog site and the shopping cart (full of Products) is "brought back" to MFMP. No orders are sent to a supplier when the user exits the supplier's punchout catalog site. Instead, the chosen Products are "brought back" to MFMP as line items in a purchase order. The user can then proceed through the normal workflow steps, which may include adding/editing the Products (i.e., line items) in the purchase order. An order is not submitted to a supplier until the user approves and submits the purchase order, at which point the supplier receives an email with the order details.

The Contractor may supply electronic invoices in lieu of paper-based invoices for those transactions processed through MFMP. Electronic invoices may be submitted to the agency through one of the mechanisms as listed below:

1) EDI (Electronic Data Interchange)

This standard establishes the data contents of the Invoice Transaction Set (810) for use within the context of an Electronic Data Interchange (EDI) environment. This transaction set can be used for invoicing via the Ariba Network (AN) for catalog and non-catalog goods and services.

2) PO Flip via AN

This online process allows Contractors to submit invoices via the AN for catalog and non-catalog goods and services. Contractors have the ability to create an invoice directly from their inbox in their AN account by simply "flipping" the PO into an invoice. This option does not require any special software or technical capabilities.

The Contractor warrants and represents that it is authorized and empowered to and hereby grants the State and the third-party provider of MFMP, a State contractor, the right and license to use, reproduce, transmit, distribute, and publicly display within MFMP. In addition, the Contractor warrants and represents that it is authorized and empowered to and hereby grants the State and the third-party provider the right and license to reproduce and display within MFMP the Contractor's trademarks, system marks, logos, trade dress, or other branding designation that identifies the products made available by the Contractor under the Contract.

F. Contract Reporting: The Contractor shall provide the Department the following accurate and complete reports associated with this Contract.

1) Contract Quarterly Sales Reports. The Contractor shall submit Quarterly Sales Reports in the manner and format required by the Department within 30 calendar days after the close of each State fiscal quarter (the State's fiscal quarters close on September 30, December 31, March 31, and June 30).

The Quarterly Sales Report template can be found here: [Quarterly Sales Report Format / Vendor Resources / State Purchasing / Business Operations / Florida Department of Management Services - DMS \(myflorida.com\)](#). Initiation and submission of the most recent version of the Quarterly Sales Report posted on the DMS website is the responsibility of the Contractor without prompting or notification from the Department. Sales will be reviewed on a quarterly basis. If no sales are recorded in two consecutive quarters, the Contractor may be placed on probationary status, or the Department may terminate the Contract. Failure to provide the

Quarterly Sales Report, or other reports requested by the Department, will result in the imposition of financial consequences and may result in the Contractor being found in default and the termination of the Contract.

- 2) Certified and Minority Business Enterprises Reports. Upon Customer request, the Contractor shall report to each Customer spend with certified and other minority business enterprises in the provision of commodities or services related to the Customer orders. These reports shall include the period covered; the name, minority code, and Federal Employer Identification Number of each minority business enterprise utilized during the period; commodities and services provided by the minority business enterprise; and the amount paid to each minority business enterprise on behalf of the Customer.
  - 3) Ad Hoc Sales Reports. The Department may require additional Contract sales information such as copies of purchase orders or ad hoc sales reports. The Contractor shall submit these documents and reports in the format acceptable to the Department and within the timeframe specified by the Department.
  - 4) MFMP Transaction Fee Reports. The Contractor shall submit complete monthly MFMP Transaction Fee Reports to the Department. Reports are due 15 calendar days after the end of each month. Information on how to submit MFMP Transaction Fee Reports online can be located at [https://www.dms.myflorida.com/business\\_operations/state\\_myfloridamarketplace/mfmp\\_vendors/transaction\\_fee\\_and\\_reporting](https://www.dms.myflorida.com/business_operations/state_myfloridamarketplace/mfmp_vendors/transaction_fee_and_reporting). Assistance with transaction fee reporting is also available by email at [feeprocessing@myfloridamarketplace.com](mailto:feeprocessing@myfloridamarketplace.com) or telephone at 866-FLA-EPRO (866-352-3776) from 8:00 a.m. to 6:00 p.m. Eastern Time.
- G. Financial Consequences: The Department reserves the right to impose financial consequences when the Contractor fails to comply with the requirements of the Contract. The following financial consequences will apply for the Contractor's non-performance under the Contract. The Customer and the Contractor may agree to add additional Financial Consequences on an as-needed basis beyond those stated herein to apply to that Customer's resultant contract or purchase order. The State of Florida reserves the right to withhold payment or implement other appropriate remedies, such as Contract termination or nonrenewal, when the Contractor has failed to comply with the provisions of the Contract. The Contractor and the Department agree that financial consequences for non-performance are an estimate of damages which are difficult to ascertain and are not penalties.

The financial consequences below will be paid and received by the Department of Management Services within 30 calendar days from the due date specified by the Department. These financial consequences below are individually assessed for failures over each target period beginning with the first full month or quarter of the Contract performance and every month or quarter, respectively, thereafter.

### Financial Consequences Chart

Deliverable	Performance Metric	Performance Due Date	Financial Consequence for Non-Performance /Not Received by the Contract Manager
Contractor will timely submit complete Quarterly Sales Reports	All Quarterly Sales Reports will be submitted timely with the required information	Completed reports are due on or before the 30 <sup>th</sup> calendar day after the close of each State fiscal quarter	\$250 per day late
Contractor will timely submit complete MFMP Transaction Fee Reports	All MFMP Transaction Fee Reports will be submitted timely with the required information	Completed reports are due on or before the 15 <sup>th</sup> calendar day after the end of each month	\$100 per day late

**No favorable action will be considered when Contractor has outstanding Contract Quarterly Sales Reports, MFMP Transaction Fee Reports, or any other documentation owed to the Department or Customer, to include fees / monies, that is required under this Contract.**

- H. Business Review Meetings: Both the Department and Customer reserve the right to schedule business review meetings. The Department or Customer may specify the format or agenda for the meeting. At a minimum, the Business Review Meeting may include the following topics:
- a. Contract compliance
  - b. Contract savings (in dollar amount and cost avoidance)
  - c. Spend reports by Customer
  - d. Recommendations for improved compliance and performance
- I. Special Contract Conditions revisions: the corresponding subsections of the Special Contract Conditions referenced below are replaced in their entirety with the following:

#### 2.2 Renewal.

Upon written agreement, the Department and the Contractor may renew the Contract in whole or in part only as set forth in the Contract documents, and in accordance with section 287.057(14), F.S.

#### 3.4 Purchase Order.

A Customer may use purchase orders to buy commodities or contractual services pursuant to the Contract and, if applicable, the Contractor must provide commodities or contractual services pursuant to purchase orders. Purchase orders issued pursuant to the Contract must be received by the Contractor no later than the close of business on the last day of the Contract's term. The Contractor is required to accept timely purchase orders specifying delivery schedules that extend beyond the Contract term even when such extended delivery will occur after expiration of the Contract. Purchase orders shall be valid through their

specified term and performance by the Contractor, and all terms and conditions of the Contract shall survive the termination or expiration of the Contract and apply to the Contractor's performance. The duration of purchase orders for recurring deliverables shall not exceed the expiration of the Contract by more than twelve months. However, if an extended pricing plan offered in the state term or agency contract is selected by the ordering entity, the contract terms on pricing plans and renewals shall govern the maximum duration of purchase orders reflecting such pricing plans and renewals. Any purchase order terms and conditions conflicting with these Special Contract Conditions shall not become a part of the Contract.

### 3.7 Transaction Fees.

The State of Florida, through the Department of Management Services, has instituted MyFloridaMarketPlace, a statewide eProcurement system. Pursuant to Section 287.057(24), F.S., all payments shall be assessed a Transaction Fee of one percent (1.0%), or as may otherwise be established by law, which the vendor shall pay to the State.

For payments within the State accounting system (FLAIR or its successor), the Transaction Fee shall, when possible, be automatically deducted from payments to the vendor. If automatic deduction is not possible, the vendor shall pay the Transaction Fee pursuant to subsection 60A-1.031(2), F.A.C. By submission of these reports and corresponding payments, vendor certifies their correctness. All such reports and payments shall be subject to audit by the State or its designee.

The vendor shall receive a credit for any Transaction Fee paid by the vendor for the purchase of any item(s) if such item(s) are returned to the vendor through no fault, act, or omission of the vendor. Notwithstanding the foregoing, a Transaction Fee is non-refundable when an item is rejected or returned, or declined, due to the vendor's failure to perform or comply with specifications or requirements of the agreement.

Vendors will submit any monthly reports required pursuant to the rule. All such reports and payments will be subject to audit. Failure to comply with the payment of the Transaction Fees or submission of required reporting of transactions shall constitute grounds for declaring the Vendor in default.

### 5.1 Conduct of Business.

The Contractor must comply with all laws, rules, codes, ordinances, and licensing requirements that are applicable to the conduct of its business, including those of federal, state, and local agencies having jurisdiction and authority. For example, the Contractor must comply with section 274A of the Immigration and Nationality Act, the Americans with Disabilities Act, Health Insurance Portability and Accountability Act, if applicable, and all prohibitions against discrimination on the basis of race, religion, sex, creed, national origin, handicap, marital status, or veteran's status. The provisions of subparagraphs 287.058(1)(a)-(c) and (g), F.S., are hereby incorporated by reference.

Nothing contained within this Contract shall be construed to prohibit the Contractor from disclosing information relevant to performance of the Contract or purchase order to members or staff of the Florida Senate or Florida House of Representatives.

Pursuant to section 287.057(26), F.S., the Contractor shall answer all questions of, and ensure a representative will be available to, a continuing oversight team.

The Contractor will comply with all applicable disclosure requirements set forth in section 286.101, F.S. In the event the Department of Financial Services issues the Contractor a final order determining a third or subsequent violation pursuant to section 286.101(7)(c), F.S., the Contractor shall immediately notify the Department and applicable Customers and shall be disqualified from Contract eligibility.

#### 5.4 Convicted, Discriminatory, Antitrust Violator, and Suspended Vendor Lists.

In accordance with sections 287.133, 287.134, and 287.137, F.S., the Contractor is hereby informed of the provisions of sections 287.133(2)(a), 287.134(2)(a), and 287.137(2)(a), F.S. For purposes of this Contract, a person or affiliate who is on the Convicted Vendor List, the Discriminatory Vendor List, or the Antitrust Violator Vendor List may not perform work as a contractor, supplier, subcontractor, or consultant under the Contract. The Contractor must notify the Department if it or any of its suppliers, subcontractors, or consultants have been placed on the Convicted Vendor List, the Discriminatory Vendor List, or the Antitrust Violator Vendor List during the term of the Contract.

In accordance with section 287.1351, F.S., a vendor placed on the Suspended Vendor List may not enter into or renew a contract to provide any goods or services to an agency after its placement on the Suspended Vendor List.

A firm or individual placed on the Suspended Vendor List pursuant to section 287.1351, F.S., the Convicted Vendor List pursuant to section 287.133, F.S., the Antitrust Violator Vendor List pursuant to section 287.137, F.S., or the Discriminatory Vendor List pursuant to section 287.134, F.S., is immediately disqualified from Contract eligibility.

#### 5.5 Scrutinized Companies - Termination by the Department.

The Department may, at its option, terminate the Contract if the Contractor is found to have submitted a false certification as provided under section 287.135(5), F.S., or been placed on the Scrutinized Companies with Activities in Sudan List or the Scrutinized Companies with Activities in the Iran Terrorism Sectors List, or been engaged in business operations in Cuba or Syria, or to have been placed on the Scrutinized Companies that Boycott Israel List or is engaged in a boycott of Israel.

#### 5.6 Cooperation with Inspector General and Records Retention.

Pursuant to section 20.055(5), F.S., the Contractor understands and will comply with its duty to cooperate with the Inspector General in any investigation, audit, inspection, review, or hearing. Upon request of the Inspector General or any other authorized State official, the Contractor must provide any information the Inspector General deems relevant. Such information may include, but will not be limited to, the Contractor's business or financial records, documents, or files of any type or form that refer to or relate to the Contract. The Contractor will retain such records for the longer of five years after the expiration or termination of the Contract, or the period required by the General Records Schedules maintained by the Florida Department of State, at the Department of State's Records Management website. The Contractor agrees to reimburse the State of Florida for the reasonable costs of investigation incurred by the Inspector General or other authorized State of Florida official for investigations of the Contractor's compliance with the terms of this or any other agreement between the Contractor and the State of Florida which results in the suspension or debarment of the Contractor. Such costs will include but will not be limited to: salaries of investigators, including overtime; travel and lodging expenses; and expert witness and documentary fees. The Contractor agrees to impose the same obligations to

cooperate with the Inspector General and retain records on any subcontractors used to provide goods or services under the Contract.

6.10 Cooperative Purchasing. Pursuant to their own governing laws, and subject to the agreement of the Contractor, governmental entities that are not Customers may make purchases under the terms and conditions contained herein, if agreed to by Contractor. Such purchases are independent of the Contract between the Department and the Contractor, and the Department is not a party to these transactions. Agencies seeking to make purchases under this Contract are required to follow the requirements of Rule 60A-1.045(6), F.A.C.

8.1.1 Termination of Contract.

The Department may terminate the Contract for refusal by the Contractor to comply with this section by not allowing access to all public records, as defined in Chapter 119, F.S., made or received by the Contractor in conjunction with the Contract unless the records are exempt from s. 24(a) of Art. I of the State Constitution and section 119.071(1), F.S.

8.1.2 Statutory Notice.

Pursuant to section 119.0701(2)(a), F.S., for contracts for services with a contractor acting on behalf of a public agency, as defined in section 119.011(2), F.S., the following applies:

**IF THE CONTRACTOR HAS QUESTIONS REGARDING THE APPLICATION OF CHAPTER 119, FLORIDA STATUTES, TO THE CONTRACTOR'S DUTY TO PROVIDE PUBLIC RECORDS RELATING TO THIS CONTRACT, CONTACT THE DEPARTMENT'S CUSTODIAN OF PUBLIC RECORDS AT [PUBLICRECORDS@DMS.FL.GOV](mailto:PUBLICRECORDS@DMS.FL.GOV), (850) 487-1082 OR 4050 ESPLANADE WAY, SUITE 160, TALLAHASSEE, FLORIDA 32399-0950.**

Pursuant to section 119.0701(2)(b), F.S., for contracts for services with a contractor acting on behalf of a public agency as defined in section 119.011(2), F.S., the Contractor shall:

- (a) Keep and maintain public records required by the public agency to perform the service.
- (b) Upon request from the public agency's custodian of public records, provide the public agency with a copy of the requested records or allow the records to be inspected or copied within a reasonable time at a cost that does not exceed the cost provided in Chapter 119, F.S., or as otherwise provided by law.
- (c) Ensure that public records that are exempt or confidential and exempt from public records disclosure are not disclosed except as authorized by law for the duration of the Contract term and following the completion of the Contract if the Contractor does not transfer the records to the public agency.
- (d) Upon completion of the Contract, transfer, at no cost, to the public agency all public records in possession of the Contractor or keep and maintain public records required by the public agency to perform the service. If the Contractor transfers all public records to the



public agency upon completion of the Contract, the Contractor shall destroy any duplicate public records that are exempt or confidential and exempt from public records disclosure requirements. If the Contractor keeps and maintains public records upon completion of the Contract, the Contractor shall meet all applicable requirements for retaining public records. All records stored electronically must be provided to the public agency, upon request from the public agency's custodian of public records, in a format that is compatible with the information technology systems of the public agency.

#### 12.1 Performance or Compliance Audits.

The Department may conduct or have conducted performance and/or compliance audits of the Contractor and subcontractors as determined by the Department. The Department may conduct an audit and review all the Contractor's and subcontractors' data and records that directly relate to the Contract. To the extent necessary to verify the Contractor's fees and claims for payment under the Contract, the Contractor's agreements or contracts with subcontractors, partners, or agents of the Contractor, pertaining to the Contract, may be inspected by the Department upon fifteen (15) calendar days' notice, during normal working hours and in accordance with the Contractor's facility access procedures where facility access is required. Release statements from its subcontractors, partners, or agents are not required for the Department or its designee to conduct compliance and performance audits on any of the Contractor's contracts relating to this Contract. The Inspector General, in accordance with section 5.6, the State of Florida's Chief Financial Officer, and the Office of the Auditor General shall also have authority to perform audits and inspections.

#### 13.2 E-Verify.

The Contractor and its subcontractors shall register with and use the U.S. Department of Homeland Security's (DHS) E-Verify system to verify the work authorization status of all new employees of the contractor or subcontractor in accordance with section 448.095, F.S. The Contractor shall obtain an affidavit from its subcontractors in accordance with paragraph (5)(b) of section 448.095, F.S., and maintain a copy of such affidavit for the duration of the Contract.

Special Contract Conditions additions: the following subsections are added to the Special Contract Conditions:

#### 5.7 Foreign Country of Concern Attestation.

If the Contract or Customer's purchase order issued pursuant to this Contract grants the Contractor access to an individual's personal identifying information as defined in section 501.171, Florida Statutes, the Contractor must, prior to execution, extension, or renewal of this Contract or Customer purchase order, complete and submit to the applicable Governmental Entity the Form PUR 1355, "Foreign Country of Concern Attestation Form," available at: <http://www.flrules.org/Gateway/reference.asp?No=Ref-15958>.

#### 5.8 Common Carrier Attestation.

The Contractor as a Common Carrier, as defined in section 908.111, Florida Statutes, or contracted carrier must, prior to execution, amendment, or renewal of this Contract or Customer purchase order issued pursuant to this Contract, complete and submit to the applicable Governmental Entity the Form PUR 1808, "Common Carrier or Contracted



Carrier Attestation Form,” available at:

<http://www.flrules.org/Gateway/reference.asp?No=Ref-14614>.

This Contract or a Customer purchase order may be terminated if the Contractor is found to be in violation of the submitted attestation.

### 12.3 Document Inspection.

In accordance with section 216.1366, F.S., the Department or a state agency is authorized to inspect the: (a) financial records, papers, and documents of the Contractor that are directly related to the performance of the Contract or the expenditure of state funds; and (b) programmatic records, papers, and documents of the Contractor which the Department or state agency determines are necessary to monitor the performance of the Contract or to ensure that the terms of the Contract are being met. The Contractor shall provide such records, papers, and documents requested by the Department or a state agency within 10 Business Days after the request is made.

City of North Miami Beach Florida  
Service Proposal



Carson Burrell  
Associate Commercial Director  
cburrell@infotech.com  
1-888-670-8889 ext.2509  
November 22, 2024

Hi RICARDO,

On behalf of our entire team at Info-Tech Research Group, I am pleased to present this proposal for IT Research and Advisory services to you and your IT department at City of North Miami Beach Florida.

Info-Tech's IT Research and Advisory membership provides you with access to our powerful diagnostic tools and key research to help you systematically improve your IT department's performance.

To help you maximize the impact of your membership, we also provide an unmatched level of member service.

I welcome the opportunity to work with you and your IT executives at City of North Miami Beach Florida. Should you have questions at any time, please contact me directly at your convenience.

Sincerely,

Carson Burrell  
Associate Commercial Director  
cburrell@infotech.com  
1-888-670-8889 ext.2509

Info-Tech Research Group

3960 Howard Hughes Parkway  
Suite 500, Las Vegas, NV, USA  
89169

[infotech.com](http://infotech.com)

Proposal prepared for:

RICARDO CASTILLO

City of North Miami Beach Florida  
17011 NE 19th Ave, North Miami Beach,  
Florida, United States 33162-3111

# SERVICE AGREEMENT WITH INFO-TECH RESEARCH GROUP

Service Start Date: January 24, 2025 || Contract Length: 3-year  
 Contact: RICARDO CASTILLO

## City of North Miami Beach Florida

Product	Bundle Options	Description	Quantity	Subtotal	Discount	Total
SE Core Membership	See below for your selected bundle products		1.00			
	Executive Counselor Membership	Dedicated Executive Counselor, 2 Onsite/Virtual Counselor visits, Concierge Services, Industry Research, Unlimited Price Benchmarking, IT Vendor Negotiation Assistance for 3 contracts	1.00	\$66,458.00	\$13,677.35	\$52,780.65
	Online IT Spend & Staffing Benchmarking Membership	IT Spend & Staffing Benchmarking Membership (Online)	1.00			
	Industry /MLE (Executive/ Technical Counselor Option)	Deep Insights Tailored To Your Industry	1.00			
	Team Membership	Access to core research content - project blueprints, Info-Tech Academy, online Leadership training, software selection content, tools and templates library	1.00	\$4,297.00	\$1,103.45	\$3,193.55
	Industry /SE	Deep Insights Tailored To Your Industry	1.00	\$6,796.00	\$6,796.00	\$0.00
Leadership Summit		Leadership Summit (Core Membership)	2.00	\$0.00	\$0.00	\$0.00
Reference Membership		Access to core research content - project blueprints, Info-Tech Academy, software selection content, tools and templates library	1.00	\$0.00	\$0.00	\$0.00
<b>Total Discounts:</b>						\$21,576.80
<b>Total:</b>						\$55,974.20

All items stated on this document are in USD and is subject to applicable taxes.

State of Florida Alternate Contract Source (ACS) 81141902-VITA-18-ACS for IT Research and Advisory Services - 81141902-VITA-18-ACS

Payment Terms: Payable upon receipt of invoice

Unless otherwise stated, consulting and workshop engagements do not include travel and expenses, which will be charged in addition to the fees listed. Workshops purchased as part of membership expire without refund or credit at the end of the membership period covered by the purchase. Workshops purchased outside membership expire without refund or credit 1-year after purchase. Please work with your member services representative to select and schedule workshops prior to expiration.

Subject to applicable taxes. If your company is tax exempt, please provide a valid tax exemption certificate with the signed proposal. This Service Agreement is an order for services under (and subject to terms and conditions of) State of Florida Alternate Contract Source 81141902-VITA-18-ACS between Info-Tech Research Group Inc. and the State of Florida, Dept of Management Services

Unless agreed to in writing, any customer terms, including purchase order terms and conditions, are of no force or effect. By signing this Service Agreement, you agree to pay the fees set out herein annually for the term indicated.

This proposal has a definite expiry date of January 24, 2025.

**Please return this signed Service Agreement to Info-Tech by DocuSign, email [cburrell@infotech.com](mailto:cburrell@infotech.com) or fax (1-519-432-2506). Please include PO if required. Thank you for your business!**

---

The signature below affirms your commitment to pay for the services ordered in accordance with the terms of this Service Agreement.

**If you are tax exempt, please provide tax exemption certificate.**

Name \_\_\_\_\_

Signature \_\_\_\_\_

Title \_\_\_\_\_

Date \_\_\_\_\_



**Consent Agenda  
9.7.**

City of North Miami Beach  
17011 NE 19 Avenue  
North Miami Beach, FL 33162  
305-947-7581  
www.citynmb.com

**MEMORANDUM**

---

<b>TO:</b>	Mayor and City Commission
<b>FROM:</b>	Hamid Nikvan, NMB Water Director
<b>VIA:</b>	Mario A. Diaz, City Manager
<b>DATE:</b>	January 21, 2025

---

Resolution No. R2025-06 Approving an Agreement with MKI Services, Inc. to Purchase Sludge  
**RE:** Pumps, Mixers and Replacement Parts for NMB Water Production (Hamid Nikvan, NMB Water Director)

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**Description**

The City of North Miami Beach is requesting approval to proceed with the purchase of replacement sludge pumps, mixers, and parts through MKI Services, Inc. MKI Services is the sole authorized sales representative for Hayward Gordon and Westech equipment and parts in the state of Florida. As a result, all purchases related to these specific equipment and parts must be made through this sole source provider.

**BACKGROUND**

**ANALYSIS:**

Hayward Gordon equipment is used in the treatment system for sludge processing and Westech is the manufacturer of sludge thickeners. In the water treatment process, sewage and other substances pass through the sludge pumps to remove muck, debris and other liquid slurries.

A Notice to Sole Source (Ref: NTS-24-043-AS), was published on the Periscope E-Procurement portal on December 3, 2024, through December 10, 2024. The notice, outlined the City's intention to proceed with a sole-source procurement methodology for the purchase of replacement sludge pumps, mixers, and parts through MKI Services, Inc.

**RECOMMENDATION:** NMB Water Director and Chief Procurement Officer recommend that the City Commission approve and authorize the City Manager or designee to approve Sole Source purchase with MKI Engineering in an annual

estimated amount subject to budget appropriation.

**FISCAL/ BUDGETARY**

**IMPACT:**

As approved in the adopted budget appropriation.

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**ATTACHMENTS:**

**Description**

- ▣ MKI Services\_Resolution
- ▣ Solicitation

**RESOLUTION NO. R2025**

**A RESOLUTION OF THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA, APPROVING ANS AUTHORIZING A PURCHASE ORDER WITH MKI SERVICES, INC FOR THE PURCHASE OF SLUDGE PUMPS, MIXERS AND REPLACEMENT PARTS SUBJECT TO ANNUAL BUDGET APPROPRIATION; AUTHORIZING THE CITY MANAGER OR DESIGNEE TO DO ALL THINGS NECESSARY TO EFFECTUATE THIS RESOLUTION; PROVIDING FOR CONFLICTS; PROVIDING FOR SCRIVENER ERRORS, PROVIDING FOR SEVERABILITY; AND PROVIDING FOR AN EFFECTIVE DATE.**

**WHEREAS**, pursuant to Chapter 166, *Florida Statutes* and Section 1.4 of the Charter of the City of North Miami Beach (“City”), the City shall have all available governmental, corporate, and proprietary powers and may exercise them except when prohibited by law; and

**WHEREAS**, Section 3-4.5 of the Code of Ordinances City of North Miami Beach, Florida 2008 (“Code”) provides that purchases of the following material and services shall be exempt from the bidding process and subject to the spending limitation provided in subsection 3-3.14a. “Sole Source Purchase”, which states “sole source supplies and services, such as unique, patented, or franchised supplies or services are exempt if the Purchasing Agent determines, after conducting a good faith review of available sources, that the particular supply or service is available from one (1) source;” and

**WHEREAS**, A Notice to Sole Source (Ref: NTS-24-043-AS), was published on the Periscope E-Procurement portal outlining the City’s intention to proceed with a sole-source procurement methodology for the purchase of replacement sludge pumps, mixers, and parts through MKI Services, Inc. During that period, the City did not receive and/or could not substantiate the same products or services from alternate vendors.

**WHEREAS**, the NMB Water Treatment Plant requests to replace sludge pumps, mixers and parts used in the lime treatment system for sludge processing. Regular maintenance and parts replacement are required due to wear and tear. This is essential in maintaining water treatment operations; and

**WHEREAS**, MKI Services, Inc. is the sole distributor of WesTech Engineering and Hayward Gordon for sludge pumps, mixers and parts; and

**WHEREAS**, Section 3-3.14 of the City’s Code of Ordinances provides that contracts in excess of fifty thousand dollars (\$50,000.00) shall be awarded by the City Commission; and

**WHEREAS**, the City Manager and the Chief Procurement Officer recommend that the City Commission approve the sole source purchase of sludge pumps, mixers and parts with MKI Services, Inc. subject to annual budget appropriation; and

**WHEREAS**, the Mayor and City Commission believe it is in the best interests of the City to approve a sole source purchase with MKI Services, Inc to replace sludge pumps, mixers and parts

**RESOLUTION NO. R2025-X**



used in the lime treatment system for sludge processing subject to annual budget appropriation; and

**NOW, THEREFORE, BE IT RESOLVED** by the Mayor and City Commission of the City of North Miami Beach, Florida, that:

**Section 1.** The foregoing whereas clauses are true and correct and adopted as the legislative and administrative findings of the City Commission and made a specific part of this Resolution; all exhibits attached hereto are made a specific part of this Resolution.

**Section 2.** The sole source purchase, in substantially the form attached as Exhibit “A”, for the purchase of sludge pumps, mixers and parts with MKI Services, Inc., subject to annual budget appropriation and availability of funds is hereby approved.

**Section 3.** The City Manager or designee is authorized to do all things necessary to effectuate this Resolution.

**Section 4.** All Resolutions or parts of Resolutions in conflict with this Resolution are repealed to the extent of such conflict.

**Section 5.** Any scrivener or typographical errors that do not affect intent may be corrected with notice to, and the authorization of the City Attorney and City Manager without further process.

**Section 6.** If any provision of this Resolution or the application thereof to any person or circumstance is held invalid, such invalidity shall not affect other provisions or applications of this Resolution that can be given effect without the invalid provision or application, and to this end the provisions of this Resolution are declared to be severable.

**Section 7.** This Resolution shall take effect immediately upon adoption.

**[THE REMAINDER OF THIS PAGE INTENTIONALLY LEFT BLANK]**

**APPROVED AND ADOPTED** by the City of North Miami Beach City Commission at the regular meeting assembled this **21<sup>st</sup> day of January 2025**.

ATTEST:

\_\_\_\_\_  
ANDRISE BERNARD, MMC  
CITY CLERK

\_\_\_\_\_  
MICHAEL JOSEPH  
MAYOR

(CITY SEAL)

APPROVED AS TO FORM AND LEGAL SUFFICIENCY FOR THE USE  
AND RELIANCE OF THE CITY OF NORTH MIAMI BEACH ONLY:

GREENSPOON MARDER, LLP.

By: \_\_\_\_\_  
JOSEPH S. GELLER  
CITY ATTORNEYS

Sponsored by: Mayor & Commission

# **EXHIBIT A**

## **Solicitation NTS-24-043-AS**

### **Sludge Thickener Pumps, Mixers & Parts from MKI Services Inc.**

**Bid Designation: Public**



**City of North Miami Beach**

## **Bid NTS-24-043-AS**

### **Sludge Thickener Pumps, Mixers & Parts from MKI Services Inc.**

Bid Number **NTS-24-043-AS**  
Bid Title **Sludge Thickener Pumps, Mixers & Parts from MKI Services Inc.**

Bid Start Date **Dec 3, 2024 3:50:24 PM EST**  
Bid End Date **Dec 10, 2024 2:00:00 PM EST**

Bid Contact **Ahsan Saleem**  
**Contract Compliance Specialist**  
**ahsan.saleem@citynmb.com**

#### **Description**

This is not a Request for Proposals and there is no solicitation available. The proposed contract action is for product or services for which the City intends to negotiate and award with only one source under the authority of the City of North Miami Beach City Code Section 3-4.8. Any responses received as a result of this Notice of Intent shall be considered solely for the purpose of determining whether to conduct a competitive procurement. Responses will not be considered as proposals, bids, or quotes.

The City of North Miami Beach, Florida intends to negotiate a Sole Source procurement:

**Request Department/Office:** NMB Water

**Product and/or services to be purchased :** Sludge Thickener Pumps, Mixers & Parts from MKI Services Inc.

**Anticipated Cost:** \$100,000

**Sole Source Justification:** The Noorwood Water Treatment Facility needs to replace Sludge Pumps mixers and parts. MKI Services Inc is the sole or exclusive representative for WesTech Engineering, Inc and Hayward Gordon within the state of Florida for the purchase of new products, OEM parts, repairs, and maintenance.

**Active to be Taken:** Interested firms or individuals may identify their interest and capability to respond to the requirement by submitting in writing their name, address, point of contact, telephone number, email, and a statement regarding capability to provide the specified procurement per the attached specifications. Interested firms will be considered only if they respond with clear and convincing documentation that they are capable of meeting or exceeding the requirements stated herein. All responses received within seven (7) calendar days after the date of publication of this synopsis will be reviewed by the City. A determination by the Chief Procurement Officer & sourcing Buyer II not to compete this proposed action based on the responses to this notice is solely within the discretion of the Chief Procurement Officer.

**All responses must be in writing and returned to ATTN:** City of North Miami Beach, 17011 NE 19<sup>th</sup> Ave., Suite 315, North Miami Beach, FL 33162 by: e-mail to bids@citynmb.com . Note the number of the Sole Source Information inquiry on documentation.



## Notice of Intent to Award a Sole Source Procurement

**Subject:** Sludge Thickener Pumps, mixers & Parts from MKI Services Inc.

**Document Number:** NTS-24-043-AS

**Date:** December 3, 2024

**Written Response Due:** December 10, 2024

**Time:** 2:00 PM EST

**E-mail Address:** bids@citynmb.com

This is not a Request for Proposals and there is no solicitation available. The proposed contract action is for product or services for which the City intends to negotiate and award with only one source under the authority of the City of North Miami Beach City Code Section 3-4.8. Any responses received as a result of this Notice of Intent shall be considered solely for the purpose of determining whether to conduct a competitive procurement. Responses will not be considered as proposals, bids, or quotes.

The City of North Miami Beach, Florida intends to negotiate a Sole Source procurement:

**Request Department/Office:** NMB Water

**Product to be purchased:** Sludge Thickener Pumps, Mixers & Parts from MKI Services Inc

**Anticipated Cost:** \$100,000

**Sole Source Justification:** The Noorwood Water Treatment Facility needs to replace Sludge Pumps mixers and parts. MKI Services Inc is the sole or exclusive representative for WesTech Engineering, Inc and Hayward Gordon within the state of Florida for the purchase of new products, OEM parts, repairs, and maintenance.

**Active to be Taken:** Interested firms or individuals may identify their interest and capability to respond to the requirement by submitting in writing their name, address, point of contact, telephone number, email, and a statement regarding capability to provide the specified procurement per the attached specifications. Interested firms will be considered only if they respond with clear and convincing documentation that they are capable of meeting or exceeding the requirements stated herein. All responses received within seven (7) calendar days after the date of publication of this synopsis will be reviewed by the City. A determination by the Chief Procurement Officer & sourcing Buyer II not to compete this proposed action based on the responses to this notice is solely within the discretion of the Chief Procurement Officer.

**All responses must be in writing and returned to ATTN:** City of North Miami Beach, 17011 NE 19<sup>th</sup> Ave., Suite 315, North Miami Beach, FL 33162 by: e-mail to [bids@citynmb.com](mailto:bids@citynmb.com). Note the number of the Sole Source Information inquiry on documentation.



SOLE SOURCE REQUEST FORM

PROCUREMENT MANAGEMENT DIVISION

TO: **Mario A. Diaz**  
City Manager

VIA: Chief Procurement Officer

FROM: Pedro Melo (Name)  
NMB Water (Department)

DATE: 10/01/2024

---

RE: Replacement sludge pumps, mixers and parts.

Annual Expenditure not to Exceed: \$ 100,000 Vendor # 526763

Section 3-4.5 Exemptions for Bidding, Purchase of the following materials and services shall be exempt from the bidding process and subject to the spending limitations provided in subsection 3-3.14, unless otherwise provided by **State law: a. Sole source purchases. Sole-source supplies and services, such as unique, patented, or franchised supplies or services, are exempt if the Purchasing Agent determines, after conducting a good faith review of available sources, that the particular supply or service is available from only one (1) source.**

**Sole Source Justification: 3-4.8 Sole Source Purchasing.** Department heads may recommend purchase of a part, commodity, or service from a sole source supplier after a reasonable search has been made to find other suppliers. The recommendation shall include a written justification documenting the potential vendors contacted, and the results. The Purchasing Agent shall either confirm the lack of additional suppliers or inform the Department of potential suppliers.

The Norwood Water Treatment plant currently need to purchase replacement sludge pumps, mixers and parts.

MKI Services Inc. is the sole authorized sales representative for Hayward Gordon and Westech equipment and parts in the state of Florida. All purchases can only be done through sole representative.

	Approved	Date
Chief Procurement Officer (Up to \$25,000)	_____	_____
Mario A. Diaz, City Manager (Up to \$50,000)	_____	_____

*Purchases exceeding \$50,000.00 will be placed on the next Commission Agenda pending Procurement review.*



**PROCUREMENT EXPLANATION MEMO**

*PROCUREMENT MANAGEMENT DIVISION*

**TO:** **Mario A. Diaz, City Manager**

**VIA:** Chief Procurement Officer

**FROM:** Pedro Melo  
Name  
Interim Director of NMB Water  
Title/Department

**DATE:** \_\_\_\_\_

**RE:** Replacement sludge pumps, mixers and parts.

**Fiscal Amount not to Exceed:** \$ 100,000

**Vendor #** 526763

**Purpose (How does it align with City NMB Strategic Plan?):**

In keeping with City of NMB's Strategic Plan Mission of providing a safe environment for residents and visitors to the City, and being fiscally responsible, a request is being made to award a sole source contract to MKI Services Inc. for the purchase of critical equipment and parts required to maintain normal plant operations.

**Background:**

Hayward Gordon equipment is used in the lime treatment system for sludge processing, also Westech is the manufacturer for the Sludge thickener. Those equipment requires maintenance and at times repairs or replacement parts due to wear and tear. This purchase will enable the water plant to make timely repair and replacement in case one of the pumps or mixers becomes defective or fails.

**Recommendation:**

NMB Water recommends this Sole Source Request be approved and established as MKI Services Inc. is the authorized sole source vendor of these services. By establishing this contract, the water plant will have the means of procuring critical equipment and parts to maintain normal plant operations of the lime treatment system.

**Fiscal Impact / Account Number(s):**

410904 - 533460

**Contact Person(s):**

Pedro Melo, Interim Director of NMB Water; Carlos Carrazana, Water Plant Manager

MKI Services, Inc.  
 7284 West Palmetto Park Road  
 Suite 304  
 Boca Raton, FL 33433

# Quote

Date	Quote#
10/29/2024	3153

Name / Address
City of North Miami Beach 17011 N.E. 19th Avenue North Miami Beach, FL 33162

Ship To
City of North Miami Beach Norwood Water Treatment Plant 19150 NW 8th Avenue Miami Gardens, FL 33169

P.O. No.	Rep	Terms	Project	
	MS	Net 30 Days		
Description	Qty	Cost	Total	
Replacement parts for Hayward Gordon Model XR4-7 as per attached Hayward Gordon Breakdown #Q4-83820 dated 10/29/24	1	9,610.49	9,610.49	
Replacement parts for Hayward Gordon Model XR2-7 as per attached Hayward Gordon Breakdown #Q4-83773 dated 10/29/24	1	9,610.49	9,610.49	
Replacement parts for Hayward Gordon Model XR3-8 as per attached Hayward Gordon Breakdown #Q4-83822 dated 10/29/24	1	8,954.08	8,954.08	
Shipping & Freight	1	1,200.00	1,200.00	
NOTE: These quotes are for ESTIMATING purposes only. We will need to request updated quotes when purchasing. All of these items will be purchased through MK.I Services, Inc.				
Please contact Michele Shuminer if you need additional information. Thank you			<b>Subtotal</b>	\$29,375.06
Phone #	E-mail			
954-755-2092	michele@mosskelley.com			
			<b>Sales Tax (0.0%)</b>	\$0.00
			<b>Total</b>	\$29,375.06



MKI Services, Inc.  
 7284 West Palmetto Park Road  
 Suite 304  
 Boca Raton, FL 33433

# Quote

Date	Quote#
10/23/2024	3154

Name / Address
City of North Miami Beach 17011 N.E. 19th Avenue North Miami Beach, FL 33162

Ship To
City of North Miami Beach Norwood WTP 19150 N.W. 8th Avenue Miami Gardens, FL 33169 Att: Carlos Carrazana 786-586-8395

P.O. No.	Rep	Terms	Project	
	MS	Net 30 Days		
Description	Qty	Cost	Total	
Replacement Parts Job #19433A Westech Thickener				
Westech Item #2-1958 Bearing Item 515	2	1,230.50	2,461.00	
Westech Item #521-003B0-A Shaft Hanger Item 521	1	2,750.00	2,750.00	
Westech Item #LM10014-196 Lift Jack Item 503	1	10,273.00	10,273.00	
Westech Item #HJ4100 SM-Cyclo Reducer Item 505	1	1,309.00	1,309.00	
Westech Item #L100-100 Coupling Half 1" Item 507A	1	127.88	127.88	
Westech Item #513-016C00 Thrust Bearing Housing Item 513	1	5,912.50	5,912.50	
Westech Item #514-008B00 Thrust Bearing Housing Adapter Item 514	1	2,475.00	2,475.00	
Westech Item #400600 Oil Seal Shaft Support Item 519	1	14.41	14.41	
Westech Item #3100-125 Retaining Ring Item 520	2	2.64	5.28	
Please contact Michele Shuminer if you need additional information. Thank you		<b>Subtotal</b>		
Phone #	E-mail	<b>Sales Tax (0.0%)</b>		
954-755-2092	michele@mosskelley.com	<b>Total</b>		

MKI Services, Inc.  
 7284 West Palmetto Park Road  
 Suite 304  
 Boca Raton, FL 33433

# Quote

Date	Quote#
10/23/2024	3154

Name / Address
City of North Miami Beach 17011 N.E. 19th Avenue North Miami Beach, FL 33162

Ship To
City of North Miami Beach Norwood WTP 19150 N.W. 8th Avenue Miami Gardens, FL 33169 Att: Carlos Carrazana 786-586-8395

P.O. No.	Rep	Terms	Project	
	MS	Net 30 Days		
Description	Qty	Cost	Total	
Westech Item #521-003B00-B Shaft Hanger Pin Item 522	1	687.50	687.50	
Westech Item #7616DLTN Bearing Roller Item 530	1	111.60	111.60	
Westech Item #2367-1890000 Coupling Item 532	1	2.75	2.75	
Westech Item #2367-2100000 Socket Capscrew Item 603	4	4.40	17.60	
Westech Item #2367-2130000 Capscrew Hex Nut Item 606	4	1.24	4.96	
Westech Item #2367-2150000 Capscrew Hex HD Item 608	8	2.20	17.60	
Westech Item #2367-2230000 Capscrew Hex HD Item 616	4	0.83	3.32	
Westech Item #L100-112 Coupling Half Item 507C	1	127.88	127.88	
Westech Item #L100-HYTSPD Coupling Hytrel Spider Item 507B	1	256.67	256.67	
Shipping & Freight LEAD TIME: 8-10 WEEKS	1	750.00	750.00	
Please contact Michele Shuminer if you need additional information. Thank you			<b>Subtotal</b>	
Phone #	E-mail	<b>Sales Tax (0.0%)</b>		
954-755-2092	michele@mosskelley.com	<b>Total</b>		

MKI Services, Inc.  
 7284 West Palmetto Park Road  
 Suite 304  
 Boca Raton, FL 33433

# Quote

Date	Quote#
10/23/2024	3154

Name / Address
City of North Miami Beach 17011 N.E. 19th Avenue North Miami Beach, FL 33162

Ship To
City of North Miami Beach Norwood WTP 19150 N.W. 8th Avenue Miami Gardens, FL 33169 Att: Carlos Carrazana 786-586-8395

P.O. No.	Rep	Terms	Project	
	MS	Net 30 Days		
Description		Qty	Cost	Total
NOTE: These quotes are for ESTIMATING purposes only. We will need to request updated quotes when purchasing. All of these items will be purchased through MK.I Services, Inc.				
Please contact Michele Shuminer if you need additional information. Thank you			<b>Subtotal</b>	\$27,307.95
Phone #	E-mail		<b>Sales Tax (0.0%)</b>	\$0.00
954-755-2092	michele@mosskelley.com		<b>Total</b>	\$27,307.95



October 22, 2024

Subject: Sole Source Representative

To Whom It May Concern,

WesTech Engineering, Inc. is the sole manufacture of its products. MKI Services, Inc. is the sole or exclusive representative for WesTech Engineering, Inc. within the state of Florida for the purchase of new products, OEM repair parts, repairs and maintenance.

No other representative can sell products, repair/replacement parts, maintenance, repair/replacement services, field services and technical support for WesTech Engineering, Inc.

Your contact for MKI Services Inc. is:

MKI Services, Inc.  
7284 W. Palmetto Park Road, Suite 304  
Boca Raton, FL 33433  
Contact: Michele Shuminer  
Phone: (954) 755-2092

If you have questions regarding this issue, please contact me at 706-255-8964.

Sincerely,

*Mitch Matthews*

Mitch Matthews  
Southeast Regional Manager





October 22, 2024

To Whom It May Concern:

Re: Hayward Gordon ULC – Pumps and Mixers

The purpose of this correspondence is to confirm the following:  
MKI Services Inc. is our sole authorized sales representative for Hayward Gordon equipment and parts in the state of Florida with the exception of the Florida panhandle.

We thank you for your interest in our products, and request you send all of your inquiries and orders to the following address for proper handling and processing:

MKI Services, Inc.  
7284 W. Palmetto Park Road, Suite 304  
Boca Raton, FL 33433  
Tel: 954-755-2092  
Attention: Michele Shuminer  
[michele@mosskelley.com](mailto:michele@mosskelley.com)

Sincerely,

*David Caton*

David Caton  
East Region Sales Manager  
Hayward Gordon ULC

## Question and Answers for Bid #NTS-24-043-AS - Sludge Thickener Pumps, Mixers & Parts from MKI Services Inc.

### Overall Bid Questions

There are no questions associated with this bid.



**Consent Agenda  
9.8.**

City of North Miami Beach  
17011 NE 19 Avenue  
North Miami Beach, FL 33162  
305-947-7581  
www.citynmb.com

**MEMORANDUM**

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<b>TO:</b>	Mayor and City Commission
<b>FROM:</b>	Andrew Plotkin, Assistant City Manager/Parks and Recreation Director
<b>VIA:</b>	Mario A. Diaz, City Manager
<b>DATE:</b>	January 21, 2025

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Resolution No. R2025-07 Approving an Agreement with Musco Sports Lighting LLC, for the  
**RE:** Purchase and Install of Sports Lighting at Kevin R. Sims Aquatic Center (Andrew Plotkin, Assistant City Manager/Parks and Recreation Director)

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**Description**

The Parks and Recreation Department is requesting approval to proceed with replacing the existing lighting system at the Kevin R. Sims Aquatic Center with a new, energy-efficient LED lighting system. This upgrade is essential to ensure the safety and well-being of both City staff and residents who utilize the facility.

**BACKGROUND ANALYSIS:**

The current lighting at the Kevin R. Sims Aquatic Center is outdated and not meeting modern safety and efficiency standards. By switching to LED lights, the City will benefit from enhanced lighting quality, reduced energy consumption, and lower maintenance costs over time. Moreover, this upgrade will significantly improve the overall safety of the facility, particularly during evening hours, for both staff and visitors.

The purchase will be made through the Clay County's Invitation for Bid no. 23/24-074 to Provide Various Equipment and Amenities for Parks and Recreation in an estimated budgeted amount of \$125,000. The effective date of the contract is July 24, 2024, through July 23, 2027, with the option to renew for two additional one-year periods.

**RECOMMENDATION:** NMB Parks Director and Chief Procurement Officer recommend that the City Commission approve and authorize the City Manager or designee to

approve a purchase order in an estimated budgeted amount of \$125,000 with Musco Sports Lighting, LLC for the purchase.

**FISCAL/ BUDGETARY**

**IMPACT:**

As approved in the adopted budget appropriation.

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**ATTACHMENTS:**

**Description**

- ▣ Musco\_Resolution
- ▣ Musco\_Piggyback Request Form



**RESOLUTION NO. 2025-XX**

**A RESOLUTION OF THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA, APPROVING A PIGGYBACK CONTRACT BETWEEN THE CITY AND MUSCO SPORTS LIGHTING, LLC, FOR THE PURCHASE AND INSTALL OF SPORTS LIGHTING AT KEVIN R. SIMS AQUATIC CENTER; IN A BUDGETED AMOUNT OF \$125,000.00; AUTHORIZING THE CITY MANAGER OR DESIGNEE TO DO ALL THINGS NECESSARY TO EFFECTUATE THIS RESOLUTION; PROVIDING FOR CONFLICTS; PROVIDING FOR SCRIVENER ERRORS, PROVIDING FOR SEVERABILITY; AND PROVIDING FOR AN EFFECTIVE DATE.**

**WHEREAS**, pursuant to Chapter 166, *Florida Statutes* and Section 1.4 of the Charter of the City of North Miami Beach (“City”), the City shall have all available governmental, corporate, and proprietary powers and may exercise them except when prohibited by law; and

**WHEREAS**, Section 3-2.2 of the City of North Miami Beach Code of Ordinances (“Code”) provides that the Chief Procurement Officer has the authority to join with other governmental entities in cooperative purchasing plans, when the best interests of the City would be served.

**WHEREAS**, Clay County issued and awarded Contract No. 23/24-074 to provide Various Equipment and Amenities for Parks and Recreation effective July 24, 2024 through July 23, 2027, with the option to renew for two additional one-year terms; and

**WHEREAS**, to ensure the safety of City staff and residents, the Parks and Recreation Department would like to replace the existing lighting at the Kevin R. Sims Aquatic Center with a new, energy-efficient LED system.

**WHEREAS**, pursuant to Section 3-3.14 of the City Code, the City Manager has the authority to approve purchases and awards up to fifty thousand dollars (\$50,000), and any expenditures above this amount need to be presented to the Mayor and City Commission for approval; and

**WHEREAS**, the City Manager and the Chief Procurement Officer recommend that the City Commission approve a Piggyback Contract in an estimated budgeted amount of \$125,000 for the purchase and install of Sports Lighting at Kevin R. Sims Aquatic Center; and

**WHEREAS**, the Mayor and City Commission determine it is in the best interests of the City to approve a Piggyback Contract in an estimated budgeted amount of \$125,000.00 for the purchase and install of Sports Lighting at Kevin R. Sims Aquatic Center with Musco Sports Lighting, LLC.

**NOW, THEREFORE, BE IT RESOLVED BY THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA, THAT:**

**Section 1.** The foregoing whereas clauses are true and correct and adopted as the

**RESOLUTION NO. 2025-XX**

legislative and administrative findings of the City Commission and made a specific part of this Resolution; all exhibits attached hereto are made a specific part of this Resolution.

**Section 2.** The contract with Musco Sports Lighting, LLC in substantially the form attached as Exhibit “A” for an estimated budgeted amount of \$125,000, for the purchase and installation of Sports Lighting at the Kevin R. Sims Aquatic Center, subject to the budget appropriation and availability of funds is hereby approved.

**Section 3.** The City Manager or designee is authorized to do all things necessary to effectuate this Resolution.

**Section 4.** All Resolutions or parts of Resolutions in conflict with this Resolution are repealed to the extent of such conflict.

**Section 5.** Any scrivener or typographical errors that do not affect intent may be corrected with notice to, and the authorization of the City Attorney and City Manager without further process.

**Section 6.** If any provision of this Resolution or the application thereof to any person or circumstance is held invalid, such invalidity shall not affect other provisions or applications of this Resolution that can be given effect without the invalid provision or application, and to this end the provisions of this Resolution are declared to be severable.

**Section 7.** This Resolution shall take effect immediately upon adoption.

**[THE REMAINDER OF THIS INTENTIONALLY LEFT BLANK]**

**APPROVED AND ADOPTED** by the City of North Miami Beach City Commission at the regular meeting assembled this **21<sup>st</sup> day of January 2025**.

ATTEST:

\_\_\_\_\_  
ANDRISE BERNARD, MMC  
CITY CLERK

\_\_\_\_\_  
MICHAEL JOSEPH  
MAYOR

(CITY SEAL)

APPROVED AS TO FORM AND LEGAL SUFFICIENCY FOR THE USE  
AND RELIANCE OF THE CITY OF NORTH MIAMI BEACH ONLY:

GREENSPOON MARDER, LLP.

By: \_\_\_\_\_  
CITY ATTORNEYS

Sponsored by: Mayor & Commission

**RESOLUTION NO. 2025-XX**



**EXHIBIT A**

**PIGGYBACK/COOPERATIVE PURCHASE REQUEST FORM**

Revised 3.23.23

*PROCUREMENT MANAGEMENT DIVISION*

Requesting Department: \_\_\_\_\_  
Primary Contact Name: \_\_\_\_\_  
Primary Contact E-mail: \_\_\_\_\_  
Secondary Contact Name: \_\_\_\_\_  
Secondary Contact E-mail: \_\_\_\_\_  
Department Phone: \_\_\_\_\_  
Department Fax: \_\_\_\_\_

Company Name: \_\_\_\_\_  
Contact Name: \_\_\_\_\_  
Company Address: \_\_\_\_\_  
\_\_\_\_\_  
Company Phone: \_\_\_\_\_  
Company Fax: \_\_\_\_\_  
Company E-mail: \_\_\_\_\_  
Vendor Registration #: \_\_\_\_\_

**Piggyback Contract Details**

1. Contract Title: \_\_\_\_\_  
  - a. Awarding Agency \_\_\_\_\_ b. Solicitation # \_\_\_\_\_
  - c. Solicitation included? Yes  Awarded Letter included? Yes  Proposal/Quote from Company included? Yes
2. Description of the Scope of Service of This Contract: \_\_\_\_\_
3. Total Value of Contract: \$ \_\_\_\_\_
4. Account Number(s): FY \_\_\_\_\_ FY \_\_\_\_\_

**Contract Verification Information**

5. Were alternative contracts evaluated to determine that the City is obtaining the most advantageous contract pricing for the required product / service? Yes  No  \_\_\_\_\_
6. Would this purchase(s) result in the potential of future purchases for related products/ services being restricted to a particular vendor or create a specific vendor as sole source provider for the related items? Yes  No
7. Would this purchase(s) result in any future maintenance costs which are not included in the initial purchase? Yes  No   
If yes, please attach a draft maintenance plan which includes cost estimates and funding sources(s).

**Required Documents Checklist**

- Contract Explanation Memo       Solicitation       Award Letter       Proposal/Quote
- Renewal Letter       Risk Manager Approved Insurance Certificate       Vendor Registration Form

**Grant Information (only applicable if grant related purchase)**

11. Provide details (expiration dates, special requirements, etc). \_\_\_\_\_
12. Will this require matching funds? Yes  No
13. Grant source? \_\_\_\_\_ Grant (dollar) amount? \_\_\_\_\_
14. Complete an advanced search of the vendor recommended for award on the federal governments system for Award Management at [www.sam.gov](http://www.sam.gov). Attach a copy of the results.

**Approved**

**Date**

Form Prepared By: \_\_\_\_\_

Department Director: \_\_\_\_\_



\_\_\_\_\_  
11/5/24

Chief Procurement Officer: \_\_\_\_\_  
(Purchases/Contract up to \$25,000.00)

City Manager: \_\_\_\_\_  
(Purchases/Contracts up to \$50,000.00)

\_\_\_\_\_

\_\_\_\_\_

Purchases/Contracts exceeding \$50,000.00 will be placed on the next Commission Agenda pending Procurement review

**3-4.3 Use of Other Governmental Entities' Contracts**

*Subject to the spending limitations in Section 3-3.14 and upon a determination that the supplies, materials, equipment or contractual services needed by the City are comparable to solicitation procedures substantially equivalent to the requirements of the North Miami Beach Purchasing Code, the Purchasing Agent may procure, without following formal contract procedure, all supplies, materials, equipment and contractual services which are the subject of contracts with the State of Florida, its political subdivisions, the United States government, other governmental entities, or a corporation not for profit whose members are governmental entities, public officers, or any combination thereof; provided, however, that this section shall apply only if (i) the supplies, materials, equipment or contractual services are the subject of a price schedule negotiated by the State of Florida or the United States government, or (ii) the supplies, materials, equipment or contractual services are the subject of a contract with another governmental entity or a corporation not for profit whose members are governmental entities, public officers, or any combination thereof, which contract is based strictly on competitive bids or competitive proposals and not on any preference.*



**PROCUREMENT EXPLANATION MEMO**

*PROCUREMENT MANAGEMENT DIVISION*

**TO: Mario A. Diaz**  
City Manager

**VIA: Sherece George**  
Chief Procurement Officer

**FROM:** *AD*  
\_\_\_\_\_  
Name  
\_\_\_\_\_  
Title/Department

**DATE:** \_\_\_\_\_

**RE:** \_\_\_\_\_

**Fiscal Amount not to Exceed:** \$ \_\_\_\_\_ **Vendor #** \_\_\_\_\_

**Purpose (How does it align with City NMB Strategic Plan?):**

**Background:**

**Recommendation:**

**Fiscal Impact / Account Number(s):**

**Contact Person(s):**

# Quote

Date: October 23, 2024  
 To: City of North Miami Beach

Project: Victory Pool Family Aquatics Center  
 North Miami Beach, FL

**Quotation Price – Materials Delivered to Job Site and Fixture Installation – Existing Poles / New Controls / Existing Electrical Underground**

➤ **Pool Lighting**

..... **\$ 96,000.00**

*Sales tax, bonding, and permitting fees are not included.  
 Pricing furnished is effective for 90 days unless otherwise noted and is considered confidential.*

**Clay County RFB #23/24-074 – Sports Lighting**

Field Description	Quantity	Unit Price	Extended Price
(Section I B) Additional lighting for security, special areas, replacing fixtures on existing poles or non – standard field sizes & pole locations	13	\$54,600.00	\$54,600.00
(Section III G) Installation of Fixtures on Existing Poles	5	\$17,000.00	\$85,000.00
(Section IV C b) Installation of Contactor Cabinet	1	\$12,000.00	\$12,000.00
<b>Deduct: Design Parameters</b>			<b>\$55,000.00</b>
			<b>\$ 96,000.00</b>



### ***SportsCluster™ System with Total Light Control – TLC for LED® technology***

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#### **Guaranteed Lighting Performance**

- Guaranteed light levels per design

#### **System Description**

- Factory wired poletop luminaire assemblies
- Factory aimed and assembled luminaires, including BallTracker™ luminaires
- Factory wired and tested remote electrical component enclosures
- Pole length, factory assembled wire harnesses
- Mounting hardware for poletop luminaire assemblies and electrical components enclosures
- Disconnects
- UL Listed assemblies

#### **Environmental Light Control**

- Spill light minimized
- Off-site glare light minimized

#### **Control Systems and Services**

- Existing controls to be utilized

#### **Operation and Warranty Services**

- Reduction of energy and maintenance costs by 40% to 85% over typical 1500W metal halide equipment
- Product assurance and warranty program that covers materials and onsite labor, eliminating 100% of your maintenance costs for 25 years
- Support from Musco's Lighting Services Team – over 170 Team members dedicated to operating and maintaining your lighting system – plus a network of 1800+ contractors

### ***Installation Services Provided***

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#### **Customer Responsibilities:**

1. Complete access to the site for construction using standard 2-wheel drive rubber tire equipment.
2. Locate existing underground utilities not covered by your local utilities. (i.e. water lines, electrical lines, irrigation systems, and sprinkler heads). Musco or Subcontractor will not be responsible for repairs to unmarked utilities.
3. Locate and mark field reference point, home plate, per Musco supplied layout.
4. Ensure usability of existing underground wiring.
5. Pay any necessary power company fees and requirements.
6. Pay all permitting fees.
7. Provide any existing as-built documents or drawings.

#### **Musco Responsibilities:**

1. Provide required fixtures, electrical enclosures, mounts, hardware, wire harnesses.
2. Provide fixture layout and aiming diagram.
3. Provide Project Management as required.
4. Assist our installing subcontractor and ensure our responsibilities are satisfied.





### **Musco Subcontractor Responsibilities**

#### **General:**

1. Provide labor, equipment, and materials to off load equipment at jobsite per scheduled delivery.
2. Provide storage containers for material (including electrical components enclosures), as needed.
3. Provide necessary waste disposal and daily clean up.
4. Provide adequate security to protect Musco delivered products from theft, vandalism, or damage during the installation.
5. Obtain any required permitting.
6. Confirm the existing underground utilities and irrigation systems have been located and are clearly marked to avoid damage from construction equipment. Repair any damage made during construction.
7. Keep all heavy equipment off playing fields when possible. Repair damage to grounds which exceeds that which would be expected. Indentations caused by heavy equipment traveling over dry ground would be an example of expected damage. Ruts and sod damage caused by equipment traveling over wet grounds would be an example of damage requiring repair.
8. Provide startup and aiming as required to provide complete and operating sports lighting system.
9. Installation to commence upon delivery and proceed without interruption until complete. Musco to be immediately notified of any breaks in schedule or delays.

#### **Demolition:**

1. Remove and dispose of the existing lighting fixtures and electrical enclosures on 6 poles. This will include the recycling of lamps, aluminum reflectors, ballast, and steel as necessary.
2. Leave existing power feed in place for connection to new lighting equipment.

#### **Retrofit Musco Equipment to Existing Poles:**

1. Provide labor, materials, and equipment to assemble and install Musco TLC for LED® equipment on existing poles and terminate power feed. Power feed may need to be reworked to adapt to the new Musco equipment.
2. Ensure grounding components meet minimum standards required by NEC and NFPA780.
3. New lightning down conductor(aluminum) and  $\frac{5}{8}$  in copper ground rod. For poles 75 ft (22 m) or less use 1/0 AWG, poles over 75 ft (22 m) use 4/0 AWG conductor. Bond internal pole ground to new down conductor.
4. Down conductor shall be converted to copper wire for any underground runs and bonded to ground rod(s).
5. Ensure all Musco components are bonded to both equipment and lightning grounds. No upward sweeps allowed for lightning down conductor or bonding jumper(s). See installation instructions for further information.
6. Test ground resistance with 3-point megger and confirm 25 ohms or less for each pole. Install additional ground rods or create grounding grid until resistance of 25 ohms or less is achieved.

#### **Electrical:**

1. Provide materials and equipment to reuse existing electrical service panels.
2. Provide materials and equipment to reuse existing electrical wiring as permitted.



## Quote

### **Control System:**

1. Provide labor, equipment, and materials to connect lighting circuits to existing Musco controls.
2. Check all zones to make sure they work in both auto and manual mode.
3. Commission Control-Link® by contacting Control-Link Central™ at 877-347-3319.

### **Demolition:**

1. Remove and dispose of the existing lighting fixtures and electrical enclosures on 5 poles. This will include the recycling of lamps, aluminum reflectors, ballast, and steel as necessary.
2. Leave existing power feed in place for connection to new lighting equipment.

### **Payment Terms**

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Net 30 days for materials and progressive payments for labor.

### **Delivery Timing**

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8 - 12 weeks for delivery of materials to the job site from the time of order, submittal approval, and confirmation of order details including voltage, phase, and pole locations.

Due to the built-in custom light control per luminaire, pole locations need to be confirmed prior to production. Changes to pole locations after the product is sent to production could result in additional charges.

### **Notes**

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Quote is based on:

- Shipment of entire project together to one location.
- Existing Volt, Existing Phase electrical system requirement.
- Owner is responsible for getting electrical power to the site, coordination with the utility, and any power company fees.
- Confirmation of pole locations prior to production.
- Product assurance and warranty program is contingent upon site review and compatibility with Musco's lighting system

Thank you for considering Musco for your lighting needs. Please contact me with any questions or if you need additional details.



Jason Frucht  
Sales Representative  
Musco Sports Lighting, LLC  
Phone: 954-732-5674  
E-mail: [jason.frucht@musco.com](mailto:jason.frucht@musco.com)



**AGREEMENT TO PROVIDE VARIOUS EQUIPMENT AND AMENITIES FOR PARKS AND RECREATION**

This Agreement to Provide Various Equipment and Amenities for Parks and Recreation (“Agreement”) is entered into and shall be deemed effective as of July 24, 2024, and is between Musco Sports Lighting, LLC, a Foreign Limited Liability Company authorized to do business in Florida (“Contractor”), and Clay County, a political subdivision of the State of Florida (the “County”).

**RECITALS**

**WHEREAS**, the County issued an Invitation for Bid, Bid No.: 23/24-074 (“Bid”), to establish a firm, fixed percentage discount from manufacturer’s and/or bidder’s current catalog/supply/product information price list for the purchase and installation of various equipment and amenities for parks and playgrounds to include a means for qualifying suppliers and establishing pricing for ballpark lighting services and court surfacing; and

**WHEREAS**, the Contractor responded to the Bid with a proposal that included Contractor’s products and discount pricing and pricing details for such products and services (“Proposal”); and

**WHEREAS**, the County evaluated the proposals submitted, and on July 23, 2024, the Clay County Board of County Commissioners of Clay County, Florida (the “Board”) accepted staff’s evaluation and awarded the Bid to the 23 companies that responded to the Bid; and

**WHEREAS**, the awarded Bids will be utilized on an as needed and as requested basis; and

**WHEREAS**, to the extent permitted by applicable law, the Contractor agrees to offer and extend this Agreement and pricing to any states, municipalities, local governments, school districts, higher educational institutions, public utilities, hospitals, and any other governmental agencies or non-profit organizations; and

**WHEREAS**, the parties hereby acknowledge and expressly agree that the terms and conditions of the Bid, including any addendums and attachments thereto, as well as the Proposal apply to this Agreement and are incorporated herein by reference; and

**WHEREAS**, the parties desire to enter into this Agreement in accordance with the terms and conditions set forth herein.

**NOW THEREFORE**, in consideration of the foregoing recitals, the mutual covenants and promises set forth herein, and for other good and valuable consideration, the receipt of which is hereby acknowledged and all objections to the sufficiency and adequacy of which are hereby waived, the parties agree as follows:

## 1. EQUIPMENT, PRODUCTS, OR SERVICES

- (a) The above recitals are true and correct and are incorporated herein by reference.
- (b) For purposes of this Agreement, the County Representative shall be Howard Wanamaker, County Manager, and the Project Manager shall be Donna Fish, Buyer 1 with Clay County Purchasing, or designee.
- (c) The Contractor agrees to provide the Products and Services in accordance with the Bid Scope of Work attached hereto as **Attachment A**, its Proposal attached hereto as **Attachment B**, and the terms and conditions of this Agreement when ordered and/or requested from time to time by the County. As used herein, "Products" shall mean all equipment, amenities, materials, and/or products that the Contractor agrees to provide as stated in its Proposal. As used herein, "Services" shall mean any services that the Contractor agrees to provide as stated in its Proposal or as requested under this Agreement, including, but not limited to, installation of Products for parks and playgrounds, ballpark/field lighting services, court surfacing, and other related services.
- (d) Products and/or Services will be ordered and/or requested by personnel designated by the County on an as needed basis for the quantity requested during the term of the Agreement. Such orders/requests will be made in accordance with the method of ordering section of **Attachment A**. The County at its sole discretion will generate purchase orders as a result of approved quotations submitted in response to a request. Depending on the Services ordered, the Contractor may be required to enter into a separate agreement or task order with the County addressing such Services.
- (e) No later than 30 days prior to the anniversary date of this Agreement throughout the Agreement term, the Contractor may submit an updated Proposal to the Project Manager reflecting any changes to manufacturers and/or Products. Upon receipt, the Project Manager shall review and approve or reject the updated Proposal in writing. If the Project Manager approves the updated Proposal, it shall automatically be deemed to be incorporated into this Agreement and shall replace and/or modify **Attachment B**, in whole or in part, as applicable, as of the date of approval, without the need for a formal amendment or further action by either party. If the Project Manager does not approve the updated Proposal, the original Proposal shall continue without modification.
- (f) In providing the Products and Services, the Contractor shall:
1. Be familiar with the ordered/requested Products and/or Services, deadlines, requirements, and the conditions under which the Products and/or Services are to be provided;
  2. Conduct business in a manner that reflects favorably at all times on the services and the goodwill and reputation of the County;
  3. Avoid deceptive, misleading or unethical practices that are or might be detrimental to the County; and

4. Not use any false, deceptive or misleading trade practices in the performance of the Services.

(g) In entering into this Agreement, the Contractor represents that it now has or will secure all equipment and personnel required to provide all Products and Services as may be requested under this Agreement. The Contractor shall assign such personnel as are necessary to assure faithful prosecution and timely delivery of the Products and/or Services pursuant to the requirements of this Agreement. The Contractor shall ensure that the personnel assigned to provide the Products and/or Services comply with the terms of this Agreement, have current licenses and permits required to provide the Products and/or Services, and are fully qualified and capable to perform their assigned tasks.

(h) The Contractor represents and warrants to the County that Contractor is experienced with providing the Products and Services described in this Agreement and is qualified and competent to provide such Products and perform such Services. The Contractor shall provide any and all Products and perform any and all Services requested in a timely, efficient, workmanlike, and cost-effective manner that comports with professional industry standards, applicable federal, state and local laws and regulations, and in accordance with the applicable professional standards.

(i) The Contractor shall provide the Products and Services using the degree of care and skill ordinarily exercised by similarly practicing professionals performing similar services under similar conditions in the same or similar geographic area and in compliance with all applicable laws (“Standard of Care”).

(j) In performance of this Agreement, the Contractor is bound by and shall comply with all terms and conditions of this Agreement and all federal, state, and local laws and regulations applicable to the Products and/or Services. Any reference in this Agreement to a particular law, rule, or regulation in no way implies that no other law, rule, or regulation applies. Any violation of these laws, rules, and regulations shall constitute a material breach of this Agreement and shall entitle the County to terminate this Agreement upon delivery of written notice of termination to the Contractor as outlined herein.

(k) The County may elect, in certain circumstances, to purchase only Products and have such Products installed by others (e.g., volunteers, County staff, etc.). If such election is made, the Products will be shipped to a designated location.

(l) Non-Exclusive. The parties acknowledge and agree that this Agreement is non-exclusive. Nothing in this Agreement shall be construed to prevent either party from entering into similar agreements with other third parties, or from engaging in any other business activities for such products and/or services, including, but not limited to the use of other available bids or contracts.

(m) The County gives the Contractor no guarantee of any Products or Services or any specific amount or quantity of Products or Services that may be accomplished or performed by the Contractor during the term of this Agreement. Additionally, the County makes no guarantee of usage by other users or Contracting Entities of this Agreement.

(n) The County may conduct performance evaluations at any time during the term of this Agreement to ensure the Contractor's compliance with the Agreement. One or more evaluations may be conducted solely at the discretion of the County.

## **2. ADDITIONAL PRODUCTS OR SERVICES**

(a) If the County identifies or the Contractor recommends any additional products or services to be provided by the Contractor that are not covered under the Agreement but are beneficial to the County, such additional products and/or services, including scope, timing, and fees, as applicable, must be mutually agreeable between the County and the Contractor and authorized in writing by the County.

## **3. TERM**

(a) The term shall begin on July 24, 2024 ("Effective Date") and shall remain in effect for a period of three years continuing through July 23, 2027, unless sooner terminated as provided herein. The Agreement may be renewed for two additional one year periods upon subsequent written agreement of the parties.

(b) The parties hereto mutually understand and agree that time is of the essence in the performance of this Agreement. The Contractor agrees to timely provide the requested Products and/or Services in accordance with the Agreement and the deadlines that may be established for such Products and/or Services.

(c) Notwithstanding the termination or expiration of this Agreement, this Agreement will survive as to any and all pending purchase orders, contracts, etc., until all of the rights and obligations of both parties thereunder have been fulfilled or the purchase orders, contracts, etc. have been terminated.

## **4. WARRANTIES AND REPRESENTATIONS**

(a) The Products and Services shall comply with all rules, regulations, and requirements set forth in this Agreement and the Attachments to this Agreement.

(b) Warranties related to the Products and/or Services provided under this Agreement shall be established and confirmed at the time of each individual order. For each order, the Contractor shall provide a warranty statement specifying the duration, scope, and terms of the warranty applicable to the specific Products and/or Services being purchased. Depending on the Services ordered, the warranty may be set forth in a separate agreement or task order with the County addressing such Services.

(c) Neither the Services, nor any Products provided by the Contractor under this Agreement will infringe or misappropriate any patent, copyright, trademark or trade secret rights of any third party.

(d) The Contractor certifies that all Products meet all federal and state requirements. Upon

completion of installation of play equipment and/or playground surfacing, the Contractor shall furnish to the County's Purchasing Department a certificate stating the Products/equipment/surfacing and its installation meet all federal and state requirements as outlined in the publications set forth in **Attachment A** under the Compliance with Laws and Codes section. The Contractor further certifies that if the Product(s) delivered and/or installed are subsequently found to be deficient in any of the aforementioned requirements in effect on date of delivery, all costs necessary to bring the Product(s) and installation into compliance shall be borne by the Contractor.

(e) The Contractor warrants that all Products and Services furnished are free from liens and encumbrances, and are free from defects in design, materials, and workmanship. In addition, the Contractor warrants the Products and Services are suitable for and will perform in accordance with the ordinary use for which they are intended.

(f) All material, equipment, manufacturer, or other special warranties required by the Agreement or applicable to the Products and/or Services shall be transferable to, or issued in the name of the County, and provide the warranty period. The period of manufacturer's warranty shall begin to run at the time the Products are received and accepted by a representative of the County. Notwithstanding anything to the contrary, Contractor's equipment warranty shall begin upon shipment, not delivery and acceptance.

## **5. PIGGYBACKING, SALES REPORTS, AND ADMINISTRATIVE FEE**

(a) To the extent permitted by law, the Contractor agrees to offer and extend this Agreement and pricing to any states, municipalities, local governments, school districts, higher educational institutions, public utilities, hospitals, and any other governmental agencies or non-profit organizations (collectively "Contracting Entities").

(b) The County as the lead agency for the Bid shall not be liable or responsible for any costs, damages, liability, or other obligations incurred by any Contracting Entities. The Contractor including its subsidiaries shall deal directly with each Contracting Entity concerning the placement of orders, issuance of purchase orders, issuance of contracts, contractual disputes, invoicing, payment, and all other matters relating or referring to such Contracting Entities access or use of the Agreement and/or pricing. Accordingly, any Contracting Entity wishing to use this Agreement will be responsible for placing its own orders, issuing its own purchase order/documents/price agreements/contracts, providing for its own acceptance, making any subsequent payments, addressing any contractual disputes, and handling all other matters relating or referring to its access or use of the Agreement and/or pricing. The Contracting Entities are responsible for obtaining all certificates of insurance and bonds as may be required.

(c) Volume Sales Report. Throughout the term of this Agreement, the Contractor shall submit a quarterly volume sales report ("Sales Report") to the County's Purchasing Department by email at [purchasing@claycountygov.com](mailto:purchasing@claycountygov.com) or U.S. mail to the Clay County Board of Commissioners, Attn: Purchasing Department, PO Box 1366, Green Cove Springs, Florida 32043. Quarterly Sales Report dates are as follows: December 31, March 31, June 30, and September 30. Sales Reports must be delivered to the County's Purchasing Department no later

than the 15<sup>th</sup> day of the following month. Initiation and submission of the Sales Reports are the responsibility of the Contractor without prompting or notification by the County. The Sales Report must be provided regardless of whether or not any sales have been conducted during such quarter (i.e., if there are no sales, Contractor must submit a Sales Report indicating that no sales were made during that particular quarter). The Sales Report must include the following:

- Contracting Entity's name and contact information;
- Detail of any Products sold/purchased including description, quantity, and price;
- Detail of any Services sold/purchased and/or performed; and
- All transactions pertaining to sales for Products and/or Services and pricing for that quarter to include the date the purchase was invoiced/sale was recognized as revenue by Contractor.

(d) Administrative Fee. The Contractor agrees to pay to the County an administrative fee equal to 1.5% of the eligible revenues generated from the sale of Products or Services to Contracting Entities utilizing this Agreement and/or pricing under this Agreement. For purposes of this Agreement, "eligible revenues" shall mean the gross amount actually received by the Contractor from the sale of Products purchased and/or installed utilizing this Agreement, excluding any amounts attributable to shipping, freight, handling charges, taxes, mandatory fees, or any other expenses not directly related to the core sale or installation transaction.

(e) The County will review the Sales Report and will prepare an invoice to the Contractor for payment of the administrative fee based on the Sales Report submitted for that quarter. Such invoices will be submitted to the Contractor at its email address provided to the County's Purchasing Department. Upon receipt of an invoice submitted under this paragraph, the Contractor shall submit payment pursuant to the instructions on the invoice within 30 calendar days of the invoice date.

(f) Failure of the Contractor to provide the quarterly Sales Reports and payment of administrative fees in accordance with an invoice, shall be considered a breach of the Agreement. A late penalty of 15 percent on the value of the administrative fee may be assessed to the Contractor for each month the payment of such fee is not received.

(g) The Contractor agrees to cooperate with the County in auditing transactions under this Agreement to ensure that the administrative fee is paid on all Products and/or Services purchased under this Agreement.

## **6. PRICING AND PAYMENT**

(a) All Products and Services under this Agreement will be priced and/or discounted as stated in Contractor's Proposal. It is understood that Contractor's current catalog/supply/product information price list are subject to change throughout the term of this Agreement. However, percent discount shall remain fixed for the entire term of this Agreement including any renewals or extensions thereto.

(b) Freight must be pre-paid and added to the Invoice and the quote. The County will pay actual freight charges.



(c) Sales Promotion/Price Reduction. The parties acknowledge that sales promotions may occur during the term of the Agreement which will lower prices of Products and Services for the period of such sales promotion. The Contractor acknowledges and agrees that the County shall receive the full benefit of such reductions if lower than the discount established by this Agreement. The County must be notified of these sales promotions in writing, specifying the beginning and ending dates of the sales promotions.

(d) The County shall pay the Contractor for the Products and Services provided under this Agreement in compliance with the specifications at the prices in accordance with **Attachment B** upon presentation of an Invoice submitted to the Paying Agent in accordance with paragraph 7.

## **7. PAYMENT PROCEDURES**

(a) As used herein, the term “Act” means the Local Government Prompt Payment Act set forth in Part VII of Chapter 218, Florida Statutes; the term “Invoice” means a statement, invoice, bill, draw request or payment request submitted by the Contractor under this Agreement; and the term “Submittal Date” means, with respect to an Invoice, the submittal date thereof to the Paying Agent. Invoices shall be submitted to Clay County Comptroller’s office (“Paying Agent”) by Email at [invoices@clayclerk.com](mailto:invoices@clayclerk.com) or U.S. Mail at Clay County BOCC, PO Box 988, Green Cove Springs, FL 32043 ATTN: Accounts Payable. All payments will be governed by the Act.

(b) Invoices shall be signed by the Contractor and must include the following information and items:

1. The Contractor’s name, address and phone number, including payment remittance address.
2. The Invoice number and date.
3. Reference to the Agreement by its title and number as designated by the County and Purchase Order number.
4. Identify the Products and/or Services covered by the Invoice.
5. The total amount of payment requested, the total amount previously requested, and the total amount paid to date for such Products and/or Services covered by the Invoice.
6. Supporting documentation necessary to satisfy auditing requirements (both preaudits and post-audits), for cost and Services completion.
7. The Contractor must provide any additional documents, certificates, or information as needed to support or document the Invoice as may be requested by the County.

(c) Upon receipt of an Invoice submitted under this paragraph, the Paying Agent and/or Project Manager shall date stamp the Invoice as received. Thereafter, the Paying Agent and/or

Project Manager shall review the Invoice and may also review the Products and/or Services as delivered, installed, or performed to determine whether the quantity and quality of the Products and/or Services is as represented in the Invoice and is as required by this Agreement. If the Paying Agent and/or Project Manager determines that the Invoice does not conform with the applicable requirements of this Agreement or that the Products and/or Services within the scope of the Invoice have not been properly delivered, installed, or performed in full accordance with this Agreement, the Paying Agent and/or Project Manager shall notify the Contractor in writing within 10 business days after the improper Invoice is received that the Invoice is improper and indicate what corrective action on the part of the Contractor is needed to make the Invoice proper.

(d) By the submittal of an Invoice hereunder, the Contractor shall have been deemed to have warranted to the County that all Products and/or Services for which payments have been previously received from the County shall be free and clear of liens, claims, security interests or other encumbrances in favor of the Contractor or any other person or entity for failure to make payment.

(e) The parties will attempt to settle any payment dispute arising under this paragraph through consultation and a spirit of mutual cooperation. The dispute will be escalated to appropriate higher-level managers of the parties, if necessary. If the dispute concerning payment of an Invoice remains unresolved within 30 days following the Submittal Date, then the Project Manager shall schedule a meeting between the Contractor's representative and the Project Manager with the County Manager, to be held no later than 43 calendar days following the Submittal Date, and shall provide written notice to the Contractor regarding the date, time and place of the meeting no less than 5 calendar days prior thereto. At the meeting, the Contractor's representative and the Project Manager shall submit to the County Manager their respective positions regarding the dispute, including any testimony and documents in support thereof. The County Manager shall issue a written decision resolving the dispute within 45 calendar days following the Submittal Date, and serve copies thereof on the Contractor's representative and the Project Manager.

(f) The County's review, approval, acceptance of, or payment for the Products and/or Services provided under this Agreement may not be construed or deemed to operate as a waiver of any rights under this Agreement or of any cause of action arising out of the performance of this Agreement, and the Contractor will be and remain liable to the County in accordance with applicable law for damages suffered by the County caused by the Contractor's negligent performance of any of the Products and/or Services furnished under this Agreement

## **8. INDEMNIFICATION**

(a) To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the County including its officers and employees, from liabilities, damages, losses and costs, including, but not limited to, reasonable attorney's fees, to the extent caused by the negligence, recklessness or intentional wrongful misconduct of the Contractor and persons employed or utilized by the Contractor in the performance of this Agreement.

(b) The County does not agree to and shall not indemnify the Contractor or any other person or entity, for any purpose whatsoever. To the extent any indemnification by the County may be construed under this Agreement, any such indemnification shall be subject to and within the limitations set forth in Section 768.28, Florida Statutes, and to any other limitations, restrictions and prohibitions that may be provided by law, and shall not be deemed to operate as a waiver of, or modification to, the County's sovereign immunity protections.

(c) This paragraph shall survive the expiration or termination of this Agreement.

## 9. INSURANCE

(a) The Contractor shall maintain throughout the term of this Agreement and completion of any Services and during any renewal or extension term(s) of this Agreement or as required herein insurance of the following types and with such terms and limits:

### 1. Commercial General Liability

Coverage must be afforded under a Commercial General Liability policy with limits not less than:

- \$1,000,000 each occurrence and \$2,000,000 aggregate for Bodily Injury, Property Damage, and Personal and Advertising Injury
- \$1,000,000 each occurrence and \$2,000,000 aggregate for Products and Completed Operations
- \$50,000 each occurrence for Damage to Rented Premises
- \$5,000 Medical Expenses (any one person)

Commercial and General Liability policy must include coverage for contractual liability and independent contractors.

### 2. Business Automobile Liability

Coverage must be afforded for all Owned, Hired, Scheduled, and Non-Owned vehicles for Bodily Injury and Property Damage in an amount not less than \$1,000,000 combined single limit each accident. If the Contractor does not own vehicles, the Contractor shall maintain coverage for Hired and Non-Owned Auto Liability, which may be satisfied by way of endorsement to the Commercial General Liability policy or separate Business Auto Liability policy.

### 3. Workers' Compensation and Employer's Liability

Any person or entity performing work for or on behalf of the County must provide Workers' Compensation and Employer's Liability insurance in limits not less than:

- Workers Compensation      Statutory limits
- Employers Liability      \$100,000 Each Accident  
   \$500,000 Disease Policy  
   \$100,000 Disease-Each Employee

Exceptions and exemptions may be allowed by the County Manager, if they are in accordance with Florida Statutes.

The Contractor waives, and the Contractor shall ensure that its insurance carrier waives, all subrogation rights against the County, its employees, agents, boards, and commissions, for all losses or damages. The County requires the policy to be endorsed with WC 00 03 13 Waiver of our Right to Recover from Others or equivalent.

The Contractor must be in compliance with all applicable State and federal workers' compensation laws, including the U.S. Longshore Harbor Workers' Act and the Jones Act, if applicable.

For any Contractor who has exempt status as an individual, the County requires proof of Workers' Compensation insurance coverage for that Contractor's employees, leased employees, volunteers, and any workers performing work.

4. Umbrella/Excess Insurance

If the Contractor's primary insurance policy/policies do not meet the minimum requirements, the Contractor may provide an Umbrella/Excess insurance policy to comply with the insurance requirements.

(b) Providing and maintaining adequate insurance coverage is a material obligation of the Contractor. Prior to any work or services being performed under this Agreement, the Contractor must deliver valid certificates of insurance for the required insurance coverage to the County's Purchasing Department.

(c) The certificates of insurance for the required coverages, with the exception of Workers' Compensation and Employer's Liability shall name "**Clay County, a political subdivision of the State of Florida, and The Board of County Commissioners, Clay County, Florida, its employees, agents, boards and commissions, as their interests may appear**" as "**Additional Insureds.**" The coverage shall contain no special limitation on the scope of protection afforded to the County, its employees, agents, officials, boards, and commissions. The certificates of insurance shall indicate if coverage is provided under a claims-made or occurrence form. If any coverage is provided on a claims-made form, the certificates of insurance will show a retroactive date, which should be the same date of the initial Agreement or prior. The Agreement number, and/or other identifying reference must be listed on the certificates of insurance.

(d) The Certificate Holder on the certificates of insurance should read as follows: "**Clay County Board of County Commissioners, P.O. Box 1366, Green Cove Springs, FL 32043**" or as otherwise designated by the County's Purchasing Department.

(e) The certificates of insurance shall be provided to the County with a thirty (30) day notice of cancellation; ten (10) days' notice if cancellation is for nonpayment of premium. In the event that the insurer is unable to accommodate the cancellation notice requirement, it shall be the responsibility of the Contractor to provide the proper notice. Such notification will be in writing by registered mail, return receipt requested, and addressed to the Certificate Holder. In the event the Agreement term goes beyond the expiration date of any insurance policy, the Contractor shall provide the County's Purchasing Department with an updated certificate of insurance no later

than ten (10) days prior to the expiration of the insurance currently in effect. The County reserves the right to suspend the Agreement until this requirement is met. If any required insurance coverage is canceled, terminated, or revoked, the Contractor agrees to immediately suspend its operations until replacement insurance is obtained and verified.

(f) These insurance requirements may be modified and/or waived, in whole or in part, upon written approval by the County Manager or designee, without the need for a formal amendment to the Agreement.

## **10. BONDS**

(a) A Performance Bond and Payment Bond may be required for specific projects and/or Services provided under this Agreement as security for the faithful performance and payment of the Contractor's obligations. Whether such Bonds will be required, will be based upon the size and price of each particular project and/or purchase under this Agreement. If such Bonds are required, the Contractor understands, acknowledges, and agrees that the Contractor shall cause the Bonds to be recorded in the public records of the County with the Clay County Clerk of Court and Comptroller at the Contractor's sole expense, and shall deliver a certified copy of the recorded Bonds to the County's Purchasing Department prior to receiving a purchase order for the project.

## **11. DEFAULT AND TERMINATION**

(a) Default. If the Contractor breaches any covenant made by it hereunder; fails to satisfactorily perform any condition, provision, or obligation of this Agreement; fails to make progress so as to endanger performance under the terms and conditions of the Agreement; fails to perform on time or timely deliver any requested Products; provides false or inaccurate information; fails to address and/or correct any deficiencies identified by the County during a performance evaluation; fails to timely submit reports as required herein; fails to pay the administrative fee; fails to comply with applicable rules, laws and regulations; or whenever the Contractor ceases operation, dissolves its corporation, or otherwise no longer provides the Products and/or Services under the terms of this Agreement, the County may consider the Contractor to be in default and may assert a default claim by giving the Contractor a written notice of default. Except for a default by the Contractor for failing to comply with applicable laws, rules, and regulations or for no longer providing the services contemplated under this Agreement which must be cured immediately or is otherwise subject to automatic termination for cause, the Contractor shall have 10 calendar days after receipt of the notice of default to either cure the default or, if the default is not curable within 10 calendar days, provide a written cure plan to the County describing how and when the default will be cured, which the County in its sole discretion may approve or disapprove. The Contractor will begin implementing the cure plan immediately after receipt of notice by the County that it approves the plan. If the Contractor fails to cure or the County does not approve the cure plan, then the County may terminate this Agreement for cause.

(b) Termination for Cause. Upon the failure or inability of the Contractor to cure the default as provided above, unless otherwise agreed in writing, the County may, at its option, without

releasing or waiving its rights and remedies against the Contractor and without prejudice to any other right or remedy it may be entitled to hereunder or by law, terminate this Agreement, in whole or in part, for cause immediately upon written notice of termination by the County Representative to the Contractor. In the event the County terminates the Agreement, in whole or in part, because of default by Contractor, the County may procure goods, services, materials, and/or work similar to those terminated, and the Contractor shall be liable for any damages, costs, and any other expenses incurred due to this action. If it is determined that the Contractor was not in default or that the default was excusable (e.g. failure due to causes beyond the control of, or without the fault or negligence of the Contractor), the rights and obligations of the parties shall be those as provided in the provision for Termination for Convenience.

(c) Termination for Convenience. The County may whenever the interests of the County so require, terminate the Agreement, in whole or in part, for the convenience of the County. The County Representative shall give 30 calendar days prior written notice of termination to the Contractor, specifying when the termination is to become effective. In the event of any such termination, the Contractor shall be paid by the County for all Products and/or Services satisfactorily provided up to receipt of the notice of termination, and thereafter until the date of termination, the Contractor shall be paid only for such Services as are specifically authorized in writing by the County. The Contractor may terminate this Agreement for the convenience of the Contractor by giving the County 180 calendar days advance written notice.

(d) Unless directed differently in the notice of termination, the Contractor shall incur no further obligations in connection with the terminated Products and/or Services and shall stop any work to the extent specified and on the date given in the notice of termination. Additionally, unless directed differently, the Contractor shall terminate outstanding orders and/or subcontractor agreements related to the terminated Products and/or Services and shall transfer all Services in progress, completed Services, and other materials related to the terminated Services to the County. The Contractor agrees to refund to the County all pre-paid sums for Products and/or Services that have been cancelled and will not be delivered.

(d) Termination of this Agreement or a portion hereof under the provisions incorporated herein shall not relieve the Contractor of its responsibilities for the completed portion or concerning any just claims arising out of the Products provided and/or Services performed.

## **12. TAXES**

(a) In that the County is a governmental agency exempt from sales and use taxes, the County shall pay no such taxes, any other provisions of this Agreement to the contrary notwithstanding. The County shall provide proof of its exempt status upon reasonable request.

## **13. APPROPRIATED FUNDS**

(a) The Contractor acknowledges that in the budget for each fiscal year of the County during which the term of the Agreement is in effect a limited amount of funds are appropriated which are available to make payments arising under the Agreement. Any other provisions of the Agreement to the contrary notwithstanding, and pursuant to the provisions of Section 129.07,

Florida Statutes, the maximum payment that the County is obligated to make under the Agreement from the budget of any fiscal year shall not exceed the appropriation for said fiscal year.

#### **14. PUBLIC RECORDS**

(a) The Contractor acknowledges the County's obligation under Art. 1, Section 24, Florida Constitution, and Chapter 119, Florida Statutes, as from time to time amended (together, the Public Records Laws), to release public records to members of the public upon request. The Contractor acknowledges that the County is required to comply with the Public Records Laws in the handling of the materials created under the Agreement and that the Public Records Laws control over any contrary terms in the Agreement. In accordance with the requirements of Section 119.0701, Florida Statutes, the Contractor covenants to comply with the Public Records Laws, and in particular to:

1. Keep and maintain public records required by the County to provide the Products and Services requested under the Agreement;
2. Upon request from the County's custodian of public records, provide the County with a copy of the requested records or allow the records to be inspected or copied within a reasonable time at a cost that does not exceed the cost provided in Chapter 119, Florida Statutes, or as otherwise provided by law;
3. Ensure that public records that are exempt or confidential and exempt from public records disclosure requirements are not disclosed except as authorized by law for the duration of the Agreement term and following completion of the Agreement if the Contractor does not transfer the records to the County; and
4. Upon completion of the Agreement, transfer, at no cost, to the County all public records in possession of the Contractor or keep and maintain public records required by the County to perform the Services. If the Contractor transfers all public records to the County upon completion of the Agreement, the Contractor shall destroy any duplicate public records that are exempt or confidential and exempt from public records disclosure requirements. If the Contractor keeps and maintains public records upon completion of the Agreement, the Contractor shall meet all applicable requirements for retaining public records. All records stored electronically must be provided to the County, upon request from the County's custodian of public records, in a format that is compatible with the information technology systems of the County.

(b) The Contractor's failure to comply with the requirements of this paragraph shall be deemed a material breach of this Agreement, for which the County may terminate the Agreement immediately upon written notice to the Contractor.

(c) The Contractor acknowledges the provisions of Section 119.0701(3)(a), Florida Statutes, which, as applicable to the County and the Contractor, require as follows:

1. A request to inspect or copy public records relating to the Agreement must be made directly to the County. If the County does not possess the requested records, the County shall immediately notify the Contractor of the request, and the

Contractor must provide the records to the County or allow the records to be inspected or copied within a reasonable time.

2. If the Contractor does not comply with the County's request for records, the County shall enforce the Agreement provisions in accordance with the Agreement.
3. If the Contractor fails to provide the public records to the County within a reasonable time, the Contractor may be subject to penalties under Section 119.10, Florida Statutes.

**IF THE CONTRACTOR HAS QUESTIONS REGARDING THE APPLICATION OF CHAPTER 119, FLORIDA STATUTES, TO THE CONTRACTOR'S DUTY TO PROVIDE PUBLIC RECORDS RELATING TO THE AGREEMENT, CONTACT THE CUSTODIAN OF PUBLIC RECORDS AT (904) 529-3604, [publicrecords@claycountygov.com](mailto:publicrecords@claycountygov.com), POST OFFICE BOX 1366, GREEN COVE SPRINGS, FLORIDA 32043.**

#### **15. AUDIT**

(a) The Contractor shall retain all records relating to this Agreement for a period of at least five (5) years after the Agreement ends or terminates, whichever occurs first. All records shall be kept in such a way as will permit their inspection pursuant to Chapter 119, Florida Statutes. The County reserves the right to examine and/or audit such records. This provision shall survive the termination or expiration of this Agreement.

#### **16. SCRUTINIZED COMPANIES CERTIFICATION**

(a) In compliance with Section 287.135(5), Florida Statutes, the undersigned hereby certifies that the Contractor is not participating in a boycott of Israel as defined in Section 287.135(1), Florida Statutes; is not on the Scrutinized Companies with Activities in Sudan List or the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List as referred to in Section 287.135(2), Florida Statutes; and does not have business operations in Cuba or Syria as defined in Section 287.135(1), Florida Statutes. In accordance with Section 287.135(3), Florida Statutes, the County shall have the option of terminating this Agreement if the Contractor is found to have submitted a false certification as provided under Section 287.135(5), Florida Statutes, or been placed on the Scrutinized Companies with Activities in Sudan List or the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List, or been engaged in business operations in Cuba or Syria, or to have been placed on the Scrutinized Companies that Boycott Israel List or is engaged in a boycott of Israel as defined in Section 287.135(1), Florida Statutes.

#### **17. E-VERIFY REQUIREMENT**

(a) Pursuant to Section 448.095, Florida Statutes, the Contractor shall register with and utilize the U.S. Department of Homeland Security's E-Verify system to verify the work authorization status of all new employees hired by the Contractor during the term of the



Agreement, and shall expressly require any subcontractors performing work or providing services pursuant to the Agreement to likewise register with and utilize the U.S. Department of Homeland Security's E-Verify system to verify the work authorization status of all new employees hired by the subcontractor during the term of the subcontractor agreement. Subcontractors shall provide the Contractor with an affidavit stating that the subcontractor does not employ, contract with, or subcontract with an unauthorized alien, as set forth in Section 448.095(2)(b)1, Florida Statutes. Upon request, the Contractor must provide evidence of compliance with this provision. Failure to comply with this provision is a material breach of the Agreement, and the County shall have the option of terminating this Agreement at its discretion.

**18. HUMAN TRAFFICKING ATTESTATION**

(a) In compliance with Section 787.06 (13), Florida Statutes, the undersigned, on behalf of the Contractor, a nongovernmental entity, hereby attests under penalty of perjury as follows:

1. The Contractor does not use *coercion* for *labor* or *services*, as such italicized terms are defined in Section 787.06, Florida Statutes, as may be amended from time to time.
2. If, at any time in the future, the Contractor does use coercion for labor or services, the Contractor will immediately notify the County and no contracts may be executed, renewed, or extended between the parties.
3. By execution of this Agreement, the undersigned represents that undersigned has read the foregoing statements and confirms that the facts stated in it are true and are made for the benefit of, and reliance by the County.

**19. PUBLIC ENTITIES CRIMES**

(a) A person or affiliate who has been placed on the convicted vendor list following a conviction for public entity crime may not submit a bid, proposal, or reply on a contract to provide any goods or services to a public entity, may not submit a bid, proposal, or reply on a contract with a public entity for the construction or repair of a public building or public work, may not submit bids, proposals, or replies on leases of real property to a public entity, may not be awarded or perform work as a contractor, supplier, subcontractor, or consultant under a contract with any public entity, and may not transact business with any public entity in excess of the threshold amount provided in Section 287.017 of the Florida Statutes, for CATEGORY TWO for a period of 36 months from the date of being placed on the convicted vendor list.

(b) By signing this Agreement, the Contractor represents that the execution of this Agreement will not violate the Public Entity Crimes Act (Section 287.133, Florida Statutes). Violation of this Section shall result in termination of this Agreement and recovery of all monies paid hereto and may result in debarment from the County's competitive procurement activities.

(c) In addition to the foregoing, the Contractor further represents that there has been no determination, based on an audit, that it or any subcontractor has committed an act defined by Section 287.133, Florida Statutes, as a "public entity crime" and that it has not been formally charged with committing an act defined as a "public entity crime" regardless of the amount of money involved or whether the Contractor has been placed on the convicted vendor list.

(d) The Contractor will promptly notify the County if it or any subcontractor of the Contractor is formally charged with an act defined as a “public entity crime” or has been placed on the convicted vendor list.

**20. SUSPENSION AND DEBARMENT**

(a) By execution of this Agreement, the Contractor certifies that neither it nor its principals are presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any state or federal department or agency.

**21. INDEPENDENT CONTRACTOR**

(a) The parties to this Agreement are independent contractors. Neither party is an agent, representative, or partner of the other party. This Agreement shall not be interpreted or construed to create an association, agency, joint venture, or partnership between the parties or to impose any liability attributable to such a relationship upon either party.

**22. NO ASSIGNMENT**

(a) The Contractor shall not assign any of its rights or duties under this Agreement to any other party without the prior written consent of the County, which consent may be withheld by the County for any or no reason. Any such assignment attempted by the Contractor without such prior written consent shall be null and void. If the Contractor attempts to assign any such rights or duties without securing such prior written consent, this Agreement may be declared in default and terminated by the County.

**23. SUBCONTRACTORS**

(a) The Contractor shall provide the names of all subcontractors performing any work or services under this Agreement to the Project Manager. The County reserves the right to approve the utilization of any subcontractors in connection with this Agreement. Such written authorization may be obtained from the Project Manager on behalf of the County. The County further reserves the right to reject any quotation in response to a request for quotation if such quotation names a subcontractor who has, in the sole opinion of the County, previously failed in the proper performance of an award, failed to deliver on time contracts of a similar nature, or is not in a position to perform properly under this Agreement.

(b) Any subcontractor utilized by the Contractor shall be supervised and compensated by the Contractor.

(c) The Contractor shall be fully responsible to the County for the (i) acts and omissions (ii) satisfactory performance and (iii) timeliness of the Services of its subcontractors and of persons directly or indirectly employed by them.

(d) The Contractor shall cause appropriate provisions to be inserted in all subcontractor agreements relative to the Services giving the Contractor the same powers that the County may exercise over the Contractor under any provision of this Agreement.

(e) Nothing in the Agreement shall be construed as providing any subcontractor with any rights or remedies against the County or any of its employees, principals, officers, or agents for nonpayment or otherwise.

**24. NO THIRD-PARTY BENEFICIARIES**

(a) Any other provisions of this Agreement to the contrary notwithstanding, no third-party beneficiaries are intended or contemplated under this Agreement, and no third-party shall be deemed to have rights or remedies arising under this Agreement against either party to this Agreement.

**25. CONFLICT OF INTEREST**

(a) Throughout the term of this Agreement, the Contractor must not accept nor perform any other employment, assignments of contracts nor obligations that would conflict with the Contractor's duties and obligations provided under this Agreement.

**26. AMENDMENT OR MODIFICATION OF AGREEMENT**

(a) The Agreement may only be modified or amended upon mutual written agreement of the County and the Contractor. No oral agreements or representation shall be valid or binding upon either party. The Contractor may not unilaterally modify the terms of the Agreement by affixing additional terms to or by incorporating such terms onto the Contractor's documents forwarded by the Contractor to the County.

**27. FURTHER ASSURANCES**

(a) Each of the parties shall cooperate with one another, shall do and perform such actions and things, and shall execute and deliver such agreements, documents and instruments, as may be reasonable and necessary to effectuate the purposes and intents of this Agreement.

**28. REMEDIES**

(a) The parties will attempt to settle any dispute arising from this Agreement through negotiation and a spirit of mutual cooperation. The Contractor and the Project Manager will use reasonable efforts to arrange meetings as needed, at mutually convenient times and places, to address and work toward resolution of issues that arise in the performance of this Agreement. The dispute will be escalated to appropriate higher-level managers of the parties, if necessary. Each party shall have the right to seek the judicial enforcement and interpretation of this Agreement.

**29. GOVERNING LAW AND VENUE**

(a) This Agreement shall be governed by and construed in accordance with the laws of the State of Florida. Venue for any litigation, mediation, or other action proceeding between the parties arising out of this Agreement lies in Clay County, Florida.

**30. ATTORNEYS' FEES**

(a) In the event either party shall retain an attorney to litigate on its behalf against the other party regarding the enforcement or interpretation of this Agreement or regarding the rights, remedies, or obligations of the parties arising under this Agreement, the party prevailing on the majority of its claims, or which successfully defends against a majority of the other party's claims, shall be entitled to an award of reasonable attorney's fees, court costs, and any other expenses against the other party, including fees, court costs, and any other expenses incurred from the date of referral of the dispute to the prevailing party's attorney through the conclusion of litigation, or incurred in bankruptcy or on appeal. Nothing contained herein is intended to serve as a waiver of sovereign immunity and extend the County's liability beyond the limits established in Section 768.28, Florida Statutes.

**31. WAIVER**

(a) No waiver by either party of any term or condition of this Agreement will be deemed or construed as a waiver of any other term or condition, nor shall a waiver of any breach be deemed to constitute a waiver of any subsequent breach, whether of the same or of a different section, subsection, paragraph, subparagraph, clause, phrase, or other provision of this Agreement.

**32. SEVERABILITY**

(a) If any provision of this Agreement shall for any reason be held to be invalid or unenforceable, the invalidity or unenforceability of such provision shall not affect any of the remaining provisions of this Agreement, and this Agreement shall be enforced as if such invalid and unenforceable provision had not been contained herein.

**33. HEADINGS**

(a) The headings contained in this Agreement are for reference purposes only and shall not affect in any way the meaning or interpretation of any or all of the provisions hereof.

**34. ENTIRE AGREEMENT**

(a) This Agreement represents the entire understanding between the parties regarding the subject matter herein and supersedes all previous agreements, whether oral or written.

**35. COUNTERPARTS**

(a) The Agreement may be executed in any number of counterparts and by the separate parties in separate counterparts, each of which shall be deemed to constitute an original and all of which shall be deemed to constitute the one and the same agreement.

**36. ATTACHMENTS**

(a) The Attachments listed below are incorporated herein by reference and made a part of this Agreement as if set out fully herein.

**Attachment A:** Bid Scope of Work

**Attachment B:** Proposal

**37. AUTHORITY**

(a) The parties agree to utilize electronic signatures and that the digital signatures of the parties set forth below are intended to authenticate this Agreement and have the same force and effect as manual written signatures. Each person signing on behalf of the parties represents and warrants that he/she has full authority to execute this Agreement on behalf of such party and that the Agreement will constitute a legal and binding obligation of such party.

**IN WITNESS WHEREOF**, the parties have executed this Agreement as of the date stated in the introductory paragraph.

**CONTRACTOR**

By 

Print Name: James M. Hansen

Print Title: Secretary

**CLAY COUNTY, a political subdivision of the State of Florida**

By: 

Howard Wanamaker (Sep 16, 2024 10:26 EDT)

Howard Wanamaker  
County Manager on behalf of the  
Board of County Commissioners

**ATTACHMENT A**  
**BID SCOPE OF WORK**



INVITATION FOR BID

23/24-074

VARIOUS EQUIPMENT AND AMENITIES FOR PARKS AND  
RECREATION

Clay County

477 Houston Street

Green Cove Springs, FL 32043

RELEASE DATE: May 16, 2024

LAST DATE FOR INQUIRIES: May 31, 2024, 4:00 pm

BID DUE: June 13, 2024, 4:00 pm

RESPONSES MUST BE SUBMITTED ELECTRONICALLY TO:

<https://secure.procurenw.com/portal/claycounty>

# 1. Scope of Work

## 1.1. Purpose

The purpose of this bid is to establish a firm, fixed percentage discount off manufacturer's and/or supplier's current catalog/supply/product information price list for the purchase and installation of various equipment and amenities for parks and playgrounds. The bid is also a means for qualifying vendors and establishing pricing for ball park lighting services and court surfacing.

## 1.2. Scope

1. The bid will establish a firm, fixed percentage discount off manufacturer's and/or supplier's current catalog/supply/product information price list for the purchase of various equipment and amenities for parks and playgrounds as requested by Clay County Parks and Recreation. Additionally, this bid will also establish a firm, fixed percentage off manufacturer's and/or bidder's current catalog/supply/product information price list, after applying the above requested discount for purchase, for the installation of various equipment and amenities for parks and playgrounds as needed. The County reserves the right to award to multiple bidders.

2. It is understood that bidder's current catalog/supply/product information price list are subject to change; however, percent discount shall remain fixed. No extra charges or compensation will be allowed for installation above and beyond what has already been presented in the bid. If the bidder offers specialized catalogs, the catalogs must be submitted separately from any other catalog offered by the bidder throughout the duration of the contract.

3. This bid is also a means for qualifying bidders for ball park lighting services and court surfacing. Qualifying bidders will be requested to provide pricing on a project by project basis as defined in the method of ordering section of this bid. The qualified bidder(s) providing the lowest responsive quote based on contracted pricing will be awarded the project.

4. Freight must be pre-paid and added to the invoice and the quote. The County will pay actual freight charges.

5. Performance and payment bonds may be required for specific projects. This requirement is driven by the size and price of each particular job. Bidders will be required to meet this requirement before receiving a purchase order for the project.

6. The County reserves the right to purchase from other agreements when in the best interest of the County.

### **Responsibility:**

Bidder shall be responsible for all labor, materials, equipment, supervision, off-loading, storage, and installation, of various equipment and amenities for parks and playground equipment or amenities ordered, unless otherwise specified by the County. The County may elect, in certain circumstances, to



purchase only materials and have those materials installed by others (e.g., volunteers. County staff). These items will be shipped to a designed location and off-loaded by the bidder or bidder's representative.

### 1.3. Method of Ordering

The County may generate a Request for Quotation, on an "as needed" basis, for park and playground equipment and/or ball field lighting, lighting installation, and court surfacing together with a request for additional services required to complete that project (see attached Quote sample sheet). The County reserves the right to send such Request for Quotation to any or all awarded bidders. The Request for Quotation can define the project exactly or the Request for Quotation can describe a desired end result, allowing the bidder to design the park or playground site.

After generating a Request for Quotation for a project, and before bidder's submission of its quotation in response to the Request for Quotation, the County may require requested bidder (s) to attend a site visit with County personnel to familiarize the bidder(s) with the site and determine additional services that may be required to complete the project. Bidders will be responsible for the accuracy of all fixed measurements.

The bidder's quotation in response to the Request for Quotation must contain each of the following:

- A detailed breakdown of the cost for the entire project. Descriptions of additional services related to the project, together with their price, shall also be listed.
- Include Catalog Name, Number and associated discount. When quoting projects where freight would be charged, those costs must be included in quote so freight charges can appear on the purchase order. Freight charges for equipment must be pre-paid and added to the invoice.
- Names of any and all subcontractors on the project. It is understood the bidder remains responsible for project completion and acceptance by the County. The County reserves the right to reject any quotation in response to a Request for Quotation if said quotation names a subcontractor who has, in the sole opinion of the County, previously failed in the proper performance of an award or failed to deliver on time contracts of a similar nature, or who is not in a position to perform properly under this award.
- Project Completion Date.
- Include an updated catalog, if needed and updated MSRP lists for the park and play equipment specifically quoted.

The County will generate purchase orders as a result of approved "Request for Quotations" submitted, at the sole discretion of the County. The County reserves the right to not award to any, or to use other available bids or contracts when in the best interest of the County.

#### 1.4. [Administrative Fee \(Piggybacking\)](#)

**Cooperative Contract:** The Bidder agrees to extend provisions and pricing of this contract to any Municipal, County, Public Utility, Educational Institution, Hospital, or any other non-profit or governmental organization. Governmental entities wishing to use this contract will be responsible for issuing their own purchase documents / price agreements, providing for their own acceptance, and making any subsequent payments. The cooperative entities are responsible for obtaining all certificates of insurance and bonds required. Clay County makes no guarantee of usage by other users of this contract.

A 1.5 percent administrative fee on Eligible Revenues will be paid to the County for any contracts/purchase orders the Bidder receives or agrees to enter into with other entities under the provisions and pricing of the County's contract. The Bidder shall provide quarterly Volume Sales Reports to the County about additional sales to other entities under the provisions and pricing of the Contract. The Reports shall include the ordering agency, detail of items sold including description, quantity, and price; and shall include all transactions pertaining to sales under the contract provisions and pricing for that Reporting Period. Bidder shall provide the Volume Sales Reports regardless of whether or not any sales have been conducted. Failure of the Bidder to provide quarterly reports as required, may be deemed breach of the contract. All payments of administrative fees are due 30 calendar days after the closing of each quarter. A late penalty of 15 percent on the value of the Administrative Fee may be assessed to the Bidder for each month the payments are not received. All sales shall include the 1.5 percent administrative fee.

Volume Sales Reports and Administrative fees will be mailed to the Clay County Board of Commissioners, Attn: Purchasing Department, PO Box 1366, Green Cove Springs, Florida 32043.

#### 1.5. [Qualification of Installers](#)

If a bidder utilizes a sub-contracted installer for any park or playground equipment, lighting, or court surfacing a list of sub-contracted installers must be included with this bid. Additionally, upon request the bidder must supply WRITTEN FACTORY/MANUFACTURER CERTIFICATION that its installer, or its sub-contracted installer, is an authorized installer, certified to install various equipment and amenities for parks and playground equipment as required by each manufacturer.

#### 1.6. [Catalogs and Manufacturer Suggested Retail Price \(MSRP\) Lists](#)

Each bidder shall submit with this bid, a website link of each catalog and current catalog/supply/product price list for each catalog submitted. All catalogs and price lists shall clearly identify the bidder's name, address and telephone number. If digital catalogs are not available on website, catalogs must be mailed or delivered to the Clay County Purchasing Department, Fourth Floor, 477 Houston Street, Green Cove Springs, FL 32043 prior to bid opening. Annually Bidder may request that new manufacturers be added. The County reserves the right to approve or deny this request.

**SALES PROMOTION/PRICE REDUCTION:** It is understood that sales promotions occur during the course of the contract that will lower prices of products for the period of the sales promotion. The County shall receive the full benefit of such reductions if lower than the discount established by this bid. The County

must be notified of these promotions in writing, specifying the beginning and ending dates of the sales promotions.

### 1.7. Compliance With Laws and Codes

Bidders must strictly comply with Federal, State and local building and safety codes. Equipment must meet all State and Federal safety regulations. The following publications (issue in effect on date of invitation to bid) shall form a part of this specification:

A. American Society for Testing and Materials (ASTM)

ASTM-F1487 Standards – Methods of testing Playground Equipment for Public Use

ASTM-F1292 Standards - Method for testing various surfacing materials to determine their “critical height” (the fall height below which a life-threatening head injury would not be expected to occur)

Copies may be obtained from the:

American Society for Testing and Materials  
100 Barr Harbor Drive  
West Conshohocken, PA 19428

B. Consumer Product Safety Commission (CPSC) – printed Handbook for Public Playground Safety.

Copies may be obtained from the:

US Consumer Product Safety Commission  
4330 East West Highway  
Bethesda, MD 20814  
(301) 504-7923

C. National Playground Safety Institute (NPSI) – identification of 12 leading causes of injuries on playgrounds.

Copies may be obtained from the:

National Recreation and Park Association  
22377 Belmont Ridge Road  
Ashburn, VA 20148-4150  
(703) 858-0784

D. Americans with Disabilities Act (ADA) Regulations for Title III, Appendix A, Standards for Accessible Design, issued by the Department of Justice.

Copies may be obtained by calling:

(800) 514-0301

Bidders certify that all products (materials, equipment, processes, age appropriate signage, or other items supplied in response to this bid) contained in its bid meet all Federal and State requirements, Upon completion of installation of play equipment and/or playground surfacing, bidder shall furnish to the County a certificate so stating the equipment /surfacing and its installation meet all Federal and State requirements as outlined in the above publications.

Bidders further certify that if the product(s) delivered and/or installed are subsequently found to be deficient in any if the aforementioned requirements in effect on date of delivery, all costs necessary to bring the product(s) and installation into compliance shall be borne by the bidder.

### 1.8. Award

The County reserves the right to award to multiple bidders. There is no guarantee any purchase order will be issued after award. Purchase orders will be issued subject to availability of funds.

### 1.9. Site Inspections

It is incumbent upon all bidders to examine the site and insure that they are aware of all conditions that may affect the contract work. The County will not be responsible for conclusions made by the Bidder. No claims for additional compensation will be considered on behalf of any Contractor, Sub-Contractor, materials suppliers or others on account of that person's failure to be fully informed of all requirements of all parts of this bid.

### 1.10. Work Hours

Workdays and hours – Normal work hours of Monday through Friday, 7:30 a.m. to 5:00 p.m. unless approved by the County Project Manager or designee.

Any work performed outside of the normal County business hours will require prior County approval and payment to the County for all expenses incurred by the County may be required.

### 1.11. Permit & Fees

The Bidder shall comply with all applicable State and local laws, ordinances, codes, and regulations. The Bidder is required to familiarize themselves with all permits required for each individual project. If a County permit is required, this project is not exempt from permit fees and permit fees must be paid to the County Building Department by the Contractor.

For questions about permitting please contact:

Clay County Building Department

Phone: (904) 269-6307

Email: [permits@claycountygov.com](mailto:permits@claycountygov.com)

Website: <https://www.claycountygov.com/government/building>

All other permits, assessments, fees, bonds, and other charges as necessary to perform and complete the work of the individual project is the responsibility of and will be paid for by the Contractor, including any related inspection fees.

### 1.12. Clean up & Restoration of Site

The Bidder is responsible for anything damaged due to the direct result of installation or construction. Remove all debris from site and dispose of appropriately at Contractor expense.

Bidder shall maintain work site in a safe manner, and daily clear construction debris.

### 1.13. Bidder and Subcontractor Requirements

1. The Bidder shall be licensed to perform all work listed in the Scope of Work provided.
2. The Bidder shall own or have full access to the appropriate personnel and equipment to complete the project requested.

### 1.14. Subcontractors and Major Material Suppliers

Contractor shall submit names of subcontractors and major material suppliers that they anticipate utilizing for any portion of the Work required within this RFB.

The County reserves the right to approve all Sub-Contractors. If Sub-Contractors are to be utilized, their names must be included within this Bid. The County may request references of the Sub-Contractors prior to approval. Responsibility for the performance of the Contract remains with the main Contractor exclusively. After the commencement of the project, Sub-Contractors may be added or modified during the Contract period only with prior written permission from the County, and only for reasonable cause, as judged by the County. If any Subcontractor or Major Material Supplier is found to be incompetent, careless, or neglectful, or unduly delays progress of work, they shall be dismissed. Another shall then be employed in its place, as approved the County.

### 1.15. Damage to Public or Private Property

If property (public or private) is damaged while Contractor is performing work specified or is removed for the convenience of the work, it shall be repaired or replaced at the expense of the Contractor in a manner acceptable to the County prior to the final acceptance of the work. Contractor will be responsible for applying and securing any permits that may be required to complete such repairs.

Contractor must provide protection necessary to prevent damage to property being repaired or replaced.

If the work site has any pre-existing damage, the Contractor shall notify the County Project Manager in writing. Failure to do so shall obligate the Contractor to make repairs per the above section. Any damage to property (public or private) caused by the action of the Contractor shall be repaired or replaced at the expense of the Contractor to the satisfaction of the County. Failure to restore said property within five (5) working days following notification will result in a deduction from the final payment invoice. All damage which occurs as a result of the Contractor's application of materials shall be remedied by the Contractor at no additional cost to the County. Repairs made as a result of damage must be guaranteed for a period of thirty (30) days. Should the replacement be damaged within the 30-day period the Contractor shall replace the materials continually until the area is re-established.

Should the County have any expenses incurred due to the Contractor not restoring the property/damage within said time, any appropriate labor, material, and/or equipment use or rental to restore damaged property to its original condition will be deducted from the final Invoice prior to a payment being made.

### 1.16. Compliance with Occupation Safety and Health Act

The Bidder warrants that the product(s) and/or service(s) supplied to Clay County shall conform in all respects to the standards set forth in the Occupational Safety and Health Act (OSHA) of 1970 as amended and the failure to comply will be considered a breach of contract. Clay County shall be held harmless against any unsafe conditions and contractor employee incidents.

Bidder certifies that all material, equipment, services, etc., furnished in this bid meets all OSHA requirements for the applicable Sectors. Bidder further certifies that, if the successful bidder, and the material, equipment, service, etc., delivered or provided is subsequently found to be deficient in any OSHA requirement in effect on date of delivery or service fulfillment date, all costs necessary to bring the material, equipment, service, etc., into compliance with the aforementioned requirements shall be borne by the bidder. All Personal Protective Equipment used by the Contractor and their employees shall be ANSI certified and meet OSHA standards.

### 1.17. Unsatisfactory Equipment and/or Services

The County will discuss all instances of unacceptable equipment and/or services with the awarded Bidder. This shall be immediately rectified by the Bidder at no charge to the County, to include any labor and materials as it may apply.

During this time, the County may suspend service with the Bidder until the problem(s) are corrected or may elect to use another company on an emergency basis. A record of failure to perform or of an unsatisfactory performance may result in supplier debarment.

### 1.18. Payment

The Contractor may request payment no more than once monthly, based on the amount of work completed. All partial estimates and payments found to be in error shall be subject to correction in the estimates and payments subsequent thereto, and in the final estimate and payment. Payments will be made in accordance with the Florida Local Government Prompt Payment Act.

The amount of such payments shall be the total value of the project work completed to the date of the estimate, based on the quantities and the Contract unit and/or lump sum prices, less an amount retained and less payments previously made. The amount retained shall be determined in accordance with Section 255.078, Florida Statutes.

### 1.19. Warranty

The Contractor shall provide a warranty for equipment and parts. Warranty will begin from the date of final acceptance.

### 1.20. Term

The term of bid award for various equipment and amenities for parks and playgrounds will be three (3) years, with two (2) one (1) year renewal options. Discounts from this solicitation shall prevail for the full duration of the contract and including subsequent extensions. The County reserves the right to use other available bids or contracts when in the best interest of the County.

### 1.21. Performance Evaluation

A work performance evaluation will be conducted periodically to ensure compliance with the Contract.

### 1.22. Cancellation of Contract

If the awarded Bidder fails to maintain acceptable product quality or to perform adequately in accordance with the terms, conditions and specifications established in this Request for Bid, the County reserves the right to cancel the contract upon thirty (30) days written notice to the Contractor.

### 1.23. Additional Services

If the County and/or awarded Bidder identifies any additional services to be provided by Bidder that are not covered under the Agreement but are beneficial to the County, such additional services shall be mutually negotiated between the County and the Bidder.

Example Request for Quotation  
Various Equipment and Amenities for Parks and Playgrounds

Description of Project: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Price Quotation:

Manufacturer	Item and Page Number	Quantity	MSRP Unit Price	Contract Discount	Extended Price

\*When quoting projects where freight would be charged, include those costs so freight charges can appear on the purchase order. Freight charges for equipment must be pre-paid and added to the invoice.

Additional Services Required:

Description	Quantity	Unit Price	Extended Price

Total: \$ \_\_\_\_\_

List any Subcontractors:

1. Name \_\_\_\_\_
2. Address \_\_\_\_\_
3. Telephone Number \_\_\_\_\_
4. Contact Name \_\_\_\_\_
5. Designated Work \_\_\_\_\_
6. Subcontractor Cost \_\_\_\_\_



# **ATTACHMENT B PROPOSAL**



Clay County  
Purchasing / Administrative and Contractual Services  
477 Houston Street, Green Cove Springs, FL 32043

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**[MUSCO SPORTS LIGHTING, LLC] RESPONSE DOCUMENT REPORT**

RFB No. 23/24-074

Various Equipment and Amenities for Parks and Recreation

RESPONSE DEADLINE: June 13, 2024 at 4:00 pm

**Musco Sports Lighting, LLC Response**

**CONTACT INFORMATION**

**Company:**

Musco Sports Lighting, LLC

**Email:**

musco.contracts@musco.com

**Contact:**

Beth Sheeley

**Address:**

100 1st Avenue West  
PO Box 808  
Oskaloosa, IA 52577

**Phone:**

(800) 825-6030

**Website:**

[www.musco.com](http://www.musco.com)

**Submission Date:**

Jun 12, 2024 3:11 PM

**Clay County RFB #23/24-074  
Sports Lighting Pricing Sheet**

Manufacturer: Musco Sports Lighting, LLC  
Address: 100 1<sup>st</sup> Ave West  
City, State, Zip Code: Oskaloosa, IA 52577  
Contact: Beth Sheeley  
Phone: 800-825-6030  
Fax: 641-672-1996  
Email: [musco.contracts@musco.com](mailto:musco.contracts@musco.com)  
Federal ID#: 42-1511754

Terms: 25% of contract price required with order. Balance due Net 30 days upon delivery.

All prices include delivery within Clay County, FL to the job site and are for the lighting system materials only.

**Section I: Musco Sports Lighting Price List**

A. Light-Structure System™ with Total Light Control – TLC for LED™ & SportsCluster® System with Total Light Control – TLC for LED™

**Light-Structure System™ with Total Light Control – TLC for LED™**

The Light-Structure System™ with TLC for LED® includes precast concrete bases, galvanized steel poles, electrical components enclosures, wire harnesses, luminaire assemblies and Control-Link® Control & Monitoring package. Installation is NOT included in pricing for the items listed in Section 1.

WARRANTY AND GUARANTEE: Musco will provide all materials and labor to maintain operation of the Light-Structure System™ with Total Light Control – TLC for LED™ to original design criteria for 25 years. Musco products and services are guaranteed to perform for the customer as detailed in the “Musco Constant 25™” document.

**SportsCluster® System with Total Light Control – TLC for LED®**

SportsCluster® System with TLC for LED® includes electrical components enclosures, wire harnesses, luminaire assemblies and Control-Link® Control & Monitoring package (does not include poles or concrete bases). Utilizes existing sports lighting poles that are compatible with Musco’s lighting system. Installation is NOT included in the pricing for the items listed in Section 1.

WARRANTY AND GUARANTEE: Musco will provide all materials and labor to maintain operation of the SportsCluster® System with Total Light Control – TLC for LED™ to original design criteria for 10 years. Musco products and services are guaranteed to perform for the customer as detailed in the “Musco Constant 10™” document. The Constant 10™ warranty is contingent upon a site inspection.

**FOOTBALL**

Field Size	Pole Setback	Average Maintained Light Level	Price for Light-Structure TLC-LED Materials	Price for Sports Cluster TLC-LED Materials	Average Maintained Light Level	Price for Light-Structure TLC-LED Materials	Price for Sports Cluster TLC-LED Materials
360' x 160'	50'	30 fc	\$178,998	\$121,967	50 fc	\$253,938	\$167,577
360' x 160'	80'	30 fc	\$215,993	\$140,687	50 fc	\$273,843	\$188,483
360' x 160'	100'	30 fc	\$222,875	\$140,955	50 fc	\$333,980	\$199,583
360' x 160'	120'	30 fc	\$258,978	\$141,532	50 fc	\$367,807	\$202,307

**SOCCER**

Field Size	Pole Setback	Average Maintained Light Level	Price for Light-Structure TLC-LED Materials	Price for Sports Cluster TLC-LED Materials	Average Maintained Light Level	Price for Light-Structure TLC-LED Materials	Price for Sports Cluster TLC-LED Materials
330' x 195'	30'	30 fc	\$173,035	\$96,296	50 fc	\$221,726	\$137,980
360' x 210'	30'	30 fc	\$172,949	\$96,345	50 fc	\$239,031	\$159,151
360' x 225'	30'	30 fc	\$186,624	\$118,148	50 fc	\$271,414	\$183,640

**BASEBALL / SOFTBALL**

Field Type	Field Size	Average Maintained Light Level	Price for Light-Structure TLC-LED Materials	Price for Sports Cluster TLC-LED Materials	Average Maintained Light Level	Price for Light-Structure TLC-LED Materials	Price for Sports Cluster TLC-LED Materials
		(Inf/Out)			(Inf/Out)		
60' Base Path	200'	30/20	\$112,090	\$73,451	50/30	\$131,588	\$90,581
60' Base Path	225'	30/20	\$127,292	\$83,951	50/30	\$137,976	\$94,999
60' Base Path	250'	30/20	\$132,916	\$81,528	50/30	\$164,564	\$114,939
60' Base Path	300'	30/20	\$180,830	\$124,909	50/30	\$214,656	\$145,588
60' Base Path	325'	30/20	\$185,638	\$129,579	50/30	\$246,041	\$162,813
90' Base Path	300'	50/30	\$246,556	\$159,395	70/50	\$336,496	\$224,641
90' Base Path	300'/325'/300'	50/30	\$271,349	\$168,870	70/50	\$368,208	\$239,981
90' Base Path	350'	50/30	\$285,182	\$176,229	70/50	\$424,570	\$294,514
90' Base Path	320'/360'/320'	50/30	\$278,623	\$187,326	70/50	\$432,538	\$291,061
90' Base Path	330'/400'/330'	50/30	\$380,224	\$222,008	70/50	\$477,153	\$310,958

**TENNIS**

# Courts	Average Maintained Light Level	Price for Light-Structure TLC-LED Materials	Price for Sports Cluster TLC-LED Materials
2	50 fc	\$72,398	\$51,262
3	50 fc	\$84,388	\$54,790
4	50 fc	\$95,622	\$63,696
6	50 fc	\$168,232	\$105,797

**PICKLEBALL**

# Courts	Average Maintained Light Level	Price for Light-Structure TLC-LED Materials	Price for Sports Cluster TLC-LED Materials
2	50 fc	\$35,695	\$24,738
3	50 fc	\$55,938	\$33,822
4	50 fc	\$65,363	\$42,941

**BASKETBALL - OUTDOOR**

# Courts	Average Maintained Light Level	Price for Light-Structure TLC-LED Materials	Price for Sports Cluster TLC-LED Materials
1	50 fc	\$63,549	\$45,921
2	50 fc	\$79,436	\$57,401

**BASKETBALL - INDOOR - 10 year parts and labor warranty**

# Courts	Average Maintained Light Level	Price for LED Material
1 - 94' x 50'	75 fc	\$55,940

**PARKING LOT - 10 year parts and labor warranty**

Parking Lot Area	Light Level	Price for LED Material	Price Per Square foot (to be used for alternate size areas)
320' x 200'	1 fc	\$34,697	\$0.74/ sq ft



### Mini-Pitch System™ Modular Sports Solution

Mini-Pitch System™ - 10 year parts and labor warranty		
	Light Level	Price for TLC-LED Materials
40' x 84'	25 fc	\$80,000
50' x 104'	20 fc	\$85,000
60' x 120'	15 fc	\$90,000

### MuscoVision® Automated Sports Broadcasting

MuscoVision® - 5 year parts and labor warranty	
	Price for Materials per field
Diamond Field*	\$12,000
Rectangular Field/Court*	\$12,000

\*750 hours of streaming included; additional hours available for purchase

\*For every year of maturity of the contract please take into account a 2.5% increase for materials on MuscoVision®.

#### B. Other Applications/ Supplemental Items

	Cost	
Additional lighting for security, special areas, replacing fixtures on existing poles or non-standard field sizes & pole locations	\$4,200	Per Fixture
Control-Link Retrofit Unit (material only)	\$9,850	Per Unit
Control-Link Unit - Multiple Services (material only)	\$8,040	Per Unit
Osprey Nest Platforms	\$3,600	Each
TLC for LED®-RGBW Fixture	\$6,000	Per Fixture
TLC for LED®- RGBU Fixture	\$6,000	Per Fixture
LED Security Fixture (mount on Musco pole)	\$2,500	Per Fixture
LED Pathway Lighting (8' pole with LED fixture)	\$2,760	Per Pole
LED Area Lighting (15' pole with LED fixture)	\$2,700	Per Pole
ED Roadway Lighting (30' pole with LED fixture)	\$3,060	Per Pole
LED Bollard Lighting (42" pole with LED fixture)	\$960	Per Pole

#### Section II: Adders

- A. The above pricing is based upon 2023 FBC 130 mph. For each 10 mph increase in wind zone, the equipment and installation price will increase by 20%.
- B. Florida Building Code, 2023 edition with supplement for public schools will add up to 20% to the price of the job plus any applicable wind zone increase adder.
- C. Broward County, Miami-Dade County, and Palm Beach County for HVHZ wind zone will add up to 30% to the price of the job plus any applicable wind zone increase adder.
- D. During the term of this contract, technical upgrades to these products may periodically become available and may be offered to the owner. Bidder reserves the right to supply

upgraded technology provided it maintains on-field lighting performance and enhances benefit, additional costs may vary.

- E. This pricing is based on using Musco's typical 5700 Kelvin/75 CRI LED fixtures. Other Kelvin & CRI LED fixture combinations are available and may add additional cost.
- F. The pricing is based on 480v; other voltage options are available and may add additional cost.
- G. This pricing is based on standard installation. If a pier foundation, suspended pier foundation, or other non-standard installation is required price will increase by 15% plus any applicable wind zone increase adder.
- H. Standard soil conditions – rock, bottomless, wet, or unsuitable soil may require additional engineering, special installation methods and additional cost.
- I. Pricing is based on using Musco's Control-Link® Control & Monitoring package. Musco's Show-Light® entertainment services packages are available and will increase the equipment cost by 20%. Musco is not responsible for obtaining rights to or any cost associated with music licenses.
- J. Sales tax, labor and unloading of the equipment is not included as part of the materials only pricing.
- K. Pricing is based on shipment of the entire project together to one location. Delivery time of order, submittal approval, and confirmation of order details include voltage and phase, and pole location is approximately 10-12 weeks standard shipping.
- L. This pricing does not include situations with obstructed site access and the related matting, and non-standard equipment that would be required, which may add additional cost.
- M. This pricing list should not be considered complete and exhaustive due to the nature of each project being a unique, design-build situation. Additional costs will be incurred with non-standard situations and design elements.

### Section III: Labor Costs-

- A. Pole Installation (price per pole) Max diameter 36" no suspension  
Pole Height LS 2023 FBC 130 mph price with Musco precast base

Pole Height	LS 2023 FBC 130 mph Price
40'	\$7,500
50'	\$7,500
60'	\$8,500
70'	\$9,500
80'	\$10,500
90'	\$11,000
100'	\$13,000
110'	\$17,000

- B. Sub-Standard Soil Conditions – The above installation price is based upon 130 mph wind zone installed in standard class 5 soils. If sub-standard soil conditions exist, it is understood that there may be additional costs associated with a sub-standard soil installation and the owner agrees to accept the additional costs. In addition, because wind zones sometimes impact pole size, there may be a 10% increase in the cost of installation for each 10 mph increase in wind zone.

- C. Removal of Existing Concrete Poles **\$10,000 per pole**
- D. Removal of Existing Wooden Poles **\$4,500 per pole**
- E. Straighten Concrete Pole **\$10,000 per pole**
- F. Patching Concrete Poles **\$5,500 per pole**
- G. Installation of Fixtures on Existing Poles **\$17,000 per pole**
- H. Installation of Osprey Platform **\$3,600 per platform**
- I. Installation of Control Link Retrofit **\$8,500 per unit**
- J. Retrofit existing Gymnasium with LED **\$1,500 per fixture**
- K. Site Inspection – Evaluation of existing lighting system **\$5,000 per project**



## Section IV: Electrical Costs

### A. Service Options

Option A – 200 Amp Service (Section IV, A, 1)	\$28,300 each
Option B – 400 Amp Service (Section IV, A, 1)	\$34,300 each
Option C – 600 Amp Service (Section IV, A, 1)	\$42,300 each
Option D – 800 Amp Service (Section IV, A, 1)	\$48,300 each

\*Musco does not manufacture main distribution panels and delivery timing may vary and differ from Musco equipment delivery schedule.

### B. Conduit, Pull Boxes and Conductors

#### 1. Wiring from Panel to Contactors

a. Connect wiring from one 3 pole, 30 amp breaker to one 3 pole, 30 amp contactor using 3 #6 conductors, max distance of 10 feet	\$600 each
b. Connect wiring from one 3 pole, 60 amp breaker to one 3 pole, 60 amp contactor using 3 -#4 conductors, max distance of 10 feet	\$800 each

#### 2. Wiring from Contactors to Poles

a. 2" PVC with (4) #1 THWN conductors \$30 per foot	\$65 per foot
b. 2 1/2" PVC with (4) 3/0	\$105 per foot
c. 4" PVC with (4) 500mcm	\$207 per foot
d. (2) 4" PVC with (4) 300mcm	\$225 per foot

3. Copper Conductors in PVC Conduit pricing is based on a 500' maximum distance. After 500' the per foot pricing will apply.

A	10	\$10,800	\$11.50 per foot
B	8	\$11,960	\$17.30 per foot
C	6	\$12,420	\$23.00 per foot
D	4	\$13,580	\$28.80 per foot

#### 4. Pull Boxes

a. Brooks 38T pull box with 8" x 8" x 6" PVC box Inside	\$2,700 each
b. Connect 4-#1 conductors from pull box to sports lighting pole, maximum distance of 10 feet	\$1,800 each

### C. Installation of Contactor Cabinets

a. 48" Cabinet	\$8,500 each
b. 72" Cabinet	\$12,000 each

### D. Lightning Protection

1. Surge Arrestor – protection at remote electrical enclosure	\$9,200 each
2. Surge Arrestor – protection on line side of panel	\$13,500 each

### E. Pole Grounding

1. Provide and install ground rods for poles 70' and below	\$2,500 per pole
2. Provide and install ground rods for poles 80' and above	\$3,900 per pole

### F. Miscellaneous

CAT 6 cable with conduit- for show lights, and show light retrofit	\$17 per foot
Dark Sky International Phase 1 design approval	\$1,000 per design
Dark Sky International Phase 2 light level reading	\$3,000 per design
Remove drilling spoils from site	\$400 per pole
Storage container	\$2,800 each
Dumpster	\$3,000 each

## Section V: Engineered Plans

### A. Electrical Engineering Drawings, sealed by P.E.

1. Adder for 200 amp service	\$12,100 each
2. Adder for 400 amp service	\$17,450 each
3. Adder for 600 amp service	\$25,900 each
4. Adder for 800 amp service	\$41,450 each

### B. Structural Engineering Drawings, sealed by P.E.

1. Foundation and pole plans based on assumed soils	\$1,850 per project
2. Foundation and pole plans based on Geotech report	\$3,800 per project

### C. Geotech report

\*max of 6 samples per project

\$14,500 per project

### D. Bonding (over \$200,000)

\$2,000 per \$100,000

### E. Site survey

\$5,000 per project

### F. Project management

\$15,000 per project

## Section VI: Yearly Adjustments

A. During the term of this contract, technical upgrades to these products may periodically become available and will be offered to the owner. Musco reserves the right to supply upgraded technology provided it maintains the on-field lighting performance, enhances benefits, and does not exceed the prices bid when applied to a project application under the current contract provisions.

B. During the term of this contract if the State of Florida Building Code and/or wind speeds change, Musco reserves the right to adjust pricing accordingly.

C. This pricing list should not be considered complete and exhaustive due to the nature of each project being a unique, design-build situation. Additional costs will be incurred with non-standard situations and design elements.

### Sports Lighting - Base Bid Lighting Equipment

#### Part 1 - General

A. The project goals are as follows:

- i. **Guaranteed Light Levels:** Selection of the appropriate light levels impacts the safety of the players and the enjoyment of the spectators. Therefore, the lighting system shall be designed such that the light levels are guaranteed for a period of 25 years.
- ii. **Environmental Light Control:** Provide precise control of light with engineered optic systems using proven spill and glare reduction methods. The lighting system manufacturer needs to certify that they can meet or exceed all local lighting ordinances, offsite spill, and glare. If required, the lighting manufacturer will meet Dark Skies requirements.
- iii. **Life Cycle Costs:** In order to reduce the operating budget, the preferred lighting system shall be energy efficient and cost effective to operate. All maintenance costs shall be eliminated, and the field(s) should be proactively monitored to detect luminaire outages over a 25-year life cycle.
- iv. **Control and Monitoring:** To allow for optimized use of labor resources and to avoid unneeded operation of the facility, a remote on/off control system for the lighting system must be included. Fields should be proactively monitored to detect luminaire outages over the 25-year life cycle. All communication and monitoring costs for the 25-year period shall be included in the pricing.

B. Sports Lighting Performance

- i. The performance shall be in accordance with IES guidelines, which states maintained average illuminance levels are values which the lighting system should always meet or exceed.
- ii. **Uniformity Ratio:** The foot-candle level shall have a uniformity ratio of maximum ratio of not greater than the following:
  1. The manufacturer guarantees field light intensity levels and uniformity ratios at initial start-up and throughout rated life of the lamp and shall be maintained for the warranty life.

**Football** – Standard 4-pole layout, with poles located at the 15-yard line, with setbacks from the field as given below with two options for lighting levels to be submitted and quoted.

Field Size	Pole Setback	Target light Level	Targe Light Level	Uniformity	Grid Spacing	Grid Points
360 x 160	50'	30 fc	50 fc	2.0:1	30' x 30'	72
360 x 160	70'	30 fc	50 fc	2.0:1	30' x 30'	72
360 x 160	100'	30 fc	50 fc	2.0:1	30' x 30'	72
360 x 160	120'	30 fc	50 fc	2.0:1	30' x 30'	72

**Soccer** – Standard 4-pole layout, with poles located at a distance of  $(\text{Field Length}/2 - ((\text{Field Width}/2 + \text{Setback}) \times 0.40))$  from the centerline, with setbacks from the field as given below. Standard outside pole locations for a 6-pole design would be located at a distance of  $(\text{Field Length}/2 - ((\text{Field Width}/2 + \text{Setback}) \times 0.28))$  from the center line, with setbacks from the field as given below with two options for lighting levels to be submitted and quoted.

Field Size	Pole Setback	Target light Level	Targe Light Level	Uniformity	Grid Spacing	Grid Points
330 X 200	30'	30 fc	50 fc	2.0:1	30' x 30'	77
330 X 200	50'	30 fc	50 fc	2.0:1	30' x 30'	77
360 X 210	30'	30 fc	50 fc	2.0:1	30' x 30'	84
360 X 210	50'	30 fc	50 fc	2.0:1	30' x 30'	84
360 X 225	30'	30 fc	50 fc	2.0:1	30' x 30'	96
360 X 225	50'	30 fc	50 fc	2.0:1	30' x 30'	96

**Baseball** -(90' Base path) – Standard A- pole locations are 50' down line and 55' off for a 90' base path. Standard B-pole locations are 5' beyond the outfield radius and 10' off the foul line for a 4-pole design and are at a distance down the line of  $((\text{Foul Line} + (\text{Base path} \times 0.5))/2)$  and 40' off the foul line for a 6-pole and 8-pole design. Standard C-pole locations are 5' beyond the outfield radius at an angle of 20 degrees from the foul line for a 6-pole design and 10 degrees from the foul for an 8-pole design. Standard D- pole locations are 5' beyond the outfield radius at an angle of 30 degrees from the foul line for an 8-pole design.

**Softball** -(60' Base path) – Standard A- pole locations are 35' down line and 40' off for a 60' base path. Standard B-pole locations are 5' beyond the outfield radius and 10' off the foul line for a 4-pole design and are at a distance down the line of  $((\text{Foul Line} + (\text{Base path} \times 0.5))/2)$  and 40' off the foul line for a 6-pole and 8-pole design. Standard C-pole locations are 5' beyond the outfield radius at an angle of 20 degrees 5' beyond the outfield radius at an angle of 20 degrees from the foul line for a 6-pole design and 10 degrees from the foul line for an 8-pole design.

Field Type	Field Size	Target light Level (Inf/out)	Targe Light Level (inf/out)	Uniformity Infield	Uniformity Outfield	Grid Spacing	Grid Points (infield/outfield)
60' Base Path	200'	30/20 fc	50/30 fc	2.0:1	2.5:1	20' x 20'	25/73
60' Base Path	225'	30/20 fc	50/30 fc	2.0:1	2.5:1	20' x 20'	25/96
60' Base Path	250'	30/20 fc	50/30 fc	2.0:1	2.5:1	20' x 20'	25/119
60' Base Path	300'	30/20 fc	50/30 fc	2.0:1	2.5:1	20' x 20'	25/181



60' Base Path	320'	30/20 fc	50/30 fc	2.0:1	2.5:1	20' x 20'	25/209
90' Base Path	300'	50/30 fc	70/50 fc	2.0:1	2.5:1	30' x 30'	25/73
90' Base Path	325'	50/30 fc	70/50 fc	2.0:1	2.5:1	30' x 30'	25/90
90' Base Path	350'	50/30 fc	70/50 fc	2.0:1	2.5:1	30' x 30'	25/106
90' Base Path	320/360/320	50/30 fc	70/50 fc	2.0:1	2.5:1	30' x 30'	25/100
90' Base Path	330/400/330	50/30 fc	70/50 fc	2.0:1	2.5:1	30' x 30'	25/121

**Tennis** – Standard pole locations are 6' beyond the serving line and 3' outside the fence.

# Courts	Target Light Level	Uniformity
2	50 fc	2.0:1
3	50 fc	2.0:1
4	50 fc	2.0:1
6	50 fc	2.0:1

**Pickelball** – Standard pole locations are 6' beyond the serving line and 3' outside the fence.

# Courts	Target Light Level	Uniformity
2	50 fc	2.0:1
3	50 fc	2.0:1
4	50 fc	2.0:1

**Basketball - Outdoor** - Standard pole locations are at the center line.

# Courts	Target Light Level	Uniformity
2	50 fc	2.0: 1

**Basketball - Indoor** - Lighting shall be provided utilizing LED luminaires \*

Court size	Target Light Level	Uniformity
94' x 50'	80 fc	2.0: 1

**Parking Lots** - Lighting shall be provided utilizing LED luminaires\*

Parking Lot	Total Square Feet	Target Average Light Level	Uniformity
320' x 200'	64,000	1 fc	N/A

\*Pricing for alternate size parking lots may be determined by calculating a cost per square foot of the base size parking area and utilizing this cost to a different size area.

C. Point by Point Analysis

- i. Measurements of light shall be demonstrated on computer generated model that consists of a grid of a specified number of points covering a stated area on an equally spaced grid. See the below chart for the exact specifications of points, areas, and grid spacing for each field.

- ii. Light Level and Uniformity Ratio shall be calculated and shown on the computer-generated model. The Light Levels and Uniformities must meet or exceed the defined criteria.

**Computer Models - Test Stations**

Area of Lighting	Size of Area to be Covered	Grid Spacing
Football	Entire Field	30' x 30'
Soccer	Entire Field	30' x 30'
Baseball	Entire Field	30' x 30'
Softball	Entire Field	20' x 20'
Tennis Courts 1-6	Entire Court	20' x 20'
Pickleball Courts 2-4	Entire Court	10' x 10'
Basketball Courts 2	Entire Court	20' x 20'
Basketball- Indoor	Entire Court	10' x 10'
Parking Lot	Entire area (320' X 200')	4' x 4'

**D. Spill/Glare Equipment**

- i. Light Control Luminaires: All luminaires shall utilize spill light and glare control devices including, but not limited to, internal shields, louvers, and external shields. No symmetrical beam patterns are accepted.
- ii. Glare Control: Maximum candela measured at 5' above grade at a distance of 150' should be better than that of a comparable HID design. These values are defined for typical sports fields listed below. \*

Typical Field Type	Maximum Candela at 150'
Baseball	≤7,000 candela
Softball	≤7,000 candela
Football	≤7,000 candela
Soccer	≤7,000 candela
Tennis	≤7,000 candela
Pickleball	≤7,000 candela

\*If the design of the project requires the pole setback to be greater than 70' from the edge of the field, the candela value at 150' may exceed the value stated in the above chart.

**Part 2 – Product**

**A. Sports Lighting System Construction**

- i. System Description – Light-Structure System™ shall consist of the following:
  - a. Galvanized steel poles and cross-arm assembly. No direct burial steel or inverted base steel poles are allowed.
    - 1. The cross-arm mounting plate shall be attached to the cross-arm assembly at the factory.
  - b. Pre-engineered concrete base embedded in concrete backfill. Alternate may be an anchor bolt foundation designed such that the steel pole and any exposed steel

portion of the foundation is located a minimum of 18 inches above final grade. The concrete for the anchor bolt foundations shall be allowed to cure for a minimum of 28 days before the pole stress is applied.

c. All luminaires shall be constructed with die cast aluminum housing to protect the luminaire reflector system. If the manufacturer cannot provide die cast aluminum housing, external hail shrouds shall be required. Luminaires shall be complete with an external visor. The luminaire and visor should be powder coat painted to match the Electrical Component Enclosure.

d. Manufacturer must mount all drivers and supporting electrical equipment in aluminum enclosures mounted approximately 10' above grade. The enclosures shall be touch safe and include drivers and fusing with indicator lights on fuses to notify when a fuse is to be replaced for each luminaire. Safety disconnect per circuit for each pole structure will be located in the enclosure.

e. Manufacturer shall provide surge protection at the pole equal to or greater than 40 kA for each line to ground (common mode) as recommended by current IEEE.

f. Wire harness complete with an abrasion protection sleeve, strain relief and plug-in connections for fast, trouble-free installation.

g. All luminaires, visors, and cross-arm assemblies shall withstand 150 mph winds and maintain luminaire aiming alignment.

h. Control cabinet to provide remote on-off control and monitoring of the lighting system.

i. Manufacturer must supply a signed warranty covering the entire system (Light Structure System™) for 25 years from the date of shipment.

ii. System Description – SportsCluster® System (existing structures) shall consist for the following:

a. Galvanized cross-arm assembly for attachment to existing structures.

1. The cross-arm mounting plate shall be attached to the cross-arm assembly at the factory

b. All luminaires shall be constructed with a die cast aluminum housing to protect the luminaire reflector system. If manufacturer cannot provide die cast aluminum housing, external hail shrouds shall be required. Luminaires shall be complete with an external visor. The luminaire and visor should be powder coat painted to match the Electrical Component Enclosure.

c. Manufacturer must mount all drivers and supporting electrical equipment in aluminum enclosures mounted approximately 10' above grade. The enclosures shall be touch safe and include drivers and fusing with indicator lights on fuses to notify when a fuse is to be replaced for each luminaire. Safety disconnect per circuit for each pole structure will be located in the enclosure.

d. Wire harness complete with an abrasion protection sleeve, strain relief and plug-in connections for fast, trouble-free installation.

e. All luminaires, visors, and cross-arm assemblies shall withstand 150 mph winds and maintain luminaire aiming alignment.

f. Control cabinet to provide remote on-off control and monitoring of the lighting system.

g. Product assurance and warranty program is contingent upon site inspection and compatibility with existing structures.

h. Manufacturer must supply a signed warranty covering the entire system (SportsCluster® System) for 10 years from the date of shipment.

### iii. Manufacturing Requirements

a. All components shall be designed and manufactured as a system. All luminaires, wire harness, drivers and other enclosures shall be factory assembled, aimed, wired, and tested.

### iv. Durability

a. All exposed components shall be constructed of corrosion resistant material and/or coated to help prevent corrosion. All exposed steel shall be hot dip galvanized per ASTM A123. All exposed hardware and fasteners shall be stainless steel of at least 18-8 grade, passivated and polymer coated to prevent possible galvanic corrosion to adjoining metals. All exposed aluminum shall be powder coated with high performance polyester. All exterior reflective inserts shall be anodized, coated with a clear, high gloss, durable fluorocarbon, and protected from direct environmental exposure to prevent reflective degradation or corrosion. All wiring shall be enclosed within the cross-arms, pole, or electrical components enclosure.

### v. Lightning Protection

a. Manufacturer shall supply and equip all structures with lightning protection meeting NFPA 780 standards. Manufacturing shall integrate the required grounding electrode into the structure. System shall be UL listed.

b. If grounding is NOT integrated into the structure the Manufacturer shall supply an electrode of not less than 5/8" in diameter and 8' in length, with a minimum of 10' embedment. Grounding electrode shall be connected to the structure by a grounding electrode conductor with a minimum size of 2 AWG for poles with 75 feet mounting height or less, and 2/0 AWG for poles with more than 75 feet mounting height.

### vi. Safety

a. All safety components shall be UL listed for the appropriate application.

### vii. Electric Power Requirements for sports lighting equipment

a. Maximum total voltage drop to the disconnect switch located on the poles shall not exceed 3% of rated voltage. Voltage/Phase to be determined for each specific site.

### viii. Building Code



- a. The base bid of the lighting system must comply with Florida Building Code Edition 2023, Exposure C, Standard Variation with a wind speed of 130 mph.

ix. Structural Design

- a. The stress analysis and safety factor of the poles shall conform to AASHTO 2013 (LTS-6) Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals.

x. Soil Conditions

- a. The design criteria for these specifications are based on soil design parameters that shall meet or exceed those of a Class 5 material as defined by 2023 FBC, Table 1806.2. It shall be the installation contractor's (or manufacturer's) responsibility to notify the owner of soil conditions other than the design criteria. The owner shall then be responsible and absorb the additional costs associated with:

1. Engineered foundation embedment design by a registered engineer in the State of Florida
2. Additional materials and/or services required to achieve alternate foundation
3. Geotechnical report

xi. Foundation Drawings

- a. Project specific foundation drawings stamped by a registered engineer in the State of Florida. The drawings shall be available to the owner at the time of the permit. The foundation drawings must list the moment, shear (horizontal) force, and axial (vertical) force at ground level for each pole.

B. Control and Monitoring

i. Instant On/Off Capabilities

- a. System shall provide instant on/off luminaires.

ii. Lighting contactor cabinet(s)

- a. Constructed of NEMA Type 4 aluminum, designed for easy installation with contactors, labeled to match field diagrams and electrical design.
- b. Manual off-on-auto selector switches shall be provided.

iii. Optional Dimming

- a. System shall provide for "High, Medium, Low" or "High/Low" dimming.
- b. System shall include key activated switches to allow for automated dimming control or manual override.

iv. Remote Lighting Control System

- a. System shall allow owner and users with a security code to schedule on/off system operation via web site, phone, fax or email up to 10 years in advance.

- b. Manufacturer shall provide and maintain two-way TCP/IP communication link.
- c. Trained staff shall be available 24/7 to provide scheduling support and assist with reporting needs.
- d. The owner may assign various security levels to schedulers by function and/or fields. This function must be flexible to allow a range of privileges such as a full scheduling capability for all fields to only having permission to execute "early off" commands by phone. The scheduling tool shall be capable of setting curfew limits.
- e. Controller shall accept and store 7-day schedules, be protected against memory loss during power outages, and shall reboot once power is regained and execute any commands that would have occurred during power outage.

v. Remote Monitoring System

- a. System shall monitor lighting performance and notify manufacturer if individual luminaire outage is detected so that appropriate maintenance can be scheduled.
- b. The controller shall determine switch position (manual or auto) and contactor status (open or closed).

vi. Management Tools

- a. Manufacturer shall provide a web-based database and dashboard tool of actual field usage and provide reports by facility and user group.
  - 1. Dashboard shall also show current status of luminaire outages, control operation and service
  - 2. Mobile applications will be provided suitable for IOS, Android and Blackberry devices.
- b. Hours of Usage
  - 1. Manufacturer shall provide a means of tracking actual hours of usage for the field lighting system that is readily accessible to the owner.
    - a. Cumulative hours shall be tracked to show the total hours used by the facility.
    - b. Report hours saved by using early off and push buttons by users.

c. Communication Cost

- 1. Manufacturer shall include communication cost for the operating of the control and monitoring system for a period of 25 years.

vii. Warranty

- a. 25 Year Warranty (Light-Structure System™)
  - 1. Manufacturer shall supply a signed warranty covering the entire system for 25 years from the date of shipment.
  - 2. Warranty shall guarantee specified target light levels.

3. Manufacturer shall maintain specifically funded financial reserves to assure fulfillment of the warranty for the full term.

4. Warranty does not cover weather conditions events such as lightning or hail damage, improper installation, vandalism or abuse, unauthorized repairs or alterations, or product made by other manufacturers

b. 10 Year Warranty (SportsCluster® System)

1. Manufacturer shall supply a signed warranty covering the entire system of 10 years from the date of shipment.

2. Warranty shall guarantee specified target light levels.

3. Manufacturer shall maintain specifically funded financial reserves to assure fulfillment of the warranty for the full term

4. Warranty does not cover weather conditions events such as lightning or hail damage, improper installation, vandalism or abuse, unauthorized repairs or alterations, or product made by other manufacturers

5. Constant 10™ warranty is contingent upon a site inspection

c. Maintenance

1. Manufacturer shall monitor the performance of the lighting system, including on/off status, hours of usage and luminaire outage for the life of the warranty (date of equipment shipment).

2. Parts and labor shall be covered such that individual luminaire outages will be repaired when the usage of any field is materially impacted.

3. Owner agrees to check fuses in the event of a luminaire outage.

d. Exclusions

1. Maintenance, repair or replacement necessitated by loss or damage resulting from any external causes such as, but not limited to, theft, environmental conditions, negligence, misuse, abuse, improper electrical/power supply, unauthorized repairs by third parties, attachments, damage to cabinetry, equipment modifications, vandalism, animal or insect infestation, physical damage to covered products parts or components, or acts of God/nature (including, but not limited to: earthquake, flood, tornadoes, typhoons, hurricanes and lightning).

2. It is the customer's responsibility to check and change fusing.

e. Manufacturer shall have in place, the personnel, procedures, and processes to implement and execute the warranty as detailed in this section of the specification.

viii. Inspection and Verification

a. The lighting manufacturer shall guarantee illumination light levels for the life of the warranty.

1. Field measurements shall be done per IESNA RP-6-22 recommendations.
2. Failure to achieve the required results will require individual luminaire re-aiming and re-measurements at the expense of the manufacturer.

### **Part 3 – Installation (pole construction, pole removal, and relight)**

#### **A. Pole Installation**

i. Provide pricing for labor to install owner furnished poles & fixtures. Price will include unloading of the equipment upon arrival to job site, excavation of holes, assembly of the poles and luminaires, all wiring from the remote electric enclosures to the luminaires, proper grounding, installation of the pre-stressed foundations with concrete backfill, pole erection and aiming. Installation assumes standard soils of 2000 psf with no rock or abnormal collapsing holes.

#### **B. Removal of existing poles or structures**

i. Provide pricing for labor to take down existing poles, structures and fixtures and remove them to a staging area on the job site designated by the owner. Concrete and steel poles will be completely removed. Any pre-engineered concrete base will be cut – foundations will not be removed but cut and jack hammered to a foot below grade. Wood poles may be cut off 2 feet below grade, as long as the stumps are covered back with soil.

#### **C. Installation of fixtures on existing poles**

i. Provide pricing for labor to take down existing fixtures and remove them to a staging area on the job site designated by the owner. The cost will also include labor to install the new fixtures on the existing structure. Installation assumes that the pole structure and wiring will be sufficient to handle the new fixtures. Owner assumes all responsibility of structural integrity of existing poles.

#### **D. Owner and Bidder responsibilities**

##### **i. Owner's responsibilities**

- a. Provide total access to the site and poles location for construction. Equipment must be able to move from location to location on standard rubber tires – no towing required.
- b. Remove any trees, limbs, shrubs, etc. for total access to poles locations.
- c. Survey in pole locations and aiming points (one per field) for sighting in lighting cross arms. Mark home plate, foul lines, and field boundary lines. Final grade elevations will also need to be marked if necessary.
- d. Removal, replacement, and repair of all fencing necessary for construction.
- e. Repair and replacement of any field turf, asphalt, curbs, and concrete inadvertently damaged during installation.
- f. Provide area on site for disposal of spoils from foundation excavation.
- g. Locate and mark existing underground utilities not covered by "One Call" and irrigation systems including sprinkler heads prior to excavation. Bidder will not be responsible for repairs to unmarked utilities.

- h. Pay for any power company fees and requirements, if necessary.
- i. Additional charges will apply for foundation excavation and construction in nonstandard soils (rock, caliche, high water table, collapsing holes, alluvial soils, etc.) Standard soils are defined as Class 5 soils in the 2023 Edition of the Florida Building Code and can be excavated using standard earth auguring equipment.
- j. Provide a source of water such as a fire hydrant or 2" water line for foundation excavation. Pay for any all fees associated with the water access and usage.
- k. Pay for any and all permitting fees.

ii. Bidder's responsibilities

- a. Provide required poles, fixtures, foundations, and associated designs.
- b. Provide structural design for poles and foundations, certified by a professional engineer licensed in the State of Florida
- c. Provide layout of poles locations and aiming diagram
- d. Provide light test upon completion of works, once owner supplied electrical system is energized.
- e. Provide review of electrical design as provided by Electrical Contractor or Electrical Engineer.
- f. Provide bonding per the State of Florida requirements.
- g. Provide equipment and materials to offload equipment at job site per scheduled delivery.
- h. Provide storage containers for material, including electrical enclosures.
- i. Provide adequate trash containers for cardboard waste and packing debris.
- j. Provide adequate security to protect delivered products from theft, vandalism, and damage during installation.
- k. Obtain any and all required permits. Costs to be paid by Owner.
- l. Make appropriate contact to ensure utility locations have been marked prior to excavation and trenching. Repair any damage to existing utilities made during construction.
- m. Provide materials and equipment to install Musco's Light-Structure System™ foundations as specified on layout.
- n. Remove augured spoils to owner designated location at job site.
- o. Provide materials and equipment to assemble and install Musco's TLC for LED® fixtures and terminate all necessary wiring.
- p. Provide equipment and materials to assemble and erect Musco's Light-Structure System™ poles.

**Part 4 – Electrical Supply labor/equipment**

A. Electrical Services

- i. All services are to be quoted at 277/480-volt three phase. Base all service feeders on a length of 150 feet at burial depth of 36" with no obstructions in the path. Provide lump sum costs for equipment and labor to install each of the following four options.



a. Option A

1. 200 amp three phase meter can
2. 200 amp main circuit breaker N3R 42 circuit panel with 8 three pole 30 amp breakers
3. Service feeders. (4) 3/0 conductors in a 2 1/2" raceway. 150'
4. Build service rack out of 2" galvanized pipe with galvanized uni-strut to accommodate meter can, electrical panel and one lighting contractor cabinet sized at 72" high, 36" wide and 12" deep. The lighting contractor cabinet will be provided by the sports lighting manufacturer and installed.
5. Pull necessary permits

b. Option B

1. 400 amp three phase meter can
2. 400 amp main circuit breaker N3R 42 circuit panel with 8 three pole 60 amp breakers
3. Service feeders. (4) 500 mcm conductors in a 4" raceway. 150'
4. Build service rack out of 2" galvanized pipe with galvanized uni-strut to accommodate meter can, electrical panel and one lighting contractor cabinet sized at 72" high, 36" wide and 12" deep. The lighting contractor cabinet will be provided by the sports lighting manufacturer and installed.
5. Pull necessary permits

c. Option C

1. 600 amp three phase meter can
2. 600 amp main circuit breaker N3R 42 circuit panel with 12 three pole 60 amp breakers
3. Service feeders. (2) 4" raceways with (4) 300 MCM conductors in a 4" raceway. 150'
4. Build service rack out of 3" galvanized pipe with galvanized uni-strut to accommodate meter can, electrical panel and one lighting contractor cabinet sized at 72" high, 36" wide and 12" deep. The lighting contractor cabinet will be provided by the sports lighting manufacturer and installed.
5. Pull necessary permits

d. Option D

1. 800 amp three phase CT enclosure
2. 800 amp three phase CT meter can
3. 800 amp main circuit breaker N3R 42 circuit panel with 12 three pole 80 amp breakers

4. Service feeders (2) 4" raceways with (4) 500 mcm conductors in each raceway.  
150'

5. Build service rack out of 3" galvanized pipe with galvanized uni-strut to accommodate meter can, CT enclosure, electrical panel and one lighting contractor cabinet sized at 72" high, 36" wide and 12" deep. The lighting contractor cabinet will be provided by the sports lighting manufacturer and installed.

6. Grounding per NEC and local building codes

7. Pull necessary permits

ii. Conduit, pull boxes and conductors

- a. Provide equipment and labor to install conduit, pull boxes and conductors. All installations are to be in PVC schedule 40 pipe at a burial depth of 36" with twin conductors.

iii. Lightning protection

- a. Surge Arrestors: UL labeled and rated for 277/480 V, 3 phase, 4 wire, as manufactured by Erico (TDX-50) or equal and shall be attached to the bottom of the remote electrical enclosure and/or on line side of main electrical panel.

**End of Bid**

SUB-CONTRACTOR EQUIPMENT INSTALLERS:

Business Name: **Parks Electric Service Inc**  
Address: **2986 Florence Drive**  
**Middleburg, FL 32068**  
Phone Number: **904-237-0165**  
Contact Name: **Claude Parks**

Business Name: **Davco**  
Address: **4885 Park Ridge Boulevard**  
**Boynton Beach, FL 33426**  
Phone Number: **561-732-3434**  
Contact Name: **Russ White/ Mark Komar**

Business Name: **Electrical Contracting Service**  
Address: **2375 West 77th Street**  
**Hialeah, FL 33016**  
Phone Number: **305-556-0041**  
Contact Name: **Charlie Floyd/ Chuck Floyd**

Note: Upon request bidders must supply WRITTEN CERTIFICATION (s) naming bidder, and/or each of its sub-contractor installer(s), as an authorized installer certified to install park and playground equipment as required by each manufacturer. Installers shall have a Certified National Playground Safety Inspector (NPSI) present during installations and repairs.

**(MULTIPLE SHEETS CAN BE USED)**



SUB-CONTRACTOR EQUIPMENT INSTALLERS:

Business Name: **Imperial Electric Inc**  
Address: 951 NW 51 Place  
Fort Lauderdale, FL 33309  
Phone Number: **954-938-0520**  
Contact Name: **Mike Terrango**

Business Name: **M. Gay Constructors**  
Address: 11802 Industry Drive  
Jacksonville, FL 32226  
Phone Number: **904-714-4001**  
Contact Name: **Mike Gay**

Business Name: **Himes Electric**  
Address: 1040 Land O Lake Blvd  
Lutz, FL 33549  
Phone Number: **813-909-1927**  
Contact Name: **Thomas Cook**

Note: Upon request bidders must supply WRITTEN CERTIFICATION (s) naming bidder, and/or each of its sub-contractor installer(s), as an authorized installer certified to install park and playground equipment as required by each manufacturer. Installers shall have a Certified National Playground Safety Inspector (NPSI) present during installations and repairs.

**(MULTIPLE SHEETS CAN BE USED)**

SUB-CONTRACTOR EQUIPMENT INSTALLERS:

Business Name: Bentley Electric Company of Naples  
Address: 4406 Enterprise Ave  
Naples, FL 34104  
Phone Number: 239-643-5339  
Contact Name: Steve Bentley

Business Name: Simmonds Electrical of Naples, Inc.  
Address: 8941 Quality Road  
Bonita Springs, FL 34135  
Phone Number: 239-643-2770  
Contact Name: Noe Alvarado

Business Name: \_\_\_\_\_  
Address: \_\_\_\_\_  
Phone Number: \_\_\_\_\_  
Contact Name: \_\_\_\_\_

Note: Upon request bidders must supply WRITTEN CERTIFICATION (s) naming bidder, and/or each of its sub-contractor installer(s), as an authorized installer certified to install park and playground equipment as required by each manufacturer. Installers shall have a Certified National Playground Safety Inspector (NPSI) present during installations and repairs.

**(MULTIPLE SHEETS CAN BE USED)**



**Consent Agenda  
9.9.**

City of North Miami Beach  
17011 NE 19 Avenue  
North Miami Beach, FL 33162  
305-947-7581  
www.citynmb.com

**MEMORANDUM**

---

<b>TO:</b>	Mayor and City Commission
<b>FROM:</b>	Hamid Nikvan, NMB Water Director
<b>VIA:</b>	Mario A. Diaz, City Manager
<b>DATE:</b>	January 21, 2025

---

Resolution No. R2025-08 Approving an Agreement with Sun-Star Electric Inc., to Purchase Hitachi  
**RE:** Submersible Motors and Replacement Parts for NMB Water Production (Hamid Nikvan, NMB Water Director)

---

**Description**

City of North Miami Beach is utilizing the services of Sun-Star Electric, Inc. for the purchase of Hitachi submersible motors and replacement parts for the Floridian and Biscayne wells.

At the Norwood Water Plant, we have four wells (1F, 2F, 3F, 4F) with the same Hitachi submersible motor (125 HP), and another five wells (13, 17, 19, 20, 21) equipped with the same Hitachi submersible motor (200 HP). These wells are critical for water production as they allow for the efficient extraction of water from deep underground sources. Submersible motors help in providing reliable and consistent water supply with minimal energy consumption.

**BACKGROUND  
ANALYSIS:**

Sun-Star Electric is Hitachi's main distributor and the only authorized warranty, repair, and service facility for submersible electric motors.

A Notice to Sole Source (Ref: SSN-2024-0000000002-AS), was published on the Bid-net E-Procurement portal on November 15, 2024, through November 22, 2024. During that period, the City did not receive or could not substantiate the same products or services from alternate vendors. The notice outlined the City's intention to proceed with a sole-source procurement methodology for the purchase of Hitachi submersible motors

from Sun-Star Electric, Inc.

**RECOMMENDATION:** NMB Water Works Director & Chief Procurement Officer recommend the City Commission to approve and authorize the City Manager or designee to approve Sole Source purchase with Sun-Star Electric in an annual budgeted amount subject to budget appropriation.

**FISCAL/ BUDGETARY**

**IMPACT:** As approved in the adopted budget appropriation.

---

**ATTACHMENTS:**

**Description**

- ☐ Sun-Star Electric\_Resolution
- ☐ Sun-Star\_Sole Source Document

**RESOLUTION NO. R2025**

**A RESOLUTION OF THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA, APPROVING AND AUTHORIZING A PURCHASE ORDER WITH SUN-STAR ELECTRIC, INC FOR THE PURCHASE OF HITACHI SUBMERSIBLE MOTORS AND REPLACEMENT PARTS SUBJECT TO ANNUAL BUDGET APPROPRIATION; AUTHORIZING THE CITY MANAGER OR DESIGNEE TO DO ALL THINGS NECESSARY TO EFFECTUATE THIS RESOLUTION; PROVIDING FOR CONFLICTS; PROVIDING FOR SCRIVENER ERRORS, PROVIDING FOR SEVERABILITY; AND PROVIDING FOR AN EFFECTIVE DATE.**

**WHEREAS**, pursuant to Chapter 166, *Florida Statutes* and Section 1.4 of the Charter of the City of North Miami Beach (“City”), the City shall have all available governmental, corporate, and proprietary powers and may exercise them except when prohibited by law; and

**WHEREAS**, Section 3-4.5 of the Code of Ordinances City of North Miami Beach, Florida 2008 (“Code”) provides that purchases of the following material and services shall be exempt from the bidding process and subject to the spending limitation provided in subsection 3-3.14a. “Sole Source Purchase”, which states “sole source supplies and services, such as unique, patented, or franchised supplies or services are exempt if the Purchasing Agent determines, after conducting a good faith review of available sources, that the particular supply or service is available from one (1) source;” and

**WHEREAS**, A Notice to Sole Source (Ref: SSN-2024-0000000002-AS), was published on the Bid-net E-Procurement portal on November 15, 2024, through November 22, 2024 outlining the City’s intention to proceed with a sole-source procurement methodology for the purchase of Hitachi submersible motors from Sun-Star Electric, Inc. During that period, the City did not receive and/or could not substantiate the same products or services from alternate vendors; and

**WHEREAS**, the NMB Water Treatment Plant requests to replace the Hitachi submersible motors for the Floridian Well and Biscayne Wells. Hitachi submersible motors are utilized in nine other wells managed by the Norwood Water Treatment Plant, and for continuity and cost savings it is best to replace and/or repair motors and parts; and

**WHEREAS**, Sun-Star Electric, Inc (“Sun-Star”) is Hitachi’s largest distributor and the only authorized warranty, repair, and manufacturing facility for submersible motors; and

**WHEREAS**, Section 3-3.14 of the City’s Code of Ordinances provides that contracts in excess of fifty thousand dollars (\$50,000.00) shall be awarded by the City Commission; and

**WHEREAS**, the City Manager and the Chief Procurement Officer recommend that the City Commission approve the purchase of Hitachi submersible motors and replacement parts with Sun-Star Inc., subject to annual budget appropriation; and

**WHEREAS**, the Mayor and City Commission believe it is in the best interests of the City to approve a sole source purchase with Sun-Star Electric, Inc for the purchase of Hitachi submersible

**RESOLUTION NO. R2025-X**

motors and replacement parts subject to annual budget appropriation; and

**NOW, THEREFORE, BE IT RESOLVED** by the Mayor and City Commission of the City of North Miami Beach, Florida, that:

**Section 1.** The foregoing whereas clauses are true and correct and adopted as the legislative and administrative findings of the City Commission and made a specific part of this Resolution; all exhibits attached hereto are made a specific part of this Resolution.

**Section 2.** The sole source purchase, in substantially the form attached as Exhibit “A”, for the purchase of Hitachi submersible motors and replacement parts with Sun-Star Electric, Inc, subject to annual budget appropriation and availability of funds is hereby approved.

**Section 3.** The City Manager or designee is authorized to do all things necessary to effectuate this Resolution.

**Section 4.** All Resolutions or parts of Resolutions in conflict with this Resolution are repealed to the extent of such conflict.

**Section 5.** Any scrivener or typographical errors that do not affect intent may be corrected with notice to, and the authorization of the City Attorney and City Manager without further process.

**Section 6.** If any provision of this Resolution or the application thereof to any person or circumstance is held invalid, such invalidity shall not affect other provisions or applications of this Resolution that can be given affect without the invalid provision or application, and to this end the provisions of this Resolution are declared to be severable.

**Section 7.** This Resolution shall take effect immediately upon adoption.

**[THE REMAINDER OF THIS PAGE INTENTIONALLY LEFT BLANK]**

**APPROVED AND ADOPTED** by the City of North Miami Beach City Commission at the regular meeting assembled this **21<sup>st</sup> day of January 2025**.

ATTEST:

\_\_\_\_\_  
ANDRISE BERNARD, MMC  
CITY CLERK

\_\_\_\_\_  
MICHAEL JOSEPH  
MAYOR

(CITY SEAL)

APPROVED AS TO FORM AND LEGAL SUFFICIENCY FOR THE USE  
AND RELIANCE OF THE CITY OF NORTH MIAMI BEACH ONLY:

GREENSPOON MARDER, LLP.

By: \_\_\_\_\_  
CITY ATTORNEYS

Sponsored by: Mayor & Commission

## Notice

### Basic Information

**Estimated Contract Value (USD)** \$300,000.00 (Not shown to suppliers)  
**Reference Number** 0000368613  
**Issuing Organization** City of North Miami Beach  
**Owner Organization** NMB Water  
**Solicitation Type** SSN - Sole Source Notice (Formal)  
**Solicitation Number** SSN-2024-0000000002-AS  
**Title** Purchase of Hitachi Submersible Motor from Sun-Star Electric  
**Source ID** PU.AG.USA.2703598.C17873126  
**Piggyback Solicitation** No

### Details

**Location** Miami-Dade County, Florida  
**Description** The Norwood Water Plant currently need to purchase a replacement Hitachi submersible Motor for the Floridan well and Biscayne well. In Norwood water plant we have four wells (1F, 2F,3F,4F) with the same Hitachi submersible motor (125 HP) and another five wells (13,17,19, 20, 21)with the same Hitachi submersible motor (200 HP). Sun-Star Electric is Hitachi's main distributor and their only authorized warranty, repair, and service facility for submersible electric motors.

### Dates

**Publication** 11/15/2024 02:12 PM EST  
**Questions are submitted online** No  
**Closing Date** 11/22/2024 02:00 PM EST

### Contact Information

Ahsan Saleem  
305-948-2946  
ahsan.saleem@citynmb.com

NMB Water  
Bids NMB Procurement  
305-948-2946  
bids@citynmb.com

### Bid Submission Process

**Bid Submission Type** Physical Bid Submission



## Documents

### Documents

Document	Size	Uploaded Date	Language
Sun-Star Electric Sole Source.pdf [pdf]	1 Mb	11/15/2024 01:53 PM EST	English

## Categories

### Selected Categories

NIGP Categories (3)	
025	<b>AIR COMPRESSORS AND ACCESSORIES</b>
02550	<b>Compressor, Portable, Electric Motor or Engine Driven, over 25 CFM at 100 PSI; and Parts</b> Compressor, Portable, Electric Motor or Engine Driven, over 25 CFM at 100 PSI; and Parts
02545	<b>Compressor, Portable, Electric Motor or Engine Driven, 5 HP and less; and Parts</b> Compressor, Portable, Electric Motor or Engine Driven, 5 HP and less; and Parts
060	<b>AUTOMOTIVE AND TRAILER EQUIPMENT AND PARTS</b>
06072	<b>Replacement Parts for General Motors</b> Replacement Parts for General Motors

This copy of the NIGP Code is the property of the National Institute of Governmental Purchasing, Inc. (NIGP), is displayed and used by BidNet under license from Periscope Holdings, Inc. (the authorized sub-licensor of NIGP), and is protected under the copyright laws of the United States. It may not be copied or used (in whole or part) by any party unless such party is authorized to do so under the terms of a written license agreement entered into with NIGP or its authorized sub-licensors expressly authorizing such party to use the NIGP Code. Unauthorized copying or use is prohibited. Dated: January 2016

## Document Request List

### Document Request List

Organization Name	Main Contact	Download Date	City	Province/State
Company Name	Andrew Conlon	11/18/2024 11:00 PM EST	Grand Rapids	Michigan
Bart Richard Woodward Corporation	Bart Woodward	11/18/2024 02:00 PM EST	Medaryville	Indiana
Morgan Inland LLC	AYYAZ KHAN	11/18/2024 10:57 AM EST	MORGAN HILL	California
Holzberg Communications, Inc.	Andy Holzberg	11/18/2024 10:12 AM EST	Totowa	New Jersey
jonson	jonson dew	11/18/2024 08:31 AM EST	ny	
Acon Traders LLC	venkatesh thirumoorthi	11/18/2024 06:40 AM EST	EAGLEVILLE	Pennsylvania
Construction Journal	Construction Journal	11/18/2024 04:05 AM EST	Stuart	Florida
North America Procurement Council, Inc. PBC	Tim Loncarich	11/15/2024 05:21 PM EST	Grand Junction	Colorado
Kijero LLC	Aaron Jarson	11/15/2024 02:16 PM EST	Morgan Hill	California



SOLE SOURCE REQUEST FORM

PROCUREMENT MANAGEMENT DIVISION

TO: Mario A. Diaz
City Manager
VIA: Chief Procurement Officer
FROM: Pedro Melo (Name) Karim Rossy 10/31/24
Interim Director of NMB Water (Department)
DATE: 10/30/2024

RE:
Annual Expenditure not to Exceed: \$ 223,676.00 Vendor #

Section 3-4.5 Exemptions for Bidding, Purchase of the following materials and services shall be exempt from the bidding process and subject to the spending limitations provided in subsection 3-3.14, unless otherwise provided by State law: a. Sole source purchases. Sole-source supplies and services, such as unique, patented, or franchised supplies or services, are exempt if the Purchasing Agent determines, after conducting a good faith review of available sources, that the particular supply or service is available from only one (1) source.

Sole Source Justification: 3-4.8 Sole Source Purchasing. Department heads may recommend purchase of a part, commodity, or service from a sole source supplier after a reasonable search has been made to find other suppliers. The recommendation shall include a written justification documenting the potential vendors contacted, and the results. The Purchasing Agent shall either confirm the lack of additional suppliers or inform the Department of potential suppliers.

The Norwood Water Plant currently needs to purchase a replacement Hitachi submersible motor for the Floridan well and the Biscayne well. At the Norwood Water Plant, we have four wells (1F, 2F, 3F, 4F) with the same Hitachi submersible motor (125 HP), and another five wells (13, 17, 19, 20, 21) equipped with the same Hitachi submersible motor (200 HP). Sun-Star Electric is Hitachi's main distributor and the only authorized warranty, repair, and service facility for submersible electric motors.

Approved Date
Chief Procurement Officer (Up to \$25,000)
Mario A. Diaz, City Manager (Up to \$50,000)

Purchases exceeding \$50,000.00 will be placed on the next Commission Agenda pending Procurement review.



**PROCUREMENT EXPLANATION MEMO**

PROCUREMENT MANAGEMENT DIVISION

TO: **Mario A. Diaz, City Manager**

VIA: Chief Procurement Officer

FROM: Pedro Melo *Karim Rossy* 10/31/24  
Name  
Interim Director of NMB Water  
Title/Department

DATE: 10/30/2024

RE: \_\_\_\_\_

Fiscal Amount not to Exceed: \$ 223,676.00 Vendor # \_\_\_\_\_

**Purpose (How does it align with City NMB Strategic Plan?):**

The purpose of this request is to award a sole source contract to Sun-Star Electric, Inc. for the purchase of a Hitachi submersible motor. This purchase supports our goal of providing excellent municipal services in a financially responsible manner.

**Background:**

The Hitachi submersible well motor for the RO and Nano wells has failed and requires replacement. This equipment is critical for maintaining normal plant operations.

**Recommendation:**

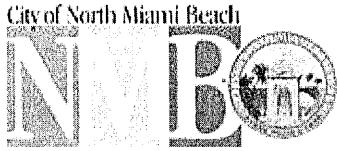
NMB Water recommends this Sole Source Request be approved and established as Sun-Star Electric, Inc are the authorized sole source vendor of these services.

**Fiscal Impact / Account Number(s):**

410904-533640 (\$222,691.00)  
410904-533420 (\$985.00)

**Contact Person(s):**

Pedro Melo, Interim Director of NMB; Carlos Carrazana, Water Plant Manager



SOLE SOURCE REQUEST FORM

PROCUREMENT MANAGEMENT DIVISION

TO: **Mario A. Diaz**  
City Manager

VIA: Chief Procurement Officer

FROM: Pedro Melo (Name) *Karim Rossy* 10/31/24  
Interim Director of NMB Water (Department)

DATE: 10/28/2024

RE: \_\_\_\_\_

Annual Expenditure not to Exceed: \$ 59,630.00 Vendor # \_\_\_\_\_

Section 3-4.5 Exemptions for Bidding, Purchase of the following materials and services shall be exempt from the bidding process and subject to the spending limitations provided in subsection 3-3.14, unless otherwise provided by **State law: a. Sole source purchases. Sole-source supplies and services, such as unique, patented, or franchised supplies or services, are exempt if the Purchasing Agent determines, after conducting a good faith review of available sources, that the particular supply or service is available from only one (1) source.**

**Sole Source Justification: 3-4.8 Sole Source Purchasing.** Department heads may recommend purchase of a part, commodity, or service from a sole source supplier after a reasonable search has been made to find other suppliers. The recommendation shall include a written justification documenting the potential vendors contacted, and the results. The Purchasing Agent shall either confirm the lack of additional suppliers or inform the Department of potential suppliers.

The Norwood Water Plant currently needs to repair three Hitachi submersible motors for the Floridan well and the Biscayne well.  
At the Norwood Water Plant, we have four wells (1F, 2F, 3F, 4F) equipped with the same Hitachi submersible motor (125 HP), and another five wells (13, 17, 19, 20, 21) with the same Hitachi submersible motor (200 HP).

Sun-Star Electric is Hitachi's main distributor and the only authorized warranty, repair, and service facility for submersible electric motors.

	Approved	Date
Chief Procurement Officer (Up to \$25,000)	_____	_____
Mario A. Diaz, City Manager (Up to \$50,000)	_____	_____

Purchases exceeding \$50,000.00 will be placed on the next Commission Agenda pending Procurement review.



**PROCUREMENT EXPLANATION MEMO**

PROCUREMENT MANAGEMENT DIVISION

TO: **Mario A. Diaz, City Manager**

VIA: Chief Procurement Officer

FROM: Pedro Melo *Karim Rossy*  
Name  
Interim Director of NMB Water  
Title/Department

10/31/24

DATE: 10/28/2024

RE: \_\_\_\_\_

Fiscal Amount not to Exceed: \$ 59,630.00

Vendor # \_\_\_\_\_

**Purpose (How does it align with City NMB Strategic Plan?):**

The purpose of this request is to award a sole source contract to Sun-Star Electric, Inc. for the repair of Hitachi submersible motors. This purchase supports our goal of providing excellent municipal services in a financially responsible manner.

**Background:**

The Hitachi submersible well motor for the RO and Nano wells has failed and requires repair. The motor will be sent for evaluation and repair by Sun-Star Electric, the sole source provider of Hitachi submersible motors. This equipment is critical for maintaining normal plant operations. A \$600.00 will be credited if it is repaired or replaced with a new motor within 60 days.

**Recommendation:**

NMB Water recommends this Sole Source Request be approved and established as Sun-Star Electric, Inc are the authorized sole source vendor of these services.

**Fiscal Impact / Account Number(s):**

410904-533460 (\$55,608.00)  
410904-533420 (\$4,022.00)

**Contact Person(s):**

Pedro Melo, Interim Director of NMB; Carlos Carrazana, Water Plant Manager







# SUN-STAR ELECTRIC, INC.

7722 W. 34TH STREET  
LUBBOCK, TEXAS 79407  
SUNSTARUSA.COM

PHONE: 806.793.2812  
800.782.9675  
FAX: 806.793.1989

Quote Number: 15888

## QUOTE

Page: 2 of 2

3	900-OF Outbound Freight	1.00EA	985.00	985.00
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Lines Total	223,676.00
Total Taxes	0.00
Line Miscellaneous Charges	0.00
Quote Miscellaneous Charges	0.00
<b>Quote Total</b>	<b>223,676.00</b>

---



# SUN-STAR ELECTRIC, INC.

7722 W. 34TH STREET  
LUBBOCK, TEXAS 79407  
SUNSTARUSA.COM

PHONE: 806.793.2812  
800.782.9675  
FAX: 806.793.1989

Quote Number: 15902

## QUOTE

Page: 1 of 4

<p><b>Quote To:</b></p> <p>City of North Miami Beach Norwood Water Plant 19150 NW 8th Ave. Miami Gardens FL 33169</p> <p>Phone: 305-650-0000      Fax: 305-654-7136</p>	<p><b>Date:</b> 10/25/2024</p> <p><b>Expires:</b> 11/24/2024</p> <p><b>Reference:</b> Hitachi</p> <p><b>Sales Person:</b> Jered K Nichols</p>
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*Base Currency.*

Line	Part	Description	Rev Drawing	Expected Qty	Unit Price	Ext. Price
1	510-12534410-A	125 HP 3/60/460v 4P 10" 316SS A Sun Star Hitachi Motor Disassemble, Clean, and Inspect, Check Rotor for Straight and Balance Replace Diaphragm, Seals and Fluid, Reassemble, Test, and Paint.		2.00EA	2,334.00	4,668.00
2	510-12534410-B	125 HP 3/60/460v 4P 10" 316 SS B Sun Star Hitachi Submersible Motor Rewind and Test.		2.00EA	5,270.00	10,540.00
		Serial #:	Date Code:			



# SUN-STAR ELECTRIC, INC.

7722 W. 34TH STREET  
LUBBOCK, TEXAS 79407  
SUNSTARUSA.COM

PHONE: 806.793.2812  
800.782.9675  
FAX: 806.793.1989

Quote Number: 15902

## QUOTE

Page: 2 of 4

3	510-C10 Guide Bearing Replacement 10"Parts as Required	2.00EA	1,738.00	3,476.00
4	510-D10 Thrust Assembly Replacement SS Const 10"Parts as Required	2.00EA	1,213.00	2,426.00
5	510-STUB-10B Stub Shaft 10" SS Const "B" Flange 10" Keyed Shaft 1 15/16"	2.00EA	1,360.00	2,720.00
6	510-20034412-A 200 HP 3 / 60 / 460v 4P 12" 316 SS A Sun Star Hitachi Motor Disassemble, Clean, and Inspect, Check Rotor for Straight and Balance, Replace Diaphragm, Seal, and Fluid, Reassemble, Test, and Paint.	2.00EA	3,410.00	6,820.00



# SUN-STAR ELECTRIC, INC.

7722 W. 34TH STREET  
LUBBOCK, TEXAS 79407  
SUNSTARUSA.COM

PHONE: 806.793.2812  
800.782.9675  
FAX: 806.793.1989

Quote Number: 15902

## QUOTE

Page: 3 of 4

7	510-20034412-B 200 HP 3 / 60 / 460v 4P 316 SS B Sun Star Hitachi Motor Rewind and Test.  Serial #:                      Date Code:  .	2.00EA	6,245.00	12,490.00
8	510-C12 Guide Bearing Replacement 12" Parts as Required	2.00EA	2,486.00	4,972.00
9	510-D12 Thrust Assembly Replacement 12" Parts as Required	2.00EA	1,916.00	3,832.00
10	510-STUB-10B Stub Shaft 10" SS Const "B" Flange 10" Keyed Shaft 1 15/16"	2.00EA	1,832.00	3,664.00

<b>Line (10) - Miscellaneous Charge -</b>	
Description	Ext. Price
1.) Freight PPD & ADD	4,022.00



# SUN-STAR ELECTRIC, INC.

7722 W. 34TH STREET  
LUBBOCK, TEXAS 79407  
SUNSTARUSA.COM

PHONE: 806.793.2812  
800.782.9675  
FAX: 806.793.1989

Quote Number: 15902

## QUOTE

Page: 4 of 4

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Lines Total	55,608.00
Total Taxes	0.00
Line Miscellaneous Charges	4,022.00
Quote Miscellaneous Charges	0.00
<b>Quote Total</b>	<b>59,630.00 Estimated</b>



**SUN-STAR ELECTRIC, INC.**  
AN EMPLOYEE OWNED COMPANY

7722 W. 34th Street  
Lubbock, Texas 79407  
Phone: (806) 793-2812 (800) 782-9675  
Fax: (806) 793-1989  
sales@sunstarusa.com

Carlos Carrazana  
Water Plant Manager  
Norwood Water Treatment Plant  
19150 NW 8th Ave.  
Miami Gardens, FL 33169  
PH. (786) 586-8395  
Fax (305) 651-8277

Date: 11/15/2024

The City of North Miami Beach:

This letter is to inform you that Sun-Star Electric is the Sole Source of the following item(s) and/or service(s):

- (1) 110-12534410331  
125 HP, 3/60/460v 4P 10”  
SSEI/HITACHI Submersible Motor  
316 SS Materials of Construction  
Single Mechanical Seal  
Water Filled  
w/(3) 20 FT x #2/0 AWG (30mm2) Motor Leads
  
- (1) 110-20034412331  
200 HP, 3/60/460v 4P 12”  
SSEI/HITACHI Submersible Motor  
316 SS Material of Construction  
Single Mechanical Seal  
Water Filled  
w/(3) 20 FT x #2/0 AWG (30mm2) Motor Leads

The above-named company or firm is the Sole Source of the item(s) and/or service(s) listed above, and no other company or firm sells or distributes such item(s) and/or service(s). Competition in providing the above-named item(s) and/or service(s) is precluded by the existence of a patent, copyright, secret process, or monopoly. There is/are no other item(s) and/or service(s) available for purchase that would serve the same purpose or function.

Sincerely,

Scott Campbell  
Sales Manager

November 15, 2024



**Consent Agenda  
9.10.**

City of North Miami Beach  
17011 NE 19 Avenue  
North Miami Beach, FL 33162  
305-947-7581  
www.citynmb.com

**MEMORANDUM**

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<b>TO:</b>	Mayor and City Commission
<b>FROM:</b>	Samuel Zamacona, Public Works Director
<b>VIA:</b>	Mario A. Diaz, City Manager
<b>DATE:</b>	January 21, 2025

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Resolution No. R2025-09 Change Order for The Engineering Company, LLC for City Streetlight  
**RE:** Repair Management, Upgrade Services and Development of City Traffic Calming Standards (Samuel Zamacona, Public Works Director)

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**Description**

The Engineering Company is currently providing services to the Public Works Department of the City of North Miami Beach. These services include repair management and upgrade services for the City's streetlight infrastructure, as well as the development of City Traffic Calming Standards, which also supports the City in the adoption of these standards.

**BACKGROUND  
ANALYSIS:**

The City of North Miami Beach is utilizing these services through the Seminole Tribe of Florida's Piggyback Contract (RFQ 46-2022-TW) for Transportation Project Engineering Services. This contract is effective for a 3-year term, which began on October 28, 2022, and will run through October 28, 2025.

In addition to the development of the City's Traffic Calming Study, The Engineering Company, LLC was hired in June 2024 to conduct an assessment and inventory of the damaged streetlights with the City limits. As part of this task, the company created repair tickets and coordinated with Miami Dade County and Florida Power and Light (FPL) to ensure the completion of necessary repairs. As of the latest update, a total of 242 streetlights have been repaired.

The Public Works Director and Chief Procurement Officer recommend

**RECOMMENDATION:** that the City Commission approve and authorize the City Manager, or designee, to approve a change order ratification to the contract with The Engineering Company. This ratification will allow for an additional \$50,000 in annual expenditures to be allocated for these services.

**FISCAL/ BUDGETARY**

**IMPACT:** As approved in the adopted budget appropriation.

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**ATTACHMENTS:**

**Description**

- ▣ The Engineering Company-Resolution
- ▣ The Engineering Company - Change Order Justification



**RESOLUTION NO. 2025-**

**A RESOLUTION OF THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA, APPROVING AND AUTHORIZING A CHANGE ORDER TO THE CONTRACT WITH THE ENGINEERING COMPANY, LLC FOR THE PURCHASE OF TRANSPORTATION PROJECT ENGINEERING SERVICES; INCREASING THE ESTIMATED ANNUAL EXPENDITURE BY \$50,000.00; AUTHORIZING THE CITY MANAGER OR DESIGNEE TO DO ALL THINGS NECESSARY TO EFFECTUATE THIS RESOLUTION; PROVIDING FOR CONFLICTS; PROVIDING FOR SCRIVENER ERRORS; PROVIDING FOR SEVERABILITY; SUBJECT TO THE BUDGET APPROPRIATION AND AVAILABILITY OF FUNDS; AND PROVIDING FOR AN EFFECTIVE DATE.**

**WHEREAS**, pursuant to Chapter 166, *Florida Statutes* and Section 1.4 of the Charter of the City of North Miami Beach (“City”), the City shall have all available governmental, corporate, and proprietary powers and may exercise them except when prohibited by law; and

**WHEREAS**, The Seminole Tribe of Florida awarded Contract RFQ No. 46-2022 Transportation Project Engineering Services Agreement to The Engineering Company, LLC for a three-year term effective from October 27, 2022 through October 27, 2025.

**WHEREAS**, under the City Manager’s authority, a budgeted amount of \$50,000 was previously approved for Transportation Project Engineering Services. To ensure continuity of the service, an annual expenditure (“Change Order”) of \$50,000 is required for assessments and repair of streetlights and related traffic hindrances; and

**WHEREAS**, Section 3-3.20 of the Code of Ordinances City of North Miami Beach, Florida, 2008 (“Code”) requires that change orders exceeding 10% or \$50,000.00, whichever is less, shall be approved by the City Commission; and

**WHEREAS**, the City Manager and Chief Procurement Officer recommend that the City Commission approve and authorize the City Manager or designee to a Change Order to contract for \$50,000 annual expenditure with The Engineering Company, LLC; and

**WHEREAS**, the Mayor and City Commission believe it is in the best interests of the City to approve and authorize the City Manager or designee to approve a Change Order to the contract to increase the previously approved expenditure by \$50,000 annually for a total annual expenditure of \$100,000.

**NOW, THEREFORE, BE IT RESOLVED BY THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA, THAT:**

**Section 1.** The foregoing whereas clauses are true and correct and adopted as the legislative and administrative findings of the City Commission and made a specific part of this

**RESOLUTION NO. R2025-XX**

Resolution; all exhibits attached hereto are made a specific part of this Resolution.

**Section 2.** The Change Order, in substantially the form attached as Exhibit “A,” to the previously approved contract with The Engineering Company, LLC to increase the annual expenditure by \$50,000 thereby increasing the annual expenditure to \$100,000 for the purchase of Transportation Project Engineering Services, subject to budget appropriation and availability of funds is hereby approved.

**Section 3.** The City Manager or designee is authorized to do all things necessary to effectuate this Resolution.

**Section 4.** All Resolutions or parts of Resolutions in conflict with this Resolution are repealed to the extent of such conflict.

**Section 5.** Any scrivener or typographical errors that do not affect intent may be corrected with notice to, and the authorization of the City Attorney and City Manager without further process.

**Section 6.** If any provision of this Resolution or the application thereof to any person or circumstance is held invalid, such invalidity shall not affect other provisions or applications of this Resolution that can be given effect without the invalid provision or application, and to this end the provisions of this Resolution are declared to be severable.

**Section 7.** This Resolution shall take effect immediately upon adoption.

**[THE REMAINDER OF THIS PAGE INTENTIONALLY LEFT BLANK]**

**RESOLUTION NO. R2025-XX**

**APPROVED AND ADOPTED** by the City of North Miami Beach City Commission at the regular meeting assembled this **21<sup>st</sup> day of January 2025**.

ATTEST:

\_\_\_\_\_  
ANDRISE BERNARD, MMC  
CITY CLERK

\_\_\_\_\_  
MICHAEL JOSEPH  
MAYOR

(CITY SEAL)

APPROVED AS TO FORM AND LEGAL SUFFICIENCY FOR THE USE  
AND RELIANCE OF THE CITY OF NORTH MIAMI BEACH ONLY:

GREENSPOON MARDER, LLP.

By: \_\_\_\_\_  
CITY ATTORNEYS

Sponsored by: Mayor & Commission

**RESOLUTION NO. R2025-XX**

# EXHIBIT A



## CHANGE ORDER FORM

PROCUREMENT MANAGEMENT DIVISION

(Revised 5.1.23)

Title:	Contract No.: _____
	Purchase Order No.: _____
Vendor:	Change Order No.:
Contract Award Date:	Completion Date:
Revised Completion Date (prior to this change):	Extension(s) of Time Previously Approved:        days
Revised Completion Date (including this change):	

<b>Summary of Amount</b>	
<i>Original Amount</i>	\$
Change Orders Previously Approved	\$
Adjusted Value Prior to this Change Order	\$
Cost of Changes in this Change Order	\$
<i>Adjusted Amount Including this Change</i>	\$
Percentage Increase this Change Order	%
Total Percent Increase to Date	%
Extension of Time Allowed by this Change -	days

Description of Change:

Procurement Notes:

Account Number: \_\_\_\_\_

**Code of Ordinances – Chapter III Purchasing, 3-3.20 Change Orders**

*The City Manager may approve any change orders so long as the total sum of all change orders does not exceed the total amount awarded by the City Commission by more than either ten percent of the contract cost or \$50,000.00, whichever is less. The scope of any project may not be changed without prior approval of the City Commission. No increase in contract price shall be approved unless there are sufficient funds available for such purpose.*

***This change order is hereby incorporated into and becomes a part of the Contract.***

RECOMMENDED:

\_\_\_\_\_  
(Project Manager / Preparer)

By:

\_\_\_\_\_  
(Division Approval)

\_\_\_\_\_  
(Signature) (Date)

By:

\_\_\_\_\_  
(Department Head) (Date)

APPROVED:

By:

\_\_\_\_\_  
(Finance Department) (Date)

By:

\_\_\_\_\_  
(Procurement Department) (Date)

By:

\_\_\_\_\_  
(Mario A. Diaz, City Manager) (Date)

# THE ENGINEERING COMPANY

Date: September 23<sup>rd</sup>, 2024

City of North Miami Beach  
17050 NE 19th Ave.  
North Miami Beach, FL 33162  
Attention: Samuel Zamacona  
Director of Public Works

**Subject:** Proposal for repair management of Streetlight Infrastructure and development of Traffic Calming Standards for the City of North Miami Beach

Dear Sam Zamacona:

The Engineering Company, LLC is pleased to submit the subject proposal for your review and approval. This proposal includes performing repair management and upgrades services for the City's streetlights infrastructure, and the development of the City's Traffic Calming Standards and support the City in the adoption of such Standards by Miami Dade County and the City Commission via an Intergovernmental Agreement.

Let me know if you have any questions.

I look forward to delivering this project for the City of North Miami Beach.

Sincerely,

A handwritten signature in blue ink, appearing to read "Omar Herrera".

OMAR HERRERA, PE

PRESIDENT

## INTRODUCTION

The City of North Miami Beach requested the services of The Engineering Company (TEC) for providing support to the Public Works Department in performing repair management and upgrades services for the City's streetlights infrastructure. TEC was hired by the City in June of 2024 to conduct an assessment and inventory of the damaged lights within the City limits. TEC created tickets for repairs and worked with Miami Dade County and FPL for the completion of the repairs. Since then, TEC successfully managed the repairs of 242 streetlights that were out or damaged.

The City also requested the services of TEC to develop the City's Traffic Calming Standards. Currently, the City utilizes the standards of Miami Dade County which have been adopted via an INTERGOVERNMENTAL AGENCY AGREEMENT TO PERFORM TRAFFIC ENGINEERING FUNCTIONS between Miami Dade County and the City of North Miami Beach, dated July 8<sup>th</sup>, 2022, which was adopted by the City Commission in Resolution No. 2021-92. The City intends to incorporate their own Traffic Calming Standards in the Intergovernmental Agreement with Miami Dade County which will allow the City to address the specific needs of their community. TEC will develop the City's Traffic Calming Standards and support the City in the development of the draft Intergovernmental Agreement to incorporate the new standards.

The services will be provided by personnel of TEC. TEC will perform the services presented herein on a time and materials fee basis as outlined in the following task.

### 1 Streetlights Repair Management

TEC will provide the following services:

- Perform an assessment of available information regarding streetlight damages to include: tickets, City's damage reports, residents' complaints, etc.
- Conduct site surveys to verify condition of damaged streetlights.
- Generate tickets for damaged and new reported streetlight outages and manage the repairs.
- Create and update Repair Tracker for streetlight tickets submitted with dates, status and follow up dates.
- Schedule monthly meetings with FPL regarding streetlight upgrades and repairs, if needed. TEC will develop meeting minutes with action items for these meetings.
- Coordination with Miami Dade County regarding streetlight upgrades and repairs.
- Coordination with cable companies for streetlight infrastructure repairs.
- Manage the repair of damaged poles owned by FPL, Miami Dade County or cable companies.
- Review lighting agreement between the City and FPL and lighting agreements between the City of Miami Dade County.
- Follow up on upgrades and repairs completed on streetlights.
- Review and update City of North Miami Beach GIS map of streetlight repairs.

- Site survey to verify and identify missing LED conversions from FPL per the City's lighting agreement with FPL.

The City's Police Department will be available to conduct pre-repair and post-repair site inspections during the day or night to document condition of streetlight infrastructure and verification of repair completion by FPL and Miami Dade County.

TEC will produce a monthly progress report that will be submitted along with the monthly invoice which will include a description of the work performed for the time period. This report will include number of lights fixed, number of meetings held, number of tickets created, number of site surveys, and other relevant information to document the forward progress of the project.

## **Deliverables**

- Repair Tracker with streetlights repair tickets for FPL and Miami Dade County.
- Meeting minutes with action items for meetings held with FPL and Miami Dade County.
- Site survey reports.
- GIS updated with streetlights that have been repaired.
- Monthly progress reports with a summary of the work completed.
- Weekly timesheets. Timesheets will include a description of the work performed.

## **2 Traffic Calming Standards**

The City has expressed interest in the use of the Traffic Calming Standards of the City of Miami Beach. TEC will request these standards in editable form from the City of Miami Beach and will utilize them as a template and guide to create the standards of the City. TEC will provide the following services:

- Request editable files of Traffic Calming Standards of Miami Beach and Intergovernmental Agency Agreement to Perform Traffic Engineering Functions between Miami Beach and Miami Dade County.
- Review existing Intergovernmental Agency Agreement to Perform Traffic Engineering Functions between the City and Miami Dade County.
- Review existing standards and Miami Dade County Code used by the City for Traffic Calming projects.
- Create the City's Traffic Calming Standards, including applicable forms and figures.
- Develop draft Intergovernmental Agency Agreement to Perform Traffic Engineering Functions between the City and Miami Dade County. This agreement will be sent to the City Attorney and City Manager's office for review.
- Work with the City in submitting the updated Intergovernmental Agreement to Miami Dade County for review and adoption.
- Work with the City in submitting the updated Intergovernmental Agreement to the City's Planning and Zoning, and to the City Commission for adoption.



# THE ENGINEERING COMPANY

TEC will produce a monthly progress report that will be submitted along with the monthly invoice which will include a description of the work performed for the time period.

## Deliverables

- Traffic Calming Standards.
- Draft Intergovernmental Agency Agreement to Perform Traffic Engineering Functions between the City and Miami Dade County.
- Monthly progress reports with a summary of the work completed.
- Weekly timesheets. Timesheets will include a description of the work performed.

## SCHEDULE

The project schedule is approximately 9 months from NTP.

## INVOICING

The invoicing will be per the contract between the CITY OF NORTH MIAMI BEACH and THE ENGINEERING COMPANY, LLC. The City of North Miami Beach shall pay The Engineering Company within 30 days of invoice submission.

## COMPENSATION

The services described herein will be performed on time and materials with a fee not to exceed (NTE) of **49,960.00**.

Below is a breakdown of the estimated level of effort for this project.

SUMMARY OF THE FEE AND HOUR BREAKDOWN							
	Project Manager	Project Engineer	Senior Inspector	Senior Engineer	Total Hours	Labor	Subtotal
Billing rate, \$/hr	\$160.00	\$140.00	\$140.00	\$180.00			
Task							
1 Streetlights Repair Management	44	136	40		220	\$31,680.00	\$31,680.00
2 Traffic Calming Standards	20	82		20	122	\$18,280.00	\$18,280.00
Total (Hours)	64	218	40	20	342		
Sub-total Labor Fee						\$49,960.00	\$49,960.00
ODC - Reimbursable Expenses							
Sub-total Labor Fee/ODC							\$49,960.00
Total Project Cost (Labor/ODC)							\$49,960.00
% Utilization (calculated based on total number of hours)	18.71%	63.74%	11.70%	5.85%			
Total (\$)	\$10,240.00	\$30,520.00	\$5,600.00	\$3,600.00			\$49,960.00

## ASSUMPTIONS

This proposal was developed based on the following assumptions:

- The scope of services of this project will be performed on a time and materials basis and the number of hours and fee represent an estimate based on the information available to TEC as of the date of this document. Additional time and fees may be necessary to complete the work included in this proposal.
- The repairs are to be performed by FPL, Miami Dade County, City, and applicable communication companies. Thus, TEC shall not be liable for malfunctioning of streetlight infrastructure, for the quality of the repairs performed, or for time delays.
- The City will grant TEC access to available information regarding streetlights such as, agreements, existing tickets, expired tickets, GIS, maps, etc.
- The City of Miami Beach will share the editable files of their Traffic Calming Standards and their Intergovernmental Agency Agreement to Perform Traffic Engineering Functions with Miami Dade County. TEC will use these documents to develop the City's Traffic Calming Standards and Intergovernmental Agreement with Miami Dade County.
- Due to the nature of this project, the completion of repairs may extend beyond the schedule of this project. Additional time and fees may be necessary to complete the management of the streetlight repairs.
- Due to the nature of this project, the adoption by Miami Dade County and City Commission of the new Traffic Calming Standards and new Intergovernmental Agency Agreement may extend beyond the schedule of this project. Additional time and fees may be necessary to complete the work included in this proposal.

## PROPOSAL ACCEPTED BY

Name and Title:

Signature:

Date:

## PROPOSAL ACKNOWLEDGED BY (THE ENGINEERING COMPANY)

Name and Title: Omar Herrera, PE, / PRESIDENT

Signature:

Date:

# SEMINOLE TRIBE OF FLORIDA

Michael J. Gebhardt  
Purchasing Department  
Director

6300 STIRLING ROAD  
HOLLYWOOD, FLORIDA 33024  
PHONE (954) 966-6300 x11371  
FAX (954) 967-3478

E-MAIL: [michaelgebhardt@semtribe.com](mailto:michaelgebhardt@semtribe.com)  
WEBSITE: <http://www.seminoletribe.com>



Tribal Officers:

MARCELLUS W. OSCEOLA, JR.  
Chairman

MITCHELL CYPRESS  
Vice-Chairman

LAVONNE ROSE  
Secretary

PETER HAHN  
Treasurer

August 3, 2022

The Engineering Company, LLC  
Attention: Omar Herrera  
2875 NE 191 Street, Suite 602  
Aventura, Florida 33180  
Phone: (726) 543-8936  
Email: [omar@theengineeringco.com](mailto:omar@theengineeringco.com)

Re: RFQ 46-2022 - TW Transportation Project Engineering Services

Mr. Herrera,

The Seminole Tribe of Florida (hereinafter the "Tribe") has completed its evaluation of the proposals submitted by your firm in response to the above-mentioned solicitation.

The final determination has resulted in the selection of your firm as a pre-qualified contractor to provide as-needed transportation project engineering services to the Tribe. Please be advised that you are not authorized to provide these services until such time as a contract between the Tribe and your firm has been executed. In addition, any expenses incurred by your firm will not be reimbursed by the Tribe in the event that this award is withdrawn by the Tribe or if a contract cannot be successfully negotiated. Someone from the Tribe will contact you towards taking the next steps to provide the solicited services.

Please contact me if you have any questions regarding this or any other procurement matter.

Sincerely,

*Trecia Demby*

Trecia Demby  
Contract Administrator II

cc: Derek Koger, TCD Executive Director  
Emran Rahaman, Public Works Director  
Luis Rioseco, TCD Senior Director of Administration  
Marla Osborn, TCD Senior Project Manager  
Michael Gebhardt, Purchasing Director  
Tristan Evertz, Assistant Director of Purchasing  
Alex Rodriguez, Purchasing Contracts Unit Manager  
Adriana Rodriguez, Bids and Proposals Supervisor

**SERVICE AGREEMENT  
BETWEEN THE SEMINOLE TRIBE OF FLORIDA  
AND  
THE ENGINEERING COMPANY, LLC**

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This service agreement is made, entered into and effective as of the date of the last signature of this agreement by and between the SEMINOLE TRIBE OF FLORIDA, a federally recognized Indian Tribe under 25 U.S.C. §5123 (hereinafter referred to as the "TRIBE") and THE ENGINEERING COMPANY, LLC, a Florida Limited Liability Company (the "CONSULTANT").

***Identification information***

**OWNER:**

SEMINOLE TRIBE OF FLORIDA, A  
FEDERALLY RECOGNIZED INDIAN TRIBE  
UNDER 25 U.S.C. §5123

**CONSULTANT:**

THE ENGINEERING COMPANY, LLC

**OWNER ADDRESS:**

6300 STIRLING ROAD  
HOLLYWOOD, FLORIDA 33024

**CONSULTANT ADDRESS:**

2875 NE 191 STREET, SUITE 602  
AVENTURA, FL 33180

**OWNER REPRESENTATIVE:**

EMRAN RAHAMAN  
DIRECTOR OF PUBLIC WORKS  
SEMINOLE TRIBE OF FLORIDA  
5700 GRIFFIN ROAD  
DAVIE, FLORIDA 33314  
PHONE: (954) 894-1060  
E-MAIL: [emranrahaman@semtribe.com](mailto:emranrahaman@semtribe.com)

**CONSULTANT REPRESENTATIVE:**

OMAR HERRERA, PE  
PRINCIPAL  
THE ENGINEERING COMPANY, LLC  
2875 NE 191 STREET, SUITE 602  
AVENTURA, FL 33180  
PHONE: (305) 904 6218  
EMAIL: [omar@theengineeringco.com](mailto:omar@theengineeringco.com)

**PROJECT DESCRIPTION:**

TRANSPORTATION ENGINEERING  
SERVICES

**PROJECT LOCATION:**

SOME OR ALL SEMINOLE INDIAN  
RESERVATIONS OR OTHER RESTRICTED  
TRIBAL TRUST LAND AND CERTAIN FEE  
PROPERTY OWNED OR LEASED BY THE  
SEMINOLE TRIBE OF FLORIDA.

## RECITALS

A. The SEMINOLE TRIBE OF FLORIDA, (hereinafter referred to as “TRIBE”), is an organized Indian Tribe as defined in Section 16 of the Indian Reorganization Act of June 18, 1934, as amended.

B. CONSULTANT is a professional engineering firm specializing in providing professional services to the public with the professional background, skill, and qualifications as well as the technical expertise necessary to provide the professional services necessary to achieve the objectives set forth by the Public Works Department of the TRIBE.

C. CONSULTANT has certain skills and abilities that are required by TRIBE.

D. CONSULTANT is an independent firm willing to provide its Transportation Engineering Services in accordance with EXHIBIT A – RATE SHEET, attached hereto and by this reference incorporated herein, to the TRIBE (hereinafter the “Services”) on a confidential basis under the terms and conditions and for the period contemplated by this Agreement.

E. The scope of work under this agreement involves Transportation Engineering Services on some or all Seminole Indian Reservations or other restricted tribal trust land and certain fee property owned or leased by the Seminole Tribe of Florida (hereinafter the “Project”).

## TERMS AND CONDITIONS

THEREFORE, in consideration of the mutual promises and covenants herein contained, the parties hereto hereby agree as follows:

### 1. ENGAGEMENT

TRIBE hereby engages and retains CONSULTANT as an independent Consultant, and CONSULTANT hereby accepts engagement upon the terms and conditions hereinafter set forth herein.

### 2. TERM

Subject to the provisions for termination as hereinafter provided, the term of this Agreement shall be for a period of three (3) years, which Agreement shall be entered into and effective as of the date of the last signature of this Agreement. The TRIBE reserves the right to cancel this Agreement upon payment of compensation due CONTRACTOR pursuant to Paragraph 12 hereof.

### 3. COMPENSATION

CONSULTANT shall be paid a not-to-exceed sum of Two Hundred Fifty Thousand Dollars and Zero Cents (\$250,000.00) in the aggregate per year for its Services, with no carryover of prior year sum(s). The method of compensation will be determined through a Work Authorization, either a lump sum (LS) or hourly not-to-exceed (HNTE) amount in accordance with EXHIBIT A – RATE SHEET. Project assignments will be made by the TRIBE through Work Authorization(s) with a project-specific Scope of Services, which will be negotiated for the time and method of compensation for each task and authorized by the Director of the Public Works Department. CONSULTANT shall not exceed, nor be required to exceed, the estimated costs set forth in EXHIBIT A without TRIBE’S prior written authorization.

CONSULTANT shall not proceed with any HNTE Services without prior written approval from the TRIBE.

CONSULTANT shall send monthly invoices to “Seminole Tribe of Florida Attn: Accounts Payable Department, Post Office Box 840939, Pembroke Pines, Florida, 33084” or email;

[invoices@semtribe.com](mailto:invoices@semtribe.com) or *facsimile number of (954)967-3988* for SERVICES performed during the preceding month. If CONSULTANT provides the SERVICES for a fixed price, CONSULTANT shall include on the invoice a description of the SERVICES performed, the percentage of completion of SERVICES represented by the invoice and the amount of the fixed price to which the percentage of completion was applied.

Invoices for payment should also include time sheets, summary sheets, a copy of the Description of Services, and copy of the TRIBE'S prior written approval for all HNTe services.

Invoice request for payment **requests for payments shall be delivered to TRIBE for approval by the fifth (5th) day of each month for inclusion into the following month's payment estimate. Approved payment requests will be paid within 30 days of receipt of invoice.** Should there be an ambiguity or conflict between or among the Attachments and the Agreement; CONSULTANT shall obtain the TRIBE'S written direction to proceed.

CONSULTANT shall comply with the TRIBE'S fiscal year end cut off schedule which is September 30..

#### **4. DIRECTION**

CONSULTANT shall report to, be responsible for its performance, and receive its direction from the Public Works Department of TRIBE.

#### **5. DUTIES**

TRIBE retains CONSULTANT pursuant to the terms and conditions of this Agreement. Duties of CONSULTANT shall include, but not be limited to, the rate schedule for services outlined in EXHIBIT A and the work as defined by the TRIBE in a Work Authorization on an as-needed basis.

#### **6. STANDARD OF CARE**

The CONSULTANT represents that it is knowledgeable and experienced in providing SERVICES, is familiar with the property and the applicable laws affecting the property. CONSULTANT also represents that the standard of care for all SERVICES performed or furnished by CONSULTANT under this Agreement will be the care and skill ordinarily used by members of the CONSULTANT'S profession practicing under similar conditions.

#### **7. EXTENT OF SERVICES**

CONSULTANT shall devote such time, attention and energies to the business as is required by TRIBE. In CONSULTANT'S performance of the work contemplated by this Agreement, the CONSULTANT shall not during the term of this Agreement, be precluded from engaging in any other business activity, whether or not such business activity is pursued for gain, profit, or other pecuniary advantage. Provided however, that the CONSULTANT shall not, during the term of this Agreement, solicit TRIBE'S employees on behalf of it or another organization, or provide any other firm or business with information regarding the operations, including without limitation the agreements and clients of the TRIBE.

#### **8. OWNERSHIP OF DOCUMENTS**

Copies of all drawings and specifications (both in electronic form, clearly marked as copies, and in the form of reproducible hard copies) shall be furnished to TRIBE, along with copies (or originals to the extent permitted by the regulations of the Florida state authorities governing the practice of consultants) of any drafts, work papers, samples, prototypes, models, sketches, conceptual or schematic drawings, master plan documents, and other work product produced in connection with this Agreement or the Project which are

the subject of this Agreement, regardless of the state of completion of the work, and regardless of the source (collectively, CONSULTANT's "Work") that CONSULTANT has retained in his possession. Copies of the construction drawings and specifications retained by TRIBE may be utilized only for the TRIBE's use for the project for which they are prepared, and not for the construction of another project on another site. TRIBE, may however, reuse the concepts, themes, ideas, and expression reflected or embodied in the drawings and specifications and may, if it wishes, retain another licensed design professional to incorporate said concepts, themes, ideas, and expression into other plans and specifications. All CONSULTANT's Work other than one set of original construction drawings, line drawings, specifications, and computer disks prepared by the CONSULTANT shall be the property of the TRIBE and may be used by the TRIBE as the TRIBE sees fit. The original physical drawings and specifications retained by TRIBE may be used for occupying the Project, completing or modifying the Project, the building, the site for which they were prepared, and not for the construction of another project on another site. All original construction drawings, line drawings, specifications, and computer disks shall remain in the possession, care, custody and control of CONSULTANT, who shall retain them in confidence. CONSULTANT's Work shall be deemed "work for hire" commissioned by TRIBE to the fullest extent permitted by the copyright laws of the United States and by Florida law. To the fullest extent permitted by Federal and Florida law, CONSULTANT hereby transfers to TRIBE, for good and valuable consideration, all copyright, trademark, and patent rights in and to CONSULTANT's Work, and agrees to sign any and all further documents deemed necessary by TRIBE to protect TRIBE's copyright rights therein at the conclusion of the project. CONSULTANT agrees not to share, reveal, or advertise any of the Work, or the concepts, themes or ideas reflected therein, with or to any third parties absent TRIBE's prior written consent, and further agrees not to reuse same for any purpose without TRIBE's prior written consent. CONSULTANT expressly acknowledges that, to the extent the concepts and themes for a given Project were initially conceived by TRIBE, they shall remain the property of TRIBE, who may reuse them as it sees fit. Upon the completion or termination of CONSULTANT's involvement on a given Project, any and all documents, information or use rights provided to the CONSULTANT for purposes of or in connection with the CONSULTANT's performance of this Agreement in connection with that Project, or otherwise related to the Project, shall be returned to the TRIBE, without CONSULTANT retaining any copies except that CONSULTANT retain copies of documents or information furnished by TRIBE which were influential in CONSULTANT's production of the Work so long as the CONSULTANT holds same in confidence and does not disseminate them or share them with any other third parties.

When TRIBE requests that the CONSULTANT provide to it certain plans, specifications, or other documents in electronic form ('Electronic Documents'), for the Project ('Project') CONSULTANT will do so subject to the terms of this provision. TRIBE recognizes that Electronic Form Documents are not intended to be used for construction, are not Contract Documents under the terms of the Construction Contract, may be revised by others without the knowledge or consent of the CONSULTANT, and, when plotted, may result in variances or corrupt other files of the user. TRIBE agrees not to use the Electronic Form Documents for any purposes other than the Project for which they were prepared. CONSULTANT will provide to TRIBE only a working copy of the Electronic Form Documents. Said working copy of the Electronic Form Documents shall have removed from the electronic display all indices of the CONSULTANT's ownership, professional name, and/or involvement in the Project. Any use of any kind and/or changes to the Electronic Form Documents will be at the sole risk of the user and without liability, risk, or legal exposure to the CONSULTANT.

## **9. NO PARTICIPATION**

CONSULTANT acknowledges and agrees that this Agreement shall not give or extend to CONSULTANT any rights with respect to additional contributions by TRIBE to any deferred compensation plan, bonus plans, or fringe benefits, employment, income or other taxes which may be assessed in connection with payments to CONSULTANT under the terms of this Agreement.

## **10. SUBCONTRACTING AND ASSIGNMENT**

This Agreement shall be binding upon and shall inure to the benefit of the successors and assigns of the TRIBE and CONSULTANT. However, CONSULTANT shall not subcontract or retain an independent consultant, subconsultant or consultant to perform under or assign this or any portion of this Agreement, nor shall this Agreement inure to the benefit of any trustee in bankruptcy, receiver or creditor of CONSULTANT, by operation of applicable law or otherwise, without the prior written consent of TRIBE. CONSULTANT shall not utilize any subconsultants on the work to be performed hereunder unless said subconsultants have executed an agreement agreeing to be bound by the terms of this Agreement. CONSULTANT assumes full responsibility for the work of any independent Consultant, subconsultant or consultant. Subject to the terms of this paragraph and except as provided to the contrary in the Scope of Work, TRIBE hereby consents to the retention by CONSULTANT of title abstractors and automated data retrieval firms reasonably acceptable to CONSULTANT.

## **11. ALTERATION OF SITES**

CONSULTANT will perform no SERVICES and will have no SERVICES performed that would materially alter, damage or affect the terrain, subsurface, vegetation, buildings, structures or equipment in, at, or upon the property without the prior, express, written consent of both TRIBE and the existing owner of the property if other than TRIBE. This paragraph shall not apply to normal wear and tear associated with routine access to the property reasonably necessary to perform the SERVICES.

## **12. TERMINATION**

### **a. Termination for Convenience**

TRIBE may terminate this Agreement for convenience prior to completion of SERVICES. The termination will become effective upon delivery of written notice pursuant to paragraph 13 below. TRIBE shall compensate CONSULTANT for all costs incurred to the effective date of termination, plus any reasonable and necessary termination costs and non-cancelable commitments entered into prior to the date of notice of termination. In no event shall CONSULTANT be entitled to profits on SERVICES not performed due to termination of the Agreement.

### **b. Termination for Default**

TRIBE may terminate this Agreement in the event of CONSULTANT'S failure to make timely progress, non-performance of any material item of this Agreement, default, material breach by CONSULTANT of this Agreement, or in the event of insolvency, bankruptcy or receivership of CONSULTANT, effective upon written notice pursuant to paragraph 13 below. TRIBE may contract with others for performance of the SERVICES in the event of termination under this paragraph. Payment of any additional costs shall not relieve CONSULTANT of any other liability it may have in connection with the SERVICES.

### **c. Delivery of Materials**

Upon receipt of notice of termination under subparagraphs 12(a) or (b) above, CONSULTANT shall immediately deliver to TRIBE all materials as defined in paragraph 19 and 27 below, held or used by CONSULTANT in connection with the SERVICES, except those materials, if any, owned by CONSULTANT or supplied by CONSULTANT at CONSULTANT'S own cost. If, at the time of termination further sums are due CONSULTANT, CONSULTANT shall not be entitled to sums until all materials required to be delivered to TRIBE are delivered.

### **d. Survival**

Upon receipt of notice of termination for any reason, CONSULTANT shall promptly



cease all SERVICES, except for additional SERVICES that TRIBE may, in its discretion, request CONSULTANT to perform. CONSULTANT shall perform additional SERVICES with the standard of care as stated in paragraph 6 above.

### **13. NOTICES**

All notices or other communications provided for by this Agreement shall be in writing. Notice shall be deemed properly delivered by: (a) personal delivery; (b) sending via a nationally recognized overnight courier, such as FedEx; or (c), the mailing of such notices to the parties entitled thereto, via certified mail, return receipt requested, postage prepaid, to the parties at the below addresses (or to such address designated in writing by one (1) party to the other). Notice shall be deemed given when: (i) personally delivered; (ii) the next business day after delivery of the notice to the nationally recognized overnight courier; or (iii) three business days after being sent by certified mail, return receipt requested, postage prepaid.

**TRIBE:**

EMRAN RAHAMAN  
DIRECTOR OF PUBLIC WORKS  
SEMINOLE TRIBE OF FLORIDA  
5700 GRIFFIN ROAD  
DAVIE, FLORIDA 33314  
PHONE: (954) 894-1060  
E-MAIL: [emranrahaman@semtribe.com](mailto:emranrahaman@semtribe.com)

**CONSULTANT:**

OMAR HERRERA, PE  
PRINCIPAL  
THE ENGINEERING COMPANY, LLC  
2875 NE 191 STREET, SUITE 602  
AVENTURA, FL 33180  
PHONE: (305) 904 6218  
EMAIL: [omar@theengineeringco.com](mailto:omar@theengineeringco.com)

### **14. AMENDMENTS**

This Agreement may be amended at any time by the written agreement of TRIBE and CONSULTANT. All amendments, changes, revisions and discharges of this Agreement shall be binding upon the Parties despite any lack of legal consideration, as long as it shall be in writing and executed by the Parties. CONSULTANT shall not perform a change in SERVICES without TRIBE'S prior written approval of the changes and their costs.

### **15. PARTIES IN INTEREST**

Nothing in this Agreement, whether expressed or implied, is intended to confer upon any person other than the parties hereto and their respective heirs, representatives, successors and permitted assigns, any right or remedies under or by reason of this Agreement. Nothing in this Agreement is intended to relieve or discharge the liability of any other party hereto, nor shall any provision hereof give any entity any right of subrogation against or action over any party.

### **16. SEVERABILITY**

If any term, covenant, condition or provision of this Agreement, or their application to any person or circumstance, shall to any extent be held by a court of competent jurisdiction to be invalid, void or unenforceable, the parties shall renegotiate the unenforceable or invalid terms so as to effect the intent of

the Agreement. Regardless of the success of any renegotiation the remainder of the provisions of this Agreement, or their application to any person or circumstances, shall remain in full force and effect.

## **17. SUBJECT HEADINGS**

The subject headings of the articles, paragraphs and subparagraphs of this Agreement are included solely for purposes of convenience and reference only, and shall not be deemed to explain, modify, limit, amplify or aid in the meaning, construction or interpretation of any of the provisions of the Agreement.

## **18. APPLICABLE LAWS AND REGULATIONS**

This Agreement shall be governed by and construed and enforced in accordance with and subject to applicable laws and orders including without limit, licensing, and certification requirements, environmental laws, health and safety laws, worker health and safety laws, drug free workplace requirements, and applicable laws pertaining to labor wages, hours and other conditions of employment. CONSULTANT shall comply with any and all applicable safety and security regulations which are now in effect or hereinafter may be applicable. CONSULTANT agrees that it will at all times conduct its business in a lawful manner and in full compliance with all applicable Tribal and governmental laws, ordinances, rules and regulations.

## **19. CONFIDENTIAL MATTERS AND PROPRIETARY INFORMATION**

The CONSULTANT and its employees shall keep in strictest confidence all information, books, reports, photographs, slides, materials, new data, boring logs, sample results, laboratory reports, calculations, estimates, documents, communications, notes, proposals, scopes of work, or related responses relating to this Agreement and that which may be acquired in connection with or as a result of this Agreement. CONSULTANT shall not, during the term of this Agreement or at any time thereafter, without the prior written consent of TRIBE, publish, communicate, divulge, disclose or use any of such information designated by TRIBE as proprietary or confidential or which from the surrounding circumstances in good conscience ought to be treated by the CONSULTANT as proprietary or confidential.

Except as required by applicable law, CONSULTANT will not meet or confer with any member of any federal, state, or local regulatory agency concerning the SERVICES without obtaining the prior written consent of TRIBE. In addition, CONSULTANT will not discuss any matters arising out of this Agreement with members of the press or public and will not issue any press release without the prior written consent of TRIBE. If CONSULTANT becomes aware of a possible site condition or situation, which, if confirmed, could impose a reporting requirement of the TRIBE, operator, lessee, or lessor, CONSULTANT shall promptly notify TRIBE.

## **20. CONFLICT OF INTEREST**

During the term of this Agreement and at any time thereafter, CONSULTANT shall not act as an agent, or in a liaison capacity as an officer, employee, agent or representative of any TRIBE supplier or prospective supplier nor serve in any of the foregoing capacities for any of TRIBE'S clients or prospective clients without the prior written approval of TRIBE. CONSULTANT hereby warrants that there is no conflict of interest in CONSULTANT'S other service agreements or other employment, if any, with the activities to be performed hereunder and shall advise TRIBE if a conflict of interest arises in the future.

## **21. FIELD REPRESENTATIVE**

Unless CONSULTANT specifically agrees to the contrary in writing, CONSULTANT shall not be responsible for the job safety or practices of a Consultant retained by any party other than CONSULTANT or its Personnel and CONSULTANT or its Personnel shall not have the right to stop the work of such

Consultant. Notwithstanding the forgoing, CONSULTANT shall notify TRIBE if CONSULTANT considers the job safety or practices of a Consultant retained by any party other than CONSULTANT to be unsafe or in violation of applicable law.

## **22. INDEPENDENT CONSULTANT**

In all matters relating to this Agreement, CONSULTANT shall be acting as an independent Consultant and as such shall have and maintain complete control over and be responsible for all of its employees and agents and operations. Neither CONSULTANT nor employees of CONSULTANT are employees of TRIBE under the meaning or application of any applicable Federal or State unemployment or insurance laws or workers' compensation laws or otherwise. CONSULTANT shall assume all liabilities or obligations imposed by any one or more such applicable laws with respect to the employees of CONSULTANT in the performance of this Agreement. CONSULTANT shall not have any authority to assume or create any obligations, expressed or implied, on behalf of TRIBE and CONSULTANT shall not have the authority to represent itself, as an agent, employee or in any other capacity of TRIBE; except as specifically set forth in this Agreement.

### **a. Personnel**

"Personnel" means all officers, directors, affiliates, partners, employees, agents, independent Consultants and subconsultants of either CONSULTANT or TRIBE as specified. CONSULTANT represents that all Personnel of CONSULTANT will and shall be required to abide by the terms and provisions of this Agreement, including, without limit, the requirement of confidentiality as provided in paragraph 19 above, and at the request of TRIBE, CONSULTANT shall require any or all of its Personnel to sign mutually agreeable agreements or statements so providing.

### **b. Employees**

All Personnel of and used by CONSULTANT in the performance of the SERVICES shall be the agents, representatives, employees or subconsultants of CONSULTANT and not of TRIBE. CONSULTANT states to TRIBE that all SERVICES supplied by CONSULTANT in the performance of this Agreement shall be supplied by Personnel who are careful, skilled, experienced, licensed or certified, and reasonably competent in their respective trades or professions, consistent with paragraph 6. CONSULTANT shall be responsible for payment of all taxes, fees, contributions, or other charges in any way applicable to CONSULTANT, which are specifically, solely and directly attributable to the SERVICES.

## **23. REPORTS, RECORDS AND AUDITS**

CONSULTANT, when directed, shall provide written reports with respect to the SERVICES rendered hereunder to the Director of the Community Planning and Development Department of TRIBE.

CONSULTANT shall maintain all costs, expense, payroll and related and financial records and accounts pertaining to SERVICES performed by CONSULTANT under this Agreement for a period of three (3) years after final payment under this Agreement or until final conclusion of any litigation or administration proceeding arising under or materially concerning this Agreement, the SERVICES, or PROPERTY.

TRIBE shall have access to and the right to audit, copy and inspect such records at all mutually agreeable times during the course of the SERVICES and for the period during which records are maintained.

## **24. ACCESS TO PREMISES**

CONSULTANT shall not have the authority to access the TRIBE'S PROPERTY without express written consent by the TRIBE'S contact person listed in paragraph 13 of this Agreement during the period

of performance.

## **25. INSPECTION**

The SERVICES performed by CONSULTANT shall be subject to the TRIBE'S inspection and approval. CONSULTANT shall control and be fully responsible for the details, manner and method of performing the SERVICES. TRIBE shall have access at all times to the areas where SERVICES are being performed. Inspection or lack of inspection by TRIBE shall not be deemed approval or be construed to be a waiver of TRIBE'S rights under this Agreement.

## **26. STRICT LOYALTY**

CONSULTANT shall avoid all circumstances and actions, which reasonably would place CONSULTANT in a position of divided loyalty with respect to its obligations under this Agreement.

## **27. TITLE TO INFORMATION AND EQUIPMENT**

All information developed under this Agreement, of whatever type relating to the work performed under this Agreement, shall be the exclusive property of TRIBE. All machines, instruments and products purchased, manufactured or assembled by CONSULTANT pursuant to this Agreement and paid for by TRIBE shall be the exclusive property of TRIBE. Upon termination of this Agreement, CONSULTANT shall dispose of such items as directed by TRIBE in writing.

Upon receipt of termination or expiration of this Agreement, the CONSULTANT shall deliver all originals of records, data, information and other documents thereof to TRIBE and such originals and all copies thereof shall remain the property of TRIBE.

## **28. INDEMNIFICATION / HOLD HARMLESS**

CONSULTANT hereby agrees to indemnify and hold harmless TRIBE from and against: (1) any claims and or liabilities arising from any material breach or default in the performance of CONSULTANT'S obligations under the terms and conditions of this Agreement or to the extent arising from any negligence or intentional acts of CONSULTANT or its agents, Consultants, employees and invitees; and (2) all costs, reasonable attorneys' fees, expenses and liabilities incurred in the defense of any such claim, action or proceeding brought herein, except in the event such claims or liabilities are the result of negligence of the TRIBE, its contractor, employees, or consultants other than the CONSULTANT. In the event an action or proceeding is brought against TRIBE by reason of any such claim, CONSULTANT, upon notice from TRIBE, shall defend the same at CONSULTANT'S expense by counsel satisfactory to TRIBE.

TRIBE agrees that CONSULTANT'S indemnification obligation pursuant to this paragraph shall not exceed \$2,000,000.00 unless CONSULTANT agrees to a greater amount in writing.

CONSULTANT, with regard to environmental liabilities, shall be liable to the extent such liabilities are due to the negligence or intentional acts of CONSULTANT and/or its sub-consultant (s).

Neither party shall be liable to the other in contract, tort, (including negligence and breach of statutory duty) or otherwise for loss of profit (whether direct or indirect) or for any indirect, consequential, punitive or special loss or damage, including without limitation loss of profits, revenue, business, or anticipated savings (even when advised of their possibility).

## **29. INSURANCE (Exhibit B)**

The CONSULTANT shall procure and maintain for the duration of the contract the following required insurance, with insurers' financially acceptable and lawfully authorized to do business in the states

where the TRIBE conducts operations. Such coverage shall protect Professional against claims arising from sickness, disease, death or injury to persons, and/or physical damage to tangible property, including loss of use, which may arise from services performed by or on behalf of the Professional, his agents or representatives.

### **Minimum Scope of Insurance**

CONSULTANT's insurance coverage shall include the following minimum limits and coverage. The CONSULTANT is responsible for assuring that each subcontractor also carries the required minimum insurance coverage and continues such coverage in full force and effect for the duration of this Agreement. CONSULTANT shall obtain Certificates of insurance from each subcontractor prior to the subcontractor commencing work, and subject to review of TRIBE, if required:

1. Commercial General Liability insurance on an occurrence coverage form, at least as broad as the *Insurance Services Office Commercial General Liability Policy form CG 0001* ©, current edition. Other than standard exclusions applicable to pollution, asbestos, mold, employment practices, ERISA and professional liability, there shall be no additional limitations or exclusions beyond those contained in the above referenced policy form, including but not limited to additional limitations or exclusions applicable to products and completed operations and contractual liability.
2. Automobile Liability insurance covering liability arising from the use or operation of any auto, including those owned, hired or otherwise operated or used by or on behalf of the Professional. The coverage shall be at least as broad as the *Insurance Services Office Business Automobile Policy form CA 0001* ©, current edition.
3. Workers' Compensation and Employer's Liability insurance as is required by statute or law, or as may be available on a voluntary basis.
4. Professional Liability insurance covering wrongful acts made by or on behalf of the Professional. Claims-made coverage is permitted, provided the policy retroactive date is continuously maintained prior to the commencement of professional services rendered to the Tribe, plus an additional period of three years after such services have been rendered to the Tribe. If the Professional's scope of work includes environmental engineering or consulting, the coverage required hereunder must not exclude coverage for environmental (professional) services.

### **Consultant Minimum Limits of Insurance**

CONSULTANT shall maintain the following minimum limits of insurance (unless higher limits required by law or statute):

1. Commercial General Liability (including umbrella or excess liability): \$1,000,000 per occurrence, bodily injury and property damage liability; \$1,000,000 per offense, personal and advertising injury liability; \$1,000,000 products and completed operations policy aggregate and \$2,000,000 policy general aggregate applicable to lines other than products and completed operations.
2. Automobile Liability: \$1,000,000.00 each person for bodily injury, \$1,000,000 each accident and \$1,000,000 property damage each accident.
3. Employer's Liability: \$1,000,000 per accident for bodily injury by accident or disease, including \$1,000,000 disease aggregate.
4. Professional Liability: \$2,000,000 each wrongful act, \$4,000,000 policy aggregate. If Professional's contract with the Tribe exceeds \$1,000,000, for each wrongful act limits shall apply separately to the Tribe's project.

### **Deductibles and Self-insured Retentions**

The funding of deductibles and self-insured retentions maintained by Professional shall be the sole responsibility of Professional. Self-insured retentions in excess of \$50,000 must be declared to the Tribe.

### **Other Insurance Provisions**

The required insurance shall contain the following additional provisions:

1. **ADDITIONAL INSURED** – The Tribe must be included as an additional insured by policy endorsement under Professional’s Commercial General Liability policy as respects liability arising from work or operations performed by or on behalf of the Professional.
2. **WAIVERS OF SUBROGATION** – Professional agrees to waive all rights by policy endorsement of subrogation against the Tribe as respects loss, damage, claims, suits or demands, howsoever caused:
  - a. To property, equipment, vehicles, laptops, cell phones, etc. owned, leased or used by the Professional or the Professional’s employees, agents or subconsultants; and
  - b. To the extent such loss, damage, claims, suits or demands are covered, or should be covered, by the required or any other insurance (except professional liability to which this requirement does not apply) maintained by the Professional. This waiver shall apply to all first party property, equipment, vehicle and workers compensation claims, and all third party liability claims, including deductibles or retentions which may be applicable thereto. If necessary, the Professional agrees to endorse the required insurance policies to acknowledge the required waivers of subrogation in favor of the Tribe. Professional further agrees to hold harmless and indemnify the Tribe for any loss or expense incurred as a result of Professional’s failure to obtain such waivers of subrogation from Professional’s insurers.
3. **NOTICE OF CANCELLATION** - Each insurance policy shall be endorsed to require Insurer(s) to provide ten (10) days' written notice to the Tribe by certified mail, return receipt requested, prior to any suspension, cancellation or non-renewal of the required insurance.

### **Acceptability of Insurers**

Insurance is to be placed with insurers with a current A.M. Best's rating of not less than A- VII, unless otherwise approved by the Tribe.

### **Verification of Coverage**

CONSULTANT shall furnish the TRIBE with a certificate of insurance evidencing the required coverage prior to the delivery of services to the TRIBE. The certificates are to be signed by a person authorized by the insurer(s) to bind coverage on their behalf. Renewal certificates are to be provided to the TRIBE prior to the expiration of the required insurance policies. As an alternative to a certificate of insurance, CONSULTANT’s broker or insurer may provide complete, certified copies of all required insurance policies, including endorsements necessary to affect coverage required by these specifications.

If any of the required liability insurance is on a “claims made” basis, “tail” coverage will be required at the completion of this contract for a duration of 24 months, or the maximum time period reasonably available in the marketplace. Contractor shall furnish certification of “tail” coverage as described or continuous “claims made” liability coverage for 24 months following Contract completion. Continuous “claims made” coverage will be acceptable in lieu of “tail” coverage, provided its retroactive date is on or before the effective date of this Contract. If Continuous “claims



made” coverage is used, Contractor shall be required to keep the coverage in effect for a duration of not less than 24 months from the end of the Contract. This will be a condition of the final acceptance of work or services.

### **Subconsultant Minimum Limits of Insurance**

The CONSULTANT is responsible for assuring that each subcontractor or subconsultant also carries the following required minimum insurance coverage prior to commencing work, and continues such coverage in full force and effect for the duration of any contractual Agreement.

Comprehensive General Liability – 1,000,000 per occurrence/2,000,000 in the aggregate

General Liability: Per Occurrence, Bodily Injury and Property Damage Liability: 1,000,000

Aggregate Per Offense, Personal and Advertising Injury Liability:  
1,000,000

Products and Completed Operations Policy Aggregate: 1,000,000

General Aggregate Applicable to Claims Other Than Products and Completed Operations:  
2,000,000

The Comprehensive General Liability policy, by policy endorsements shall:

- Name the Tribe as an additional insured
- Include a Waiver of Subrogation Endorsement to the Tribe, in favor of the Tribe.

Automobile Liability – 1,000,000 Combined Bodily Injury and Property Damage Liability Per Accident for Bodily Injury and Property Damage

Worker’s Compensation – insurance as statutorily required.

Professional Liability – 1,000,000 Each Wrongful Act, required only if sub-consultant’s scope of services includes architectural, engineering, professional consulting or construction management. Such policy shall cover wrongful acts made by or on behalf of the sub-consultant. Claims-made coverage is permitted, provided the policy retroactive date is continuously maintained prior to the commencement of professional services rendered to the Tribe, plus an additional period of three years after such services have been rendered to the Tribe.

### **30. ADDITIONAL TERMS AND CONDITIONS**

The parties to this Agreement shall make a good faith effort to settle disputes arising under the Agreement or the breach thereof; however, in the event such disputes cannot be settled by the parties’ good faith efforts, the following procedure shall apply:

Any controversy or claim arising out of or relating to this contract, or the breach thereof shall be subject to mediation which may be initiated by either party upon ten (10) days written notice to the other party. All mediation proceedings shall be held at the Administrative Offices of the Seminole Tribe of Florida within the confines of Broward County in the State of Florida. Selection of Mediator shall be subject to mutual agreement of the parties. In the alternative, the Mediator shall be selected by a neutral third party. The parties and the Mediator shall maintain strict confidentiality with respect to any mediation proceeding. Nothing that transpires during the mediation proceeding is intended in any way to affect the rights or prejudice the position of any of the parties to the dispute in any later litigation or proceeding. The Mediator is authorized to end the mediation whenever further efforts at mediation would not contribute to a solution of the dispute between the parties. A written report of the mediation process will not be prepared by the Mediator. There shall be no record, electronic or otherwise, of the mediation proceeding. Mediator’s fee or time

charge rate will be established at the time of selection or appointment. The expenses of witnesses for either side shall be paid by the party providing such witnesses. All other expenses of the mediation, including required traveling and other expenses of the Mediator, and the expenses of any witness, or the cost of any proofs or expert advice produced at the direct request of the Mediator, shall be shared equally by the parties unless they agree otherwise. Neither party shall institute litigation while the mediation proceeding is pending; however, a party may withdraw at any time from the mediation proceeding. Any written settlement agreement of the parties that emerges from mediation shall be final and binding once fully executed, and the contents of which shall be maintained in strict confidentiality. The mediation proceeding shall be deemed terminated if, and when: (a) the parties have not executed a written settlement agreement within forty-five (45) days following conclusion of the mediation formal meeting (which deadline may be extended by mutual agreement), or (b) either party serves on the other party and on the Mediator a written notice of withdrawal from the proceeding. The Mediator shall apply all applicable laws in conducting the mediation proceedings, and in assessing the respective positions of each party to the mediation in an effort to bring about a voluntary resolution of the dispute. Nothing contained herein is intended to constitute consent on the part of the TRIBE or the CONSULTANT to participate in any legal proceeding regarding any claim, controversy or dispute arising out of relating to this agreement or to any alleged breach thereof and nothing contained herein shall be construed as consent on the part of either TRIBE or CONSULTANT to submit to the jurisdiction of any tribunal for that purpose.

### **31. ENTIRE AGREEMENT AND WAIVER**

This Agreement contains the entire agreement of the Parties and supersedes all prior understandings and agreements, whether oral or in writing, regarding the subject matter of this Agreement. No representations, warranties, covenants, or conditions expressed or implied, whether by statute or otherwise, other than as set forth herein have been made by any party hereto. No waiver of any term, provision, or condition of this Agreement, whether by conduct or otherwise, in any one or more instances, shall be deemed to be, or shall constitute a continuing waiver, and no waiver shall be binding unless executed in writing by the party making the waiver and accepted and agreed to by both parties.

### **32. ATTACHMENTS AND EXHIBITS**

Exhibit A – Rate Sheet  
Exhibit B – Insurance

All exhibits and attachments referred to in this Agreement are deemed incorporated in this Agreement, whether or not actually attached.

### **33. FURTHER ACTS.**

Each Party agrees to perform any further acts and to execute, acknowledge and deliver any documents which may be reasonably necessary to carry out the provisions of this Agreement.

### **34. COMPLIANCE RESPONSIBILITY.**

Any applicable laws, regulations, or the requirements of any federal or state grant or contract, or pass-through agreement through which funds are provided for this Agreement are incorporated herein by reference as if fully stated herein, which may include but not be limited to, procurement, receipt, and payment for goods and services policies and procedures, and other certifications and assurances. The CONSULTANT by entering into this agreement acknowledges that it has familiarized itself with all such laws, regulations or other requirements, and fully understands its responsibility to comply with the same, and to require that any of its subconsultants, material suppliers, or other sub-recipients comply with the same. CONSULTANT further acknowledges that the Tribe may have responsibility to ensure that the



CONSULTANT complies with such laws, regulations, or other requirements, by monitoring its compliance through review of the CONSULTANT'S records related to this Agreement, and which CONSULTANT agrees to provide upon request of the Tribe.

**35. VENUE**

The venue for any litigation brought under this agreement shall be in Broward County, Florida.

**36. ATTORNEYS' FEES**

The prevailing party in any litigation brought under this Service Agreement shall be entitled to reimbursement from the other of all reasonable costs incurred in connection therewith, including attorneys' fees, all pre-trial, appellate, post-judgment, bankruptcy and other proceedings. The right to recover attorneys' fees shall also include any attorneys' fees incurred in establishing the amount of such fees.


**37. WAIVER OF JURY TRIAL**


**EACH OF THE UNDERSIGNED HEREBY KNOWINGLY, VOLUNTARILY AND INTENTIONALLY WAIVE THE RIGHT TO A TRIAL BY JURY WITH RESPECT TO ANY LITIGATION BETWEEN OR AMONG THEM, INCLUDING, BUT NOT LIMITED TO, ANY AND ALL CAUSE OR CAUSES OF ACTION, DEFENSES, COUNTERCLAIMS, CROSSCLAIMS, THIRD PARTY CLAIMS AND INTERVENOR'S CLAIMS, REGARDLESS OF THE CAUSE OR CAUSES OF ACTION, DEFENSES OR COUNTERCLAIMS ALLEGED OR THE RELIEF SOUGHT BY ANY PARTY, ALL TO THE EXTENT BASED ON OR ARISING OUT OF OR IN CONNECTION WITH THIS SERVICE AGREEMENT.**

END OF TEXT. SIGNATURES APPEAR ON NEXT PAGE


**IN WITNESS WHEREOF**, the parties hereto have executed this Agreement at Hollywood Seminole Indian Reservation, Broward County, Florida.

**TRIBE:**  
SEMINOLE TRIBE OF FLORIDA

By:   
Name: Peter Hahn  
Title: Treasurer  
Date: 10/28/2022

By:   
Name: Derek Koger, MPA  
Title: Executive Director of Tribal  
Community Development  
Date: 10/27/2022

**CONTRACTOR:**  
THE ENGINEERING COMPANY, LLC

By:   
Name: Omar Herrera  
Title: Principal  
Date: 10/25/22

Date: September 15, 2022

Hector Garcia-Ochoa Rojas

Transportation Civil Engineer, Public Works Department

Seminole Tribe of Florida

5700 Griffin Road, Davie, FL 33134

**Subject:** Rate Sheet for the STOF General Services Agreement for Transportation

The Engineering Company, LLC is hereby presenting the Rate Sheet for the subject contract.

<b>Role</b>	<b>Hourly Rate (\$)</b>
Principal	200
Senior Project Manager	180
Project Manager	160
Senior Engineer	180
Project Engineer	140
Senior Staff Professional	160
Staff Professional / Support	120
Engineering Technician / CAD Drafter	80
Senior System Operator	160
System Operator	120
Senior Inspector	140
Inspector	100
GIS Specialist	130
GIS Technician	80
Database Administrator / Data Review	100
Video Editor	150

Let me know if you have any questions.

Sincerely,



OMAR HERRERA, PE

PRINCIPAL

THE ENGINEERING COMPANY, LLC

2875 NE 191 Street, Suite 602, Aventura, FL 33180



**Consent Agenda  
9.11.**

City of North Miami Beach  
17011 NE 19 Avenue  
North Miami Beach, FL 33162  
305-947-7581  
www.citynmb.com

**MEMORANDUM**

---

<b>TO:</b>	Mayor and City Commission
<b>FROM:</b>	Juan Pinillos, Interim Chief of Police
<b>VIA:</b>	Mario A. Diaz, City Manager
<b>DATE:</b>	January 21, 2025

---

**RE:** Resolution No. R2025-10 Change Order for Wright Express Financial Services Corporation D/B/A Wex Bank for Fuel Card Services (Juan Pinillos, Interim Chief of Police)

---

**Description**

The State of Florida awarded Contract No. 78181701-21-NASPO-ACS "Fuel Card Services" to Wright Express Financial Services Corporation dba WEX Bank for a five (5) year term effective October 1, 2020, through December 31, 2025, with five (5) years of renewals.

**BACKGROUND  
ANALYSIS:**

The fleet fuel card allows the City of North Miami Beach Police Department the convenience of purchasing fuel and any commodity and/or service for immediate use to maintain daily operations of the vehicle fleet. The fleet fuel card is accepted at 95% of U.S gas stations and over 45,000 service locations.

A budgeted amount of \$70,469.15 was previously approved for fuel card services. To ensure the Police Department vehicle fleet has continuous access to fuel card services, an annual increase of \$30,000.00 is required, thereby increasing the previously approved piggyback contract to an annual expenditure of \$100,469.15.

**RECOMMENDATION:** The City Manager and Chief Procurement Officer recommend that the City Commission approve and authorize the City Manager or designee to execute a Change Order to the previously approved contract with Wright Express to increase the previously approved expenditure by \$30,000, thereby increasing the total expenditure to \$100,469.15.

**FISCAL/ BUDGETARY**

**IMPACT:**

As approved in the adopted budget appropriation.

---

**ATTACHMENTS:**

**Description**

- ▣ WEX Bank \_ Resolution
- ▣ Wex Bank \_ Change Order

**RESOLUTION NO. 2025-**

**A RESOLUTION OF THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA, APPROVING AND AUTHORIZING A CHANGE ORDER TO THE CONTRACT WITH WRIGHT EXPRESS FINANCIAL SERVICES CORPORATION D/B/A WEX BANK, FOR FUEL CARD SERVICES; INCREASING THE CONTRACT AMOUNT BY \$30,000.00; AUTHORIZING THE CITY MANAGER OR DESIGNEE TO DO ALL THINGS NECESSARY TO EFFECTUATE THIS RESOLUTION; PROVIDING FOR CONFLICTS; PROVIDING FOR SCRIVENER ERRORS, PROVIDING FOR SEVERABILITY; AND SUBJECT TO THE BUDGET APPROPRIATION AND AVAILABILITY OF FUNDS; AND PROVIDING FOR AN EFFECTIVE DATE.**

**WHEREAS**, pursuant to Chapter 166, *Florida Statutes* and Section 1.4 of the Charter of the City of North Miami Beach (“City”), the City shall have all available governmental, corporate, and proprietary powers and may exercise them except when prohibited by law; and

**WHEREAS**, State of Florida awarded Contract No. 78181701-21-NASPO-ACS “Fuel Card Services” to Wright Express Financial Services Corporation dba WEX Bank (“Wright Express”) for a five (5) year term effective October 1, 2020 through December 31, 2025 with five (5) years of renewals; and

**WHEREAS**, the fleet fuel card allows the City of North Miami Beach Police Department the convenience of purchasing fuel and any commodity and/or service for immediate use to maintain daily operations of the vehicle fleet. The fleet fuel card is accepted at 95% of U.S gas stations and over 45,000 service locations; and

**WHEREAS**, A budgeted amount of \$70,470 was previously approved for fuel card services. To ensure the Police Department vehicle fleet has continuous access to fuel card services, an annual increase of \$30,000.00 is required, thereby increasing the previously approved piggyback contract to an annual expenditure of \$100,470; and

**WHEREAS**, Section 3-3.20 of the Code of Ordinances City of North Miami Beach, Florida, 2008 (“Code”) requires that change orders exceeding 10% or \$50,000.00, whichever is less, shall be approved by the City Commission; and

**WHEREAS**, the City Manager and Chief Procurement Officer recommend that the City Commission approve and authorize the City Manager or designee to execute a Change Order to the previously approved contract to increase the previously approved expenditure by \$30,000 annually for a total expenditure of \$100,470; and

**WHEREAS**, the Mayor and City Commission believe it is in the best interests of the City to approve and authorize the City Manager or designee to execute a Change Order to the previously approved Contract to increase the previously approved expenditure by \$30,000 annually, thereby

increasing the annual expenditure to \$100,470 for fuel card services.

**NOW, THEREFORE, BE IT RESOLVED BY THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA, THAT:**

**Section 1.** The foregoing whereas clauses are true and correct and adopted as the legislative and administrative findings of the City Commission and made a specific part of this Resolution; all exhibits attached hereto are made a specific part of this Resolution.

**Section 2.** The Change Order, in substantially form attached as Exhibit “A,” to the previously approved contract with Wright Express to increase the annual expenditure by \$30,000.00, thereby increasing the annual expenditure to \$100,470 for the purchase of fuel card services, subject to budget appropriation and availability of funds, is hereby approved.

**Section 3.** The City Manager or designee is authorized to do all things necessary to effectuate this Resolution.

**Section 4.** All Resolutions or parts of Resolutions in conflict with this Resolution are repealed to the extent of such conflict.

**Section 5.** Any scrivener or typographical errors that do not affect intent may be corrected with notice to, and the authorization of the City Attorney and City Manager without further process.

**Section 6.** If any provision of this Resolution or the application thereof to any person or circumstance is held invalid, such invalidity shall not affect other provisions or applications of this Resolution that can be given affect without the invalid provision or application, and to this end the provisions of this Resolution are declared to be severable.

**Section 7.** This Resolution shall take effect immediately upon adoption.

**APPROVED AND ADOPTED** by the City of North Miami Beach City Commission at the regular meeting assembled this **21<sup>st</sup> day of January 2025**.

**[THE REMAINDER OF THIS PAGE INTENTIONALLY LEFT BLANK]**

ATTEST:

\_\_\_\_\_  
ANDRISE BERNARD, MMC  
CITY CLERK

\_\_\_\_\_  
MICHAEL JOSEPH  
MAYOR

(CITY SEAL)

APPROVED AS TO FORM AND LEGAL SUFFICIENCY FOR THE USE  
AND RELIANCE OF THE CITY OF NORTH MIAMI BEACH ONLY:

GREENSPOON MARDER, LLP.

By: \_\_\_\_\_  
CITY ATTORNEYS

Sponsored by: Mayor & Commission



# EXHIBIT A



## CHANGE ORDER FORM

PROCUREMENT MANAGEMENT DIVISION

(Revised 5.1.23)

Title:	Contract No.: _____ Purchase Order No.: _____
Vendor:	Change Order No.:
Contract Award Date:	Completion Date:
Revised Completion Date (prior to this change):	Extension(s) of Time Previously Approved:     days
Revised Completion Date (including this change):	

<b>Summary of Amount</b>	
<i>Original Amount</i>	\$
Change Orders Previously Approved	\$
Adjusted Value Prior to this Change Order	\$
Cost of Changes in this Change Order	\$
<i>Adjusted Amount Including this Change</i>	\$
Percentage Increase this Change Order	%
Total Percent Increase to Date	%
Extension of Time Allowed by this Change -	days

Description of Change:

Procurement Notes:

Account Number: \_\_\_\_\_

**Code of Ordinances – Chapter III Purchasing, 3-3.20 Change Orders**

*The City Manager may approve any change orders so long as the total sum of all change orders does not exceed the total amount awarded by the City Commission by more than either ten percent of the contract cost or \$50,000.00, whichever is less. The scope of any project may not be changed without prior approval of the City Commission. No increase in contract price shall be approved unless there are sufficient funds available for such purpose.*

***This change order is hereby incorporated into and becomes a part of the Contract.***

RECOMMENDED:

\_\_\_\_\_  
(Project Manager / Preparer)

By:

\_\_\_\_\_  
(Division Approval)

\_\_\_\_\_  
(Signature) (Date)

By:

\_\_\_\_\_  
(Department Head) (Date)

APPROVED:

By:

\_\_\_\_\_  
(Finance Department) (Date)

By:

\_\_\_\_\_  
(Procurement Department) (Date)

By:

\_\_\_\_\_  
(Mario A. Diaz, City Manager) (Date)



**Alternate Contract Source (ACS)  
No. 78181701-21-NASPO-ACS  
For  
Fuel Card Services**

This Alternate Contract Source (“ACS” or “Contract”) No. 78181701-21-NASPO-ACS; for Fuel Card Services, is between the Department of Management Services (Department), an agency of the State of Florida (State), located at 4050 Esplanade Way, Tallahassee, FL 32399 and WEX Bank, 1 Hancock Street, Portland, Maine 04101 (Contractor), registered to do business in Florida as Wex Inc., collectively referred to herein as the “Parties.”

**WHEREAS**, the Department is authorized by section 287.042(16), Florida Statutes:

To evaluate contracts let by the Federal Government, another state, or a political subdivision for the provision of commodities and contract services, and, if it is determined in writing to be cost-effective and in the best interest of the state, to enter into a written agreement authorizing an agency to make purchases under such contract;

**WHEREAS**, the Department evaluated the Master Agreement and determined that use of the Master Agreement is cost-effective and in the best interest of the State.

**NOW THEREFORE**, in consideration of the mutual promises contained herein, the receipt and sufficiency of which are hereby acknowledged, the Parties agree as follows:

**1. Term and Effective Date.**

The Master Agreement became effective October 1, 2020, and its term currently ends on December 31, 2025. The Master Agreement has five years of renewals available. The ACS will become effective on April 6, 2021, or on the date signed by all Parties, whichever is later. The ACS will expire on December 31, 2025, unless terminated earlier or renewed in accordance with Exhibit B, Special Contract Conditions.

**2. Order of Precedence.**

This Contract document and the attached exhibits constitute the Contract and the entire understanding of the Parties. Exhibit A, Exhibit B, Exhibit C, and this Contract document constitute the Participating Addendum to the Master Agreement, and modify or supplement the terms and conditions of the Master Agreement (Exhibit D). All exhibits

**Alternate Contract Source (ACS)  
No. 78181701-21-NASPO-ACS  
For  
Fuel Card Services**

listed below are incorporated by reference into, and form part of, this Contract. In the event of a conflict, the following order of precedence shall apply:

- a) This ACS document and amendments, with the latest issued having priority.
- b) Exhibit A: Additional Special Contract Conditions (Florida)
- c) Exhibit B: Special Contract Conditions (Florida)
- d) Exhibit C: Schedule of Points and Fees
- e) Exhibit D: Cooperative Purchasing Master Agreement No. 00819, Fleet Card Services

Where the laws and regulations of a state other than the State of Florida are cited or referenced in the Master Agreement, such citation or reference shall be replaced by the comparable Florida law or regulation.

**3. National Annual Volume**

The National Annual Volume Incentive will be applied as an ancillary credit for each Customer.

**4. Purchases off this ACS.**

Upon execution of this ACS, agencies, as defined in section 287.012, Florida Statutes, may purchase products and services under this Contract. Any entity making a purchase off of this Contract acknowledges and agrees to be bound by the terms and conditions of this Contract. The Contractor shall adhere to the terms included in any contract or purchase orders issued pursuant to this Contract.

**5. Primary Contacts**

**Department's Contract Manager:**

Christopher McMullen  
Division of State Purchasing  
Florida Department of Management Services  
4050 Esplanade Way, Suite 360  
Tallahassee, Florida 32399-0950  
Telephone: (850) 922-9867  
Email: [Christopher.McMullen@dms.fl.gov](mailto:Christopher.McMullen@dms.fl.gov)

**Contractor's Contract Manager:**

Denise Baumgart  
Strategic Relationship Manager  
WEX Inc.  
1 Hancock Street  
Portland, ME 04101  
Telephone: (913) 538-6781  
Email: [denise.baumgart@wexinc.com](mailto:denise.baumgart@wexinc.com)

**Alternate Contract Source (ACS)  
No. 78181701-21-NASPO-ACS  
For  
Fuel Card Services**

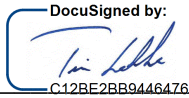
**6. Modifications.**

Any amendments to this Contract must be in writing and signed by the Parties. If amendments are made to the Master Agreement after the effective date of this Contract, the Contractor shall: 1) notify the Department of such amendments; and 2) provided the Department is amenable to incorporating the amendments into this Contract, enter into a written amendment with the Department reflecting the addition of such amendments to this Contract.

**IN WITNESS THEREOF**, the Parties hereto have caused this Contract to be executed by their duly authorized undersigned officials.

**CONTRACTOR  
Wex Bank**

DS  
ASR

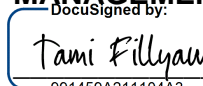
DocuSigned by:  
  
C12BE2BB9446476

**Tim Laukka, President**

4/5/2021 | 12:28 PM PDT

**Date:**

**STATE OF FLORIDA,  
DEPARTMENT OF  
MANAGEMENT SERVICES**

DocuSigned by:  
  
991459A211104A3

**Tami Fillyaw, Chief of Staff**

4/5/2021 | 5:35 PM EDT

**Date:**



**Consent Agenda  
9.12.**

City of North Miami Beach  
17011 NE 19 Avenue  
North Miami Beach, FL 33162  
305-947-7581  
www.citynmb.com

**MEMORANDUM**

---

<b>TO:</b>	Mayor and City Commission
<b>FROM:</b>	Juan Pinillos, Interim Chief of Police
<b>VIA:</b>	Mario A. Diaz, City Manager
<b>DATE:</b>	January 21, 2025

---

**RE:** Resolution No. R2025-11 Approving an Agreement with Florida Bullet, Inc. for the Sole Purchase of Ammunition (Juan Pinillos, Interim Chief of Police)

---

**Description**

**BACKGROUND  
ANALYSIS:**

The City of North Miami Beach Police Department relies on Florida Bullet, Inc. to supply duty ammunition for its officers' annual firearms qualifications, as well as for routine operations to ensure the safety of citizens and employees. Ammunition is a critical component in maintaining law enforcement preparedness and safety standards.

Florida Bullet, Inc. is the sole source distributor of Speer and Federal duty ammunition in the State of Florida. Given their exclusive distribution rights for these brands, all ammunition purchases for the Police Department must be made through this provider.

**RECOMMENDATION:** The NMB Police Department and Chief Procurement Officer recommend that the City Commission approve and authorize the City Manager or designee to approve the sole source purchase with Florida Bullet, Inc. an estimated budgeted amount of \$110,000 for the purchase of Speer and Federally duty ammunition.

**FISCAL/ BUDGETARY  
IMPACT:** As approved in the adopted budget appropriation.

---

**ATTACHMENTS:**

**Description**

- ☐ Florida Bullet\_Resolution
- ☐ Florida Bullet\_Solicitation

**RESOLUTION NO. R2025**

**A RESOLUTION OF THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA, APPROVING AND AUTHORIZING A PURCHASE ORDER WITH FLORIDA BULLET, INC. FOR THE SOLE SOURCE PURCHASE OF AMMUNITION IN AN ESTIMATED BUDGETED AMOUNT OF \$110,000.00, AUTHORIZING THE CITY MANAGER OR DESIGNEE TO DO ALL THINGS NECESSARY TO EFFECTUATE THIS RESOLUTION; SUBJECT TO THE BUDGET APPROPRIATION AND AVAILABILITY OF FUNDS; PROVIDING FOR CONFLICTS; PROVIDING FOR SCRIVENER ERRORS, PROVIDING FOR SEVERABILITY; AND PROVIDING FOR AN EFFECTIVE DATE.**

**WHEREAS**, pursuant to Chapter 166, *Florida Statutes* and Section 1.4 of the Charter of the City of North Miami Beach (“City”), the City shall have all available governmental, corporate, and proprietary powers and may exercise them except when prohibited by law; and

**WHEREAS**, Section 3-4.5 of the Code of Ordinances City of North Miami Beach, Florida 2008 (“Code”) provides that purchases of the following material and services shall be exempt from the bidding process and subject to the spending limitation provided in subsection 3-3.14a. “Sole Source Purchase”, which states “sole source supplies and services, such as unique, patented, or franchised supplies or services are exempt if the Purchasing Agent determines, after conducting a good faith review of available sources, that the particular supply or service is available from one (1) source;” and

**WHEREAS**, a Notice to Sole Source (Ref: NTS-24-049-KC), was published on the Periscope E-Procurement portal outlining the City’s intention to proceed with a sole-source procurement methodology for the purchase of ammunition from Florida Bullet, Inc. During that period, the City did not receive and/or could not substantiate the same products or services from alternate vendors. Florida Bullet is the only factory-authorized law enforcement distributor in the State of Florida for “Sinterfire” and “Speer” ammunition, and the only distributor authorized for drop shipments directly from the factory ; and

**WHEREAS**, the NMB Police Department (“NMBPD”) uses duty ammunition during the recertification of its officers at the Annual Firearms Qualifications. Ammunition is required also in daily operations to ensure the safety of employees and citizens; and

**WHEREAS**, the NMBPD, upon conducting an intensive review of the Federal Bureau of Investigations (FBI) testing protocols, has determined that the spear bonded and federally bonded ammunition provided by Florida Bullet, Inc. meets and exceeds the FBI’s standards.

**WHEREAS**, Section 3-3.14 of the City’s Code of Ordinances provides that contracts in excess of fifty thousand dollars (\$50,000.00) shall be awarded by the City Commission; and

**WHEREAS**, the City Manager and the Chief Procurement Officer recommend that the City Commission approve a purchase order in an estimated budgeted amount of \$110,000.00 for the sole source purchase of ammunition from Florida Bullet, Inc.; and

**RESOLUTION NO. R2025-X**



**WHEREAS**, the Mayor and City Commission believe it is in the best interests of the City to approve a purchase order in an estimated budgeted amount of \$110,000.00 for the sole source purchase of ammunition from Florida Bullet, Inc.; and

**NOW, THEREFORE, BE IT RESOLVED** by the Mayor and City Commission of the City of North Miami Beach, Florida, that:

**Section 1.** The foregoing whereas clauses are true and correct and adopted as the legislative and administrative findings of the City Commission and made a specific part of this Resolution; all exhibits attached hereto are made a specific part of this Resolution.

**Section 2.** The sole source purchase, in substantially the form attached as Exhibit "A", for the purchase of ammunition with Florida Bullets, Inc. for an estimated budgeted amount of \$110,000.00, subject to budget appropriation and availability of funds is approved.

**Section 3.** The City Manager or designee is authorized to do all things necessary to effectuate this Resolution.

**Section 4.** All Resolutions or parts of Resolutions in conflict with this Resolution are repealed to the extent of such conflict.

**Section 5.** Any scrivener or typographical errors that do not affect intent may be corrected with notice to, and the authorization of the City Attorney and City Manager without further process.

**Section 6.** If any provision of this Resolution or the application thereof to any person or circumstance is held invalid, such invalidity shall not affect other provisions or applications of this Resolution that can be given effect without the invalid provision or application, and to this end the provisions of this Resolution are declared to be severable.

**Section 7.** This Resolution shall take effect immediately upon adoption.

**[THE REMAINDER OF THIS PAGE INTENTIONALLY LEFT BLANK]**

**APPROVED AND ADOPTED** by the City of North Miami Beach City Commission at the regular meeting assembled this **21<sup>st</sup> day of January 2025**.

ATTEST:

\_\_\_\_\_  
ANDRISE BERNARD, MMC  
CITY CLERK

\_\_\_\_\_  
MICHAEL JOSEPH  
MAYOR

(CITY SEAL)

APPROVED AS TO FORM AND LEGAL SUFFICIENCY FOR THE USE  
AND RELIANCE OF THE CITY OF NORTH MIAMI BEACH ONLY:

GREENSPOON MARDER, LLP.

By: \_\_\_\_\_  
CITY ATTORNEYS

Sponsored by: Mayor & Commission

**EXHIBIT A**

**Solicitation NTS-24-049-KC**

**Purchase of Speer and Federal Bonded Ammunition from  
Florida Bullet, Inc.**

**Bid Designation: Public**



**City of North Miami Beach**

## Bid NTS-24-049-KC

### Purchase of Speer and Federal Bonded Ammunition from Florida Bullet, Inc.

Bid Number           **NTS-24-049-KC**

Bid Title             **Purchase of Speer and Federal Bonded Ammunition from Florida Bullet, Inc.**

Bid Start Date       **Dec 16, 2024 5:45:12 PM EST**

Bid End Date         **Dec 23, 2024 2:00:00 PM EST**

Bid Contact          **Kemesia Clarke**  
                          **Purchasing Specialist**

**Description**

This is not a Request for Proposals and there is no solicitation available. The proposed contract action is for product or services for which the City intends to negotiate and award with only one source under the authority of the City of North Miami Beach City Code Section 3-4.8. Any responses received as a result of this Notice of Intent shall be considered solely for the purpose of determining whether to conduct a competitive procurement. Responses will not be considered as proposals, bids, or quotes.

The City of North Miami Beach, Florida intends to negotiate a Sole Source procurement:

**Request Department/Office:** NMB Police Department

**Product and/or services to be purchased:** Purchase of Speer and Federal Bonded Ammunition from Florida Bullet, Inc.

**Anticipated Cost:** \$109,256.40

**Sole Source Justification:** Florida Bullet, Inc. is the sole source distributor of Speer and Federal duty ammunition in the State of Florida.

**Active to be Taken:** Interested firms or individuals may identify their interest and capability to respond to the requirement by submitting in writing their name, address, point of contact, telephone number, email, and a statement regarding capability to provide the specified procurement per the attached specifications. Interested firms will be considered only if they respond with clear and convincing documentation that they are capable of meeting or exceeding the requirements stated herein. All responses received within seven (7) calendar days after the date of publication of this synopsis will be reviewed by the City. A determination by the Chief Procurement Officer & sourcing Buyer II not to compete this proposed action based on the responses to this notice is solely within the discretion of the Chief Procurement Officer.

**All responses must be in writing and returned to ATTN:** City of North Miami Beach, 17011 NE 19th Ave., Suite 315, North Miami Beach, FL 33162 by: e-mail to [bids@citynmb.com](mailto:bids@citynmb.com) . Note the number of the Sole Source Information inquiry on documentation.



## Notice of Intent to Award a Sole Source Procurement

**Subject:** Purchase of Speer & Federal bonded duty ammunition from Florida Bullet, Inc.

**Document Number:** NTS-24-049-KC

**Date:** December 16, 2024

**Written Response Due:** December 23, 2024

**Time:** 2:00 PM EST

**E-mail Address:** bids@citynmb.com

This is not a Request for Proposals and there is no solicitation available. The proposed contract action is for product or services for which the City intends to negotiate and award with only one source under the authority of the City of North Miami Beach City Code Section 3-4.8. Any responses received as a result of this Notice of Intent shall be considered solely for the purpose of determining whether to conduct a competitive procurement. Responses will not be considered as proposals, bids, or quotes.

The City of North Miami Beach, Florida intends to negotiate a Sole Source procurement:

**Request Department/Office:** NMB Police Department

**Product and/or services to be purchased:** Purchase of Speer & Federal bonded duty ammunition from Florida Bullet, Inc.

**Anticipated Cost:** \$109,256.40

**Sole Source Justification:** Florida Bullet, Inc. is the sole source distributor of Speer and Federal duty ammunition in the State of Florida.

**Active to be Taken:** Interested firms or individuals may identify their interest and capability to respond to the requirement by submitting in writing their name, address, point of contact, telephone number, email, and a statement regarding capability to provide the specified procurement per the attached specifications. Interested firms will be considered only if they respond with clear and convincing documentation that they are capable of meeting or exceeding the requirements stated herein. All responses received within seven (7) calendar days after the date of publication of this synopsis will be reviewed by the City. A determination by the Chief Procurement Officer & sourcing Buyer II not to compete this proposed action based on the responses to this notice is solely within the discretion of the Chief Procurement Officer.

**All responses must be in writing and returned to ATTN:** City of North Miami Beach, 17011 NE 19<sup>th</sup> Ave., Suite 315, North Miami Beach, FL 33162 by: e-mail to [bids@citynmb.com](mailto:bids@citynmb.com). Note the number of the Sole Source Information inquiry on documentation.



SOLE SOURCE REQUEST FORM

PROCUREMENT MANAGEMENT DIVISION

TO: Mario A. Diaz
City Manager

VIA: Chief Procurement Officer

FROM: Richard C. Slusher II (Name)
Police (Department)

DATE: 12-5-24

RE: Florida Bullet Inc. (Vista Outdoor Shooting Sports) Sole Source Letter

Annual Expenditure not to Exceed: \$ 109,256.40 Vendor # 495877

Section 3-4.5 Exemptions for Bidding, Purchase of the following materials and services shall be exempt from the bidding process and subject to the spending limitations provided in subsection 3-3.14, unless otherwise provided by State law: a. Sole source purchases. Sole-source supplies and services, such as unique, patented, or franchised supplies or services, are exempt if the Purchasing Agent determines, after conducting a good faith review of available sources, that the particular supply or service is available from only one (1) source.

Sole Source Justification: 3-4.8 Sole Source Purchasing. Department heads may recommend purchase of a part, commodity, or service from a sole source supplier after a reasonable search has been made to find other suppliers. The recommendation shall include a written justification documenting the potential vendors contacted, and the results. The Purchasing Agent shall either confirm the lack of additional suppliers or inform the Department of potential suppliers.

The Police Department has reviewed and researched the manufacturing of bullet designs. With this research, the duty ammunition of all sworn personnel will be a "bonded" round. Bonding a round is when the lead core is bonded to the copper jacket of a bullet which prevents separation and fragmentation. The Police Department also adheres to minimum penetration protocols for a round to be 12" - 18", as standardized by the Federal Bureau of Investigations (FBI). Our research has found that the Speer Bonded and Federal Bonded ammunition meets and exceeds these standards.

Approved Date

Chief Procurement Officer (Up to \$25,000)

\_\_\_\_\_

Mario A. Diaz, City Manager (Up to \$50,000)

\_\_\_\_\_

Purchases exceeding \$50,000.00 will be placed on the next Commission Agenda pending Procurement review.



**PROCUREMENT EXPLANATION MEMO**

PROCUREMENT MANAGEMENT DIVISION

TO: **Mario A. Diaz**, *City Manager*

VIA: Chief Procurement Officer

FROM: Richard C. Slusher II  
Name  
Training Coordinator/Police  
Title/Department

DATE: 12-5-24

RE: Florida Bullet Inc. (Vista Outdoor Shooting Sports) Sole Source Letter

**Fiscal Amount not to Exceed:** \$ 109,256.40

**Vendor #** 495877

**Purpose (How does it align with City NMB Strategic Plan?):**

Each year the officers of the Police Department cycle through their duty ammunition while at their Annual Firearms Qualifications. Ammunition is needed in daily operations and to ensure the citizens and employees are safe in the event of a deadly force situation.

**Background:**

The Police Department has reviewed and researched the manufacturing of bullet designs. With this research, the duty ammunition of all sworn personnel will be a "bonded" round. Bonding a round is when the lead core is bonded to the copper jacket of a bullet, which prevents separation and fragmentation. The Police Department also adheres to minimum penetration protocols for a round to be 12" - 18", as standardized by the Federal Bureau of Investigation (FBI).

**Recommendation:**

It is my recommendation to purchase Speer Bonded and Tactical Bonded duty ammunition through the Sole Source Distributor, Florida Bullet Inc. Vista Outdoor Shooting Sports is owned by Florida Bullet Inc.

**Fiscal Impact / Account Number(s):**

\$109,256.40 / 010510521520

**Contact Person(s):**

NMBPD Training Coordinator: Richard C. Slusher II: Richard.Slusher@nmbpd.org: 954-802-7339 Cell



**Florida Bullet, Inc.**

P.O. Box 1122  
 Oldsmar, FL 34677-1122  
 V:(727) 461-6081 F:(727) 441-4477

**QUOTATION**

Date	FL Bullet Rep	Number
12/2/2024	AA	9046

Name / Address
North Miami Beach Police Dept Attn: ACCOUNTS PAYABLE 16901 NE 19th Avenue North Miami Beach, FL 33162



Item	Description	Qty	Rate	Total
SF45155GL(LP)	Sinterfire, Training 45ACP 155 grain Frangible Lead Free, 1,000 Rds. bulk	60	679.90	40,794.00
53966	Speer Bonded Duty, 45 ACP, 230 Gr, GDHP, Per 1,000 Rds	8	519.90	4,159.20
SF22355GL(LP)	Sinterfire, 223/55 grain, Frangible, Lead Free Primer, 1,000 BULK	36	680.90	24,512.40
LE223T3	Federal Tactical Bonded Duty, 223 Rem, 62 Gr, Bonded SP, Per 200 Rds	40	309.90	12,396.00
SF40125GL(LP)	Sinterfire, Training 40 S&W 125 grain Frangible Lead Free, 1,000 Rds. bulk	1	599.90	599.90
SF9100GL(LP)	Sinterfire, Training 9mm 100 grain Frangible Lead Free, 1,000 Rds. bulk	8	509.90	4,079.20
53619	Speer Bonded Duty, 9mm, 147 Gr, GDHP Per 1,000 Rds	3	406.90	1,220.70
LE308TT2	Federal Tactical Bonded Duty, 308 Win, 168 Gr, Tactical Bonded Tip, Per 200 Rds - IN STOCK<<<<<<	50	429.90	21,495.00
Shipping & Delive...	SPEER & FEDERAL - Shipping and Handling - Ground: Free when ordering 3 cases or more from the manufacturer - Does Not Include Lift Gate or Inside Delivery.*	1	0.00	0.00
Shipping & Delive...	SINTERFIRE - Shipping and Handling - Ground: Free when ordering 3 cases or more from the manufacturer - Does Not Include Lift Gate or Inside Delivery.*	1	0.00	0.00
Shipping & Handl...	Shipping & Handling Fee* - FOR ITEMS MARKED "IN STOCK"	1	0.00	0.00
Please contact Andy Anderson with any questions or concerns (727) 461-6081.			<b>Total</b>	



**Florida Bullet, Inc.**

P.O. Box 1122  
 Oldsmar, FL 34677-1122  
 V:(727) 461-6081 F:(727) 441-4477

QUOTATION		
Date	FL Bullet Rep	Number
12/2/2024	AA	9046

Name / Address
North Miami Beach Police Dept Attn: ACCOUNTS PAYABLE 16901 NE 19th Avenue North Miami Beach, FL 33162



Item	Description	Qty	Rate	Total
	>>>>>DO NOT PAY - THIS IS NOT AN INVOICE<<<<<<  *ANY CHANGES MADE TO AN ORDER AFTER IT HAS SHIPPED (destination address, lift gate, etc.) WILL INCUR ADDITIONAL FEES THAT WILL BE CHARGED TO YOUR ACCOUNT WITHOUT NOTICE - CHANGES MADE BEFORE AN ORDER SHIPS WILL NOT - LIFTGATE CHARGE IS \$50.00  **PLEASE VERIFY "SHIP TO" ADDRESSES ON YOUR PURCHASE ORDERS - FLORIDA BULLET IS NOT RESPONSIBLE FOR INCORRECT "SHIP TO" ADDRESSES  ***THIS QUOTATION CONTAINS ITEMS THAT ARE "IN STOCK," THEREFORE IT EXPIRES IN 7 DAYS - THE PRICING EXPIRES 30 DAYS AFTER THE QUOTATION DATE  Richard.Slusher@nmbpd.org; Jose.Maya@nmbpd.org			
Please contact Andy Anderson with any questions or concerns (727) 461-6081.			<b>Total</b>	\$109,256.40



January 31, 2024

TO: Whom It May Concern,

RE: FL - Authorized Distributors

This letter is to serve as a notice that Florida Bullet in Oldsmar, FL is currently the only authorized “exclusive” Law Enforcement Ammunition Distributor for the State of Florida for Federal and Speer Ammunition.

Presently, Florida Bullet is the only Law Enforcement Ammunition Distributor authorized to dropship factory ammunition within Florida to Law Enforcement Agencies.

Please contact me if you have any questions.

Respectfully,

A handwritten signature in black ink, appearing to read "R. Watkins", with a long horizontal flourish extending to the right.

Randall D. Watkins  
Director, LE Sales - West  
USMC Ret.  
Mobile: 512-549-9646  
[Randall.Watkins@VistaOutdoor.com](mailto:Randall.Watkins@VistaOutdoor.com)

**FEDERAL**  **PREMIUM**  
LAW ENFORCEMENT

**SPEER** **LE** *Remington*



March 19, 2024

To whom it may concern:

Florida Bullet is currently the only factory authorized Law Enforcement Distributor in the State of Florida for SinterFire ammunition.

Florida Bullet is currently the only Law Enforcement Distributor authorized for drop shipments directly from the factory within Florida.

Thank you for your interest in our products.

Sincerely,

A handwritten signature in black ink, appearing to read 'GB', is written over a horizontal line.

Greg Benini  
Director of Sales  
SinterFire, Inc.

---

200 Industrial Park Road Kersey, PA 15846    Tel: 814.885-6672    Cell: 814-335-4581    Fax: 814.885.6673  
gbenini@sinterfire.com  
[www.sinterfire.com](http://www.sinterfire.com)

## Question and Answers for Bid #NTS-24-049-KC - Purchase of Speer and Federal Bonded Ammunition from Florida Bullet, Inc.

### Overall Bid Questions

There are no questions associated with this bid.



**Consent Agenda  
9.13.**

City of North Miami Beach  
17011 NE 19 Avenue  
North Miami Beach, FL 33162  
305-947-7581  
www.citynmb.com

**MEMORANDUM**

---

<b>TO:</b>	Mayor and City Commission
<b>FROM:</b>	Andy Plotkin, Assistant City Manager/Parks and Recreation Director
<b>VIA:</b>	Mario A. Diaz, City Manager
<b>DATE:</b>	January 21, 2025

---

Resolution No. R2025-12 Approving an Agreement with TriNova, Inc. for the Purchase of Pumps,  
**RE:** Flow Meters, Pressure Sensors and Transmitters and more for NMB Water Production (Hamid Nikvan,  
NMB Water Director)

---

**Description**

The City of North Miami Beach utilizes TriNova, Inc. for the purchase of essential equipment, including pumps, flow meters, pressure sensors and transmitters, and related products. Additionally, TriNova provides calibration and maintenance services for testing instruments used in routine operations at the Water Plant.

**BACKGROUND  
ANALYSIS:**

TriNova, Inc. has been designated as the sole authorized representative in the State of Florida by several manufacturers, including ProMinent, Fluid Controls, Inc., Endress + Hauser, King Instruments Company, and Hardy Company. As such, all purchases of these products and services must be made through TriNova, Inc., as they are the exclusive provider for these goods and services in Florida.

A Notice to Sole Source (Ref: NTS-24-041-KC), was published on the Periscope E-Procurement portal on December 11, 2024, through December 17, 2024. During that period, the City did not receive or could not substantiate the same products or services from alternate vendors. The notice, outlined the City's intention to proceed with a sole-source procurement methodology for the purchase of pumps, parts, spares and services from TriNova, Inc.

**RECOMMENDATION:** The NMB Water Director and Chief Procurement Officer recommend that the City Commission approve and authorize the City Manager or designee to approve the Sole Source purchase with TriNova, Inc. in an annual amount subject to budget appropriation.

**FISCAL/ BUDGETARY**

**IMPACT:** As approved in the adopted budget appropriation.

---

**ATTACHMENTS:**

**Description**

- ▣ TriNova\_Resolution
- ▣ TriNova\_Solicitation

**RESOLUTION NO. 2025-XX**

**A RESOLUTION OF THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA, APPROVING AND AUTHORIZING A PURCHASE ORDERS WITH TRINOVA, INC FOR THE SOLE SOURCE PURCHASE OF PUMPS, PARTS, SPARES AND SERVICES SUBJECT TO ANNUAL BUDGET APPROPRIATION; AUTHORIZING THE CITY MANAGER OR DESIGNEE TO DO ALL THINGS NECESSARY TO EFFECTUATE THIS RESOLUTION; PROVIDING FOR CONFLICTS; PROVIDING FOR SCRIVENER ERRORS, PROVIDING FOR SEVERABILITY; AND PROVIDING FOR AN EFFECTIVE DATE.**

**WHEREAS**, pursuant to Chapter 166, *Florida Statutes* and Section 1.4 of the Charter of the City of North Miami Beach (“City”), the City shall have all available governmental, corporate, and proprietary powers and may exercise them except when prohibited by law; and

**WHEREAS**, Section 3-4.5 of the City’s Code of Ordinances provides that purchases of the following material and services shall be exempt from the bidding process and subject to the spending limitation provided in subsection 3-3.14a. Sole Source purchase. Sole source supplies and services, such as unique, patented, or franchised supplies or services are exempt if the Purchasing Agent determines, after conducting a good faith review of available sources, that the particular supply or service is available from one (1) source; and

**WHEREAS**, A Notice to Sole Source (Ref: NTS-24-041-KC), was published on the Periscope E-Procurement portal outlining the City’s intention to proceed with a sole-source procurement methodology for the purchase of pumps, parts, spares and services from TriNova, Inc. During that period, the City did not receive and/or could not substantiate the same products or services from alternate vendors.

**WHEREAS**, the NMB Water Department requests to purchase calibration and maintenance services, replacement pumps, parts, sensors, transmitters and more for daily operations of the water and wastewater facilities; and

**WHEREAS**, Trinova, Inc (“Trinova”) is the sole authorized representative in the State of Florida for the purchase of new products and services through ProMinent Fluid Controls, Inc., Endress + Hauser, King Instrument Company, and Hardy Instrument Company. All the equipment and services would be purchased through this Sole source vendor; and

**WHEREAS**, pursuant to Section 3-3.14 of the City Code, the City Manager has the authority to approve purchases and awards up to fifty thousand dollars (\$50,000), and any expenditures above this amount need to be presented to the Mayor and City Commission for approval; and

**WHEREAS**, the City Manager and the Chief Procurement Officer recommend that the City Commission approve sole source purchases with TriNova, Inc. for pumps, parts, spares and services subject to annual budget appropriation; and

**RESOLUTION NO. 2025-XX**

**WHEREAS**, the Mayor and City Commission believe it is in the best interests of the City to approve sole source purchases with TriNova, Inc., for pumps, parts, spares and services subject to annual budget appropriation.

**NOW, THEREFORE, BE IT RESOLVED BY THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA, THAT:**

**Section 1.** The foregoing whereas clauses are true and correct and adopted as the legislative and administrative findings of the City Commission and made a specific part of this Resolution; all exhibits attached hereto are made a specific part of this Resolution.

**Section 2.** The approval of the sole source purchase with Trinova, Inc., in substantially the form attached as “Exhibit A”, for the purchase of pumps, parts, spares and services subject to annual budget appropriation, is hereby approved.

**Section 3.** The City Manager or designee is authorized to do all things necessary to effectuate this Resolution.

**Section 4.** All Resolutions or parts of Resolutions in conflict with this Resolution are repealed to the extent of such conflict.

**Section 5.** Any scrivener or typographical errors that do not affect intent may be corrected with notice to, and the authorization of the City Attorney and City Manager without further process.

**Section 6.** If any provision of this Resolution or the application thereof to any person or circumstance is held invalid, such invalidity shall not affect other provisions or applications of this Resolution that can be given affect without the invalid provision or application, and to this end the provisions of this Resolution are declared to be severable.

**Section 7.** This Resolution shall take effect immediately upon adoption.

**[THE REMAINDER OF THIS PAGE INTENTIONALLY LEFT BLANK]**



**APPROVED AND ADOPTED** by the City of North Miami Beach City Commission at the regular meeting assembled this **21<sup>st</sup> day of January 2025**.

ATTEST:

\_\_\_\_\_  
ANDRISE BERNARD, MMC  
CITY CLERK

\_\_\_\_\_  
MICHAEL JOSEPH  
MAYOR

(CITY SEAL)

APPROVED AS TO FORM AND LEGAL SUFFICIENCY FOR THE USE  
AND RELIANCE OF THE CITY OF NORTH MIAMI BEACH ONLY:

GREENSPOON MARDER, LLP.

By: \_\_\_\_\_  
CITY ATTORNEYS

Sponsored by: Mayor & Commission

**RESOLUTION NO. 2025-XX**

**EXHIBIT A**

**Solicitation NTS-24-041-KC**

**Purchase of Pumps, Parts, Spares & Services from TriNova  
Inc.**

**Bid Designation: Public**



**City of North Miami Beach**

## Bid NTS-24-041-KC

### Purchase of Pumps, Parts, Spares & Services from TriNova Inc.

Bid Number           **NTS-24-041-KC**

Bid Title              **Purchase of Pumps, Parts, Spares & Services from TriNova Inc.**

Bid Start Date       **Dec 11, 2024 11:43:19 AM EST**

Bid End Date         **Dec 17, 2024 2:00:00 PM EST**

Bid Contact          **Kemesia Clarke**  
**Purchasing Specialist**

#### **Description**

This is not a Request for Proposals and there is no solicitation available. The proposed contract action is for product or services for which the City intends to negotiate and award with only one source under the authority of the City of North Miami Beach City Code Section 3-4.8. Any responses received as a result of this Notice of Intent shall be considered solely for the purpose of determining whether to conduct a competitive procurement. Responses will not be considered as proposals, bids, or quotes.

The City of North Miami Beach, Florida intends to negotiate a Sole Source procurement:

**Request Department/Office:** NMB Water

**Product and/or services to be purchased:** Purchase of Pumps, Parts, Spares & Services from TriNova Inc.

**Anticipated Cost:** \$160,901.67

**Sole Source Justification:** The Norwood Water Plant needs to purchase replacement pump and parts, PH meter, flow meters, flow sensors, pressure sensors and transmitters. Testing instruments utilized for routine operations at the Water Plant requires critical calibration and maintenance services.

ProMinent Fluid Controls, Inc., Endress + Hauser, King Instrument Company, and Hardy Investment Company have appointed TriNova, Inc. as the sole or exclusive authorized representative in the State of Florida for the purchase of new products. Therefore, all purchase repair/replacement parts and maintenance service can only be done through the sole representative.

**Active to be Taken:** Interested firms or individuals may identify their interest and capability to respond to the requirement by submitting in writing their name, address, point of contact, telephone number, email, and a statement regarding capability to provide the specified procurement per the attached specifications. Interested firms will be considered only if they respond with clear and convincing documentation that they are capable of meeting or exceeding the requirements stated herein. All responses received within seven (7) calendar days after the date of publication of this synopsis will be reviewed by the City. A determination by the Chief Procurement Officer & sourcing Buyer II not to compete this proposed action based on the responses to this notice is solely within the discretion of the Chief Procurement Officer.

**All responses must be in writing and returned to ATTN:** City of North Miami Beach, 17011 NE 19<sup>th</sup> Ave., Suite 315, North Miami Beach, FL 33162 by: e-mail to bids@citynmb.com . Note the number of the Sole Source Information inquiry on documentation.



## Notice of Intent to Award a Sole Source Procurement

**Subject:** Purchase of Pumps, Parts, Spares & Services from TriNova Inc.

**Document Number:** NTS-24-041-KC

**Date:** December 10, 2024

**Written Response Due:** December 17, 2024

**Time:** 2:00 PM EST

**E-mail Address:** bids@citynmb.com

This is not a Request for Proposals and there is no solicitation available. The proposed contract action is for product or services for which the City intends to negotiate and award with only one source under the authority of the City of North Miami Beach City Code Section 3-4.8. Any responses received as a result of this Notice of Intent shall be considered solely for the purpose of determining whether to conduct a competitive procurement. Responses will not be considered as proposals, bids, or quotes.

The City of North Miami Beach, Florida intends to negotiate a Sole Source procurement:

**Request Department/Office:** NMB Water

**Product and/or services to be purchased:** Purchase of Pumps, Parts, Spares & Services from TriNova Inc.

**Anticipated Cost:** \$ 160,901.67

**Sole Source Justification:** The Norwood Water Plant needs to purchase replacement pump and parts, PH meter, flow meters, flow sensors, pressure sensors and transmitters. Testing instruments utilized for routine operations at the Water Plant requires critical calibration and maintenance services.

ProMinent Fluid Controls, Inc., Endress + Hauser, King Instrument Company, and Hardy Instrument Company have appointed TriNova, Inc. as the sole or exclusive authorized representative in the State of Florida for the purchase of new products. Therefore, all purchase repair/ replacement parts and maintenance service can only be done through the sole representative.

**Active to be Taken:** Interested firms or individuals may identify their interest and capability to respond to the requirement by submitting in writing their name, address, point of contact, telephone number, email, and a statement regarding capability to provide the specified procurement per the attached specifications. Interested firms will be considered only if they respond with clear and convincing documentation that they are capable of meeting or exceeding the requirements stated herein. All responses received within seven (7) calendar days after the date of publication of this synopsis will be reviewed by the City. A determination by the Chief Procurement Officer & sourcing Buyer II not to compete this proposed action based on the responses to this notice is solely within the discretion of the Chief Procurement Officer.

**All responses must be in writing and returned to ATTN: City of North Miami Beach, 17011 NE 19th Ave., Suite 315, North Miami Beach, FL 33162 by: e-mail to [bids@citynmb.com](mailto:bids@citynmb.com). Note the number of the Sole Source Information inquiry on documentation.**



SOLE SOURCE REQUEST FORM

PROCUREMENT MANAGEMENT DIVISION

TO: Mario A. Diaz
City Manager

VIA: Chief Procurement Officer

FROM: (Name) PM
(Department)

DATE:

RE:

Annual Expenditure not to Exceed: \$ Vendor #

Section 3-4.5 Exemptions for Bidding, Purchase of the following materials and services shall be exempt from the bidding process and subject to the spending limitations provided in subsection 3-3.14, unless otherwise provided by State law: a. Sole source purchases. Sole-source supplies and services, such as unique, patented, or franchised supplies or services, are exempt if the Purchasing Agent determines, after conducting a good faith review of available sources, that the particular supply or service is available from only one (1) source.

Sole Source Justification: 3-4.8 Sole Source Purchasing. Department heads may recommend purchase of a part, commodity, or service from a sole source supplier after a reasonable search has been made to find other suppliers. The recommendation shall include a written justification documenting the potential vendors contacted, and the results. The Purchasing Agent shall either confirm the lack of additional suppliers or inform the Department of potential suppliers.

[Empty rectangular box for justification text]

Approved Date

Chief Procurement Officer (Up to \$25,000)

Mario A. Diaz, City Manager (Up to \$50,000)

Purchases exceeding \$50,000.00 will be placed on the next Commission Agenda pending Procurement review.



**PROCUREMENT EXPLANATION MEMO**

*PROCUREMENT MANAGEMENT DIVISION*

TO: **Mario A. Diaz**, *City Manager*

VIA: Chief Procurement Officer

FROM: \_\_\_\_\_  
Name

*PM*

\_\_\_\_\_  
Title/Department

DATE: \_\_\_\_\_

RE: \_\_\_\_\_

Fiscal Amount not to Exceed: \$ \_\_\_\_\_

Vendor # \_\_\_\_\_

**Purpose (How does it align with City NMB Strategic Plan?):**

**Background:**

**Recommendation:**

**Fiscal Impact / Account Number(s):**

**Contact Person(s):**



Please address your order to:  
 TriNova Inc.  
 c/o Accounts Payable  
 4485 Laughlin Dr. S  
 Mobile, AL 36693  
 Tel: (251) 378-7837

Quote Number	
1308861	
Quote Date	Page
10/03/2024 13:33:47	1 of 6

Quote Expires On: 12/18/2024

**Bill To:**

City Of North Miami Beach  
 PS Norwood Plant  
 17050 NE 19TH AVE  
 North Miami Beach, FL 33162  
 US

**Ship To:**

City Of North Miami Beach  
 Nmb Norwood Water Plant  
 19150 Nw 8 Ave  
 Miami, FL 33169  
 US  
 Requested By: JESSE EMO

**Customer ID:** 12760

<i>Terms</i>	<i>Shipping</i>	<i>Customer Service Rep</i>
Net 30		ZACHARY.KAISER

<i>Quantities</i>			<i>Item ID</i> <i>Item Description</i>	<i>Unit Price</i>	<i>Extended Price</i>
<i>Line</i>	<i>QTY</i>	<i>UOM</i> <i>Unit Size</i>			

**Order Note:** Budgetary quote for 2025 Fiscal Year Blanket PO  
 Freight is not included. It will be added as a separate line item for each individual formal quote.

1	1.00	EA	HARDY PLACE HOLDER Hardy Project Quote	25,000.0000	25,000.00
---	------	----	---	-------------	-----------

Hardy

**Order Line Notes:** Ammonia Tank Scale system  
 Reference Number 61386

Includes:

- 8 load cells
- 2 junction box
- 2 transmitters
- all wiring necessary

SOW:  
 Start up and commissioning of the devices, does not include installation.

2	2.00	EA	5H5B15-CSINABAAGADBLDAA1SGAA1+CME B Promag H 500, 5H5B15, DN15 1/2"	7,359.4400	14,718.88
---	------	----	---	------------	-----------

Endress + Hauser

**Order Line Notes:** Ammonia Flow Meters

Reference Number: 2061232232





Please address your order to:  
 TriNova Inc.  
 c/o Accounts Payable  
 4485 Laughlin Dr. S  
 Mobile, AL 36693  
 Tel: (251) 378-7837

Quote Number	
1308861	
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Quote Expires On: 12/18/2024

Quantities			Item ID Item Description	Unit Price	Extended Price
Line	QTY	UOM Unit Size			
3	3.00	EA	5W5B2F-CSEINABAAGADALDUA1KGAA1+A AEB 10in Promag W500	9,134.0100	27,402.03
		1.0			

Endress + Hauser

**Order Line Notes:** RAW RO 10" Mag meters includes grounding rings and cables

4	1.00	EA	CPF81E-AA5LAD2 Memosens CPF81E	707.6000	707.60
		1.0			

Endress + Hauser

5	1.00	EA	CYK10-A051 APPLICATION: DIGITAL SENSORS WITH	287.8200	287.82
		1.0			

Endress + Hauser

6	4.00	EA	71412917 Kit CCS120/120D, maintenance set	566.6800	2,266.72
		1.0			

Endress + Hauser

7	3.00	EA	CYK10-A101 Meas. cable CYK10 Memosens	425.5600	1,276.68
		1.0			

Endress + Hauser

8	1.00	EA	CCS120D-AA21AE Memosens CCS120D	2,683.4500	2,683.45
		1.0			

Endress + Hauser



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 Tel: (251) 378-7837

Quote Number	
1308861	
Quote Date	Page
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Quote Expires On: 12/18/2024

Quantities			Item ID Item Description	Unit Price	Extended Price
Line	QTY	UOM Unit Size			
9	1.00	EA 1.0	CPF81E-AA5LAD2 Memosens CPF81E	877.0700	877.07
Endress + Hauser					
10	1.00	EA 1.0	CYK10-A051 APPLICATION: DIGITAL SENSORS WITH	251.0100	251.01
Endress + Hauser					
11	2.00	EA 1.0	7501339 100ml PVC Cal Col 1/2" SOC (SIG)	141.0000	282.00
ProMinent					
12	3.00	EA 1.0	7510-1-3-2A10 7510 King Rotameter	75.0000	225.00
King Instruments					
13	5.00	EA 1.0	1023112 ProMinent SPARE PARTS KIT GAMMA X	288.8900	1,444.45
SPARE PARTS KIT GAMMA X 0713 PVT					
ProMinent					
14	2.00	EA 1.0	1117459 Spare part set 0518 VPT (US)	202.7600	405.52
ProMinent					
15	1.00	EA	1115678	87.6720	87.67



Please address your order to:  
 TriNova Inc.  
 c/o Accounts Payable  
 4485 Laughlin Dr. S  
 Mobile, AL 36693  
 Tel: (251) 378-7837

Quote Number	
1308861	
Quote Date	Page
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Quote Expires On: 12/18/2024

Quantities			Item ID Item Description	Unit Price	Extended Price
Line	QTY	UOM Unit Size			
	1.0		Dosing head cover ass. DFXa V2		
			ProMinent		
16	1.00	EA	10428602	499.1700	499.17
		1.0	Miscellaneous Items		
			TriNova		
17	1.00	EA	791994	257.0000	257.00
		1.0	Prominent 15 Gal Tank for Polymer		
			ProMinent		
20	14.00	EA	1034678	836.6000	11,712.40
		1.0	ProMinent SPARE PARTS KIT FOR SIGMA3		
			ProMinent		
21	3.00	EA	SVC-TS-CHEMFEED	1,775.0000	5,325.00
		1.0	Chemical Feed Service		
			TriNova		
22	2.00	EA	XD64AB	1,775.0000	3,550.00
		1.0	On-site Calibration		
			TriNova		
23	1.00	EA	1136590	14,500.0000	14,500.00
		1.0	PROMIX S_dialog X 60x2-0.60TA		



Please address your order to:  
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 Tel: (251) 378-7837

Quote Number	
1308861	
Quote Date	Page
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Quote Expires On: 12/18/2024

<i>Quantities</i>			<i>Item ID</i> <i>Item Description</i>	<i>Unit Price</i>	<i>Extended Price</i>
<i>Line</i>	<i>QTY</i>	<i>UOM</i> <i>Unit Size</i>			
ProMinent					
24	1.00	EA 1.0	10430945 Piping and Fittings	440.0000	440.00
TriNova					
25	6.00	EA 1.0	37032 1/2" ID Clear PVC Hose w/ Fabric Reinfor	3.7000	22.20
ProMinent					
26	1.00	EA 1.0	MISC MISCELLANEOUS PARTS	600.0000	600.00
TriNova					
27	1.00	EA 1.0	SPILL CONTAINMENT 60 Gallon Capacity	850.0000	850.00
TriNova					
28	1.00	EA 1.0	SVC-TS-CHEM FEED Service on Chemical Feed Pumps/Skids	6,800.0000	6,800.00
Commissioning of Polymer system					
TriNova					
29	1.00	EA 1.0	CHEMFEEED PROJECT MANAGEMENT ...	530.0000	530.00



Please address your order to:  
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 c/o Accounts Payable  
 4485 Laughlin Dr. S  
 Mobile, AL 36693  
 Tel: (251) 378-7837

Quote Number	
1308861	
Quote Date	Page
10/03/2024 13:33:47	6 of 6

Quote Expires On: 12/18/2024

<i>Quantities</i>			<i>Item ID</i> <i>Item Description</i>	<i>Unit Price</i>	<i>Extended Price</i>
<i>Line</i>	<i>QTY</i>	<i>UOM</i> <i>Unit Size</i>			

TriNova

30	1.00	EA	SVC-TS-CHEMFEED	2,000.0000	2,000.00
		1.0	Chemical Feed Service		

Post Install Polymer PM/service visit

TriNova

Total Lines: 28

**SUB-TOTAL:** 125,001.67  
**TAX:** 0.00  
**AMOUNT DUE: \$ 125,001.67**



## LETTER OF APPOINTMENT

To Whom It May Concern:

Hardy Process Solutions, a California LLC, with its principal place of business being 10075 Mesa Rim Road, San Diego, CA 92121 hereby confirms that we have appointed:

Trinova Inc.  
2401 Drane Field Road  
Lakeland, FL 33811

as our Sales Representative being entitled to offer and to sell products manufactured and /or sold by Hardy Product Solutions.

This agreement is valid until further notice.

A handwritten signature in blue ink that reads "Tony Branch".

Tony Branch  
Hardy Product Solutions  
Interim President

October 2024

City of North Miami Beach  
Norwood Water Treatment Plant  
19150 NW 8th Ave Miami Garden FL 33169

Subject: Sole Source Representative

Endress+Hauser, is the sole manufacturer of its products. TriNova Inc is the sole or exclusive representative for Endress+Hauser within the state of Florida for the purchase of new products, OEM repair parts, repairs and maintenance.

No other representative can sell products, repair/replacement parts, provide factory maintenance, repair/replacement services, provide field services or offer technical support for Endress+Hauser.

The Florida Sales Team can be reached at:

TriNova Florida  
2401 Drane Field Road, Lakeland, FL33811  
800-881-1487  
floridasales@trinovainc.com

If you have questions regarding this issue, please contact Korey Toepel at 800-881-1487.



Best regards  
Chad Green

---

Regional Sales Manager | Gulf Region

Endress+Hauser USA

Endress+Hauser Inc. | 4485 Laughlin Drive South | Mobile, AL 36693 | United States  
Mobile: +1 205 908 5828  
[chad.green@endress.com](mailto:chad.green@endress.com) | [www.us.endress.com](http://www.us.endress.com)

4485 Laughlin Drive • Mobile, AL 36693 • Phone 251-378-7837

October 22, 2024

Carlos Carrazana  
Water Plant Manager, NMB Water  
Norwood Water Treatment Plant  
19150 NW 8<sup>th</sup> Ave,  
Miami Garden, FL 33169  
Phone: 786-586-8395  
Fax: 305-651-8277  
City of North Miami Beach

Dear Carlos,

ProMinent Fluid Controls, Inc. has appointed TriNova Inc.-Florida, as our authorized single source representative for the municipal market. TriNova Inc represents ProMinent Fluid Controls as a direct sales and service agent to local, county, and state governments and sales to contractors and/or system integrators on municipal projects, for the State of Florida, excluding the panhandle. To properly support ProMinent customers, TriNova personnel receives exclusive yearly factory training to keep up with the latest technologies.

TriNova Inc. – Florida’s corporate office is as follows:

TriNova Inc. - Florida  
2401 Drane Field Road  
Lakeland, FL 33811

Tel: 863-682-4500  
Fax: 863-687-0077  
Email: [FLSales@trinovainc.com](mailto:FLSales@trinovainc.com)

Very truly yours,  
PROMINENT FLUID CONTROLS, INC.

*Chad Kloft*

Chad Kloft  
Regional Sales Manager





12700 Pala Drive  
Garden Grove, CA 92841  
Phone (714) 891-0008  
Fax (714) 891-0023

## **Distribution of King Instrument Company Products**

Dear Customer-

With this letter we confirm that King Instrument Company has appointed:

**TRINOVA INC**  
**2401 Drane Field Road | Lakeland, FL 33811**

as an authorized distributor and reseller of King Instrument Company products.

Thank you,

*Adam Larsen*

Director of Sales

**King Instrument Company**

Phone: (714) 891-0008 ext. 108

Fax: (714) 891-0023



SOLE SOURCE REQUEST FORM

PROCUREMENT MANAGEMENT DIVISION

TO: Mario A. Diaz
City Manager

VIA: Chief Procurement Officer

FROM: (Name) (Department) with handwritten initials PM

DATE:

RE:

Annual Expenditure not to Exceed: \$ Vendor #

Section 3-4.5 Exemptions for Bidding, Purchase of the following materials and services shall be exempt from the bidding process and subject to the spending limitations provided in subsection 3-3.14, unless otherwise provided by State law: a. Sole source purchases. Sole-source supplies and services, such as unique, patented, or franchised supplies or services, are exempt if the Purchasing Agent determines, after conducting a good faith review of available sources, that the particular supply or service is available from only one (1) source.

Sole Source Justification: 3-4.8 Sole Source Purchasing. Department heads may recommend purchase of a part, commodity, or service from a sole source supplier after a reasonable search has been made to find other suppliers. The recommendation shall include a written justification documenting the potential vendors contacted, and the results. The Purchasing Agent shall either confirm the lack of additional suppliers or inform the Department of potential suppliers.

Large empty rectangular box for justification details.

Approved Date

Chief Procurement Officer (Up to \$25,000)

Mario A. Diaz, City Manager (Up to \$50,000)

Purchases exceeding \$50,000.00 will be placed on the next Commission Agenda pending Procurement review.



**PROCUREMENT EXPLANATION MEMO**

*PROCUREMENT MANAGEMENT DIVISION*

TO: **Mario A. Diaz**, *City Manager*

VIA: Chief Procurement Officer

FROM: \_\_\_\_\_  
Name  
\_\_\_\_\_  
Title/Department

*PM*

DATE: \_\_\_\_\_

RE: \_\_\_\_\_

Fiscal Amount not to Exceed: \$ \_\_\_\_\_ Vendor # \_\_\_\_\_

**Purpose (How does it align with City NMB Strategic Plan?):**

**Background:**

**Recommendation:**

**Fiscal Impact / Account Number(s):**

**Contact Person(s):**



Please address your order to:  
 TriNova Inc.  
 c/o Accounts Payable  
 4485 Laughlin Dr. S  
 Mobile, AL 36693  
 Tel: (251) 378-7837

Quote Number	
1313089	
Quote Date	Page
11/01/2024 10:43:16	1 of 1

Quote Expires On: 01/09/2025

**Bill To:**

City Of North Miami Beach  
 PS Norwood Plant  
 17050 NE 19TH AVE  
 North Miami Beach, FL 33162  
 US

**Ship To:**

City Of North Miami Beach  
 PS Norwood Plant  
 17050 NE 19TH AVE  
 North Miami Beach, FL 33162  
 US  
 Requested By: JESSE EMO

**Customer ID:** 12760

<i>Terms</i>	<i>Shipping</i>	<i>Customer Service Rep</i>
Net 30		PEDRO.OSORIO

<i>Quantities</i>			<i>Item ID Item Description</i>	<i>Unit Price</i>	<i>Extended Price</i>
<i>Line</i>	<i>QTY</i>	<i>UOM Unit Size</i>			

**Order Note:** 2025 City of NMB proposed Instrument calibration and repair contract

1	1.00	EA 1.0	SVC-TS-CALIBRATION Labor Charges to perform services	30,600.0000	30,600.00
2025 device count recommendation: 204					
2	1.00	EA 1.0	ON-DEMAND SERVICE on-demand repair labor	1,800.0000	1,800.00
Estimated annual repair hours: 20					
3	1.00	EA 1.0	1-YEAR SPARE PARTS Loose Spare Parts Network	1,000.0000	1,000.00
Estimated repair parts					

Total Lines: 3

**SUB-TOTAL:** 33,400.00  
**TAX:** 0.00  
**AMOUNT DUE: \$ 33,400.00**



People for Process Automation

Greenwood, 29, October 2024

**Endress+Hauser Representatives**

**Contact**

Leland Harris  
Service  
Telephone 317.464.7618  
Leland.harris@endress.com

To Whom it may concern,

Endress+Hauser USA uses sole exclusive authorized sales representation in the USA. TriNova is the sole authorized Endress+Hauser representative in your area. They hold an exclusive representative agreement with Endress+Hauser for coverage of municipal and industrial accounts in the above territory.

TriNova is also the Endress+Hauser authorized service provider for the states of Alabama, Mississippi, Florida, Louisiana, Tennessee, Arkansas, Puerto Rico, New York, Connecticut, Massachusetts, Rhode Island, Vermont, New Hampshire, and Maine. TriNova is the sole factory trained, certified and recommended service provider by Endress+Hauser for performing the necessary calibrations and verifications at our users' sites

Please address purchase orders to TriNova on Endress+Hauser's behalf, as they are our sole-source calibration partner.

Regards,

Leland Harris

Service Coordinator

Midwest Regional Center

**Endress+Hauser, Inc.**

2350 Endress Place

Greenwood, IN 46143

USA

## Question and Answers for Bid #NTS-24-041-KC - Purchase of Pumps, Parts, Spares & Services from TriNova Inc.

### Overall Bid Questions

There are no questions associated with this bid.



**Consent Agenda  
9.14.**

City of North Miami Beach  
17011 NE 19 Avenue  
North Miami Beach, FL 33162  
305-947-7581  
www.citynmb.com

**MEMORANDUM**

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<b>TO:</b>	Mayor and City Commission
<b>FROM:</b>	Juan Pinillos, Interim Chief of Police
<b>VIA:</b>	
<b>DATE:</b>	January 21, 2025

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**RE:** Resolution No. R2025-13 Approving a Mutual Aid Agreement with Miami Dade County Association of Chiefs of Police (Juan Pinillos, Interim Chief of Police)

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**Description**

**BACKGROUND**

**ANALYSIS:**

**RECOMMENDATION:**

**FISCAL/ BUDGETARY**

**IMPACT:**

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**ATTACHMENTS:**

**Description**

- Agenda Memo
- MutualAid\_Resolution
- MutualAid\_Agreement



# ***City of North Miami Beach, Florida***

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## **Police Department**

Memorandum No. \_\_\_\_\_

Date: December 30, 2024

To: Marline Monestime, Chief of Staff

From: Juan Pinillos, Interim Chief of Police *J.P. #258*

Subject: Consent Agenda Addition of MDCACP MAA for January Commission Meeting

The purpose of this memorandum is to respectfully request that the entry of the attached mutual aid agreement (MAA) be added to the Consent Agenda for the Commission Meeting that will be held on Tuesday, January 21, 2025. Please note that the executed MAA requires a submission deadline of December 31, 2024, by the Miami-Dade County Associations of Chiefs or Police (MDCACP) from all Miami-Dade County police agencies. Please note that this process has been previously approved by City Manager Mario Diaz.

With that said, the MAA will be submitted electronically to the MDCACP to avoid any issues, and this item will go before the Mayor and Commission to be ratified at the upcoming Commission Meeting for January 2025. I have attached a copy of the MAA for reference accordingly.

Should you have any questions or concerns, please do not hesitate to contact me at extension 2584.

JP/sj  
Attachment



**RESOLUTION NO. 2025-XX**

**A RESOLUTION OF THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA, APPROVING THE MDCACP MUTUAL AID AGREEMENT BETWEEN THE SIGNATORY LAW ENFORCEMENT AGENCIES, INCLUDING THE CITY OF NORTH MIAMI BEACH, AND THE CONSTITUTIONAL SHERIFF'S OFFICE; AUTHORIZING THE CITY MANAGER OR DESIGNEE TO DO ALL THINGS NECESSARY TO EFFECTUATE THIS RESOLUTION; PROVIDING FOR CONFLICTS; PROVIDING FOR SCRIVENER ERRORS, PROVIDING FOR SEVERABILITY; AND PROVIDING FOR AN EFFECTIVE DATE.**

**WHEREAS**, the Mayor and City Commission of the City of North Miami Beach determine it is in the best interests of the City of North Miami Beach to approve the MDCACP Mutual Aid Agreement between the Signatory Law Enforcement Agencies, including the City of North Miami Beach, and the Constitutional Sheriff's Office attached hereto as Exhibit A; and

**NOW, THEREFORE, BE IT RESOLVED BY THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA, THAT:**

**Section 1.** The foregoing whereas clauses are true and correct and adopted as the legislative and administrative findings of the City Commission and made a specific part of this Resolution; all exhibits attached hereto are made a specific part of this Resolution.

**Section 2.** The Mayor and City Commission approve the MDCACP Mutual Aid Agreement between the Signatory Law Enforcement Agencies, including the City of North Miami Beach, and the Constitutional Sheriff's Office attached as Exhibit A.

**Section 3.** The City Manager or designee is authorized to do all things necessary to effectuate this Resolution.

**Section 4.** All Resolutions or parts of Resolutions in conflict with this Resolution are repealed to the extent of such conflict.

**Section 5.** Any scrivener or typographical errors that do not affect intent may be corrected with notice to, and the authorization of the City Attorney and City Manager without further process.

**Section 6.** If any provision of this Resolution or the application thereof to any person or circumstance is held invalid, such invalidity shall not affect other provisions or applications of this Resolution that can be given effect without the invalid provision or application, and to this end the provisions of this Resolution are declared to be severable.

**RESOLUTION NO. 2025-XX**

**Section 7.** This Resolution shall take effect immediately upon adoption.

**APPROVED AND ADOPTED** by the City of North Miami Beach City Commission at the regular meeting assembled this \_\_\_\_ **day of January 2025.**

ATTEST:

\_\_\_\_\_  
ANDRISE BERNARD, MMC  
CITY CLERK

\_\_\_\_\_  
MICHAEL JOSEPH  
MAYOR

(CITY SEAL)

APPROVED AS TO FORM AND LEGAL SUFFICIENCY FOR THE USE  
AND RELIANCE OF THE CITY OF NORTH MIAMI BEACH ONLY:

GREENSPOON MARDER LLP

By: \_\_\_\_\_  
JOSEPH S. GELLER  
CITY ATTORNEYS

**RESOLUTION NO. 2025-XX**

**MIAMI-DADE COUNTY ASSOCIATION OF CHIEFS OF POLICE  
COMBINED VOLUNTARY COOPERATION AND OPERATIONAL ASSISTANCE  
MUTUAL AID AGREEMENT IN AND BETWEEN THE SIGNATORY LAW  
ENFORCEMENT AGENCIES**

This Voluntary Cooperation and Operational Assistance Mutual Aid Agreement (“Agreement”) is made by and between the Signatory Law Enforcement Agencies, including the municipal governments / corporations / political subdivisions located within Miami-Dade County and the Constitutional Sheriff’s Office for Miami-Dade County, each having principal offices at the locations designated in their signature panels. The Signatory Law Enforcement Agencies state as follows:

**WHEREAS**, it is the responsibility of the municipal governments / corporations / political subdivisions located within the boundaries of Miami-Dade County, Florida, and of the Miami-Dade County Sheriff’s Office to ensure the public safety and welfare of their citizens by providing adequate levels of public safety and police services to address any foreseeable routine / emergency situation; and

**WHEREAS**, there exists a continuing possibility of the occurrence of situations / issues, and other natural / manmade conditions that require law enforcement response which are, or are likely to be, beyond the control of the capabilities, services, personnel, equipment or facilities of one or more of the Signatory Law Enforcement Agencies; and

**WHEREAS**, the Signatory Law Enforcement Agencies must ensure their preparations and operations will be adequate to address any and all of these conditions, to protect the public peace, safety and security, and to preserve the lives and property of the people of Miami-Dade County, Florida and of the municipal governments / corporations / political subdivisions located within Miami-Dade County; and

**WHEREAS**, the Signatory Law Enforcement Agencies are so located in relation to each other that it is in the best interest and advantage of each to receive and extend mutual aid in the form of law enforcement services and resources to adequately respond to:

- (1) Continuing, multi-jurisdictional criminal activity, so as to protect the public peace and safety, and preserve the lives and property of the people; and
- (2) Intensive situations including, but not limited to, natural or manmade disasters or emergencies as defined under Section 252.34, Florida Statutes; and
- (3) Joint provision of law enforcement services specified herein and allowed pursuant to Section 166.0495, Florida Statute; and

**WHEREAS**, the Signatory Law Enforcement Agencies have the authority under the Florida Mutual Aid Act, Chapter 23, Part I, Florida Statutes, to enter into a Mutual Aid Agreement for law enforcement services, which both:

- (1) Permits voluntary cooperation and operational assistance of a routine law enforcement nature across jurisdictional lines; and
- (2) Provides for rendering of assistance in a law enforcement emergency.

**NOW, THEREFORE, BE IT KNOWN**, that the Signatory Law Enforcement Agencies, and their respective political subdivisions of the State of Florida, in consideration of mutual promises to render valuable aid in daily operations and in times of necessity, do hereby agree to fully and faithfully abide by and be bound by the following terms and conditions:

1. **Provisions for Voluntary Cooperation:** the Signatory Law Enforcement Agencies hereby approve and enter into this Agreement whereby each of these agencies may provide voluntary cooperation and assistance of a routine or emergency law enforcement nature across jurisdictional lines. The nature of the law enforcement assistance to be rendered shall include but is not limited to:
  - A. Concurrent law enforcement jurisdiction in and throughout the jurisdictional limits of the Signatory Law Enforcement Agencies for arrests, made pursuant to the laws of arrest, for felonies and misdemeanors, including arrestable traffic offenses, which spontaneously take place in the presence of the arresting officer, at such times as the arresting officer is traveling from place to place on official business outside of their jurisdiction (e.g., to / from court, vehicle maintenance run, any authorized use / operation, per agency policy, of their law enforcement vehicle).
  - B. Concurrent law enforcement jurisdiction in and throughout the jurisdictional limits of the Signatory Law Enforcement Agencies for arrests, made pursuant to the laws of arrest, of persons identified because of investigations of any offense constituting a felony, violent misdemeanor or any act of Domestic Violence as defined in Section 741.28, Florida Statutes, when such offense occurred within the jurisdiction of the agency employing the arresting officer.
  - C. Concurrent law enforcement jurisdiction in and upon the jurisdictional waters of the Signatory Law Enforcement Agencies, for arrests, made pursuant to the laws of arrest, for felonies and misdemeanors and for boating infractions.
  - D. Concurrent law enforcement jurisdiction for certain exigent situations, without the need for a formal request, including, but not limited to, area searches for wanted subjects, perimeters, crimes in progress, escaped prisoners, requests for assistance when no available local units are nearby, calls indicating a crime or incident has occurred in which a citizen may likely be injured and the assisting municipality is closer to the area than the officer receiving the call.
  - E. Concurrent law enforcement jurisdiction in and throughout the jurisdictional limits of the Signatory Law Enforcement Agencies, for investigations of, but not limited to, homicides, sex offenses, robberies, assaults, batteries, burglaries, larcenies, frauds, gambling, motor vehicle thefts, drug violations pursuant to Chapter 893, Florida Statutes, Internal Affairs, and multi-agency task forces / joint investigations.

- F. Flagrant violations of Traffic Laws, that left unchecked could reasonably lead to the injury of people on / around the roadway upon which the violation is occurring (e.g. speeding through a school zone or weaving through heavy traffic).

Prior to any officer taking enforcement action pursuant to paragraphs (A) through (F) above, the officer shall notify the jurisdiction in which the action will be taken, unless exigent circumstances prevent such prior notification, in which case notification shall be made as soon after the action as practicable. If the agency having normal jurisdiction responds to the scene, they will have the absolute authority to decide whether to take over the situation. If the agency of normal jurisdiction decides to take over, then the assisting agency's officer(s) shall offer and are required to provide any assistance requested. The assisting agency's officer(s) shall, at a minimum, author a follow-up written report documenting the event and the actions taken.

These provisions are not intended to grant general law enforcement operational authority, or to respond without request to emergencies already being addressed by the agency of normal jurisdiction, but is intended to address critical, life-threatening, or public safety situations, prevent bodily injury to citizens, or secure apprehension of criminals whom the law enforcement officer may encounter.

**2. Provisions for Operational Assistance:** the Signatory Law Enforcement Agencies approve and enter into this Agreement whereby each of these agencies may request / render law enforcement assistance to the other to include, but not necessarily limited to, the following:

- A. Joint multi-jurisdictional criminal investigations.
- B. Civil affray or disobedience, disturbances, riots, large protest demonstrations, controversial trials, political conventions, labor disputes, and strikes.
- C. Any natural, technological, or manmade disaster.
- D. Incidents which may require rescue operations / crowd / traffic control measures, including, but not limited to, large-scale evacuations, aircraft and shipping disasters, fires, explosions, gas line leaks, radiological incidents, train wrecks and derailments, chemical or hazardous waste spills, and electrical power failures.
- E. Terroristic activities including, but not limited to, acts of sabotage.
- F. Escapes from or disturbances within detention facilities.
- G. Hostage and barricaded subject situations, and aircraft piracy.
- H. Control of major crime scenes, area searches, perimeter control, backups to emergency and in-progress calls, pursuits, and missing persons calls.
- I. Enemy attack / Active Shooter / Active Assailant.
- J. Transportation of evidence requiring security.
- K. Major events (e.g., sporting events, concerts, parades, fairs, festivals, and conventions).
- L. Security and escort duties for dignitaries.

- M. Situations in which one agency cannot perform its functional objective.
- N. Incidents requiring utilization of specialized units (e.g. underwater recovery, aircraft, canine, motorcycle, bicycle, mounted, SWAT, bomb, crime scene, marine patrol enforcement or investigation, intelligence, police / public information, DUI / BUI Investigators [BTO, SFST, DRE]).
- O. Joint training in areas of mutual interest.
- P. Exigent situations without a formal request which occur / arise from spontaneous occurrences (i.e. area searches for wanted subjects, perimeters, crimes in progress, escaped prisoners; traffic stops near municipal boundaries, request for assistance and no local unit is available or nearby, calls or transmissions indicating an officer is injured, calls indicating a crime or incident has occurred in which a citizen may likely be injured and the assisting agency is closer to the area than the officer receiving the call, active shooter / assailant situations).
- Q. Mutual enforcement of all existing applicable laws and ordinances and exercise of arrest powers within the area comprising the jurisdictional waters of the Signatory Law Enforcement Agencies.
- R. DUI checkpoints, Traffic Safety Checkpoints / Operation.
- S. Impaired Driving Investigations, including all aspects of DUI, BUI, and DRE.
- T. Extra-Duty Details / Special Events.

### **3. Procedure for Requesting Operational Assistance:**

- A. If a Signatory Law Enforcement Agency needs assistance, the Chief Executive, or designee, of the law enforcement agency requiring assistance shall notify the agency from which such assistance is requested. The Chief Executive, or designee, whose assistance is sought shall evaluate the situation and available resources and will respond in a manner deemed appropriate. This authority may be granted either verbally or in writing as the situation dictates.
- B. Signatory Law Enforcement Agencies agree to furnish necessary manpower, equipment, facilities, and other resources and to render services to the requesting party(ies) as required to assist in addressing the situation which caused the request; provided, however, that no Signatory Law Enforcement Agencies shall be required to unreasonably deplete its own manpower, equipment, facilities, and other resources and services in rendering such assistance.
- C. Specific reporting instructions for personnel rendering mutual aid will be included in the request for mutual aid. In the absence of such reporting instructions, assisting personnel will report to the ranking supervisor on the scene.
- D. Communications instructions should be included in each request for mutual aid and each responding agency's communications centers will endeavor to maintain radio / telephone / other as appropriate contact with each other until the mutual aid situation has ended.

- E. Incidents requiring mass processing of arrestees, transporting prisoners, and operating temporary detention facilities will be handled per established procedures of the requesting agency or the direction of the Incident Commander.
- F. Agency Heads of Signatory Law Enforcement Agencies, or their designees, shall establish procedures for transferring control of the mission and for transferring tactical control of any assigned task, and supervisory control over personnel or equipment provided pursuant to this Agreement.

#### 4. **Command and Supervisory Responsibility:**

- A. Command: The personnel and equipment that are assigned by the Assisting Agency shall be under the immediate command of a supervising officer designated by the Assisting Agency. Such supervising officer shall be under the direct supervision and command of the Chief Executive or designee of the agency requesting assistance.
- B. Conflicts: Whenever an officer is rendering assistance pursuant to this Agreement, the officer shall abide by and be subject to the rules and regulations, personnel policies, general orders, and standard operating procedures of their employer. If any such rule, regulation, personnel policy, general order or standing operating procedure is contradicted, contravened or otherwise in conflict with a direct order of a superior officer of the requesting agency, then the rule, regulation, policy, general order or procedure of the assisting officer's agency shall control and will supersede the direct order.
- C. Handling Complaints: For any complaints that are generated because of a cooperative effort under this Agreement, the Chief Executive, or designee, of the agency employing the subject officer shall be responsible for the investigation of the complaint. The Chief Executive, or designee of the requesting agency (receiving the complaint) should, at a minimum, determine:
  - 1. The identity of the complainant.
  - 2. Contact information for the complainant.
  - 3. The specific allegation.
  - 4. The identity of the accused employee(s) without regard as to agency affiliation.

If, during the investigation, it is determined that the subject officer is an employee of the Assisting Agency, all information and pertinent documentation gathered during the receipt and processing of the complaint, shall be forwarded, without delay, to the subject officer's employing agency for administrative review. The Requesting Agency may conduct a review of the complaint to determine if any factual basis for the complaint exists and / or whether any of the employees of the Requesting Agency violated any of their respective policies / procedures.

**5. Powers, Privileges, Immunities, and Costs:**

- A. All certified law enforcement employees, as defined in Chapter 943, Florida Statutes, of Signatory Law Enforcement Agencies, during such time that said employees are actually providing aid outside of the jurisdictional limits of the employing agency pursuant to the terms of this Agreement, shall pursuant to the provisions of Chapter 23, Florida Statutes, have the same powers, duties, rights, privileges, and immunities as if they were performing their duties in the political subdivision in which they are regularly employed.
- B. The political subdivision having financial responsibility for the law enforcement agency providing the services, personnel, equipment, or facilities pursuant to the provisions of this Agreement shall bear any loss or damage to same and shall pay any and all expenses incurred in the maintenance and operation of same.
- C. The political subdivision having financial responsibility for the law enforcement agency providing aid pursuant to this Agreement shall compensate its employees providing services pursuant to this Agreement, during the time of rendering of such services, and shall defray the actual travel and maintenance expenses of such employees while they are rendering such aid. Such compensation shall include any amounts paid or due for compensation due to personal injury or death while such employees are engaged in rendering such aid. Such compensation shall also include all benefits normally due such employees.
- D. All privileges and immunities from liability, exemptions from laws, ordinances and rules, and all pension, insurance, relief, disability, works compensation, salary, death, and other benefits which apply to the activity of such officers, agents, or employees of any such agency, when performing their respective functions within the jurisdictional limits of the employing agency, shall apply to the same degree, manner, and extent while engaged in the performance of their functions and duties extraterritorially under the provisions of this Agreement. The provisions of this Agreement shall apply with equal effect to paid, volunteer, reserve, and auxiliary employees.
- E. Nothing herein shall prevent the requesting agency from seeking supplemental appropriations from the governing authority having budgeting jurisdiction to reimburse the assisting agency for any actual costs or expenses incurred by the assisting agency performing hereunder.

- 6. Liability:** Each Signatory Law Enforcement Agency engaging in any cooperation and assistance pursuant to this Agreement, agrees to assume responsibility for the acts, omissions or conduct of their own employees while engaged in rendering services pursuant to this Mutual Aid Agreement, subject to the provisions of Section 768.28, Florida Statutes, where applicable. Nothing in this Agreement shall be deemed or treated as a waiver of any immunity to which any party is entitled by law, including but not limited to the sovereign immunity protections as set forth in Section 768.28, Florida Statutes.



7. **Insurance:** Each Signatory Law Enforcement Agency shall provide, upon request, satisfactory proof of liability insurance by one or more of the means specified in Section 768.28, Florida Statutes.
8. **Forfeitures:** While operating under the auspices of this Agreement, property subject to forfeiture under Sections 932.701 - 932.707, Florida Statutes, known as the "Florida Contraband Forfeiture Act," may be seized. The agency initiating / pursuing the forfeiture action shall have the exclusive right to control, and the responsibility to maintain the property in accordance with Chapter 932, Florida Statutes, including, but not be limited to, the complete discretion to bring the action or dismiss the action. The proceeds from seized property that is successfully forfeited shall be distributed equitably among the participating agencies in proportion to the amount of investigation and participation performed by each agency, pursuant to the provisions of the Florida Contraband Forfeiture Act, less the costs and attorney's fees associated with the forfeiture action. The political subdivision / agency controlling the forfeiture may allow another Signatory Law Enforcement Agency to prosecute the forfeiture, subject to the written authorization of the Chief Executive and the legal counsel for each of the participating Signatory Law Enforcement Agencies.
9. **Conflicts:** Any conflict between this Agreement and the Florida Mutual Aid Act will be controlled by the provisions of the latter, whenever conditions exist that are within the definitions stated in Chapter 23, Florida Statutes.
10. **Effective Date and Duration:** This Agreement shall be in effect upon execution and approval by the hereinafter named officials of the Signatory Law Enforcement Agencies and their respective political subdivisions (where applicable) and shall continue in full force and effect until **January 1, 2035**. Under no circumstances may this Agreement be renewed, amended or extended except in writing.
11. **Supersedure:** Upon execution and approval by the hereinafter named officials of the Signatory Law Enforcement Agencies and their respective political subdivisions (where applicable), this Agreement will supersede any and all such agreement(s) of this nature and type, becoming the controlling document in consideration of mutual promises to render valuable aid in daily operations and in times of emergency, setting the terms and conditions by which the Signatory Law Enforcement Agencies will be bound.
12. **Nonexclusive Privilege:** Nothing herein shall preclude any Signatory Law Enforcement Agency from formulating additional specialty MOU / MAA with other Signatory Law Enforcement Agencies for the benefit of their collective operations. In instances where the terms / conditions of such specialty MOU / MAA overlap with the terms and conditions of this Agreement, the terms and conditions of this Agreement will take priority and bind the Signatory Law Enforcement Agencies.
13. **Cancellation:** Participation in this Agreement may be terminated by any Signatory Law Enforcement Agency and their respective political subdivision (where applicable) upon ninety (90) days written notice to the other Signatory Law Enforcement Agencies.

**AGREED AND ACKNOWLEDGED** this \_\_\_\_ day of \_\_\_\_\_, 2024.

---

Miami Dade County, FL

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Miami Dade County, FL

**ATTEST:**

---

Miami Dade County, FL

**APPROVED AS TO FORM  
AND LEGAL SUFFICIENCY:**

---

Miami Dade County, FL



**Consent Agenda  
9.15.**

City of North Miami Beach  
17011 NE 19 Avenue  
North Miami Beach, FL 33162  
305-947-7581  
www.citynmb.com

**MEMORANDUM**

---

<b>TO:</b>	Mayor and City Commission
<b>FROM:</b>	Samuel Zamacona, Public Works Director
<b>VIA:</b>	Mario A. Diaz, City Manager
<b>DATE:</b>	January 21, 2025

---

**RE:** Resolution No. R2025-14 Change Order for Rechten International Trucks, Inc. for the Purchase of a Trash Dump Truck (Samuel Zamacona, Public Works Director)

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**Description**

Florida Sheriffs Association awarded contract FSA23-VEH21.0 for Heavy Trucks and Buses to multiple authorized manufacturers, distributors, and resellers on October 1, 2023 through September 30, 2024. The contract has been renewed for one year ending September 30, 2025.

**BACKGROUND  
ANALYSIS:**

The NMB Public Works Department uses dump trucks for the haulage and disposal of trash, debris, aggregate, vegetation etc. An additional trash dump truck is required by the department to replace a trash truck that will be decommissioned as it has passed its useful life and is proving costly to repair.

Public Works Department previously used this contract for \$138,048 to purchase a trash truck (previously approved through R2023-126). The additional truck purchase will result in an increase of \$142,115.00 to make the total expenditure \$280,163.00.

**RECOMMENDATION:** The City Manager and Chief Procurement Officer recommend that the City Commission approve and authorize the City Manager or designee to execute a Change Order to the previously approved contract by increasing the expenditure by \$142,115.00, thereby making the total expenditure \$280,163.00.

**FISCAL/ BUDGETARY**

**IMPACT:** As approved in the adopted budget appropriation.

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**ATTACHMENTS:**

**Description**

- ▣ Rechten\_Resolution
- ▣ Rechten\_Change Order Request Form

**RESOLUTION NO. 2025-**

**A RESOLUTION OF THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA, APPROVING AND AUTHORIZING A CHANGE ORDER TO THE CONTRACT WITH RECHTIEN INTERNATIONAL TRUCKS, INC. FOR THE PURCHASE OF A 22 FT TRASH DUMP TRUCK; INCREASING THE ESTIMATED EXPENDITURE BY \$142,115; AUTHORIZING THE CITY MANAGER OR DESIGNEE TO DO ALL THINGS NECESSARY TO EFFECTUATE THIS RESOLUTION; PROVIDING FOR CONFLICTS; PROVIDING FOR SCRIVENER ERRORS; PROVIDING FOR SEVERABILITY; SUBJECT TO THE BUDGET APPROPRIATION AND AVAILABILITY OF FUNDS; AND PROVIDING FOR AN EFFECTIVE DATE.**

**WHEREAS**, pursuant to Chapter 166, *Florida Statutes* and Section 1.4 of the Charter of the City of North Miami Beach (“City”), the City shall have all available governmental, corporate, and proprietary powers and may exercise them except when prohibited by law; and

**WHEREAS**, The Florida Sheriffs Association (FSA) has renewed contract FSA23-VEH21.0: Heavy Trucks & Buses, with Rechtien International Trucks, Inc. (“Rechtien”) through September 30, 2025; and

**WHEREAS**, A trash dump truck was purchased by the City through the previously approved Resolution R2024-126 in the amount of \$138,048.00; and

**WHEREAS**, The Public Works Department is desirous of purchasing an additional trash dump truck for the haulage and disposal of trash, debris and vegetation. An additional dump truck will increase the fleet to two by replacing the current trash truck that that has passed its useful life and

**WHEREAS**, Section 3-3.20 of the of the Code of Ordinances City of North Miami Beach, Florida, 2008 (“Code”) requires that change orders exceeding 10% or \$50,000.00, whichever is less, shall be approved by the City Commission; and

**WHEREAS**, the City Manager and Chief Procurement Officer recommend that the City Commission approve and authorize the City Manager or designee to execute a Change Order to the previously approved Contract to increase the previously approved expenditure by \$142,115, thereby increasing the total expenditure to \$280,163 for the purchase of a 22 Ft. trash dump truck; and

**WHEREAS**, the Mayor and City Commission believe it is in the best interests of the City to approve and authorize the City Manager or designee to execute a Change Order to the previously approved expenditure by \$142,115. Thereby increasing the total expenditure of \$280,163 for the purchase of a 22 Ft. trash dump truck.

**RESOLUTION NO. R2025-XX**

**NOW, THEREFORE, BE IT RESOLVED BY THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA, THAT:**

**Section 1.** The foregoing whereas clauses are true and correct and adopted as the legislative and administrative findings of the City Commission and made a specific part of this Resolution; all exhibits attached hereto are made a specific part of this Resolution.

**Section 2.** The Change Order, in substantially the form attached as Exhibit “A,” to the previously approved contract with Rechten International Trucks, Inc. to increase the expenditure by \$142,115, thereby increasing the total expenditure to \$280,163 for the purchase of a 22 Ft. Trash Dump Truck, subject to budget appropriation and availability of funds is hereby approved.

**Section 3.** The City Manager or designee is authorized to do all things necessary to effectuate this Resolution.

**Section 4.** All Resolutions or parts of Resolutions in conflict with this Resolution are repealed to the extent of such conflict.

**Section 5.** Any scrivener or typographical errors that do not affect intent may be corrected with notice to, and the authorization of the City Attorney and City Manager without further process.

**Section 6.** If any provision of this Resolution or the application thereof to any person or circumstance is held invalid, such invalidity shall not affect other provisions or applications of this Resolution that can be given effect without the invalid provision or application, and to this end the provisions of this Resolution are declared to be severable.

**Section 7.** This Resolution shall take effect immediately upon adoption.

**[THE REMAINDER OF THIS PAGE INTENTIONALLY LEFT BLANK]**

**APPROVED AND ADOPTED** by the City of North Miami Beach City Commission at the regular meeting assembled this **21<sup>st</sup> day of January 2025**.

ATTEST:

\_\_\_\_\_  
ANDRISE BERNARD, MMC  
CITY CLERK

\_\_\_\_\_  
MICHAEL JOSEPH  
MAYOR

(CITY SEAL)

APPROVED AS TO FORM AND LEGAL SUFFICIENCY FOR THE USE  
AND RELIANCE OF THE CITY OF NORTH MIAMI BEACH ONLY:

GREENSPOON MARDER, LLP.

By: \_\_\_\_\_  
CITY ATTORNEYS

Sponsored by: Mayor & Commission

**RESOLUTION NO. R2025-XX**

# EXHIBIT A



## CHANGE ORDER FORM

PROCUREMENT MANAGEMENT DIVISION

(Revised 5.1.23)

Title:	Contract No.: _____
	Purchase Order No.: _____
Vendor:	Change Order No.:
Contract Award Date:	Completion Date:
Revised Completion Date (prior to this change):	Extension(s) of Time Previously Approved:     days
Revised Completion Date (including this change):	

<b>Summary of Amount</b>	
<i>Original Amount</i>	\$
Change Orders Previously Approved	\$
Adjusted Value Prior to this Change Order	\$
Cost of Changes in this Change Order	\$
<i>Adjusted Amount Including this Change</i>	\$
Percentage Increase this Change Order	%
Total Percent Increase to Date	%
Extension of Time Allowed by this Change -	days



Description of Change:

Procurement Notes:

Account Number: \_\_\_\_\_

**Code of Ordinances – Chapter III Purchasing, 3-3.20 Change Orders**

*The City Manager may approve any change orders so long as the total sum of all change orders does not exceed the total amount awarded by the City Commission by more than either ten percent of the contract cost or \$50,000.00, whichever is less. The scope of any project may not be changed without prior approval of the City Commission. No increase in contract price shall be approved unless there are sufficient funds available for such purpose.*

***This change order is hereby incorporated into and becomes a part of the Contract.***

RECOMMENDED:

\_\_\_\_\_  
(Project Manager / Preparer)

By:

\_\_\_\_\_  
(Division Approval)

\_\_\_\_\_  
(Signature) (Date)

By:

\_\_\_\_\_  
(Department Head) (Date)

APPROVED:

By:

\_\_\_\_\_  
(Finance Department) (Date)

By:

\_\_\_\_\_  
(Procurement Department) (Date)

By:

\_\_\_\_\_  
(Mario A. Diaz, City Manager) (Date)

c

**PROPOSAL PREPARED FOR:**

**PROPOSAL PREPARED BY:**

<b>Sourcewell Member:</b>	CITY OF NORTH MIAMI BEACH	Rechtien International Trucks
<b>Contact:</b>	JOSE TELLEZ	Raul Arellano
<b>Address:</b>	1965 NE 151 ST	
<b>City/State/Zip:</b>	Miami Florida 33162	
<b>Phone:</b>	305.275.7635	
<b>Email:</b>	JOSE.TELLEZ@CITYNMB.COM	

Proposal Number	24526-02
Date	11/7/2024
Quantity of this Specification	1
Single Sourcewell Transaction Total Volume	0

<b>Chassis</b>		
New 2025 International MV607 Chassis		\$ 141,000.00
Base Chassis List	\$ 110,943.00	
Options List	\$ 30,057.00	
Sourcewell Contract Discount	30.3%	\$ (42,749.99)
Volume Incentive		\$ -
Material Price Increases		\$ 3,250.00
<b>Net Sourcewell Chassis Price</b>		<b>\$ 101,500.01</b>
<b>Sourcewell Partner Body</b>		
0		\$ -
Handling Fee	4.00%	\$ -
<b>Non-Sourcewell Dealer Supplied Body</b>		
MARQUEZ BROTHERS 14 FT. DUMP		\$ 32,100.00
0		\$ -
Handling Fee	5.00%	\$ 1,712.62
<b>Additional Post Build Work</b>		
Safety & Mudflaps & Cummins Engine		\$ 233.00
0		\$ -
0		\$ -
Handling Fee	5.00%	\$ 12.23
<b>Service Contracts</b>		
0		\$ -
0		\$ -
0		\$ -
<b>Additional Freight</b>		
0		\$ -
<b>Additional Floorplan</b>		
Floor Plan		\$ 6,000.00
Marquet Adjustments		\$ 1,500.00
<b>Additional Fees &amp; Taxes</b>		
0		\$ -
		\$ -
		\$ -
<b>Final Sourcewell Per Vehicle Price FOB Miami Florida</b>		<b>\$ 143,721.82</b>
<b>Final Sourcewell Total Vehicle(s) Price</b>		<b>\$ 143,721.82</b>

<i>Additional Sourcewell Qualified Content</i>

**Terms:**

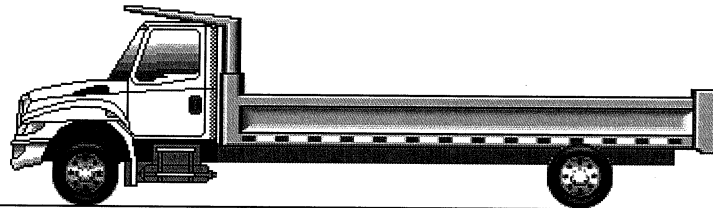
Stock unit in dealer's inventory, dealer will accept a final purchase order using the current Sourcewell pricing quoted above.

Dealer placing a new orders for the Sourcewell Member, the purchase order cannot be firmed up until the unit is slotted to build with a firm build date or lineset. Once a firm build date has been established, dealer will provide the Sourcewell Member approved pricing and a final purchase order can be accepted with firm pricing. Dealer cannot guarantee bodies and/or equipment pricing added to the chassis for a turnkey sale until chassis is lineset.

**Prepared For:**  
 City of North Miami Beac  
 Jose Tellez  
 P.o. Box 60,000m  
 North Miami Beach, FL 33160-1076  
 (305)787 - 6002

**Presented By:**  
 RECHTIEN INTERNATIONAL TRUCKS, INC.  
 Raul Arellano  
 7227 N W 74TH AVE  
 MIAMI FL 33166 -  
 (800)654-2383

Thank you for the opportunity to provide you with the following quotation on a new International truck. I am sure the following detailed specification will meet your operational requirements, and I look forward to serving your business needs.



**Model Profile**  
**2025 MV607 SBA (MV607)**

**AXLE CONFIG:** 4X2  
**MISSION:** Requested GVWR: 33000. Calc. GVWR: 35350. Calc. GCWR: 50000  
 Calc. Start / Grade Ability: 23.25% / 1.66% @ 55 MPH  
**DIMENSION:** Wheelbase: 254.00, CA: 186.90, Axle to Frame: 49.00  
**ENGINE, DIESEL:** {Cummins B6.7 260} EPA 2024, 260HP @ 2400 RPM, 660 lb-ft Torque @ 1600 RPM, 2600 RPM Governed Speed, 260 Peak HP (Max)  
**TRANSMISSION, AUTOMATIC:** {Allison 3000 RDS} 6th Generation Controls, Close Ratio, 6-Speed with Double Overdrive, with PTO Provision, Less Retarder, Includes Oil Level Sensor, with 80,000-lb GVW and GCW Max, On/Off Highway  
**CLUTCH:** Omit Item (Clutch & Control)  
**AXLE, FRONT NON-DRIVING:** {Meritor MFS-14-122A} I-Beam Type, 14,000-lb Capacity  
**AXLE, REAR, SINGLE:** {Dana Spicer S23-190D} Single Reduction, Hypoid Gearing, 23,000-lb Capacity, Driver Control Locking Differential, R Wheel Ends Gear Ratio: 5.38  
**CAB:** Conventional, Day Cab  
**TIRE, FRONT:** (2) 11R22.5 Load Range G AH37 (HANKOOK), 501 rev/mile, 75 MPH, All-Position  
**TIRE, REAR:** (4) 11R22.5 Load Range G AH37 (HANKOOK), 501 rev/mile, 75 MPH, All-Position  
**SUSPENSION, REAR, SINGLE:** 31,000-lb Capacity, Vari-Rate Springs, with 4500-lb Capacity Auxiliary Rubber Springs

**PAINT:**

Cab schematic 100WP  
Location 1: 9219, Winter White (Std)  
Chassis schematic N/A

<u>Code</u>	<u>Description</u>	<u>F/R</u>	<u>Wt</u>	<u>Tot Wt</u>
		(lbs)	(lbs)	
MV60700	Base Chassis, Model MV607 SBA with 254.00 Wheelbase, 186.90 CA, and 49.00 Axle to Frame.	5381/3069		8450
<b>AXLE CONFIGURATION</b>				
1ANA	AXLE CONFIGURATION 4x2	0/0		0
<b>ENGINE</b>				
12EXV	ENGINE, DIESEL {Cummins B6.7 260} EPA 2024, 260HP @ 2400 RPM, 660 lb-ft Torque @ 1600 RPM, 2600 RPM Governed Speed, 260 Peak HP (Max)	0/0		0
12VJR	EMISSION, CALENDAR YEAR {Cummins B6.7} EPA, OBD and GHG Certified for Calendar Year 2024	0/0		0
12XCS	CARB EMISSION WARR COMPLIANCE Does Not Comply with CARB Emission Warranty	0/0		0
12WZE	CARB IDLE COMPLIANCE Does Not Comply with California Clean Air Idle Regulations	0/0		0
12WVG	EPA IDLE COMPLIANCE Low NOx Idle Engine, Complies with EPA Clean Air Regulations; Includes "Certified Clean Idle" Decal on Hood	0/0		0
10UAV	VEHICLE REGISTRATION IDENTITY ID for Non CARB Omnibus/ Non ACT Adopting State or Exempt Vehicle << Contains non-mitigated legacy engine & must be registered outside the States of CA/MA/OR unless exempt. You may be held liable under CA/MA/OR law for failure to properly register/otherwise failing to follow CA/MA/OR law>>	0/0		0
12XCC	RADIATOR Aluminum, 2-Row, Down Flow, Front to Back System, 640 SqIn Louvered, with 383 SqIn Charge Air Cooler, Includes In-Tank Oil Cooler	0/0		0
12TSY	FAN DRIVE {Borg-Warner SA85} Viscous Type, Screw On	0/0		0
12VCE	AIR CLEANER Single Element, Fire Retardant Media	0/0		0
12703	ANTI-FREEZE Red, Extended Life Coolant; To -40 Degrees F/ -40 Degrees C, Freeze Protection	0/0		0
12XBM	ENGINE CONTROL, REMOTE MOUNTED Provision for; Includes Wiring for Body Builder Installation of PTO Controls and Starter Lockout, with Ignition Switch Control, for Cummins B6.7 and L9 Engines	0/0		0
12WPV	OIL PAN 15 Quart Capacity, For Cummins ISB/B6.7 Engines	0/0		0
12VXT	THROTTLE, HAND CONTROL Engine Speed Control; Electronic, Stationary, Variable Speed; Mounted on Steering Wheel	0/0		0

<u>Code</u>	<u>Description</u>	<u>F/R</u>	<u>Wt</u>	<u>Tot Wt</u>
		(lbs)	(lbs)	
12EMZ	VENDOR WARRANTY, ENGINE {Cummins} B6.7 Engine, 3-Year Unlimited Miles Standard Warranty	0/0		0
<b>TRANSMISSION</b>				
13BCS	TRANSMISSION, AUTOMATIC {Allison 3000 RDS} 6th Generation Controls, Close Ratio, 6-Speed with Double Overdrive, with PTO Provision, Less Retarder, Includes Oil Level Sensor, with 80,000-lb GVW and GCW Max, On/Off Highway	239/44		283
13WUS	ALLISON SPARE INPUT/OUTPUT for Rugged Duty Series (RDS) and Regional Haul Series (RHS), General Purpose Trucks, Package Number 223, Modified for Single Input Auto Neutral	0/0		0
13WEH	AUTOMATIC NEUTRAL Allison Transmission Shifts to Neutral When Parking Brake is Engaged and Remains in Neutral When Parking Brake is Disengaged, without On/Off Switch	0/0		0
13WVV	NEUTRAL AT STOP Allison Transmission Shifts to Neutral When Service Brake is Depressed and Vehicle is at Stop; Remains in Neutral Until Service Brake is Released	0/0		0
13XAL	PTO LOCATION Customer Intends to Install PTO at Left Side of Transmission	0/0		0
13WYU	SHIFT CONTROL PARAMETERS {Allison} 3000 or 4000 Series Transmissions, Performance Programming	0/0		0
13WLP	TRANSMISSION OIL Synthetic; 29 thru 42 Pints	0/0		0
13WET	TRANSMISSION SHIFT CONTROL Column Mounted Stalk Shifter, Not for Use with Allison 1000 & 2000 Series Transmission	1/0		1
<b>CLUTCH</b>				
11001	CLUTCH Omit Item (Clutch & Control)	0/0		0
<b>REAR AXLES, SUSPENSIONS</b>				
14AHG	AXLE, REAR, SINGLE {Dana Spicer S23-190D} Single Reduction, Hypoid Gearing, 23,000-lb Capacity, Driver Control Locking Differential, R Wheel Ends . Gear Ratio: 5.38	0/478		478
14VAJ	SUSPENSION, REAR, SINGLE 31,000-lb Capacity, Vari-Rate Springs, with 4500-lb Capacity Auxiliary Rubber Springs	0/168		168
<b>FRONT AXLES</b>				
2AST	AXLE, FRONT NON-DRIVING {Meritor MFS-14-122A} I-Beam Type, 14,000-lb Capacity	79/0		79
<b>FRONT SUSPENSIONS</b>				

<u>Code</u>	<u>Description</u>	<u>F/R</u>	<u>Wt</u>	<u>Tot Wt</u>
		(lbs)	(lbs)	
3ADD	SUSPENSION, FRONT, SPRING Parabolic Taper Leaf, Shackle Type, 14,000-lb Capacity, with Shock Absorbers	74/0		74
3770	SPRINGS, FRONT AUXILIARY Rubber	10/0		10
<b>CABS, COWLS, BODIES</b>				
16030	CAB Conventional, Day Cab	0/0		0
16ZBT	ACCESS, CAB Steel, Driver & Passenger Sides, Two Steps per Door, for use with Day Cab and Extended Cab	0/0		0
16BAM	AIR CONDITIONER with Integral Heater and Defroster	56/0		56
16WBY	ARM REST, RIGHT, DRIVER SEAT	3/0		3
16ATC	AUTOMATIC CLIMATE CONTROL Automatically Maintains Cabin Comfort Based on Selected Temperature	0/0		0
16XCM	CAB DOOR LOCKS Power, Driver Side Only; Non-Locking When Door Open	0/0		0
16VKB	CAB INTERIOR TRIM Classic, for Day Cab	0/0		0
16XCW	CAB, INTERIOR TRIM, CLOSEOUT Under IP, Driver Side	0/0		0
16VLK	CAB REAR SUSPENSION Air Suspension, for Mid Cab Height	42/0		42
16WLS	FRESH AIR FILTER Attached to Air Intake Cover on Cowl Tray in Front of Windshield Under Hood	1/0		1
16GED	GAUGE CLUSTER Base Level; English with English Electronic Speedometer	0/0		0
16HGH	GAUGE, OIL TEMP, AUTO TRANS for Allison Transmission	1/0		1
16GHU	GRAB HANDLE, CAB INTERIOR (2) Safety Yellow	0/0		0
16XJN	INSTRUMENT PANEL Flat Panel	0/0		0
16HKT	IP CLUSTER DISPLAY On Board Diagnostics Display of Fault Codes in Gauge Cluster	0/0		0
16WSE	LOW WASHER FLUID INDICATOR	1/0		1
16SNV	MIRRORS (2) Aero Pedestal, Power Adjust, Heated, Turn Signals, Bright Heads, Black Arms, 6.5" x 14" Flat Glass, Includes 6.5" x 6" Convex Mirrors, for 102" Load Width	0/0		0
16SSE	MIRROR, CONVEX, HOOD MOUNTED (2) Right and Left Sides, Breakaway, Bright, Heated	0/0		0
16VCC	SEAT BELT All Orange; 1 to 3	0/0		0

<u>Code</u>	<u>Description</u>	<u>F/R Wt</u>	<u>Tot Wt</u>
		(lbs)	(lbs)
16JNT	SEAT, DRIVER {National 2000} Air Suspension, High Back with Integral Headrest, Vinyl, Isolator, 1 Chamber Lumbar, with 2 Position Front Cushion Adjust, -3 to +14 Degree Angle Back Adjust	-15/-3	-18
16SML	SEAT, TWO-MAN PASSENGER {National} Fixed Back, Integrated Headrest in Both Occupant Positions, Vinyl, Less Under Seat Storage Compartment	43/22	65
16HCH	SEATBELT WARNING LIGHT IND. Mounted in Dash, Will Flash when Park Brake is Disengaged and Driver Seatbelt Unfastened, Audible Alarm to Remind Driver to Fasten Seatbelt	0/0	0
16WJU	WINDOW, POWER (2) and Power Door Locks, Left and Right Doors, Includes Express Down Feature	5/0	5
<b>FRAMES</b>			
1CAH	FRAME RAILS Heat Treated Alloy Steel (120,000 PSI Yield); 10.375" x 3.705" x 0.438" (263.5mm x 94.1mm x 11.1mm); 456.0" (11582mm) Maximum OAL	424/485	909
1LNN	BUMPER, FRONT Contoured, Steel, Chrome Plated	0/0	0
1570	TOW HOOK, FRONT (2) Frame Mounted	8/0	8
1LEG	LICENSE PLATE HOLDER Includes Upper & Lower Mounting Plate Hardware, Mounted in Existing Holes in Front Bumper	3/0	3
1WEJ	WHEELBASE RANGE 199" (505cm) Through and Including 254" (645cm)	251/-251	0
<b>BRAKES</b>			
4091	BRAKE SYSTEM, AIR Dual System for Straight Truck Applications	0/0	0
4AZA	AIR BRAKE ABS {Bendix AntiLock Brake System} 4-Channel (4 Sensor/4 Modulator) Full Vehicle Wheel Control System	0/0	0
4GBM	BRAKE, PARKING Manual Push-Pull Pneumatic Parking Brake	0/0	0
4XDP	BRAKES, FRONT {Meritor 16.5X5 Q-PLUS CAST} Air S-Cam Type, Cast Spider, Fabricated Shoe, Double Anchor Pin, Size 16.5" X 5", 14,700-lb Capacity	47/0	47
4EXP	BRAKE CHAMBERS, FRONT AXLE {Bendix} 20 SqiIn	16/0	16
4LAG	SLACK ADJUSTERS, FRONT {Gunite} Automatic	14/0	14
4XDR	BRAKES, REAR {Meritor 16.5X7 Q-PLUS CAST} Air S-Cam Type, Cast Spider, Fabricated Shoe, Double Anchor Pin, Size 16.5" X 7", 23,000-lb Capacity per Axle	0/0	0
4EXU	BRAKE CHAMBERS, REAR AXLE {Bendix EverSure} 30/30 SqiIn Spring Brake	0/39	39



<u>Code</u>	<u>Description</u>	<u>F/R</u>	<u>Wt</u>	<u>Tot Wt</u>
		(lbs)	(lbs)	
4LGG	SLACK ADJUSTERS, REAR {Gunite} Automatic	0/14		14
4WDM	DUST SHIELDS, REAR BRAKE for Air Cam Brakes	0/10		10
4SPA	AIR COMPRESSOR {Cummins} 18.7 CFM	37/1		38
4EDN	AIR DRYER {Bendix AD-9SI} with Heater, Includes Safety Valve	18/-1		17
4VLE	AIR DRYER LOCATION Mounted Inside Engine Compartment, Right Side	0/0		0
4XEZ	AIR TANK LOCATION (2) Mounted Between the Rails, Back of Cab, One on Each Side, Parallel to Rails	0/0		0
4722	DRAIN VALVE {Bendix DV-2} Automatic, with Heater, for Air Tank	2/0		2
<b>STEERING</b>				
5PSA	STEERING GEAR {Sheppard M100} Power	25/-3		22
5708	STEERING COLUMN Tilting	15/1		16
5CAW	STEERING WHEEL 4-Spoke; 18" Dia., Black	0/0		0
<b>DRIVELINES</b>				
6DGG	DRIVELINE SYSTEM {Dana Spicer} 1710, for 4x2/6x2	4/24		28
<b>EXHAUST SYSTEMS</b>				
7BLW	EXHAUST SYSTEM Horizontal Aftertreatment System, Frame Mounted Right Side Under Cab, for Single Vertical Tail Pipe, Frame Mounted Right Side Back of Cab	149/29		178
7BEV	AFTERTREATMENT COVER Steel, Black	11/2		13
7WDM	EXHAUST HEIGHT 10'	20/7		27
7WDN	MUFFLER/TAIL PIPE GUARD (1) Aluminum	13/4		17
7WAZ	TAIL PIPE (1) Turnback Type	7/2		9
<b>ELECTRICAL SYSTEMS</b>				
8000	ELECTRICAL SYSTEM 12-Volt, Standard Equipment	0/0		0
8WXD	ALARM, PARKING BRAKE Electric Horn Sounds in Repetitive Manner When Vehicle Park Brake is "NOT" Set, with Ignition "OFF" and any Door Opened	0/0		0
8GXD	ALTERNATOR {Leece-Neville AVI160P2013} Brush Type, 12 Volt, 160 Amp Capacity, Pad Mount, with Remote Sense	0/0		0
8RPP	ANTENNA Shark Fin, Roof Mounted	1/0		1
8THB	BACK-UP ALARM Electric, 102 dBA	0/3		3

<u>Code</u>	<u>Description</u>	<u>F/R</u>	<u>Wt (lbs)</u>	<u>Tot Wt (lbs)</u>
8XDU	BATTERY BOX Steel, with Aluminum Cover, 14" Wide, 2-3 Battery Capacity, Mounted Left Side Under Cab	14/10		24
8MJP	BATTERY SYSTEM {Fleetrite} Maintenance-Free, (2) 12-Volt 1320CCA Total, Top Threaded Stud	0/0		0
8HAB	BODY BUILDER WIRING Back of Day Cab at Left Frame or Under Sleeper, Extended or Crew Cab at Left Frame; Includes Sealed Connectors for Tail/Amber Turn/Marker/ Backup/Accessory Power/ Ground and Sealed Connector for Stop/Turn	2/0		2
8XAH	CIRCUIT BREAKERS Manual-Reset (Main Panel) SAE Type III with Trip Indicators, Replaces All Fuses	0/0		0
8XHA	CRUISE DISABLED W/WIPERS Cruise Control will Automatically be Disabled if Windshield Wipers are Turned on when Vehicle Speed Exceeds 25 MPH	0/0		0
8HAH	ELECTRIC TRAILER BRAKE/LIGHTS Accommodation Package to Rear of Frame; for Combined Trailer Stop, Tail, Turn, Marker Light Circuits; Includes Electric Trailer Brake Accommodation Package with Cab Connections for Mounting Customer Installed Electric Brake Unit, Less Trailer Socket	0/2		2
8WXB	HEADLIGHT WARNING BUZZER Sounds When Head Light Switch is on and Ignition Switch is in "Off" Position	0/0		0
8XKC	HEADLIGHTS Halogen, with Daytime Running Lights, Automatic Twilight Controlled	0/0		0
8WRB	HEADLIGHTS ON W/WIPERS Headlights Will Automatically Turn On if Windshield Wipers are Turned On	0/0		0
8XHN	HORN, AIR Single Trumpet, Black, with Lanyard Pull Cord	3/0		3
8VBE	HORN, ELECTRIC (1) Trumpet Style	0/0		0
8WWJ	INDICATOR, LOW COOLANT LEVEL with Audible Alarm	0/0		0
8XPK	POWER SOURCE, ADDITIONAL Auxiliary Power Outlet (APO) with USB-A Port and USB-C Port, Located in the Instrument Panel	0/0		0
8RPS	RADIO AM/FM/WB/Clock/Bluetooth/USB Input/Auxiliary Input	3/0		3
8RMV	SPEAKERS (2) 6.5" Dual Cone Mounted in Doors	5/0		5
8XKL	STARTING MOTOR {Mitsubishi Electric Automotive America 90P47} 12-Volt, with Soft-Start	0/0		0
8TKJ	STOP, TURN, TAIL & B/U LIGHTS {Truck Lite} Super 44, with LED Lights for Stop, Turn, Tail and Backup Lights, with Power Module, "International" Termination and Less Junction Box, Includes License Plate Light	0/2		2

<u>Code</u>	<u>Description</u>	<u>F/R Wt Tot Wt</u>	
		(lbs)	(lbs)
8WMA	SWITCH, TOGGLE, FOR WORK LIGHT Lighted; on Instrument Panel and Wiring Effects for Customer Furnished Back of Cab Light	2/1	3
8WPZ	TEST EXTERIOR LIGHTS Pre-Trip Inspection will Cycle all Exterior Lamps Except Back-up Lights	0/0	0
8XPN	USB PORT One USB-A Port and One USB-C Port, Located in Instrument Panel	0/0	0
8WGL	WINDSHIELD WIPER SPD CONTROL Force Wipers to Slowest Intermittent Speed When Park Brake Set and Wipers Left on for a Predetermined Time	0/0	0
<b>FRONT END</b>			
9WBW	FRONT END Tilting, Fiberglass, with Three Piece Construction, Dual Air Intakes	0/0	0
9WBZ	BUG SCREEN Mounted Behind Grille and Bumper Grille	5/0	5
9WBN	FENDER EXTENSIONS Painted	0/0	0
9HCY	GRILLE Molded in Black, with Chrome Surround	0/0	0
9AAB	LOGOS EXTERIOR Model Badges	0/0	0
9AAE	LOGOS EXTERIOR, ENGINE Badges	0/0	0
<b>SPEEDOMETER, TOOLS, MISC</b>			
10AGB	COMMUNICATIONS MODULE Telematics Device with Over the Air Programming; Includes Five Year Data Plan and International 360	0/0	0
10XAN	FIRE EXTINGUISHER 5 lb Class A B C	9/1	10
10XAP	FIRE EXTINGUISHER BRACKET Mounted Left Side Driver Seat	1/0	1
10BAE	LABEL, DEF "DEF ONLY"	0/0	0
10WUE	MUD FLAPS, FRONT WHEELS (2) Rubber, Mounted on Fender Extension	12/0	12
10060	PAINT SCHEMATIC, PT-1 Single Color, Design 100	0/0	0
10761	PAINT TYPE Base Coat/Clear Coat, 1-2 Tone	0/0	0
10WCY	SAFETY TRIANGLES	6/0	6
<b>FUEL TANKS</b>			
15SXJ	FUEL TANK Top Draw, Non-Polished Aluminum, 24" Dia, 50 US Gal (189L), Mounted Left Side, Under Cab	10/-1	9
15WCN	DEF TANK 5 US Gal (19L) Capacity, Frame Mounted Outside Left Rail, Under Cab	4/13	17

<u>Code</u>	<u>Description</u>	<u>F/R</u>	<u>Wt</u>	<u>Tot</u>	<u>Wt</u>
		(lbs)	(lbs)	(lbs)	(lbs)
15LMN	FUEL/WATER SEPARATOR {Racor 400 Series,} 12 VDC Electric Heater, Includes Pre-Heater, with Primer Pump, Includes Water-in-Fuel Sensor	-3/0		-3	
15LRE	LOCATION FUEL/WATER SEPARATOR Mounted Under Hood, Left Side, Above Front Axle	0/0		0	
<b>WHEELS, TIRES - FRONT</b>					
27DTU	WHEELS, FRONT {Accuride 29001} DISC; 22.5x7.50 Rims, Powder Coat Steel, 5-Hand Hole, 10-Stud, 285.75mm BC, Hub-Piloted, Flanged Nut, with Steel Hubs	0/0		0	
7372135809	(2) TIRE, FRONT 11R22.5 Load Range G AH37 (HANKOOK), 501 rev/mile, 75 MPH, All-Position	56/0		56	
<b>WHEELS, TIRES - REAR</b>					
28DTU	WHEELS, REAR {Accuride 29001} DUAL DISC; 22.5x7.50 Rims, Powder Coat Steel, 5-Hand Hole, 10-Stud, 285.75mm BC, Hub-Piloted, Flanged Nut, with Steel Hubs	0/0		0	
7372135809	(4) TIRE, REAR 11R22.5 Load Range G AH37 (HANKOOK), 501 rev/mile, 75 MPH, All-Position	0/112		112	
<b>WHEELS MISC OPTIONS</b>					
29PAW	PAINT IDENTITY, FRONT WHEELS Disc Front Wheels; with Vendor Applied Gray Powder Coat Paint	0/0		0	
29PAX	PAINT IDENTITY, REAR WHEELS Disc Rear Wheels; with Vendor Applied Gray Powder Coat Paint	0/0		0	
<b>Services Section:</b>					
<b>WARRANTY</b>					
40129	WARRANTY Standard for MV Series, Effective with Vehicles Built July 1, 2017 or Later, CTS-2020A	0/0		0	
40YYK	SRV CONT, EXT CUMMINS ENG/AFTR {Cummins} To 60-Month/150,000 Miles (240,000 km), Extended Cummins B6.7 Engine Coverage, Protection Plan 1 and Aftertreatment, (Truck Application Only)	0/0		0	
	<b>Total Component Weight:</b>	<b>7115/4284</b>		<b>11399</b>	
		(lbs)		(lbs)	
1	Marquez Brothers 22 FT. Trash Dump	0/0		0	
	<b>Total Body Allied:</b>	<b>0/0</b>		<b>0</b>	
		(lbs)		(lbs)	

**Vehicle Specifications**  
**2025 MV607 SBA (MV607)**

The weight calculations included in this proposal are an estimate of future vehicle weight. The actual weight as manufactured may be different from the estimated weight. Navistar, Inc. shall not be liable for any consequences resulting from any differences between the estimated weight of a vehicle and the actual weight.



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# FLORIDA SHERIFFS ASSOCIATION

2617 Mahan Drive  
Tallahassee, Florida 32308

p: (850) 877-2165 f: (850) 878-8665  
flsheriffs.org    

## Contract Extension Amendment

### Contract FSA23-VEH21.0: Heavy Trucks and Busses

### Extension Term: October 1, 2024, through September 30, 2025

The Terms and Conditions of this Contract allow for modification via contract addenda as provided for in Section 1.23. The effective dates of the original contract term for FSA23-VEH21.0 are October 1, 2023, through September 30, 2024. The Florida Sheriffs Association (FSA) shall extend this contract for an additional one (1) year term from October 1, 2024, through September 30, 2025. The Terms and Conditions remain in effect for the contract extension term. Items and pricing may be updated in accordance with Sections 3.05 and 3.06 of the Terms and Conditions.

FSA is amending the original contract to reflect the following modifications:

- Modify the contract number to FSA23-VEH21.1, which reflects the extension; and
- Amend Section 1.03 to recognize the term of the contract extension.

Section 1.03 is amended to include the following language:

#### 1.03 TERM OF CONTRACT

The FSA elected to renew the contract and extend the term of the contract for another twelve (12) months. The contract extension term will begin October 1, 2024, and end September 30, 2025.

For questions regarding this contract extension, please email Hugh Oliver at [holiver@flsheriffs.org](mailto:holiver@flsheriffs.org).

Hugh Oliver  
Florida Sheriffs Association  
Director- Cooperative Purchasing Program



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# FLORIDA SHERIFFS ASSOCIATION

2617 Mahan Drive, Tallahassee, Florida 32308  
P.O. Box 12519 • Tallahassee, Florida 32317-2519

p: (850) 877-2165  
f: (850) 878-8665  
[www.flsheriffs.org](http://www.flsheriffs.org)  

## Notice of Final Award FSA23-VEH21.0: Heavy Trucks & Buses

Date: October 1, 2023

To: Bidders and Purchasers

From: Hugh Oliver, Cooperative Purchasing Program Manger

Re: Notice of Final Award for FSA23-VEH21.0: Heavy Trucks & Buses

Florida Sheriffs Association (FSA) has completed its 21st year of the cooperative purchasing heavy trucks and buses contract. FSA is issuing the Notice of Final Award for contract FSA23-VEH21.0: Heavy Trucks & Buses that will be effective from October 1, 2023, through September 30, 2024. This year's bid included 80 items. The contract will offer class 3-5 cab & chassis trucks and buses.

The competitive process for this award began in May 2023, when stakeholders were surveyed regarding procurement needs. Items were added based on survey results and the Fleet Advisory Committee's review of products.

An advertisement for the Invitation to Bid was published in the Florida Administrative Weekly, as well as the State of Florida's Office of Supplier Diversity and the FSA websites. On May 5, 2023, a direct notification was sent to 716 prospective bidders to participate in a voluntary bidder workshop. The ITB advertisement resulted in 81 pre-bid attendees or waivers. Of these respondents, 30 submitted bids and 29 qualified. FSA has identified intended awardees in the attached Final Award Report. The Final Award Report shows up to three lowest bidders per item, per zone.

The Florida Sheriffs Association Cooperative Purchasing Program has followed the Contract Terms and Conditions for this procurement. Bidders that become awarded vendors are governed by their manufacturer agreements and the Contract Terms and Conditions.





Contract pricing will be extended and guaranteed to the Florida Sheriffs Association, any unit of local government, political subdivision or agency of the State of Florida, or to other entities approved by manufacturers to buy from this contract, which can include out-of-state sales. Vendors that wish to extend contract pricing to entities other than those defined here are governed by their manufacturer's agreement. All purchasers are bound by state law, local ordinances, rules, and regulations for purchases made under this contract.



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# FLORIDA SHERIFFS ASSOCIATION

2617 Mahan Drive  
Tallahassee, Florida 32308

p: (850) 877-2165 f: (850) 878-8665  
fisheriffs.org    

## FSA23-VEH21.0: Heavy Trucks and Busses

### Contract Renewal

**October 1, 2024, through September 30, 2025**

The Terms and Conditions of this contract allow for modification via contract amendment as provided for in Section 1.23. The effective dates of the contract term for FSA23-VEH21.0 are October 1, 2023, through September 30, 2024. Per Contract Terms and Conditions, Section 3.05, the contract may be renewed by mutual agreement, initiated at the discretion of the FSA (Florida Sheriffs Association), for up to two additional one-year terms on a year-to-year basis. The Florida Sheriffs Association Cooperative Purchasing Program seeks to renew FSA23-VEH21.0 for a one-year term. The contract term will extend from October 1, 2024, through September 30, 2025.

Please sign and return this contract renewal acknowledgment prior to May 31, 2024. If the FSA does not receive a written response to this decision by May 31, 2024, the contract term will be extended for the additional period.

Any vendor not in agreement may opt out of the extra contract term before September 30, 2024.

For questions regarding this contract extension, please email Hugh Oliver at [holiver@flsheriffs.org](mailto:holiver@flsheriffs.org).

**Name of Authorized Agent (Please Print):**

Carlos Correa

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**Signature:**

Carlos Correa

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Digitally signed by Carlos  
Correa  
Date: 2024.04.12 14:08:50  
-04'00'

**Awarded Vendor Company Name:**

Rechtien International Trucks

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**Date:**

4/12/24

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**Consent Agenda  
9.16.**

City of North Miami Beach  
17011 NE 19 Avenue  
North Miami Beach, FL 33162  
305-947-7581  
www.citynmb.com

**MEMORANDUM**

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<b>TO:</b>	Mayor and City Commission
<b>FROM:</b>	Zafar Ahmed, Community Development Director
<b>VIA:</b>	
<b>DATE:</b>	January 21, 2025

---

Resolution No. R2025-15 Accepting the Request to Amend the Second Amendment to the  
**RE:** Development Agreement for the Soleste Project aka North Miami Beach Village located at 16375  
Biscayne Boulevard (Zafar Ahmed, Community Development Director)

---

**Description**

**BACKGROUND**

**ANALYSIS:**

**RECOMMENDATION:**

**FISCAL/ BUDGETARY**

**IMPACT:**

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**ATTACHMENTS:**

**Description**

- Soleste\_Agenda Memo
- Soleste\_Resolution
- Soleste\_Second Amendment
- Soleste\_Exhibit K
- Soleste\_Exhibit 1



# ***City of North Miami Beach, Florida***

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Community Development / Planning and Zoning

TO: Mario Diaz, City Manager and City attorney  
FROM: Javier Parra-Garcia, Planning and Zoning Technician  
DATE: FRIDAY, JANUARY 10, 2025

---

SUBJECT: **Soleste Declaration Second Amendment**

---

Planning and Zoning staff has reviewed the proposed second amendment for the sign easement in comparison to the first amendment to the sign easement. The proposed second amendment relocates the sign easement to an area within the shared access easement for the development. The attached Exhibit K shows the original location and Exhibit 1, found in page 11 of the development agreement, shows its newly proposed location.

**Findings:**

The newly proposed sign easement location is within the existing median of the access easement. Staff finds that the proposed sign easement does not interfere with any vehicular or non-motorized use of the access easement. Staff will evaluate any possible technical issues with the sign including sign configuration, line of sight, and final location within the easement at time of sign permit review.

**Recommendation:**

Planning and Zoning staff recommends approval of the proposed second amendment relocating the sign easement. (Signatures required on page 9 of attachment Second Amendment to AR)

**RESOLUTION NO. R2025-XX**

**A RESOLUTION OF THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA, ACCEPTING THE REQUEST FROM THE DEVELOPER TO AMEND THE SECOND AMENDMENT TO THE DEVELOPMENT AGREEMENT BY REPLACING EXISTING EXHIBIT “K” WITH EXHIBIT “1,” INDICATING THE ALTERNATE REVISED SIGN EASEMENT LOCATION FOR THE MONUMENT SIGN FOR THE SOLESTE PROJECT (AKA NORTH MIAMI BEACH VILLAGE); PROVIDING FOR IMPLEMENTATION; AND PROVIDING FOR AN EFFECTIVE DATE.**

**WHEREAS**, the City of North Miami Beach (“City”) and the Developer of the Soleste Project entered into the Second Amendment to the Development Agreement on May 31, 2024, governing various rights and obligations concerning the project; and

**WHEREAS**, Exhibit “K” of the Second Amendment contains the legal description of the Sign Easement Number 2 associated with the placement of the project’s monument sign; and

**WHEREAS**, the Developer has requested an amendment to the Second Amendment to replace Exhibit “K” with Exhibit “1,” reflecting the revised sign easement location of the monument sign as outlined in the legal description and sketch provided; and

**WHEREAS**, the City has reviewed and considered the Developer’s request and finds that the proposed amendment is consistent with applicable City regulations and the goals of the project; and

**WHEREAS**, the City Commission desires to approve the Developer’s request and authorize the amendment to the Second Amendment Development Agreement, subject to the terms and conditions stated therein.

**NOW, THEREFORE, BE IT RESOLVED BY THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA, AS FOLLOWS:**

**Section 1. Approval of Amendment.** The Mayor and City Commission hereby approve the request from the Developer to amend the Second Amendment to the Development Agreement for the Soleste Project by replacing Exhibit “K” with Exhibit “1,” as submitted and attached hereto.

**Section 2. Implementation.** The City Manager and City Attorney are authorized to take all actions necessary to execute and implement the amendment, consistent with this Resolution, and ensure that the final location of the monument sign within the sign easement complies with all applicable laws and regulations.

**Section 3.** All Resolutions or parts of Resolutions in conflict with this Resolution are repealed to the extent of such conflict.

**Section 4.** Any scrivener or typographical errors that do not affect intent may be corrected with notice to, and the authorization of the City Attorney and City Manager without further process.

**Section 5.** If any provision of this Resolution or the application thereof to any person or circumstance is held invalid, such invalidity shall not affect other provisions or applications of this Resolution that can be given affect without the invalid provision or application, and to this end the provisions of this Resolution are declared to be severable.

**Section 6.** **Effective Date.** This Resolution shall take effect immediately upon adoption.

**APPROVED AND ADOPTED** by the City Commission of the City of North Miami Beach, Florida, at its regular meeting assembled this \_\_\_\_\_ day of February, 2025.

**ATTEST:**

\_\_\_\_\_  
ANDRISE BERNARD, MMC  
CITY CLERK

(CITY SEAL)

\_\_\_\_\_  
MICHEAL JOSEPH, ESQ.  
MAYOR

**APPROVED AS TO FORM AND LEGAL  
SUFFICIENCY FOR USE AND RELIANCE  
OF THE CITY OF NORTH MIAMI BEACH:**

GREENSPOON MARDER LLP  
CITY ATTORNEYS

BY: \_\_\_\_\_  
JOSEPH S. GELLER

This Instrument Was Prepared By:

Eduardo R. Robayna, Esq.  
Eduardo R. Robayna, PLLC  
6201 SW 70th Street, Suite 200  
South Miami, FL 33143

(Space Reserved for Clerk of Court)

**SECOND AMENDMENT  
TO  
AMENDED AND RESTATED DECLARATION OF  
RESTRICTIONS, GRANT OF EASEMENTS AND  
COMMON AREA MAINTENANCE AGREEMENT  
FOR NORTH MIAMI BEACH VILLAGE**

This **SECOND AMENDMENT TO AMENDED AND RESTATED DECLARATION OF RESTRICTIONS, GRANT OF EASEMENTS AND COMMON AREA MAINTENANCE AGREEMENT** (this "**Amendment**") is made and entered into as of May 31st, 2024, by and among by and among Nomi Beach Holdings, LLC, a Delaware limited liability company whose mailing address is 6201 SW 70th Street, Suite 200, South Miami, FL 33143 ("**Nomi**"); Nomi South Holdings, LLC, a Delaware limited liability company whose mailing address is 6201 SW 70th Street, Suite 200, South Miami, FL 33143 ("**Nomi South**"); CK Prive Group 1800 LLC, a Florida limited liability company whose mailing address is 20161 NE 16th Place Miami, FL 33179 ("**CK Prive**"); THE HARBOUR HOMEOWNERS' ASSOCIATION INC., a Florida not-for-profit corporation whose mailing address is 16385 Biscayne Blvd, Suite 120, North Miami Beach, FL 33160 ("**The Harbour**"); and THE NORTH MIAMI BEACH VILLAGE PROPERTY OWNERS ASSOCIATION, INC., a Florida not-for-profit corporation, whose principal office is located at 9861 SW 184th Street, Miami, Florida 33157 (the "**Association**") to further amend<sup>1</sup> that certain AMENDED AND RESTATED DECLARATION OF RESTRICTIONS, GRANT OF EASEMENTS AND COMMON AREA MAINTENANCE AGREEMENT dated as of August 26, 2015 recorded in Official Records Book 29753, Page 1376 of the Public Records of Miami-Dade County, Florida, (the "**Declaration**"). Nomi, Nomi South, CK Prive, and The Harbour are collectively referred to herein as the "**Owners**."

WITNESSETH

**WHEREAS**, the Owners are Members of the Association and are parties to the Declaration;

**WHEREAS**, Nomi is the fee simple owner of that certain real property located in Miami-

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<sup>1</sup> The Declaration was previously amended pursuant to that certain FIRST AMENDMENT TO AMENDED AND RESTATED DECLARATION OF RESTRICTIONS, GRANT OF EASEMENTS AND COMMON AREA MAINTENANCE AGREEMENT dated as of June 12, 2023 recorded in Official Records Book 33927, Page 2605 of the Public Records of Miami-Dade County, Florida, (the "First Amendment").

Dade County, Florida more particularly described in Exhibit "A-1" to the Declaration;

**WHEREAS**, Nomi South is the fee simple owner of that certain real property located in Miami-Dade County, Florida more particularly described in Exhibit "A-2" to the Declaration;

**WHEREAS**, CK Prive is the fee simple owner of those two (2) certain parcels of real property located in Miami-Dade County, Florida more particularly described in Exhibit "B" and Exhibit "C" to the Declaration;

**WHEREAS**, The Harbour is the fee simple owner of those two (2) certain parcels of real property located in Miami-Dade County, Florida more particularly described in Exhibit "D-1" and Exhibit "D-2" to the Declaration;

**WHEREAS**, The Harbour was granted a perpetual, non-exclusive easement in, on, under and across Sign Easement 2 Property, legally described in Exhibit K to the Declaration, for the purpose of constructing, installing, operating, maintaining, inspecting, repairing and replacing a Monument Sign;

**WHEREAS**, the Owners wish to amend the Declaration as set forth herein to relocate Sign Easement 2 Property.

**NOW, THEREFORE**, in consideration of the foregoing, the mutual covenants herein contained, and other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the Declaration is hereby amended as follows:

**ARTICLE I  
AMENDMENTS TO THE DECLARATION**

Section 1.1 Relocation of Sign Easement 2 Property. The Declaration is hereby amended by replacing the legal description of Sign Easement 2 Property as reflected on or depicted in Exhibit "K" to the Declaration (titled "Sign Easement Property 1, 2 and 3") with the sketch and legal description attached as **Exhibit "1"** hereto, thereby relocating Sign Easement 2 Property. All references in the Declaration to Sign Easement 2 Property shall henceforth mean or refer to Exhibit 1 to this Amendment. This Amendment shall have no effect on Sign Easement 1 Property or Sign Easement 3 Property depicted in Exhibit "K" to the Declaration. Subject to the conditions and limitations set forth in the Declaration, each Owner, to the extent of its fee simple ownership in the Common Areas, hereby reaffirms the easements, rights, benefits and privileges set forth in the Declaration with respect to Sign Easement 2 Property, as amended hereby, without need for any additional grants or conveyances.

Section 1.2 Improvements Impairing Visibility. The fee simple owner of Parcel 1-B hereby covenants and agrees not to construct, plant, or install any permanent above-ground improvements, palms, trees, bushes, or any other vegetation, other signage of any sort, furniture, artwork, or any other article or object, on Parcel 1-B that would materially

reduce the visibility of the Monument Sign (to be constructed at the hereby amended location for Sign Easement 2 Property) to vehicular traffic traveling on U.S. Highway No. 1 (a/k/a State Road No. 5 a/k/a Biscayne Boulevard a/k/a Federal Highway). For the avoidance of doubt, no improvements indicated on the following identified plans shall be subject to this Section 1.2 or otherwise be deemed to reduce the visibility of the Monument Sign:

1. Construction Drawing Sheet No. SKK-1, Project No. 20-034, signed and sealed as of March 22, 2024 by Gelson Alves, PE; and
2. Form Group, Inc. "Overall Ground Floor Plan", Drawing No. A-200, Project No. 20-0123, dated October 25, 2023

## **ARTICLE II MISCELLANEOUS**

Section 2.1 Ratification: Effect of Amendment. Except as expressly amended hereby (or in the First Amendment), all the provisions of the Declaration shall remain unmodified and in full force and effect to the same extent as if fully set forth herein. As of the date of this Amendment, the Declaration and First Amendment shall be amended as provided herein, and the Declaration and First Amendment as amended by this Amendment shall be binding on all parties thereto.

Section 2.2 Governing Law. The interpretation and construction of this Amendment, and all matters relating hereto, shall be governed by the laws of the State of Florida applicable to agreements executed and to be performed solely within such state.

Section 2.3 Defined Terms; Recitals. Capitalized or defined terms used in this Amendment shall have the same meaning as are assigned to those terms in the Declaration, or (as applicable) the First Amendment. The above recitals are true and correct in all respects and are incorporated herein as if set forth in the body of this Amendment.

Section 2.4 Counterparts and Electronic Delivery. This Amendment may be executed in several counterparts, each of which shall be deemed an original, but all of which shall constitute one and the same document. Any signature page of this Amendment may be detached from any counterpart of this Amendment and re-attached to any other counterpart of this Amendment identical in form hereto but having attached to it one or more additional signature pages. Delivery of a signed counterpart of this Amendment, or of a signature page hereto (with instructions to attach the same to the approved form of this Amendment), by electronic mail or other electronic means shall constitute good and valid delivery for all purposes.

Section 2.5 Authority. Each undersigned individual signing on behalf of an Owner or Member represents and warrants that he/she is an authorized agent of such Owner or Member and has fully authority to execute this Amendment and bind the applicable Owner or Member hereto.

IN WITNESS WHEREOF, this Amendment has been executed by each Owner and consent to and joined in by the Association and the City as of the day and year first set forth above.

**OWNER:**

**NOMI BEACH HOLDINGS, LLC,**  
a Delaware limited liability company

By: Nomi Beach Management, LLC  
its Manager

By: [Signature]  
Name: Roberto J. Suris  
Title: Manager

**WITNESSES:**

Print Name: Janet Bravo

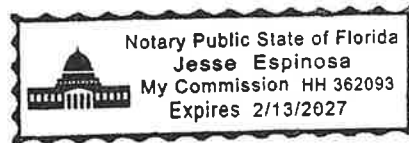
Print Name: Eduardo R. Bayna

STATE OF FLORIDA )  
) :SS  
COUNTY OF MIAMI-DADE )

The foregoing instrument was acknowledged before me by means of  physical presence or  online notarization, this 25 day of July 2024 by Roberto J. Suris, as Manager of Nomi Beach Management, LLC, a Delaware limited liability company, the sole Manager of Nomi Beach Holdings, LLC, a Delaware limited liability company, on behalf of the company, who is  personally known to me or has produced \_\_\_\_\_ as identification.

My Commission Expires: 2/13/27

[Signature]  
Notary Public, State of Florida  
Print Name: Jesse Espinosa



*[Signature Page to Second Amendment to Amended and Restated Declaration of Restrictions, Grant of Easements and Common Area Maintenance Agreement]*



IN WITNESS WHEREOF, this Amendment has been executed by each Owner and consent to and joined in by the Association and the City as of the day and year first set forth above.

**OWNER:**

**NOMI SOUTH HOLDINGS, LLC,**  
a Delaware limited liability company

By: Nomi South Partners, LLC  
its sole member

By: Nomi South Management, LLC  
its Manager

**WITNESSES:**

Print Name: Janet Bravo

Print Name: Eduardo R. Robayna

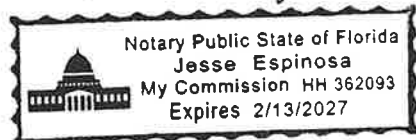
By: [Signature]  
Name: Roberto J. Suris  
Title: Manager

STATE OF FLORIDA )  
) :SS  
COUNTY OF MIAMI-DADE )

The foregoing instrument was acknowledged before me by means of  physical presence or  online notarization, this 25 day of July 2024 by Roberto J. Suris, as Manager of Nomi South Management, LLC, a Delaware limited liability company, manager of Nomi South Partners, LLC, a Delaware limited liability company, sole member of Nomi South Holdings, LLC, a Delaware limited liability company, on behalf of the company, who is  personally known to me or has produced \_\_\_\_\_ as identification.

My Commission Expires: 2/13/27

Notary Public, State of Florida  
Print Name: Jesse Espinosa



[Signature Page to Second Amendment to Amended and Restated Declaration of Restrictions, Grant of Easements and Common Area Maintenance Agreement]

IN WITNESS WHEREOF, this Amendment has been executed by each Owner and consent to and joined in by the Association and the City as of the day and year first set forth above.

**OWNER:**

**THE HARBOUR HOMEOWNERS' ASSOCIATION INC.,**  
a Florida not-for-profit corporation

**WITNESSES:**

[Signature]  
Print Name: Svaly Sardinas

[Signature]  
Print Name: Ashley Castro

By: [Signature]  
Name: Gabriel Herrera  
Title: President

STATE OF FLORIDA )  
 ) :SS  
COUNTY OF MIAMI-DADE )

The foregoing instrument was acknowledged before me by means of  physical presence or  online notarization, this 31 day of MAY 2024 by Gabriel Herrera, as President of THE HARBOUR HOMEOWNERS' ASSOCIATION INC., a Florida not-for-profit corporation, on behalf of the corporation, who is  personally known to me or has produced \_\_\_\_\_ as identification.

[Signature]  
Notary Public, State of Florida  
Print Name: CRISTYAN ARCINIEGAS

My Commission Expires:



**CRISTYAN ARCINIEGAS**  
Notary Public  
State of Florida  
Comm# HH209049  
Expires 12/16/2025

IN WITNESS WHEREOF, this Amendment has been executed by each Owner and consent to and joined in by the Association and the City as of the day and year first set forth above.

WITNESSES:

[Signature]

Print Name: Mia Bloch

Address: 1584 Presidential Way, 33179

[Signature]

Print Name: Liz Kary Cruz Duarte

Address: 10060 SHERIDAN ST, 104 Pembroke Pines, FL 33024

OWNER:

**CK PRIVE GROUP 1800 LLC,**  
a Florida limited liability company

By: IG LDI 1800, LLC  
its Manager

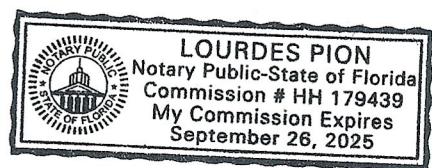
[Signature]  
By: \_\_\_\_\_  
Name: Bruno Bloch  
Title: Manager

STATE OF FLORIDA )  
  ):SS  
COUNTY OF MIAMI-DADE )

The foregoing instrument was acknowledged before me by means of  physical presence or  online notarization, this 1 day of October 2024 by Bruno Bloch, as Manager of IG LDI 1800, LLC, a Florida limited liability company, the sole Manager of CK PRIVE GROUP 1800 LLC, a Florida limited liability company, on behalf of the company, who is  personally known to me or has produced Drivers License as identification.

My Commission Expires: 9/24/25

[Signature]  
\_\_\_\_\_  
Notary Public, State of Florida  
Print Name: Lourdes Pion



[Signature Page to Second Amendment to Amended and Restated Declaration of Restrictions, Grant of Easements and Common Area Maintenance Agreement]

WITNESS WHEREOF, this Amendment has been executed by each Owner and consent to and joined in by the Association and the City as of the day and year first set forth above.

**THE ASSOCIATION:**

**THE NORTH MIAMI BEACH VILLAGE  
PROPERTY OWNERS ASSOCIATION, INC.,**  
a Florida not-for-profit corporation

WITNESSES:

Print Name: Janet Bravo

Print Name: Eduardo R. Robayna

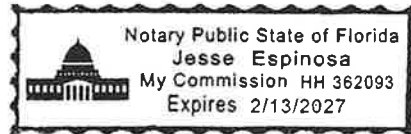
By: [Signature]  
Name: Alejandro Arrieta  
Title: President

STATE OF FLORIDA )  
 ) : SS  
COUNTY OF MIAMI-DADE )

The foregoing instrument was acknowledged before me by means of  physical presence or  online notarization, this 25 day of July 2024 by Alejandro Arrieta, as President of THE NORTH MIAMI BEACH VILLAGE PROPERTY OWNERS ASSOCIATION, INC., a Florida not-for-profit corporation, on behalf of the corporation, who is  personally known to me or has produced \_\_\_\_\_ as identification.

My Commission Expires: 2/13/27

Notary Public, State of Florida  
Print Name: Jesse Espinosa



*[Signature Page to Second Amendment to Amended and Restated Declaration of Restrictions, Grant of Easements and Common Area Maintenance Agreement]*

**CONSENT OF THE CITY**

Pursuant to **Article VI, Section 7** of the AMENDED AND RESTATED DECLARATION OF RESTRICTIONS, GRANT OF EASEMENTS AND COMMON AREA MAINTENANCE AGREEMENT dated as of August 26, 2015 recorded in Official Records Book 29753, Page 1376 of the Public Records of Miami-Dade County, Florida (the "Declaration"), any amendment to the Declaration is subject to the approval of the City. The City hereby approves and consents to the Second Amendment to the Declaration (the "Amendment"). By their execution of this Amendment, the Owners acknowledge and agree that (i) the City's approval of this Amendment shall not impose upon the City any obligation to enforce the terms and conditions contained in the Declaration or Amendment, nor shall the City be required to mediate, arbitrate or otherwise resolve any disputes among the Owners or the Association arising from the Declaration or the Amendment, nor shall the City be made a party to any litigation, action or claim brought by an Owner to enforce any of the terms or conditions of the Declaration or Amendment; (ii) the development of the Parcels shall be performed in accordance with all Applicable Laws; and (iii) the City's consent to this Amendment shall not be deemed as a waiver ( and is not a waiver) of the enforceability of all Applicable Laws of the City.

WITNESSES:

**CITY OF NORTH MIAMI BEACH**

\_\_\_\_\_  
Print Name: \_\_\_\_\_  
Address: \_\_\_\_\_  
\_\_\_\_\_

By: \_\_\_\_\_  
Name: Mario Diaz  
Title: City Manager

**APPROVED AS TO FORM AND LEGAL SUFFICIENCY**

\_\_\_\_\_  
Print Name: \_\_\_\_\_  
Address: \_\_\_\_\_  
\_\_\_\_\_

By: \_\_\_\_\_  
Name: \_\_\_\_\_  
Title: City Attorney

STATE OF FLORIDA                    )  
  
COUNTY OF MIAMI-DADE        )

);SS

The foregoing instrument was acknowledged before me by means of  physical presence or  online notarization, this \_\_\_\_\_ day of \_\_\_\_\_ 2024 by \_\_\_\_\_, as \_\_\_\_\_ of THE CITY OF NORTH MIAMI BEACH, on behalf of the City, who is  personally known to me or has produced \_\_\_\_\_ as identification.

My Commission Expires:

\_\_\_\_\_  
Notary Public, State of Florida  
Print Name: \_\_\_\_\_

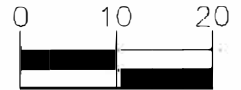
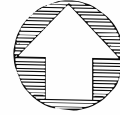
**EXHIBIT "1"**

**Legal Description of Sign Easement 2 Property**

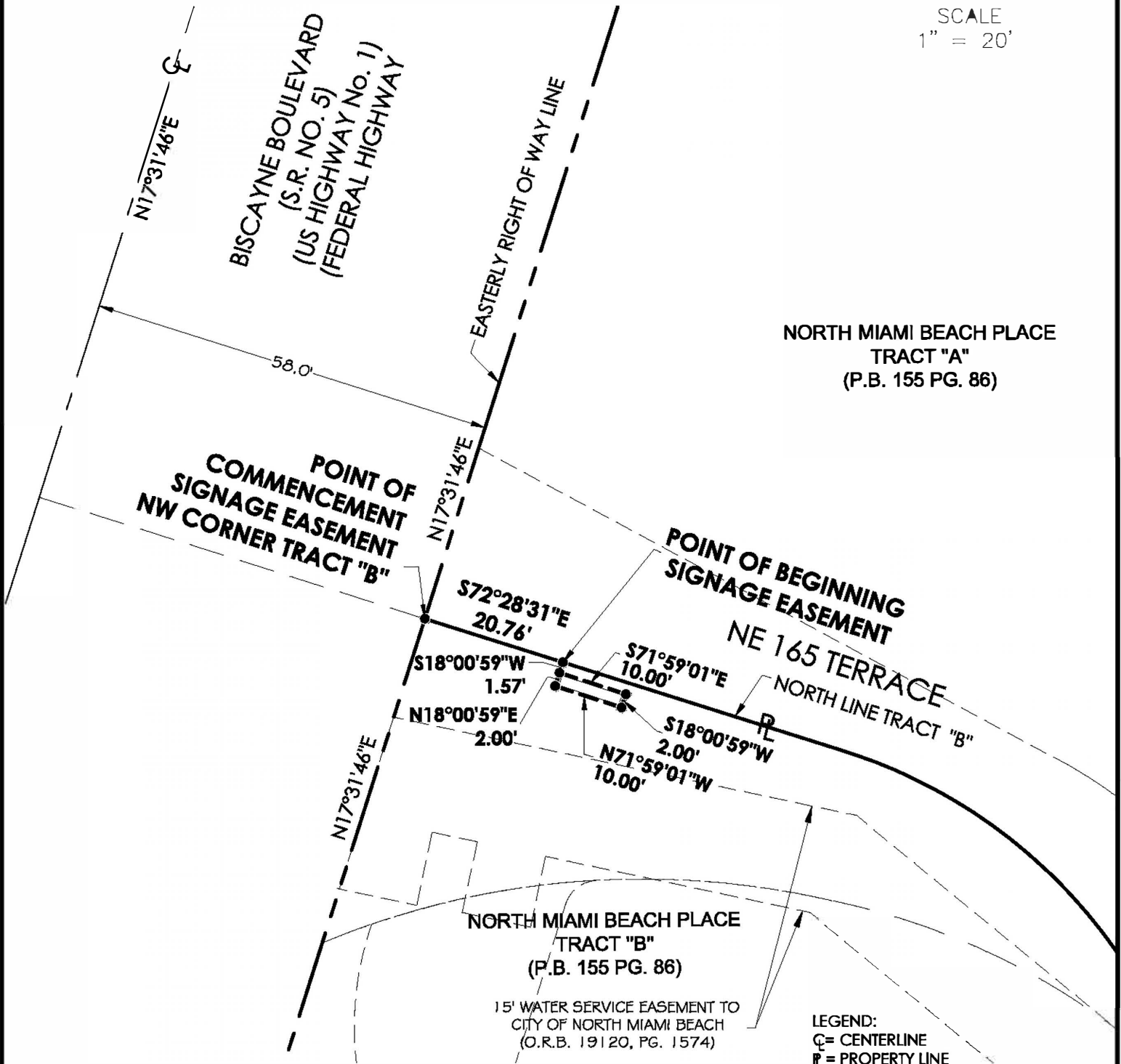


# SKETCH TO ACCOMPANY LEGAL DESCRIPTION FOR SIGNAGE EASEMENT

EXHIBIT "1"



SCALE  
1" = 20'



**LEGEND:**  
 C= CENTERLINE  
 P= PROPERTY LINE  
 P.B. = PLAT BOOK  
 PG. = PAGE  
 O.R.B. = OFFICIAL RECORD BOOK  
 P.O.C.= POINT OF COMMENCEMENT  
 P.O.B.=POINT OF BEGINNING

NOTICE: This document is not valid, full and complete without all pages.

**THIS IS NOT A SURVEY**

**LONGITUDE SURVEYORS**

7700 N. KENDALL DRIVE, SUITE 705, MIAMI, FLORIDA 33156 \* PHONE:(305)463-0912 \* WWW.LONGITUDESURVEYORS.COM

JOB No. 15473.0.43 PAGE 1 OF 3

# SKETCH TO ACCOMPANY LEGAL DESCRIPTION FOR SIGNAGE EASEMENT

## LEGAL DESCRIPTION:

A parcel of land being a portion of Tract "B" of "NORTH MIAMI BEACH PLACE", according to the plat thereof, as recorded in Plat Book 155, Page 86 of the Public Records of Miami-Dade County, Florida, and being more particularly described as follows:

**COMMENCE** at the Northwest Corner of Tract "B" of the aforesaid Plat; thence S 72°28'31" E along the most Northerly Line of said Tract "B" for a distance of 20.76 feet, thence leaving said Northerly line S 18°00'59" W, for a distance of 1.57 feet to the **POINT OF BEGINNING** of the Signage Easement; thence run S 71°59'01" E, for a distance of 10.00 feet; thence S 18°00'59" W for a distance of 2.00 feet; thence N 71°59'01" W, for a distance of 10.00 feet; thence N 18°00'59" E, for a distance of 2.00 feet to the **POINT OF BEGINNING**.

Containing 20 square feet, more or less, by calculations.

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**LONGITUDE** SURVEYORS

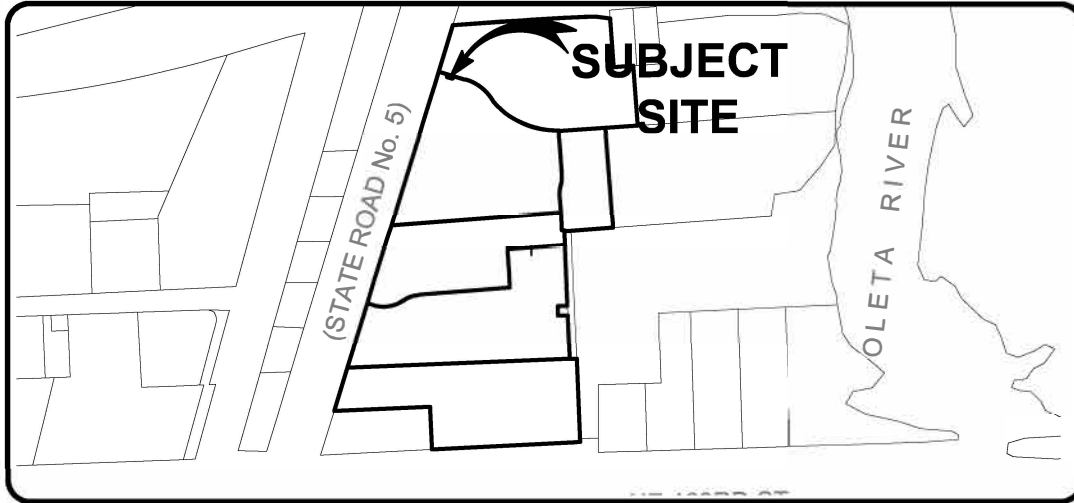
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JOB No. 15473.0.43 PAGE 2 OF 3





# SKETCH TO ACCOMPANY LEGAL DESCRIPTION FOR SIGNAGE EASEMENT



## LOCATION MAP

(NOT TO SCALE)

PERTINENT INFORMATION USED FOR THE PREPARATION OF THIS DOCUMENT:

The Legal Description of the Subject Parcel was generated from the following documents:

1. Plat of "NORTH MIAMI BEACH PLACE", recorded in Plat Book 155, Page 86, Miami-Dade County Public Records.
2. Soleste NOMI Duct Bank, dwg PP2, WR 9545114, IWR D095-45-114 provided by the client.
3. Grant of Easement, recorded in Official Records Book 19601, Page 3936, Miami-Dade County Public Records.
4. Modification of Easement, recorded in Official Records Book 18767, Page 4770, Miami-Dade County Public Records.
5. Temporary Access Easement, recorded in Official Records Book 18767, Page 4794, Miami-Dade County Public Records.
6. Easement Agreement, recorded in Official Records Book 19120, Page 1574, Miami-Dade County Public Records.
7. Amended and Restated Declaration of Restrictions, Grant of Easement and Common Area Maintenance Agreement for North Miami Beach Village, recorded in Official Records Book 29753, Page 1376, Miami-Dade County Public Records.
8. Easement, recorded in Official Records Book 18995, Page 4948, Miami-Dade County Public Records.

Bearings shown hereon are based upon the centerline of Biscayne Boulevard, with an assumed bearing of N 17°31'46" E, said line to be considered a well established and monumented line.

EASEMENTS AND ENCUMBRANCES:

No information was provided as to the existence of any easements other than what appears on the underlying Plat of record. Please refer to the Limitations item with respect to possible restrictions of record and utility services.

LIMITATIONS:

Since no other information was furnished other than what is cited above, the Client is hereby advised that there may be legal restrictions on the subject property that are not shown on this Sketch or contained within this report that may be found in the Public Records of Miami-Dade County, Florida or any other public and private entities as their jurisdictions may appear. This document does not represent a field boundary survey of the described property, or any part or parcel thereof.

SURVEYOR'S CERTIFICATE:

I HEREBY CERTIFY that the LEGAL DESCRIPTION and SKETCH of the subject area described hereon was made under my supervision and that the Legal Description meets the Standards of Practice set forth by the Florida Board of Professional Land Surveyors and Mappers in Chapter 5J-17, Florida Administrative Code, pursuant to Section 472.027, Florida Statutes, and that the sketch hereon is true and correct to the best of my knowledge and belief, subject to notes and notations shown hereon. This sketch shown is not a land survey.

LONGITUDE SURVEYORS LLC., a Florida Limited Liability Company  
Florida Certificate of Authorization Number LB7335

Digitally signed by Eduardo M Suarez  
'Date: 2024.03.27 12:42:39 -04'00'



By: \_\_\_\_\_  
Eduardo M. Suarez, PSM  
Registered Surveyor and Mapper LS6313  
State of Florida

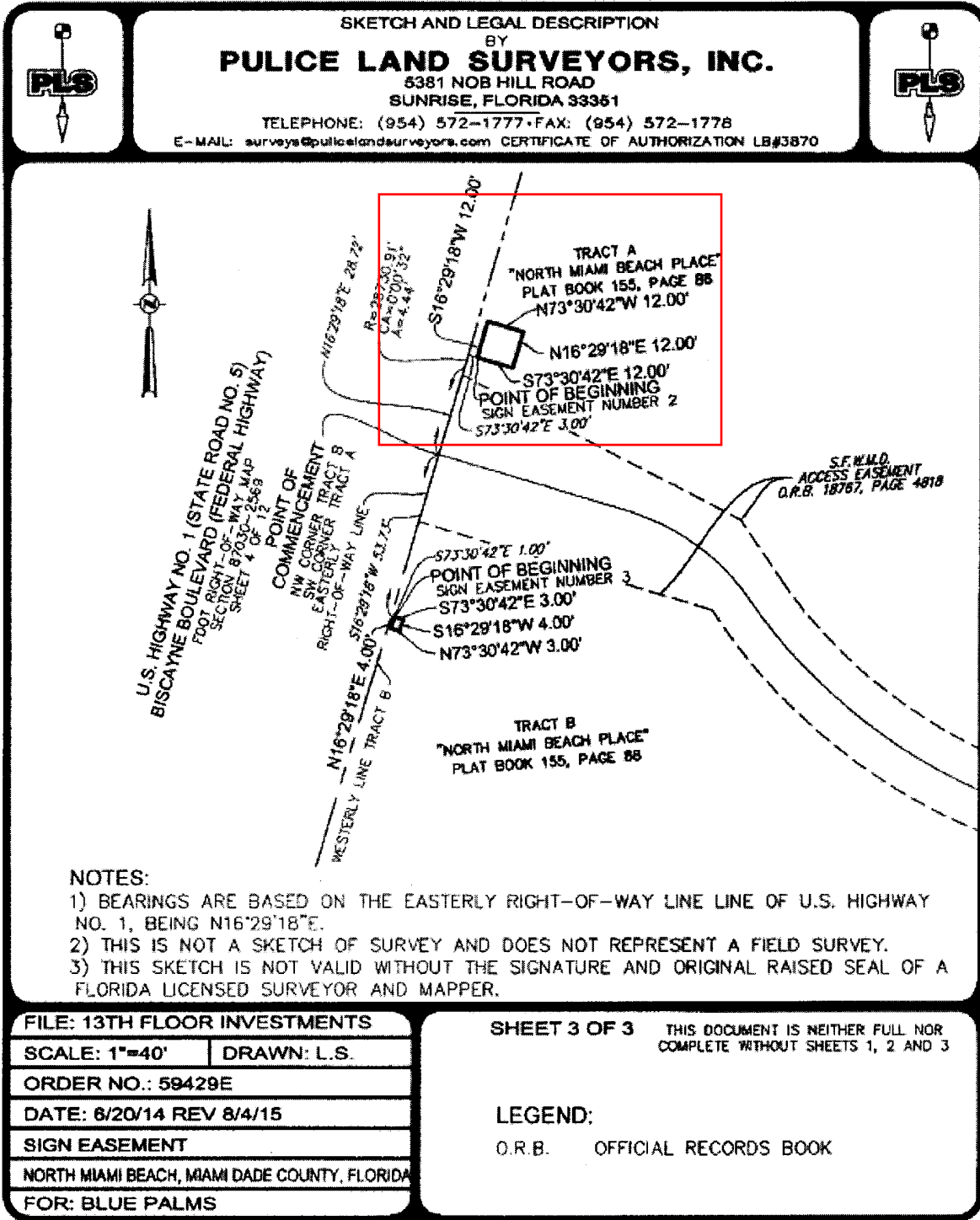
NOTICE: Not valid without the digital signature and seal and/or the signature and original raised seal of a Florida Licensed Surveyor and Mapper. Additions and deletions to this map to Survey by other than the signing party are prohibited without the written consent of the signing party.

NOTICE: This document is not valid, full and complete without all pages.

**EXHIBIT "1"**

**EXHIBIT "K"**

**Sign Easement Property 1, 2 and 3**

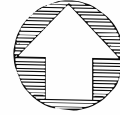


**EXHIBIT "1"**

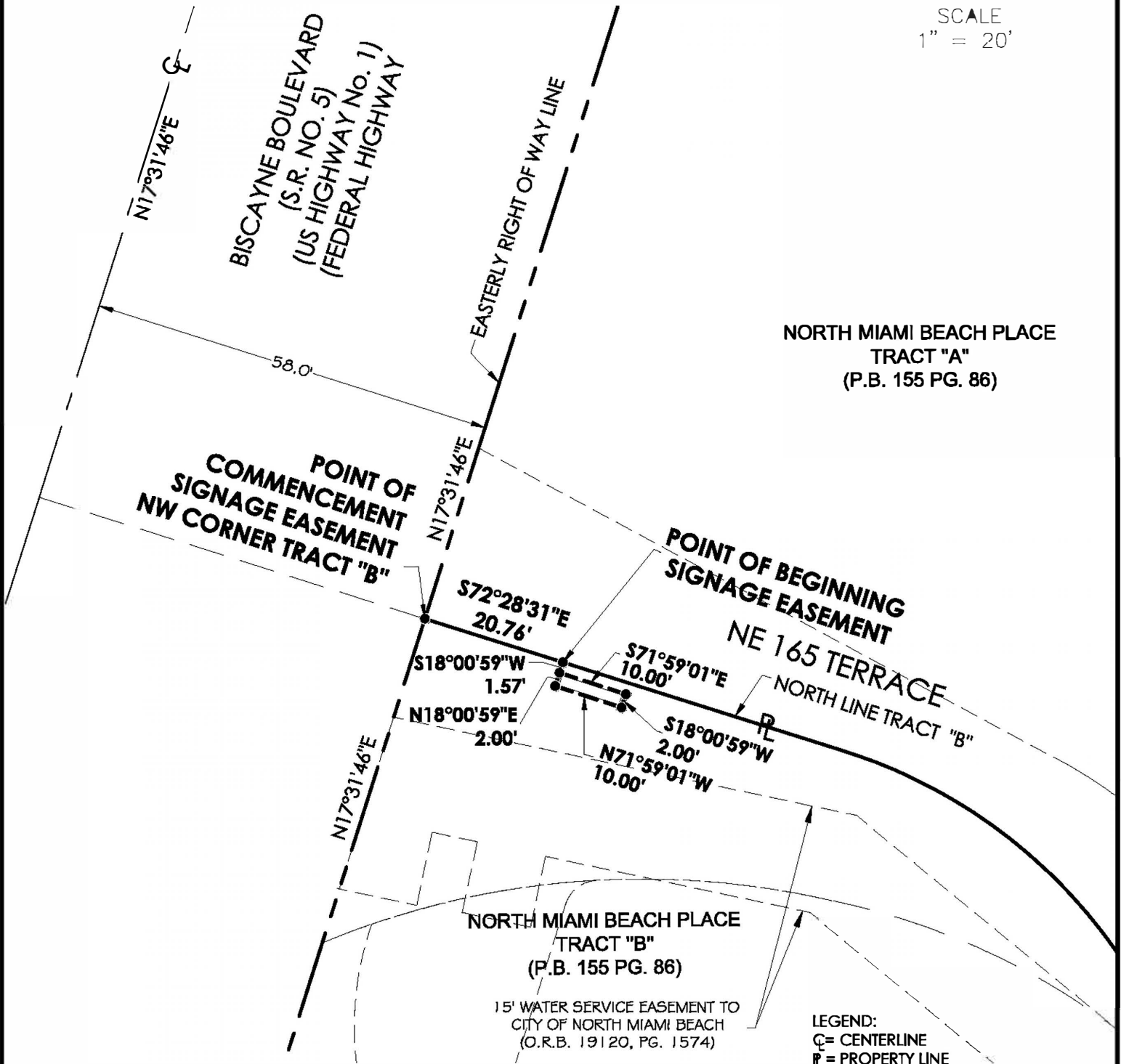
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# SKETCH TO ACCOMPANY LEGAL DESCRIPTION FOR SIGNAGE EASEMENT

EXHIBIT "1"



SCALE  
1" = 20'



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 P= PROPERTY LINE  
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JOB No. 15473.0.43 PAGE 1 OF 3

# SKETCH TO ACCOMPANY LEGAL DESCRIPTION FOR SIGNAGE EASEMENT

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JOB No. 15473.0.43 PAGE 2 OF 3



**Consent Agenda  
9.17.**

City of North Miami Beach  
17011 NE 19 Avenue  
North Miami Beach, FL 33162  
305-947-7581  
www.citynmb.com

**MEMORANDUM**

---

<b>TO:</b>	Mayor and City Commission
<b>FROM:</b>	Commissioner Fortuna Smukler
<b>VIA:</b>	
<b>DATE:</b>	January 21, 2025

---

**RE:** Resolution No. R2025-16 Supporting the 2025 Florida League of Cities Legislative Platform  
(Commissioner Fortuna Smukler)

---

**Description**

**BACKGROUND**

**ANALYSIS:**

**RECOMMENDATION:**

**FISCAL/ BUDGETARY**

**IMPACT:**

---

**ATTACHMENTS:**

Description

📎 FLC Platform\_Resolution

**A RESOLUTION OF THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA, URGING MEMBERS OF THE FLORIDA LEGISLATURE TO SUPPORT THE 2025 FLORIDA LEAGUE OF CITIES' LEGISLATIVE PLATFORM; AUTHORIZING THE CITY MANAGER OR DESIGNEE TO DO ALL THINGS NECESSARY TO EFFECTUATE THIS RESOLUTION; PROVIDING FOR CONFLICTS; PROVIDING FOR SCRIVENER ERRORS, PROVIDING FOR SEVERABILITY; AND PROVIDING FOR AN EFFECTIVE DATE.**

**WHEREAS**, the Florida Legislature will convene the 2025 Legislative Session on March 4, 2025; and

**WHEREAS**, the membership of the Florida League of Cities (FLC) adopted its 2025 Legislative Platform during the FLC Legislative Conference on December 6, 2024; and

**WHEREAS**, the City of North Miami Beach supports the 2025 FLC Legislative Platform, which includes:

- Supporting legislation that allows for a collaborative approach that balances the pressing needs for affordable and workforce housing while respecting the ability of local governments to effectively manage growth to ensure developments align with the character, capabilities and resources of each community.
- Supporting legislation that ensures all vehicles, regardless of fuel type, contribute fairly to the funding of Florida's transportation infrastructure, which will allow cities to maintain safe and reliable roads for all residents.
- Supporting the preservation of municipal authority over utility revenues and the ability to realize a reasonable rate of return on utility assets. Legislation should honor current practices, existing contracts, utility operation and maintenance costs, service territory obligations and revenues obligated for debt service and planned projects.
- Supporting the levy of property taxes by municipalities to provide critical services such as infrastructure, police, fire and emergency services. Further changes or exemptions to the property tax system and tangible personal property taxes would create inequities and unfairly shift the tax burden onto families, homeowners, renters, businesses and our most vulnerable population.
- Supporting the preservation of reasonable sovereign immunity liability caps for municipal governments to protect taxpayer funds and ensure the delivery of public services.

**WHEREAS**, the City of North Miami Beach also supports the FLC policy positions relating to:

- Annexation

- Impact Fees
- Local Business Taxes
- One Water
- Public Safety Recruitment and Retention

**NOW, THEREFORE, BE IT RESOLVED BY THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA, THAT:**

**Section 1.** The City of North Miami Beach will work with our local legislative delegation in support of these and other issues affecting Florida's cities, towns and villages during the upcoming 2025 Legislative Session.

**Section 2.** A copy of this resolution shall be provided to the members of our local legislative delegation and the Florida League of Cities, Inc.

**Section 3.** The City Manager or designee is authorized to do all things necessary to effectuate this Resolution.

**Section 4.** All Resolutions or parts of Resolutions in conflict with this Resolution are repealed to the extent of such conflict.

**Section 5.** Any scrivener or typographical errors that do not affect intent may be corrected with notice to, and the authorization of the City Attorney and City Manager without further process.

**Section 6.** If any provision of this Resolution or the application thereof to any person or circumstance is held invalid, such invalidity shall not affect other provisions or applications of this Resolution that can be given affect without the invalid provision or application, and to this end the provisions of this Resolution are declared to be severable.

**Section 7.** This Resolution shall take effect immediately upon adoption.

**APPROVED AND ADOPTED** by the City of North Miami Beach City Commission at the regular meeting assembled this \_\_\_ **day of January 2025.**

ATTEST:

---

ANDRISE BERNARD, MMC  
CITY CLERK

---

MICHAEL JOSEPH  
MAYOR

(CITY SEAL)



APPROVED AS TO FORM AND LEGAL SUFFICIENCY FOR THE USE  
AND RELIANCE OF THE CITY OF NORTH MIAMI BEACH ONLY:

GREENSPOON MARDER LLP

By: \_\_\_\_\_  
JOSEPH S. GELLER  
CITY ATTORNEYS



**Legislation  
11.1.**

City of North Miami Beach  
17011 NE 19 Avenue  
North Miami Beach, FL 33162  
305-947-7581  
[www.citynmb.com](http://www.citynmb.com)

**MEMORANDUM**

---

<b>TO:</b>	Mayor and City Commission
<b>FROM:</b>	
<b>VIA:</b>	
<b>DATE:</b>	January 21, 2025

---

**RE:** Ordinance No. 2024-15 (Second Reading) Permanent Irrigation Ordinance (Sam Zamacona, Public Works Director)

---

**Description**

**BACKGROUND**

**ANALYSIS:**

**RECOMMENDATION:**

**FISCAL/ BUDGETARY  
IMPACT:**

---

**ATTACHMENTS:**

Description

- Staff Report
- Business Impact Statement
- Ordinance



# ***City of North Miami Beach, Florida***

**Community Development Department – Planning & Zoning Division**

17050 NE 19<sup>TH</sup> AVENUE

1<sup>ST</sup> FLOOR

NORTH MIAMI BEACH, FLORIDA 33162

PLANNING & ZONING DIVISION: (305) 948-2966

## **CITY COMMISSION MEETING**

**Meeting Date:** 12/17/2024

**File No:** 24-22

**Application Name:**

Water Shortage Emergency, Irrigation,  
and Landscape Ordinance  
Amendments and Updates

## **STAFF REPORT**

**Request:**

To amend the City’s Emergency Water Shortage Ordinance and Landscape Ordinance and to add a new Irrigation Ordinance. The proposed amendments and updates would protect the City from overutilization of its water resources during a water shortage emergency and align the City’s codes with the South Florida Water Management District’s and Miami-Dade County’s updated irrigation codes. The amendments and updates propose to do this by putting forth a set of rules and regulations concerning the utilization of water resources during a defined water shortage emergency, consistent irrigation requirements, and an updated landscaping design, application, installation, and maintenance process.

**Background:**

Since February 2020, the South Florida Water Management District (the District) has been working to have the local governments within its jurisdiction, including Miami-Dade County (the County), adopt local ordinances regarding mandating irrigation restrictions. On July 20, 2023, the South Florida Water Management District requested the assistance of the City of North Miami Beach (the City) in implementing consistent landscaping irrigation ordinances throughout the District. The City recently updated its sediment and erosion control ordinances to align with the County’s and the State’s pollution requirements and believed that a landscape irrigation ordinance would provide additional protection of its waterways and habitat, along with enhancing its environmental sustainability. Within this effort, there were three updates that were determined to align with these goals, and are as follows:

1. The revision of Section 19-24, the Emergency Water Conservation Rates Ordinance. The City’s original language was replaced with language from the County, revised to be consistent with the City’s other language and codes.
2. The addition of Section 19-25, the Irrigation Ordinance. This is a new ordinance, revised from a model code proposed by the District, which sets mandatory, year-round irrigation restrictions.
3. The revision of Chapter 24, Article 11, the Landscaping Ordinance. Revisions include adding language related to Florida-Friendly landscaping principles as suggested by the District with water conservation practices in mind. The language itself was modeled after the Broward County sections which have been reviewed by FDEP.

Florida-Friendly landscaping principles were suggested by the District to be included in the updates. Florida-Friendly landscaping gives guidance for designing and maintaining landscapes in such a way that water resources are conserved, natural habitats are enhanced, and the need for application of pesticides and fertilizers are reduced.

This amendment was presented to the Planning and Zoning Board on October 21, 2024. The item passed unanimously

with two absences. Additional items to note from the discussion during the Board meeting are as follows. During the drafting of these ordinances, Staff cross-referenced these proposed ordinances against those of Miami-Dade County, reviewed them for consistency, and have found them to be consistent with the County’s code. The landscaping ordinance is continuing the work started by previous ordinance updates – for example the recent legislation relating to trees—which are all working to solidify the codification of Florida-friendly landscaping through added clarification and language. The passage of the updates to the irrigation ordinance would allow the City to close a loophole in the current codes that is causing the City liability issues. It was noted that the City’s water source is a sole source aquifer. Treating brackish water from saltwater intrusion is more costly to treat. These irrigation and water use ordinances are taking a step towards addressing the complexities that come with supplying water for the City. The Public Works Department has staff dedicated to public outreach and education that can communicate to the public any changes or updates. The public will have a chance to make comments during the Commission meetings. The ordinances also provide more specific mechanisms for evaluation and enforcement and add new definitions that will allow the City to better address and expand water reclamation and water supply sources. These ordinance updates are part of a regional update, mandated by the South Florida Water Management District.

Project Planner:	Review Dates:	Attachments
<p>Sam Zamacona Public Works Director <a href="mailto:Samuel.Zamacona@citynmb.com">Samuel.Zamacona@citynmb.com</a> (305) 948-2932, ext. 2576</p> <p>Rachel E. Vitek Project Manager, RES Consultant <a href="mailto:revitek@res.us">revitek@res.us</a> 954.484.8500</p>	<p>Planning &amp; Zoning Board: October 21, 2024</p> <p>City Commission: December 17, 2024 - (1<sup>st</sup> Reading) January 2025 - (2<sup>nd</sup> Reading)</p>	<p>1. Draft Ordinance</p>

**Staff Analysis:**

Currently, the City's water conservation code stipulates that during a Phase II Water Conservation Emergency, a surcharge should be applied to water customers for excess consumption over a set amount. The City wished to replace this language. To replace it, language was modified from Miami-Dade County's (the County) Code, Section 32-8.1 and incorporated into the City's updated code.

The City did not have any language in its code for irrigation restrictions when the South Florida Water Management District (District) reached out in 2023. The District had been working with the County and other local governments within its jurisdiction to update and include irrigation ordinances to provide conserve water and provide consistency throughout the area. The City chose to use the model code that the District offered, formatting it to match the City's current fines and penalties system.

At the suggestion of the District, the City also updated their landscaping code at the same time. The District suggested the incorporation of Florida-Friendly landscaping principles. These principles are landscaping guidelines that are centered around planting the right plant in the right place, fertilizing appropriately, water efficiently, wildlife attraction, mulching, responsible pest management, responsible yard waste disposal, stormwater runoff reduction, and waterfront protection. The City replaced all language related to Xeriscaping with Florida-friendly principles, as Xeriscaping was not specifically designed for Florida's unique climate, geology, and hydrology. The City used Broward County's landscaping code (Chapter 39, Article VIII) as a model for its updates, as Broward had also incorporated Florida-friendly landscaping principles into its code, which had been reviewed and approved by the Florida Department of Environmental Protection. The entirety of the City's Landscaping code (Chapter 24, Article 11) was reviewed and nearly every section within it was updated to incorporate Florida-friendly principles and to reference the new irrigation ordinance. In addition, language was updated to keep the code consistent with the City's larger codes concerning penalties and fines, to improve legibility and conciseness of the code, and to update outside reference manuals and regulatory references to the most updated versions.

By amending the Code of Ordinances Chapter XIX, entitled "Water and Sewer; amending Article II, entitled "Water" amending Section 19-24 entitled "Emergency Conservation Rates" to replace current language requiring surcharge rates with language modeled after Miami-Dade County, to ensure consistency and compliance with the County's codes and the City's other codes.

By amending the Code of Ordinances Chapter XIX, entitled "Water and Sewer; amending Article II, entitled "Water and Sewer" to include Section 19-25 entitled "Irrigation" to provide specific requirements and standards for irrigation practices, using a model code proposed by the South Florida Water Management District, which sets mandatory, year-round irrigation restrictions.

By amending the Code of Ordinances Chapter XXIV, entitled “Zoning and Land Development”, Article XI entitled “Landscaping”, to amend section 24-115, entitled “Purpose” to incorporate additional statements that encompass the City’s intent with the amendments to the code; to amend section 24-116 “Applicability” to add clearer language; to amend section 24-117 entitled “Definitions” to alphabetize current definitions, to incorporate additional definitions from amendments to code, and to remove references to Xeriscaping; to amend section 24-118 “Landscape Plan Required” to add clearer, more concise language, and to identify additional features to include in a landscape plan; to amend section 24-119 “Minimum Landscaping Requirements for All Zoning Districts” to include Florida-Friendly landscaping principles for plant selection, installation, placement, water requirements, soil selection, mulch placement, specifying requirements for tree credits, and barring invasive or poor quality trees from installation ; to amend Section 24-120 “Maintenance” to include Florida-Friendly principles for maintenance and disposal of yard debris and to include training and certification requirements for commercial fertilizer applicators; to amend Section 24-221 “Tree Removal Permit” to remove limiting definitions and reference updated reference manuals for tree selection; to amend Section 24-122 “Minimum Design Standards” to include more concise language, to ensure trees are mature when installed and that the installation location is suitably sized, and to include Florida-Friendly principles for multifamily and non-residential areas; to amend Section 24-123 “Minimum Landscaping Requirements In Single- and Two-Family Residential Districts” to remove references to Xeriscaping, to include landscaping plan requirement for single family and duplex residential dwellings, and to include Florida-Friendly principles for shade trees, foundation planting, irrigation, fertilizer and pesticide application, and to define a minimum required use of Florida-Friendly principles; to amend Section 24-124 “Landscape Application and Review Fee” to include concise language; and to include Section 24-126 “Site survey and assessment” to define what should be included in the site survey and assessments for developments, as attached.

**Compliance with the Code of Ordinance:**

Staff finds that amending the City of North Miami Beach Code of Ordinances Chapter XIX, entitled “Water and Sewers”, Article II “Water”, Section 19-24, and to incorporate Section 19-25 “Irrigation”, and Chapter XXIV, entitled “Zoning And Land Development”, Article XI “Landscaping”, Section 24-115, 24-116, 24-117, 24-118, 24-119, 24-120, 24-121, 24-122, 24-123, 24-124, and to incorporate Section 24-126 “Site survey and assessment” is consistent with the existing Code of Ordinances.

**Compliance with the Comprehensive Plan:**

Staff finds that amending the City of North Miami Beach Code of Ordinances Chapter XIX, entitled “Water and Sewers”, Article II “Water”, Section 19-24, and to incorporate Section 19-25 “Irrigation”, and Chapter XXIV, entitled “Zoning And Land Development”, Article XI “Landscaping”, Section 24-115, 24-116, 24-117, 24-118, 24-119, 24-120, 24-121, 24-122, 24-123, 24-124, and to incorporate Section 24-126 “Site survey and assessment” is consistent with the City’s Comprehensive Plan.

**Board Motion Options for Items:**

1. **Move to continue** with direction.
2. **Move to approve** the Text Amendment (File# 24-22), to amend the City of North Miami Beach Code of Ordinances Chapter XIX, entitled “Water and Sewers”, Article II “Water”, Section 19-24, and to incorporate Section 19-25 “Irrigation”, and Chapter XXIV, entitled “Zoning And Land Development”, Article XI “Landscaping”, Section 24-115, 24-116, 24-117, 24-118, 24-119, 24-120, 24-121, 24-122, 24-123, 24-124, and to incorporate Section 24-126 “Site survey and assessment” by finding that the request is consistent with the City Charter and the Comprehensive Plan, and meets criteria set forth in the Zoning and Land Development Regulations.
3. **Move to deny** the Text Amendment (File# 24-22), to amend the City of North Miami Beach Code of Ordinances Chapter XIX, entitled “Water and Sewers”, Article II “Water”, Section 19-24, and to incorporate Section 19-25 “Irrigation”, and Chapter XXIV, entitled “Zoning And Land Development”, Article XI “Landscaping”, Section 24-115, 24-116, 24-117, 24-118, 24-119, 24-120, 24-121, 24-122, 24-123, 24-124, and to incorporate Section 24-126 “Site survey and assessment” by finding that the request is inconsistent with the City Charter and the Comprehensive Plan and does not meet the criteria set forth in the Zoning and Land Development Regulations



# **City of North Miami Beach, Florida**

## **Community Development Department – Planning & Zoning Division**

17050 NE 19<sup>TH</sup> AVENUE  
1<sup>ST</sup> FLOOR  
NORTH MIAMI BEACH, FLORIDA 33162  
PLANNING & ZONING DIVISION: (305) 948-2966

### **Business Impact Estimate**

***Directions to using/sponsoring department staff:*** Pursuant to F.S. s. 166.041(4), as amended by Ch. 2023-101, Laws of Florida, the City is required to prepare a Business Impact Statement for ordinances that are NOT exempt from this requirement. A list of ordinance exemptions is provided below. Please check all exemption boxes that apply to the proposed ordinance. If none of the boxes are checked, please complete and sign the Business Impact Statement on the following page.

- The proposed ordinance is required for compliance with Federal or State law or regulation;
- The proposed ordinance relates to the issuance or refinancing of debt;
- The proposed ordinance relates to the adoption of budgets or budget amendments, including revenue sources necessary to fund the budget;
- The proposed ordinance is required to implement a contract or an agreement, including, but not limited to, any Federal, State, local, or private grant or other financial assistance accepted by the municipal government;
- The proposed ordinance is an emergency ordinance;
- The ordinance relates to procurement; or
- The proposed ordinance is enacted to implement the following:
  - a. Part II of Chapter 163, Florida Statutes, relating to growth policy, county and municipal planning, and land development regulation, including zoning, development orders, development agreements and development permits;
  - b. Sections 190.005 and 190.046, Florida Statutes, regarding community development districts;
  - c. Section 553.73, Florida Statutes, relating to the Florida Building Code; or
  - d. Section 633.202, Florida Statutes, relating to the Florida Fire Prevention Code.

Prepared by: Sam Zamacona, Public Works  
Director/ Public Works

Date: 10/7/2024

Printed Name/Title/Department

*Regardless of whether any of the boxes are checked, Include this completed page in the agenda packet.*

*If none of the boxes above are checked, complete the attached Business Impact Statement and include the completed Statement as part of the agenda package. **The completed Statement must be posted on the City of North Miami Beach web site not later than the time notice of the proposed ordinance is published.***



## BUSINESS IMPACT STATEMENT

### ORDINANCE TITLE

AN ORDINANCE OF THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA, AMENDING THE CODE OF ORDINANCES OF THE CITY OF NORTH MIAMI BEACH, FLORIDA 2008, AMENDING CHAPTER XIX ENTITLED "WATER AND SEWERS" AMENDING ARTICLE II "WATER", SECTION 19-24 "EMERGENCY WATER CONSERVATION RATES", REMOVING THE SURCHARGE FOR WATER USAGE BASED ON CUSTOMER TYPE; ADDING LANGUAGE THAT PROVIDES UNIFORM STANDARDS FOR WATER SHORTAGE EMERGENCIES, ENFORCEMENT ACTION, AND PENALTIES; AMENDING ARTICLE II "WATER", INCLUDING SECTION 19-25 "IRRIGATION", PROVIDING FOR SPECIFIC DEFINITIONS AND PERMANENT, YEAR-ROUND IRRIGATION REQUIREMENTS; PROVIDING FOR UNIFORM STANDARDS FOR IRRIGATION PRACTICES; AND PROVIDING FOR APPLICABLE VARIANCES, ENFORCEMENT ACTION, AND PENALTIES; AMENDING CHAPTER XXIV ENTITLED "ZONING AND LAND DEVELOPMENT" AMENDING ARTICLE XI "LANDSCAPE ORDINANCE", PROVIDING FOR SPECIFIC DEFINITIONS AND REQUIREMENTS; PROVIDING FOR UNIFORM STANDARDS FOR LANDSCAPING DESIGN, APPLICATION, INSTALLATION, AND MAINTENANCE PROCESSES; PROVIDING FOR CONCISE LANGUAGE THROUGHOUT THE ORDINANCE; PROVIDING FOR REFERENCE TO CURRENT REFERENCE LITERATURE AND MANUALS; ESTABLISHING TRAINING REQUIREMENTS FOR COMMERCIAL FERTILIZER APPLICATORS; REMOVING LANGUAGE RELATING TO XERISCAPING; AND ADDING SECTION 124-126 WHICH DEFINES THE REQUIREMENTS FOR A SITE SURVEY AND ASSESSMENT.

### ORDINANCE SUMMARY

*(Must include a statement of the public purpose, such as service the public health, safety, morals, and welfare):*

To amend the City's Emergency Water Shortage Ordinance and Landscape Ordinance and to add a new Irrigation Ordinance. The proposed amendments and updates would protect the City from overutilization of its water resources during a water shortage emergency and align the City's codes with the South Florida Water Management District's and Miami-Dade County's updated irrigation codes. The amendments and updates propose to do this by putting forth a set of rules and regulations concerning the utilization of water resources during a defined water shortage emergency, consistent irrigation requirements, and an updated landscaping design, application, installation, and maintenance process.

### DIRECT ECONOMIC IMPACT

ESTIMATE OF THE DIRECT ECONOMIC IMPACT OF THE PROPOSED ORDINANCE ON PRIVATE, FOR-PROFIT BUSINESSES IN THE CITY OF NORTH MIAMI BEACH, IF ANY: **N/A**

### DIRECT COMPLIANCE COST

ESTIMATE OF DIRECT COMPLIANCE COSTS THAT BUSINESSES MAY REASONABLY INCUR: **N/A**

**NEW CHARGES/ FEES**

DESCRIPTION OF NEW CHARGES/ FEES IMPOSED BY THE PROPOSED ORDINANCE OR FOR WHICH BUSINESSES WILL BE FINANCIALLY RESPONSIBLE: **N/A**

**ESTIMATE OF THE CITY'S REGULATORY COSTS**

ESTIMATE OF THE CITY'S REGULATORY COSTS, INCLUDING ESTIMATED REVENUES FROM ANY NEW CHARGES OR FEES TO COVER SUCH COSTS: **N/A**

**GOOD FAITH ESTIMATE**

GOOD FAITH ESTIMATE OF THE NUMBER OF BUSINESSES LIKELY TO BE IMPACTED BY THE PROPOSED ORDINANCE: **N/A**

**ADDITIONAL INFORMATION**

ADDITIONAL INFORMATION THE GOVERNING BODY DEEMS USEFUL (IF ANY): **N/A**

\_\_\_\_\_  
SIGNATURE

\_\_\_\_\_  
DATE

**ORDINANCE NO. 2024-XX**

**AN ORDINANCE OF THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA, AMENDING THE CODE OF ORDINANCES OF THE CITY OF NORTH MIAMI BEACH, FLORIDA , AMENDING CHAPTER XIX ENTITLED “WATER AND SEWERS” AMENDING ARTICLE II “WATER”, SECTION 19-24 “EMERGENCY WATER CONSERVATION RATES”, REMOVING THE SURCHARGE FOR WATER USAGE BASED ON CUSTOMER TYPE; ADDING LANGUAGE THAT PROVIDES UNIFORM STANDARDS FOR WATER SHORTAGE EMERGENCIES, ENFORCEMENT ACTION, AND PENALTIES; AMENDING ARTICLE II “WATER”, INCLUDING SECTION 19-25 “IRRIGATION”, PROVIDING FOR SPECIFIC DEFINITIONS AND PERMANENT, YEAR-ROUND IRRIGATION REQUIREMENTS; PROVIDING FOR UNIFORM STANDARDS FOR IRRIGATION PRACTICES; AND PROVIDING FOR APPLICABLE VARIANCES, ENFORCEMENT ACTION, AND PENALTIES; AMENDING CHAPTER XXIV ENTITLED “ZONING AND LAND DEVELOPMENT” AMENDING ARTICLE XI “LANDSCAPE ORDINANCE”, PROVIDING FOR SPECIFIC DEFINITIONS AND REQUIREMENTS; PROVIDING FOR UNIFORM STANDARDS FOR LANDSCAPING DESIGN, APPLICATION, INSTALLATION, AND MAINTENANCE PROCESSES; PROVIDING FOR CONCISE LANGUAGE THROUGHOUT THE ORDINANCE; PROVIDING FOR REFERENCE TO CURRENT REFERENCE LITERATURE AND MANUALS; ESTABLISHING TRAINING REQUIREMENTS FOR COMMERCIAL FERTILIZER APPLICATORS; REMOVING LANGUAGE RELATING TO XERISCAPING; AND ADDING SECTION 124-126 WHICH DEFINES THE REQUIREMENTS FOR A SITE SURVEY AND ASSESSMENT.**

**WHEREAS**, pursuant to Chapter 166, Florida Statutes and Section 1.4 of the Charter of the City of North Miami Beach (“City”), the City shall have all available governmental, corporate, and proprietary powers and may exercise them except when prohibited by law; and

**WHEREAS**, the South Florida Water Management District (District) requested the City’s assistance in implementing consistent irrigation and landscaping ordinances throughout the District; and

**WHEREAS**, the City had recently updated its sediment and erosion control ordinance to align with the Miami-Dade County and State’s pollution requirements to encourage water quality protection and water conservation; and

**WHEREAS**, the City believed that adopting the District and County’s water conservation, irrigation, and landscaping codes would further align itself with its commitment to water conservation and sustainability; and

**WHEREAS**, the City included Florida-Friendly landscaping principles in the amended landscaping ordinance – at the suggestion of the District – as they provided guidance for designing, installing, and maintaining landscapes in such a way that water resources are conserved, natural habitats are enhanced, the need for application of pesticides and fertilizers are reduced, stormwater runoff is reduced, waterfront is protected, and yard waste is recycled; and

**WHEREAS**, the proposed amendments are intended to provide additional protection of the City’s waterways and habitats and enhance its environmental sustainability; and

**WHEREAS**, pursuant to Section 163.3174 (4)(c), *Florida Statutes*, the Planning and Zoning Board of the City of North Miami Beach, sitting as the Local Planning Agency, considered this Ordinance at a public meeting on October 21, 2024 and reviewed the proposed amendments for consistency with the City of North Miami Beach's Comprehensive Plan, and recommended approval by a vote of five to zero; and

**WHEREAS**, the Mayor and City Commission find the proposed amendments to be consistent with the North Miami Beach Comprehensive Plan and in the best interests of the City.

**NOW, THEREFORE, BE IT ORDAINED BY THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA:** <sup>1</sup>

**Section 1.** The foregoing whereas clauses are true and correct and adopted as the legislative and administrative findings of the City Commission and made a specific part of this Ordinance; all exhibits attached hereto are made a specific part of this Ordinance.

**Section 2.** That Chapter XIX “Water and Sewers,” Article II “Emergency Water Conservation Ordinance,” Section 19-24 of the Code of Ordinances of North Miami Beach, Florida is hereby amended to read as follows (underline is added; ~~stricken through~~ is deleted):

**19-24 – Emergency Water Conservation Ordinance.**

~~During periods of mandated water restrictions by the South Florida Water Management District, an automatic adjustment to the rates shall be instituted. The rate adjustments are as follows:~~

~~a. Currently, permanent mandatory year round water restrictions are imposed by the South Florida Water Management District in lieu of phases. It is the policy of the City of North Miami Beach to apply Phase II Emergency Water Conservation Rates.~~

~~1. During Phase II restrictions, a ten (10%) percent surcharge will be added to the consumption portion of the bill for the following: each single family customer for all water used in excess of three thousand (3,000) gallons per month per Equivalent Residential Connection; each multi-family customer for all water used in excess of two thousand (2,000) gallons per unit per month per Equivalent Residential Connection; each nonresidential customer for all water used in excess of two thousand (2,000) gallons per month per Equivalent Residential Connection; each wholesale customer~~

~~for all water used.~~

a. Intent and purpose. It is the intent and purpose of this section to protect the water resources of the City of North Miami Beach from the harmful effects from overutilization of water resources during periods of water shortage and allocate available water supplies by assisting the South Florida Water Management District in the implementation of its water shortage plan (Chapter 40E-21 F.A.C.).

b. Definitions. For the purpose of this section the following terms, phrases, words and their derivatives shall have the meaning given herein. When not inconsistent with the context, words used in the present tense include the future, words in the plural include the singular, and words in the singular include the plural. The word "shall" is always mandatory and not merely directory.

City: The City of North Miami Beach or designee.

District: The South Florida Water Management District, a government entity created under Chapter 373, Florida Statutes.

Person: For the purpose of this code shall mean any person, firm, partnership, association, corporation, company, or organization of any kind.

Reclaimed water: Wastewater that has received at least secondary treatment, and basic disinfection and is reused after flowing out of a wastewater treatment facility as defined by Rule 62-40.210, F.A.C.

Water resource: Any and all water on or beneath the surface of the ground, including natural or artificial watercourses, lakes, ponds, or diffused surface water, and water percolating, standing, or flowing beneath the surface of the ground.

Water Shortage: When the District determines there is the possibility that insufficient water will be available to meet the present and anticipated needs of the users, or when the District determines the conditions are such as to require a temporary reduction in total use within a particular area to protect water resources from serious harm.

Water Shortage Emergency: When the District determines the provisions listed in Part II of Chapter 40E-21, F.A.C., are not sufficient to protect the public health, safety, or welfare; the health of animals, fish, or aquatic life; a public water supply; or commercial, industrial, agricultural, recreational, or other reasonable-beneficial uses.

c. Application of section. The provisions of this section shall apply to all persons using the water resource within the geographical areas subject to the water shortage condition or water shortage emergency, as determined by the District, whether from publicly or privately owned water utility systems, private wells, or private connections with surface water bodies. This section shall not apply to persons using reclaimed or saltwater.

1. Adoption of water shortage plan. The effective Chapter 40E-21, F.A.C., is incorporated herein by reference as part of the Code of the City.

2. Declaration of water shortage condition; water shortage emergency. The declaration of a water shortage condition or water shortage emergency within all or any part of the City by the District shall invoke the provisions of this section. During such water shortage emergency or water shortage condition, all water use restrictions or other measures adopted by the District applicable to the City of North Miami Beach, or any portion thereof, shall be subject to enforcement action pursuant to this section. Any violation of the provisions of Chapter

40E-21, F.A.C., or any order issued pursuant thereto, shall be a violation of this section.

3. Notwithstanding any provision of this Code, the following shall be prohibited in the City of North Miami Beach upon declaration of a water shortage condition or water shortage emergency by the District:
  - (a) Serving of water from any public or private well, water supply or distribution system to any customer of a restaurant unless specifically requested by the customer.
  - (b) Operation of outdoor fountains or outside aesthetic facilities whose purpose is strictly ornamental or decorative.
  - (c) Pressure cleaning of impervious surfaces, except for the preparation of surfaces for painting, sealing, waterproofing, or for safety, sanitation, health or medical purposes.
4. These restrictions shall remain in effect for the duration of the declared water shortage condition or water shortage emergency.
- d. Enforcement. Every police officer, code compliance officer, or sheriff having jurisdiction in the area governed by this section shall, in connection with all other duties imposed by law, diligently enforce the provisions of this section. In addition, the City Manager may also delegate enforcement responsibility for this section to agencies and departments of the City government.
- e. Penalties. Any person found guilty of a violation of any of the foregoing rules and regulations shall be subject to prosecution as provided in Section 1-8 of this Code.
- f. Water users to accept provisions of the section. No water service shall be furnished to any person by a public or private utility unless such person agrees to accept all the provisions of this section. The acceptance of water service shall be in itself the acceptance of the provisions thereof.

**Section 3.** That Chapter XIX “Water and Sewers,” Article II “Irrigation Ordinance,” of the Code of Ordinances of North Miami Beach, Florida is hereby amended by adding a section to be numbered Section 19-25, which said Section reads as follows (underline is added; stricken through is deleted):

**19-25 – Irrigation Ordinance.**

- a. Intent and purpose. It is the intent and purpose of this Code to implement procedures to protect the water resources of the City of North Miami Beach and to promote water conservation through the efficient use of landscape irrigation and consistency with the South Florida Water Management District’s (District) mandatory year-round landscape irrigation conservation measures under Chapter 40E-24, Florida Administrative Code, (F.A.C.). This Code will increase water use efficiency; prevent and curtail wasteful irrigation practices by providing mandatory landscape irrigation conservation measures; and prohibit the operation of irrigation systems in a manner that causes water to be wasted.
- b. Definitions. For the purpose of this Code, the following terms, phrases, words and their derivatives shall have the meaning listed below. When not inconsistent with the context, words used in the present tense also include the future, and words used in the singular also include the plural. The word "shall" is always mandatory and not merely a directory.

Address: The “house number” (a numeric or alphanumeric designation) that, together with the

street name, describes the physical location of a specific property. If a lot number in a mobile home park or similar community is used by the U.S. Postal Service to determine a delivery location, the lot number shall be the property's address. If a lot number in a mobile home park or similar residential community is not used by the U.S. Postal Service (e.g., the park manager sorts incoming mail delivered to the community's address), then the community's main address shall be the property's address. If a property has no address, it shall be considered "even-numbered."

*Athletic Play Area:* All golf course fairways, tees, roughs, greens, and other athletic play surfaces; including, football, baseball, soccer, polo, tennis, lawn bowling fields, and rodeo, equestrian and livestock arenas.

*Even-Numbered Address:* An address ending in the number 0, 2, 4, 6 or 8; rights-of-way or other locations with no address; or the letters A-M.

*Existing Landscaping:* Any landscaping which has been planted in the ground for more than ninety (90) days.

*Landscaping:* Shrubbery, trees, lawns, sod, grass, ground covers, plants, vines, ornamental gardens, and such other flora not intended for resale, which are situated in locations such as residential landscapes, recreation areas, cemeteries, public, commercial, and industrial establishments, public medians, and rights-of-way, except athletic play areas.

*Landscape Irrigation:* The outside watering of shrubbery, trees, lawns, sod, grass, ground covers, plants, vines, ornamental gardens, and such other flora not intended for resale, which are planted and are situated in such diverse locations as residential landscapes, recreation areas, cemeteries, public, commercial, and industrial establishments, public medians, and rights-of-way, except athletic play areas.

*Law Enforcement Official:* Any officer of the Florida Highway Patrol, County sheriff's departments, North Miami Beach Police Department, municipal law enforcement departments, law enforcement department of any other political subdivision, department of natural resources, and game and freshwater fish commission that has jurisdiction to enforce the law.

*Low Volume Hand Watering:* The watering of the landscape by one (1) person, with one (1) hose, fitted with a self-canceling or automatic shutoff nozzle.

*Low Volume Irrigation:* The use of equipment and devices specifically designed to allow the volume of water delivered to be limited to a level consistent with the water requirement of the plant being irrigated, and to allow that water to be placed with a high degree of efficiency in the root zone of the plant. The term also includes water used in mist houses and similar establishments for plant propagation. Overhead irrigation and flood irrigation are not included.

*Micro-irrigation:* The application of small quantities of water on or below the soil surface as drops or tiny streams of spray through an emitter or applicators placed along a water delivery line. Micro-irrigation includes several methods or concepts such as bubbler, drip, trickle, mist or micro-spray, and subsurface irrigation.

*New Landscaping:* Any landscaping that has been planted and established for ninety (90) days or less.

*Odd-Numbered Address:* An address ending in the number 1, 3, 5, 7 or 9; or the letters N-Z.

*Rights-of-way:* As defined in Section 26-3 of the City's Ordinances.

*Reclaimed Water:* Wastewater that has received at least secondary treatment, and basic disinfection



and is reused after flowing out of a wastewater treatment facility as defined by Rule 62-40.210, F.A.C.

Rooftop Cisterns: Storage tanks for rainfall that has been collected from a roof. Cisterns should be watertight, have smooth interior surfaces, enclosed lids, and be large enough to provide adequate storage. They should be fabricated from non-reactive materials such as reinforced concrete, galvanized steel, and plastic.

User: Any person, individual, firm, association, organization, partnership, business trust, corporation, company, agent, employee or other legal entity, whether natural or artificial, the United States of America, and the State and all political subdivisions, regions, districts, municipalities, and public agencies thereof, which directly or indirectly takes water from the water resource, including uses from private or public utility systems, uses under water use permits issued pursuant to Chapter 40E-2, F.A.C., or uses from individual wells or pumps.

Wasteful and unnecessary: Allowing water to be dispersed without any practical purpose to the water use; for example, excessive landscape irrigation, leaving an unattended hose on a driveway with water flowing, allowing water to be dispersed in a grossly inefficient manner, regardless of the type of water use; for example, allowing landscape irrigation water to unnecessarily fall onto pavement, sidewalks and other impervious surfaces; or allowing water flow through a broken or malfunctioning water delivery or landscape irrigation system.

c. Application.

1. The provisions of this Code shall apply to each user providing landscape irrigation from all water resources within the boundaries of the City. The provisions of this section shall not apply to athletic play areas or agricultural operations (including nurseries), and irrigation accomplished using reclaimed water or rooftop cisterns.
2. Declaration of a water shortage condition and/or water shortage emergency within all or parts of the City by the District shall supersede this Code for the duration of the applicable declaration, in accordance with Sec. 19-24. A water shortage usually occurs due to drought.
3. Such a declaration would apply to all users using the water resource within the geographical areas subject to a water shortage or water shortage emergency, as determined by the District, whether from public or privately-owned water utility systems, private wells or private connections with surface water bodies, but shall not apply to users using reclaimed water or rooftop cisterns.

d. Year-Round Permanent Landscape Irrigation Measures.

1. The following requirements or exceptions shall apply to all users, unless otherwise specified.
  - (a) Landscape irrigation shall be prohibited daily between the hours of 10:00 a.m. and 4:00 p.m., except as provided below.
  - (b) Irrigation of existing landscaping shall comply with the following provisions:
    - (1) Even-Numbered Addresses and rights-of-way, or other locations without an address, may accomplish necessary landscape irrigation only on Thursdays, and/or Sundays.
    - (2) Odd-Numbered Addresses may accomplish necessary landscape irrigation only on Wednesdays, and/or Saturdays.



- (c) Irrigation of new landscaping shall comply with the following provisions:
- (1) New Landscaping may be irrigated once on the day it is installed without regard to the listed watering days and times. Irrigation of the soil immediately prior to the installation of the new landscaping is allowed without regard to the listed watering days and times.
  - (2) A ninety (90) day establishment period begins on the day new landscaping is installed. The new landscaping shall be installed within a reasonable time from the date of purchase, which may be demonstrated with a dated receipt or invoice.
  - (3) Irrigation of new landscaping that has been in place for thirty (30) days or less may be accomplished on Monday, Tuesday, Wednesday, Thursday, Saturday, and/or Sunday.
  - (4) Irrigation of new landscaping which has been in place for thirty-one (31) to ninety (90) days may be accomplished on Monday, Wednesday, Thursday, and/or Saturday.
  - (5) Irrigation of the new landscaping is limited to areas containing only the new landscaping. An entire zone of an irrigation system shall only be utilized for landscape irrigation under this Code if the zone in question is for an area that contains at least fifty percent (50%) new landscaping. If a zone contains less than fifty percent (50%) of new landscaping, or if the new landscaping is in an area that will not typically be irrigated by an irrigation system, only the new plantings are eligible for additional irrigation. Targeted watering may be accomplished by low volume hand watering, or any appropriate method which isolates and waters only the new landscaping.
- (d) Irrigation systems may be operated outside restricted days and/or times for cleaning, maintenance, and repair with an attendant on-site in the area being tested. Landscape irrigation systems may routinely be operated for such purposes no more than once per week, and the run time for any one (1) test should not exceed ten (10) continuous minutes per zone.
- (e) Landscape irrigation for the purpose of watering-in fertilizers, insecticides, pesticides, fungicides, and herbicides, where such watering-in is required by the manufacturer, or by federal, state or local law, shall be allowed under the following conditions:
- (1) Such watering-in shall be limited to one (1) application in the absence of specific alternative instructions from the manufacturer; and
  - (2) Such watering-in shall be accomplished during normal watering days and times listed above unless a professional licensed applicator has posted a temporary sign containing the date of application and the date(s) of needed watering-in activity.
- (f) Any plant material may be watered using low volume irrigation, micro-irrigation,

low volume hand watering methods, rain barrels, cisterns, or other similar rain-harvesting devices without regard to the listed watering days or times.

- (g) In addition to the specific listed measures, all wasteful and unnecessary water use is prohibited.
- (h) In the event the District imposes restrictions on landscape irrigation for new and existing installations which are more restrictive than those imposed by this Code, such as under the declaration of a water shortage or water shortage emergency, the more restrictive regulations shall apply for the applicable duration of the more restrictive regulations.
- (i) It shall be the duty of each user to keep informed as to the landscape irrigation conservation measures within this Code.

e. *Additional Measures.* Any user who purchases and installs an automatic landscape irrigation system shall properly install, maintain, and operate technology that inhibits or interrupts operation of the system during periods of sufficient moisture in accordance with Section 373.62, Florida Statutes and Sections 24-119.F of this Code for irrigation requirements for landscaping.

f. *Variance Relief.*

1. Any user affected by this Code may apply for a variance to the City. See Section 24-176.1 of this code for details on the administrative waiver process.
2. Examples of circumstances for a variance include, but are not limited to:
  - (a) Two (2) or more properties which share a common source of water;
  - (b) A public or private water system experiencing or anticipating distribution problems; or
  - (c) A user maintains an irrigation system that uses soil moisture sensors or weather-based irrigation controllers; or
  - (d) Where a contiguous property is divided into different zones, a variance may be granted so that each zone may be irrigated on days different than other zones of the property; or
  - (e) Where a user maintains, manages, or owns a non-residential property, such as a house of worship or weekly market (farmer/flea), where the primary day of use, operation, or attendance for the property coincides with the prescribed watering day for the address.
3. No single zone may be irrigated more than two (2) days per week unless a user maintains an irrigation system that uses soil moisture sensors or weather-based irrigation controllers.
4. A variance application and/or granting a variance under provisions of this section shall operate prospectively, shall not stay or abate the enforcement of the provisions of this section, and shall not affect any prior or pending enforcement actions against the affected person that have been initiated pursuant to the provisions of this section.
5. If a variance is granted, the user shall be required to post a notice at each parcel to which the variance pertains.
6. A variance is invalid if it has expired or if the user or its agent violates the terms of the

variance.

7. Recognition of District Variances. The City recognizes and adopts all irrigation variances or waivers issued by the District.
- g. Enforcement. Every law enforcement official having jurisdiction in the area governed by this Code shall, in connection with all other duties imposed by law, diligently enforce the provisions of this Code by issuance of a citation, summons, or notice to appear in county court, or by filing an action in civil court for injunctive relief. The city manager may also delegate enforcement responsibility for this Code to other departments of the city government, or cities in the service areas governed by this Code, in accordance with state and local law.
- h. Penalties.
  1. Wasteful and unnecessary water use violations that are irreparable or irreversible in nature which shall include without limitations, a broken irrigation system and/or water pipe that allows water to flow from a broken sprinkler head, outdoor faucet, or other malfunctioning plumbing or irrigation system component, or other water system malfunction that continuously disperses a high quantity of water, shall be subject to prosecution as provided in Section 1-8 of this Code.
  2. Each day a violation occurs is a separate offense. The City, in addition to the criminal sanctions, may take any other appropriate legal action, including, emergency injunctive action to enforce this Codes' provisions.
  3. Notice of alleged violations shall be provided to the alleged violator by a local law enforcement official(s), code inspector or any other person designated by the City manager/administrator, or by certified mail, return receipt requested, to the owner of the property in question at the address listed with the tax collector's office for tax notices, or property appraiser's records, and at any other address provided to the City. If notice is provided by certified mail and returned unclaimed or refused, notice will be provided by posting same in a conspicuous location at the subject property.
  4. Any person found guilty of a violation of any of the foregoing rules and regulations shall be subject to prosecution as provided in Section 1-8 of this Code.

**Section 4.** That Chapter XXIV “Zoning and Land Development,” Article XI “Landscape Ordinance,” is hereby amended by modifying Section 24-115 entitled “Purpose” to read as follows (underline is added; stricken through is deleted):

**Sec. 24-115 – Purpose**

The general purposes and intent of this article are as follows:

- (A) is to provide regulation for the installation and maintenance of landscaping and landscaped open space;
- (B) to provide procedures to protect the water resources of the City of North Miami Beach (City);
- (C) to promote water conservation through the efficient use of landscape irrigation;
- (D) to promote water conservation measures for landscaping that maximizes the efficient use of water by the use of native and regionally adapted plants, trees, turfs and efficient irrigation design and applications;

- (E) to establish minimum standards for the development, redevelopment, installation, and maintenance of Florida-Friendly Landscaped™ areas, without inhibiting creative landscape design, construction, and management, and to protect and enhance the aesthetic character of the City;
- (F) to provide minimum standards for landscaping at new developments or redevelopment and to increase the overall tree canopy of the City;
- (G) to promote the establishment of functional and sustainable landscapes that increase the storage of sequestered carbon and reduce greenhouse gas emissions;
- (H) to provide the physical benefits of using plants as a function of sustainability and an integral part of the City’s urban development; and
- (I) to promote water conservation, water quality improvement, and vegetation protection objectives by providing for:
  - (1) the preservation of existing native plant communities;
  - (2) the reestablishment of native plant communities;
  - (3) the use of site-appropriate plants;
  - (4) the implementation of Florida-Friendly Landscaping™ principles as identified by the Florida Yards and Neighborhoods program operated by the University of Florida's Institute of Food and Agricultural Services Extension ("UF/IFAS Extension"), Best Management Practices identified in the most recent edition of the Florida-Friendly Best Management Practices for Protection of Water Resources by the Green Industries (Florida Department of Environmental Protection), and as provided by law; and
  - (5) the use of specific management guidelines to minimize negative secondary and cumulative environmental effects associated with the misuse of fertilizers.

~~Employing water efficient landscaping techniques, also known as Xeriscaping, generally results in long term reduction in irrigation requirements, costs, energy and maintenance. Trees and plants are integral and vital parts of the earth's ecosystem: they conserve energy; they provide essential and desirable benefits to man, including the production of life supporting oxygen, the reduction of carbon dioxide, the filtering of dust and gaseous pollutants; they serve as a natural abatement to noise pollution; they camouflage unsightly views; they provide shelter to birds and wildlife; they enhance the value of property; they preserve open space; and they maintain and improve the aesthetic quality of the City of North Miami Beach, thereby promoting the health and general welfare of its citizenry. In addition, it is the policy of the City Council that every effort shall be made to preserve and maintain viable vegetation within the City of North Miami Beach.~~

**Section 5.** That Chapter XXIV “Zoning and Land Development,” Article XI “Landscape Ordinance,” is hereby amended by modifying Section 24-116 entitled “Applicability” to read as follows (underline is added; stricken through is deleted):

**Sec. 24-116 – Applicability**

The provisions of Article XI contained herein shall be applicable to all projects or entities that fall under one or more of the categories listed below:

- (A) Projects ~~comprising~~ comprised of new construction or substantial additions and alterations,

except as set forth in Section 24-116.1, Administrative Waiver;

- (B) ~~Also, if~~ If projects have landscape in excess of fifty (50) percent of total site landscaping square footage that requires replacement, then the entire property shall be brought up to current landscape standards and requirements. This provision regarding existing development shall be applicable to the greatest extent reasonably possible as determined by the City ~~Manager or~~ designee.
- (C) All development of land requiring a site plan review in accordance with this Chapter shall require the submittal of a landscape plan that complies with the provisions of this article. Where required by Chapter 481, Florida Statutes, landscape plans shall be prepared by a registered landscape architect, or other person authorized pursuant to Sections 481.301 through 481.329, Florida Statutes.

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**Section 6.** That Chapter XXIV “Zoning and Land Development,” Article XI “Landscape Ordinance,” is hereby amended by modifying Section 24-117 entitled “Definitions” to read as follows (underline is added; stricken through is deleted):

**Sec. 24-117 – Definitions**

For the purpose of this section, the following terms and words shall have the meaning herein prescribed unless the context clearly requires otherwise. When not inconsistent with the context, words used in the present tense also include the future, and words used in the singular also include the plural. The word "shall" is always mandatory and not merely a directory.

Accessway: A private vehicular roadway intersecting a public right-of-way.

Application or Apply: The actual physical deposit of fertilizer to turf or landscape plants.

Applicator: Any person who applies fertilizer on turf or landscape plants in the City of North Miami Beach.

Athletic Play Area: All golf course fairways, tees, roughs, greens, and other athletic play surfaces; including, football, baseball, soccer, polo, tennis, lawn bowling fields, and rodeo, equestrian and livestock arenas.

Berm: Earthen mounding created by grading the terrain on a project site higher than the surrounding area.

Best Management Practices (BMP): Turf and landscape practices or a combination of those practices which, based on research, field-testing, expert review, and economic and technological considerations, are determined to be the most effective and practicable on-location means for improving water quality, conserving water supplies, and protecting natural resources. The principles of Florida-Friendly Landscaping™ Best Management Practices are explained in detail in the most recent edition of the Florida-Friendly Best Management Practices for Protection of Water Resources by the Green Industries, as published by the Florida Department of Environmental Protection.

Bioretention: An engineered process to manage stormwater runoff using the chemical, biological, or physical properties found in natural, terrestrial-based communities of plants, microbes, and soils.

Buffer area: An area(s) located on nonresidential property that extends the full length of the property lines abutting residential property.

Caliper, tree: The measurement of the diameter of a tree's trunk. For trees with a Diameter at Breast Height (DBH) of less than four (4) inches, the tree caliper is taken at six (6) inches above the grade or crown of the root flair. A tree caliper is taken at twelve (12) inches above the grade or crown of the root flair for trees with a DBH of four (4) inches or more.

Canopy: The upper portion of a tree consisting of limbs, branches, and leaves. Canopy trees are large trees that have a canopy sufficient to form a shade cover over the ground, creating a shaded and cool environment, as in a forest.

City: the City of North Miami Beach or designee

Clear trunk: The distance between the top of the root ball along the vertical trunk or trunks of a tree to the point at which lateral branching or fronds begin.

Clear wood (Greywood): The portion of the palm trunk that is mature, measured from the top of the root ball to the base of green terminal growth or fronds.

Commercial fertilizer applicator: Any person who applies fertilizer on turf or landscape plants in exchange for money, goods, services, or other valuable consideration.

Complete Street: A street designed and operated to enable safe use and support mobility for all users. Those include people of all ages and abilities, regardless of whether they are travelling as drivers, pedestrians, bicyclists, or public transportation riders.

County: Miami Dade County or the department or division of Miami Dade County government that the County Administrator has designated to enforce this article.

Diameter at Breast Height (DBH): The diameter of the tree trunk(s), measured at four and one-half (4½) feet above grade.

District: The South Florida Water Management District, a government entity created under Chapter 373, Florida Statutes.

Director: The Director of the Community Development Department of North Miami Beach, Florida, or designee.

Drip Line: An imaginary vertical line extending from the outermost horizontal circumference of a tree's branches to the ground. No soil disturbance shall occur within this area.

Dumpster: A refuse container of one (1) cubic yard or larger.

Fertilize: The act of applying fertilizer (plant nutrients) to turf, specialized turf, or landscape plants.

Fertilizer: Any substance or mixture of substances, except pesticide/fertilizer mixtures such as "weed and feed" products, that contains one (1) or more recognized plant nutrients and promotes plant growth, controls soil acidity or alkalinity, provides for soil enrichment, or provides other corrective measures to the soil.

Florida-Friendly Landscaping™: Quality landscapes that conserve water, protect the environment, are appropriate for local conditions, and are drought, wind, or salt tolerant. The principles of Florida-Friendly Landscaping™ include planting the right plant in the right place, efficient watering, appropriate fertilization, mulching, attraction of wildlife, responsible management of yard pests, recycling yard waste, reduction of stormwater runoff, and waterfront protection. Additional components of Florida-Friendly Landscaping™ include planning and design, soil analysis, use of

solid waste compost, practical use of turf, and proper maintenance. The principles of Florida-Friendly Landscaping™ are explained in detail in the most recent edition of The Florida-Friendly Landscaping Guide to Plant Selection & Landscape Design, published by the University of Florida IFAS Extension and the Florida Department of Environmental Protection.

Foundation planting: A group of plants in a landscaped bed placed at the base of a building structure and used to blend the building with its setting.

*Ground cover:* Plant material which normally reaches a maximum height of not more than eighteen (18) inches and is planted at twelve (12) inches on center, minimum.

Hardscape: Areas such as patios, decks, driveways, paths, and sidewalks that do not require irrigation.

*Hatracking:* To flat cut the top of a tree, severing the leader or leaders; or pruning a tree by stubbing off mature wood larger than three (3) inches in diameter; or reducing the total circumference or canopy spread not in conformance with the current National Arborist Association standards as may be amended from time to time and incorporated herein by reference except where removal of branches is necessary to protect property and public safety. The following trees are exempt from this section: Schinus terebinthifolius (Brazilian Pepper), Metopium toxiferum (Poison Wood), Casuarina spp. (Australian Pine), Melaleuca quinquenervia (Cajeput Tree), Acacia, Bishoffia Javanica, Araucaria heterophylla (Norfolk Island Pine), any trees listed on the Invasive Plant list as published by FISC.

Heat island; heat island effect: The term "heat island" describes built or paved areas that are hotter than nearby rural areas due to human activities. The term "heat island effect" refers to an effect heat islands can have on communities by affecting water quality and increasing summertime peak energy demand, air conditioning costs, air pollution and greenhouse gas emissions, and heat-related illness and mortality.

Hedge: A row of evenly spaced shrubs or other vegetation planted to form a dense, continuous, unbroken visual screen.

Hydrozone: See Water Use Zone.

Infiltration rate: The rate of water entry into the soil, expressed as a depth of water per unit of time (inches per hour).

Institutional fertilizer applicator: Any person, other than a noncommercial or commercial fertilizer applicator (unless such definitions also apply under the circumstances), that applies fertilizer for the purpose of maintaining turf or landscape plants. Institutional applicators shall include, but shall not be limited to, owners and managers of public lands, schools, parks, religious institutions, utilities, industrial or business sites, and any residential properties maintained in condominium, common ownership, or common management.

Interior landscape area: A landscape area located within a vehicular use area (VUA) that is within the perimeter of a site. An interior landscape area may or may not be attached to the perimeter landscape or buffer area.

Irrigation system: A constructed watering system designed to transport and distribute water to plants or grasses.



Landscape design: Consultation for and preparation of planting plans drawn for money, goods, services, or other valuable consideration, including specifications and installation details for plants, soil amendments, mulch, edging, gravel, and other similar materials. Such plans may include only recommendations for the conceptual placement of tangible objects for landscape design projects. Construction documents, details, and specifications for placement of tangible objects and irrigation systems shall be designed, approved, or, if necessary, sealed by licensed professionals as required by Section 481.303(7), Florida Statutes.

Landscape layout plan: Plans and drawings showing the location of buildings, structures, underground and overhead utilities, pedestrian transportation, or environmental systems, and the detail for placement of site amenities, accessibility components, plantings, and other tangible objects. Plans shall be numbered, dated, North arrow indicated, scaled, and sealed by an appropriately licensed professional where required by Section 481.321, Florida Statutes.

Landscape plans: Landscape plans may include all or some of the following: a planting plan, a landscape layout plan, an irrigation plan, a grading and drainage plan, detail sheets, and written specifications. Plans shall be numbered, dated, North arrow indicated, scaled, and sealed by an appropriately licensed professional where required by Section 481.321, Florida Statutes. (See also Planting Plans.)

Landscaped plant: Any native or exotic tree, palm, shrub, vine, hedge, or groundcover (excluding turf).

Landscaped area: The entire parcel less the building footprint, hardscapes, and nonporous areas. Water features are included in the calculation of the landscaped area.

Landscaping material: Any of the following or combination thereof such as, but not limited to: Grass, ground cover, shrubs, vines, hedges, and trees or palms.

Manual Irrigation: The use of watering cans, garden hoses with self-closing spray attachments or other spray devices. Manual irrigation does not include any permanent irrigation systems, automatic or otherwise.

Micro-Irrigation: The frequent application of small volumes of water directly on or below the soil surface using discrete drops, tiny streams or miniature sprays. ~~Microirrigation~~ Micro-irrigation encompasses a number of methods including drip, subsurface, bubbler, low-trajectory and low-volume spray irrigation.

Mulch: Nonliving, organic materials customarily used in landscaping to retard erosion, retain moisture, and control weeds.

Native vegetation: Any plant species with a geographic distribution indigenous to all, or part, of the State of Florida as identified in the Atlas of Florida Vascular Plants, Institute for Systematic Botany or similar academic publication.

Natural area: An area, as identified in the City's Comprehensive Plan, designated on the site plan containing natural vegetation, which will remain undisturbed when property is fully developed.

Noncommercial fertilizer applicator: Any person who applies fertilizer on turf or landscape plants on his or her own private, residential property, or that of another when not done in exchange for money, goods, services, or other valuable consideration.



Open space or nonvehicular open space: The total square footage of a parcel of land after all impervious areas are subtracted, such as the square footage area of any building footprint, walls, walks, swimming pools, and VUA, and including the pervious areas of VUA required landscaping and perimeter landscape buffer area.

*Palms:* Members of the Palmae family which are monocots characterized by palmae or pinnate fronds attached to a trunk with a single growing point on each trunk. Palms may be single or multiple trunk.

Parking area: The area on a parcel or property designated for the temporary parking of vehicles. Parking areas shall be either:

1. Interior parking spaces that are not contiguous to, nor directly abutting, the site perimeter or street; or
2. Perimeter parking spaces that are contiguous to and on the street such that vehicles must enter or back into the street in order to leave the parcel or property.

Parking island or landscape island: A nonpaved area within the paved area of parking lots that provides landscaping, particularly trees, to reduce the heat island effect and to provide areas for infiltration of water into the ground aquifer to alleviate stormwater runoff.

Perimeter: The boundary or property line separating one (1) parcel of land from another or from a right-of-way.

Perimeter landscape area: The landscape area both within the buffer area, as defined herein, and directly abutting the paved perimeter of a VUA.

Pervious area: That noncompacted land located at grade that allows the passage of air and water to the subsurface and is used or set aside for landscaping.

Plant communities: An association of native plants that are dominated by one (1) or more prominent species or a characteristic physical attribute and forming a distinct habitat.

Planting plan: Specifications and installation details for plants, soil amendments, mulch, edging, gravel, staking materials, and other similar materials. (See also landscape plan.)

Planting soil: A soil medium, which is a mix composed of fertile organics and other soil mediums, including solid waste compost, that is used to augment, enhance, and improve the native soils to maximize the vitality of plant vegetation.

Protective Barrier: A temporary fence or other structure built to restrict passage into an area surrounding a tree for the purpose of preventing any disturbance to the roots, trunk or branches of the tree or trees.

Prune: The removal of dead, dying, diseased, weak or objectionable branches in a manner consistent with the National Arborist Association standards as incorporated herein.

Reclaimed Water: Wastewater that has received at least secondary treatment, and basic disinfection and is reused after flowing out of a wastewater treatment facility as defined by Rule 62-40.210, F.A.C.

Retention area: An area designed and used for the temporary or permanent storage of stormwater runoff, which may be either dry or wet retention as defined below:

1. Dry retention is an area which is designed for temporary storage of storm-water runoff. These areas shall be designed in accordance with Rule 40E-4.091(1)(a) and Rule 62-330.010 F.A.C. ~~Dry retention is an area which is designed for temporary storage of storm-water runoff and which is one (1) foot above the groundwater level as established by the Water Control District and has a maximum slope of 4:1.~~
2. Wet retention is an area which is designed for the permanent storage of storm-water runoff. These areas shall be designed in accordance with Rule 40E-4.091(1)(a) and Rule 62-330.010 F.A.C. ~~Wet retention is an area which is designed for the permanent storage of water and is at least one half (½) acre in size, with an average width of not less than one hundred (100) feet and a minimum depth of eight (8) feet below groundwater level as established by the Water Control District, with maximum slope 4:1 extending down to a point five (5) feet below the low water line.~~

Runoff: The water following a rain event, or following an irrigation event, that is not absorbed by the soil or landscape and flows off from the area.

Setback and yard areas: The front, side and rear areas or yards as established and required under this chapter and within the zoning district requirements applicable thereto.

Sandy loam: Soil consisting of fifty percent (50%) coarse sand and fifty percent (50%) muck.

Shrub: A bushy woody plant, usually with several permanent stems, and usually not over ten (10) feet in height at its maturity and is planted at eighteen (18) inches on center, minimum.

Sod or lawn: Grass or turf-covered soil held together by the roots of the grass or turf.

Subject plot, parcel, or property: The site for which a development permit is being sought pursuant to the requirements of the Code.

Sustainable: Capable of continuing long-term without depleting natural resources or being harmful to the environment or people.

Swale: A low-lying or shallow trough-like depression that carries water, mainly during rainstorms, and that provides flood control and onsite water quality mitigation through the removal of pollutants and nutrients associated with runoff.

Tree: Any self-supporting woody perennial plant which, at maturity, attains a trunk diameter of at least four (4) inches when measured at a point four and one-half (4½) feet above ground level and which normally attains an overall height of at least twenty-five (25) feet, usually with one main stem or trunk and many branches.

Topsoil: Existing soil that can be separated from the top surface of the ground, retaining the original organics native to the soil at the location from which it was separated. Unlike "planting soil" which is usually mixed with sand, compost, manure, and a number of several other ingredients, topsoil has no specific or specified ingredients and can be scraped from weedy fields or other natural spaces.

Tree sizes: (minimum size refers to at time of installation)

1. Small trees (mature height of less than 15 feet): minimum tree size is 8 feet;
2. Medium trees (mature height of 15 feet - 25 feet): minimum tree size is 10 feet; and
3. Large trees (mature height of more than 25 feet): minimum tree size is 12 feet.

*Turf or turfgrass:* A mat layer of monocotyledonous plants such as, but not limited to, Bahia, Bermuda, Centipede, Seaside Paspalum, St. Augustine, and Zoysia and their cultivars.

*Valve:* A device used to control the flow of water.

*Vegetation:* Angiosperms, gymnosperms, ferns, mosses, or other living plant material.

*Vehicular use areas or VUAs:* Areas used for the display or parking of any type of vehicle, board, or construction equipment, whether self-propelled or not, and all land upon which such vehicles traverse.

*Vines:* Plants which normally require support to reach their mature form.

*Visual screen:* A physical obstruction used to separate two (2) areas or uses which is at least seventy-five (75) percent opaque. Visual screens shall be living plant material, of natural or manmade construction material or any combination thereof.

*Water Conservation Measure:* Practices, techniques and technologies that improve the efficient use, or re-use, of water.

*Water Use Zone:* A grouping of sprays, sprinklers or micro-irrigation emitters that can be operated simultaneously by the control of one (1) valve according to the water requirements of the plants being used. All water use zones shall be shown, or otherwise indicated, on the landscape plan.

1. *Water Use Zone Table:*

<b>Water Use Zones</b>	<b>Percent of Total Landscaped Area</b>	<b>Plant and Turf Description</b>	<b>Irrigation Description</b>
High Water Use Zone	No more than 40%	Plants and turfs that are associated with moist soils and require supplemental irrigation, in addition to natural rainfall to survive. This zone includes shallow rooted turf grass varieties.	All portions of this zone shall be provided with central automatic irrigation systems.
Moderate Water Use Zone	No more than 50%	Plants and turfs that survive on natural rainfall with supplemental irrigation only during seasonal dry periods. This zone includes deep-rooted turf grass varieties.	All portions of this zone shall be irrigated, only when necessary, using either a central automatic irrigation system, micro-irrigation system or manual irrigation methods.
Low Water Use Zone	At least 10%	Plants that survive on natural rainfall only with no supplemental irrigation. Because of high water requirements for turf grass, no turf grasses are included in this zone.	All portions of this zone shall require no regular or seasonal irrigation. Manual irrigation methods can be employed only to establish new plantings.

Water Resource: All water on or beneath the surface of the ground, including natural or artificial watercourses, lakes, ponds, or diffused surface water, and water percolating, standing, or flowing beneath the surface of the ground.

~~Xeriscape:~~ A technique of landscaping utilizing native plants, trees, turfs and ground cover that generally results in long term reduction in irrigation requirements, water use, costs, energy and landscaping maintenance while producing a creative and aesthetically pleasing landscape. Xeriscaping techniques are detailed in the South Florida Water Management District publication, Xeriscape, Plant Guide II as amended, incorporated herein by reference.

**Section 7.** That Chapter XXIV “Zoning and Land Development,” Article XI “Landscape Ordinance,” is hereby amended by modifying Section 24-118 entitled “Landscape Plan Required” to read as follows (underline is added; ~~stricken through~~ is deleted):

**Sec. 24-118 – Landscape Plan Required**

Prior to the issuance of a building permit, a landscape plan shall be submitted to and approved by the Director of the Community Development Department. The landscape plan shall meet the following requirements:

- (A) ~~Be~~ Be drawn to a scale not less than 1" = 30'-0".
- (B) All landscape plans must be signed and sealed by a State of Florida Registered Landscape Architect or as determined by the City ~~Manager or designee~~.
- (C) ~~This plan s~~Shall clearly delineate existing and proposed buildings, parking, driveways, ~~or~~ other vehicular use areas, site improvements, water bodies, and hardscape features such as driveways, sidewalks, pools, fountains, fences, and retaining walls.
- (D) ~~This plan s~~Shall also designate the name (botanical and common), size (height and spread), quantity, ~~quality~~ and location of the plant material to be installed, as well as the name, size, location, and condition of viable, existing vegetation, and the degree of drought tolerance (as determined by the most recent edition of the Florida-Friendly Landscaping™ Guide to Plant Selection & Landscape Design). The use of Florida-Friendly Landscaping™ and Best Management Practices ~~Xeriscape techniques~~ shall be an integral component of the landscape design and plan. No building permit shall be issued unless such landscape plan complies with the provisions herein.
- (E) Depict zoning designations of property and abutting property in a format approved by the Director;
- (F) Depict site plan calculations displayed in a format approved by the Director;
- (G) Depict the location of all on-grade, underground, and overhead utilities;
- (H) Include a site survey, tree survey, and site assessment no more than one (1) year old, unless otherwise approved by the Director, in accordance with the requirements of Sections 24-121 and 24-125 of this article;
- (I) The location of all existing and proposed light and respective standards in accordance with the City requirements;
- (J) Include a table, in a format approved by the Director, showing the total square footage of the

various landscape hydrozones on the plan;

- (K) Except for single family and duplex residential developments, include a notation indicating that all applications of fertilizer shall be performed by a commercial fertilizer applicator, certified by the Department of Agriculture and Consumer Services pursuant to Section 482.1562, Florida Statutes; and
- (L) Except for single family and duplex residential developments, include a notation indicating that all applications of pesticides, including "weed and feed" products, should be made in accordance with State and federal law and the most recent edition of the Florida-Friendly Best Management Practices for Protection of Water Resources by the Green Industries.

**Section 8.** That Chapter XXIV “Zoning and Land Development,” Article XI “Landscape Ordinance,” is hereby amended by modifying Section 24-119 entitled “Minimum Landscaping Requirements for All Zoning Districts” to read as follows (underline is added; stricken through is deleted):

**Sec. 24-119 – Minimum Landscaping Requirements for All Zoning Districts**

- (A) General. Plant selection should be based on the plant's adaptability to the existing conditions present at the landscaped area and native plant communities, particularly considering appropriate hardiness zone, soil type and moisture conditions, light, mature plant size, desired effect, color, and texture. Plant species listed in the Florida Friendly Landscaping™ are preferred. Determinations of prohibited and controlled plant species shall be pursuant to the Department of Agriculture and Consumer Services, Chapter 5B-57, Florida Administrative Code (F.A.C.), and the Florida Invasive Species Council (FISC) Invasive Plant Species list. Plant species identified as prohibited and controlled according to Chapter 5B-57, F.A.C., and the FISC Invasive Plant Species list may not be used, except as specifically allowed therein.
  - (1) Plant quality grades. Plants used to meet the requirements of this article shall conform to the standards for Florida Grade One, or better, as provided in the most current edition of Florida Grades and Standards for Nursery Plants, by the Division of Plant Industry, Department of Agriculture and Consumer Affairs, State of Florida. Sod shall be clean and visibly free of weeds, noxious pests, and diseases.
  - (2) Invasive plants. Prohibited and controlled plant species, pursuant to the Department of Agriculture and Consumer Services, Chapter 5B-57, FISC Invasive Plant Species list, that exist on site shall be removed.
- (B) Water requirements for plants. Plants shall be grouped in accordance with their respective water (hydrozone) and maintenance needs consistent with Florida-Friendly Landscaping™ principles. Plants with similar water and cultural (soil, climate, sun, and light) requirements shall be grouped together. Consideration should be given to plants that require minimal or no use of gasoline-powered maintenance equipment.
  - (1) The hydrozones shall be shown on the irrigation layout and planting plans, as required. Where natural conditions are such that irrigation is not required, the presence of site-appropriate plants shall not be considered a high water use hydrozone.
  - (2) The combined size of all high water use hydrozones, other than turf areas, shall be limited to twenty percent (20%) of the total landscaped area. In landscapes irrigated with reclaimed (reuse) water, the allowable size of all high water use zones shall not be limited. These

high water use limits do not apply to landscaped areas requiring large amounts of turf for their primary functions.

(C) (A) Tree Specifications.

- (1) Required trees shall be of a species, which normally grow to a minimum height of twenty-five (25) feet and have a mature crown spread of not less than twenty (20) feet with trunks, which can be maintained, with over six (6) feet of clear wood. The Director shall maintain a list of acceptable trees. Trees or palms having an average mature crown spread of less than twenty (20) feet may be substituted by grouping the same to create the equivalent of a twenty (20) foot crown spread. Such a grouping shall count as one (1) tree towards meeting tree requirements for any provision herein.

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- (3) ~~Required palms~~ Palms shall be a minimum of ten (10) ~~ft~~ feet in height.
- (4) ~~maximum~~ Maximum twenty-five (25) percent of all required trees shall be of a palm species.

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- (8) ~~Modification of specifications:~~ The specific requirements relating to landscape materials, including but not limited to, type, size, quantity and spacing, may be adjusted or modified by the City ~~Manager~~ to reflect existing field conditions, so long as the general spirit and intent of this chapter is upheld. Field conditions, which may require modifications to the planting requirements, include, but are not limited to, overhead or underground utilities, (including septic tanks), proximity to adjacent buildings and ~~visibility issues~~ roadway safety lines of sight.
- (9) As part of the site plan review for proposed projects, additions and renovations, the proposed landscaping shall be reviewed by the Director to determine if the proposed locations of any of the trees ~~is~~ are in proximity to an overhead or underground electric facilities. This section of the Code shall also be used when selecting the replacement planting for the replacement of dead, diseased, destroyed or otherwise removed vegetation from a site.

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- (c) Existing trees that are in violation of this section of the Code shall be maintained ~~annually~~ by the property owner, such that there are no branches of the tree closer than ten (10) feet to overhead electrical facilities.

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- (e) Those plants defined by the FISC as invasive species shall not be planted. Additionally, trees considered nuisance or problem trees due to their brittleness, early decay and non-suitability for planting near electric facilities or elsewhere, shall not be planted. These trees are listed as follows:

Common Name	Botanical Name
Earleaf Acacia	Acacia auriculiformis

Australian Pine	Casuarina spp.
Melaleuca	Melaleuca quinquenervia
Brazilian Pepper	Schinus terebinthifolius
Woman's Tongue Tree	Albizzia lebbeck
Norfolk Island Pine	Araucaria heterophylla
Tree Bamboo	Bambusa vulgaris
Bischofia	Bischofia javanica
Schefflera	Brassaia actinophylla
Ear Tree	Enterolobium cyclocarpum
Eucalyptus	Eucalyptus spp.
Nonnative Ficus	Ficus spp.
Silk Oak	Grevillea robusta
Mahoe	Hibiscus tiliaceus
Chinese Tallow Tree	Sapium sebiferum
Java Plum	Syzygium cumini
Cork Tree	Thespesia populanea

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(10) Based on the existing and required quantity of total trees to meet the Code for the subject property, the following conditions shall determine the number of differing species that shall be required:

Preserved Trees + Existing Trees = Total Required Trees. Therefore, if:

- (a) Required trees = 4—10, then a minimum of two (2) species shall be used.
- (b) Required trees = 11—20, then a minimum of three (3) species shall be used.
- (c) Required trees = 21—50, then a minimum of four (4) species shall be used.
- (d) Required Trees = 51 or more, then a minimum of five (5) species shall be used.

These requirements are based on perimeter and interior requirement totals and calculations.

(11) Credit for existing native and noninvasive trees preserved on a site shall be granted towards meeting the tree requirements of any landscaping provisions of this article. No credit shall be granted for preserved trees that are in extremely poor condition.

(12) Trees used in the required landscaping adjacent to a public street or swale are subject to approval by the City so that the sustainable character, biological diversity of tree species,



and safety of the public street can be maintained, the reduction of the urban heat island effect shall be encouraged, and Complete Streets and "walkable" communities shall be promoted.

(13) All large trees installed within six (6) feet of public infrastructure shall utilize a root barrier system, as approved by the City. Tree root barriers shall be installed at the sidewalk edge in those circumstances where tree roots are causing, or may potentially cause, a trip hazard because of lifting of some portions of a public roadway or sidewalk.

(14) Tree removal is to be conducted pursuant to Section 24-121, of the City's Code of Ordinances.

(15) Prohibited and invasive tree species. These species are determined by FISC.

(a) Prohibited and invasive tree species shall not be counted towards fulfilling minimum tree requirements.

(b) Prohibited and invasive trees shall be removed from the property.

(16) Required trees shall be planted consistent with the principles of the Florida-Friendly Landscaping TM Guide.

(17) Existing trees on site shall be protected according to Section 24-121, of the City's Code of Ordinances.

(18) ~~(40)~~ Additional minimum tree specifications for properties with buildings of three (3) stories or taller:

(a) All required trees shall be field grown and have a minimum caliper or diameter at breast height (D.B.H.) of five (5) inches and be a minimum of eighteen (18) feet in height and eight (8) to ten (10) feet in spread at the time of planting.

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(D) ~~(B)~~ Other Plant Material Specifications.

(1) Shrubs and hedges:

(a) Shall be ~~of a self-supporting, woody, evergreen species and shall be~~ a minimum of two (2) feet in height at the time of planting.

(b) Hedges shall be planted and maintained so as to form a continuous, solid visual screen, of not less than three (3) feet in height, within one (1) year of planting.

(c) Spacing of plants shall ~~be no more than eighteen inches (18) on center~~ conform to standard nursery practices.

(d) Where pedestrians traverse through and damage existing hedges, a fence or other durable barrier, three (3) feet in height ~~must~~ may be installed, subject to the approval of the Director. Hedges must be installed on both sides of the barrier to screen it from view.

(e) When shrubs are used as a screen around vehicular open space areas, said shrubs shall be a minimum of two (2) feet in height above the vehicular open space pavement surface that directly abuts the shrubs at the time of planting and, if within



a safe sight distance triangle, shall be no greater than thirty (30) inches in height, in accordance to Section 24-122 of this article.

- (f) A minimum fifty percent (50%) of required shrubs shall be listed native species in the Florida-Friendly Landscaping™ Guide.
  - (g) Hedges may be placed on the property lines; however, this regulation shall not be construed to permit such hedges to extend beyond the official right-of-way lines or property lines, or to create issues with acceptable sight distances.
  - (h) Hedges may be incorporated into the landscape design so as to screen air conditioning units or other equipment from being visible from public rights-of-way. The air conditioning and other equipment will still be installed in accordance with City Ordinances.
  - (i) See Section 24-80 for additional regulations regarding hedges.
- (2) Ground covers ~~May~~ may be used in lieu of grass. Ground covers shall ~~present a finished appearance and reasonably complete coverage at time of planting at twelve (12) inches on center, minimum~~ be planted with a minimum of fifty percent (50%) coverage, with one hundred percent (100%) coverage occurring within six months after installation.
- (3) ~~Vines: Shall~~ shall not be less than twenty-four (24) inches in height at the time of planting and may be used in conjunction with fences or walls to meet physical barrier requirements ~~as specified~~. Where required, support vines with a trellis or other suitable support system that allows the vines to grow to the top of the fence or wall. Vines shall be planted at ten (10) foot intervals to meet landscape buffer requirements.
- (4) ~~Turf Grass: Shall~~ shall be a variety that requires less irrigation and conforms to the requirements of this article. Any solid sod, or other turf type, as approved by the Director, shall be reasonably free of insects and noxious weeds. The type and location of turf areas shall be selected in the same manner as with all the other plantings. Irrigated turf areas, as opposed to nonirrigated turf areas, are considered to be high water use hydrozones. Irrigated turf shall not be treated as a fill-in material but rather as a planned element of the landscape. Turf grass shall be placed so that it can be irrigated using separate zones.
- (a) Irrigated turf areas shall be consolidated and limited to those areas on the site that receive pedestrian traffic, provide for recreation use, provide cover for septic tank drain fields, and required drain field reserve areas, or provide soil erosion control, such as on slopes or in swales, and in limited instances, where turf is used as a design unifier or other similar practical use.
  - (b) As a matter of public safety, no turf that requires mowing shall be allowed on slopes greater than four-to-one (4:1) or within ten (10) feet of the water's edge, except where adjacent to seawalls and bulkheads or needed to control erosion.
  - (c) Turf grass areas shall be identified on the landscape plan and be subject to the requirement that no more than fifty percent (50%) of the landscaped area for multifamily dwellings and other development uses (excluding single family residences and duplex dwellings, which are subject to the turf requirements set forth in Section 24-123 of this article) may be in turf.

- (d) In areas where no turf or groundcover is required, the property shall be maintained in its natural state; except that all invasive species shall be removed.
- (5) Foundation Planting may be shrubs or groundcover, or a combination thereof, and shall be counted towards the minimum native species requirements and Florida-Friendly Landscaping™ requirements of this section. The quantity and type of foundation plants shall vary depending on the building size, configuration, and entryways and openings.
- (6) ~~(5)~~ Quality: Plant material shall comply with required inspections, grading standards and plant regulations as set forth by the Florida Department of Agriculture's "Grades and Standards of Nursery Plants, Part I," latest revisions, and "Grades and Standards for Nursery Plants, Part II for Palms and Trees," or with superseding standards called for in these specifications as they may be revised from time to time. Plants shall conform to the standards of Florida No. 1 or better regarding:
- (a) Shape and form.
  - (b) Health and vitality.
  - (c) Condition of foliage.
  - (d) Root system.
  - (e) Free from pest and mechanical damage.
- (7) ~~(6)~~ Planting Soil: All planting pits shall be back filled with a topsoil mix consisting of fifty (50) percent sand, forty (40) percent muck, and ten (10) percent humus or peat, by volume, well mixed, with appropriate fertilizer added. There are many varieties of planting soils. These different types and required uses are described below.
- (a) Existing topsoil or imported topsoil.
    - i. Where landscape plans are required, applicants are encouraged to seek a soil test and analysis, performed by a reputable soil testing lab, to determine soil texture, percentage of organic matter, measurement of pH, total soluble salts, and estimated soil infiltration rate to determine soil suitability to sustain landscape plants.
    - ii. Existing horticulturally-suitable topsoil onsite shall be stockpiled and respread during final site grading.
    - iii. Any imported topsoil shall be similar to the existing soil in pH, texture, permeability, and other characteristics, unless demonstrated to the Director that a different type of soil amendment approach is justified. Further, existing or imported topsoil:
      - 1. Shall be free of roots, clods, stones larger than three-fourths (¾) inch in the greatest dimension, pockets of coarse sand, noxious weeds, sticks, lumber, brush, and other litter. It shall not be infested with undesirable disease-causing organisms such as insects and plant pathogens; and
      - 2. For all planting areas, shall be composed of a minimum of thirty percent (30%) muck or horticulturally-acceptable organic material.
  - (b) Mechanically mixed planting soil.

- i. Mechanically mixed planting soil is typically identified as being composed of sandy loam, typical of the locality, or as specified. At a minimum, mechanically mixed planting soil must meet the following requirements:
  1. Gradation limits - soil shall be a sandy loam, loam, or clay loam. The definition of soil texture shall be the USDA classification scheme. Gravel over one-quarter (1/4) inch in diameter shall be less than twenty percent (20%) by weight.
  2. Permeability rate - hydraulic conductivity rate shall be not less than one inch (1") per hour nor more than twenty inches (20") per hour, when tested in accordance with the USDA Handbook Number 60 (Diagnosis and Improvement of Saline and Alkaline Soils), method 34b, Hydraulic Conductivity of Disturbed Soils, or other approved method.
  3. Fertility - the range of the essential elemental concentration in soil shall be as specified for its intended use.
- ii. The use of solid waste compost as a soil amendment is encouraged, where it is appropriate.

~~(8) (7) Mulch:~~ All exposed soil areas in planting beds, including hedge rows, shall be kept weed free, and mulched to a minimum three (3) inch depth with organic mulch, except that two (2) inches shall be required in annual beds. Mulch should be replenished, as needed, to meet this requirement. The use of shredded and composted Melaleuca, grade B mulch is encouraged. Cypress mulch shall not be used. Mulch shall be at least six (6) inches away from any portion of a building or structure, or the trunks of trees, and at least three (3) inches away from the base of shrubs. Mulch rings should extend at least three (3) feet around freestanding trees and shrubs.

~~(E) (C)~~ Installation.

- (1) Planting methods: All plant material shall be installed following accepted planting procedures as defined by the American Association of Nurserymen and The Florida Nurserymen and Growers Association and in consideration to the quality of plants as described in this section. Additional measures are as follows:
  - (a) Topsoil shall be of the minimum quality as specified in this section. Excluding palm trees, all trees shall be planted with twelve (12) inches of topsoil around the root ball and shrubs shall be planted with a minimum of six (6) inches of topsoil around the root ball. A minimum of three (3) inches of shredded, approved, organic mulch or groundcover shall be installed around each tree planting, including palms, for a minimum of thirty-six (36) inches beyond its trunk in all directions and throughout all hedge and shrub planting. A minimum of six (6) inch clear area shall be made around each trunk to prevent root rot and other damaging effects. The use of clean mulch (i.e., seeds killed) either recycled or obtained from Melaleuca, Eucalyptus, Australian Pine, or other nonold growth hardwood is encouraged to reduce impacts on the environment and to preserve the remaining native plant communities.
  - (b) All trees and palms shall be properly guided and/or staked at the time of planting until establishment, which should not exceed more than seven (7) months for

broadleaf trees and one (1) year for palms. The use of any method which damages the trees or palms is prohibited. All plants shall be installed so that the top of the root ball remains even with, or slightly above, the soil grade.

- (c) The soil volume around and adjacent to the tree should be adequate to allow for a healthy root zone based on the ultimate tree size at maturity.
  - (d) When the landscaping has been installed and established by the contractor or installer, the owner of the property shall be subject to this article and shall be responsible for the maintenance of the land and landscaping so as to present a healthy, sustainable, vigorous, and neat appearance, free from refuse and debris.
- (2) *Curbing:* Landscaped areas, walls, structures, and walks shall require protection from the encroachment or overhang of vehicles. A continuous ~~Type D~~ concrete curbing arrangement of not less than six (6) inches in height, as approved by the Director, shall be installed to prevent such encroachment.
- (3) *Existing plant credit:* In instances where healthy plants ~~material~~ exists on site (~~particularly native or Xeriscape species~~), the Director may adjust the requirements of this article to allow credit for such plants ~~material~~ if, in his opinion, such an adjustment is in keeping with and will preserve the intent of this article.
- (4) *Certificate of compliance:* Upon completion of all required landscape improvements, the site shall be inspected for compliance with the landscape plan by the Director. A certificate of compliance must be issued before a certificate of occupancy can be issued for any related structure. When occupancy of a related structure is desired prior to completion of the ~~vehicular use area~~ VUA, a temporary certificate of occupancy may be issued if a financial guarantee is provided, acceptable in form to the City Attorney, which will ~~insure~~ ensure compliance with the requirements herein.
- (F) ~~(D)~~ *Irrigation.* For high and moderate water use zones in all landscapes, the irrigation system(s) shall be designed, managed and maintained to promote the efficient use of water used for irrigation, as dictated in Section 19-25 of the City's Code. Irrigation systems used in a landscape shall be designed to correlate to the organization of plants as described in the Water Use Zone Table.
- (1) Automatic moisture and/or rain shut-off switch equipment shall be required on automatic irrigation systems to avoid irrigation during periods of sufficient rainfall, in accordance with Section 373.62, Florida Statutes. This equipment shall consist of an automatic mechanical or electronic sensing device(s) ~~which that~~ will override the irrigation cycle of the system when adequate rainfall has occurred. The operation of an irrigation system during periods of heavy rainfall is prohibited.
  - (2) Landscape irrigation systems shall be designed, managed and maintained so that no water is being applied to ~~nonperVIOUS~~ impervious areas ~~is eliminated~~.
  - (3) Use of non-potable water for use in the irrigation of lawn and plant material ~~is required~~ shall be used when ~~determined to be~~ available. When practical, the use of cisterns and other rain collecting devices is encouraged.
  - (4) Existing developed properties ~~which that~~ receive three (3) or more Code violations in a twelve (12) month period for landscaping ~~which in the opinion of the City are~~ attributable,

wholly or partially, to lack of proper watering shall be required to install an irrigation system.

**Section 9.** That Chapter XXIV “Zoning and Land Development,” Article XI “Landscape Ordinance,” is hereby amended by modifying Section 24-120 entitled “Maintenance” to read as follows (underline is added; stricken through is deleted):

**Sec. 24-120 – Maintenance**

(A) *General.* In all districts the owner, or his agent, shall be responsible for the maintenance, in perpetuity, of all landscaping material in good condition ~~so as~~ to present a healthy, neat, and orderly appearance and be clear of weeds, refuse and debris. Landscaping material shall be trimmed and maintained ~~so as~~ to meet all City, County, or ~~state~~ State site distance requirements.

(1) Required property maintenance of landscape areas.

- (a) If all landscaping is found to be in a state of decline, dead, or missing, it shall be replaced with native vegetation plant species that will be at least equivalent in size at maturity. If any preserved vegetation exists, which is being used to satisfy current landscape requirements of this article, dies, such vegetation shall be replaced with the same landscape material, if available, or comparable vegetation that complies with this article.
- (b) Turf should be mowed frequently enough so that no more than one-third (1/3) of the blade height is removed per mowing.
- (c) All mulch should be renewed periodically and maintained in accordance with the landscape plan standards in Section 24-119 of this article. Plastic sheeting and other impervious materials shall not be used under mulched areas.
- (d) Preserved and created ecological communities shall be maintained in a natural state. Only clearing by hand is permissible, unless otherwise authorized by the Director.

(2) Best Management Practices.

- (a) All persons providing commercial landscape maintenance services, commercial fertilizer applicator services, and institutional fertilizer applicator services within the City’s unincorporated areas or on City properties, including City maintenance operations staff providing such services, shall:
  - i. Attend a training in the Best Management Practices described in the most recent edition of the Florida-Friendly Best Management Practices for Protection of Water Resources by the Green Industries (Florida Department of Environmental Protection); and
  - ii. Have at least one (1) person holding a current certificate of completion for training as set forth above present at all times on any job site while fertilizer application is in progress.
- (b) In no case shall grass clippings, vegetative material, or vegetative debris be washed, swept, or blown off into stormwater drains, ditches, conveyances, water bodies, wetlands, sidewalks, or roadways, either intentionally or accidentally.

- (c) Yard waste shall not be disposed of or stored by shorelines, ditches, swales, or the vicinity of storm drains. Yard waste and compost sites must be hidden from street view, maintained to prevent odor, and be free of weeds.
- (d) Turf clippings should be left on the lawn to replace nutrients. Shredded yard clippings and leaves should be used for mulch or be composted for use as fertilizer. However, diseased material should not be mulched and should be properly disposed of to avoid spreading disease.
- (e) Composting of yard waste and other recycled solid waste products should be used, when appropriate.
- (f) Irrigation shall be maintained at its highest efficiency, as designed, and eliminate all free flow possibilities should any breaks occur in the main, lateral, or other piping within the system. In the event of such an occurrence, the break(s) shall be repaired immediately.

(B) *Failure to Conform or Maintain.* If at any time after the issuance of a certificate of occupancy, any landscaping material is found to be in nonconformance, including, but not limited to, dead or dying plant material, notice shall be issued to the owner or his agent that corrective action ~~is~~ shall be required to be in compliance with this article. Such notice shall describe what action is necessary to comply.

The owner or his agent shall have a time period, as set forth by the Code Compliance Division of the Community Development Department, to fulfill the landscaping requirements. Failure of compliance within the allotted time shall be considered a violation of this ordinance and shall subject the property owner to fines as determined appropriate, by the Code Enforcement Board of the City of North Miami Beach.

(C) *Tree Topping or Hatracking or Trimming into Unnatural Shapes.* It shall be unlawful for any person, firm or City department to top any tree. Topping is defined as the severe cutting back of limbs to stubs larger than three (3) inches in diameter within the tree's crown to such a degree so as to remove more than one-third (1/3) of the normal canopy and disfigure the tree. Trees which are hatracked/topped or unnaturally shaped may be required to be removed and replaced or mitigated by the planting of additional trees on or off site, in order to replace the tree canopy existing prior to the damage. More than one (1) tree may be required to replace each damaged tree, depending upon the size and canopy of the damaged tree. If the trees are not replaced the owner is subjected to a fine. The fines are laid out in Section 24-7. As an alternative, a fine of up to five hundred (\$500.00) dollars per tree may be applied to each tree determined to be hatracked or unnaturally shaped. Criteria upon which the amount of the fine is assessed shall include, but not be limited to, the number of trees involved, type of tree, the severity of the offense, likelihood of recovery and return to natural growth habits, first or repeat offense, and the overall effect on the streetscape and surrounding neighborhood.

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(D) *Edging.* Edging shall be accomplished in such a manner so as not to destroy landscaping material, rights of ways, or curbing.

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**Section 10.** That Chapter XXIV “Zoning and Land Development,” Article XI “Landscape Ordinance,” is hereby amended by modifying Section 24-121 entitled “Tree Removal Permit” to read as follows (underline is added; ~~stricken through~~ is deleted):

**Sec. 24-121 – Tree Removal Permit**

An existing tree on the site having a trunk diameter of three (3) inches or greater, except for ~~Shinus terebinthifolius (Brazilian Pepper), Metopium toxiferum (Poison Wood), Casuarina spp. (Australian Pine), Melaleuca quinquenervia (Cajeput Tree), Ficus species, Acacia, Bishoffia javanica or Araucaria heterophylla (Norfolk Island Pine)~~ an invasive species listed by FISC shall not be removed or relocated without a permit from the Community Development Department of the City. In evaluating whether to grant a tree removal permit, the ~~Director~~ City shall consider the size, species (~~native or not~~), health, rareness and age of the tree. A tree survey identifying all existing trees over three (3) inches in diameter shall be included with any site plan application. This survey drawing shall be overlaid directly upon the site plan sufficiently to provide the accurate location of all existing trees which are proposed to be destroyed, relocated, or preserved, the botanical and common name of each tree, and the diameter, height and canopy spread of each tree.

In addition, all applicable portions of Miami-Dade County Tree Protection Ordinance #89-8 are adopted herein. Applicability of the Miami-Dade County Ordinance shall be as determined by the City ~~Manager or designee~~.

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**Section 11.** That Chapter XXIV “Zoning and Land Development,” Article XI “Landscape Ordinance,” is hereby amended by modifying Section 24-122 entitled “Minimum Design Standards” to read as follows (underline is added; ~~stricken through~~ is deleted):

**Sec. 24-122 – Minimum Design Standards**

The following shall apply to all developments requiring site plan approval except for single and two-family dwellings:

(A) *Perimeter Landscape Requirements.*

- (1) Design: Adjacent to any street right-of-way plus along the perimeter of all ~~vehicular use areas~~ VUAs there shall be a continuous buffer strip of not less than five (5) feet in width. These buffer strips shall include at least one (1) tree for each thirty (30) linear feet, or portion thereof, of perimeter. Where these buffer strips abut a vehicular use area, there shall be installed a hedge, berm, or other durable landscaped visual barrier, of not less than three (3) feet in height within one (1) year of planting. Buffer strips shall conform to the landscape and irrigation requirements for ~~“moderate”~~ and “low” water use zones.
- (2) Exceptions to requirements:
  - (a) Access drives: Necessary accessways shall be permitted to traverse required perimeter buffer strips.
  - (b) Abutting a right-of-way but no vehicular use area: Buffer strips shall require continuous hedges and one (1) tree for every twenty-five (25) feet.
  - (c) Abutting a residential district: Buffer strips shall include a continuous solid fence,

hedge, or other barrier vegetation or wall with a vine of three (3) feet height, five (5) feet on center, and one (1) tree every twenty-five (25) feet. Buffer strips shall conform to the landscape and irrigation requirements for “~~moderate~~” and “low” water use zones.

- (d) Abutting another vehicular use area: Accessways may traverse required buffer strips along common interior lot lines when said accessways improve overall vehicular circulation within and between abutting properties.

(B) *Interior Landscape Requirements.* Within the interior of any ~~vehicular use area~~ VUA (total area less than required for perimeter buffer strips), the following shall be required:

- (1) When the interior of any ~~vehicular use area~~ VUA is designed for off-street parking purposes, the following shall be provided:

- (a) *Terminal Islands:* ~~Contiguous~~ Continuous rows of parking spaces shall be terminated on both ends with landscaped islands not less than ten (10) feet in width (excluding curbing), and with a minimum of one (1) tree per ~~each~~ island. The ends of such islands may be tapered to accommodate vehicle circulation. Such islands shall extend the entire length of the parking space and include at least one (1) tree for every one hundred (100) square feet, or portion thereof, of said island. The remainder of the terminal island shall be well landscaped with grass or ground cover that conforms to the landscape and irrigation requirements for “~~moderate~~” and “low” water use zones.

- (b) *Interior Islands:* Landscaped interior islands shall be five (5) feet in width (excluding curbing) and not less than ninety (90) square feet each ~~in area~~ and shall be placed within individual rows of contiguous parking spaces so that there is not less than one (1) island for every eight (8) parking spaces, or portion thereof and shall continue the full length of the contiguous parking space. At least one (1) tree shall be planted in every interior island and the remainder of the island shall be landscaped with grass or ground cover that conforms to the landscape and irrigation requirements for “~~moderate~~” and “low” water use zones.

- (c) The following specifications shall be followed during installation:

- i. Trees shall be a minimum of twelve (12) feet in height and trunk DBH of two (2) inches; or

- ii. Palms shall be a minimum one (1) multiple trunk palm, with at least three (3) trunks, or a group of at least three (3) single trunk palms with a minimum overall height of sixteen (16) feet.

- iii. Tree spacing requirements and a maximum number of trees per island will vary by tree species and the soil volume requirements. Island size shall meet the soil volume necessary for the tree species selected to be planted in said island. The following sized islands shall serve as a guide for the selected trees or palms:

- 1. 135 square foot island size (9' x 15') for small trees or palms;

- 2. 225 square foot island size (15' x 15') for medium trees or palms;

- 3. 324 square foot island size (18' x 18') for large trees or palms;

- 4. 378 square foot island size (21' x 18') for large trees or groups of trees or palms;



and

5. 486 square foot island size (27' x 18') or larger for larger groups of trees or palms.

(d) Interior islands should not be placed directly opposite each other when in abutting parking rows. Any arrangement which creates an ~~unregimented~~ unregimented appearance, relieves monotony, increases tree canopy and fulfills the requirements of this article may be approved by the Director.

(e) ~~(e)~~ *Divider Medians*: Where any row of contiguous parking spaces is located so as to abut an interior driveway rather than another row of contiguous parking spaces, a landscaped divider median of not less than five (5) feet (excluding curbing) in width shall be required between said row and the abutting driveway. At least one (1) tree shall be planted for every twenty-five (25) lineal feet of said median and the remainder of said median shall be landscaped with grass or ground cover ~~that~~ which conforms to the landscape and irrigation requirements for ~~"moderate"~~ and "low" water use zones.

(f) Parking lot landscaping should be designed to be sustainable and to function as part of the development's stormwater management system, utilizing vegetated islands as bioretention or swale areas at or below grade and with curb cuts. Existing natural drainage ways and vegetated channels shall be incorporated into the design, rather than the standard soil mounding and continuous concrete curb and gutter configuration, to decrease flow velocity and allow for stormwater infiltration.

(g) Parking tiers shall be separated by a minimum of three (3) feet of nonirrigated landscape filter areas, unless impracticable considering lot size, site conditions, and minimum parking requirements. Landscape filter areas are to include a groundcover and landscape material that will achieve one hundred percent (100%) coverage when mature.

(h) Parking lots shall be designed to drain the parking areas through the landscape filter areas, dividing the parking tiers to filter urban runoff.

(i) Flexibility in the spacing of interior parking islands is permitted in retail centers to facilitate "view corridors" to anchor tenants' pedestrian entries, as long as the total required interior island plant count is provided and the spacing of shade trees to frame the view is not more than forty-five (45) feet.

(2) When the interior of any ~~vehicular use area~~ VUA is designed primarily for purposes other than off-street parking, such as for drive-in or drive-thru banking or retailing, the drive-thru lane shall be separated from other ~~vehicular use area~~ VUA for its entire length, with a five (5) foot wide (excluding curbing) landscaped area planted with one (1) tree for every twenty-five (25) linear feet, and with turf grass or ground cover that conforms to the landscape and irrigation requirements for ~~"moderate"~~ and "low" water use zones. The portion of the drive-thru lane that is adjacent to the primary structure shall have a minimum three (3) foot wide landscaped area between the structure and the drive-thru lane.

(C) *Landscape Requirements for Nonvehicular Use Areas.* ~~Design:~~ Develop a landscape plan that beautifies, provides shade, and complements the architecture of the adjacent building, subject to the approval of the Director.

(D) *Vision Clearance.*

- (1) When an accessway intersects a public street or alley right-of-way, or another accessway, or when the ~~vehicular use area~~ VUA is contiguous to the intersection of two (2) or more public rights-of-way, all landscaping within the triangular areas created by such intersections and defined below shall provide unobstructed vision clearance at an elevation of ~~from~~ three (3) to six (6) feet in height. Vision clearance requirements shall comply with the ~~requirements of the~~ American Association of State Highway & Transportation Officials (AASHTO).

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- (5) Where City, Miami-Dade County or Florida Department of Transportation (FDOT) roads are involved, ~~the City requires meet all City, Miami Dade County, or FDOT design criteria related to highway safety for all landscaping material.~~

~~(E) Landscaped or Pervious Areas.~~ Not not more than fifty (50) percent of such areas shall be grass. The balance shall be in mulched ground cover or shrubs.

- ~~(E)(F) Dumpsters.~~ All dumpsters shall be completely screened from view from the adjacent properties and the public right-of-way by the use of using walls, or fences, and landscaping material, or a combination and is subject to the approval and standards as established by the Director of the Public Works Department.

- ~~(F)(G) Retention Areas.~~ Retention areas shall be landscaped with suitable planting material so as to create an aesthetically pleasing appearance, subject to the approval of the Director.

- ~~(G) Generalized minimum landscape requirements.~~ All multifamily, nonresidential uses, and mixed-use areas, including facilities owned by the City, shall conform to the landscaping and buffering requirements set forth below. Zoning district regulations may contain further minimum landscape and buffering requirements related to specific uses.

- (1) Shade trees. All developments shall provide the required number of shade trees in compliance with the following standards:

- (a) Open space requirements: There shall be 1 tree for every two thousand (2,000) square feet of lot area.
- (b) All required perimeter trees shall consist of at least two (2) large species trees consistent with the Florida-Friendly Landscaping™ Guide; except that up to forty percent (40%) of the required large trees may be substituted with smaller tree species at two (2) small trees for every one (1) large tree substituted.
- (c) No more than thirty percent (30%) of required shade trees shall be palms, where every three (3) palms shall equal one (1) required shade tree. Palms shall be a minimum height of sixteen (16) feet in height at time of planting.
- (d) Required perimeter trees and parking island shade trees shall count towards the required open space tree requirements.
- (e) Required perimeter trees and landscaping shall be placed so as to minimize conflict with existing trees on adjacent properties within twenty-five (25) feet of the property line and integrate the landscaping for both properties. Credit may be given for the tree requirement of the subject property if trees occurring on the abutting property are in

conflict with those required trees.

- (2) Shrubs, hedging. All developments shall provide the required number of shrubs and hedging in compliance with the following standards:
  - (a) When abutting a public thoroughfare, a single family residence, or a duplex complex, the property line shall have one (1) continuous hedge, except for ingress and egress openings, to be maintained by the property owner.
  - (b) Open space requirements: ten (10) shrubs for every two thousand (2,000) square feet of lot area.
- (3) All developments shall provide the required foundation plantings in compliance with the following standards:
  - (a) Foundation planting shall be installed adjacent to, and span a minimum twenty percent (20%) of, structures that face a public right-of-way; except that foundation planting shall not block any entryways, windows, or openings.
- (4) All permanent freestanding sign installations require the installation and establishment of a minimum of one (1) shrub for every two (2) lineal feet of width of the sign structure on each side and a minimum of five (5) square feet of groundcover around the perimeter of the sign base, designed in such a manner so as to not block the message on the sign.

For additional requirements for signs and permitting, please see Chapter 14-10, Florida Administrative Code and Chapter XXIV, Article XIII of the City code.

**Section 12.** That Chapter XXIV “Zoning and Land Development,” Article XI “Landscape Ordinance,” is hereby amended by modifying Section 24-123 entitled “Minimum Landscaping Requirements In Single- and Two-Family Residential Districts” to read as follows (underline is added; ~~stricken through~~ is deleted):

**Sec. 24-123 – Minimum Landscaping Requirements In Single- and Two-Family Residential Districts**

All new single family and duplex residential dwellings shall conform to the following landscaping requirements:

- (A) Landscape requirements for new development residential zoning classifications will be as follows per platted lot:

<u>Zoning District (as defined in Chapter 24, Article 5 of the City’s Ordinances)</u>	<u>Tree Requirement</u>	<u>Shrub Requirement</u>
RS-1	6 Trees	50 Shrubs
RS-2	4 Trees	30 Shrubs
RS-3	3 Trees	20 Shrubs

RS-4	3 Trees	20 Shrubs
RS-5	2 Trees	15 Shrubs
MH-1	2 Trees	15 Shrubs
RD	2 Trees	15 Shrubs

In addition, the swale area shall be sodded to the edge of all pavements.

- (B) Partial waivers may be granted by the Director if ~~Xeriscape~~ Florida-friendly principles are used including, but not limited to, use of native landscaping materials and preservation of existing native vegetation.
- (C) Owners of detached single family and duplex residential dwellings shall submit landscape plans in the form of a landscape permit application. Any such landscape plans, or a note included on the corresponding site plans if no landscape plans are submitted for a particular project, shall identify the plants selected for the site and the quantity, size, and quality of such plants (including which plants constitute Florida-Friendly Landscaping™ vegetation), and planting specifications, as required by this article.
- (D) Additional minimum landscape requirements.
  - (1) Shade trees. All developments shall provide the required number of shade trees in compliance with the following standards:
    - (a) No more than fifty percent (50%) of required shade trees shall be palms, where every three (3) palms shall equal one (1) required shade tree.
    - (b) A minimum of one (1) shade tree shall be planted in the front yard; all other required trees shall be planted consistent the principles of the Florida-Friendly Landscaping™ Guide.
  - (2) Foundation planting. Foundation planting shall be installed adjacent to and span along the foundation of any residential structure, or portion thereof, that faces a public right-of-way, except that foundation planting shall not block any entryways, windows, or openings.
  - (3) Florida-Friendly Landscaping™.
    - (a) At least five percent (5%) of the lot area shall be installed with Florida-Friendly Landscaping™ principles.
    - (b) All species and quantities of Florida-Friendly Landscaping™ shall count towards the total required amount of Florida-Friendly Landscaping™.
  - (4) Irrigation.
    - (a) All irrigation systems shall meet the irrigation standards developed pursuant to Section

373.228, Florida Statutes and Section 19-25 of this Code. All required landscape areas for single family residences and duplex dwellings shall be provided with an automatically-operating, underground irrigation system designed to have head-to-head coverage (one hundred percent (100%) coverage with one hundred percent (100%) overlap).

(b) Pursuant to Section 373.62, Florida Statutes, rain shut-off switch equipment shall be required on automatic irrigation systems to avoid irrigation during periods of sufficient rainfall or soil moisture. The equipment shall consist of an automatic mechanical or electronic sensing device or switch that will override the irrigation cycle of the sprinkler system when adequate rainfall has occurred.

(5) Fertilizer applications. Noncommercial fertilizer applicators, not otherwise required to be certified, such as private citizens applying fertilizer on private residential properties, are encouraged to follow the most recent edition of the Florida Yards and Neighborhood Handbook (University of Florida) and UF/IFAS Extension's most recent Florida Yards and Neighborhoods program recommendations.

(6) Pesticide applications. Persons applying pesticides on private residential properties should use an "Integrated Pest Management Strategy," as currently recommended by the UF/IFAS Extension publications.

**Section 13.** That Chapter XXIV “Zoning and Land Development,” Article XI “Landscape Ordinance,” is hereby amended by modifying Section 24-124 entitled “Landscape Application and Review Fee” to read as follows (underline is added; stricken through is deleted):

**Sec. 24-124 – Landscape Application and Review Fee**

\*\*\*

(C) Developed properties that do not require site plan review; but are in violation of the provisions of this Code, shall pay said fee detailed above, prior to being found in compliance with said Code or prior to receipt of building permit(s).

**Section 14.** That Chapter XXIV “Zoning and Land Development,” Article XI “Landscape Ordinance,” is hereby amended by adding Section 24-126 entitled “Site survey and assessment” to read as follows (underline is added; stricken through is deleted):

**Sec. 24-126 – Site survey and assessment.**

(A) All site surveys must show all existing:

(1) Zoning designations for the subject property and all contiguous parcels;

(2) Grade elevations sufficient to determine the direction of existing flow or runoff;

(3) Overhead, on-grade, and below-grade utilities such as transformers, fire hydrants, underground cables, water mains, etc.;

(4) Light poles and type of lighting;

(5) Sight distance triangles must be identified and shown at all road intersections; and

(6) Tree and vegetation inventory.

(B) All site assessments shall:

- (1) Determine whether existing wetlands or ecological communities exist onsite or within fifty (50) feet offsite from the perimeter of the subject property. If so, said wetlands or ecological communities shall be indicated on the survey;
- (2) For properties of five (5) acres or more in size, determine whether there is a reclaimed (reuse) water line within one thousand (1,000) feet of the subject property, as measured from the property line of the subject property, that is available for irrigation; and
- (3) Include the following:
  - (a) Soil type and structure;
  - (b) Topography;
  - (c) Hydrology;
  - (d) Climate factors; and
  - (e) Vegetation.

**Section 15.** It is the intention of the City Commission of the City of North Miami Beach, and it is hereby ordained that the provisions of this Ordinance shall become and be made a part of the Code of Ordinances of the City of North Miami Beach, Florida. The sections of this Ordinance may be renumbered or re-lettered to accomplish such intentions; and the word “ordinance” may be changed to “section,” “article” or any other appropriate word.

**Section 16.** If the provisions of this Ordinance conflict with any other ordinance, rule or regulation, the provisions of this Ordinance shall prevail. All ordinances or parts of ordinances in conflict herewith are repealed.

**Section 17.** Any typographical errors that do not affect the intent of this Ordinance may be corrected with notice to and authorization of the City Attorney and City Manager without further process.

**Section 18.** The provisions of this Ordinance are declared to be severable, and if any section, sentence, clause or phrase of this Ordinance shall for any reason be held to be invalid or unconstitutional by a court of competent jurisdiction, such decision shall not affect the validity of the remaining sections, sentences, clauses, and phrases of this Ordinance, but they shall remain in effect, it being the legislative intent that this Ordinance shall stand notwithstanding the invalidity of any part.

**Section 19.** This Ordinance shall become effective immediately upon adoption on second reading.

**[SIGNATURE PAGE TO FOLLOW]**

**APPROVED** on this first reading this \_\_\_\_\_ day of October 2024.

**APPROVED AND ADOPTED** by the City Commission of the City of North Miami Beach, Florida, at regular meeting, on second reading this \_\_\_\_\_ day of November 2024.

ATTEST:

\_\_\_\_\_  
ANDRISE BERNARD, MMC  
CITY CLERK

\_\_\_\_\_  
MICHAEL JOSEPH  
MAYOR

(CITY SEAL)

APPROVED AS TO FORM AND LEGAL SUFFICIENCY FOR THE USE  
AND RELIANCE OF THE CITY OF NORTH MIAMI BEACH ONLY:

\_\_\_\_\_  
JOSEPH GELLER, ESQ.  
CITY ATTORNEY





**Legislation  
11.2.**

City of North Miami Beach  
17011 NE 19 Avenue  
North Miami Beach, FL 33162  
305-947-7581  
www.citynmb.com

**MEMORANDUM**

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<b>TO:</b>	Mayor and City Commission
<b>FROM:</b>	Vice Mayor Lynn Su
<b>VIA:</b>	
<b>DATE:</b>	January 21, 2025

---

**RE:** Resolution No. R2025-17 Ordering an End to Fluoridation of the City of North Miami Beach's Water  
(Vice Mayor Lynn Su)

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**Description**

**BACKGROUND**

**ANALYSIS:**

**RECOMMENDATION:**

**FISCAL/ BUDGETARY**

**IMPACT:**

---

**ATTACHMENTS:**

**Description**

- Fluoride Backup
- Fluoride Backup (Countries that Reject)
- Dr. Josephine Perez Letter
- Green Med
- Legal Analysis Memo
- SK Justification to end fluoridation

- ▣ Univar Fluoride
- ▣ Email communication
- ▣ ADA - Fluoride Information
- ▣ Resolution No R2025-XX Ordering an end to Fluoridation



**FLUORIDEALERT.ORG**  
Fluoride Action Network

# 50 REASONS TO OPPOSE FLUORIDATION

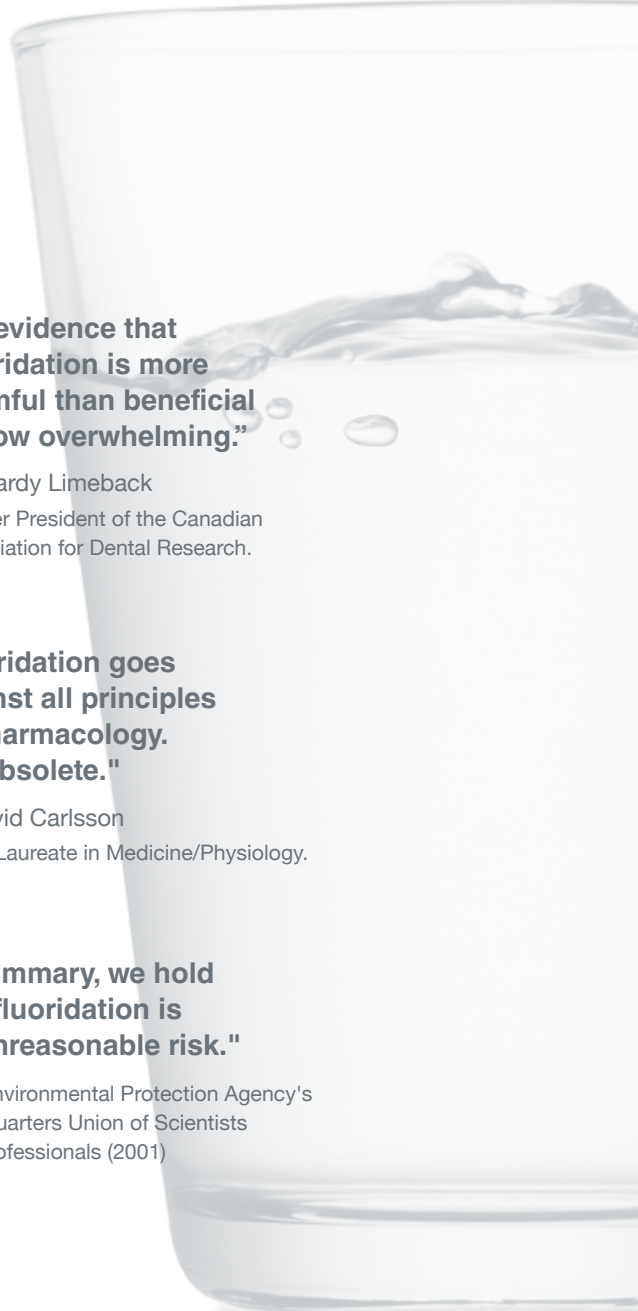
Written by

**PAUL CONNETT, PHD.**

Fluoride Action Network

## OTHER CONTRIBUTORS:

James Beck, MD, PhD  
Michael Connett, JD  
Hardy Limeback, DDS, PhD  
David McRae  
Spedding Micklem, D.Phil



**"The evidence that  
fluoridation is more  
harmful than beneficial  
is now overwhelming."**

Dr. Hardy Limeback  
Former President of the Canadian  
Association for Dental Research.

**"Fluoridation goes  
against all principles  
of pharmacology.  
It's obsolete."**

Dr. Arvid Carlsson  
Nobel Laureate in Medicine/Physiology.

**"In summary, we hold  
that fluoridation is  
an unreasonable risk."**

U.S. Environmental Protection Agency's  
Headquarters Union of Scientists  
and Professionals (2001)

UPDATED AUGUST, 2012

Fluoridation is the practice of adding a fluoride compound to the public drinking water supply ostensibly for the purpose of fighting tooth decay. The levels used range from 0.6 to 1.2 milligrams of fluoride ion per liter. The practice began in the United States in 1945 and was endorsed by most U.S. medical and dental associations shortly thereafter. Very few countries, however, have adopted the practice to any significant extent. Only eleven countries in the world have more than 50% of their populations drinking artificially fluoridated water (Australia, Brunei, Chile, Hong Kong, Ireland, Israel, Guyana, Malaysia, New Zealand, Singapore, and the United States).

In Europe, only Ireland (73%), Poland (1%), Serbia (3%), Spain (11%), and the U.K. (11%) fluoridate any of their water. Most developed countries, including Japan and 97% of the western European population, do not consume fluoridated water.

In the U.S., about 70% of public water supplies are fluoridated. This equates to approximately 185 million people, which is over half the number of people drinking artificially fluoridated water worldwide. Some countries have areas with high natural fluoride levels in the water. These include India, China and parts of Africa. In these countries measures are being taken to remove the fluoride because of the health problems that fluoride can cause.

**“WE’VE GONE WITH THE STATUS QUO REGARDING FLUORIDE FOR MANY YEARS—FOR TOO LONG, REALLY—AND NOW WE NEED TO TAKE A FRESH LOOK. IN THE SCIENTIFIC COMMUNITY, PEOPLE TEND TO THINK THIS IS SETTLED. BUT WHEN WE LOOKED AT THE STUDIES THAT HAVE BEEN DONE, WE FOUND THAT MANY OF THESE QUESTIONS ARE UNSETTLED AND WE HAVE MUCH LESS INFORMATION THAN WE SHOULD, CONSIDERING HOW LONG THIS HAS BEEN GOING ON.”**

Dr. John Doull

CHAIRMAN, NATIONAL RESEARCH COUNCIL'S REVIEW ON FLUORIDE IN DRINKING WATER.

## FLUORIDATION IS A BAD MEDICAL PRACTICE

### 1) FLUORIDE IS THE ONLY CHEMICAL ADDED TO WATER FOR THE PURPOSE OF MEDICAL TREATMENT.

The U.S. Food and Drug Administration (FDA) classifies fluoride as a drug when used to prevent or mitigate disease (FDA 2000). As a matter of basic logic, adding fluoride to water for the sole purpose of preventing tooth decay (a non-waterborne disease) is a form of medical treatment. All other water treatment chemicals are added to improve the water's quality or safety, which fluoride does not do.

### 2) FLUORIDATION IS UNETHICAL.

Informed consent is standard practice for all medication, and one of the key reasons why most of Western Europe has ruled against fluoridation. With water fluoridation we are allowing governments to do to whole communities (forcing people to take a medicine irrespective of their consent) what individual doctors cannot do to individual patients.

Put another way: Does a voter have the right to require that their neighbor ingest a certain medication (even if it is against that neighbor's will)?

### 3) THE DOSE CANNOT BE CONTROLLED.

Once fluoride is put in the water it is impossible to control the dose each individual receives because people drink different amounts of water. Being able to control the dose a patient receives is critical. Some people (e.g., manual laborers, athletes, diabetics, and people with kidney disease) drink substantially more water than others.

### 4) THE FLUORIDE GOES TO EVERYONE REGARDLESS OF AGE, HEALTH OR VULNERABILITY.

According to Dr. Arvid Carlsson, the 2000 Nobel Laureate in Medicine and Physiology and one of the scientists who helped keep fluoridation out of Sweden:

*“Water fluoridation goes against leading principles of pharmacotherapy, which is progressing from a stereotyped medication — of the type 1 tablet 3 times a day — to a much more individualized therapy as regards both dosage and selection of drugs.*

*The addition of drugs to the drinking water means exactly the opposite of an individualized therapy” (Carlsson 1978).*

## **5) PEOPLE NOW RECEIVE FLUORIDE FROM MANY OTHER SOURCES BESIDES WATER.**

Fluoridated water is not the only way people are exposed to fluoride. Other sources of fluoride include food and beverages processed with fluoridated water (Kiritsy 1996; Heilman 1999), fluoridated dental products (Bentley 1999; Levy 1999), mechanically deboned meat (Fein 2001), tea (Levy 1999), and pesticide residues (e.g., from cryolite) on food (Stannard 1991; Burgstahler 1997). It is now widely acknowledged that exposure to non-water sources of fluoride has significantly increased since the water fluoridation program first began (NRC 2006).

## **6) FLUORIDE IS NOT AN ESSENTIAL NUTRIENT.**

No disease, not even tooth decay, is caused by a “fluoride deficiency” (NRC 1993; Institute of Medicine 1997, NRC 2006). Not a single biological process has been shown to require fluoride. On the contrary there is extensive evidence that fluoride can interfere with many important biological processes. Fluoride interferes with numerous enzymes (Waldbott 1978). In combination with aluminum, fluoride interferes with G-proteins (Bigay 1985, 1987). Such interactions give aluminum-fluoride complexes the potential to interfere with signals from growth factors, hormones and neurotransmitters (Strunecka & Patocka 1999; Li 2003). More and more studies indicate that fluoride can interfere with biochemistry in fundamental ways (Barbier 2010).

## **7) THE LEVEL IN MOTHERS’ MILK IS VERY LOW.**

Considering reason #6 it is perhaps not surprising that the level of fluoride in mother’s milk is remarkably low (0.004 ppm, NRC, 2006). This means that a bottle-fed baby consuming fluoridated water (0.6 – 1.2 ppm) can get up to 300 times more fluoride than a breast-fed baby. There are no benefits (see reasons #11-19), only risks (see reasons #21-36), for infants ingesting this heightened level of fluoride at such an early age (an age where susceptibility to environmental toxins is particularly high).

## **8 ) FLUORIDE ACCUMULATES IN THE BODY.**

Healthy adult kidneys excrete 50 to 60% of the fluoride they ingest each day (Marier & Rose 1971). The remainder accumulates in the body, largely in calcifying tissues such as the bones and pineal gland (Luke 1997, 2001). Infants and children excrete less fluoride from their kidneys and take up to 80% of ingested fluoride into their bones (Ekstrand 1994). The fluoride concentration in bone steadily increases over a lifetime (NRC 2006).

## **9) NO HEALTH AGENCY IN FLUORIDATED COUNTRIES IS MONITORING FLUORIDE EXPOSURE OR SIDE EFFECTS.**

No regular measurements are being made of the levels of fluoride in urine, blood, bones, hair, or nails of either the general population or sensitive subparts of the population (e.g., individuals with kidney disease).

## **10) THERE HAS NEVER BEEN A SINGLE RANDOMIZED CLINICAL TRIAL TO DEMONSTRATE FLUORIDATION'S EFFECTIVENESS OR SAFETY.**

Despite the fact that fluoride has been added to community water supplies for over 60 years, “there have been no randomized trials of water fluoridation” (Cheng 2007). Randomized studies are the standard method for determining the safety and effectiveness of any purportedly beneficial medical treatment. In 2000, the British Government’s “York Review” could not give a single fluoridation trial a Grade A classification – despite 50 years of research (McDonagh 2000). The U.S. Food and Drug Administration (FDA) continues to classify fluoride as an “unapproved new drug.”

# **SWALLOWING FLUORIDE PROVIDES NO (OR VERY LITTLE) BENEFIT**

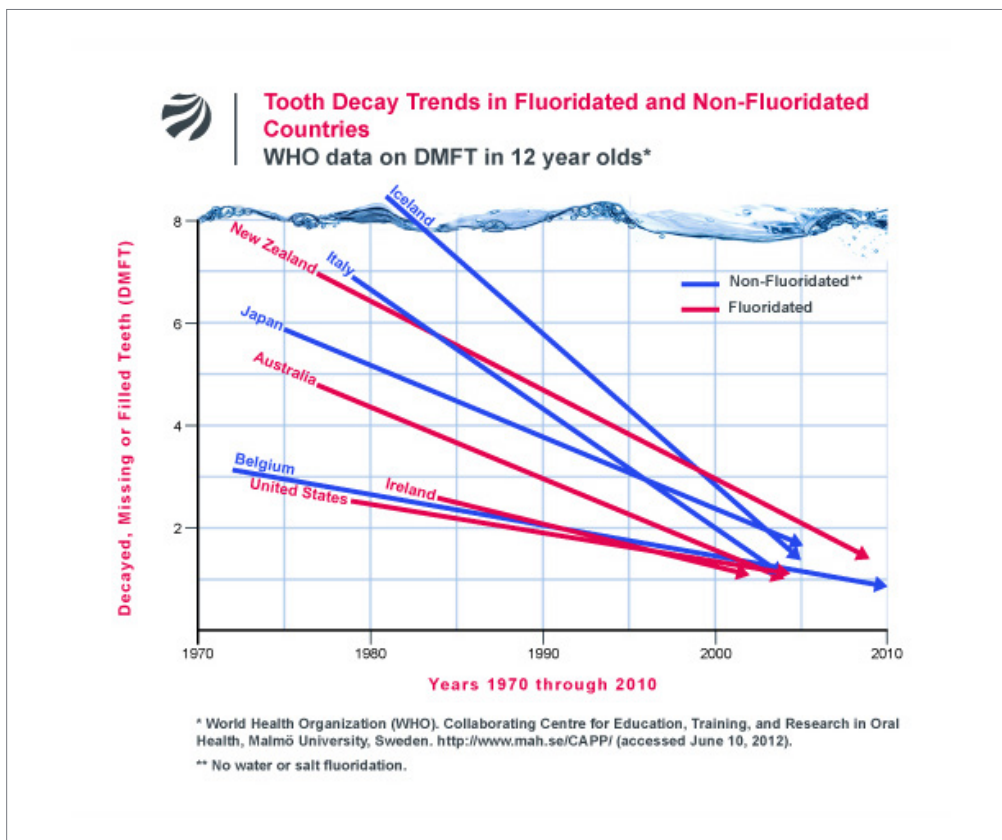
## **11) BENEFIT IS TOPICAL NOT SYSTEMIC. THE CENTERS FOR DISEASE CONTROL AND PREVENTION (CDC, 1999, 2001) HAS NOW ACKNOWLEDGED THAT THE MECHANISM OF FLUORIDE'S BENEFITS ARE MAINLY TOPICAL, NOT SYSTEMIC.**

There is no need whatsoever, therefore, to swallow fluoride to protect teeth. Since the purported benefit of fluoride is topical, and the risks are systemic, it makes more sense to deliver the fluoride directly to the tooth in the form of toothpaste.

Since swallowing fluoride is unnecessary, and potentially dangerous, there is no justification for forcing people (against their will) to ingest fluoride through their water supply.

## 12) FLUORIDATION IS NOT NECESSARY.

Most western, industrialized countries have rejected water fluoridation, but have nevertheless experienced the same decline in childhood dental decay as fluoridated countries. (See data from World Health Organization presented graphically in Figure).





### **13) FLUORIDATION'S ROLE IN THE DECLINE OF TOOTH DECAY IS IN SERIOUS DOUBT.**

The largest survey ever conducted in the US (over 39,000 children from 84 communities) by the National Institute of Dental Research showed little difference in tooth decay among children in fluoridated and non-fluoridated communities (Hileman 1989). According to NIDR researchers, the study found an average difference of only 0.6 DMFS (Decayed, Missing, and Filled Surfaces) in the permanent teeth of children aged 5-17 residing their entire lives in either fluoridated or unfluoridated areas (Brunelle & Carlos, 1990). This difference is less than one tooth surface, and less than 1% of the 100+ tooth surfaces available in a child's mouth. Large surveys from three Australian states have found even less of a benefit, with decay reductions ranging from 0 to 0.3 of one permanent tooth surface (Spencer 1996; Armfield & Spencer 2004). None of these studies have allowed for the possible delayed eruption of the teeth that may be caused by exposure to fluoride, for which there is some evidence (Komarek 2005). A one-year delay in eruption of the permanent teeth would eliminate the very small benefit recorded in these modern studies.

### **14) NIH-FUNDED STUDY ON INDIVIDUAL FLUORIDE INGESTION AND TOOTH DECAY FOUND NO SIGNIFICANT CORRELATION.**

A multi-million dollar, U.S. National Institutes of Health (NIH)-funded study found no significant relationship between tooth decay and fluoride intake among children (Warren 2009). This is the first time tooth decay has been investigated as a function of individual exposure (as opposed to mere residence in a fluoridated community).

### **15) TOOTH DECAY IS HIGH IN LOW-INCOME COMMUNITIES THAT HAVE BEEN FLUORIDATED FOR YEARS.**

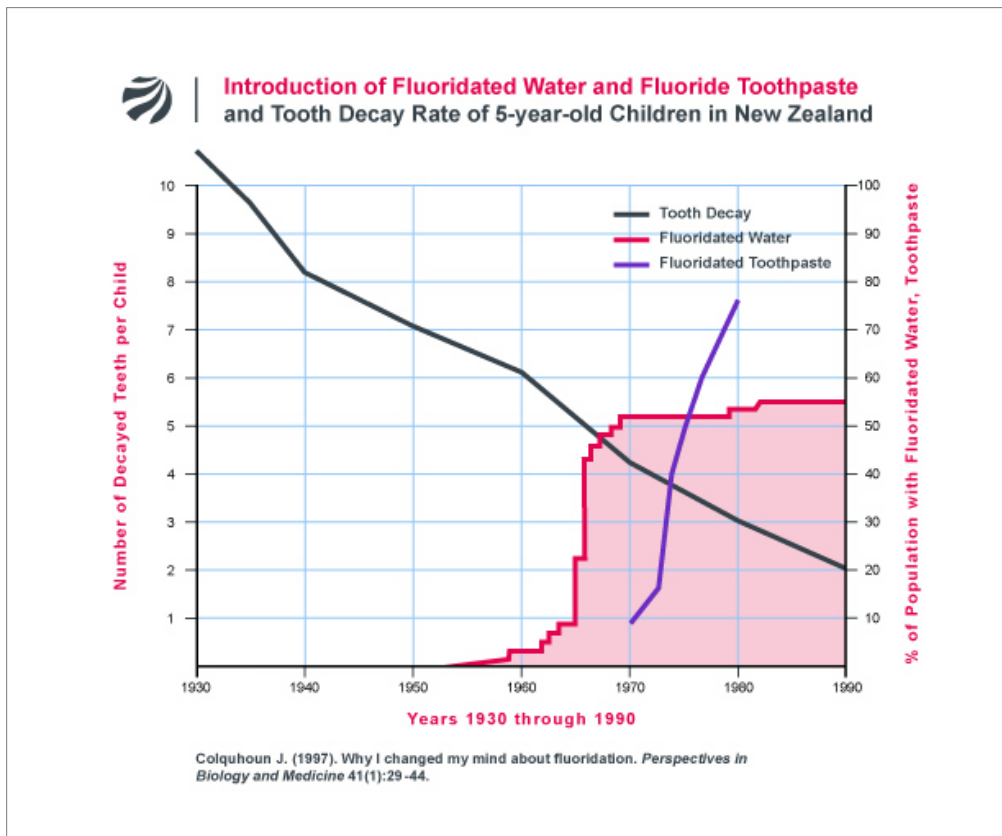
Despite some claims to the contrary, water fluoridation cannot prevent the oral health crises that result from rampant poverty, inadequate nutrition, and lack of access to dental care. There have been numerous reports of severe dental crises in low-income neighborhoods of US cities that have been fluoridated for over 20 years (e.g., Boston, Cincinnati, New York City, and Pittsburgh). In addition, research has repeatedly found fluoridation to be ineffective at preventing the most serious oral health problem facing poor children, namely "baby bottle tooth decay," otherwise known as early childhood caries (Barnes 1992; Shiboski 2003).

## 16) TOOTH DECAY DOES NOT GO UP WHEN FLUORIDATION IS STOPPED.

Where fluoridation has been discontinued in communities from Canada, the former East Germany, Cuba and Finland, dental decay has not increased but has generally continued to decrease (Maupomé 2001; Kunzel & Fischer, 1997, 2000; Kunzel 2000; Seppa 2000).

## 17) TOOTH DECAY WAS COMING DOWN BEFORE FLUORIDATION STARTED.

Modern research shows that decay rates were coming down before fluoridation was introduced in Australia and New Zealand and have continued to decline even after its benefits would have been maximized. (Colquhoun 1997; Diesendorf 1986). As the following figure indicates, many other factors are responsible for the decline of tooth decay that has been universally reported throughout the western world.



## **18) THE STUDIES THAT LAUNCHED FLUORIDATION WERE METHODOLOGICALLY FLAWED.**

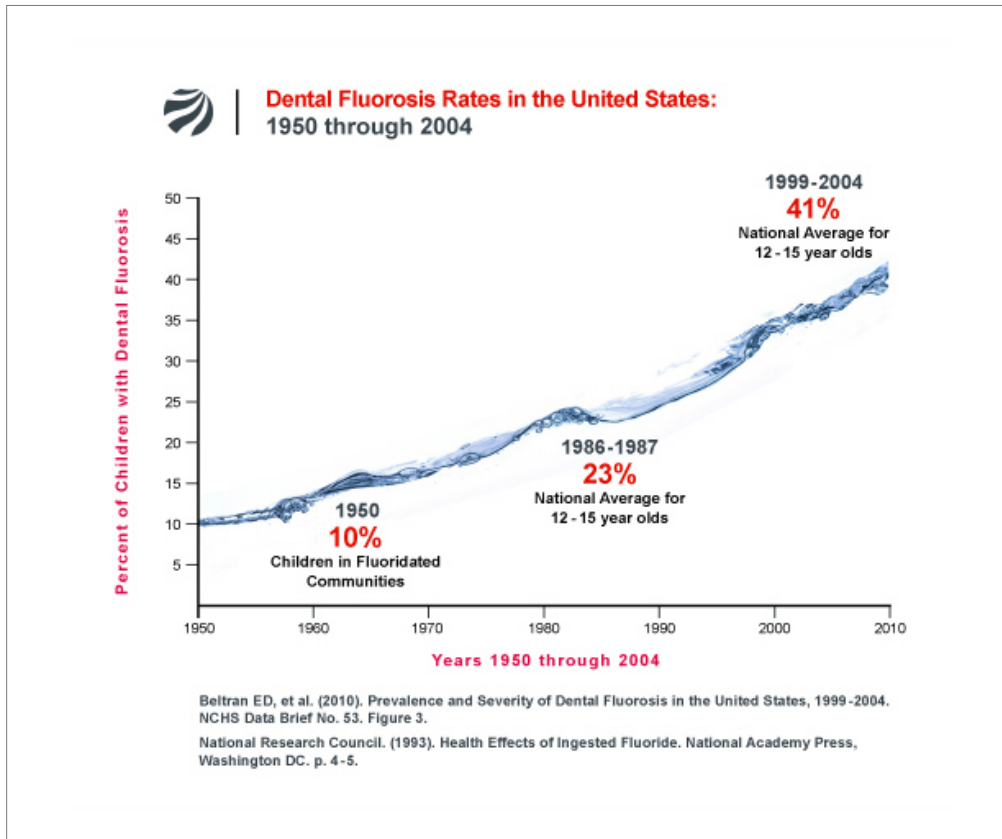
The early trials conducted between 1945 and 1955 in North America that helped to launch fluoridation, have been heavily criticized for their poor methodology and poor choice of control communities (De Stefano 1954; Sutton 1959, 1960, 1996; Ziegelbecker 1970).

According to Dr. Hubert Arnold, a statistician from the University of California at Davis, the early fluoridation trials “are especially rich in fallacies, improper design, invalid use of statistical methods, omissions of contrary data, and just plain muddleheadedness and hebetude.” Serious questions have also been raised about Trendley Dean’s (the father of fluoridation) famous 21-city study from 1942 (Ziegelbecker 1981).

## **CHILDREN ARE BEING OVER-EXPOSED TO FLUORIDE**

### **19) CHILDREN ARE BEING OVER-EXPOSED TO FLUORIDE.**

The fluoridation program has massively failed to achieve one of its key objectives, i.e., to lower dental decay rates while limiting the occurrence of dental fluorosis (a discoloring of tooth enamel caused by too much fluoride. The goal of the early promoters of fluoridation was to limit dental fluorosis (in its very mild form) to 10% of children (NRC 1993, pp. 6-7). In 2010, however, the Centers for Disease Control and Prevention (CDC) reported that 41% of American adolescents had dental fluorosis, with 8.6% having mild fluorosis and 3.6% having either moderate or severe dental fluorosis (Beltran-Aguilar 2010).



As the 41% prevalence figure is a national average and includes children living in fluoridated and unfluoridated areas, the fluorosis rate in fluoridated communities will obviously be higher.

The British Government's York Review estimated that up to 48% of children in fluoridated areas worldwide have dental fluorosis in all forms, with 12.5% having fluorosis of aesthetic concern (McDonagh, 2000).

## 20) THE HIGHEST DOSES OF FLUORIDE ARE GOING TO BOTTLE-FED BABIES.

Because of their sole reliance on liquids for their food intake, infants consuming formula made with fluoridated water have the highest exposure to fluoride, by bodyweight, in the population. Because infant exposure to fluoridated water has been repeatedly found to be a major risk factor for developing dental fluorosis later in life (Marshall 2004; Hong 2006; Levy 2010), a number of dental researchers have recommended that parents of newborns not use fluoridated water when reconstituting formula (Ekstrand 1996; Pendrys 1998; Fomon 2000; Brothwell 2003; Marshall 2004). Even the American

Dental Association (ADA), the most ardent institutional proponent of fluoridation, distributed a November 6, 2006 email alert to its members recommending that parents be advised that formula should be made with “low or no-fluoride water.” Unfortunately, the ADA has done little to get this information into the hands of parents. As a result, many parents remain unaware of the fluorosis risk from infant exposure to fluoridated water.

## EVIDENCE OF HARM TO OTHER TISSUES

### 21) DENTAL FLUOROSIS MAY BE AN INDICATOR OF WIDER SYSTEMIC DAMAGE.

There have been many suggestions as to the possible biochemical mechanisms underlying the development of dental fluorosis (Matsuo 1998; Den Besten 1999; Sharma 2008; Duan 2011; Tye 2011) and they are complicated for a lay reader. While promoters of fluoridation are content to dismiss dental fluorosis (in its milder forms) as merely a cosmetic effect, it is rash to assume that fluoride is not impacting other developing tissues when it is visibly damaging the teeth by some biochemical mechanism (Groth 1973; Colquhoun 1997). Moreover, ingested fluoride can only cause dental fluorosis during the period before the permanent teeth have erupted (6-8 years), other tissues are potentially susceptible to damage throughout life. For example, in areas of naturally high levels of fluoride the first indicator of harm is dental fluorosis in children. In the same communities many older people develop skeletal fluorosis.

### 22) FLUORIDE MAY DAMAGE THE BRAIN.

According to the National Research Council (2006), “it is apparent that fluorides have the ability to interfere with the functions of the brain.” In a review of the literature commissioned by the US Environmental Protection Agency (EPA), fluoride has been listed among about 100 chemicals for which there is substantial evidence of developmental neurotoxicity.” Animal experiments show that fluoride accumulates in the brain and alters mental behavior in a manner consistent with a neurotoxic agent (Mullenix 1995). In total, there have now been over 100 animal experiments showing that fluoride can damage the brain and impact learning and behavior. According to fluoridation proponents, these animal studies can be ignored because high doses were used. However, it is important to note that rats generally require five times more fluoride to reach the same plasma levels in humans (Sawan 2010). Further, one animal experiment found effects at remarkably low doses (Varner 1998). In this study, rats fed for one year with 1 ppm

fluoride in their water (the same level used in fluoridation programs), using either sodium fluoride or aluminum fluoride, had morphological changes to their kidneys and brains, an increased uptake of aluminum in the brain, and the formation of beta-amyloid deposits which are associated with Alzheimer's disease. Other animal studies have found effects on the brain at water fluoride levels as low as 5 ppm (Liu 2010).

### **23) FLUORIDE MAY LOWER IQ.**

There have now been 33 studies from China, Iran, India and Mexico that have reported an association between fluoride exposure and reduced IQ. One of these studies (Lin 1991) indicates that even just moderate levels of fluoride exposure (e.g., 0.9 ppm in the water) can exacerbate the neurological defects of iodine deficiency. Other studies have found IQ reductions at 1.9 ppm (Xiang 2003a,b); 0.3-3.0 ppm (Ding 2011); 1.8-3.9 ppm (Xu 1994); 2.0 ppm (Yao 1996, 1997); 2.1-3.2 ppm (An 1992); 2.38 ppm (Poureslami 2011); 2.45 ppm (Eswar 2011); 2.5 ppm (Seraj 2006); 2.85 ppm (Hong 2001); 2.97 ppm (Wang 2001, Yang 1994); 3.15 ppm (Lu 2000); 4.12 ppm (Zhao 1996). In the Ding study, each 1 ppm increase of fluoride in urine was associated with a loss of 0.59 IQ points. None of these studies indicate an adequate margin of safety to protect all children drinking artificially fluoridated water from this affect. According to the National Research Council (2006), "the consistency of the results [in fluoride/IQ studies] appears significant enough to warrant additional research on the effects of fluoride on intelligence." The NRC's conclusion has recently been amplified by a team of Harvard scientists whose fluoride/IQ meta-review concludes that fluoride's impact on the developing brain should be a "high research priority." (Choi et al., 2012). Except for two small IQ studies from New Zealand (Shannon et al., 1986; Spittle 1998) no fluoridating country has yet investigated the matter.

### **24) FLUORIDE MAY CAUSE NON-IQ NEUROTOXIC EFFECTS.**

Reduced IQ is not the only neurotoxic effect that may result from fluoride exposure. At least three human studies have reported an association between fluoride exposure and impaired visual-spatial organization (Calderon 2000; Li 2004; Rocha-Amador 2009); while four other studies have found an association between prenatal fluoride exposure and fetal brain damage (Han 1989; Du 1992; Dong 1993; Yu 1996).

## 25) FLUORIDE AFFECTS THE PINEAL GLAND.

Studies by Jennifer Luke (2001) show that fluoride accumulates in the human pineal gland to very high levels. In her Ph.D. thesis, Luke has also shown in animal studies that fluoride reduces melatonin production and leads to an earlier onset of puberty (Luke 1997). Consistent with Luke's findings, one of the earliest fluoridation trials in the U.S. (Schlesinger 1956) reported that on average young girls in the fluoridated community reached menstruation 5 months earlier than girls in the non-fluoridated community. Inexplicably, no fluoridating country has attempted to reproduce either Luke's or Schlesinger's findings or examine the issue any further.

## 26) FLUORIDE AFFECTS THYROID FUNCTION.

According to the U.S. National Research Council (2006), "several lines of information indicate an effect of fluoride exposure on thyroid function." In the Ukraine, Bachinskii (1985) found a lowering of thyroid function, among otherwise healthy people, at 2.3 ppm fluoride in water. In the middle of the 20th century, fluoride was prescribed by a number of European doctors to reduce the activity of the thyroid gland for those suffering from hyperthyroidism (overactive thyroid) (Stecher 1960; Waldbott 1978). According to a clinical study by Galletti and Joyet (1958), the thyroid function of hyperthyroid patients was effectively reduced at just 2.3 to 4.5 mg/day of fluoride ion. To put this finding in perspective, the Department of Health and Human Services (DHHS, 1991) has estimated that total fluoride exposure in fluoridated communities ranges from 1.6 to 6.6 mg/day. This is a remarkable fact, particularly considering the rampant and increasing problem of hypothyroidism (underactive thyroid) in the United States and other fluoridated countries. Symptoms of hypothyroidism include depression, fatigue, weight gain, muscle and joint pains, increased cholesterol levels, and heart disease. In 2010, the second most prescribed drug of the year was Synthroid (sodium levothyroxine) which is a hormone replacement drug used to treat an underactive thyroid.

## 27) FLUORIDE CAUSES ARTHRITIC SYMPTOMS.

Some of the early symptoms of skeletal fluorosis (a fluoride-induced bone and joint disease that impacts millions of people in India, China, and Africa), mimic the symptoms of arthritis (Singh 1963; Franke 1975; Teotia 1976; Carnow 1981; Czerwinski 1988; DHHS 1991). According to a review on fluoridation published in Chemical & Engineering News, "Because some

of the clinical symptoms mimic arthritis, the first two clinical phases of skeletal fluorosis could be easily misdiagnosed” (Hileman 1988). Few, if any, studies have been done to determine the extent of this misdiagnosis, and whether the high prevalence of arthritis in America (1 in 3 Americans have some form of arthritis – CDC, 2002) and other fluoridated countries is related to growing fluoride exposure, which is highly plausible. Even when individuals in the U.S. suffer advanced forms of skeletal fluorosis (from drinking large amounts of tea), it has taken years of misdiagnoses before doctors finally correctly diagnosed the condition as fluorosis.

## **28) FLUORIDE DAMAGES BONE.**

An early fluoridation trial (Newburgh-Kingston 1945-55) found a significant two-fold increase in cortical bone defects among children in the fluoridated community (Schlesinger 1956). The cortical bone is the outside layer of the bone and is important to protect against fracture. While this result was not considered important at the time with respect to bone fractures, it did prompt questions about a possible link to osteosarcoma (Caffey, 1955; NAS, 1977). In 2001, Alarcon-Herrera and co-workers reported a linear correlation between the severity of dental fluorosis and the frequency of bone fractures in both children and adults in a high fluoride area in Mexico.

## **29) FLUORIDE MAY INCREASE HIP FRACTURES IN THE ELDERLY.**

When high doses of fluoride (average 26 mg per day) were used in trials to treat patients with osteoporosis in an effort to harden their bones and reduce fracture rates, it actually led to a higher number of fractures, particularly hip fractures (Inkovaara 1975; Gerster 1983; Dambacher 1986; O’Duffy 1986; Hedlund 1989; Bayley 1990; Gutteridge 1990. 2002; Orcel 1990; Riggs 1990 and Schnitzler 1990). Hip fracture is a very serious issue for the elderly, often leading to a loss of independence or a shortened life. There have been over a dozen studies published since 1990 that have investigated a possible relationship between hip fractures and long term consumption of artificially fluoridated water or water with high natural levels. The results have been mixed – some have found an association and others have not. Some have even claimed a protective effect. One very important study in China, which examined hip fractures in six Chinese villages, found what appears to be a dose-related increase in hip fracture as the concentration of fluoride rose from 1 ppm to 8 ppm (Li 2001) offering little comfort to those who drink a lot of



fluoridated water. Moreover, in the only human epidemiological study to assess bone strength as a function of bone fluoride concentration, researchers from the University of Toronto found that (as with animal studies) the strength of bone declined with increasing fluoride content (Chachra 2010). Finally, a recent study from Iowa (Levy 2009), published data suggesting that low-level fluoride exposure may have a detrimental effect on cortical bone density in girls (an effect that has been repeatedly documented in clinical trials and which has been posited as an important mechanism by which fluoride may increase bone fracture rates).

### **30) PEOPLE WITH IMPAIRED KIDNEY FUNCTION ARE PARTICULARLY VULNERABLE TO BONE DAMAGE.**

Because of their inability to effectively excrete fluoride, people with kidney disease are prone to accumulating high levels of fluoride in their bone and blood. As a result of this high fluoride body burden, kidney patients have an elevated risk for developing skeletal fluorosis. In one of the few U.S. studies investigating the matter, crippling skeletal fluorosis was documented among patients with severe kidney disease drinking water with just 1.7 ppm fluoride (Johnson 1979). Since severe skeletal fluorosis in kidney patients has been detected in small case studies, it is likely that larger, systematic studies would detect skeletal fluorosis at even lower fluoride levels.

### **31) FLUORIDE MAY CAUSE BONE CANCER (OSTEOSARCOMA).**

A U.S. government-funded animal study found a dose-dependent increase in bone cancer (osteosarcoma) in fluoride-treated, male rats (NTP 1990). Following the results of this study, the National Cancer Institute (NCI) reviewed national cancer data in the U.S. and found a significantly higher rate of osteosarcoma (a bone cancer) in young men in fluoridated versus unfluoridated areas (Hoover et al 1991a). While the NCI concluded (based on an analysis lacking statistical power) that fluoridation was not the cause (Hoover et al 1991b), no explanation was provided to explain the higher rates in the fluoridated areas. A smaller study from New Jersey (Cohn 1992) found osteosarcoma rates to be up to 6 times higher in young men living in fluoridated versus unfluoridated areas. Other epidemiological studies of varying size and quality have failed to find this relationship (a summary of these can be found in Bassin, 2001 and Connett & Neurath, 2005). There are three reasons why a fluoride-osteosarcoma connection is plausible:

First, fluoride accumulates to a high level in bone. Second, fluoride stimulates bone growth. And, third, fluoride can interfere with the genetic apparatus of bone cells in several ways; it has been shown to be mutagenic, cause chromosome damage, and interfere with the enzymes involved with DNA repair in both cell and tissue studies (Tsutsui 1984; Caspary 1987; Kishi 1993; Mihashi 1996; Zhang 2009). In addition to cell and tissue studies, a correlation between fluoride exposure and chromosome damage in humans has also been reported (Sheth 1994; Wu 1995; Meng 1997; Joseph 2000).

### **32) PROPONENTS HAVE FAILED TO REFUTE THE BASSIN-OSTEOSARCOMA STUDY.**

In 2001, Elise Bassin, a dentist, successfully defended her doctoral thesis at Harvard in which she found that young boys had a five-to-seven fold increased risk of getting osteosarcoma by the age of 20 if they drank fluoridated water during their mid-childhood growth spurt (age 6 to 8). The study was published in 2006 (Bassin 2006) but has been largely discounted by fluoridating countries because her thesis adviser Professor Chester Douglass (a promoter of fluoridation and a consultant for Colgate) promised a larger study that he claimed would discount her thesis (Douglass and Joshipura, 2006). Now, after 5 years of waiting the Douglass study has finally been published (Kim 2011) but in no way does this study discount Bassin's findings. The study, which used far fewer controls than Bassin's analysis, did not even attempt to assess the age-specific window of risk that Bassin identified. Indeed, by the authors' own admission, the study had no capacity to assess the risk of osteosarcoma among children and adolescents (the precise population of concern). For a critique of the Douglass study, [click here](#).

### **33) FLUORIDE MAY CAUSE REPRODUCTIVE PROBLEMS.**

Fluoride administered to animals at high doses wreaks havoc on the male reproductive system – it damages sperm and increases the rate of infertility in a number of different species (Kour 1980; Chinoy 1989; Chinoy 1991; Susheela 1991; Chinoy 1994; Kumar 1994; Narayana 1994a,b; Zhao 1995; Elbetieha 2000; Ghosh 2002; Zakrzewska 2002). In addition, an epidemiological study from the US found increased rates of infertility among couples living in areas with 3 ppm or more fluoride in the water (Freni 1994), two studies have found increased fertility among men living in high-fluoride areas of China and

India (Liu 1988; Neelam 1987); four studies have found reduced level of circulating testosterone in males living in high fluoride areas (Hao 2010; Chen P 1997; Susheela 1996; Barot 1998), and a study of fluoride-exposed workers reported a “subclinical reproductive effect” (Ortiz-Perez 2003). While animal studies by FDA researchers have failed to find evidence of reproductive toxicity in fluoride-exposed rats (Sprando 1996, 1997, 1998), the National Research Council (2006) has recommended that, “the relationship between fluoride and fertility requires additional study.”

### **34) SOME INDIVIDUALS ARE HIGHLY SENSITIVE TO LOW LEVELS OF FLUORIDE AS SHOWN BY CASE STUDIES AND DOUBLE BLIND STUDIES.**

In one study, which lasted 13 years, Feltman and Kosel (1961) showed that about 1% of patients given 1 mg of fluoride each day developed negative reactions. Many individuals have reported suffering from symptoms such as fatigue, headaches, rashes and stomach and gastro intestinal tract problems, which disappear when they avoid fluoride in their water and diet (Shea 1967; Waldbott 1978; Moolenburgh 1987). Frequently the symptoms reappear when they are unwittingly exposed to fluoride again (Spittle, 2008). No fluoridating government has conducted scientific studies to take this issue beyond these anecdotal reports. Without the willingness of governments to investigate these reports scientifically, should we as a society be forcing these people to ingest fluoride?

### **35) OTHER SUBSETS OF POPULATION ARE MORE VULNERABLE TO FLUORIDE’S TOXICITY.**

In addition to people suffering from impaired kidney function discussed in reason #30 other subsets of the population are more vulnerable to fluoride’s toxic effects. According to the Agency for Toxic Substances and Disease Registry (ATSDR 1993) these include: infants, the elderly, and those with diabetes mellitus. Also vulnerable are those who suffer from malnutrition (e.g., calcium, magnesium, vitamin C, vitamin D and iodine deficiencies and protein-poor diets) and those who have diabetes insipidus. See: Greenberg 1974; Klein 1975; Massler & Schour 1952; Marier & Rose 1977; Lin 1991; Chen 1997; Seow 1994; Teotia 1998.

## NO MARGIN OF SAFETY

### 36) THERE IS NO MARGIN OF SAFETY FOR SEVERAL HEALTH EFFECTS.

No one can deny that high natural levels of fluoride damage health. Millions of people in India and China have had their health compromised by fluoride. The real question is whether there is an adequate margin of safety between the doses shown to cause harm in published studies and the total dose people receive consuming uncontrolled amounts of fluoridated water and non-water sources of fluoride.

This margin of safety has to take into account the wide range of individual sensitivity expected in a large population (a safety factor of 10 is usually applied to the lowest level causing harm). Another safety factor is also needed to take into account the wide range of doses to which people are exposed. There is clearly no margin of safety for dental fluorosis (CDC, 2010) and based on the following studies nowhere near an adequate margin of safety for lowered IQ (Xiang 2003a,b; Ding 2011; Choi 2012); lowered thyroid function (Galletti & Joyet 1958; Bachinskii 1985; Lin 1991); bone fractures in children (Alarcon-Herrera 2001) or hip fractures in the elderly (Kurtio 1999; Li 2001). All of these harmful effects are discussed in the NRC (2006) review.

## ENVIRONMENTAL JUSTICE

### 37) LOW-INCOME FAMILIES PENALIZED BY FLUORIDATION.

Those most likely to suffer from poor nutrition, and thus more likely to be more vulnerable to fluoride's toxic effects, are the poor, who unfortunately, are the very people being targeted by new fluoridation programs. While at heightened risk, poor families are least able to afford avoiding fluoride once it is added to the water supply. No financial support is being offered to these families to help them get alternative water supplies or to help pay the costs of treating unsightly cases of dental fluorosis.

### 38) BLACK AND HISPANIC CHILDREN ARE MORE VULNERABLE TO FLUORIDE'S TOXICITY.

According to the CDC's national survey of dental fluorosis, black and Mexican-American children have significantly higher rates of dental fluorosis than white children (Beltran-Aguilar 2005, Table 23). The recognition that minority children appear to be more vulnerable to toxic effects of fluoride, combined with the

fact that low-income families are less able to avoid drinking fluoridated water, has prompted prominent leaders in the environmental-justice movement to oppose mandatory fluoridation in Georgia. In a statement issued in May 2011, Andrew Young, a colleague of Martin Luther King, Jr., and former Mayor of Atlanta and former US Ambassador to the United Nations, stated:

*“I am most deeply concerned for poor families who have babies: if they cannot afford unfluoridated water for their babies’ milk formula, do their babies not count? Of course they do. This is an issue of fairness, civil rights, and compassion. We must find better ways to prevent cavities, such as helping those most at risk for cavities obtain access to the services of a dentist...My father was a dentist. I formerly was a strong believer in the benefits of water fluoridation for preventing cavities. But many things that we began to do 50 or more years ago we now no longer do, because we have learned further information that changes our practices and policies. So it is with fluoridation.”*

### **39) MINORITIES ARE NOT BEING WARNED ABOUT THEIR VULNERABILITIES TO FLUORIDE.**

The CDC is not warning black and Mexican-American children that they have higher rates of dental fluorosis than Caucasian children (see #38). This extra vulnerability may extend to other toxic effects of fluoride. Black Americans have higher rates of lactose intolerance, kidney problems and diabetes, all of which may exacerbate fluoride’s toxicity.

### **40) TOOTH DECAY REFLECTS LOW-INCOME NOT LOW-FLUORIDE INTAKE.**

Since dental decay is most concentrated in poor communities, we should be spending our efforts trying to increase the access to dental care for low-income families. The highest rates of tooth decay today can be found in low-income areas that have been fluoridated for many years. The real “Oral Health Crisis” that exists today in the United States, is not a lack of fluoride but poverty and lack of dental insurance. The Surgeon General has estimated that 80% of dentists in the US do not treat children on Medicaid.

## THE LARGELY UNTESTED CHEMICALS USED IN FLUORIDATION PROGRAMS

### 41) THE CHEMICALS USED TO FLUORIDATE WATER ARE NOT PHARMACEUTICAL GRADE.

Instead, they largely come from the wet scrubbing systems of the phosphate fertilizer industry. These chemicals (90% of which are sodium fluorosilicate and fluorosilicic acid), are classified hazardous wastes contaminated with various impurities.

Recent testing by the National Sanitation Foundation suggest that the levels of arsenic in these silicon fluorides are relatively high (up to 1.6 ppb after dilution into public water) and of potential concern (NSF 2000 and Wang 2000). Arsenic is a known human carcinogen for which there is no safe level. This one contaminant alone could be increasing cancer rates—and unnecessarily so.

### 42) THE SILICON FLUORIDES HAVE NOT BEEN TESTED COMPREHENSIVELY.

The chemical usually tested in animal studies is pharmaceutical grade sodium fluoride, not industrial grade fluorosilicic acid. Proponents claim that once the silicon fluorides have been diluted at the public water works they are completely dissociated to free fluoride ions and hydrated silica and thus there is no need to examine the toxicology of these compounds. However, while a study from the University of Michigan (Finney et al., 2006) showed complete dissociation at neutral pH, in acidic conditions (pH 3) there was a stable complex containing five fluoride ions. Thus the possibility arises that such a complex may be regenerated in the stomach where the pH lies between 1 and 2.

### 43) THE SILICON FLUORIDES MAY INCREASE LEAD UPTAKE INTO CHILDREN'S BLOOD.

Studies by Masters and Coplan (1999, 2000, 2007), and to a lesser extent Macek (2006), show an association between the use of fluorosilicic acid (and its sodium salt) to fluoridate water and an increased uptake of lead into children's blood. Because of lead's acknowledged ability to damage the

developing brain, this is a very serious finding. Nevertheless, it is being largely ignored by fluoridating countries. This association received some strong biochemical support from an animal study by Sawan et al. (2010) who found that exposure of rats to a combination of fluorosilicic acid and lead in their drinking water increased the uptake of lead into blood some threefold over exposure to lead alone.

#### **44) FLUORIDE MAY LEACH LEAD FROM PIPES, BRASS FITTINGS AND SOLDERED JOINTS.**

In tightly controlled laboratory experiments, Maas et al (2007) have shown that fluoridating agents in combination with chlorinating agents such as chloroamine increase the leaching of lead from brass fittings used in plumbing. While proponents may argue about the neurotoxic effects of low levels of fluoride there is no argument that lead at very low levels lowers IQ in children.

## **CONTINUED PROMOTION OF FLUORIDATION IS UNSCIENTIFIC**

#### **45) KEY HEALTH STUDIES HAVE NOT BEEN DONE.**

In the January 2008 issue of Scientific American, Professor John Doull, the chairman of the important 2006 National Research Council review, Fluoride in Drinking Water: A Review of EPA's Standards, is quoted as saying:

*“What the committee found is that we’ve gone with the status quo regarding fluoride for many years—for too long really—and now we need to take a fresh look . . . In the scientific community people tend to think this is settled. I mean, when the U.S. surgeon general comes out and says this is one of the top 10 greatest achievements of the 20th century, that’s a hard hurdle to get over. But when we looked at the studies that have been done, we found that many of these questions are unsettled and we have much less information than we should, considering how long this [fluoridation] has been going on.”*

The absence of studies is being used by promoters as meaning the absence of harm. This is an irresponsible position.

#### **46) ENDORSEMENTS DO NOT REPRESENT SCIENTIFIC EVIDENCE.**

Many of those promoting fluoridation rely heavily on a list of endorsements. However, the U.S. PHS first endorsed fluoridation in 1950, before one single trial had been completed and before any significant health studies had been published (see chapters 9 and 10 in *The Case Against Fluoride* for the significance of this PHS endorsement for the future promotion of fluoridation). Many other endorsements swiftly followed with little evidence of any scientific rationale for doing so. The continued use of these endorsements has more to do with political science than medical science.

#### **47) REVIEW PANELS HAND-PICKED TO DELIVER A PRO-FLUORIDATION RESULT.**

Every so often, particularly when their fluoridation program is under threat, governments of fluoridating countries hand-pick panels to deliver reports that provide the necessary re-endorsement of the practice.

In their recent book *Fluoride Wars* (2009), which is otherwise slanted toward fluoridation, Alan Freeze and Jay Lehr concede this point when they write:

*There is one anti-fluoridationist charge that does have some truth to it. Anti-fluoride forces have always claimed that the many government-sponsored review panels set up over the years to assess the costs and benefits of fluoridation were stacked in favor of fluoridation. A review of the membership of the various panels confirms this charge. The expert committees that put together reports by the American Association for the Advancement of Science in 1941, 1944 and 1954; the National Academy of Sciences in 1951, 1971, 1977 and 1993; the World Health Organization in 1958 and 1970; and the U.S. Public Health Service in 1991 are rife with the names of well-known medical and dental researchers who actively campaigned on behalf of fluoridation or whose research was held in high regard in the pro-fluoridation movement. Membership was interlocking and incestuous.*

The most recent examples of these self-fulfilling prophecies have come from the Irish Fluoridation Forum (2002); the National Health and Medical Research Council (NHMRC, 2007) and Health Canada (2008, 2010). The latter used a panel of six experts to review the health literature. Four of the six were pro-fluoridation dentists and the other two had no demonstrated



expertise on fluoride. A notable exception to this trend was the appointment by the U.S. National Research Council of the first balanced panel of experts ever selected to look at fluoride's toxicity in the U.S. This panel of twelve reviewed the US EPA's safe drinking water standards for fluoride. After three and half years the panel concluded in a 507- page report that the safe drinking water standard was not protective of health and a new maximum contaminant level goal (MCLG) should be determined (NRC, 2006). If normal toxicological procedures and appropriate margins of safety were applied to their findings this report should spell an end to water fluoridation. Unfortunately in January of 2011 the US EPA Office of Water made it clear that they would not determine a value for the MCLG that would jeopardize the water fluoridation program (EPA press release, Jan 7, 2011). Once again politics was allowed to trump science.

## MORE AND MORE INDEPENDENT SCIENTISTS OPPOSE FLUORIDATION

### 48) MANY SCIENTISTS OPPOSE FLUORIDATION.

Proponents of fluoridation have maintained for many years— despite the fact that the earliest opponents of fluoridation were biochemists—that the only people opposed to fluoridation are not bona fide scientists. Today, as more and more scientists, doctors, dentists and other professionals, read the primary literature for themselves, rather than relying on self-serving statements from the ADA and the CDC, they are realizing that they and the general public have not been diligently informed by their professional bodies on this subject. As of January 2012, over 4,000 professionals have signed a statement calling for an end to water fluoridation worldwide. This statement and a list of signatories can be found on the website of the Fluoride Action Network. A glimpse of the caliber of those opposing fluoridation can be gleaned by watching the 28-minute video “Professional Perspectives on Water fluoridation” which can be viewed online at the same FAN site.

## PROponents' DUBIOUS TACTICS

### **49) PROPONENTS USUALLY REFUSE TO DEFEND FLUORIDATION IN OPEN DEBATE.**

While pro-fluoridation officials continue to promote fluoridation with undiminished fervor, they usually refuse to defend the practice in open public debate – even when challenged to do so by organizations such as the Association for Science in the Public Interest, the American College of Toxicology, or the U.S. EPA (Bryson 2004). According to Dr. Michael Easley, a prominent lobbyist for fluoridation in the US, “Debates give the illusion that a scientific controversy exists when no credible people support the fluorophobics’ view” (Easley, 1999). In light of proponents’ refusal to debate this issue, Dr. Edward Groth, a Senior Scientist at Consumers Union, observed that, “the political profluoridation stance has evolved into a dogmatic, authoritarian, essentially antiscientific posture, one that discourages open debate of scientific issues” (Martin 1991).

### **50) PROPONENTS USE VERY DUBIOUS TACTICS TO PROMOTE FLUORIDATION.**

Many scientists, doctors and dentists who have spoken out publicly on this issue have been subjected to censorship and intimidation (Martin 1991). Dr. Phyllis Mullenix was fired from her position as Chair of Toxicology at Forsythe Dental Center for publishing her findings on fluoride and the brain (Mullenix 1995); and Dr. William Marcus was fired from the EPA for questioning the government’s handling of the NTP’s fluoride-cancer study (Bryson 2004). Many dentists and even doctors tell opponents in private that they are opposed to this practice but dare not speak out in public because of peer pressure and the fear of recriminations. Tactics like this would not be necessary if those promoting fluoridation were on secure scientific and ethical grounds.

## CONCLUSION

When it comes to controversies surrounding toxic chemicals, vested interests traditionally do their very best to discount animal studies and quibble with epidemiological findings. In the past, political pressures have led government agencies to drag their feet on regulating asbestos, benzene, DDT, PCBs, tetraethyl lead, tobacco and dioxins. With fluoridation we have had a sixty-year delay. Unfortunately, because government officials and dental leaders have put so much of their credibility on the line defending fluoridation, and because of the huge liabilities waiting in the wings if they admit that fluoridation has caused an increase in hip fracture, arthritis, bone cancer, brain disorders or thyroid problems, it will be very difficult for them to speak honestly and openly about the issue. But they must, not only to protect millions of people from unnecessary harm, but to protect the notion that, at its core, public health policy must be based on sound science, not political expediency. They have a tool with which to do this: it's called the Precautionary Principle. Simply put, this says: if in doubt leave it out. This is what most European countries have done and their children's teeth have not suffered, while their public's trust has been strengthened.

Just how much doubt is needed on just one of the health concerns identified above, to override a benefit, which when quantified in the largest survey ever conducted in the US, amounts to less than one tooth surface (out of 128) in a child's mouth?

While fluoridation may not be the greatest environmental health threat, it is one of the easiest to end. It is as easy as turning off a spigot in the public water works. But to turn off that spigot takes political will and to get that we need masses more people informed and organized. Please get these 50 reasons to all your friends and encourage them to get fluoride out of their community and to help ban this practice worldwide.

## **POSTSCRIPT**

Further arguments against fluoridation, can be viewed at <http://fluoridealert.org> and in the book *The Case Against Fluoridation* (Chelsea Green, 2010). Arguments for fluoridation can be found at <http://www.ada.org>

## **PUBLICATION HISTORY OF THE 50 REASONS**

The 50 Reasons were first compiled by Paul Connett and presented in person to the Irish Fluoridation Forum in October 2000. The document was refined in 2004 and published in *Medical Veritas*. In the introduction to the 2004 version it was explained that after over four years the Irish authorities had not been able to muster a response to the 50 Reasons, despite agreeing to do so in 2000. Eventually, an anonymous, incomplete and superficial response was posted on the Irish Department of Health and Children's website (see this response and addendum at [http://www.dohc.ie/other\\_health\\_issues/dental\\_research/](http://www.dohc.ie/other_health_issues/dental_research/)). Paul Connett's comprehensive response to this response can be accessed at <http://fluoridealert.org/50reasons.ireland.pdf>. We learned on August 7, 2011 that this governmental response was prepared by an external contractor at a cost to the Irish taxpayers' of over 30,000 Euros.

Since 2004, there have been many major scientific developments including the publication of the U.S. National Research Council report (NRC, 2006); the publication of Bassin's study on Osteosarcoma (Bassin 2006), and many more studies of fluoride's interaction with the brain, that necessitated a major update of the 50 Reasons in August 2011. This update was made with the generous assistance of James Beck, MD, PhD, Michael Connett, JD, Hardy Limeback, DDS, PhD, David McRae and Spedding Micklem, D.Phil. Additional developments in 2012, including FAN's translation of over 20 Chinese studies on fluoride toxicity and publication of the Harvard team's meta-review of fluoride and IQ (Choi 2012), warranted a further update in August 2012, with the extremely helpful assistance of my son, Michael Connett.

All cited references in this article can be found at the Fluoride Action Network's Online Bibliography, available at:

**[WWW.FLUORIDEALERT.ORG/RESEARCHERS/FAN-BIBLIOGRAPHY/](http://WWW.FLUORIDEALERT.ORG/RESEARCHERS/FAN-BIBLIOGRAPHY/)**

# Most Countries Reject Water Fluoridation

## Statements from European and other Health, Water, & Environment Authorities on Water Fluoridation

### Austria:

“Toxic fluorides have never been added to the public water supplies in Austria.” (*M. Eisenhut, Head of Water Department, Osterreichische Yereinigung fur das Gas-und Wasserfach Schubertring 14, A-1015 Wien, Austria, February 17, 2000*).

### Belgium:

“This water treatment has never been of use in Belgium and will never be (we hope so) into the future. The main reason for that is the fundamental position of the drinking water sector that it is not its task to deliver medicinal treatment to people. This is the sole responsibility of health services.” (*Chr. Legros, Directeur, Belgaqua, Brussels, Belgium, February 28, 2000*).

### China:

Fluoridation is banned: “not allowed”

Naturally high fluoride levels in water are a serious problem in China.

“Bartram said there were many other ‘silent threats,’ including excessive fluoride in the water supply in China, India and the Rift Valley in Africa. In China alone, 30 million people suffer crippling skeletal fluorosis.” (*Jamie Bartram, Coordinator of the WHO's Water, Sanitation and Health Program, March 22, 2002*)

The Chinese government now considers any water supply containing over 1 ppm fluoride a risk for skeletal fluorosis. (*Bo Z, et al. (2003). Distribution and risk assessment of fluoride in drinking water in the West Plain region of Jilin Province, China. Environmental Geochemistry and Health 25: 421-431.*)

In China, the World Health Organization has estimated that 2.7 million people have the crippling form of skeletal fluorosis.

### Czech Republic:

“Since 1993, drinking water has not been treated with fluoride in public water supplies throughout the Czech Republic. Although fluoridation of drinking water has not actually been proscribed it is not under consideration because this form of supplementation is considered:

- uneconomical (only 0.54% of water suitable for drinking is used as such; the remainder is employed for hygiene etc. Furthermore, an increasing amount of consumers (particularly children) are using bottled water for drinking (underground water usually with fluor)
- unecological (environmental load by a foreign substance)
- unethical (“forced medication”)
- toxicologically and physiologically debateable (fluoridation represents an untargeted form of supplementation which disregards actual individual intake and requirements and may lead to excessive health-threatening intake in certain population groups; [and] complexation of fluor in water into non biological active forms of fluor.” (*Dr. B. Havlik, Ministerstvo Zdravotnictvi Ceske Republiky, October 14, 1999*).

### Denmark:

“We are pleased to inform you that according to the Danish Ministry of Environment and Energy, toxic fluorides have never been added to the public water supplies. Consequently, no Danish city has ever been fluoridated.” (*Klaus Werner, Royal Danish Embassy, Washington DC, December 22, 1999*).

### **Finland:**

“We do not favor or recommend fluoridation of drinking water. There are better ways of providing the fluoride our teeth need.” (*Paavo Poteri, Acting Managing Director, Helsinki Water, Finland, February 7, 2000*).

“Artificial fluoridation of drinking water supplies has been practiced in Finland only in one town, Kuopio, situated in eastern Finland and with a population of about 80,000 people (1.6% of the Finnish population). Fluoridation started in 1959 and finished in 1992 as a result of the resistance of local population. The most usual grounds for the resistance presented in this context were an individual’s right to drinking water without additional chemicals used for the medication of limited population groups. A concept of “force-feeding” was also mentioned.

Drinking water fluoridation is not prohibited in Finland but no municipalities have turned out to be willing to practice it. Water suppliers, naturally, have always been against dosing of fluoride chemicals into water.” (*Leena Hiisvirta, M.Sc., Chief Engineer, Ministry of Social Affairs and Health, Finland, January 12, 1996.*)

### **France:**

“Fluoride chemicals are not included in the list [of ‘chemicals for drinking water treatment’]. This is due to ethical as well as medical considerations.” (*Louis Sanchez, Directeur de la Protection de l’Environnement, August 25, 2000*).

### **Germany:**

“Generally, in Germany fluoridation of drinking water is forbidden. The relevant German law allows exceptions to the fluoridation ban on application. The argumentation of the Federal Ministry of Health against a general permission of fluoridation of drinking water is the problematic nature of compuls[ory] medication.” (*Gerda Hankel-Khan, Embassy of Federal Republic of Germany, September 16, 1999*).

### **Hungary:**

Stopped fluoridating for technical reasons in the 1960s. However, despite technological advances, Hungary has chosen to remain unfluoridated.

### **India:**

Naturally high levels of fluorides in groundwater have affected at least tens of millions with skeletal fluorosis, often resulting in crippling skeletal fluorosis. The Indian government has been working to *remove* the fluorides from drinking water sources to alleviate this crisis. In India, 17 of its 32 states have been identified as “endemic” areas, with an estimated 66 million people at risk from crippling skeletal fluorosis and 6 million people seriously afflicted.

### **Israel:**

Recently suspended mandatory fluoridation until the issue is reexamined from all aspects: medical, environmental, ethical and legal. “From our experience in Israel and the world when the fluoride issue is studied from all aspects it is rejected.” (*Representative Shimon Tsuk, Israeli Parliament*)

June 21, 2006: The labor, welfare and health Knesset (Israeli Parliament) committee called on the ministry of health to freeze the extension of the fluoridation of drinking water in Israel and to study the issue in depth in order to determine whether to continue with the project or to cancel it completely. Conclusions are to be expected within a year. Until then, municipalities and Mekorot (Israel national water company) are not required to build new fluoride installations.

Committee Chairman MK (Member of Knesset) Moshe Sharoni and MKs Ran Cohen and David Tal claimed during the investigation that the potential damage to public health and environment from fluoridation may be greater than the benefits from decreased dental cavities.

### **Japan:**

Rejected fluoridation: "...may cause health problems...." The 0.8 -1.5 mg regulated level is for calcium-fluoride, not the hazardous waste by-product which is added with artificial fluoridation.

### **Luxembourg:**

"Fluoride has never been added to the public water supplies in Luxembourg. In our views, the drinking water isn't the suitable way for medicinal treatment and that people needing an addition of fluoride can decide by their own to use the most appropriate way, like the intake of fluoride tablets, to cover their [daily] needs." (*Jean-Marie RIES, Head, Water Department, Administration De L'Environnement, May 3, 2000*).

### **Netherlands:**

"From the end of the 1960s until the beginning of the 1970s drinking water in various places in the Netherlands was fluoridated to prevent caries. However, in its judgement of 22 June 1973 in case No. 10683 (Budding and co. versus the City of Amsterdam) the Supreme Court (Hoge Road) ruled there was no legal basis for fluoridation. After that judgement, amendment to the Water Supply Act was prepared to provide a legal basis for fluoridation. During the process it became clear that there was not enough support from Parlement [sic] for this amendment and the proposal was withdrawn." (*Wilfred Reinhold, Legal Advisor, Directorate Drinking Water, Netherlands, January 15, 2000*).

### **Northern Ireland:**

"The water supply in Northern Ireland has never been artificially fluoridated except in 2 small localities where fluoride was added to the water for about 30 years up to last year. Fluoridation ceased at these locations for operational reasons. At this time, there are no plans to commence fluoridation of water supplies in Northern Ireland." (*C.J. Grimes, Department for Regional Development, Belfast, November 6, 2000*).

### **Norway:**

"In Norway we had a rather intense discussion on this subject some 20 years ago, and the conclusion was that drinking water should not be fluoridated." (*Truls Krogh & Toril Hofshagen, Folkehelse Statens institutt for folkeheise (National Institute of Public Health) Oslo, Norway, March 1, 2000*).

### **Scotland:**

In November 2004, after months of consultation, Scotland - which had been unfluoridated - rejected plans to add fluoride to the nation's water.

### **Sweden:**

"Drinking water fluoridation is not allowed in Sweden...New scientific documentation or changes in dental health situation that could alter the conclusions of the Commission have not been shown." (*Gunnar Guzikowski, Chief Government Inspector, Livsmedels Verket -- National Food Administration Drinking Water Division, Sweden, February 28, 2000*).

### **Switzerland:**

In April 9, 2003, the City Parliament of Basel, Switzerland voted 73 to 23 to stop Basel's 41 year water fluoridation program. Basel was the only city in Switzerland to fluoridate its water, and the only city in continental western Europe, outside of a few areas in Spain.



## The “F” Word: Fluoride...a 70 year controversy

When I was in Dental School, we were taught that Fluoride was like a vitamin. They taught us how to prescribe this “supplement” even to pregnant mothers...that was then- Science changes! Those of us who keep up with the research, understand now that fluoride is not that wonderful game changer that would end cavities. **“The aim of science is not to open the door to infinite wisdom, but to set a limit to infinite error.”**

I wrote my first article on fluoride over 15 years ago. I never published it for fear of losing my license and having my dental peers black list me from the dental community. Today, the evidence and research based science is overwhelming- the research based evidence is in favor of the “no fluoride” understanding. The truth is: it is extremely easy to search for this information. The meta-analysis research is easily accessible to anyone: just search medical publication- PubMed.com. Unfortunately, many “scholars” are still hanging on to the 1950’s statement that “Fluoride is beneficial especially in low-income sectors”; or that topical fluoride hardens tooth structure”, without taking into account that fluoride is basically everywhere: in our water, processed foods and Pharmaceuticals. Drugs used and prescribed everyday worldwide contain some type of fluoride; for example: Statins, antibiotics, anti-diabetics and inhaled anesthetics. The scary fact is that according to studies, 50% of ingested fluoride is absorbed into the bones. I encourage these scholars to show me recent research on the benefits outweighing the risks of fluoridation today. **The premise of good science is to be able to get a result consistently, that proves or disproves a theory you are working on.** There are no new studies. I have yet to see one (that is unbiased, meta-analysis research based).

A thin strip of fluoride covering a child’s toothbrush contains 0.75-1.5mg which exceeds “recommended’ amounts even by prescription. Even more worrisome is that fluoride is cumulative-

Would you give your child anything that had a blackbox warning from the FDA?? If more than a pea size is ingested, call POISON CONTROL. This warning is on every fluoride toothpaste. Do you use a PEA-SIZED amount of toothpaste??!!

As Dr. Mark Briener states (The Brain-Mouth Connection); How can anyone justify giving the same dose of any drug, to an infant as to a 200lb man? And according to the FDA fluoride is considered a drug.





I LOVE the IDEA of fluoride in our water...it makes it simple to strengthen teeth and prevent cavities—BUT AT WHAT COST?? I have studied this for years! The IDEA is great, but I have been devastated to discover: it doesn't work. Studies now show that the rate of cavities are increasing despite the increase in education on cavity prevention, and the increase in fluoride in our water supplies, and pharmaceuticals. I have been even more shocked to learn about the unexpected and worrisome side effects that fluoride is creating. I have over 100 hundred recent research studies here (there are even more- I have only included those within the last 10 years) showing undisputed evidence that this increase in fluoride, has led to hip fractures, increase in thyroid deficiencies, and a decrease in IQ levels in children. These aren't just stories- these are reputed Medical Journals and PubMed Research; anyone can access this information.

The Facts: The amount of cavities worldwide, even after water fluoridation and fluoride treatments has NOT decreased in relation to fluoride use. The WHO data since the 1970's: "Although the prevalence of cavities has declined, the majority of worldwide communities not fluoridating, or those that never adopted fluoridation, have also experienced a reduction in cavities exceeding 75%."

- 97% of Western Europe has rejected water fluoridation.
- FDA has poison warnings on all fluoride toothpastes.
- FDA states fluoride is a drug, not a nutrient
- Fluoride is a known enzyme disruptor
- Fluoride anti cavity activity depends on calcium and magnesium content in enamel
- National Academy of Sciences: Fluoride decreases thyroid function
- Increase in fluoride exposure contributes to hypothyroidism
- Harvard meta-analysis: Children ingesting higher levels of fluoride tested and average 7 lower IQ points
- Fluoride is NOT essential in growth and development
- Fluoride is an unwanted by-product of aluminum, fertilizer and iron ore manufacture
- The amount of fluoride in water systems cannot be measured accurately- only an estimate
- In order to remove Fluoride from water, a Reverse-Osmosis system is required.



I'm not in favor of banning anything...I still believe in patient autonomy; but why force it on anyone? If anyone wants fluoride treatment- you can go to a fluoride supplying dentist and even get a prescription for "high fluoridated products". We are ALL on the same side! We all want there to be less cavities and improved dental health. Unfortunately, research and experience is showing fluoride is not the answer we all hoped it would be. Thankfully, there is emerging evidence and research supporting new products like hydroxyapatite-the mineral that our teeth are actually made of- that are as, or more effective than fluoride, at preventing tooth decay, without sacrificing our HEALTH. Also controlling certain bacteria and avoiding a low pH environment.

Like I said... WE ARE ALL ON THE SAME SIDE!!! I am just showing you the latest information; and there ARE products that will help us achieve this goal, without causing other problems. SO, LET'S NOT USE THAT "F" WORD ANYMORE!!!

Thank you for your help.  
Josephine Perez, DMD



Sourced from the US National Library of Medicine

<http://pubmed.gov>

## Research Topic

Fluoride

## Research Subtopics

Hydrofluorosilicic acid (HFS)  
Sodium Fluoride

This Smart Search PDF was created based on **1** research topic. There are a total of **454** unique research articles on [GreenMedInfo.com](http://GreenMedInfo.com) in regard to your search topic, all compiled in this research document.

The GMI-Pub system automates the natural medical research retrieval process by creating an individualized document that matches your search requirements in order to fit the needs of real people, in real time.

Our technology pulls from the equivalent of 20,454+ years of scientific experimental labor and pulls results based on variables the user decides are relevant.

Below you will find compelling research hard-referenced to peer-reviewed biomedical research sourced from the US National Library of Medicine. For more research on over 6000 validated topics, please visit <http://GreenMedInfo.com/research-dashboard>

## Overview of Terms Associated with Your Search Topic

134 Relevant Results for Diseases

Disease/Symptom	Cumulative Knowledge	Article Count
<a href="#">Fluoride Toxicity</a>	1310	340
<a href="#">Intelligence Quotient (IQ): Low/Impaired</a>	252	22

Fluorosis	228	37
Prenatal Chemical Exposures	116	27
Oxidative Stress	95	55
Childhood Cognitive Disorders	80	6
Cognitive Decline/Dysfunction	76	9
Infertility: Female	66	12
Inflammation	65	21
Dental Caries	62	7
Infertility: Male	59	22
Chemically-Induced Liver Damage	52	24
Hypothyroidism	47	6
Kidney Damage: Chemically-Induced	43	19
Testicular Injury: Chemical/Metal Induced	33	17
DNA damage	25	15
Arsenic Poisoning	23	6
Ectopic Calcification	22	3
Neurodegenerative Diseases	22	13
Sperm Quality: Low	22	12
Gingivitis	21	3
Bone Fractures	20	2
Hypertension	17	4
Mitochondrial Dysfunction	16	10
Arterial Calcification	13	3
Lead Poisoning	13	3
Lipid Peroxidation	13	7
Aluminum Toxicity	12	6
Coronary Artery Ecstasia	10	1
Brain Inflammation	7	4
Chronic Kidney Disease (CKD)	6	3
Dysbiosis	6	3
Brain: Oxidative Stress	5	3
Autism Spectrum Disorders	3	3
Cardiovascular Diseases	3	2
Fetal Origin of Adult Disease	3	2
Low Testosterone	3	2
Brain: Microglial Activation	2	2
Cardiomyopathy	2	1

<b>Female Reproductive Development Abnormalities</b>	<b>2</b>	<b>1</b>
<b>Heart Failure</b>	<b>2</b>	<b>1</b>
<b>Aging</b>	<b>1</b>	<b>1</b>
<b>Fractures: Bone</b>	<b>1</b>	<b>1</b>
<b>Kidney Damage</b>	<b>1</b>	<b>1</b>
<b>Muscle Damage</b>	<b>1</b>	<b>1</b>
<b>Learning disorders</b>	<b>106</b>	<b>18</b>
<b>Prenatal Nutrition: Learning/Intelligence of Offspring</b>	<b>44</b>	<b>4</b>
<b>Thyroid Dysfunction</b>	<b>41</b>	<b>3</b>
<b>Childhood Chemical Exposures</b>	<b>40</b>	<b>4</b>
<b>Neurodevelopmental Disorders</b>	<b>33</b>	<b>5</b>
<b>Dental Plaque</b>	<b>30</b>	<b>3</b>
<b>Diabetes Mellitus: Type 2</b>	<b>22</b>	<b>2</b>
<b>Attention Deficit Disorder with Hyperactivity</b>	<b>21</b>	<b>3</b>
<b>Goiter: Exophthalmic</b>	<b>21</b>	<b>1</b>
<b>Memory Disorders</b>	<b>21</b>	<b>11</b>
<b>Osteoarthritis: Knee</b>	<b>20</b>	<b>2</b>
<b>Pancreatic Diseases</b>	<b>20</b>	<b>1</b>
<b>Sleep Disorders</b>	<b>20</b>	<b>2</b>
<b>Spleen Damage: Chemically Induced</b>	<b>18</b>	<b>9</b>
<b>Bone Diseases</b>	<b>13</b>	<b>3</b>
<b>Developmental Disorder: Children</b>	<b>12</b>	<b>2</b>
<b>Diabetes: Cognitive Dysfunction</b>	<b>12</b>	<b>1</b>
<b>Pineal Gland Calcification</b>	<b>12</b>	<b>2</b>
<b>Dental Caries: Children</b>	<b>11</b>	<b>2</b>
<b>Iodine Deficiency</b>	<b>11</b>	<b>2</b>
<b>Abortion: Spontaneous</b>	<b>10</b>	<b>1</b>
<b>Attention Deficit Hyperactivity Disorder</b>	<b>10</b>	<b>1</b>
<b>C-Reactive Protein</b>	<b>10</b>	<b>1</b>
<b>Children: Impaired Growth</b>	<b>10</b>	<b>1</b>
<b>Metabolic Diseases</b>	<b>10</b>	<b>1</b>
<b>Multiple Myeloma</b>	<b>10</b>	<b>1</b>
<b>Osteoarthritis</b>	<b>10</b>	<b>1</b>
<b>Periodontitis</b>	<b>10</b>	<b>1</b>
<b>Pineal Gland Diseases</b>	<b>10</b>	<b>1</b>
<b>Stroke</b>	<b>10</b>	<b>1</b>
<b>TSH: Elevated</b>	<b>10</b>	<b>1</b>

<b>Vascular Calcification</b>	<b>10</b>	<b>1</b>
<b>Ovarian Diseases</b>	<b>5</b>	<b>3</b>
<b>Anxiety</b>	<b>4</b>	<b>2</b>
<b>Depression</b>	<b>4</b>	<b>2</b>
<b>Heavy Metal Toxicity</b>	<b>3</b>	<b>2</b>
<b>Hip Dysplasia: Congenital</b>	<b>3</b>	<b>1</b>
<b>Air Pollution Linked Toxicity</b>	<b>2</b>	<b>1</b>
<b>Atheroma</b>	<b>2</b>	<b>1</b>
<b>Atherosclerosis</b>	<b>2</b>	<b>1</b>
<b>Autoimmune Diseases</b>	<b>2</b>	<b>1</b>
<b>Azoospermic</b>	<b>2</b>	<b>1</b>
<b>Birth Defects</b>	<b>2</b>	<b>1</b>
<b>Blood-Brain-Barrier Disorders</b>	<b>2</b>	<b>1</b>
<b>Bone Marrow Suppression</b>	<b>2</b>	<b>1</b>
<b>Brain Injury: Hippocampal Damage</b>	<b>2</b>	<b>1</b>
<b>Breastfeeding Concerns: Chemical Exposure</b>	<b>2</b>	<b>1</b>
<b>Colitis</b>	<b>2</b>	<b>1</b>
<b>Degenerative Joint Disease</b>	<b>2</b>	<b>1</b>
<b>Dementia</b>	<b>2</b>	<b>1</b>
<b>Diabetic Complications</b>	<b>2</b>	<b>1</b>
<b>Drug-Induced Nutrient Depletion: Riboflavin (B-2)</b>	<b>2</b>	<b>1</b>
<b>Dyslipidemias</b>	<b>2</b>	<b>1</b>
<b>Estrogen Deficiency</b>	<b>2</b>	<b>1</b>
<b>Gastrointestinal Inflammation</b>	<b>2</b>	<b>1</b>
<b>Hormone Insufficiency</b>	<b>2</b>	<b>1</b>
<b>Huntington Disease</b>	<b>2</b>	<b>1</b>
<b>Hypercalcemia</b>	<b>2</b>	<b>1</b>
<b>Hyperglycemia</b>	<b>2</b>	<b>1</b>
<b>Hyperlipidemia</b>	<b>2</b>	<b>1</b>
<b>Infertility</b>	<b>2</b>	<b>1</b>
<b>Iron Overload</b>	<b>2</b>	<b>1</b>
<b>Low Immune Function: Chemically-Induced</b>	<b>2</b>	<b>1</b>
<b>Lung Damage</b>	<b>2</b>	<b>1</b>
<b>Male Reproductive Development Abnormalities</b>	<b>2</b>	<b>1</b>
<b>Mineral Deficiencies</b>	<b>2</b>	<b>1</b>
<b>Muscle Atrophy</b>	<b>2</b>	<b>1</b>
<b>Obesity</b>	<b>2</b>	<b>1</b>

Obsessive-Compulsive Disorder	2	1
Orchitis	2	1
Schizophrenia	2	1
Sperm Count: Low	2	1
Testicular Injury: Fluoride-Induced	2	1
Thyroid Diseases	2	1
Tourette Syndrome	2	1
Uterine Diseases	2	1
Vitamin A Deficiency	2	1
Alzheimer's Disease	1	1
Autism	1	1
Endothelial Dysfunction	1	1
Enterococcus Infections	1	1
Hair Loss	1	1
Hair Quality Problems	1	1
Microplastic Toxicity	1	1
Mitochondrial Diseases	1	1
Neurotoxicity	1	1
Osteosarcoma	1	1
Porphyromonas gingivalis	1	1
Streptococcus Mutans Infections	1	1

36 Relevant Results for Adverse Pharmacological Actions

Adverse Pharmacological Action Name	Cumulative Knowledge	Article Count
Neurotoxic	278	68
Apoptotic	62	29
Anti-Fertility	50	12
Cardiotoxic	38	18
Inflammatory	26	10
Hepatotoxic	24	9
Renotoxic	15	4
Oxidant	12	9
Teratogenic	8	4
Endocrine Disruptor	6	3
Nephrotoxic	5	3
Hypertensive	4	2
Interleukin-6 up-regulation	3	2

Embryotoxic	2	1
Endocrine Disruptor: Thyroid	2	1
Immunotoxic	20	6
Abortive	10	1
Gastrotoxic	10	5
Hypermethylation	10	1
Genotoxic	4	3
Acetylcholinesterase inhibitor (xenobiotic)	2	1
Cytotoxic	2	2
Diabetogenic	2	1
Dysbiotic	2	1
Immunoreactive	2	1
Immunosuppressive	2	1
Interleukin-8 up-regulation	2	1
MCP-1 (CCL2) up-regulation	2	1
Neurotransmitter Interference	2	1
P-selectin upregulation	2	1
Vascular Cell Adhesion Molecule-1 (VCAM-1) Up-Regulation	2	1
Atherogenic	1	1
Endocrine Disruptor: Testes	1	1
Excitotoxic	1	1
Interleukin-1 up-regulation	1	1
Tumor necrosis factor $\alpha$ (TNF $\alpha$ ) up-regulation	1	1

27 Relevant Results for Problem Substances

Problem Substance Name	Cumulative Knowledge	Article Count
Sodium Fluoride	1446	393
Fluoride	366	92
Arsenic	65	15
Infant Formula	42	5
Aluminum	17	10
Lead	15	4
Sugary soda	10	1
Cadmium	4	2
Hydrofluorosilicic acid (HFS)	3	2
Chlorhexidine gluconate	10	1
Iodine: Excess	10	1



Photoresist and developed solvents (PDS)	10	1
Public Drinking Water	10	1
Sugar	10	1
Antibiotics	3	1
Sugar Sweetened Beverages	3	3
Aluminum Chloride	2	1
Bisphenol A	2	1
Diclofenac	2	1
Rotenone	2	1
Sodium Selenate	2	1
Sodium Selenite	2	1
Endocrine Disruptors	1	1
Mercury	1	1
Nano Plastic-and Micro-Particles	1	1
Polystyrene nanoparticles	1	1
Sodium lauryl sulfate	1	1

### 36 Relevant Results for Keywords

Keyword Name	Cumulative Knowledge	Article Count
Synergistic Toxicity	52	18
Increased Risk	51	9
Water Fluoridation	34	5
Dose Response	29	6
Risk Factors	22	9
Gene Expression	9	3
Public Drinking Water	1	1
Superiority of Natural Substances versus Drugs	22	4
Causes Of Decreased Birth Rates	20	1
Genomic Variation	20	2
Fluoride In The Water	12	2
Epigenetic Modification	11	2
Breast Feeding	10	1
Fluoridated Food Supplement	10	1
Maternal Dietary Patterns	10	1
Mouthwash	10	1
Natural Substances Versus Chemicals	10	1
Natural Substances Versus Drugs	10	1

<b>Toxic Substance Synergy</b>	<b>10</b>	<b>1</b>
<b>Plant Extracts</b>	<b>6</b>	<b>4</b>
<b>Gene Expression Regulation</b>	<b>4</b>	<b>2</b>
<b>Natural Substance Synergy</b>	<b>4</b>	<b>2</b>
<b>Antioxidant</b>	<b>2</b>	<b>1</b>
<b>Bottled Water</b>	<b>2</b>	<b>2</b>
<b>Drug Synergy</b>	<b>2</b>	<b>1</b>
<b>Embryonic Development</b>	<b>2</b>	<b>1</b>
<b>Groundwater Contamination</b>	<b>2</b>	<b>1</b>
<b>Gut-brain Axis</b>	<b>2</b>	<b>1</b>
<b>Methylation Downregulation</b>	<b>2</b>	<b>1</b>
<b>Multi-Generational Effects</b>	<b>2</b>	<b>1</b>
<b>Prenatal Epigenetic Programming</b>	<b>2</b>	<b>1</b>
<b>Proanthocyanidins</b>	<b>2</b>	<b>1</b>
<b>Supplementation</b>	<b>2</b>	<b>1</b>
<b>Transgenerational Epigenetic Modification</b>	<b>2</b>	<b>1</b>
<b>Heavy Metals and Autism</b>	<b>1</b>	<b>1</b>
<b>Vaccine Research</b>	<b>1</b>	<b>1</b>

72 Relevant Results for Substances

<b>Substance Name</b>	<b>Cumulative Knowledge</b>	<b>Article Count</b>
<b>Green Tea</b>	<b>31</b>	<b>4</b>
<b>Melatonin</b>	<b>10</b>	<b>5</b>
<b>Alpha-Lipoic Acid</b>	<b>6</b>	<b>3</b>
<b>Citrus naringin</b>	<b>6</b>	<b>3</b>
<b>Curcumin</b>	<b>6</b>	<b>3</b>
<b>Royal Jelly</b>	<b>6</b>	<b>3</b>
<b>Selenium</b>	<b>6</b>	<b>5</b>
<b>Vitamin E</b>	<b>5</b>	<b>3</b>
<b>Moringa oleifera</b>	<b>4</b>	<b>2</b>
<b>Neem</b>	<b>4</b>	<b>2</b>
<b>Caffeic Acid</b>	<b>2</b>	<b>1</b>
<b>Coffee</b>	<b>2</b>	<b>1</b>
<b>Prunella vulgaris</b>	<b>2</b>	<b>1</b>
<b>Black Tea</b>	<b>1</b>	<b>1</b>
<b>Emodin</b>	<b>1</b>	<b>1</b>
<b>Calcium</b>	<b>18</b>	<b>5</b>

Vitamin C	13	3
Vitamin D	13	3
Iodine	10	1
Sodium Bicarbonate	10	1
Water	10	1
Hesperidin	9	5
Quercetin	9	4
Rutin	7	3
Ginkgo biloba	6	3
Spirulina	6	3
Grape Seed Extract	5	3
Lycopene	5	3
Banaba	4	2
Ginseng	4	2
Luteolin	4	2
Apigenin	3	1
Coconut Oil	3	1
Ellagic Acid	3	1
Ferulic acid	3	1
Polyphenols	3	1
Acacia arabica	2	1
Aloe Vera	2	1
Amla Fruit	2	1
Arjuna	2	1
Betaine	2	1
Bifidobacterium	2	1
Blackberry	2	1
Charcoal	2	1
Corn: Purple	2	1
Cysteine (see N-Acetylcysteine)	2	1
Fisetin	2	1
Folic Acid	2	1
Gastrodin	2	1
Ginger	2	1
Honokiol	2	1
Ipriflavone	2	1
Lactobacillus probiotics	2	1

NAC (N-acetyl-L-cysteine)	2	1
Nigella sativa (aka Black Seed)	2	1
Pomegranate	2	1
Probiotics	2	1
Resveratrol	2	1
Riboflavin (Vitamin B-2)	2	1
Rooibos	2	1
Sesamin	2	1
Star Fruit	2	1
Tamarind	2	1
Taurine	2	1
Tea	2	1
Terminalia	2	1
Thymoquinone	2	1
Wormwood	2	1
Astaxanthin	1	1
Cocoa	1	1
EGCG (Epigallocatechin gallate)	1	1
Persimmon	1	1

### 36 Relevant Results for Pharmacological Actions

Pharmacological Action Name	Cumulative Knowledge	Article Count
Antioxidants	88	42
Anti-Inflammatory Agents	33	12
Hepatoprotective	31	16
Neuroprotective Agents	30	16
Renoprotective	30	15
Nrf2 activation	13	7
Apoptotic	10	7
Cardioprotective	8	4
Hypoglycemic Agents	4	2
Anti-Apoptotic	35	21
Anti-Bacterial Agents	20	2
Tumor Necrosis Factor (TNF) Alpha Inhibitor	17	8
Cytoprotective	10	5
Detoxifier	10	1
Superoxide Dismutase Up-regulation	8	4

Genoprotective	5	4
Interleukin-1 beta downregulation	5	2
Antihypertensive Agents	4	2
Cyclooxygenase 2 Inhibitors	4	2
Gastrointestinal Agents	4	2
Gastroprotective	4	2
Heme oxygenase-1 up-regulation	4	2
Hypolipidemic	4	2
Malondialdehyde Down-regulation	4	2
NF-kappaB Inhibitor	4	2
Antimicrobial	2	2
Bcl-2 protein down-regulation	2	1
Fertility Agents: Male	2	1
Glutathione Upregulation	2	1
Interleukin-17 downregulation	2	1
Osteogenic	2	1
Osteoprotective	2	1
Prophylactic Agents	2	1
Tumor Suppressor Protein p53 Upregulation	2	1
Antimutagenic Agents	1	1
DNA Repair Up-regulation	1	1

1 Relevant Result for Problematic Actions

Problematic Action Name	Cumulative Knowledge	Article Count
Vaccination: All	1	1

2 Relevant Results for Therapeutic Actions

Therapeutic Action Name	Cumulative Knowledge	Article Count
Exercise	6	3
Exercise: Running	2	1

**View the Evidence.**  
**454 Research Articles in Total.**

**Category : Diseases**

## Abortion: Spontaneous (AC 1) (CK 10)

**An increased risk of spontaneous abortion among fabrication workers has been linked to fluoride compound and photoresist and developed solvents (PDS) exposure.**

**Pubmed Data** : Am J Ind Med. 1995 Dec ;28(6):751-69. PMID: [8588562](#)

**Article Published Date** : Dec 01, 1995

**Authors** : S H Swan, J J Beaumont, S K Hammond, J VonBehren, R S Green, M F Hallock, S R Woskie, C J Hines, M B Schenker

**Study Type** : Human Study

**Additional Links**

**Diseases** : Abortion: Spontaneous : CK(325) : AC(42), Infertility: Female : CK(741) : AC(180)

**Problem Substances** : Fluoride : CK(1815) : AC(454), Photoresist and developed solvents (PDS) : CK(10) : AC(1)

**Adverse Pharmacological Actions** : Abortive : CK(57) : AC(9), Anti-Fertility : CK(112) : AC(21)

## Aging (AC 1) (CK 1)

**Fluorine is a factor in premature aging, and related adverse health effects.**

**Pubmed Data** : Ann Acad Med Stetin. 2004 ;50 Suppl 1:9-13. PMID: [16892576](#)

**Article Published Date** : Jan 01, 2004

**Authors** : Anna Machoy-Mokrzyńska

**Study Type** : Review

**Additional Links**

**Diseases** : Aging : CK(5992) : AC(1444), Arterial Calcification : CK(268) : AC(45)

**Problem Substances** : Fluoride : CK(1815) : AC(454), Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Cardiotoxic : CK(1168) : AC(209)

## Air Pollution Linked Toxicity (AC 1) (CK 2)

**Combination of fluoride and SO2 induce DNA damage and morphological alterations in male rat kidney.**

**Pubmed Data** : Cell Physiol Biochem. 2018 ;50(2):734-744. Epub 2018 Oct 11. PMID: [30308495](#)

**Article Published Date** : Dec 31, 2017

**Authors** : Yan Gao, Chen Liang, Jianhai Zhang, Junjie Ma, Jinming Wang, Ruiyan Niu, Chiranjeevi Tikka, Yewei Wang, Jundong Wang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Air Pollution Linked Toxicity : CK(4951) : AC(731), DNA damage : CK(2255) : AC(824), Fluoride Toxicity : CK(1389) : AC(376), Kidney Damage: Chemically-Induced : CK(542) : AC(270)

**Additional Keywords** : Synergistic Toxicity : CK(226) : AC(109)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

## Aluminum Toxicity (AC 6) (CK 12)

### Administration of resveratrol along with aluminum + fluoride showed significant reversal of oxidative stress and neuronal damage.

**Pubmed Data** : Interdiscip Toxicol. 2016 Jun ;9(2):78-82. Epub 2017 May 17. PMID: [28652849](#)

**Article Published Date** : May 31, 2016

**Authors** : Chandra Shakar Reddy Nalagoni, Pratap Reddy Karnati

**Study Type** : Animal Study

**Additional Links**

**Substances** : Resveratrol : CK(3081) : AC(1505)

**Diseases** : Aluminum Toxicity : CK(685) : AC(308), Brain: Oxidative Stress : CK(635) : AC(345), Fluoride Toxicity : CK(1389) : AC(376)

**Pharmacological Actions** : Antioxidants : CK(32218) : AC(14161), Neuroprotective Agents : CK(17667) : AC(7641)

**Additional Keywords** : Synergistic Toxicity : CK(226) : AC(109)

**Problem Substances** : Aluminum : CK(1061) : AC(349), Sodium Fluoride : CK(1446) : AC(393)

### Aluminium, fluoride and a combination of aluminium-fluoride treatments caused an increase in brain lipid peroxidation products and reactive oxygen species formation.

**Pubmed Data** : Pathophysiology. 2015 Mar ;22(1):39-48. Epub 2014 Dec 13. PMID: [25577494](#)

**Article Published Date** : Feb 28, 2015

**Authors** : Ibukun Dorcas Akinrinade, Adejoke Elizabeth Memudu, Olalekan Michael Ogundele, Olanrewaju Ibrahim Ajetunmobi

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Aluminum Toxicity : CK(685) : AC(308), Brain Inflammation : CK(1650) : AC(901), Fluoride Toxicity : CK(1389) : AC(376), Neurodegenerative Diseases : CK(12159) : AC(4162), Oxidative Stress : CK(13443) : AC(5499)

**Additional Keywords** : Increased Risk : CK(8492) : AC(1109), Synergistic Toxicity : CK(226) : AC(109)

**Problem Substances** : Aluminum : CK(1061) : AC(349), Fluoride : CK(1815) : AC(454), Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

### Aluminum appears to enhance the neurotoxic hazards caused by fluoride.

**Pubmed Data** : Drug Chem Toxicol. 2009 ;32(3):215-21. PMID: [19538017](#)

**Article Published Date** : Dec 31, 2008

**Authors** : Tanzeer Kaur, Rakesh K Bijjarnia, Bimla Nehru

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Aluminum Toxicity : CK(685) : AC(308), Lipid Peroxidation : CK(1901) : AC(774), Oxidative Stress : CK(13443) : AC(5499)

**Additional Keywords** : Synergistic Toxicity : CK(226) : AC(109)

**Problem Substances** : Aluminum : CK(1061) : AC(349), Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

### Hesperidin/chitosan nanogel mitigates apoptosis and endoplasmic reticulum stress in fluoride and aluminum-induced testicular injury.

**Pubmed Data** : Biol Trace Elem Res. 2023 Dec 13. Epub 2023 Dec 13. PMID: [38087036](#)

**Article Published Date** : Dec 12, 2023

**Authors** : Nora S Deiab, Ahmad S Kodous, Mohamed K Mahfouz, Alshaimaa M Said, Mohamed Mohamady Ghobashy, Omayma A R Abozaid

**Study Type** : Animal Study

**Additional Links**

**Substances** : Hesperidin : CK(845) : AC(358)

**Diseases** : Aluminum Toxicity : CK(685) : AC(308), Fluoride Toxicity : CK(1389) : AC(376), Testicular Injury: Chemical/Metal Induced : CK(754) : AC(374)

**Pharmacological Actions** : Anti-Apoptotic : CK(4942) : AC(3051), Antioxidants : CK(32218) : AC(14161)

**Problem Substances** : Aluminum : CK(1061) : AC(349), Sodium Fluoride : CK(1446) : AC(393)

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## Role of Spirulina in mitigating hemato-toxicity in Swiss albino mice exposed to aluminum and aluminum fluoride.

**Pubmed Data** : Environ Sci Pollut Res Int. 2016 Dec ;23(24):25280-25287. Epub 2016 Sep 29. PMID: [27687764](#)

**Article Published Date** : Nov 30, 2016

**Authors** : Shweta Sharma, K P Sharma, Subhasini Sharma

**Study Type** : Animal Study

**Additional Links**

**Substances** : Spirulina : CK(1017) : AC(292)

**Diseases** : Aluminum Toxicity : CK(685) : AC(308), Fluoride Toxicity : CK(1389) : AC(376)

**Pharmacological Actions** : Cytoprotective : CK(797) : AC(393)

**Problem Substances** : Aluminum : CK(1061) : AC(349), Sodium Fluoride : CK(1446) : AC(393)

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## Synergistic oxidative impact of aluminum chloride and sodium fluoride exposure during early stages of brain development.

**Pubmed Data** : Environ Sci Pollut Res Int. 2019 Feb 20. Epub 2019 Feb 20. PMID: [30788699](#)

**Article Published Date** : Feb 19, 2019

**Authors** : Amal A Kinawy

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Aluminum Toxicity : CK(685) : AC(308), Brain: Oxidative Stress : CK(635) : AC(345), Fluoride Toxicity : CK(1389) : AC(376)

**Additional Keywords** : Synergistic Toxicity : CK(226) : AC(109)

**Problem Substances** : Aluminum Chloride : CK(171) : AC(92), Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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# Alzheimer's Disease (AC 1) (CK 1)

## Potential role of fluoride in the etiopathogenesis of Alzheimer's disease.

**Pubmed Data** : Int J Mol Sci. 2018 Dec 9 ;19(12). Epub 2018 Dec 9. PMID: [30544885](#)

**Article Published Date** : Dec 08, 2018

**Authors** : Marta Goschorska, Irena Baranowska-Bosiacka, Izabela Gutowska, Emilia Metryka, Marta Skórka-Majewicz, Dariusz Chlubek

**Study Type** : Review

**Additional Links**

**Diseases** : Alzheimer's Disease : CK(4948) : AC(2148), Fluoride Toxicity : CK(1389) : AC(376), Inflammation : CK(15536) : AC(5279), Oxidative Stress : CK(13443) : AC(5499)



**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)  
**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Anxiety (AC 2) (CK 4)

### Exercise ameliorates fluoride-induced anxiety- and depression-like behavior in mice.

**Pubmed Data** : Biol Trace Elem Res. 2022 Feb ;200(2):678-688. Epub 2021 Apr 6. PMID: [33825162](#)

**Article Published Date** : Jan 31, 2022

**Authors** : Qiqi Cao, Jixiang Wang, Yanru Hao, Fangye Zhao, Rong Fu, Yanghuan Yu, Jundong Wang, Ruiyan Niu, Shengtai Bian, Zilong Sun

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Anxiety : CK(4195) : AC(743), Depression : CK(8817) : AC(1715), Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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### Fluoride stimulates anxiety and depression-like behaviors.

**Pubmed Data** : J Agric Food Chem. 2021 Nov 17 ;69(45):13618-13627. Epub 2021 Nov 4. PMID: [34735150](#)

**Article Published Date** : Nov 16, 2021

**Authors** : Guoyu Zhou, Yue Hu, Anqi Wang, Meng Guo, Yuhui Du, Yongxiang Gong, Limin Ding, Zichen Feng, Xiangbo Hou, Kaihong Xu, Fangfang Yu, Zhiyuan Li, Yue Ba

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Anxiety : CK(4195) : AC(743), Depression : CK(8817) : AC(1715), Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Arsenic Poisoning (AC 6) (CK 23)

### Arsenic and fluoride co-exposure affects the expression of apoptotic and inflammatory genes and proteins in mononuclear cells from children.

**Pubmed Data** : Mutat Res Genet Toxicol Environ Mutagen. 2014 Feb ;761:27-34. Epub 2014 Jan 21. PMID: [24456662](#)

**Article Published Date** : Jan 31, 2014

**Authors** : B L Estrada-Capetillo, M D Ortiz-Pérez, M Salgado-Bustamante, E Calderón-Aranda, C J Rodríguez-Pinal, E Reynaga-Hernández, N E Corral-Fernández, R González-Amaro, D P Portales-Pérez

**Study Type** : Human In Vitro, Human Study

**Additional Links**

**Diseases** : Arsenic Poisoning : CK(383) : AC(129), Fluoride Toxicity : CK(1389) : AC(376), Inflammation : CK(15536) : AC(5279)

**Additional Keywords** : Synergistic Toxicity : CK(226) : AC(109)

**Problem Substances** : Arsenic : CK(595) : AC(181), Sodium Fluoride : CK(1446) : AC(393)

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## Arsenic-fluoride co-exposure induced endoplasmic reticulum stress resulting in apoptosis in rat heart and H9c2 cells.

**Pubmed Data** : Chemosphere. 2022 Feb ;288(Pt 2):132518. Epub 2021 Oct 9. PMID: [34637859](#)

**Article Published Date** : Jan 31, 2022

**Authors** : Meng Li, Jing Feng, Ying Cheng, Nisha Dong, Xiaolin Tian, Penghui Liu, Yannan Zhao, Yulan Qiu, Fengjie Tian, Yi Lyu, Qian Zhao, Cailing Wei, Meng Wang, Jiyu Yuan, Xiaodong Ying, Xuefeng Ren, Xiaoyan Yan

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : Arsenic Poisoning : CK(383) : AC(129), Fluoride Toxicity : CK(1389) : AC(376)

**Additional Keywords** : Synergistic Toxicity : CK(226) : AC(109)

**Problem Substances** : Arsenic : CK(595) : AC(181), Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Apoptotic : CK(278) : AC(120), Cardiotoxic : CK(1168) : AC(209)

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## Co-exposure to arsenic-fluoride results in endoplasmic reticulum stress-induced apoptosis through the PERK signaling pathway in the liver of offspring rats.

**Pubmed Data** : Biol Trace Elem Res. 2020 Sep ;197(1):192-201. Epub 2019 Nov 25. PMID: [31768761](#)

**Article Published Date** : Aug 31, 2020

**Authors** : Nisha Dong, Jing Feng, Jiaxin Xie, Xiaolin Tian, Meng Li, Penghui Liu, Yannan Zhao, Cailing Wei, Yi Gao, Ben Li, Yulan Qiu, Xiaoyan Yan

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Arsenic Poisoning : CK(383) : AC(129), Chemically-Induced Liver Damage : CK(2167) : AC(1069), Fluoride Toxicity : CK(1389) : AC(376), Prenatal Chemical Exposures : CK(2428) : AC(530)

**Pharmacological Actions** : Apoptotic : CK(9052) : AC(7284)

**Problem Substances** : Fluoride : CK(1815) : AC(454), Sodium Fluoride : CK(1446) : AC(393)

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## Combined effects of fluoride and arsenic on mitochondrial function in the liver.

**Pubmed Data** : Appl Biochem Biotechnol. 2023 Mar 22. Epub 2023 Mar 22. PMID: [36947368](#)

**Article Published Date** : Mar 21, 2023

**Authors** : Huma Khan, Yeshvandra Verma, S V S Rana

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Arsenic Poisoning : CK(383) : AC(129), Chemically-Induced Liver Damage : CK(2167) : AC(1069), Fluoride Toxicity : CK(1389) : AC(376)

**Additional Keywords** : Synergistic Toxicity : CK(226) : AC(109)

**Problem Substances** : Arsenic : CK(595) : AC(181), Sodium Fluoride : CK(1446) : AC(393)

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## Fisetin attenuates arsenic and fluoride subacute co-exposure induced neurotoxicity.

**Pubmed Data** : Neurotoxicology. 2023 Jul ;97:133-149. Epub 2023 Jun 16. PMID: [37331635](#)

**Article Published Date** : Jun 30, 2023

**Authors** : Vitthal V Gopnar, Debarati Rakshit, Mounisha Bandakinda, Uttam Kulhari, Bidya Dhar Sahu, Awanish Mishra

**Study Type** : Animal Study

**Additional Links**

**Substances** : Fisetin : CK(441) : AC(275)

**Diseases** : Arsenic Poisoning : CK(383) : AC(129), Fluoride Toxicity : CK(1389) : AC(376)

**Pharmacological Actions** : Anti-Inflammatory Agents : CK(35225) : AC(15297), Tumor Necrosis Factor (TNF) Alpha Inhibitor : CK(10605) : AC(4670)

**Problem Substances** : Arsenic : CK(595) : AC(181), Sodium Fluoride : CK(1446) : AC(393)

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## Synergistic effects of arsenic and fluoride on oxidative stress and apoptotic pathway in Leydig and Sertoli cells.

**Pubmed Data** : Toxicology. 2022 Jun 15 ;475:153241. Epub 2022 Jun 14. PMID: [35714946](#)

**Article Published Date** : Jun 14, 2022

**Authors** : Yasemin Aydin, Banu Orta-Yilmaz

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : Arsenic Poisoning : CK(383) : AC(129), Fluoride Toxicity : CK(1389) : AC(376), Oxidative Stress : CK(13443) : AC(5499)

**Additional Keywords** : Synergistic Toxicity : CK(226) : AC(109)

**Problem Substances** : Arsenic : CK(595) : AC(181), Sodium Fluoride : CK(1446) : AC(393)

## Arterial Calcification (AC 3) (CK 13)

### Effect of water fluoridation on the development of medial vascular calcification in uremic rats.

**Pubmed Data** : Toxicology. 2014 Apr 6 ;318:40-50. Epub 2014 Feb 18. PMID: [24561004](#)

**Article Published Date** : Apr 06, 2014

**Authors** : Ana Martín-Pardillos, Cecilia Sosa, Ángel Millán, Víctor Sorribas

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Arterial Calcification : CK(268) : AC(45), Atheroma : CK(17) : AC(5), Atherosclerosis : CK(1964) : AC(771), Chronic Kidney Disease (CKD) : CK(1176) : AC(210), Ectopic Calcification : CK(1125) : AC(185), Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances** : Fluoride : CK(1815) : AC(454)

**Adverse Pharmacological Actions** : Cardiotoxic : CK(1168) : AC(209)

### Fluorine is a factor in premature aging, and related adverse health effects.

**Pubmed Data** : Ann Acad Med Stetin. 2004 ;50 Suppl 1:9-13. PMID: [16892576](#)

**Article Published Date** : Jan 01, 2004

**Authors** : Anna Machoy-Mokrzyńska

**Study Type** : Review

**Additional Links**

**Diseases** : Aging : CK(5992) : AC(1444), Arterial Calcification : CK(268) : AC(45)

**Problem Substances** : Fluoride : CK(1815) : AC(454), Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Cardiotoxic : CK(1168) : AC(209)

### There is an association of vascular fluoride uptake with vascular calcification and coronary artery disease.

**Pubmed Data** : Nucl Med Commun. 2012 Jan ;33(1):14-20. PMID: [21946616](#)

**Article Published Date** : Jan 01, 2012

**Authors** : Yuxin Li, Gholam R Berenji, Wisam F Shaba, Bashir Tafti, Ella Yevdayev, Simin Dadparvar

**Study Type** : Human Study

**Additional Links**

**Diseases** : Arterial Calcification : CK(268) : AC(45), Ectopic Calcification : CK(1125) : AC(185), Vascular Calcification : CK(443) : AC(82)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

## Atheroma (AC 1) (CK 2)

### Effect of water fluoridation on the development of medial vascular calcification in uremic rats.

**Pubmed Data** : Toxicology. 2014 Apr 6 ;318:40-50. Epub 2014 Feb 18. PMID: [24561004](#)

**Article Published Date** : Apr 06, 2014

**Authors** : Ana Martín-Pardillos, Cecilia Sosa, Ángel Millán, Víctor Sorribas

**Study Type** : Animal Study

#### Additional Links

**Diseases** : Arterial Calcification : CK(268) : AC(45), Atheroma : CK(17) : AC(5), Atherosclerosis : CK(1964) : AC(771), Chronic Kidney Disease (CKD) : CK(1176) : AC(210), Ectopic Calcification : CK(1125) : AC(185), Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances** : Fluoride : CK(1815) : AC(454)

**Adverse Pharmacological Actions** : Cardiotoxic : CK(1168) : AC(209)

## Atherosclerosis (AC 1) (CK 2)

### Effect of water fluoridation on the development of medial vascular calcification in uremic rats.

**Pubmed Data** : Toxicology. 2014 Apr 6 ;318:40-50. Epub 2014 Feb 18. PMID: [24561004](#)

**Article Published Date** : Apr 06, 2014

**Authors** : Ana Martín-Pardillos, Cecilia Sosa, Ángel Millán, Víctor Sorribas

**Study Type** : Animal Study

#### Additional Links

**Diseases** : Arterial Calcification : CK(268) : AC(45), Atheroma : CK(17) : AC(5), Atherosclerosis : CK(1964) : AC(771), Chronic Kidney Disease (CKD) : CK(1176) : AC(210), Ectopic Calcification : CK(1125) : AC(185), Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances** : Fluoride : CK(1815) : AC(454)

**Adverse Pharmacological Actions** : Cardiotoxic : CK(1168) : AC(209)

## Attention Deficit Disorder with Hyperactivity (AC 3) (CK 21)

### Early exposure to fluoride may have neurotoxic effects on neurodevelopment affecting behavioral, cognitive and psychosomatic symptoms related to ADHD diagnosis.

**Pubmed Data** : Medicina (Kaunas). 2023 Apr 19 ;59(4). Epub 2023 Apr 19. PMID: [37109754](#)

**Article Published Date** : Apr 18, 2023

**Authors** : Gianluca Fiore, Federica Veneri, Rosaria Di Lorenzo, Luigi Generali, Marco Vinceti, Tommaso Filippini

**Study Type** : Review

**Additional Links**

**Diseases** : [Attention Deficit Disorder with Hyperactivity](#) : CK(633) : AC(84), [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Neurotoxic](#) : CK(2838) : AC(702)

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## Exposure to higher levels of fluoride in tap water is associated with an increased risk of ADHD symptoms and diagnosis of ADHD.

**Pubmed Data** : Environ Int. 2019 Dec ;133(Pt B):105190. Epub 2019 Oct 22. PMID: [31654913](#)

**Article Published Date** : Nov 30, 2019

**Authors** : Julia K Riddell, Ashley J Malin, David Flora, Hugh McCague, Christine Till

**Study Type** : Human Study

**Additional Links**

**Diseases** : [Attention Deficit Disorder with Hyperactivity](#) : CK(633) : AC(84), [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Additional Keywords** : [Increased Risk](#) : CK(8492) : AC(1109)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Prenatal fluoride exposure and attention deficit hyperactivity disorder (ADHD) symptoms in children.

**Pubmed Data** : Environ Int. 2018 Dec ;121(Pt 1):658-666. Epub 2018 Oct 10. PMID: [30316181](#)

**Article Published Date** : Nov 30, 2018

**Authors** : Morteza Bashash, Maelle Marchand, Howard Hu, Christine Till, E Angeles Martinez-Mier, Brisa N Sanchez, Niladri Basu, Karen E Peterson, Rivka Green, Lourdes Schnaas, Adriana Mercado-García, Mauricio Hernández-Avila, Martha María Téllez-Rojo

**Study Type** : Human Study

**Additional Links**

**Diseases** : [Attention Deficit Disorder with Hyperactivity](#) : CK(633) : AC(84), [Fluoride Toxicity](#) : CK(1389) : AC(376), [Prenatal Chemical Exposures](#) : CK(2428) : AC(530)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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# Attention Deficit Hyperactivity Disorder (AC 1) (CK 10)

**This study has empirically demonstrated an association between more widespread exposure to fluoridated water and increased ADHD prevalence in U.S. children and adolescents.**

**Pubmed Data** : Environ Health. 2015 ;14(1):17. Epub 2015 Feb 27. PMID: [25890329](#)

**Article Published Date** : Dec 31, 2014

**Authors** : Ashley J Malin, Christine Till

**Study Type** : Human Study

**Additional Links**

**Diseases** : [Attention Deficit Hyperactivity Disorder](#) : CK(535) : AC(67)

**Additional Keywords** : [Toxic Substance Synergy](#) : CK(29) : AC(7)

**Problem Substances** : [Lead](#) : CK(684) : AC(227), [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Neurotoxic](#) : CK(2838) : AC(702)

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## Autism (AC 1) (CK 1)

**This study suggests that excitotoxicity may be the central mechanism of autism spectrum disorders and that excitotoxins like aluminum, fluoride, and mercury may exacerbate excitotoxicity.**

**Pubmed Data** : Curr Med Chem. 2009 ;16(2):157-70. PMID: [19149568](#)

**Article Published Date** : Jan 01, 2009

**Authors** : R L Blaylock, A Strunecka

**Study Type** : Review

**Additional Links**

**Diseases** : Autism : CK(942) : AC(162), Autism Spectrum Disorders : CK(3676) : AC(557), Brain: Microglial Activation : CK(192) : AC(114), Heavy Metal Toxicity : CK(2713) : AC(1019)

**Additional Keywords** : Heavy Metals and Autism : CK(89) : AC(15), Vaccine Research : CK(571) : AC(113)

**Problem Substances** : Aluminum : CK(1061) : AC(349), Fluoride : CK(1815) : AC(454), Mercury : CK(885) : AC(213)

**Adverse Pharmacological Actions** : Excitotoxic : CK(40) : AC(10), Neurotoxic : CK(2838) : AC(702)

## Autism Spectrum Disorders (AC 3) (CK 3)

**Chronic fluoride exposure and the risk of autism spectrum disorder.**

**Pubmed Data** : Int J Environ Res Public Health. 2019 Sep 16 ;16(18). Epub 2019 Sep 16. PMID: [31527457](#)

**Article Published Date** : Sep 15, 2019

**Authors** : Anna Strunecka, Otakar Strunecky

**Study Type** : Review

**Additional Links**

**Diseases** : Autism Spectrum Disorders : CK(3676) : AC(557), Neurodegenerative Diseases : CK(12159) : AC(4162)

**Additional Keywords** : Synergistic Toxicity : CK(226) : AC(109)

**Problem Substances** : Aluminum : CK(1061) : AC(349), Sodium Fluoride : CK(1446) : AC(393)

**Sequential systemic immune activation by immunological agents like vaccines can activate the brain immune system, leading to immunoexcitotoxicity which is exacerbated by fluoride and aluminum.**

**Pubmed Data** : Surg Neurol Int. 2018 ;9:74. Epub 2018 Apr 9. PMID: [29721353](#)

**Article Published Date** : Jan 01, 2018

**Authors** : Anna Strunecka, Russell L Blaylock, Jiri Patocka, Otakar Strunecky

**Study Type** : Review

**Additional Links**

**Diseases** : Autism Spectrum Disorders : CK(3676) : AC(557)

**Anti Therapeutic Actions** : Vaccination: All : CK(12701) : AC(1349)

**Problem Substances** : Aluminum : CK(1061) : AC(349), Fluoride : CK(1815) : AC(454)

**This study suggests that excitotoxicity may be the central mechanism of autism spectrum disorders and that excitotoxins like aluminum, fluoride, and mercury may exacerbate excitotoxicity.**

**Pubmed Data** : Curr Med Chem. 2009 ;16(2):157-70. PMID: [19149568](#)

**Article Published Date** : Jan 01, 2009

**Authors** : R L Blaylock, A Strunecka

**Study Type** : Review

**Additional Links**

**Diseases** : Autism : CK(942) : AC(162), Autism Spectrum Disorders : CK(3676) : AC(557), Brain: Microglial Activation : CK(192) : AC(114), Heavy Metal Toxicity : CK(2713) : AC(1019)

**Additional Keywords** : Heavy Metals and Autism : CK(89) : AC(15), Vaccine Research : CK(571) : AC(113)

**Problem Substances** : Aluminum : CK(1061) : AC(349), Fluoride : CK(1815) : AC(454), Mercury : CK(885) : AC(213)

**Adverse Pharmacological Actions** : Excitotoxic : CK(40) : AC(10), Neurotoxic : CK(2838) : AC(702)

## Autoimmune Diseases (AC 1) (CK 2)

### Fluoride induces autoimmune orchitis involved with enhanced IL-17A secretion in mice testis.

**Pubmed Data** : J Agric Food Chem. 2019 Nov 8. Epub 2019 Nov 8. PMID: [31703480](#)

**Article Published Date** : Nov 07, 2019

**Authors** : Panhong Wu, Zilong Sun, Xiaoqian Lv, Xuejing Pei, Ram Kumar Manthari, Jundong Wang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Autoimmune Diseases : CK(11878) : AC(2631), Fluoride Toxicity : CK(1389) : AC(376), Orchitis : CK(19) : AC(5)

**Additional Keywords** : Risk Factors : CK(14728) : AC(2072)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

## Azoospermic (AC 1) (CK 2)

### Fluoride-induced apoptosis and gene expression profiling in mice sperm in vivo has been observed.

**Pubmed Data** : Arch Toxicol. 2011 Nov ;85(11):1441-52. Epub 2011 Feb 22. PMID: [21340527](#)

**Article Published Date** : Nov 01, 2011

**Authors** : Zilong Sun, Ruiyan Niu, Bin Wang, Zhibin Jiao, Jinming Wang, Jianhai Zhang, Shaolin Wang, Jundong Wang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Azoospermic : CK(4) : AC(2), Infertility: Male : CK(1668) : AC(424), Oxidative Stress : CK(13443) : AC(5499), Sperm Count: Low : CK(116) : AC(25), Sperm Quality: Low : CK(611) : AC(121)

**Pharmacological Actions** : Antioxidants : CK(32218) : AC(14161), Apoptotic : CK(9052) : AC(7284)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Anti-Fertility : CK(112) : AC(21)

## Birth Defects (AC 1) (CK 2)



## Low levels of selenium, fluoride and arsenic are toxic to rat embryos.

**Pubmed Data** : Wei Sheng Yan Jiu. 1999 Mar 30;28(2):74-6. PMID: [11939006](#)

**Article Published Date** : Mar 30, 1999

**Authors** : Y Li, M Sun, D Wu, X Chen

**Study Type** : Animal Study

### Additional Links

**Diseases** : [Birth Defects](#) : CK(267) : AC(52), [Prenatal Chemical Exposures](#) : CK(2428) : AC(530)

**Additional Keywords** : [Drug Synergy](#) : CK(389) : AC(174)

**Problem Substances** : [Arsenic](#) : CK(595) : AC(181), [Fluoride](#) : CK(1815) : AC(454), [Sodium Selenate](#) : CK(11) : AC(8), [Sodium Selenite](#) : CK(23) : AC(16)

**Adverse Pharmacological Actions** : [Teratogenic](#) : CK(325) : AC(66)

## Blood-Brain-Barrier Disorders (AC 1) (CK 2)

### Fluoride may go through the blood-brain barrier and accumulate in rat hippocampus, and inhibit the activity of cholinesterase.

**Pubmed Data** : Zhonghua Lao Dong Wei Sheng Zhi Ye Bing Za Zhi. 2003 Apr ;21(2):102-4. PMID: [14761523](#)

**Article Published Date** : Apr 01, 2003

**Authors** : Jin-xia Zhai, Zhi-yong Guo, Chuan-lai Hu, Qi-nan Wang, Qi-xing Zhu

**Study Type** : Animal Study

### Additional Links

**Diseases** : [Blood-Brain-Barrier Disorders](#) : CK(31) : AC(18), [Brain Injury: Hippocampal Damage](#) : CK(44) : AC(21)

**Problem Substances** : [Fluoride](#) : CK(1815) : AC(454)

**Adverse Pharmacological Actions** : [Acetylcholinesterase inhibitor \(xenobiotic\)](#) : CK(8) : AC(4), [Neurotoxic](#) : CK(2838) : AC(702)

## Bone Diseases (AC 3) (CK 13)

### Calcium supplementation attenuates fluoride-induced bone injury.

**Pubmed Data** : J Hazard Mater. 2024 Mar 5 ;465:133411. Epub 2024 Jan 2. PMID: [38181596](#)

**Article Published Date** : Mar 04, 2024

**Authors** : Yingjun Hu, Yuanyuan Li, Meng Li, Tianrui Zhao, Wenhui Zhang, Yinghui Wang, Yang He, Hui Zhao, Haojie Li, Tianyu Wang, Yangfei Zhao, Jundong Wang, Jinming Wang

**Study Type** : Animal Study

### Additional Links

**Substances** : [Calcium](#) : CK(444) : AC(68)

**Diseases** : [Bone Diseases](#) : CK(325) : AC(101), [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Pharmacological Actions** : [Anti-Apoptotic](#) : CK(4942) : AC(3051), [Osteogenic](#) : CK(171) : AC(67)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

### Different effects of fluoride exposure on the three major bone cell types.



**Pubmed Data** : Biol Trace Elem Res. 2020 Jan ;193(1):226-233. Epub 2019 Mar 14. PMID: [30877522](#)

**Article Published Date** : Dec 31, 2019

**Authors** : Ningning Jiang, Fengyang Guo, Boyao Sun, Xiuyun Zhang, Hui Xu

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : [Bone Diseases](#) : CK(325) : AC(101), [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Apoptotic](#) : CK(278) : AC(120)

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## Fluoride exposure and prevalence of osteochondroma in drinking water Endemic fluorosis areas of Heilongjiang Province, China.

**Pubmed Data** : Int J Environ Health Res. 2023 Nov 3:1-14. Epub 2023 Nov 3. PMID: [37921081](#)

**Article Published Date** : Nov 02, 2023

**Authors** : Yongzheng Ma, Yang Liu, Xiaona Liu, Mang Li, Jing Cui, Zhizhong Guan, Junrui Pei, Yanhui Gao

**Study Type** : Human Study

**Additional Links**

**Diseases** : [Bone Diseases](#) : CK(325) : AC(101), [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Bone Fractures (AC 2) (CK 20)

### Community water fluoridation and rate of pediatric fractures.

**Pubmed Data** : J Am Acad Orthop Surg Glob Res Rev. 2023 Oct 1 ;7(10). Epub 2023 Oct 5. PMID: [37796978](#)

**Article Published Date** : Sep 30, 2023

**Authors** : Sarah E Lindsay, Spencer Smith, Scott Yang, Jung Yoo

**Study Type** : Human Study

**Additional Links**

**Diseases** : [Bone Fractures](#) : CK(697) : AC(121), [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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### Excessive fluoride in water causes severe dental fluorosis and raises fracture risks, urging defluoridation in affected areas.

**Pubmed Data** : Ecotoxicol Environ Saf. 2024 Sep 1 ;282:116705. Epub 2024 Jul 13. PMID: [39003868](#)

**Article Published Date** : Sep 01, 2024

**Authors** : Zeynab Ghaemi, Masoud Noshadi

**Study Type** : Human Study

**Additional Links**

**Diseases** : [Bone Fractures](#) : CK(697) : AC(121), [Fluorosis](#) : CK(262) : AC(42)

**Problem Substances** : [Fluoride](#) : CK(1815) : AC(454)

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## Bone Marrow Suppression (AC 1) (CK 2)

## Reduction in fluoride-induced genotoxicity in mouse bone marrow cells after substituting high fluoride-containing water with safe drinking water.

**Pubmed Data** : J Appl Toxicol. 2011 Oct ;31(7):703-5. Epub 2011 Mar 5. PMID: [21381055](#)

**Article Published Date** : Oct 01, 2011

**Authors** : Santosh Podder, Ansuman Chattopadhyay, Shelley Bhattacharya

**Study Type** : Animal Study

### Additional Links

**Diseases** : Bone Marrow Suppression : CK(16) : AC(5), DNA damage : CK(2255) : AC(824)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Brain Inflammation (AC 4) (CK 7)

### Aluminium, fluoride and a combination of aluminium-fluoride treatments caused an increase in brain lipid peroxidation products and reactive oxygen species formation.

**Pubmed Data** : Pathophysiology. 2015 Mar ;22(1):39-48. Epub 2014 Dec 13. PMID: [25577494](#)

**Article Published Date** : Feb 28, 2015

**Authors** : Ibukun Dorcas Akinrinade, Adejoke Elizabeth Memudu, Olalekan Michael Ogundele, Olanrewaju Ibrahim Ajetunmobi

**Study Type** : Animal Study

### Additional Links

**Diseases** : Aluminum Toxicity : CK(685) : AC(308), Brain Inflammation : CK(1650) : AC(901), Fluoride Toxicity : CK(1389) : AC(376), Neurodegenerative Diseases : CK(12159) : AC(4162), Oxidative Stress : CK(13443) : AC(5499)

**Additional Keywords** : Increased Risk : CK(8492) : AC(1109), Synergistic Toxicity : CK(226) : AC(109)

**Problem Substances** : Aluminum : CK(1061) : AC(349), Fluoride : CK(1815) : AC(454), Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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### Exposure to fluoride in the prenatal and neonatal period result in the increase in COX2 activity and increase in PGE2 concentration in rats brain.

**Pubmed Data** : Neurotoxicology. 2019 Sep ;74:81-90. Epub 2019 Jun 5. PMID: [31175943](#)

**Article Published Date** : Aug 31, 2019

**Authors** : Karolina Dec, Agnieszka Łukomska, Karolina Skonieczna-Żydecka, Agnieszka Kolasa-Wołoskiuk, Maciej Tarnowski, Irena Baranowska-Bosiacka, Izabela Gutowska

**Study Type** : Animal Study

### Additional Links

**Diseases** : Brain Inflammation : CK(1650) : AC(901), Fluoride Toxicity : CK(1389) : AC(376), Neurodegenerative Diseases : CK(12159) : AC(4162), Prenatal Chemical Exposures : CK(2428) : AC(530)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Inflammatory : CK(541) : AC(169)

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### Fluoride induces neutrophil extracellular traps and aggravates brain inflammation by disrupting neutrophil calcium homeostasis and causing ferroptosis.

**Pubmed Data** : Environ Pollut. 2023 Aug 15 ;331(Pt 1):121847. Epub 2023 May 18. PMID: [37209896](#)

**Article Published Date** : Aug 14, 2023

**Authors** : Dongxu Wang, Kai Yin, Yue Zhang, Hongmin Lu, Lulu Hou, Hongjing Zhao, Mingwei Xing

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : [Brain Inflammation](#) : CK(1650) : AC(901), [Fluoride Toxicity](#) : CK(1389) : AC(376), [Inflammation](#) : CK(15536) : AC(5279)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

## The accumulation of sodium fluoride alters the neurological function which leads to neurodegenerative disorders.

**Pubmed Data** : Biol Trace Elem Res. 2020 Aug 31. Epub 2020 Aug 31. PMID: [32865723](#)

**Article Published Date** : Aug 30, 2020

**Authors** : Yugandhar P Reddy, Santosh Tiwari, Lomas K Tomar, Nalini Desai, Varun Kumar Sharma

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Brain Inflammation](#) : CK(1650) : AC(901), [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

## Brain Injury: Hippocampal Damage (AC 1) (CK 2)

### Fluoride may go through the blood-brain barrier and accumulate in rat hippocampus, and inhibit the activity of cholinesterase.

**Pubmed Data** : Zhonghua Lao Dong Wei Sheng Zhi Ye Bing Za Zhi. 2003 Apr ;21(2):102-4. PMID: [14761523](#)

**Article Published Date** : Apr 01, 2003

**Authors** : Jin-xia Zhai, Zhi-yong Guo, Chuan-lai Hu, Qi-nan Wang, Qi-xing Zhu

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Blood-Brain-Barrier Disorders](#) : CK(31) : AC(18), [Brain Injury: Hippocampal Damage](#) : CK(44) : AC(21)

**Problem Substances** : [Fluoride](#) : CK(1815) : AC(454)

**Adverse Pharmacological Actions** : [Acetylcholinesterase inhibitor \(xenobiotic\)](#) : CK(8) : AC(4), [Neurotoxic](#) : CK(2838) : AC(702)

## Brain: Microglial Activation (AC 2) (CK 2)

### The toxic effects of fluoride on the central nervous system may be related to the activation of microglia cells.

**Pubmed Data** : Mediators Inflamm. 2012 ;2012:102954. Epub 2012 Aug 13. PMID: [22933830](#)

**Article Published Date** : Jan 01, 2012

**Authors** : Xi Shuhua, Liu Ziyou, Yan Ling, Wang Fei, Guifan Sun

**Study Type** : In Vitro Study

#### Additional Links

**Diseases** : Brain: Microglial Activation : CK(192) : AC(114), Neurodegenerative Diseases : CK(12159) : AC(4162)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702), Oxidant : CK(646) : AC(246)

**This study suggests that excitotoxicity may be the central mechanism of autism spectrum disorders and that excitotoxins like aluminum, fluoride, and mercury may exacerbate excitotoxicity.**

**Pubmed Data** : Curr Med Chem. 2009 ;16(2):157-70. PMID: [19149568](#)

**Article Published Date** : Jan 01, 2009

**Authors** : R L Blaylock, A Strunecka

**Study Type** : Review

#### Additional Links

**Diseases** : Autism : CK(942) : AC(162), Autism Spectrum Disorders : CK(3676) : AC(557), Brain: Microglial Activation : CK(192) : AC(114), Heavy Metal Toxicity : CK(2713) : AC(1019)

**Additional Keywords** : Heavy Metals and Autism : CK(89) : AC(15), Vaccine Research : CK(571) : AC(113)

**Problem Substances** : Aluminum : CK(1061) : AC(349), Fluoride : CK(1815) : AC(454), Mercury : CK(885) : AC(213)

**Adverse Pharmacological Actions** : Excitotoxic : CK(40) : AC(10), Neurotoxic : CK(2838) : AC(702)

## Brain: Oxidative Stress (AC 3) (CK 5)

**Administration of resveratrol along with aluminum + fluoride showed significant reversal of oxidative stress and neuronal damage.**

**Pubmed Data** : Interdiscip Toxicol. 2016 Jun ;9(2):78-82. Epub 2017 May 17. PMID: [28652849](#)

**Article Published Date** : May 31, 2016

**Authors** : Chandra Shakar Reddy Nalagani, Pratap Reddy Karnati

**Study Type** : Animal Study

#### Additional Links

**Substances** : Resveratrol : CK(3081) : AC(1505)

**Diseases** : Aluminum Toxicity : CK(685) : AC(308), Brain: Oxidative Stress : CK(635) : AC(345), Fluoride Toxicity : CK(1389) : AC(376)

**Pharmacological Actions** : Antioxidants : CK(32218) : AC(14161), Neuroprotective Agents : CK(17667) : AC(7641)

**Additional Keywords** : Synergistic Toxicity : CK(226) : AC(109)

**Problem Substances** : Aluminum : CK(1061) : AC(349), Sodium Fluoride : CK(1446) : AC(393)

**Emodin protected against synaptic impairment and oxidative stress induced by fluoride in SH-SY5Y cells.**

**Pubmed Data** : Environ Toxicol. 2020 Sep ;35(9):922-929. Epub 2020 Apr 15. PMID: [32293791](#)

**Article Published Date** : Aug 31, 2020

**Authors** : Chencen Lai, Qian Chen, Yuanting Ding, Heng Liu, Zhi Tang

**Study Type** : In Vitro Study

#### Additional Links

**Substances** : Emodin : CK(405) : AC(258)

**Diseases** : Brain: Oxidative Stress : CK(635) : AC(345), Fluoride Toxicity : CK(1389) : AC(376)

**Pharmacological Actions** : Neuroprotective Agents : CK(17667) : AC(7641)

**Problem Substances** : Fluoride : CK(1815) : AC(454), Sodium Fluoride : CK(1446) : AC(393)

**Synergistic oxidative impact of aluminum chloride and sodium fluoride**

## exposure during early stages of brain development.

**Pubmed Data** : Environ Sci Pollut Res Int. 2019 Feb 20. Epub 2019 Feb 20. PMID: [30788699](#)

**Article Published Date** : Feb 19, 2019

**Authors** : Amal A Kinawy

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Aluminum Toxicity : CK(685) : AC(308), Brain: Oxidative Stress : CK(635) : AC(345), Fluoride Toxicity : CK(1389) : AC(376)

**Additional Keywords** : Synergistic Toxicity : CK(226) : AC(109)

**Problem Substances** : Aluminum Chloride : CK(171) : AC(92), Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

## Breastfeeding Concerns: Chemical Exposure (AC 1) (CK 2)

### Sodium fluoride during gestation and lactation affects male reproduction in adult rats by decreasing spermatogenesis and steroidogenesis.

**Pubmed Data** : Naturwissenschaften. 2007 Jul;94(7):607-11. Epub 2007 Feb 22. PMID: [17318612](#)

**Article Published Date** : Jul 01, 2007

**Authors** : P Sreedhar Reddy, T Pushpalatha, P Sreenivasula Reddy

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Breastfeeding Concerns: Chemical Exposure : CK(123) : AC(19), Hormone Insufficiency : CK(30) : AC(8), Infertility: Male : CK(1668) : AC(424), Prenatal Chemical Exposures : CK(2428) : AC(530)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Endocrine Disruptor : CK(529) : AC(106)

## C-Reactive Protein (AC 1) (CK 10)

### Association between dental fluorosis prevalence and inflammation levels in school-aged children with low-to-moderate fluoride exposure.

**Pubmed Data** : Environ Pollut. 2023 Mar 1 ;320:120995. Epub 2023 Jan 2. PMID: [36603756](#)

**Article Published Date** : Feb 28, 2023

**Authors** : Huayang Tang, Mengru Wang, Gaochun Li, Mengwei Wang, Chen Luo, Guoyu Zhou, Qian Zhao, Lixin Dong, Hongliang Liu, Yushan Cui, Li Liu, Shun Zhang, Aiguo Wang

**Study Type** : Human Study

**Additional Links**

**Diseases** : C-Reactive Protein : CK(3920) : AC(389), C-Reactive Protein : CK(3920) : AC(389), Fluoride Toxicity : CK(1389) : AC(376), Inflammation : CK(15536) : AC(5279)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Inflammatory : CK(541) : AC(169)

## Cardiomyopathy (AC 1) (CK 2)

### Fluoride induced tissue hypercalcemia, IL-17 mediated inflammation and apoptosis lead to cardiomyopathy.

**Pubmed Data** : Toxicology. 2018 Aug 1 ;406-407:44-57. Epub 2018 May 22. PMID: [29800585](#)

**Article Published Date** : Jul 31, 2018

**Authors** : Javed Ahsan Quadri, Saba Sarwar, Pinky, Parmita Kar, Seema Singh, Saumya Ranjan Mallick, Sudheer Arava, Tapash Chand Nag, Tara Sankar Roy, A Shariff

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Cardiomyopathy : CK(358) : AC(160), Fluoride Toxicity : CK(1389) : AC(376), Inflammation : CK(15536) : AC(5279)

**Problem Substances** : Fluoride : CK(1815) : AC(454), Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Apoptotic : CK(278) : AC(120), Cardiotoxic : CK(1168) : AC(209), Inflammatory : CK(541) : AC(169)

## Cardiovascular Diseases (AC 2) (CK 3)

### Fluoride and arsenic exhibit cardiotoxic properties related to their pro-inflammatory effect.

**Pubmed Data** : Arch Toxicol. 2012 Mar 16. Epub 2012 Mar 16. PMID: [22422340](#)

**Article Published Date** : Mar 16, 2012

**Authors** : Yanqin Ma, Ruiyan Niu, Zilong Sun, Jinming Wang, Guangying Luo, Jianhai Zhang, Jundong Wang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Cardiovascular Diseases : CK(17124) : AC(2826)

**Problem Substances** : Arsenic : CK(595) : AC(181), Fluoride : CK(1815) : AC(454)

**Adverse Pharmacological Actions** : Cardiotoxic : CK(1168) : AC(209), Inflammatory : CK(541) : AC(169), Interleukin-6 up-regulation : CK(41) : AC(10), Interleukin-8 up-regulation : CK(2) : AC(1), MCP-1 (CCL2) up-regulation : CK(7) : AC(2), P-selectin upregulation : CK(2) : AC(1), Vascular Cell Adhesion Molecule-1 (VCAM-1) Up-Regulation : CK(4) : AC(2)

### This study explored the possible mechanism of fluoride induced endothelial cell injury.

**Pubmed Data** : Toxicology. 2023 Jun 15 ;492:153530. Epub 2023 Apr 28. PMID: [37121536](#)

**Article Published Date** : Jun 14, 2023

**Authors** : Chao Zhang, Yue Wang, Fengya Huang, Yaoyuan Zhang, Yunzhu Liu, Qingbo Wang, Xiaodi Zhang, Bingyun Li, Linet Angwa, Yuting Jiang, Yanhui Gao

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : Cardiovascular Diseases : CK(17124) : AC(2826), Endothelial Dysfunction : CK(2710) : AC(571), Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

# Chemically-Induced Liver Damage (AC 24) (CK 52)

## Alpha-lipoic acid alleviated fluoride-induced hepatocyte injury.

**Pubmed Data** : J Agric Food Chem. 2022 Dec 21 ;70(50):15962-15971. Epub 2022 Dec 2. PMID: [36459405](#)

**Article Published Date** : Dec 20, 2022

**Authors** : Yangfei Zhao, Xueyan Liu, Chen Liang, Ting Pei, Mingyue Guo, Jundong Wang, Jianhai Zhang

**Study Type** : Animal Study

**Additional Links**

**Substances** : [Alpha-Lipoic Acid](#) : CK(1499) : AC(365)

**Diseases** : [Chemically-Induced Liver Damage](#) : CK(2167) : AC(1069)

**Pharmacological Actions** : [Hepatoprotective](#) : CK(8320) : AC(3765)

**Problem Substances** : [Fluoride](#) : CK(1815) : AC(454)

## Alpha-lipoic acid as a potential preventive and palliative agent for fluoride-induced hepatotoxic injury.

**Pubmed Data** : Chem Biol Interact. 2023 Nov 1 ;385:110719. Epub 2023 Sep 20. PMID: [37739047](#)

**Article Published Date** : Oct 31, 2023

**Authors** : Yanghuan Yu, Jipeng Xu, Hao Li, Jia Lv, Yaqin Zhang, Ruiyan Niu, Jundong Wang, Yangfei Zhao, Zilong Sun

**Study Type** : Animal Study

**Additional Links**

**Substances** : [Alpha-Lipoic Acid](#) : CK(1499) : AC(365)

**Diseases** : [Chemically-Induced Liver Damage](#) : CK(2167) : AC(1069), [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Pharmacological Actions** : [Antioxidants](#) : CK(32218) : AC(14161), [Hepatoprotective](#) : CK(8320) : AC(3765)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

## Co-exposure to arsenic-fluoride results in endoplasmic reticulum stress-induced apoptosis through the PERK signaling pathway in the liver of offspring rats.

**Pubmed Data** : Biol Trace Elem Res. 2020 Sep ;197(1):192-201. Epub 2019 Nov 25. PMID: [31768761](#)

**Article Published Date** : Aug 31, 2020

**Authors** : Nisha Dong, Jing Feng, Jiabin Xie, Xiaolin Tian, Meng Li, Penghui Liu, Yannan Zhao, Cailing Wei, Yi Gao, Ben Li, Yulan Qiu, Xiaoyan Yan

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Arsenic Poisoning](#) : CK(383) : AC(129), [Chemically-Induced Liver Damage](#) : CK(2167) : AC(1069), [Fluoride Toxicity](#) : CK(1389) : AC(376), [Prenatal Chemical Exposures](#) : CK(2428) : AC(530)

**Pharmacological Actions** : [Apoptotic](#) : CK(9052) : AC(7284)

**Problem Substances** : [Fluoride](#) : CK(1815) : AC(454), [Sodium Fluoride](#) : CK(1446) : AC(393)

## Combined effects of fluoride and arsenic on mitochondrial function in the liver.

**Pubmed Data** : Appl Biochem Biotechnol. 2023 Mar 22. Epub 2023 Mar 22. PMID: [36947368](#)

**Article Published Date** : Mar 21, 2023

**Authors** : Huma Khan, Yeshvandra Verma, S V S Rana

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Arsenic Poisoning](#) : CK(383) : AC(129), [Chemically-Induced Liver Damage](#) : CK(2167) : AC(1069), [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Additional Keywords** : [Synergistic Toxicity](#) : CK(226) : AC(109)

**Problem Substances** : [Arsenic](#) : CK(595) : AC(181), [Sodium Fluoride](#) : CK(1446) : AC(393)



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## Effects of fluoride on DNA damage and caspase-mediated apoptosis in the liver of rats.

**Pubmed Data** : Biol Trace Elem Res. 2015 Aug ;166(2):173-82. Epub 2015 Feb 20. PMID: [25693680](#)

**Article Published Date** : Jul 31, 2015

**Authors** : Guo Hua Song, Fu Bing Huang, Ji Ping Gao, Mao Lin Liu, Wen Biao Pang, Wei bin Li, Xiao Yan Yan, Mei Jun Huo, Xia Yang

**Study Type** : Animal Study

### Additional Links

**Diseases** : [Chemically-Induced Liver Damage](#) : CK(2167) : AC(1069), [DNA damage](#) : CK(2255) : AC(824), [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Apoptotic](#) : CK(278) : AC(120), [Hepatotoxic](#) : CK(400) : AC(124)

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## Exposure to fluoride induces apoptosis in the liver, kidney, and heart of *Xenopus laevis*.

**Pubmed Data** : Acta Histochem. 2023 Apr ;125(3):151999. Epub 2023 Mar 9. PMID: [36905872](#)

**Article Published Date** : Mar 31, 2023

**Authors** : Siting Wang, Hongmei Ning, Liushuai Hua, Fei Ren, Lingli Chen, Zhisheng Ma, Rongbo Li, Yaming Ge, Zhihong Yin

**Study Type** : Animal Study

### Additional Links

**Diseases** : [Chemically-Induced Liver Damage](#) : CK(2167) : AC(1069), [Fluoride Toxicity](#) : CK(1389) : AC(376), [Kidney Damage: Chemically-Induced](#) : CK(542) : AC(270)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Hepatotoxic](#) : CK(400) : AC(124), [Renotoxic](#) : CK(56) : AC(20)

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## Expression of SDF-1/CXCR4 and related inflammatory factors in sodium fluoride-treated hepatocytes.

**Pubmed Data** : PLoS One. 2024 ;19(6):e0302530. Epub 2024 Jun 21. PMID: [38905184](#)

**Article Published Date** : Dec 31, 2023

**Authors** : Rui Yang, Hongting Shen, Mingjun Wang, Yaqian Zhao, Shiling Zhu, Hong Jiang, Yanan Li, Guanglan Pu, Xun Chen, Ping Chen, Qing Lu, Jing Ma, Qiang Zhang

**Study Type** : In Vitro Study

### Additional Links

**Diseases** : [Chemically-Induced Liver Damage](#) : CK(2167) : AC(1069), [Fluoride Toxicity](#) : CK(1389) : AC(376), [Inflammation](#) : CK(15536) : AC(5279)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Interleukin-1 up-regulation](#) : CK(8) : AC(3), [Interleukin-6 up-regulation](#) : CK(41) : AC(10), [Tumor necrosis factor \$\alpha\$  \(TNF \$\alpha\$ \) up-regulation](#) : CK(65) : AC(11)

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## Fluoridated tap water was associated with an increased risk of hepatic failure.

**Pubmed Data** : World J Pediatr. 2024 Oct ;20(10):1029-1042. Epub 2024 Jun 27. PMID: [38937407](#)

**Article Published Date** : Sep 30, 2024

**Authors** : Won Seok Lee, Ju Hee Kim, Boeun Han, Gi Chun Lee, Hye Ri Jung, Ye Jin Shin, Eun Kyo Ha, Eun Lee, Soonchul Lee, Man Yong Han

**Study Type** : Human Study

### Additional Links

**Diseases** : [Chemically-Induced Liver Damage](#) : CK(2167) : AC(1069), [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Hepatotoxic](#) : CK(400) : AC(124)

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## Fluoride exposure induces mitochondrial damage and mitophagy via activation of the IL-17A pathway in hepatocytes.

**Pubmed Data** : Sci Total Environ. 2022 Jan 15 ;804:150184. Epub 2021 Sep 8. PMID: [34517333](#)

**Article Published Date** : Jan 14, 2022

**Authors** : Yangfei Zhao, Jinming Wang, Jianhai Zhang, Zilong Sun, Ruiyan Niu, Ram Kumar Manthari, Mohammad Mehdi Ommati, Shaolin Wang, Jundong Wang

**Study Type** : Animal Study, In Vitro Study

### Additional Links

**Diseases** : [Chemically-Induced Liver Damage](#) : CK(2167) : AC(1069), [Fluoride Toxicity](#) : CK(1389) : AC(376), [Mitochondrial Dysfunction](#) : CK(618) : AC(262)

**Problem Substances** : [Fluoride](#) : CK(1815) : AC(454), [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Hepatotoxic](#) : CK(400) : AC(124)

## Fluoride-induced hepatic and cardio-renal toxicity in a concentration-dependent manner.

**Pubmed Data** : Biol Trace Elem Res. 2023 Jan ;201(1):229-241. Epub 2022 Jan 12. PMID: [35023047](#)

**Article Published Date** : Dec 31, 2022

**Authors** : Priyanka Sharma, Pawan Kumar Verma, Shilpa Sood, Maninder Singh, Deepika Verma

**Study Type** : Animal Study

### Additional Links

**Diseases** : [Chemically-Induced Liver Damage](#) : CK(2167) : AC(1069), [Fluoride Toxicity](#) : CK(1389) : AC(376), [Kidney Damage: Chemically-Induced](#) : CK(542) : AC(270), [Lipid Peroxidation](#) : CK(1901) : AC(774), [Oxidative Stress](#) : CK(13443) : AC(5499)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

## Genotoxicity of fluoride subacute exposure in rats and selenium intervention.

**Pubmed Data** : Chemosphere. 2021 Mar ;266:128978. Epub 2020 Nov 17. PMID: [33298328](#)

**Article Published Date** : Feb 28, 2021

**Authors** : Jelena Radovanović, Biljana Antonijević, Stoimir Kolarević, Sanja Milutinović-Smiljanić, Jelena Mandić, Branka Vuković-Gačić, Zorica Bulat, Marijana Ćurčić, Margareta Kračun-Kolarević, Karolina Sunjog, Jovana Kostić-Vuković, Jovana Jovanović Marić, Evica Antonijević-Miljaković, Danijela Đukić-Ćosić, Aleksandra Buha Djordjevic, Dragana Javorac, Katarina Baralić, Zoran Mandinić

**Study Type** : In Vitro Study

### Additional Links

**Substances** : [Selenium](#) : CK(1706) : AC(389)

**Diseases** : [Chemically-Induced Liver Damage](#) : CK(2167) : AC(1069), [DNA damage](#) : CK(2255) : AC(824), [Fluoride Toxicity](#) : CK(1389) : AC(376), [Spleen Damage: Chemically Induced](#) : CK(2) : AC(9)

**Pharmacological Actions** : [Genoprotective](#) : CK(522) : AC(203)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Genotoxic](#) : CK(545) : AC(184), [Neurotoxic](#) : CK(2838) : AC(702)

## Ginkgo biloba attenuated hepatotoxicity induced by combined exposure to cadmium and fluoride.

**Pubmed Data** : Mol Biol Rep. 2020 Sep ;47(9):6961-6972. Epub 2020 Sep 12. PMID: [32920758](#)

**Article Published Date** : Aug 31, 2020

**Authors** : Milad Arab-Nozari, Nematollah Ahangar, Ebrahim Mohammadi, Zahra Lorigooini, Mohammad Shokrzadeh, Fereshteh Talebpour Amiri, Fatemeh Shaki

**Study Type** : Animal Study

### Additional Links

**Substances** : [Ginkgo biloba](#) : CK(2025) : AC(644)

**Diseases** : [Chemically-Induced Liver Damage](#) : CK(2167) : AC(1069)

**Pharmacological Actions** : [Anti-Apoptotic](#) : CK(4942) : AC(3051), [Anti-Inflammatory Agents](#) : CK(35225) : AC(15297),

Antioxidants : CK(32218) : AC(14161), Hepatoprotective : CK(8320) : AC(3765)

**Problem Substances** : Cadmium : CK(562) : AC(265), Sodium Fluoride : CK(1446) : AC(393)

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## Grape seed proanthocyanidin extract as a naturally occurring prophylactic treatment for fluoride-induced hepatotoxicity associated with iron overload.

**Pubmed Data** : J Toxicol Sci. 2018 ;43(5):311-319. PMID: [29743442](#)

**Article Published Date** : Dec 31, 2017

**Authors** : Qiang Niu, Ping He, Shangzhi Xu, Ruling Ma, Yusong Ding, Lati Mu, Shugang Li

**Study Type** : Animal Study

**Additional Links**

**Substances** : Grape Seed Extract : CK(1047) : AC(329)

**Diseases** : Chemically-Induced Liver Damage : CK(2167) : AC(1069), Fluoride Toxicity : CK(1389) : AC(376), Iron Overload : CK(218) : AC(78)

**Pharmacological Actions** : Antioxidants : CK(32218) : AC(14161), Hepatoprotective : CK(8320) : AC(3765)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Grape seed proanthocyanins protect fluoride-induced hepatotoxicity.

**Pubmed Data** : Toxicol Res (Camb). 2024 Apr ;13(2):tfae039. Epub 2024 Mar 15. PMID: [38500515](#)

**Article Published Date** : Mar 31, 2024

**Authors** : Ran Wei, Guan Fang Ping, Zhe Tao Lang, Er Hui Wang

**Study Type** : In Vitro Study

**Additional Links**

**Substances** : Grape Seed Extract : CK(1047) : AC(329)

**Diseases** : Chemically-Induced Liver Damage : CK(2167) : AC(1069), Fluoride Toxicity : CK(1389) : AC(376)

**Pharmacological Actions** : Anti-Apoptotic : CK(4942) : AC(3051), Antioxidants : CK(32218) : AC(14161), Hepatoprotective : CK(8320) : AC(3765), Nrf2 activation : CK(2908) : AC(1762)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Hesperidin protects liver and kidney against sodium fluoride-induced toxicity.

**Pubmed Data** : Life Sci. 2021 Sep 15 ;281:119730. Epub 2021 Jun 17. PMID: [34147482](#)

**Article Published Date** : Sep 14, 2021

**Authors** : Cuneyt Caglayan, Fatih Mehmet Kandemir, Ekrem Darendelioğlu, Sefa Küçükler, Adnan Ayna

**Study Type** : In Vitro Study

**Additional Links**

**Substances** : Hesperidin : CK(845) : AC(358)

**Diseases** : Chemically-Induced Liver Damage : CK(2167) : AC(1069), Inflammation : CK(15536) : AC(5279), Kidney Damage: Chemically-Induced : CK(542) : AC(270), Oxidative Stress : CK(13443) : AC(5499)

**Pharmacological Actions** : Anti-Apoptotic : CK(4942) : AC(3051), Anti-Inflammatory Agents : CK(35225) : AC(15297), Antioxidants : CK(32218) : AC(14161), Hepatoprotective : CK(8320) : AC(3765), Renoprotective : CK(4133) : AC(1932)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Lead enhances fluoride influence on apoptotic processes in the HepG2 liver cell line.

**Pubmed Data** : Toxicol Ind Health. 2016 Mar ;32(3):517-25. Epub 2013 Nov 5. PMID: [24193047](#)

**Article Published Date** : Feb 29, 2016

**Authors** : Izabela Gutowska, Irena Baranowska-Bosiacka, Ewa Siwec, Małgorzata Szczuko, Agnieszka Kolasa, Anna Kondarewicz, Marta Rybicka, Małgorzata Dunaj-Stańczyk, Ireneusz Wiernicki, Dariusz Chlubek, Ewa Stachowska

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : Chemically-Induced Liver Damage : CK(2167) : AC(1069), Fluoride Toxicity : CK(1389) : AC(376), Lead Poisoning : CK(479) : AC(180)

**Additional Keywords :** Synergistic Toxicity : CK(226) : AC(109)

**Problem Substances :** Fluoride : CK(1815) : AC(454), Lead : CK(684) : AC(227), Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions :** Hepatotoxic : CK(400) : AC(124)

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## Mitochondrial respiratory chain dysfunction mediated by ROS is a primary point of fluoride-induced damage in Hepa1-6 cells.

**Pubmed Data :** Environ Pollut. 2019 Dec ;255(Pt 3):113359. Epub 2019 Oct 7. PMID: [31614248](#)

**Article Published Date :** Nov 30, 2019

**Authors :** Hong-Wei Wang, Yan Zhang, Pan-Pan Tan, Liu-Shu Jia, Yu Chen, Bian-Hua Zhou

**Study Type :** In Vitro Study

**Additional Links**

**Diseases :** Chemically-Induced Liver Damage : CK(2167) : AC(1069), Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances :** Fluoride : CK(1815) : AC(454)

**Adverse Pharmacological Actions :** Apoptotic : CK(278) : AC(120), Hepatotoxic : CK(400) : AC(124)

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## Novel pathways of fluoride-induced hepatotoxicity: P53-dependent ferroptosis induced by the SIRT1/FOXOs pathway and Nrf2/HO-1 pathway.

**Pubmed Data :** Comp Biochem Physiol C Toxicol Pharmacol. 2023 Feb ;264:109526. Epub 2022 Nov 29. PMID: [36455829](#)

**Article Published Date :** Jan 31, 2023

**Authors :** Dongxu Wang, Kai Yin, Yue Zhang, Hongmin Lu, Lulu Hou, Hongjing Zhao, Mingwei Xing

**Study Type :** In Vitro Study

**Additional Links**

**Diseases :** Chemically-Induced Liver Damage : CK(2167) : AC(1069), Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances :** Sodium Fluoride : CK(1446) : AC(393)

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## Sesamin plays an important role in maintaining hepatic health and preventing liver from toxic damage caused by fluoride.

**Pubmed Data :** Fish Shellfish Immunol. 2020 Nov ;106:715-723. Epub 2020 Aug 26. PMID: [32860904](#)

**Article Published Date :** Oct 31, 2020

**Authors :** Jinling Cao, Cuiping Feng, Lingtian Xie, Lijuan Li, Jianjie Chen, Shaojun Yun, Wenjing Guo, Tianyu Wang, Yijie Wu, Rui Meng, Guodong Wang, Xinjing He, Yongju Luo

**Study Type :** Animal Study

**Additional Links**

**Substances :** Sesamin : CK(207) : AC(94)

**Diseases :** Chemically-Induced Liver Damage : CK(2167) : AC(1069), Fluoride Toxicity : CK(1389) : AC(376), Oxidative Stress : CK(13443) : AC(5499)

**Pharmacological Actions :** Antioxidants : CK(32218) : AC(14161), Hepatoprotective : CK(8320) : AC(3765)

**Problem Substances :** Fluoride : CK(1815) : AC(454)

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## Sodium fluoride caused hepatic inflammatory responses and significantly inhibited the production of anti-inflammatory mediators.

**Pubmed Data :** Biol Trace Elem Res. 2018 Jul 30. Epub 2018 Jul 30. PMID: [30062462](#)

**Article Published Date :** Jul 29, 2018

**Authors :** Linlin Chen, Ping Kuang, Huan Liu, Qin Wei, Hengmin Cui, Jing Fang, Zhicai Zuo, Junliang Deng, Yinglun Li, Xun Wang, Ling Zhao

**Study Type :** Animal Study

**Additional Links**

**Diseases :** Chemically-Induced Liver Damage : CK(2167) : AC(1069), Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances :** Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions :** Inflammatory : CK(541) : AC(169)

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## Sodium fluoride causes oxidative stress and apoptosis in the mouse liver.

**Pubmed Data** : Aging (Albany NY). 2017 Jun 27 ;9(6):1623-1639. PMID: [28657544](#)

**Article Published Date** : Jun 26, 2017

**Authors** : Yujiao Lu, Qin Luo, Hengmin Cui, Huidan Deng, Ping Kuang, Huan Liu, Jing Fang, Zhicai Zuo, Junliang Deng, Yinglun Li, Xun Wang, Ling Zhao

**Study Type** : Animal Study

### Additional Links

**Diseases** : [Chemically-Induced Liver Damage](#) : CK(2167) : AC(1069), [Fluoride Toxicity](#) : CK(1389) : AC(376), [Oxidative Stress](#) : CK(13443) : AC(5499)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Apoptotic](#) : CK(278) : AC(120), [Hepatotoxic](#) : CK(400) : AC(124)

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## TFE3-mediated impairment of lysosomal biogenesis and defective autophagy contribute to fluoride-induced hepatotoxicity.

**Pubmed Data** : Ecotoxicol Environ Saf. 2023 Mar 15 ;253:114674. Epub 2023 Feb 22. PMID: [36827899](#)

**Article Published Date** : Mar 14, 2023

**Authors** : Zeyu Hu, Wanjing Xu, Jingjing Zhang, Yanling Tang, Hengrui Xing, Panpan Xu, Yue Ma, Qiang Niu

**Study Type** : Animal Study, In Vitro Study

### Additional Links

**Substances** : [Melatonin](#) : CK(2743) : AC(904)

**Diseases** : [Chemically-Induced Liver Damage](#) : CK(2167) : AC(1069), [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Pharmacological Actions** : [Hepatoprotective](#) : CK(8320) : AC(3765)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Treadmill exercise could restore the molecular changes caused by excessive sodium fluoride exposure.

**Pubmed Data** : Biol Trace Elem Res. 2023 Mar 8. Epub 2023 Mar 8. PMID: [36884125](#)

**Article Published Date** : Mar 07, 2023

**Authors** : Ke Liu, Lei Chai, Taotao Zhao, Shaosan Zhang, Jixiang Wang, Yanghuan Yu, Ruiyan Niu, Zilong Sun

**Study Type** : Animal Study

### Additional Links

**Diseases** : [Chemically-Induced Liver Damage](#) : CK(2167) : AC(1069), [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Therapeutic Actions** : [Exercise](#) : CK(6247) : AC(999), [Exercise: Running](#) : CK(593) : AC(71)

**Pharmacological Actions** : [Anti-Apoptotic](#) : CK(4942) : AC(3051), [Hepatoprotective](#) : CK(8320) : AC(3765)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Virgin coconut oil complements with its polyphenol components mitigate sodium fluoride toxicity in vitro and in vivo.

**Pubmed Data** : Drug Chem Toxicol. 2021 Aug 18:1-7. Epub 2021 Aug 18. PMID: [34407699](#)

**Article Published Date** : Aug 17, 2021

**Authors** : Soorya Parathodi Illam, Sruthi Panniyan Kandiyil, Arunaksharan Narayanankutty, Soumya Valappan Veetil, Thekkekara Devassy Babu, Rao M Uppu, Achuthan C Raghavamenon

**Study Type** : Animal Study, In Vitro Study

### Additional Links

**Substances** : [Coconut Oil](#) : CK(478) : AC(106), [Polyphenols](#) : CK(2728) : AC(996)

**Diseases** : [Chemically-Induced Liver Damage](#) : CK(2167) : AC(1069), [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Pharmacological Actions** : [Antioxidants](#) : CK(32218) : AC(14161), [Hepatoprotective](#) : CK(8320) : AC(3765)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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# Childhood Chemical Exposures (AC 4) (CK 40)

## Children's growth and intelligence can be adversely affected by fluoride and arsenic exposure in drinking water.

**Pubmed Data** : Environ Health Perspect. 2007 Apr;115(4):643-7. Epub 2007 Jan 9. PMID: [17450237](#)

**Article Published Date** : Apr 01, 2007

**Authors** : San-Xiang Wang, Zheng-Hui Wang, Xiao-Tian Cheng, Jun Li, Zhi-Ping Sang, Xiang-Dong Zhang, Ling-Ling Han, Xiao-Yan Qiao, Zhao-Ming Wu, Zhi-Quan Wang

**Study Type** : Human Study

### Additional Links

**Diseases** : Childhood Chemical Exposures : CK(165) : AC(17), Childhood Cognitive Disorders : CK(316) : AC(27), Children: Impaired Growth : CK(50) : AC(4), Intelligence Quotient (IQ): Low/Impaired : CK(312) : AC(27)

**Problem Substances** : Arsenic : CK(595) : AC(181), Fluoride : CK(1815) : AC(454)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Exposure to fluoride and arsenic in drinking water is associated with decreased intelligence in children.

**Pubmed Data** : Cad Saude Publica. 2007;23 Suppl 4:S579-87. PMID: [18038039](#)

**Article Published Date** : Jan 01, 2007

**Authors** : Diana Rocha-Amador, Maria Elena Navarro, Leticia Carrizales, Raúl Morales, Jaqueline Calderón

**Study Type** : Human Study

### Additional Links

**Diseases** : Childhood Chemical Exposures : CK(165) : AC(17), Childhood Cognitive Disorders : CK(316) : AC(27), Intelligence Quotient (IQ): Low/Impaired : CK(312) : AC(27)

**Problem Substances** : Arsenic : CK(595) : AC(181), Fluoride : CK(1815) : AC(454)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Fluoridation of water contributes to elevated blood levels and other disorders in children.

**Pubmed Data** : Neurotoxicology. 2007 Sep;28(5):1032-42. Epub 2007 Mar 1. PMID: [17420053](#)

**Article Published Date** : Sep 01, 2007

**Authors** : Myron J Coplan, Steven C Patch, Roger D Masters, Marcia S Bachman

**Study Type** : Human Study

### Additional Links

**Diseases** : Childhood Chemical Exposures : CK(165) : AC(17), Lead Poisoning : CK(479) : AC(180)

**Additional Keywords** : Fluoride In The Water : CK(13) : AC(3)

**Problem Substances** : Fluoride : CK(1815) : AC(454)

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## High iodine and high fluorine adversely effects the intelligence and health of children.

**Pubmed Data** : Zhonghua Liu Xing Bing Xue Za Zhi. 1994 Oct;15(5):296-8. PMID: [7859263](#)

**Article Published Date** : Oct 01, 1994

**Authors** : Y Yang, X Wang, X Guo

**Study Type** : Human Study

### Additional Links

**Diseases** : Childhood Chemical Exposures : CK(165) : AC(17), Childhood Cognitive Disorders : CK(316) : AC(27), Intelligence Quotient (IQ): Low/Impaired : CK(312) : AC(27), TSH: Elevated : CK(20) : AC(2)

**Problem Substances** : Fluoride : CK(1815) : AC(454), Iodine: Excess : CK(10) : AC(1)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Childhood Cognitive Disorders (AC 6) (CK 80)

**Children who live in a fluorosis area have 5 times higher odds of developing low IQ than those who live in a nonfluorosis area or a slight fluorosis area.**

**Pubmed Data** : Biol Trace Elem Res. 2008;126(1-3):115-20. Epub 2008 Aug 10. PMID: [18695947](#)

**Article Published Date** : Jan 01, 2008

**Authors** : Qin-Qing Tang, Jun Du, Heng-Hui Ma, Shao-Jun Jiang, Xiao-Jun Zhou

**Study Type** : Meta Analysis

**Additional Links**

**Diseases** : Childhood Cognitive Disorders : CK(316) : AC(27), Cognitive Decline/Dysfunction : CK(5061) : AC(1005), Intelligence Quotient (IQ): Low/Impaired : CK(312) : AC(27), Prenatal Nutrition: Learning/Intelligence of Offspring : CK(116) : AC(14)

**Problem Substances** : Fluoride : CK(1815) : AC(454)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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**Children's growth and intelligence can be adversely affected by fluoride and arsenic exposure in drinking water.**

**Pubmed Data** : Environ Health Perspect. 2007 Apr;115(4):643-7. Epub 2007 Jan 9. PMID: [17450237](#)

**Article Published Date** : Apr 01, 2007

**Authors** : San-Xiang Wang, Zheng-Hui Wang, Xiao-Tian Cheng, Jun Li, Zhi-Ping Sang, Xiang-Dong Zhang, Ling-Ling Han, Xiao-Yan Qiao, Zhao-Ming Wu, Zhi-Quan Wang

**Study Type** : Human Study

**Additional Links**

**Diseases** : Childhood Chemical Exposures : CK(165) : AC(17), Childhood Cognitive Disorders : CK(316) : AC(27), Children: Impaired Growth : CK(50) : AC(4), Intelligence Quotient (IQ): Low/Impaired : CK(312) : AC(27)

**Problem Substances** : Arsenic : CK(595) : AC(181), Fluoride : CK(1815) : AC(454)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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**Exposure to fluoride and arsenic in drinking water is associated with decreased intelligence in children.**

**Pubmed Data** : Cad Saude Publica. 2007;23 Suppl 4:S579-87. PMID: [18038039](#)

**Article Published Date** : Jan 01, 2007

**Authors** : Diana Rocha-Amador, Maria Elena Navarro, Leticia Carrizales, Raúl Morales, Jaqueline Calderón

**Study Type** : Human Study

**Additional Links**

**Diseases** : Childhood Chemical Exposures : CK(165) : AC(17), Childhood Cognitive Disorders : CK(316) : AC(27), Intelligence Quotient (IQ): Low/Impaired : CK(312) : AC(27)

**Problem Substances** : Arsenic : CK(595) : AC(181), Fluoride : CK(1815) : AC(454)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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**Exposure to high levels of fluoride may adversely influence children's intelligence development.**

**Pubmed Data** : Zhongguo Dang Dai Er Ke Za Zhi. 2008 Dec;10(6):723-5. PMID: [19102839](#)

**Article Published Date** : Dec 01, 2008

**Authors** : Ming Liu, Cong Qian

**Study Type** : Meta Analysis

**Additional Links**

**Diseases** : Childhood Cognitive Disorders : CK(316) : AC(27), Cognitive Decline/Dysfunction : CK(5061) : AC(1005), Fluoride



Toxicity : CK(1389) : AC(376), Fluorosis : CK(262) : AC(42), Intelligence Quotient (IQ): Low/Impaired : CK(312) : AC(27), Prenatal Nutrition: Learning/Intelligence of Offspring : CK(116) : AC(14)

**Problem Substances** : Fluoride : CK(1815) : AC(454)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

## Fluorosis is associated with impaired cognition in children.

**Pubmed Data** : Ann Indian Acad Neurol. 2021 ;24(5):715-720. Epub 2020 Nov 6. PMID: [35002129](#)

**Article Published Date** : Dec 31, 2020

**Authors** : Anjana Prabhakar, Kabeer Abdulkhayarkutty, Shaji Velayudhan Cheruvallil, Prasanth Sudhakaran

**Study Type** : Human Study

### Additional Links

**Diseases** : Childhood Cognitive Disorders : CK(316) : AC(27), Fluoride Toxicity : CK(1389) : AC(376), Fluorosis : CK(262) : AC(42)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

## High iodine and high fluorine adversely effects the intelligence and health of children.

**Pubmed Data** : Zhonghua Liu Xing Bing Xue Za Zhi. 1994 Oct;15(5):296-8. PMID: [7859263](#)

**Article Published Date** : Oct 01, 1994

**Authors** : Y Yang, X Wang, X Guo

**Study Type** : Human Study

### Additional Links

**Diseases** : Childhood Chemical Exposures : CK(165) : AC(17), Childhood Cognitive Disorders : CK(316) : AC(27), Intelligence Quotient (IQ): Low/Impaired : CK(312) : AC(27), TSH: Elevated : CK(20) : AC(2)

**Problem Substances** : Fluoride : CK(1815) : AC(454), Iodine: Excess : CK(10) : AC(1)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

## Children: Impaired Growth (AC 1) (CK 10)

### Children's growth and intelligence can be adversely affected by fluoride and arsenic exposure in drinking water.

**Pubmed Data** : Environ Health Perspect. 2007 Apr;115(4):643-7. Epub 2007 Jan 9. PMID: [17450237](#)

**Article Published Date** : Apr 01, 2007

**Authors** : San-Xiang Wang, Zheng-Hui Wang, Xiao-Tian Cheng, Jun Li, Zhi-Ping Sang, Xiang-Dong Zhang, Ling-Ling Han, Xiao-Yan Qiao, Zhao-Ming Wu, Zhi-Quan Wang

**Study Type** : Human Study

### Additional Links

**Diseases** : Childhood Chemical Exposures : CK(165) : AC(17), Childhood Cognitive Disorders : CK(316) : AC(27), Children: Impaired Growth : CK(50) : AC(4), Intelligence Quotient (IQ): Low/Impaired : CK(312) : AC(27)

**Problem Substances** : Arsenic : CK(595) : AC(181), Fluoride : CK(1815) : AC(454)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

## Chronic Kidney Disease (CKD) (AC 3) (CK 6)

## Ameliorative effect of traditional polyherbal formulation on TNF- $\alpha$ , IL-1 $\beta$ and Caspase-3 expression in kidneys.

**Pubmed Data** : J Ethnopharmacol. 2023 Jul 11 ;318(Pt A):116900. Epub 2023 Jul 11. PMID: [37442489](#)

**Article Published Date** : Jul 10, 2023

**Authors** : Mohammad Umar Khan, Parakh Basist, Gaurav, Sultan Zahiruddin, Naveen Reddy Penumallu, Sayeed Ahmad

**Study Type** : Animal Study, In Vitro Study

**Additional Links**

**Substances** : Apigenin : CK(432) : AC(391), Ellagic Acid : CK(537) : AC(292), Ferulic acid : CK(259) : AC(145), Quercetin : CK(1864) : AC(847)

**Diseases** : Chronic Kidney Disease (CKD) : CK(1176) : AC(210), Kidney Damage: Chemically-Induced : CK(542) : AC(270)

**Pharmacological Actions** : Anti-Inflammatory Agents : CK(35225) : AC(15297), Antioxidants : CK(32218) : AC(14161), Interleukin-1 beta downregulation : CK(5277) : AC(2851), Renoprotective : CK(4133) : AC(1932), Tumor Necrosis Factor (TNF) Alpha Inhibitor : CK(10605) : AC(4670)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

## Effect of water fluoridation on the development of medial vascular calcification in uremic rats.

**Pubmed Data** : Toxicology. 2014 Apr 6 ;318:40-50. Epub 2014 Feb 18. PMID: [24561004](#)

**Article Published Date** : Apr 06, 2014

**Authors** : Ana Martín-Pardillos, Cecilia Sosa, Ángel Millán, Víctor Sorribas

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Arterial Calcification : CK(268) : AC(45), Atheroma : CK(17) : AC(5), Atherosclerosis : CK(1964) : AC(771), Chronic Kidney Disease (CKD) : CK(1176) : AC(210), Ectopic Calcification : CK(1125) : AC(185), Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances** : Fluoride : CK(1815) : AC(454)

**Adverse Pharmacological Actions** : Cardiotoxic : CK(1168) : AC(209)

## Excess fluoride in drinking water and in the locally grown food in the affected areas might lead to chronic kidney diseases.

**Pubmed Data** : Environ Health Prev Med. 2015 Jul ;20(4):237-42. Epub 2015 Apr 28. PMID: [25916575](#)

**Article Published Date** : Jun 30, 2015

**Authors** : Ranjith W Dharmaratne

**Study Type** : Commentary

**Additional Links**

**Diseases** : Chronic Kidney Disease (CKD) : CK(1176) : AC(210), Fluoride Toxicity : CK(1389) : AC(376), Kidney Damage : CK(780) : AC(347)

**Additional Keywords** : Risk Factors : CK(14728) : AC(2072)

**Problem Substances** : Fluoride : CK(1815) : AC(454), Sodium Fluoride : CK(1446) : AC(393)

## Cognitive Decline/Dysfunction (AC 9) (CK 76)

**Children who live in a fluorosis area have 5 times higher odds of developing low IQ than those who live in a nonfluorosis area or a slight fluorosis area.**

**Pubmed Data** : Biol Trace Elem Res. 2008;126(1-3):115-20. Epub 2008 Aug 10. PMID: [18695947](#)

**Article Published Date** : Jan 01, 2008

**Authors** : Qin-Qing Tang, Jun Du, Heng-Hui Ma, Shao-Jun Jiang, Xiao-Jun Zhou



**Study Type** : Meta Analysis

**Additional Links**

**Diseases** : Childhood Cognitive Disorders : CK(316) : AC(27), Cognitive Decline/Dysfunction : CK(5061) : AC(1005), Intelligence Quotient (IQ): Low/Impaired : CK(312) : AC(27), Prenatal Nutrition: Learning/Intelligence of Offspring : CK(116) : AC(14)

**Problem Substances** : Fluoride : CK(1815) : AC(454)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Circulating levels of autophagy markers were low in children with higher fluoride body burden and lower intelligence quotient scores.

**Pubmed Data** : Toxicol Appl Pharmacol. 2019 Sep 1 ;378:114608. Epub 2019 Jun 5. PMID: [31173788](#)

**Article Published Date** : Aug 31, 2019

**Authors** : Guoyu Zhou, Sha Tang, Lu Yang, Qiang Niu, Jingwen Chen, Tao Xia, Sumei Wang, Mengwei Wang, Qian Zhao, Ling Liu, Pei Li, Lixin Dong, Kedi Yang, Shun Zhang, Aiguo Wang

**Study Type** : Human Study

**Additional Links**

**Diseases** : Cognitive Decline/Dysfunction : CK(5061) : AC(1005), Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Exposure to high levels of fluoride may adversely influence children's intelligence development.

**Pubmed Data** : Zhongguo Dang Dai Er Ke Za Zhi. 2008 Dec;10(6):723-5. PMID: [19102839](#)

**Article Published Date** : Dec 01, 2008

**Authors** : Ming Liu, Cong Qian

**Study Type** : Meta Analysis

**Additional Links**

**Diseases** : Childhood Cognitive Disorders : CK(316) : AC(27), Cognitive Decline/Dysfunction : CK(5061) : AC(1005), Fluoride Toxicity : CK(1389) : AC(376), Fluorosis : CK(262) : AC(42), Intelligence Quotient (IQ): Low/Impaired : CK(312) : AC(27), Prenatal Nutrition: Learning/Intelligence of Offspring : CK(116) : AC(14)

**Problem Substances** : Fluoride : CK(1815) : AC(454)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Focus on cognitive impairment induced by excessive fluoride: An update review.

**Pubmed Data** : Neuroscience. 2024 Oct 18 ;558:22-29. Epub 2024 Aug 11. PMID: [39137871](#)

**Article Published Date** : Oct 18, 2024

**Authors** : Yuhang Zhang, Yanhui Gao, Xiaona Liu

**Study Type** : Review

**Additional Links**

**Diseases** : Cognitive Decline/Dysfunction : CK(5061) : AC(1005), Mitochondrial Dysfunction : CK(618) : AC(262), Neurotoxicity : CK(49) : AC(27), Oxidative Stress : CK(13443) : AC(5499)

**Problem Substances** : Fluoride : CK(1815) : AC(454)

**Adverse Pharmacological Actions** : Oxidant : CK(646) : AC(246)

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## Inorganic fluoride and functions of brain.

**Pubmed Data** : Crit Rev Toxicol. 2020 Jan ;50(1):28-46. Epub 2020 Feb 19. PMID: [32073339](#)

**Article Published Date** : Dec 31, 2019

**Authors** : N I Agalakova, O V Nadei

**Study Type** : Review

**Additional Links**

**Diseases** : Cognitive Decline/Dysfunction : CK(5061) : AC(1005), Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Modifying effect of COMT gene polymorphism and a predictive role for proteomics analysis in children's intelligence in endemic fluorosis area in Tianjin, China.

**Pubmed Data** : Toxicol Sci. 2015 Apr ;144(2):238-45. Epub 2015 Jan 1. PMID: [25556215](#)

**Article Published Date** : Mar 31, 2015

**Authors** : Shun Zhang, Xiaofei Zhang, Hongliang Liu, Weidong Qu, Zhizhong Guan, Qiang Zeng, Chunyang Jiang, Hui Gao, Cheng Zhang, Rongrong Lei, Tao Xia, Zhenglun Wang, Lu Yang, Yihu Chen, Xue Wu, Yushan Cui, Linyu Yu, Aiguo Wang

**Study Type** : Human Study

**Additional Links**

**Diseases** : Cognitive Decline/Dysfunction : CK(5061) : AC(1005), Fluoride Toxicity : CK(1389) : AC(376)

**Additional Keywords** : Genomic Variation : CK(302) : AC(38)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Rats exposed to low iodine and high fluoride exhibit changes in brain proteins that may be associated with neurotoxicity.

**Pubmed Data** : Arch Toxicol. 2010 Apr 3. Epub 2010 Apr 3. PMID: [20364248](#)

**Article Published Date** : Apr 03, 2010

**Authors** : Yaming Ge, Ruiyan Niu, Jianhai Zhang, Jundong Wang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Cognitive Decline/Dysfunction : CK(5061) : AC(1005), Prenatal Nutrition: Learning/Intelligence of Offspring : CK(116) : AC(14)

**Problem Substances** : Fluoride : CK(1815) : AC(454)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Sirt3-mediated mitochondrial dysfunction is involved in fluoride-induced cognitive deficits.

**Pubmed Data** : Food Chem Toxicol. 2021 Dec ;158:112665. Epub 2021 Nov 12. PMID: [34780879](#)

**Article Published Date** : Nov 30, 2021

**Authors** : Dongmei Wang, Luyang Cao, Shunji Pan, Gang Wang, Lewei Wang, Ningyao Cao, Xueqin Hao

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Cognitive Decline/Dysfunction : CK(5061) : AC(1005), Cognitive Decline/Dysfunction : CK(5061) : AC(1005)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## The cognitive functions could be impaired in the older people living in high fluoride drinking water areas.

**Pubmed Data** : BMC Public Health. 2021 Dec 9 ;21(1):2237. Epub 2021 Dec 9. PMID: [34886821](#)

**Article Published Date** : Dec 08, 2021

**Authors** : Chao Ren, Peng Zhang, Xiao-Yan Yao, Hui-Hua Li, Rui Chen, Cai-Yi Zhang, De-Qin Geng

**Study Type** : Human Study

**Additional Links**

**Diseases** : Cognitive Decline/Dysfunction : CK(5061) : AC(1005), Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Colitis (AC 1) (CK 2)

### Alleviation of fluoride-induced colitis by tea polysaccharides.

**Pubmed Data** : J Hazard Mater. 2024 Sep 5 ;476:134858. Epub 2024 Jun 7. PMID: [38905983](#)

**Article Published Date** : Sep 05, 2024

**Authors** : Chenjun Zhao, Guijie Chen, Ying Huang, Yuxuan Zhang, Sichen Li, Zhiliang Jiang, Huihui Peng, Juan Wang, Daxiang Li, Ruyan Hou, Chuanyi Peng, Xiaochun Wan, Huimei Cai

**Study Type** : Animal Study

**Additional Links**

**Substances** : Tea : [CK\(4517\)](#) : [AC\(940\)](#)

**Diseases** : Colitis : [CK\(1495\)](#) : [AC\(715\)](#), Dysbiosis : [CK\(2010\)](#) : [AC\(579\)](#)

**Problem Substances** : Fluoride : [CK\(1815\)](#) : [AC\(454\)](#)

**Adverse Pharmacological Actions** : Dysbiotic : [CK\(2\)](#) : [AC\(1\)](#)

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## Coronary Artery Ecstasia (AC 1) (CK 10)

### Chronic fluoride exposure has an important role in pathogenesis of coronary artery ectasia.

**Pubmed Data** : Biol Trace Elem Res. 2011 Nov ;143(2):695-701. Epub 2010 Dec 7. PMID: [21136197](#)

**Article Published Date** : Nov 01, 2011

**Authors** : Ozkan Dede, Ercan Varol, Ahmet Altinbas, Simge Varol

**Study Type** : Human Study

**Additional Links**

**Diseases** : Coronary Artery Ecstasia : [CK\(10\)](#) : [AC\(1\)](#)

**Problem Substances** : Fluoride : [CK\(1815\)](#) : [AC\(454\)](#), Sodium Fluoride : [CK\(1446\)](#) : [AC\(393\)](#)

**Adverse Pharmacological Actions** : Cardiotoxic : [CK\(1168\)](#) : [AC\(209\)](#)

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## DNA damage (AC 15) (CK 25)

### Antimutagenic effects of the composition from green tea leaves extracts and caucasian persimmon fruits.

**Pubmed Data** : Bull Exp Biol Med. 2021 Dec ;172(2):143-145. Epub 2021 Dec 2. PMID: [34853971](#)

**Article Published Date** : Nov 30, 2021

**Authors** : M B Huseynov, N A Abdullaev

**Study Type** : In Vitro Study

**Additional Links**

**Substances** : Green Tea : [CK\(4441\)](#) : [AC\(1370\)](#), Persimmon : [CK\(200\)](#) : [AC\(106\)](#)

**Diseases** : DNA damage : [CK\(2255\)](#) : [AC\(824\)](#)

**Pharmacological Actions** : Antimutagenic Agents : [CK\(217\)](#) : [AC\(137\)](#), Antioxidants : [CK\(32218\)](#) : [AC\(14161\)](#)

**Additional Keywords** : Plant Extracts : [CK\(18030\)](#) : [AC\(6728\)](#)

**Problem Substances** : Sodium Fluoride : [CK\(1446\)](#) : [AC\(393\)](#)

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## Cell cycle arrest and gene expression profiling of testis in mice exposed to fluoride.

**Pubmed Data** : Environ Toxicol. 2017 May ;32(5):1558-1565. Epub 2016 Nov 14. PMID: [27862939](#)

**Article Published Date** : Apr 30, 2017

**Authors** : Kai Su, Zilong Sun, Ruiyan Niu, Ying Lei, Jing Cheng, Jundong Wang

**Study Type** : Animal Study

### Additional Links

**Diseases** : DNA damage : CK(2255) : AC(824), Fluoride Toxicity : CK(1389) : AC(376), Testicular Injury: Chemical/Metal Induced : CK(754) : AC(374)

**Problem Substances** : Fluoride : CK(1815) : AC(454), Sodium Fluoride : CK(1446) : AC(393)

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## Combination of fluoride and SO2 induce DNA damage and morphological alterations in male rat kidney.

**Pubmed Data** : Cell Physiol Biochem. 2018 ;50(2):734-744. Epub 2018 Oct 11. PMID: [30308495](#)

**Article Published Date** : Dec 31, 2017

**Authors** : Yan Gao, Chen Liang, Jianhai Zhang, Junjie Ma, Jinming Wang, Ruiyan Niu, Chiranjeevi Tikka, Yewei Wang, Jundong Wang

**Study Type** : Animal Study

### Additional Links

**Diseases** : Air Pollution Linked Toxicity : CK(4951) : AC(731), DNA damage : CK(2255) : AC(824), Fluoride Toxicity : CK(1389) : AC(376), Kidney Damage: Chemically-Induced : CK(542) : AC(270)

**Additional Keywords** : Synergistic Toxicity : CK(226) : AC(109)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Effects of fluoride on DNA damage and caspase-mediated apoptosis in the liver of rats.

**Pubmed Data** : Biol Trace Elem Res. 2015 Aug ;166(2):173-82. Epub 2015 Feb 20. PMID: [25693680](#)

**Article Published Date** : Jul 31, 2015

**Authors** : Guo Hua Song, Fu Bing Huang, Ji Ping Gao, Mao Lin Liu, Wen Biao Pang, Wei bin Li, Xiao Yan Yan, Mei Jun Huo, Xia Yang

**Study Type** : Animal Study

### Additional Links

**Diseases** : Chemically-Induced Liver Damage : CK(2167) : AC(1069), DNA damage : CK(2255) : AC(824), Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Apoptotic : CK(278) : AC(120), Hepatotoxic : CK(400) : AC(124)

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## Fluoride induces oxidative damage and SIRT1/autophagy through ROS-mediated JNK signaling.

**Pubmed Data** : Free Radic Biol Med. 2015 Dec ;89:369-78. Epub 2015 Sep 30. PMID: [26431905](#)

**Article Published Date** : Nov 30, 2015

**Authors** : Maiko Suzuki, Cheryl Bandoski, John D Bartlett

**Study Type** : In Vitro Study

### Additional Links

**Diseases** : DNA damage : CK(2255) : AC(824), Fluoride Toxicity : CK(1389) : AC(376), Oxidative Stress : CK(13443) : AC(5499)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Fluorosilicic acid and cotinine, separately and in combination, induce genotoxicity and telomeric reduction in human osteoblast cell line

## MG63.

**Pubmed Data** : Mutat Res Genet Toxicol Environ Mutagen. 2022 ;876-877:503474. Epub 2022 Feb 17. PMID: [35483789](#)

**Article Published Date** : Dec 31, 2021

**Authors** : Ana L H Garcia, Cristina A Matzenbacher, Solange Soares, Paula Rohr, Juliana da Silva

**Study Type** : Human In Vitro

**Additional Links**

**Diseases** : DNA damage : CK(2255) : AC(824), Fluoride Toxicity : CK(1389) : AC(376), Fluorosis : CK(262) : AC(42)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Fluorosilicic acid induces DNA damage and oxidative stress in bone marrow mesenchymal stem cells.

**Pubmed Data** : Mutat Res Genet Toxicol Environ Mutagen. 2021 ;861-862:503297. Epub 2020 Nov 21. PMID: [33551106](#)

**Article Published Date** : Dec 31, 2020

**Authors** : Ana L H Garcia, Juliana Picinini, Maiele D Silveira, Melissa Camassola, Ana P V Visentim, Mirian Salvador, Juliana da Silva

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : DNA damage : CK(2255) : AC(824), Fluoride Toxicity : CK(1389) : AC(376), Lipid Peroxidation : CK(1901) : AC(774), Oxidative Stress : CK(13443) : AC(5499)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Genotoxicity of fluoride subacute exposure in rats and selenium intervention.

**Pubmed Data** : Chemosphere. 2021 Mar ;266:128978. Epub 2020 Nov 17. PMID: [33298328](#)

**Article Published Date** : Feb 28, 2021

**Authors** : Jelena Radovanović, Biljana Antonijević, Stoimir Kolarević, Sanja Milutinović-Smiljanić, Jelena Mandić, Branka Vuković-Gačić, Zorica Bulat, Marijana Čurčić, Margareta Kračun-Kolarević, Karolina Sunjog, Jovana Kostić-Vuković, Jovana Jovanović Marić, Evica Antonijević-Miljaković, Danijela Đukić-Ćosić, Aleksandra Buha Djordjevic, Dragana Javorac, Katarina Baralić, Zoran Mandinić

**Study Type** : In Vitro Study

**Additional Links**

**Substances** : Selenium : CK(1706) : AC(389)

**Diseases** : Chemically-Induced Liver Damage : CK(2167) : AC(1069), DNA damage : CK(2255) : AC(824), Fluoride Toxicity : CK(1389) : AC(376), Spleen Damage: Chemically Induced : CK(2) : AC(9)

**Pharmacological Actions** : Genoprotective : CK(522) : AC(203)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Genotoxic : CK(545) : AC(184), Neurotoxic : CK(2838) : AC(702)

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## Reduction in fluoride-induced genotoxicity in mouse bone marrow cells after substituting high fluoride-containing water with safe drinking water.

**Pubmed Data** : J Appl Toxicol. 2011 Oct ;31(7):703-5. Epub 2011 Mar 5. PMID: [21381055](#)

**Article Published Date** : Oct 01, 2011

**Authors** : Santosh Podder, Ansuman Chattopadhyay, Shelley Bhattacharya

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Bone Marrow Suppression : CK(16) : AC(5), DNA damage : CK(2255) : AC(824)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Sodium fluoride and rotenone may interact synergistically leading to oxidative damage and neuronal cell loss.

**Pubmed Data** : Neurol Res. 2023 Nov ;45(11):979-987. Epub 2023 Sep 12. PMID: [37699078](#)

**Article Published Date** : Oct 31, 2023

**Authors** : Yilmaz Kocak, Gokhan Oto, Zubeyir Huyut, Hamit Hakan Alp, Fikret Turkan, Ezgi Onay

**Study Type** : Animal Study

**Additional Links**

**Diseases** : DNA damage : CK(2255) : AC(824), Oxidative Stress : CK(13443) : AC(5499)

**Pharmacological Actions** : Antioxidants : CK(32218) : AC(14161)

**Additional Keywords** : Synergistic Toxicity : CK(226) : AC(109)

**Problem Substances** : Rotenone : CK(57) : AC(32), Sodium Fluoride : CK(1446) : AC(393)

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## Sodium fluoride exposure exerts toxic effects on porcine oocyte maturation.

**Pubmed Data** : Sci Rep. 2017 Dec 6 ;7(1):17082. Epub 2017 Dec 6. PMID: [29213094](#)

**Article Published Date** : Dec 05, 2017

**Authors** : Shuang Liang, Zheng-Wen Nie, Minghui Zhao, Ying-Jie Niu, Kyung-Tae Shin, Xiang-Shun Cui

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : DNA damage : CK(2255) : AC(824), Fluoride Toxicity : CK(1389) : AC(376), Infertility: Female : CK(741) : AC(180), Oxidative Stress : CK(13443) : AC(5499)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Sodium fluoride induces apoptosis in the kidney of rats through caspase-mediated pathways and DNA damage.

**Pubmed Data** : J Physiol Biochem. 2014 Sep ;70(3):857-68. Epub 2014 Aug 27. PMID: [25158646](#)

**Article Published Date** : Aug 31, 2014

**Authors** : Guo Hua Song, Ji Ping Gao, Chun Fang Wang, Chao Yang Chen, Xiao Yan Yan, Min Guo, Yu Wang, Fu Bing Huang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : DNA damage : CK(2255) : AC(824), Fluoride Toxicity : CK(1389) : AC(376), Fluorosis : CK(262) : AC(42), Kidney Damage: Chemically-Induced : CK(542) : AC(270)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Apoptotic : CK(278) : AC(120), Renotoxic : CK(56) : AC(20)

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## Sodium fluoride promotes apoptosis by generation of reactive oxygen species in human lymphocytes.

**Pubmed Data** : J Toxicol Environ Health A. 2014 ;77(21):1269-80. PMID: [25268553](#)

**Article Published Date** : Dec 31, 2013

**Authors** : Manivannan Jothiramajayam, Sonali Sinha, Manosij Ghosh, Anish Nag, Aditi Jana, Anita Mukherjee

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : DNA damage : CK(2255) : AC(824), Fluoride Toxicity : CK(1389) : AC(376), Oxidative Stress : CK(13443) : AC(5499)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Apoptotic : CK(278) : AC(120), Genotoxic : CK(545) : AC(184)

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## The effect of lycopene on DNA damage and repair in fluoride-treated NRK-52E cell line.

**Pubmed Data** : Biol Trace Elem Res. 2021 May ;199(5):1979-1985. Epub 2020 Aug 8. PMID: [32770329](#)

**Article Published Date** : Apr 30, 2021

**Authors** : Sedat Çetin, Ayşe Usta, Veysel Yüksek

**Study Type** : In Vitro Study

**Additional Links**

**Substances** : Lycopene : CK(1265) : AC(371)

**Diseases** : DNA damage : CK(2255) : AC(824), Fluoride Toxicity : CK(1389) : AC(376)

**Pharmacological Actions** : Antioxidants : CK(32218) : AC(14161), Genoprotective : CK(522) : AC(203)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

## The effect of vitamin E and selenium combination in repairing fluoride-induced DNA damage to NRK-52E cells.

**Pubmed Data** : Mol Biol Rep. 2020 Oct ;47(10):7761-7770. Epub 2020 Oct 6. PMID: [33025505](#)

**Article Published Date** : Sep 30, 2020

**Authors** : Veysel Yüksek, Sedat Çetin, Ayşe Usta

**Study Type** : In Vitro Study

**Additional Links**

**Substances** : Selenium : CK(1706) : AC(389), Vitamin E : CK(3039) : AC(570)

**Diseases** : DNA damage : CK(2255) : AC(824), Fluoride Toxicity : CK(1389) : AC(376), Fluorosis : CK(262) : AC(42)

**Pharmacological Actions** : DNA Repair Up-regulation : CK(110) : AC(34), Genoprotective : CK(522) : AC(203)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

## Degenerative Joint Disease (AC 1) (CK 2)

### Chronic excess fluoride uptake contributes to degenerative joint disease.

**Pubmed Data** : Ecotoxicol Environ Saf. 2018 Oct 30 ;162:383-390. Epub 2018 Jul 13. PMID: [30015183](#)

**Article Published Date** : Oct 29, 2018

**Authors** : Clare Death, Graeme Coulson, Uwe Kierdorf, Horst Kierdorf, Richard Ploeg, Simon Firestone, Ian Dohoo, Jasmin Hufschmid

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Degenerative Joint Disease : CK(5) : AC(3), Fluoride Toxicity : CK(1389) : AC(376)

**Additional Keywords** : Increased Risk : CK(8492) : AC(1109)

**Problem Substances** : Fluoride : CK(1815) : AC(454)

## Dementia (AC 1) (CK 2)

### Pharmacological implications of ipriflavone against environmental metal-induced neurodegeneration and dementia.

**Pubmed Data** : Environ Sci Pollut Res Int. 2021 Jul 7. Epub 2021 Jul 7. PMID: [34235690](#)

**Article Published Date** : Jul 06, 2021

**Authors** : Hend M Hussien, Doaa A Ghareeb, Hany E A Ahmed, Hani S Hafez, Samar R Saleh

**Study Type** : Animal Study

**Additional Links**

**Substances** : Ipriflavone : CK(49) : AC(14)

**Diseases** : Dementia : CK(2180) : AC(375), Heavy Metal Toxicity : CK(2713) : AC(1019)

**Pharmacological Actions** : Neuroprotective Agents : CK(17667) : AC(7641)



## Dental Caries (AC 7) (CK 62)

### Fluorosis contributes to a more intense course of caries progression.

**Pubmed Data** : Wiad Lek. 2018;71(2 pt 2):335-338. PMID: [29786582](#)

**Article Published Date** : Dec 31, 2017

**Authors** : Valentina Trufanova, Olha Sheshukova, Vadym Davydenko, Tetiana Polishchuk, Sofia Bauman, Vitalina Dobroskok

**Study Type** : Human Study

**Additional Links**

**Diseases** : Dental Caries : CK(700) : AC(127), Dental Caries : CK(700) : AC(127)

**Additional Keywords** : Increased Risk : CK(8492) : AC(1109)

**Problem Substances** : Fluoride : CK(1815) : AC(454)

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### Green tea mouth rinse resulted in significant reduction of colony number of salivary Streptococcus mutans and Lactobacillus which is comparable with sodium fluoride mouth rinse.

**Pubmed Data** : Dent Res J (Isfahan). 2011 Dec ;8(Suppl 1):S58-63. PMID: [23372597](#)

**Article Published Date** : Nov 30, 2011

**Authors** : Maryam Hajenorouzali Tehrani, Gholamreza Asghari, Maryam Hajiahmadi

**Study Type** : Human Study

**Additional Links**

**Substances** : Green Tea : CK(4441) : AC(1370)

**Diseases** : Dental Caries : CK(700) : AC(127), Dental Plaque : CK(355) : AC(42)

**Pharmacological Actions** : Anti-Bacterial Agents : CK(4114) : AC(1943)

**Additional Keywords** : Mouthwash : CK(246) : AC(29), Natural Substances Versus Chemicals : CK(61) : AC(7), Superiority of Natural Substances versus Drugs : CK(1855) : AC(392)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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### High sugar intakes leads to high levels of caries in adults even in those with widespread water fluoridation and the use of fluoridated toothpastes.

**Pubmed Data** : BMC Public Health. 2014 ;14:863. Epub 2014 Sep 16. PMID: [25228012](#)

**Article Published Date** : Dec 31, 2013

**Authors** : Aubrey Sheiham, W Philip T James

**Study Type** : Human Study

**Additional Links**

**Diseases** : Dental Caries : CK(700) : AC(127)

**Additional Keywords** : Dose Response : CK(1769) : AC(700)

**Problem Substances** : Fluoride : CK(1815) : AC(454), Sugar : CK(13) : AC(4)

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### Prevention of dental caries by grape seed extract supplementation.

**Pubmed Data** : Nutr Health. 2019 Nov 24:260106019887890. Epub 2019 Nov 24. PMID: [31760860](#)

**Article Published Date** : Nov 23, 2019

**Authors** : Nicole M Delimont, Brandi N Carlson

**Study Type** : Review



#### Additional Links

**Diseases** : [Dental Caries](#) : CK(700) : AC(127)

**Pharmacological Actions** : [Antimicrobial](#) : CK(1531) : AC(781)

**Additional Keywords** : [Superiority of Natural Substances versus Drugs](#) : CK(1855) : AC(392)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## The effectiveness of 0.5% C. sinensis extract was more compared to 0.05% sodium fluoride and 0.2% chlorhexidine gluconate mouth rinses.

**Pubmed Data** : J Int Soc Prev Community Dent. 2015 May-Jun;5(3):218-26. PMID: [26236682](#)

**Article Published Date** : Apr 30, 2015

**Authors** : Chaitali U Hambire, Rashmi Jawade, Amol Patil, Vaibhav R Wani, Ankur A Kulkarni, Parag B Nehete

**Study Type** : Human Study

#### Additional Links

**Substances** : [Green Tea](#) : CK(4441) : AC(1370)

**Diseases** : [Dental Caries](#) : CK(700) : AC(127), [Dental Caries: Children](#) : CK(174) : AC(20), [Dental Plaque](#) : CK(355) : AC(42), [Gingivitis](#) : CK(595) : AC(86)

**Pharmacological Actions** : [Anti-Bacterial Agents](#) : CK(4114) : AC(1943)

**Additional Keywords** : [Natural Substances Versus Drugs](#) : CK(2773) : AC(556), [Superiority of Natural Substances versus Drugs](#) : CK(1855) : AC(392)

**Problem Substances** : [Chlorhexidine gluconate](#) : CK(52) : AC(7), [Sodium Fluoride](#) : CK(1446) : AC(393)

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## There is very little contemporary evidence, meeting the review's inclusion criteria, that has evaluated the effectiveness of water fluoridation for the prevention of caries.

**Pubmed Data** : Cochrane Database Syst Rev. 2015 ;6:CD010856. Epub 2015 Jun 18. PMID: [26092033](#)

**Article Published Date** : Dec 31, 2014

**Authors** : Zipporah Ihezor-Ejiofor, Helen V Worthington, Tanya Walsh, Lucy O'Malley, Jan E Clarkson, Richard Macey, Rahul Alam, Peter Tugwell, Vivian Welch, Anne-Marie Glenn

**Study Type** : Review

#### Additional Links

**Diseases** : [Dental Caries](#) : CK(700) : AC(127), [Dental Caries: Children](#) : CK(174) : AC(20), [Dental Caries: Children](#) : CK(174) : AC(20)

**Additional Keywords** : [Water Fluoridation](#) : CK(34) : AC(5)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Water fluoridation less effective now than in past.

**Pubmed Data** : Cochrane Database Syst Rev. 2024 Oct 4 ;10(10):CD010856. Epub 2024 Oct 4. PMID: [39362658](#)

**Article Published Date** : Oct 03, 2024

**Authors** : Zipporah Ihezor-Ejiofor, Tanya Walsh, Sharon R Lewis, Philip Riley, Dwayne Boyers, Janet E Clarkson, Helen V Worthington, Anne-Marie Glenn, Lucy O'Malley

**Study Type** : Meta Analysis

#### Additional Links

**Diseases** : [Dental Caries](#) : CK(700) : AC(127), [Fluorosis](#) : CK(262) : AC(42)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Dental Caries: Children (AC 2) (CK 11)

The effectiveness of 0.5% C. sinensis extract was more compared to

## 0.05% sodium fluoride and 0.2% chlorhexidine gluconate mouth rinses.

**Pubmed Data** : J Int Soc Prev Community Dent. 2015 May-Jun;5(3):218-26. PMID: [26236682](#)

**Article Published Date** : Apr 30, 2015

**Authors** : Chaitali U Hambire, Rashmi Jawade, Amol Patil, Vaibhav R Wani, Ankur A Kulkarni, Parag B Nehete

**Study Type** : Human Study

**Additional Links**

**Substances** : Green Tea : CK(4441) : AC(1370)

**Diseases** : Dental Caries : CK(700) : AC(127), Dental Caries: Children : CK(174) : AC(20), Dental Plaque : CK(355) : AC(42), Gingivitis : CK(595) : AC(86)

**Pharmacological Actions** : Anti-Bacterial Agents : CK(4114) : AC(1943)

**Additional Keywords** : Natural Substances Versus Drugs : CK(2773) : AC(556), Superiority of Natural Substances versus Drugs : CK(1855) : AC(392)

**Problem Substances** : Chlorhexidine gluconate : CK(52) : AC(7), Sodium Fluoride : CK(1446) : AC(393)

## There is very little contemporary evidence, meeting the review's inclusion criteria, that has evaluated the effectiveness of water fluoridation for the prevention of caries.

**Pubmed Data** : Cochrane Database Syst Rev. 2015 ;6:CD010856. Epub 2015 Jun 18. PMID: [26092033](#)

**Article Published Date** : Dec 31, 2014

**Authors** : Zipporah Iheozor-Ejiofor, Helen V Worthington, Tanya Walsh, Lucy O'Malley, Jan E Clarkson, Richard Macey, Rahul Alam, Peter Tugwell, Vivian Welch, Anne-Marie Glenny

**Study Type** : Review

**Additional Links**

**Diseases** : Dental Caries : CK(700) : AC(127), Dental Caries: Children : CK(174) : AC(20), Dental Caries: Children : CK(174) : AC(20)

**Additional Keywords** : Water Fluoridation : CK(34) : AC(5)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

## Dental Plaque (AC 3) (CK 30)

### Green tea mouth rinse resulted in significant reduction of colony number of salivary Streptococcus mutans and Lactobacillus which is comparable with sodium fluoride mouth rinse.

**Pubmed Data** : Dent Res J (Isfahan). 2011 Dec ;8(Suppl 1):S58-63. PMID: [23372597](#)

**Article Published Date** : Nov 30, 2011

**Authors** : Maryam Hajenorouzi Tehrani, Gholamreza Asghari, Maryam Hajiahmadi

**Study Type** : Human Study

**Additional Links**

**Substances** : Green Tea : CK(4441) : AC(1370)

**Diseases** : Dental Caries : CK(700) : AC(127), Dental Plaque : CK(355) : AC(42)

**Pharmacological Actions** : Anti-Bacterial Agents : CK(4114) : AC(1943)

**Additional Keywords** : Mouthwash : CK(246) : AC(29), Natural Substances Versus Chemicals : CK(61) : AC(7), Superiority of Natural Substances versus Drugs : CK(1855) : AC(392)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

### The effectiveness of 0.5% C. sinensis extract was more compared to 0.05% sodium fluoride and 0.2% chlorhexidine gluconate mouth rinses.

**Pubmed Data** : J Int Soc Prev Community Dent. 2015 May-Jun;5(3):218-26. PMID: [26236682](#)

**Article Published Date** : Apr 30, 2015

**Authors** : Chaitali U Hambire, Rashmi Jawade, Amol Patil, Vaibhav R Wani, Ankur A Kulkarni, Parag B Nehete

**Study Type** : Human Study

**Additional Links**

**Substances** : Green Tea : CK(4441) : AC(1370)

**Diseases** : Dental Caries : CK(700) : AC(127), Dental Caries: Children : CK(174) : AC(20), Dental Plaque : CK(355) : AC(42), Gingivitis : CK(595) : AC(86)

**Pharmacological Actions** : Anti-Bacterial Agents : CK(4114) : AC(1943)

**Additional Keywords** : Natural Substances Versus Drugs : CK(2773) : AC(556), Superiority of Natural Substances versus Drugs : CK(1855) : AC(392)

**Problem Substances** : Chlorhexidine gluconate : CK(52) : AC(7), Sodium Fluoride : CK(1446) : AC(393)

## Two randomized clinical studies to confirm differential plaque removal by sodium bicarbonate.

**Pubmed Data** : J Clin Dent. 2017 Sep ;28(3):44-48. PMID: [29211950](#)

**Article Published Date** : Aug 31, 2017

**Authors** : Stephen Mason, Ritu Karwal, Mary Lynn Bosma

**Study Type** : Human Study

**Additional Links**

**Substances** : Sodium Bicarbonate : CK(240) : AC(37)

**Diseases** : Dental Plaque : CK(355) : AC(42)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

## Depression (AC 2) (CK 4)

### Exercise ameliorates fluoride-induced anxiety- and depression-like behavior in mice.

**Pubmed Data** : Biol Trace Elem Res. 2022 Feb ;200(2):678-688. Epub 2021 Apr 6. PMID: [33825162](#)

**Article Published Date** : Jan 31, 2022

**Authors** : Qiqi Cao, Jixiang Wang, Yanru Hao, Fangye Zhao, Rong Fu, Yanghuan Yu, Jundong Wang, Ruiyan Niu, Shengtai Bian, Zilong Sun

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Anxiety : CK(4195) : AC(743), Depression : CK(8817) : AC(1715), Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

### Fluoride stimulates anxiety and depression-like behaviors.

**Pubmed Data** : J Agric Food Chem. 2021 Nov 17 ;69(45):13618-13627. Epub 2021 Nov 4. PMID: [34735150](#)

**Article Published Date** : Nov 16, 2021

**Authors** : Guoyu Zhou, Yue Hu, Anqi Wang, Meng Guo, Yuhui Du, Yongxiang Gong, Limin Ding, Zichen Feng, Xiangbo Hou, Kaihong Xu, Fangfang Yu, Zhiyuan Li, Yue Ba

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Anxiety : CK(4195) : AC(743), Depression : CK(8817) : AC(1715), Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

## Developmental Disorder: Children (AC 2) (CK 12)

### Excessive lysosomal stress response and consequently impaired autophagy contribute to fluoride-induced developmental neurotoxicity.

**Pubmed Data** : Biol Trace Elem Res. 2023 Sep ;201(9):4472-4483. Epub 2022 Dec 5. PMID: [36464725](#)

**Article Published Date** : Aug 31, 2023

**Authors** : Wanjing Xu, Zeyu Hu, Yanling Tang, Jingjing Zhang, Shangzhi Xu, Qiang Niu

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Developmental Disorder: Children : CK(148) : AC(19), Neurodegenerative Diseases : CK(12159) : AC(4162)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

### Maternal exposure to drinking water throughout pregnancy fluoridated at the level of 0.7 mg/L was associated with poorer inhibitory control and cognitive flexibility.

**Pubmed Data** : Sci Total Environ. 2023 Sep 15 ;891:164322. Epub 2023 May 25. PMID: [37236475](#)

**Article Published Date** : Sep 14, 2023

**Authors** : Deborah Dewey, Gillian England-Mason, Henry Ntanda, Andrea J Deane, Mandakini Jain, Nadia Barnieh, Gerald F Giesbrecht, Nicole Letourneau,

**Study Type** : Human Study

**Additional Links**

**Diseases** : Developmental Disorder: Children : CK(148) : AC(19), Fluoride Toxicity : CK(1389) : AC(376), Prenatal Chemical Exposures : CK(2428) : AC(530)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

## Diabetes Mellitus: Type 2 (AC 2) (CK 22)

### Community water fluoridation predicts increase in age-adjusted incidence and prevalence of diabetes in 22 states from 2005 and 2010.

**Pubmed Data** : J Water Health. 2016 Oct ;14(5):864-877. PMID: [27740551](#)

**Article Published Date** : Sep 30, 2016

**Authors** : Kyle Fluegge

**Study Type** : Human Study

**Additional Links**

**Diseases** : Diabetes Mellitus: Type 2 : CK(11728) : AC(2501), Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

### Exposure to fluoride exacerbates the cognitive deficit of diabetic patients living in areas with endemic fluorosis.

**Pubmed Data** : Sci Total Environ. 2024 Feb 20 ;912:169512. Epub 2023 Dec 23. PMID: [38145685](#)

**Article Published Date** : Feb 19, 2024

**Authors** : Jie Xiang, Xiao-Lan Qi, Kun Cao, Long-Yan Ran, Xiao-Xiao Zeng, Xiao Xiao, Wei Liao, Wen-Wen He, Wei Hong, Yan He, Zhi-Zhong Guan

**Study Type** : Animal Study, Human Study

**Additional Links**

**Diseases** : [Diabetes: Cognitive Dysfunction : CK\(379\) : AC\(149\)](#), [Diabetes Mellitus: Type 2 : CK\(11728\) : AC\(2501\)](#), [Fluoride Toxicity : CK\(1389\) : AC\(376\)](#)

**Additional Keywords** : [Increased Risk : CK\(8492\) : AC\(1109\)](#)

**Problem Substances** : [Sodium Fluoride : CK\(1446\) : AC\(393\)](#)

## Diabetes: Cognitive Dysfunction (AC 1) (CK 12)

**Exposure to fluoride exacerbates the cognitive deficit of diabetic patients living in areas with endemic fluorosis.**

**Pubmed Data** : Sci Total Environ. 2024 Feb 20 ;912:169512. Epub 2023 Dec 23. PMID: [38145685](#)

**Article Published Date** : Feb 19, 2024

**Authors** : Jie Xiang, Xiao-Lan Qi, Kun Cao, Long-Yan Ran, Xiao-Xiao Zeng, Xiao Xiao, Wei Liao, Wen-Wen He, Wei Hong, Yan He, Zhi-Zhong Guan

**Study Type** : Animal Study, Human Study

**Additional Links**

**Diseases** : [Diabetes: Cognitive Dysfunction : CK\(379\) : AC\(149\)](#), [Diabetes Mellitus: Type 2 : CK\(11728\) : AC\(2501\)](#), [Fluoride Toxicity : CK\(1389\) : AC\(376\)](#)

**Additional Keywords** : [Increased Risk : CK\(8492\) : AC\(1109\)](#)

**Problem Substances** : [Sodium Fluoride : CK\(1446\) : AC\(393\)](#)

## Diabetic Complications (AC 1) (CK 2)

**Exposure of fluoride with streptozotocin-induced diabetes aggravates testicular damage and spermatozoa parameters in mice.**

**Pubmed Data** : J Toxicol. 2019 ;2019:5269380. Epub 2019 Dec 3. PMID: [31885555](#)

**Article Published Date** : Dec 31, 2018

**Authors** : Manuel Sánchez-Gutiérrez, Evelia Martínez-Loredo, Eduardo Osiris Madrigal-Santillán, Gabriel Betanzos-Cabrera, Araceli Hernández-Zavala, María Angélica Mojica-Villegas, Jeannett Alejandra Izquierdo-Vega

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Diabetic Complications : CK\(4283\) : AC\(1544\)](#), [Fluoride Toxicity : CK\(1389\) : AC\(376\)](#), [Testicular Injury: Chemical/Metal Induced : CK\(754\) : AC\(374\)](#)

**Problem Substances** : [Sodium Fluoride : CK\(1446\) : AC\(393\)](#)

# Drug-Induced Nutrient Depletion: Riboflavin (B-2) (AC 1) (CK 2)

## Fluoride induces immunotoxicity by regulating riboflavin transport and metabolism partly through IL-17A in the spleen.

**Pubmed Data** : J Hazard Mater. 2024 Sep 5 ;476:135085. Epub 2024 Jul 2. PMID: [38968825](#)

**Article Published Date** : Sep 05, 2024

**Authors** : Yurou Qiao, Yukun Cui, Yanjia Tan, Cuicui Zhuang, Xiang Li, Yufei Yong, Xinying Zhang, Xuting Ren, Miaomiao Cai, Jie Yang, Yilin Lang, Jundong Wang, Chen Liang, Jianhai Zhang

**Study Type** : Animal Study

### Additional Links

**Diseases** : Drug-Induced Nutrient Depletion: Riboflavin (B-2) : CK(2) : AC(1), Low Immune Function: Chemically-Induced : CK(4) : AC(2), Mitochondrial Dysfunction : CK(618) : AC(262), Spleen Damage: Chemically Induced : CK(2) : AC(9)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Immunotoxic : CK(507) : AC(127)

# Dysbiosis (AC 3) (CK 6)

## Alleviation of fluoride-induced colitis by tea polysaccharides.

**Pubmed Data** : J Hazard Mater. 2024 Sep 5 ;476:134858. Epub 2024 Jun 7. PMID: [38905983](#)

**Article Published Date** : Sep 05, 2024

**Authors** : Chenjun Zhao, Guijie Chen, Ying Huang, Yuxuan Zhang, Sichen Li, Zhiliang Jiang, Huihui Peng, Juan Wang, Daxiang Li, Ruyan Hou, Chuanyi Peng, Xiaochun Wan, Huimei Cai

**Study Type** : Animal Study

### Additional Links

**Substances** : Tea : CK(4517) : AC(940)

**Diseases** : Colitis : CK(1495) : AC(715), Dysbiosis : CK(2010) : AC(579)

**Problem Substances** : Fluoride : CK(1815) : AC(454)

**Adverse Pharmacological Actions** : Dysbiotic : CK(2) : AC(1)

## Effect of fluoride in drinking water on fecal microbial community.

**Pubmed Data** : Biol Trace Elem Res. 2022 Jan ;200(1):238-246. Epub 2021 Feb 12. PMID: [33576944](#)

**Article Published Date** : Dec 31, 2021

**Authors** : Nan Zhong, Yongzheng Ma, Xinyue Meng, Alphonse Sowanou, Liaowei Wu, Wei Huang, Yanhui Gao, Junrui Pei

**Study Type** : Animal Study

### Additional Links

**Diseases** : Dysbiosis : CK(2010) : AC(579), Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

## Fluoride exposure cause colon microbiota dysbiosis by destroyed microenvironment and disturbed antimicrobial peptides expression in colon.

**Pubmed Data** : Environ Pollut. 2022 Jan 1 ;292(Pt B):118381. Epub 2021 Oct 18. PMID: [34673156](#)

**Article Published Date** : Dec 31, 2021

**Authors** : Shi-Quan Zhu, Jing Liu, Bo Han, Wen-Peng Zhao, Bian-Hua Zhou, Jing Zhao, Hong-Wei Wang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Dysbiosis : CK(2010) : AC(579), Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Gastrotoxic : CK(190) : AC(68)

## Dyslipidemias (AC 1) (CK 2)

**Treatment with rutin against sodium fluoride intoxication has a significant role in protecting F-induced cardiotoxicity, blood toxicity and dyslipidemia in rats.**

**Pubmed Data** : Toxicol Mech Methods. 2015 Feb ;25(2):143-9. Epub 2015 Feb 11. PMID: [25560802](#)

**Article Published Date** : Jan 31, 2015

**Authors** : V Umarani, Sudhakar Muvvala, A Ramesh, B V S Lakshmi, N Sravanthi

**Study Type** : Animal Study

**Additional Links**

**Substances** : Rutin : CK(460) : AC(221)

**Diseases** : Dyslipidemias : CK(1583) : AC(326), Fluoride Toxicity : CK(1389) : AC(376), Oxidative Stress : CK(13443) : AC(5499)

**Pharmacological Actions** : Cardioprotective : CK(8685) : AC(2877), Hypolipidemic : CK(8317) : AC(1985)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

## Ectopic Calcification (AC 3) (CK 22)

**Effect of water fluoridation on the development of medial vascular calcification in uremic rats.**

**Pubmed Data** : Toxicology. 2014 Apr 6 ;318:40-50. Epub 2014 Feb 18. PMID: [24561004](#)

**Article Published Date** : Apr 06, 2014

**Authors** : Ana Martín-Pardillos, Cecilia Sosa, Ángel Millán, Víctor Sorribas

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Arterial Calcification : CK(268) : AC(45), Atheroma : CK(17) : AC(5), Atherosclerosis : CK(1964) : AC(771), Chronic Kidney Disease (CKD) : CK(1176) : AC(210), Ectopic Calcification : CK(1125) : AC(185), Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances** : Fluoride : CK(1815) : AC(454)

**Adverse Pharmacological Actions** : Cardiotoxic : CK(1168) : AC(209)

**Fluoride deposits in the pineal gland with age and is associated with enhanced gland calcification.**

**Pubmed Data** : Caries Res. 2001 Mar-Apr;35(2):125-8. PMID: [11275672](#)

**Article Published Date** : Mar 01, 2001

**Authors** : J Luke



**Study Type** : Human Study

**Additional Links**

**Diseases** : Ectopic Calcification : CK(1125) : AC(185), Fluoride Toxicity : CK(1389) : AC(376), Pineal Gland Calcification : CK(233) : AC(31), Pineal Gland Diseases : CK(23) : AC(5)

**Problem Substances** : Fluoride : CK(1815) : AC(454)

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## There is an association of vascular fluoride uptake with vascular calcification and coronary artery disease.

**Pubmed Data** : Nucl Med Commun. 2012 Jan ;33(1):14-20. PMID: [21946616](#)

**Article Published Date** : Jan 01, 2012

**Authors** : Yuxin Li, Gholam R Berenji, Wisam F Shaba, Bashir Tafti, Ella Yevdayev, Simin Dadparvar

**Study Type** : Human Study

**Additional Links**

**Diseases** : Arterial Calcification : CK(268) : AC(45), Ectopic Calcification : CK(1125) : AC(185), Vascular Calcification : CK(443) : AC(82)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Endothelial Dysfunction (AC 1) (CK 1)

### This study explored the possible mechanism of fluoride induced endothelial cell injury.

**Pubmed Data** : Toxicology. 2023 Jun 15 ;492:153530. Epub 2023 Apr 28. PMID: [37121536](#)

**Article Published Date** : Jun 14, 2023

**Authors** : Chao Zhang, Yue Wang, Fengya Huang, Yaoyuan Zhang, Yunzhu Liu, Qingbo Wang, Xiaodi Zhang, Bingyun Li, Linet Angwa, Yuting Jiang, Yanhui Gao

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : Cardiovascular Diseases : CK(17124) : AC(2826), Endothelial Dysfunction : CK(2710) : AC(571), Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Enterococcus Infections (AC 1) (CK 1)

### Theobromine though nonfluoridated toothpaste showed greater zones of inhibition than other commercially available fluoridated kid's toothpastes.

**Pubmed Data** : Dent Res J (Isfahan). 2019 Mar-Apr;16(2):76-80. PMID: [30820200](#)

**Article Published Date** : Feb 28, 2019

**Authors** : Arthi Lakshmi, C Vishnurekha, Parisa Norouzi Baghkomeh

**Study Type** : In Vitro Study

**Additional Links**

**Substances** : Cocoa : CK(1608) : AC(214)

**Diseases** : Enterococcus Infections : CK(76) : AC(62), Steptococcus Mutans Infections : CK(467) : AC(157)

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**Pharmacological Actions** : Antimicrobial : CK(1531) : AC(781)

**Additional Keywords** : Superiority of Natural Substances versus Drugs : CK(1855) : AC(392)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Estrogen Deficiency (AC 1) (CK 2)

**Estrogen deficiency aggravates fluoride-induced small intestinal mucosa damage.**

**Pubmed Data** : Ecotoxicol Environ Saf. 2022 Nov ;246:114181. Epub 2022 Oct 14. PMID: [36252517](#)

**Article Published Date** : Oct 31, 2022

**Authors** : Ye Jin, Xiao-Ying Gao, Jing Zhao, Wei-Shun Tian, Yu-Ling Zhang, Er-Jie Tian, Bian-Hua Zhou, Hong-Wei Wang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Estrogen Deficiency : CK(61) : AC(21), Fluoride Toxicity : CK(1389) : AC(376)

**Additional Keywords** : Risk Factors : CK(14728) : AC(2072)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Female Reproductive Development Abnormalities (AC 1) (CK 2)

**The administration of high concentrations of fluoride to female mice results in ovarian damage and significantly reduces the number and the fertilization potential of mature oocytes.**

**Pubmed Data** : PLoS One. 2015 ;10(6):e0129594. Epub 2015 Jun 8. PMID: [26053026](#)

**Article Published Date** : Dec 31, 2014

**Authors** : Songna Yin, Chao Song, Haibo Wu, Xin Chen, Yong Zhang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Female Reproductive Development Abnormalities : CK(86) : AC(31), Infertility: Female : CK(741) : AC(180)

**Additional Keywords** : Gene Expression : CK(282) : AC(104)

**Problem Substances** : Fluoride : CK(1815) : AC(454), Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Anti-Fertility : CK(112) : AC(21)

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## Fetal Origin of Adult Disease (AC 2) (CK 3)

**Fluoride exposure in early life as the possible root cause of disease in later life.**

**Pubmed Data** : J Clin Pediatr Dent. 2018 ;42(5):325-330. Epub 2018 May 15. PMID: [29763350](#)

**Article Published Date** : Dec 31, 2017

**Authors** : Tetsuo Nakamoto, H Ralph Rawls

**Study Type** : Review

**Additional Links**

**Diseases** : Fetal Origin of Adult Disease : CK(249) : AC(62), Fluoride Toxicity : CK(1389) : AC(376), Prenatal Chemical Exposures : CK(2428) : AC(530)

**Problem Substances** : Fluoride : CK(1815) : AC(454)

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## Sodium fluoride may disrupt key genetic markers in developing embryos, potentially affecting normal growth.

**Pubmed Data** : Arch Toxicol. 2014 Feb ;88(2):241-8. Epub 2013 Sep 13. PMID: [24030355](#)

**Article Published Date** : Feb 01, 2014

**Authors** : Jia-Qiao Zhu, Yang-Jun Si, Lai-Yang Cheng, Bao-Zeng Xu, Qi-Wen Wang, Xiao Zhang, Heng Wang, Zong-Ping Liu

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fetal Origin of Adult Disease : CK(249) : AC(62)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Endocrine Disruptor : CK(529) : AC(106)

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## Fluoride Toxicity (AC 340) (CK 1310)

### A comparative evaluation of the fluoride content in commercially available infant formulae in India.

**Pubmed Data** : J Indian Soc Pedod Prev Dent. 2023 Oct 1 ;41(4):328-334. Epub 2024 Jan 18. PMID: [38235820](#)

**Article Published Date** : Sep 30, 2023

**Authors** : Asha Supriya Satti, Radhika Muppa, Ravichandra Sekhar Kotha, Srikanth Koya, Mrudhula J N Kantipudi, Ch Deepthi Siva Harika

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Fluorosis : CK(262) : AC(42)

**Additional Keywords** : Water Fluoridation : CK(34) : AC(5)

**Problem Substances** : Infant Formula : CK(659) : AC(97), Sodium Fluoride : CK(1446) : AC(393)

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### A mini review of fluoride-induced apoptotic pathways.

**Pubmed Data** : Environ Sci Pollut Res Int. 2018 Dec ;25(34):33926-33935. Epub 2018 Oct 18. PMID: [30338467](#)

**Article Published Date** : Nov 30, 2018

**Authors** : Qin Wei, Huidan Deng, Hengmin Cui, Jing Fang, Zhicai Zuo, Junliang Deng, Yinglun Li, Xun Wang, Ling Zhao

**Study Type** : Review

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376)

**Pharmacological Actions** : Apoptotic : CK(9052) : AC(7284)

**Problem Substances** : Fluoride : CK(1815) : AC(454), Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Apoptotic : CK(278) : AC(120)

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### A new insight into fluoride induces cardiotoxicity.

**Pubmed Data** : Toxicology. 2024 Jan ;501:153688. Epub 2023 Nov 28. PMID: [38036095](#)

**Article Published Date** : Dec 31, 2023

**Authors** : Lulu Hou, Haiyan Dong, Enyu Zhang, Hongmin Lu, Yue Zhang, Hongjing Zhao, Mingwei Xing

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Cardiotoxic](#) : CK(1168) : AC(209)

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## A relationship was identified between drinking fluoridated water from wells and the prevalence of fluorosis in individuals up to 18 years old.

**Pubmed Data** : Acta Odontol Latinoam. 2023 Dec 31 ;36(3):169-176. PMID: [38345279](#)

**Article Published Date** : Dec 30, 2023

**Authors** : Francineudo Oliveira Chagas, Lidia A Rocha Voladas, Ana Sorazabal, Adeyinka Dayo, Jhereza Cf Botelho Dantas, Aldo Squassi

**Study Type** : Review

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Fluorosis](#) : CK(262) : AC(42)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## A review of the effects of chronic fluorosis on the brain.

**Pubmed Data** : Ecotoxicol Environ Saf. 2022 Oct 1 ;244:114021. Epub 2022 Aug 29. PMID: [36049331](#)

**Article Published Date** : Sep 30, 2022

**Authors** : Chao Ren, Hui-Hua Li, Cai-Yi Zhang, Xi-Cheng Song

**Study Type** : Review

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Fluorosis](#) : CK(262) : AC(42), [Learning disorders](#) : CK(517) : AC(155), [Memory Disorders](#) : CK(1570) : AC(514), [Oxidative Stress](#) : CK(13443) : AC(5499)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Neurotoxic](#) : CK(2838) : AC(702)

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## A significant inverse relationship was found between the fluoride concentration in drinking water and IQ.

**Pubmed Data** : J Int Soc Prev Community Dent. 2016 Dec ;6(Suppl 3):S237-S242. PMID: [28217543](#)

**Article Published Date** : Nov 30, 2016

**Authors** : A Aravind, R S Dhanya, Ajay Narayan, George Sam, V J Adarsh, M Kiran

**Study Type** : Human Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Intelligence Quotient \(IQ\): Low/Impaired](#) : CK(312) : AC(27)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Abnormal spermatogenesis following sodium fluoride exposure is associated with the downregulation of CREM and ACT in the mouse testis.

**Pubmed Data** : Toxicol Ind Health. 2018 Apr ;34(4):219-227. Epub 2018 Mar 12. PMID: [29529942](#)

**Article Published Date** : Mar 31, 2018

**Authors** : Chong Wang, Yan Chen, Ram Kumar Manthari, Jundong Wang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Testicular Injury: Chemical/Metal Induced](#) : CK(754) : AC(374)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Administration of resveratrol along with aluminum + fluoride showed significant reversal of oxidative stress and neuronal damage.

**Pubmed Data** : Interdiscip Toxicol. 2016 Jun ;9(2):78-82. Epub 2017 May 17. PMID: [28652849](#)

**Article Published Date** : May 31, 2016

**Authors** : Chandra Shakar Reddy Nalagani, Pratap Reddy Karnati

**Study Type** : Animal Study

**Additional Links**

**Substances** : Resveratrol : CK(3081) : AC(1505)

**Diseases** : Aluminum Toxicity : CK(685) : AC(308), Brain: Oxidative Stress : CK(635) : AC(345), Fluoride Toxicity : CK(1389) : AC(376)

**Pharmacological Actions** : Antioxidants : CK(32218) : AC(14161), Neuroprotective Agents : CK(17667) : AC(7641)

**Additional Keywords** : Synergistic Toxicity : CK(226) : AC(109)

**Problem Substances** : Aluminum : CK(1061) : AC(349), Sodium Fluoride : CK(1446) : AC(393)

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## Aloe vera protects against fluoride-induced teratogenic effects during pre- and postnatal development in mice.

**Pubmed Data** : Environ Sci Pollut Res Int. 2022 Sep ;29(42):63577-63587. Epub 2022 Apr 23. PMID: [35460489](#)

**Article Published Date** : Aug 31, 2022

**Authors** : Priyanka Mathur, Shilpa Choudhary, Pradeep Bhatnagar

**Study Type** : Animal Study

**Additional Links**

**Substances** : Aloe Vera : CK(878) : AC(253)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Prenatal Chemical Exposures : CK(2428) : AC(530)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Teratogenic : CK(325) : AC(66)

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## Alpha-lipoic acid plays a protective role in fluoride-induced reproductive lesion.

**Pubmed Data** : Zhonghua Yi Xue Za Zhi. 2020 Dec 15 ;100(46):3706-3711. PMID: [33342149](#)

**Article Published Date** : Dec 14, 2020

**Authors** : Y Yang, H Huang, L X Cui, F Q Li

**Study Type** : Animal Study

**Additional Links**

**Substances** : Alpha-Lipoic Acid : CK(1499) : AC(365)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Infertility: Male : CK(1668) : AC(424), Oxidative Stress : CK(13443) : AC(5499)

**Pharmacological Actions** : Anti-Apoptotic : CK(4942) : AC(3051), Antioxidants : CK(32218) : AC(14161), Malondialdehyde Down-regulation : CK(2826) : AC(965)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Alpha-lipoic acid as a potential preventive and palliative agent for fluoride-induced hepatotoxic injury.

**Pubmed Data** : Chem Biol Interact. 2023 Nov 1 ;385:110719. Epub 2023 Sep 20. PMID: [37739047](#)

**Article Published Date** : Oct 31, 2023

**Authors** : Yanghuan Yu, Jipeng Xu, Hao Li, Jia Lv, Yaqin Zhang, Ruiyan Niu, Jundong Wang, Yangfei Zhao, Zilong Sun

**Study Type** : Animal Study

**Additional Links**

**Substances** : Alpha-Lipoic Acid : CK(1499) : AC(365)

**Diseases** : Chemically-Induced Liver Damage : CK(2167) : AC(1069), Fluoride Toxicity : CK(1389) : AC(376)

**Pharmacological Actions** : Antioxidants : CK(32218) : AC(14161), Hepatoprotective : CK(8320) : AC(3765)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Aluminium, fluoride and a combination of aluminium-fluoride treatments caused an increase in brain lipid peroxidation products and reactive oxygen species formation.

**Pubmed Data** : Pathophysiology. 2015 Mar ;22(1):39-48. Epub 2014 Dec 13. PMID: [25577494](#)

**Article Published Date** : Feb 28, 2015

**Authors** : Ibukun Dorcas Akinrinade, Adejoke Elizabeth Memudu, Olalekan Michael Ogundele, Olanrewaju Ibrahim Ajetunmobi

**Study Type** : Animal Study

### Additional Links

**Diseases** : Aluminum Toxicity : CK(685) : AC(308), Brain Inflammation : CK(1650) : AC(901), Fluoride Toxicity : CK(1389) : AC(376), Neurodegenerative Diseases : CK(12159) : AC(4162), Oxidative Stress : CK(13443) : AC(5499)

**Additional Keywords** : Increased Risk : CK(8492) : AC(1109), Synergistic Toxicity : CK(226) : AC(109)

**Problem Substances** : Aluminum : CK(1061) : AC(349), Fluoride : CK(1815) : AC(454), Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Ameliorative effects of nano Moringa on fluoride-induced testicular damage via down regulation of the StAR gene and altered steroid hormones.

**Pubmed Data** : Reprod Biol. 2022 Dec 21 ;23(1):100724. Epub 2022 Dec 21. PMID: [36563520](#)

**Article Published Date** : Dec 21, 2022

**Authors** : Entsar R Abd-Allah, Heba Ali Abd El-Rahman

**Study Type** : Animal Study

### Additional Links

**Substances** : Moringa oleifera : CK(748) : AC(377)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Low Testosterone : CK(852) : AC(140), Sperm Quality: Low : CK(611) : AC(121)

**Problem Substances** : Fluoride : CK(1815) : AC(454)

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## Amla exhibits antihyperglycemic and hepato-renal protective properties in fluoride induced toxicity.

**Pubmed Data** : J Pharm Bioallied Sci. 2012 Jul ;4(3):250-4. PMID: [22923969](#)

**Article Published Date** : Jul 01, 2012

**Authors** : Rupal A Vasant, A V R L Narasimhacharya

**Study Type** : Animal Study

### Additional Links

**Substances** : Amla Fruit : CK(265) : AC(94)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376)

**Pharmacological Actions** : Hepatoprotective : CK(8320) : AC(3765), Hypoglycemic Agents : CK(8194) : AC(2019), Renoprotective : CK(4133) : AC(1932)

**Problem Substances** : Fluoride : CK(1815) : AC(454)

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## An intervention with safe drinking water for 5 years in intervention group-mitigated clinical and subclinical symptoms of fluorosis.

**Pubmed Data** : Environ Monit Assess. 2018 Feb 2 ;190(3):110. Epub 2018 Feb 2. PMID: [29396763](#)

**Article Published Date** : Feb 01, 2018

**Authors** : Arjun L Khandare, Vakdevi Validandi, Shankar Rao Gourineni, Viswanathan Gopalan, Balakrishna Nagalla

**Study Type** : Human Study

### Additional Links

**Substances** : Water : CK(209) : AC(47)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Fluorosis : CK(262) : AC(42)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## An interventional clinical trial investigating the effects of *Spirulina platensis* on dental fluorosis and antioxidant system.

**Pubmed Data** : Sci Rep. 2023 Oct 6 ;13(1):16858. Epub 2023 Oct 6. PMID: [37803131](#)

**Article Published Date** : Oct 05, 2023

**Authors** : Abdellatif Rahim, Mounia Sibaoueih, Adekhalid Essamadi, Bouchra El Amiri

**Study Type** : Animal Study

**Additional Links**

**Substances** : *Spirulina* : CK(1017) : AC(292)

**Diseases** : *Spirulina* : CK(1017) : AC(292), Fluoride Toxicity : CK(1389) : AC(376), Fluorosis : CK(262) : AC(42)

**Pharmacological Actions** : Antioxidants : CK(32218) : AC(14161)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Apoptosis and inflammation involved with fluoride-induced bone injuries.

**Pubmed Data** : Nutrients. 2024 Jul 31 ;16(15). Epub 2024 Jul 31. PMID: [39125380](#)

**Article Published Date** : Jul 30, 2024

**Authors** : Miao Wang, Kangting Luo, Tongtong Sha, Qian Li, Zaichao Dong, Yanjie Dou, Huanxia Zhang, Guoyu Zhou, Yue Ba, Fangfang Yu

**Study Type** : Review

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Fluorosis : CK(262) : AC(42), Inflammation : CK(15536) : AC(5279)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Apoptotic : CK(278) : AC(120)

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## Arsenic and fluoride co-exposure affects the expression of apoptotic and inflammatory genes and proteins in mononuclear cells from children.

**Pubmed Data** : Mutat Res Genet Toxicol Environ Mutagen. 2014 Feb ;761:27-34. Epub 2014 Jan 21. PMID: [24456662](#)

**Article Published Date** : Jan 31, 2014

**Authors** : B L Estrada-Capetillo, M D Ortiz-Pérez, M Salgado-Bustamante, E Calderón-Aranda, C J Rodríguez-Pinal, E Reynaga-Hernández, N E Corral-Fernández, R González-Amaro, D P Portales-Pérez

**Study Type** : Human In Vitro, Human Study

**Additional Links**

**Diseases** : Arsenic Poisoning : CK(383) : AC(129), Fluoride Toxicity : CK(1389) : AC(376), Inflammation : CK(15536) : AC(5279)

**Additional Keywords** : Synergistic Toxicity : CK(226) : AC(109)

**Problem Substances** : Arsenic : CK(595) : AC(181), Sodium Fluoride : CK(1446) : AC(393)

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## Arsenic and fluoride exposure in drinking water caused human health risk in coastal groundwater aquifers.

**Pubmed Data** : Environ Res. 2023 Dec 1 ;238(Pt 2):117257. Epub 2023 Sep 28. PMID: [37775015](#)

**Article Published Date** : Nov 30, 2023

**Authors** : Tanmoy Biswas, Subodh Chandra Pal, Asish Saha, Dipankar Ruidas

**Study Type** : Environmental

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances** : Arsenic : CK(595) : AC(181), Sodium Fluoride : CK(1446) : AC(393)

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## Arsenic-fluoride co-exposure induced endoplasmic reticulum stress resulting in apoptosis in rat heart and H9c2 cells.

**Pubmed Data** : Chemosphere. 2022 Feb ;288(Pt 2):132518. Epub 2021 Oct 9. PMID: [34637859](#)

**Article Published Date** : Jan 31, 2022

**Authors** : Meng Li, Jing Feng, Ying Cheng, Nisha Dong, Xiaolin Tian, Penghui Liu, Yannan Zhao, Yulan Qiu, Fengjie Tian, Yi Lyu, Qian Zhao, Cailing Wei, Meng Wang, Jiyu Yuan, Xiaodong Ying, Xuefeng Ren, Xiaoyan Yan

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : [Arsenic Poisoning](#) : CK(383) : AC(129), [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Additional Keywords** : [Synergistic Toxicity](#) : CK(226) : AC(109)

**Problem Substances** : [Arsenic](#) : CK(595) : AC(181), [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Apoptotic](#) : CK(278) : AC(120), [Cardiotoxic](#) : CK(1168) : AC(209)

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## Association between dental fluorosis prevalence and inflammation levels in school-aged children with low-to-moderate fluoride exposure.

**Pubmed Data** : Environ Pollut. 2023 Mar 1 ;320:120995. Epub 2023 Jan 2. PMID: [36603756](#)

**Article Published Date** : Feb 28, 2023

**Authors** : Huayang Tang, Mengru Wang, Gaochun Li, Mengwei Wang, Chen Luo, Guoyu Zhou, Qian Zhao, Lixin Dong, Hongliang Liu, Yushan Cui, Li Liu, Shun Zhang, Aiguo Wang

**Study Type** : Human Study

**Additional Links**

**Diseases** : [C-Reactive Protein](#) : CK(3920) : AC(389), [C-Reactive Protein](#) : CK(3920) : AC(389), [Fluoride Toxicity](#) : CK(1389) : AC(376), [Inflammation](#) : CK(15536) : AC(5279)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Inflammatory](#) : CK(541) : AC(169)

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## Association between low fluoride exposure and children's intelligence.

**Pubmed Data** : Public Health. 2023 Jun ;219:73-84. Epub 2023 Apr 28. PMID: [37120936](#)

**Article Published Date** : May 31, 2023

**Authors** : Jayanth V Kumar, Mark E Moss, Honghu Liu, Susan Fisher-Owens

**Study Type** : Meta Analysis

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Intelligence Quotient \(IQ\): Low/Impaired](#) : CK(312) : AC(27)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Astaxanthin decreases spatial memory and glutamate transport impairment induced by fluoride.

**Pubmed Data** : Iran J Pharm Res. 2021 ;20(4):238-254. PMID: [35194443](#)

**Article Published Date** : Dec 31, 2020

**Authors** : Farzaneh Mirsaeed-Ghazi, Mohammad Sharifzadeh, Mohammad Reza Ashrafi-Kooshk, Saeed Karima, Sogol Meknatkhah, Gholamhossein Riazi, Farzad Mokhtari

**Study Type** : In Vitro Study

**Additional Links**

**Substances** : [Astaxanthin](#) : CK(1627) : AC(648)

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Pharmacological Actions** : [Neuroprotective Agents](#) : CK(17667) : AC(7641)

**Problem Substances** : [Fluoride](#) : CK(1815) : AC(454)

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## Autophagy may be involved in fluoride-induced learning impairment in rats.

**Pubmed Data** : Biol Trace Elem Res. 2020 Feb ;193(2):502-507. Epub 2019 May 20. PMID: [31111310](#)

**Article Published Date** : Jan 31, 2020

**Authors** : Chengzhi Zhang, Simeng Huo, Yumei Fan, Yanhui Gao, Yanmei Yang, Dianjun Sun

**Study Type** : Animal Study



#### Additional Links

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Learning disorders : CK(517) : AC(155), Neurodegenerative Diseases : CK(12159) : AC(4162)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Blackberry juice and quercetin together significantly reduced sodium fluoride induced oxidative and histological changes in rats.

**Pubmed Data** : J Basic Clin Physiol Pharmacol. 2015 May 1 ;26(3):237-51. PMID: [25918918](#)

**Article Published Date** : Apr 30, 2015

**Authors** : Reham Z Hamza, Nahla S El-Shenawy, Hayat A A Ismail

**Study Type** : Animal Study

#### Additional Links

**Substances** : Blackberry : CK(120) : AC(64), Quercetin : CK(1864) : AC(847)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Oxidative Stress : CK(13443) : AC(5499)

**Pharmacological Actions** : Antioxidants : CK(32218) : AC(14161), Cytoprotective : CK(797) : AC(393), Hepatoprotective : CK(8320) : AC(3765), Renoprotective : CK(4133) : AC(1932)

**Additional Keywords** : Natural Substance Synergy : CK(1339) : AC(657)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Caffeic acid supplementation has a protective effect against fluoride induced hepatotoxicity in rats.

**Pubmed Data** : Biofactors. 2015 Mar-Apr;41(2):90-100. Epub 2015 Apr 2. PMID: [25845575](#)

**Article Published Date** : Feb 28, 2015

**Authors** : Vishnu Vignesh Kanagaraj, Lakshmikanthan Panneerselvam, Vimal Govindarajan, Jaishabanu Ameeramja, Ekambaram Perumal

**Study Type** : Animal Study

#### Additional Links

**Substances** : Caffeic Acid : CK(136) : AC(87), Coffee : CK(1649) : AC(207)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Oxidative Stress : CK(13443) : AC(5499)

**Pharmacological Actions** : Antioxidants : CK(32218) : AC(14161), Hepatoprotective : CK(8320) : AC(3765)

**Problem Substances** : Fluoride : CK(1815) : AC(454), Sodium Fluoride : CK(1446) : AC(393)

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## Calcium alleviates fluoride-induced kidney damage.

**Pubmed Data** : Ecotoxicol Environ Saf. 2021 Dec 15 ;226:112851. Epub 2021 Oct 4. PMID: [34619480](#)

**Article Published Date** : Dec 14, 2021

**Authors** : Haojie Li, Junjiang Fan, Yangfei Zhao, Jiarong Yang, Huimiao Xu, Ram Kumar Manthari, Xiaofang Cheng, Jundong Wang, Jinming Wang

**Study Type** : Animal Study

#### Additional Links

**Substances** : Calcium : CK(444) : AC(68)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Kidney Damage: Chemically-Induced : CK(542) : AC(270)

**Pharmacological Actions** : Anti-Apoptotic : CK(4942) : AC(3051), Renoprotective : CK(4133) : AC(1932), Tumor Necrosis Factor (TNF) Alpha Inhibitor : CK(10605) : AC(4670)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Calcium and vitamin D supplementation effectively alleviates dental and skeletal fluorosis and retain elemental homeostasis in mice.

**Pubmed Data** : Biol Trace Elem Res. 2021 Aug ;199(8):3035-3044. Epub 2020 Oct 14. PMID: [33057951](#)

**Article Published Date** : Jul 31, 2021

**Authors** : Arpan Dey Bhowmik, Pallab Shaw, Paritosh Mondal, Anindita Chakraborty, Muthammal Sudarshan, Ansuman Chattopadhyay

**Study Type** : Animal Study



#### Additional Links

**Substances** : Calcium : CK(444) : AC(68), Vitamin D : CK(11555) : AC(1679)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Fluorosis : CK(262) : AC(42)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Calcium supplementation attenuates fluoride-induced bone injury.

**Pubmed Data** : J Hazard Mater. 2024 Mar 5 ;465:133411. Epub 2024 Jan 2. PMID: [38181596](#)

**Article Published Date** : Mar 04, 2024

**Authors** : Yingjun Hu, Yuanyuan Li, Meng Li, Tianrui Zhao, Wenhui Zhang, Yinghui Wang, Yang He, Hui Zhao, Haojie Li, Tianyu Wang, Yangfei Zhao, Jundong Wang, Jinming Wang

**Study Type** : Animal Study

#### Additional Links

**Substances** : Calcium : CK(444) : AC(68)

**Diseases** : Bone Diseases : CK(325) : AC(101), Fluoride Toxicity : CK(1389) : AC(376)

**Pharmacological Actions** : Anti-Apoptotic : CK(4942) : AC(3051), Osteogenic : CK(171) : AC(67)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Cell cycle arrest and gene expression profiling of testis in mice exposed to fluoride.

**Pubmed Data** : Environ Toxicol. 2017 May ;32(5):1558-1565. Epub 2016 Nov 14. PMID: [27862939](#)

**Article Published Date** : Apr 30, 2017

**Authors** : Kai Su, Zilong Sun, Ruiyan Niu, Ying Lei, Jing Cheng, Jundong Wang

**Study Type** : Animal Study

#### Additional Links

**Diseases** : DNA damage : CK(2255) : AC(824), Fluoride Toxicity : CK(1389) : AC(376), Testicular Injury: Chemical/Metal Induced : CK(754) : AC(374)

**Problem Substances** : Fluoride : CK(1815) : AC(454), Sodium Fluoride : CK(1446) : AC(393)

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## Children in endemic areas of fluorosis are at risk for impaired development of intelligence.

**Pubmed Data** : J Neurosci Rural Pract. 2012 May ;3(2):144-9. PMID: [22865964](#)

**Article Published Date** : Apr 30, 2012

**Authors** : Sudhanshu Saxena, Anjali Sahay, Pankaj Goel

**Study Type** : Human Study

#### Additional Links

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Intelligence Quotient (IQ): Low/Impaired : CK(312) : AC(27)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Children residing in areas with higher than normal water fluoride levels demonstrated more impaired development of intelligence.

**Pubmed Data** : J Dent (Tehran). 2012 ;9(3):221-9. Epub 2012 Sep 30. PMID: [23119131](#)

**Article Published Date** : Dec 31, 2011

**Authors** : B Seraj, M Shahrabi, M Shadfar, R Ahmadi, M Fallahzadeh, H Farrokh Eslamloo, M J Kharazifard

**Study Type** : Human Study

#### Additional Links

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Intelligence Quotient (IQ): Low/Impaired : CK(312) : AC(27)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Children with a low BMI may be more vulnerable to dental fluorosis.

**Pubmed Data** : Front Oral Health. 2023 ;4:1187463. Epub 2023 Jun 12. PMID: [37377524](#)

**Article Published Date** : Dec 31, 2022

**Authors** : Maria Esther Irigoyen-Camacho, Nora Perez-Perez, Marco Antonio Zepeda-Zepeda, Maria Consuelo Velazquez-Alva, Antonio Castaño-Seiquer, Ignacio Barbero-Navarro, Leonor Sanchez-Perez

**Study Type** : Human Study

**Additional Links**

**Diseases** : , [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Children with fluorosis in coal-burning areas had impaired IQ and obviously had impaired verbal intelligence quotient.

**Pubmed Data** : Biol Trace Elem Res. 2021 Feb ;199(2):482-489. Epub 2020 May 3. PMID: [32363519](#)

**Article Published Date** : Jan 31, 2021

**Authors** : Didong Lou, Yan Luo, Jing Liu, Dan Zheng, Rongrong Ma, Fangping Chen, Yanni Yu, Zhizhong Guan

**Study Type** : Human Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Learning disorders](#) : CK(517) : AC(155)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Neurotoxic](#) : CK(2838) : AC(702)

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## Chronic excess fluoride uptake contributes to degenerative joint disease.

**Pubmed Data** : Ecotoxicol Environ Saf. 2018 Oct 30 ;162:383-390. Epub 2018 Jul 13. PMID: [30015183](#)

**Article Published Date** : Oct 29, 2018

**Authors** : Clare Death, Graeme Coulson, Uwe Kierdorf, Horst Kierdorf, Richard Ploeg, Simon Firestone, Ian Dohoo, Jasmin Hufschmid

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Degenerative Joint Disease](#) : CK(5) : AC(3), [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Additional Keywords** : [Increased Risk](#) : CK(8492) : AC(1109)

**Problem Substances** : [Fluoride](#) : CK(1815) : AC(454)

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## Chronic exposure to high levels of fluoride in water was observed to be associated with lower intelligence quotient.

**Pubmed Data** : Iran J Public Health. 2013 Aug ;42(8):813-8. PMID: [26056634](#)

**Article Published Date** : Jul 31, 2013

**Authors** : Ramesh Nagarajappa, Piyush Pujara, Archana J Sharda, Kailash Asawa, Mridula Tak, Pankaj Aapaliya, Nikhil Bhanushali

**Study Type** : Human Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Intelligence Quotient \(IQ\): Low/Impaired](#) : CK(312) : AC(27)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Neurotoxic](#) : CK(2838) : AC(702)

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## Chronic fluoride exposure induces neuronal apoptosis and impairs neurogenesis and synaptic plasticity.

**Pubmed Data** : Chemosphere. 2019 Jan ;214:430-435. Epub 2018 Sep 17. PMID: [30273876](#)

**Article Published Date** : Dec 31, 2018

**Authors** : Pei Jiang, Gongying Li, Xueyuan Zhou, Changshui Wang, Yi Qiao, Dehua Liao, Dongmei Shi

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions :** Apoptotic : CK(278) : AC(120), Neurotoxic : CK(2838) : AC(702)

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## Chronic fluoride exposure induces ovarian dysfunction and potential association with premature ovarian failure.

**Pubmed Data :** Biol Trace Elem Res. 2023 Oct 13. Epub 2023 Oct 13. PMID: [37828391](#)

**Article Published Date :** Oct 12, 2023

**Authors :** Xiaoke Tang, Hongjuan Li, Yali Wang, Li Zeng, Ling Long, Yajun Qu, Hui Yang, Xiaolin Zhang, Yanmin Li, Yanni Yu, Qi Zhou, Man Luo

**Study Type :** Animal Study

**Additional Links**

**Diseases :** Fluoride Toxicity : CK(1389) : AC(376), Ovarian Diseases : CK(33) : AC(16)

**Problem Substances :** Sodium Fluoride : CK(1446) : AC(393)

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## Circulating levels of autophagy markers were low in children with higher fluoride body burden and lower intelligence quotient scores.

**Pubmed Data :** Toxicol Appl Pharmacol. 2019 Sep 1 ;378:114608. Epub 2019 Jun 5. PMID: [31173788](#)

**Article Published Date :** Aug 31, 2019

**Authors :** Guoyu Zhou, Sha Tang, Lu Yang, Qiang Niu, Jingwen Chen, Tao Xia, Sumei Wang, Mengwei Wang, Qian Zhao, Ling Liu, Pei Li, Lixin Dong, Kedi Yang, Shun Zhang, Aiguo Wang

**Study Type :** Human Study

**Additional Links**

**Diseases :** Cognitive Decline/Dysfunction : CK(5061) : AC(1005), Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances :** Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions :** Neurotoxic : CK(2838) : AC(702)

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## Co-exposure to arsenic-fluoride results in endoplasmic reticulum stress-induced apoptosis through the PERK signaling pathway in the liver of offspring rats.

**Pubmed Data :** Biol Trace Elem Res. 2020 Sep ;197(1):192-201. Epub 2019 Nov 25. PMID: [31768761](#)

**Article Published Date :** Aug 31, 2020

**Authors :** Nisha Dong, Jing Feng, Jiabin Xie, Xiaolin Tian, Meng Li, Penghui Liu, Yannan Zhao, Cailing Wei, Yi Gao, Ben Li, Yulan Qiu, Xiaoyan Yan

**Study Type :** Animal Study

**Additional Links**

**Diseases :** Arsenic Poisoning : CK(383) : AC(129), Chemically-Induced Liver Damage : CK(2167) : AC(1069), Fluoride Toxicity : CK(1389) : AC(376), Prenatal Chemical Exposures : CK(2428) : AC(530)

**Pharmacological Actions :** Apoptotic : CK(9052) : AC(7284)

**Problem Substances :** Fluoride : CK(1815) : AC(454), Sodium Fluoride : CK(1446) : AC(393)

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## Cognitive alterations in children born from exposed mothers to F could start in early prenatal stages of life.

**Pubmed Data :** Neurotoxicology. 2017 Mar ;59:65-70. Epub 2017 Jan 8. PMID: [28077305](#)

**Article Published Date :** Feb 28, 2017

**Authors :** L Valdez Jiménez, O D López Guzmán, M Cervantes Flores, R Costilla-Salazar, J Calderón Hernández, Y Alcaraz Contreras, D O Rocha-Amador

**Study Type :** Human Study

**Additional Links**

**Diseases :** Fluoride Toxicity : CK(1389) : AC(376), Prenatal Chemical Exposures : CK(2428) : AC(530)

**Problem Substances :** Sodium Fluoride : CK(1446) : AC(393)

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## Cognitive decline of rats with chronic fluorosis is associated with

## alterations in hippocampal calpain signaling.

**Pubmed Data** : Biol Trace Elem Res. 2020 Oct ;197(2):495-506. Epub 2019 Dec 3. PMID: [31797207](#)

**Article Published Date** : Sep 30, 2020

**Authors** : Olga V Nadei, Irina A Khvorova, Natalia I Agalakova

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Fluorosis : CK(262) : AC(42)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Combination of fluoride and SO<sub>2</sub> induce DNA damage and morphological alterations in male rat kidney.

**Pubmed Data** : Cell Physiol Biochem. 2018 ;50(2):734-744. Epub 2018 Oct 11. PMID: [30308495](#)

**Article Published Date** : Dec 31, 2017

**Authors** : Yan Gao, Chen Liang, Jianhai Zhang, Junjie Ma, Jinming Wang, Ruiyan Niu, Chiranjeevi Tikka, Yewei Wang, Jundong Wang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Air Pollution Linked Toxicity : CK(4951) : AC(731), DNA damage : CK(2255) : AC(824), Fluoride Toxicity : CK(1389) : AC(376), Kidney Damage: Chemically-Induced : CK(542) : AC(270)

**Additional Keywords** : Synergistic Toxicity : CK(226) : AC(109)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Combined effect of arsenic and fluoride at environmentally relevant concentrations in zebrafish (Danio rerio) brain.

**Pubmed Data** : Chemosphere. 2021 Apr ;269:128678. Epub 2020 Oct 21. PMID: [33127104](#)

**Article Published Date** : Mar 31, 2021

**Authors** : Paritosh Mondal, Pallab Shaw, Arpan Dey Bhowmik, Arindam Bandyopadhyay, Muthammal Sudarshan, Anindita Chakraborty, Ansuman Chattopadhyay

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Oxidative Stress : CK(13443) : AC(5499)

**Additional Keywords** : Synergistic Toxicity : CK(226) : AC(109)

**Problem Substances** : Arsenic : CK(595) : AC(181), Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Combined effects of fluoride and arsenic on mitochondrial function in the liver.

**Pubmed Data** : Appl Biochem Biotechnol. 2023 Mar 22. Epub 2023 Mar 22. PMID: [36947368](#)

**Article Published Date** : Mar 21, 2023

**Authors** : Huma Khan, Yeshvandra Verma, S V S Rana

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Arsenic Poisoning : CK(383) : AC(129), Chemically-Induced Liver Damage : CK(2167) : AC(1069), Fluoride Toxicity : CK(1389) : AC(376)

**Additional Keywords** : Synergistic Toxicity : CK(226) : AC(109)

**Problem Substances** : Arsenic : CK(595) : AC(181), Sodium Fluoride : CK(1446) : AC(393)

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## Community water fluoridation and rate of pediatric fractures.

**Pubmed Data** : J Am Acad Orthop Surg Glob Res Rev. 2023 Oct 1 ;7(10). Epub 2023 Oct 5. PMID: [37796978](#)

**Article Published Date** : Sep 30, 2023

**Authors** : Sarah E Lindsay, Spencer Smith, Scott Yang, Jung Yoo

**Study Type** : Human Study

**Additional Links**

**Diseases** : Bone Fractures : CK(697) : AC(121), Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Community water fluoridation predicts increase in age-adjusted incidence and prevalence of diabetes in 22 states from 2005 and 2010.

**Pubmed Data** : J Water Health. 2016 Oct ;14(5):864-877. PMID: [27740551](#)

**Article Published Date** : Sep 30, 2016

**Authors** : Kyle Fluegge

**Study Type** : Human Study

**Additional Links**

**Diseases** : Diabetes Mellitus: Type 2 : CK(11728) : AC(2501), Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Concentration of Fluoride in the ingested water was significantly associated with the IQ of children.

**Pubmed Data** : J Int Soc Prev Community Dent. 2017 ;7(5):252-258. Epub 2017 Sep 18. PMID: [29026697](#)

**Article Published Date** : Dec 31, 2016

**Authors** : Priyanka Razdan, Basavaraj Patthi, Jishnu Krishna Kumar, Nikhil Agnihotri, Prajakta Chaudhari, Monika Prasad

**Study Type** : Human Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Intelligence Quotient (IQ): Low/Impaired : CK(312) : AC(27), Learning disorders : CK(517) : AC(155)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Curcumin attenuates neurotoxicity induced by fluoride: An in vivo evidence.

**Pubmed Data** : Pharmacogn Mag. 2014 Jan ;10(37):61-5. PMID: [24696547](#)

**Article Published Date** : Dec 31, 2013

**Authors** : Chhavi Sharma, Pooja Suhalka, Piyu Sukhwal, Neha Jaiswal, Maheep Bhatnagar

**Study Type** : Animal Study

**Additional Links**

**Substances** : Curcumin : CK(6902) : AC(3215)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Lipid Peroxidation : CK(1901) : AC(774), Oxidative Stress : CK(13443) : AC(5499)

**Pharmacological Actions** : Neuroprotective Agents : CK(17667) : AC(7641)

**Problem Substances** : Fluoride : CK(1815) : AC(454), Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Curcumin showed significant nephroprotective effects against Sodium Fluoride induced toxicity upon kidneys.

**Pubmed Data** : Biol Trace Elem Res. 2012 Mar ;145(3):369-74. Epub 2011 Sep 7. PMID: [21901432](#)

**Article Published Date** : Mar 01, 2012

**Authors** : Seyed Fazel Nabavi, Akbar Hajizadeh Moghaddam, Shahram Eslami, Seyed Mohammad Nabavi

**Study Type** : Animal Study

**Additional Links**

**Substances** : Curcumin : CK(6902) : AC(3215), Vitamin C : CK(6030) : AC(1400)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376)

**Additional Keywords** : Antioxidant : CK(17) : AC(5)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Decreased learning ability and low hippocampus glutamate in offspring rats exposed to fluoride and lead.

**Pubmed Data** : Environ Toxicol Pharmacol. 2009 Sep ;28(2):254-8. Epub 2009 May 4. PMID: [21784012](#)

**Article Published Date** : Aug 31, 2009

**Authors** : Ruiyan Niu, Zilong Sun, Zhantao Cheng, Zhigang Li, Jundong Wang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Problem Substances** : [Lead](#) : CK(684) : AC(227), [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Dental fluorosis and urinary fluoride concentration as a reflection of fluoride exposure and its impact on IQ level and BMI of children.

**Pubmed Data** : Environ Monit Assess. 2016 Apr ;188(4):218. Epub 2016 Mar 9. PMID: [26960765](#)

**Article Published Date** : Mar 31, 2016

**Authors** : Kousik Das, Naba Kumar Mondal

**Study Type** : Human Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Intelligence Quotient \(IQ\): Low/Impaired](#) : CK(312) : AC(27)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Detrimental effects of sodium fluoride on the expression of insulin receptor in the olfactory bulb and hippocampus of male mice.

**Pubmed Data** : Biol Trace Elem Res. 2020 Nov ;198(1):216-223. Epub 2020 Feb 3. PMID: [32016826](#)

**Article Published Date** : Oct 31, 2020

**Authors** : Jianqin Yuan, Qi Li, Mohammad Mehdi Ommati, Ruiyan Niu, Jundong Wang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Development of nonverbal abilities in males may be more vulnerable to prenatal fluoride exposure than language or motor abilities, even at levels within the recommended intake range.

**Pubmed Data** : Neurotoxicology. 2021 Dec ;87:86-93. Epub 2021 Aug 31. PMID: [34478773](#)

**Article Published Date** : Nov 30, 2021

**Authors** : Alejandra Cantoral, Martha M Téllez-Rojo, Ashley J Malin, Lourdes Schnaas, Erika Osorio-Valencia, Adriana Mercado, EÁngeles Martínez-Mier, Robert O Wright, Christine Till

**Study Type** : Human Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Learning disorders](#) : CK(517) : AC(155)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Developmental fluoride neurotoxicity: an updated review.

**Pubmed Data** : Environ Health. 2019 Dec 19 ;18(1):110. Epub 2019 Dec 19. PMID: [31856837](#)

**Article Published Date** : Dec 18, 2019

**Authors** : Philippe Grandjean

**Study Type** : Review

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Prenatal Chemical Exposures](#) : CK(2428) : AC(530)

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**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)  
**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Different effects of fluoride exposure on the three major bone cell types.

**Pubmed Data** : Biol Trace Elem Res. 2020 Jan ;193(1):226-233. Epub 2019 Mar 14. PMID: [30877522](#)

**Article Published Date** : Dec 31, 2019

**Authors** : Ningning Jiang, Fengyang Guo, Boyao Sun, Xiuyun Zhang, Hui Xu

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : Bone Diseases : CK(325) : AC(101), Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Apoptotic : CK(278) : AC(120)

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## Does fluoride exposure impact on the human microbiome?

**Pubmed Data** : Toxicol Lett. 2023 Apr 15 ;379:11-19. Epub 2023 Mar 4. PMID: [36871794](#)

**Article Published Date** : Apr 14, 2023

**Authors** : Gary P Moran, Lina Zgaga, Blánaid Daly, Mairead Harding, Therese Montgomery

**Study Type** : Review

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Gastrotoxic : CK(190) : AC(68)

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## Domain-specific effects of prenatal fluoride exposure on child IQ at 4, 5, and 6-12 years.

**Pubmed Data** : Environ Res. 2022 Aug ;211:112993. Epub 2022 Mar 9. PMID: [35276192](#)

**Article Published Date** : Jul 31, 2022

**Authors** : Carly V Goodman, Morteza Bashash, Rivka Green, Peter Song, Karen E Peterson, Lourdes Schnaas, Adriana Mercado-García, Sandra Martínez-Medina, Mauricio Hernández-Avila, Angeles Martinez-Mier, Martha M Téllez-Rojo, Howard Hu, Christine Till

**Study Type** : Human Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Neurodevelopmental Disorders : CK(470) : AC(85), Prenatal Chemical Exposures : CK(2428) : AC(530)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Dopamine receptor D2 gene polymorphism, urine fluoride, and intelligence impairment of children in China.

**Pubmed Data** : Ecotoxicol Environ Saf. 2018 Dec 15 ;165:270-277. Epub 2018 Sep 8. PMID: [30205328](#)

**Article Published Date** : Dec 14, 2018

**Authors** : Yushan Cui, Bin Zhang, Jing Ma, Yang Wang, Liang Zhao, Changchun Hou, Jingwen Yu, Yang Zhao, Zushan Zhang, Junyan Nie, Tongning Gao, Guoli Zhou, Hongliang Liu

**Study Type** : Human Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Intelligence Quotient (IQ): Low/Impaired : CK(312) : AC(27)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Dopamine relative genes may modify the association between fluoride and intelligence,

**Pubmed Data** : Ecotoxicol Environ Saf. 2021 Feb ;209:111826. Epub 2020 Dec 24. PMID: [33360592](#)

**Article Published Date** : Jan 31, 2021

**Authors** : Liang Zhao, Canqing Yu, Jun Lv, Yushan Cui, Yang Wang, Changchun Hou, Jingwen Yu, Baihui Guo, Hongliang Liu, Liming Li

**Study Type** : Human Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Additional Keywords** : [Genomic Variation](#) : CK(302) : AC(38)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Dose and time-dependent effects of sodium fluoride on sperm motility.

**Pubmed Data** : Toxicol Ind Health. 2018 Dec ;34(12):813-818. Epub 2018 Oct 25. PMID: [30360691](#)

**Article Published Date** : Nov 30, 2018

**Authors** : Basavalingappa Chaithra, Halugudde Nagaraja Sarjan, Shivabasavaiah

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Infertility: Male](#) : CK(1668) : AC(424), [Sperm Quality: Low](#) : CK(611) : AC(121)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Due to the ability of fluoride to inhibit the production of thyroid hormones, a transition to low exposure may result in hyperthyroidism associated psychosis.

**Pubmed Data** : Med Hypotheses. 2009 May;72(5):501-3. Epub 2009 Feb 7. PMID: [19201548](#)

**Article Published Date** : May 01, 2009

**Authors** : Karl Erik Zachariassen, Trond Peder Flaten

**Study Type** : Review

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Hypothyroidism](#) : CK(847) : AC(148)

**Problem Substances** : [Fluoride](#) : CK(1815) : AC(454)

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## EGb-761 could attenuate the anti-proliferative activity of fluoride via DDK1 in PC-12 cells.

**Pubmed Data** : Neurochem Res. 2017 Feb ;42(2):606-614. Epub 2016 Nov 25. PMID: [27885578](#)

**Article Published Date** : Jan 31, 2017

**Authors** : Cai-Yi Zhang, Rui Chen, Fen Wang, Chao Ren, Peng Zhang, Qian Li, Hui-Hua Li, Ke-Tai Guo, De-Qin Geng, Chun-Feng Liu

**Study Type** : In Vitro Study

**Additional Links**

**Substances** : [Ginkgo biloba](#) : CK(2025) : AC(644)

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Pharmacological Actions** : [Neuroprotective Agents](#) : CK(17667) : AC(7641)

**Additional Keywords** : [Plant Extracts](#) : CK(18030) : AC(6728)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Early exposure to fluoride may have neurotoxic effects on neurodevelopment affecting behavioral, cognitive and psychosomatic symptoms related to ADHD diagnosis.

**Pubmed Data** : Medicina (Kaunas). 2023 Apr 19 ;59(4). Epub 2023 Apr 19. PMID: [37109754](#)

**Article Published Date** : Apr 18, 2023

**Authors** : Gianluca Fiore, Federica Veneri, Rosaria Di Lorenzo, Luigi Generali, Marco Vinceti, Tommaso Filippini



**Study Type** : Review

**Additional Links**

**Diseases** : Attention Deficit Disorder with Hyperactivity : CK(633) : AC(84), Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Effect of fluoride exposure on different immune parameters in humans.

**Pubmed Data** : Immunopharmacol Immunotoxicol. 2011 Mar ;33(1):169-77. Epub 2010 Jun 10. PMID: [20536340](#)

**Article Published Date** : Feb 28, 2011

**Authors** : Berenice Hernández-Castro, Mónica Vigna-Pérez, Lesly Doníz-Padilla, María D Ortiz-Pérez, Esther Jiménez-Capdeville, Roberto González-Amaro, Lourdes Baranda

**Study Type** : Human Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Immunotoxic : CK(507) : AC(127)

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## Effect of fluoride exposure on mRNA expression of cav1.2 and calcium signal pathway apoptosis regulators in PC12 cells.

**Pubmed Data** : Environ Toxicol Pharmacol. 2017 Sep ;54:74-79. Epub 2017 Jun 30. PMID: [28697452](#)

**Article Published Date** : Aug 31, 2017

**Authors** : Qiuxia Liao, Rui Zhang, Xiaoyu Wang, Weiwei Nian, Lulu Ke, Wei Ouyang, Zigui Zhang

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Fluorosis : CK(262) : AC(42)

**Problem Substances** : Fluoride : CK(1815) : AC(454), Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Apoptotic : CK(278) : AC(120), Neurotoxic : CK(2838) : AC(702)

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## Effect of fluoride in drinking water on fecal microbial community.

**Pubmed Data** : Biol Trace Elem Res. 2022 Jan ;200(1):238-246. Epub 2021 Feb 12. PMID: [33576944](#)

**Article Published Date** : Dec 31, 2021

**Authors** : Nan Zhong, Yongzheng Ma, Xinyue Meng, Alphonse Sowanou, Liaowei Wu, Wei Huang, Yanhui Gao, Junrui Pei

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Dysbiosis : CK(2010) : AC(579), Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Effect of fluoride on bone and growth plate cartilage.

**Pubmed Data** : J Environ Sci Health C Toxicol Carcinog. 2021 ;39(4):388-399. Epub 2021 Aug 23. PMID: [35895945](#)

**Article Published Date** : Dec 31, 2020

**Authors** : Mercedes Lombarte, Brenda L Fina, Lucas R Brun, Stella Maris Roma, Alfredo Rigalli, Di Loreto V E

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Effect of fluoride on cytotoxicity involved in mitochondrial dysfunction.

**Pubmed Data** : Front Vet Sci. 2022 ;9:850771. Epub 2022 Apr 19. PMID: [35518640](#)

**Article Published Date** : Dec 31, 2021

**Authors** : Mingbang Wei, Yourong Ye, Muhammad Muddassir Ali, Yangzom Chamba, Jia Tang, Peng Shang

**Study Type** : Review

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Mitochondrial Dysfunction](#) : CK(618) : AC(262)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Effect of fluoride on endocrine tissues and their secretory functions.

**Pubmed Data** : Chemosphere. 2020 Dec ;260:127565. Epub 2020 Jul 9. PMID: [32758781](#)

**Article Published Date** : Nov 30, 2020

**Authors** : Marta Skórka-Majewicz, Marta Goschorska, Wojciech Żwierzeń, Irena Baranowska-Bosiacka, Daniel Styburski, Patrycja Kapczuk, Izabela Gutowska

**Study Type** : Review

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Problem Substances** : [Endocrine Disruptors](#) : CK(24) : AC(15), [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Effect of hesperidin on fluoride-induced neurobehavioral and biochemical changes in rats.

**Pubmed Data** : J Biochem Mol Toxicol. 2020 Nov ;34(11):e22575. Epub 2020 Jul 5. PMID: [32627286](#)

**Article Published Date** : Oct 31, 2020

**Authors** : Pawan Jaiswal, Mukesh Mandal, Awanish Mishra

**Study Type** : Animal Study

**Additional Links**

**Substances** : [Hesperidin](#) : CK(845) : AC(358)

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Memory Disorders](#) : CK(1570) : AC(514)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Neurotoxic](#) : CK(2838) : AC(702)

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## Effect of sodium fluoride on reproductive function through regulating reproductive hormone level.

**Pubmed Data** : Biol Trace Elem Res. 2023 Apr ;201(4):1825-1836. Epub 2022 May 10. PMID: [35538195](#)

**Article Published Date** : Mar 31, 2023

**Authors** : Siyuan Dong, Yanni Yang, Biqi He, Zhao Xu, Zhaoqiang Zhou, Jinhai Wang, Chen Chen, Qun Chen

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Infertility: Female](#) : CK(741) : AC(180)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Effect of sodium fluoride on the murine splenic immune response to Porphyromonas gingivalis in vitro.

**Pubmed Data** : Immunopharmacol Immunotoxicol. 2003 Feb ;25(1):123-7. PMID: [12675204](#)

**Article Published Date** : Jan 31, 2003

**Authors** : Wihaskoro Sosroseno

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Porphyromonas gingivalis](#) : CK(46) : AC(41)

**Additional Keywords** : [Risk Factors](#) : CK(14728) : AC(2072)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Effect of water fluoridation on the development of medial vascular calcification in uremic rats.

**Pubmed Data** : Toxicology. 2014 Apr 6 ;318:40-50. Epub 2014 Feb 18. PMID: [24561004](#)

**Article Published Date** : Apr 06, 2014

**Authors** : Ana Martín-Pardillos, Cecilia Sosa, Ángel Millán, Víctor Sorribas

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Arterial Calcification : CK(268) : AC(45), Atheroma : CK(17) : AC(5), Atherosclerosis : CK(1964) : AC(771), Chronic Kidney Disease (CKD) : CK(1176) : AC(210), Ectopic Calcification : CK(1125) : AC(185), Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances** : Fluoride : CK(1815) : AC(454)

**Adverse Pharmacological Actions** : Cardiotoxic : CK(1168) : AC(209)

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## Effects of fluoride exposure on mitochondrial function: Energy metabolism, dynamics, biogenesis and mitophagy.

**Pubmed Data** : Environ Toxicol Pharmacol. 2022 Aug ;94:103916. Epub 2022 Jun 20. PMID: [35738460](#)

**Article Published Date** : Jul 31, 2022

**Authors** : Sabino Hazael Avila-Rojas, Omar Emiliano Aparicio-Trejo, Marco Antonio Sanchez-Guerra, Olivier Christophe Barbier

**Study Type** : Review

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Mitochondrial Dysfunction : CK(618) : AC(262), Oxidative Stress : CK(13443) : AC(5499)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Effects of fluoride on DNA damage and caspase-mediated apoptosis in the liver of rats.

**Pubmed Data** : Biol Trace Elem Res. 2015 Aug ;166(2):173-82. Epub 2015 Feb 20. PMID: [25693680](#)

**Article Published Date** : Jul 31, 2015

**Authors** : Guo Hua Song, Fu Bing Huang, Ji Ping Gao, Mao Lin Liu, Wen Biao Pang, Wei bin Li, Xiao Yan Yan, Mei Jun Huo, Xia Yang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Chemically-Induced Liver Damage : CK(2167) : AC(1069), DNA damage : CK(2255) : AC(824), Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Apoptotic : CK(278) : AC(120), Hepatotoxic : CK(400) : AC(124)

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## Effects of fluoride on PIWI-interacting RNA expression profiling in testis of mice.

**Pubmed Data** : Chemosphere. 2021 Apr ;269:128727. Epub 2020 Oct 24. PMID: [33213873](#)

**Article Published Date** : Mar 31, 2021

**Authors** : Yanyan Li, Min Cheng, Yangfei Zhao, Jinming Wang, Jundong Wang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Testicular Injury: Chemical/Metal Induced : CK(754) : AC(374)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Effects of fluoride on synapse morphology and myelin damage in mouse hippocampus.

**Pubmed Data** : Chemosphere. 2018 Mar ;194:628-633. Epub 2017 Dec 6. PMID: [29241138](#)

**Article Published Date** : Feb 28, 2018

**Authors** : Ruiyan Niu, Huijuan Chen, Ram Kumar Manthari, Zilong Sun, Jinming Wang, Jianhai Zhang, Jundong Wang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376)  
**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)  
**Adverse Pharmacological Actions** : [Neurotoxic](#) : CK(2838) : AC(702)

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## Effects of fluoride toxicity on female reproductive system of mammals.

**Pubmed Data** : Biol Trace Elem Res. 2024 May 6. Epub 2024 May 6. PMID: [38709367](#)

**Article Published Date** : May 05, 2024

**Authors** : Aditi Fishta, Ruhi Thakur, Krishan Chander Sharma, Neha Thakur, Bhavna Patial

**Study Type** : Meta Analysis

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Infertility: Female](#) : CK(741) : AC(180)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Effects of prolonged fluoride exposure on innate immunity, intestinal mechanical, and immune barriers in mice.

**Pubmed Data** : Res Vet Sci. 2023 Nov ;164:105019. Epub 2023 Sep 14. PMID: [37729784](#)

**Article Published Date** : Oct 31, 2023

**Authors** : Yan Wang, Jing Xu, Hang Chen, Yuanbin Shu, Weiqi Peng, Chunxiao Lai, Ruiyang Kong, Ruiyang Lan, Lijing Huang, Jinge Xin, Ning Sun, Xueqin Ni, Yang Bai, Bangyuan Wu

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Immunotoxic](#) : CK(507) : AC(127)

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## Effects of water fluoridation on early embryonic development of zebrafish.

**Pubmed Data** : Ecotoxicol Environ Saf. 2024 Jan 15 ;270:115907. Epub 2024 Jan 4. PMID: [38176185](#)

**Article Published Date** : Jan 14, 2024

**Authors** : Ya-Lan Wei, Xin-Chen Lin, Ying-Ying Liu, Yu-Qing Lei, Xu-Dong Zhuang, Hai-Tao Zhang, Xin-Rui Wang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Problem Substances** : [Fluoride](#) : CK(1815) : AC(454), [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Embryotoxic](#) : CK(20) : AC(11)

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## Elevated serum fluoride levels in perimenopausal women are related to the components of metabolic syndrome.

**Pubmed Data** : Eur Rev Med Pharmacol Sci. 2021 Sep ;25(17):5474-5482. PMID: [34533791](#)

**Article Published Date** : Aug 31, 2021

**Authors** : D Schneider-Matyka, I Gutowska, M Panczyk, E Grochans, M Szkup

**Study Type** : Human Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Hypertension](#) : CK(8603) : AC(1329), [Metabolic Diseases](#) : CK(1252) : AC(263)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Emodin protected against synaptic impairment and oxidative stress induced by fluoride in SH-SY5Y cells.

**Pubmed Data** : Environ Toxicol. 2020 Sep ;35(9):922-929. Epub 2020 Apr 15. PMID: [32293791](#)

**Article Published Date** : Aug 31, 2020

**Authors** : Chencen Lai, Qian Chen, Yuanting Ding, Heng Liu, Zhi Tang

**Study Type** : In Vitro Study

**Additional Links**

**Substances** : Emodin : CK(405) : AC(258)

**Diseases** : Brain: Oxidative Stress : CK(635) : AC(345), Fluoride Toxicity : CK(1389) : AC(376)

**Pharmacological Actions** : Neuroprotective Agents : CK(17667) : AC(7641)

**Problem Substances** : Fluoride : CK(1815) : AC(454), Sodium Fluoride : CK(1446) : AC(393)

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## Estrogen deficiency aggravates fluoride-induced small intestinal mucosa damage.

**Pubmed Data** : Ecotoxicol Environ Saf. 2022 Nov ;246:114181. Epub 2022 Oct 14. PMID: [36252517](#)

**Article Published Date** : Oct 31, 2022

**Authors** : Ye Jin, Xiao-Ying Gao, Jing Zhao, Wei-Shun Tian, Yu-Ling Zhang, Er-Jie Tian, Bian-Hua Zhou, Hong-Wei Wang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Estrogen Deficiency : CK(61) : AC(21), Fluoride Toxicity : CK(1389) : AC(376)

**Additional Keywords** : Risk Factors : CK(14728) : AC(2072)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Evaluation of kidney injury biomarkers in an adult Mexican population environmentally exposed to fluoride and low arsenic levels.

**Pubmed Data** : Toxicol Appl Pharmacol. 2018 Aug 1 ;352:97-106. Epub 2018 May 22. PMID: [29800643](#)

**Article Published Date** : Jul 31, 2018

**Authors** : Monica I Jiménez-Córdova, Mariana Cárdenas-González, Guadalupe Aguilar-Madrid, Luz C Sanchez-Peña, Ángel Barrera-Hernández, Iván A Domínguez-Guerrero, Carmen González-Horta, Olivier C Barbier, Luz M Del Razo

**Study Type** : Human Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Kidney Damage: Chemically-Induced : CK(542) : AC(270)

**Additional Keywords** : Synergistic Toxicity : CK(226) : AC(109)

**Problem Substances** : Arsenic : CK(595) : AC(181), Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Renotoxic : CK(56) : AC(20)

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## Excess fluoride in drinking water and in the locally grown food in the affected areas might lead to chronic kidney diseases.

**Pubmed Data** : Environ Health Prev Med. 2015 Jul ;20(4):237-42. Epub 2015 Apr 28. PMID: [25916575](#)

**Article Published Date** : Jun 30, 2015

**Authors** : Ranjith W Dharmaratne

**Study Type** : Commentary

**Additional Links**

**Diseases** : Chronic Kidney Disease (CKD) : CK(1176) : AC(210), Fluoride Toxicity : CK(1389) : AC(376), Kidney Damage : CK(780) : AC(347)

**Additional Keywords** : Risk Factors : CK(14728) : AC(2072)

**Problem Substances** : Fluoride : CK(1815) : AC(454), Sodium Fluoride : CK(1446) : AC(393)

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## Excessive amounts of fluoride cause autophagy of HAT-7 cells, indicating that autophagy is involved in dental fluorosis.

**Pubmed Data** : Cells Tissues Organs. 2015 Nov 13 ;200(6):405-412. Epub 2015 Nov 13. PMID: [26562167](#)

**Article Published Date** : Nov 12, 2015

**Authors** : Shuang Lei, Ying Zhang, Kaiqiang Zhang, Jian Li, Lu Liu

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : , [Fluoride Toxicity](#) : CK(1389) : AC(376)  
**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Excessive exposure of water fluoride may increase osteoarthritis risk.

**Pubmed Data** : Biol Trace Elem Res. 2022 Jul ;200(7):3107-3116. Epub 2021 Sep 28. PMID: [34581970](#)

**Article Published Date** : Jun 30, 2022

**Authors** : Alphonse Sowanou, Xinyue Meng, Nan Zhong, Yongzheng Ma, Ailin Li, Jian Wang, Hanying Li, Junrui Pei, Yanhui Gao

**Study Type** : Human Study

### Additional Links

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Osteoarthritis](#) : CK(1971) : AC(607)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Excessive fluoride exposure may have adverse effects on children's intelligence.

**Pubmed Data** : Chin Med J (Engl). 2022 Aug 5 ;135(15):1846-1854. Epub 2022 Aug 5. PMID: [35838408](#)

**Article Published Date** : Aug 04, 2022

**Authors** : Zichen Feng, Ning An, Fangfang Yu, Jun Ma, Na Li, Yuhui Du, Meng Guo, Kaihong Xu, Xiangbo Hou, Zhiyuan Li, Guoyu Zhou, Yue Ba

**Study Type** : Human Study

### Additional Links

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Learning disorders](#) : CK(517) : AC(155)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Excessive fluoride induces ovarian function impairment.

**Pubmed Data** : Reprod Toxicol. 2024 Feb 9:108556. Epub 2024 Feb 9. PMID: [38342390](#)

**Article Published Date** : Feb 08, 2024

**Authors** : Nan Geng, Siyuan Dong, Pengpeng Xie, Yi Zhang, Rong Shi, Chen Chen, Zhao Xu, Qun Chen

**Study Type** : In Vitro Study

### Additional Links

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Ovarian Diseases](#) : CK(33) : AC(16)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Excessive-fluoride intake can induce thyroid injury.

**Pubmed Data** : Zhonghua Yu Fang Yi Xue Za Zhi. 2018 Nov 6 ;52(11):1182-1187. PMID: [30419706](#)

**Article Published Date** : Nov 05, 2018

**Authors** : L Y Yu, Y S Cui, H L Liu

**Study Type** : Animal Study

### Additional Links

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Apoptotic](#) : CK(278) : AC(120)

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## Exercise alleviates fluoride-induced learning and memory impairment.

**Pubmed Data** : Biol Trace Elem Res. 2024 Jan 20. Epub 2024 Jan 20. PMID: [38244175](#)

**Article Published Date** : Jan 19, 2024

**Authors** : Lei Chai, Qiqi Cao, Ke Liu, Run Zhu, Hao Li, Yanghuan Yu, Jixiang Wang, Ruiyan Niu, Ding Zhang, Bo Yang, Mohammad Mehdi Ommati, Zilong Sun

**Study Type** : Animal Study

### Additional Links

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Memory Disorders](#) : CK(1570) : AC(514)



**Therapeutic Actions** : Exercise : CK(6247) : AC(999)

**Pharmacological Actions** : Neuroprotective Agents : CK(17667) : AC(7641)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Exercise ameliorates fluoride-induced anxiety- and depression-like behavior in mice.

**Pubmed Data** : Biol Trace Elem Res. 2022 Feb ;200(2):678-688. Epub 2021 Apr 6. PMID: [33825162](#)

**Article Published Date** : Jan 31, 2022

**Authors** : Qiqi Cao, Jixiang Wang, Yanru Hao, Fangye Zhao, Rong Fu, Yanghuan Yu, Jundong Wang, Ruiyan Niu, Shengtai Bian, Zilong Sun

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Anxiety : CK(4195) : AC(743), Depression : CK(8817) : AC(1715), Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Exercise improved intestinal morphological structure damage in fluoride-exposed mice.

**Pubmed Data** : Chemosphere. 2022 Feb ;288(Pt 3):132658. Epub 2021 Oct 25. PMID: [34710452](#)

**Article Published Date** : Jan 31, 2022

**Authors** : Rong Fu, Ruiyan Niu, Fangye Zhao, Jixiang Wang, Qiqi Cao, Yanghuan Yu, Ci Liu, Ding Zhang, Zilong Sun

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376)

**Therapeutic Actions** : Exercise : CK(6247) : AC(999)

**Pharmacological Actions** : Gastrointestinal Agents : CK(6875) : AC(2212), Gastroprotective : CK(1653) : AC(686)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Exposure of fluoride with streptozotocin-induced diabetes aggravates testicular damage and spermatozoa parameters in mice.

**Pubmed Data** : J Toxicol. 2019 ;2019:5269380. Epub 2019 Dec 3. PMID: [31885555](#)

**Article Published Date** : Dec 31, 2018

**Authors** : Manuel Sánchez-Gutiérrez, Evelia Martínez-Loredo, Eduardo Osiris Madrigal-Santillán, Gabriel Betanzos-Cabrera, Araceli Hernández-Zavala, María Angélica Mojica-Villegas, Jeannett Alejandra Izquierdo-Vega

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Diabetic Complications : CK(4283) : AC(1544), Fluoride Toxicity : CK(1389) : AC(376), Testicular Injury:

Chemical/Metal Induced : CK(754) : AC(374)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Exposure to fluoride exacerbates the cognitive deficit of diabetic patients living in areas with endemic fluorosis.

**Pubmed Data** : Sci Total Environ. 2024 Feb 20 ;912:169512. Epub 2023 Dec 23. PMID: [38145685](#)

**Article Published Date** : Feb 19, 2024

**Authors** : Jie Xiang, Xiao-Lan Qi, Kun Cao, Long-Yan Ran, Xiao-Xiao Zeng, Xiao Xiao, Wei Liao, Wen-Wen He, Wei Hong, Yan He, Zhi-Zhong Guan

**Study Type** : Animal Study, Human Study

**Additional Links**

**Diseases** : Diabetes: Cognitive Dysfunction : CK(379) : AC(149), Diabetes Mellitus: Type 2 : CK(11728) : AC(2501), Fluoride Toxicity : CK(1389) : AC(376)

**Additional Keywords** : Increased Risk : CK(8492) : AC(1109)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

## Exposure to fluoride in the prenatal and neonatal period result in the increase in COX2 activity and increase in PGE2 concentration in rats brain.

**Pubmed Data** : Neurotoxicology. 2019 Sep ;74:81-90. Epub 2019 Jun 5. PMID: [31175943](#)

**Article Published Date** : Aug 31, 2019

**Authors** : Karolina Dec, Agnieszka Łukomska, Karolina Skonieczna-Żydecka, Agnieszka Kolasa-Wołoskiuk, Maciej Tarnowski, Irena Baranowska-Bosiacka, Izabela Gutowska

**Study Type** : Animal Study

### Additional Links

**Diseases** : Brain Inflammation : CK(1650) : AC(901), Fluoride Toxicity : CK(1389) : AC(376), Neurodegenerative Diseases : CK(12159) : AC(4162), Prenatal Chemical Exposures : CK(2428) : AC(530)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Inflammatory : CK(541) : AC(169)

## Exposure to fluoride induces apoptosis in the liver, kidney, and heart of Xenopus laevis.

**Pubmed Data** : Acta Histochem. 2023 Apr ;125(3):151999. Epub 2023 Mar 9. PMID: [36905872](#)

**Article Published Date** : Mar 31, 2023

**Authors** : Siting Wang, Hongmei Ning, Liushuai Hua, Fei Ren, Lingli Chen, Zhisheng Ma, Rongbo Li, Yaming Ge, Zhihong Yin

**Study Type** : Animal Study

### Additional Links

**Diseases** : Chemically-Induced Liver Damage : CK(2167) : AC(1069), Fluoride Toxicity : CK(1389) : AC(376), Kidney Damage: Chemically-Induced : CK(542) : AC(270)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Hepatotoxic : CK(400) : AC(124), Renotoxic : CK(56) : AC(20)

## Exposure to high levels of fluoride may adversely influence children's intelligence development.

**Pubmed Data** : Zhongguo Dang Dai Er Ke Za Zhi. 2008 Dec;10(6):723-5. PMID: [19102839](#)

**Article Published Date** : Dec 01, 2008

**Authors** : Ming Liu, Cong Qian

**Study Type** : Meta Analysis

### Additional Links

**Diseases** : Childhood Cognitive Disorders : CK(316) : AC(27), Cognitive Decline/Dysfunction : CK(5061) : AC(1005), Fluoride Toxicity : CK(1389) : AC(376), Fluorosis : CK(262) : AC(42), Intelligence Quotient (IQ): Low/Impaired : CK(312) : AC(27), Prenatal Nutrition: Learning/Intelligence of Offspring : CK(116) : AC(14)

**Problem Substances** : Fluoride : CK(1815) : AC(454)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

## Exposure to high-fluoride drinking water appears to non-linearly affect thyroid function and increase TSH release in children.

**Pubmed Data** : Environ Res. 2024 Feb 1 ;242:117759. Epub 2023 Nov 28. PMID: [38029816](#)

**Article Published Date** : Jan 31, 2024

**Authors** : Inga Iamandii, Lisa De Pasquale, Maria Edvige Giannone, Federica Veneri, Luigi Generali, Ugo Consolo, Linda S Birnbaum, Jacqueline Castenmiller, Thorhallur I Halldorsson, Tommaso Filippini, Marco Vinceti

**Study Type** : Meta Analysis, Review

### Additional Links

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Goiter: Exophthalmic : CK(32) : AC(3), Hypothyroidism : CK(847) : AC(148), Thyroid Dysfunction : CK(86) : AC(13)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)



## Exposure to high-fluoride resulted in lower body weight and exercise capacity in mice.

**Pubmed Data** : Sci Rep. 2018 Feb 16 ;8(1):3211. Epub 2018 Feb 16. PMID: [29453343](#)

**Article Published Date** : Feb 15, 2018

**Authors** : Sandra L Amaral, Liane B Azevedo, Marilia A R Buzalaf, Mayara F Fabricio, Mileni S Fernandes, Ruth A Valentine, Anne Maguire, Fatemeh V Zohoori

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Fluorosis : CK(262) : AC(42)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Exposure to higher levels of fluoride in tap water is associated with an increased risk of ADHD symptoms and diagnosis of ADHD.

**Pubmed Data** : Environ Int. 2019 Dec ;133(Pt B):105190. Epub 2019 Oct 22. PMID: [31654913](#)

**Article Published Date** : Nov 30, 2019

**Authors** : Julia K Riddell, Ashley J Malin, David Flora, Hugh McCague, Christine Till

**Study Type** : Human Study

**Additional Links**

**Diseases** : Attention Deficit Disorder with Hyperactivity : CK(633) : AC(84), Fluoride Toxicity : CK(1389) : AC(376)

**Additional Keywords** : Increased Risk : CK(8492) : AC(1109)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Exposure to increasing levels of fluoride in tap water was associated with diminished non-verbal intellectual abilities.

**Pubmed Data** : Environ Int. 2020 Jan ;134:105315. Epub 2019 Nov 16. PMID: [31743803](#)

**Article Published Date** : Dec 31, 2019

**Authors** : Christine Till, Rivka Green, David Flora, Richard Hornung, E Angeles Martinez-Mier, Maddy Blazer, Linda Farmus, Pierre Ayotte, Gina Muckle, Bruce Lanphear

**Study Type** : Human Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Intelligence Quotient (IQ): Low/Impaired : CK(312) : AC(27)

**Problem Substances** : Infant Formula : CK(659) : AC(97), Sodium Fluoride : CK(1446) : AC(393)

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## Expression of SDF-1/CXCR4 and related inflammatory factors in sodium fluoride-treated hepatocytes.

**Pubmed Data** : PLoS One. 2024 ;19(6):e0302530. Epub 2024 Jun 21. PMID: [38905184](#)

**Article Published Date** : Dec 31, 2023

**Authors** : Rui Yang, Hongting Shen, Mingjun Wang, Yaqian Zhao, Shiling Zhu, Hong Jiang, Yanan Li, Guanglan Pu, Xun Chen, Ping Chen, Qing Lu, Jing Ma, Qiang Zhang

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : Chemically-Induced Liver Damage : CK(2167) : AC(1069), Fluoride Toxicity : CK(1389) : AC(376), Inflammation : CK(15536) : AC(5279)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Interleukin-1 up-regulation : CK(8) : AC(3), Interleukin-6 up-regulation : CK(41) : AC(10), Tumor necrosis factor $\alpha$  (TNF $\alpha$ ) up-regulation : CK(65) : AC(11)

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## Extract of Ginkgo biloba leaves attenuates neurotoxic damages from high levels of fluoride.

**Pubmed Data** : J Trace Elem Med Biol. 2022 Sep 30 ;75:127088. Epub 2022 Sep 30. PMID: [36265321](#)

**Article Published Date** : Sep 29, 2022

**Authors** : Jie Xiang, Yan-Lin Ma, Jian Zou, Xiao-Xiao Zeng, Xiao Xiao, Yan-Long Yu, Yang-Ting Dong, Long-Yan Ran, Xiao-Lan Qi, Wei Hong, Yan-Hui Gao, Zhi-Zhong Guan

**Study Type** : Animal Study, In Vitro Study

**Additional Links**

**Substances** : Ginkgo biloba : CK(2025) : AC(644)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376)

**Pharmacological Actions** : Neuroprotective Agents : CK(17667) : AC(7641)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Fermented rooibos tea ameliorates sodium fluoride-induced cardiorenal toxicity, oxidative stress, and inflammation.

**Pubmed Data** : Cardiovasc Toxicol. 2024 Feb 5. Epub 2024 Feb 5. PMID: [38315346](#)

**Article Published Date** : Feb 04, 2024

**Authors** : Olawale Razaq Ajuwon, Toyosi Abiodun Adeleke, Basiru Olaitan Ajiboye, Akeem Olalekan Lawal, Ibukun Folorunso, Bartholomew Brai, Fisayo Abraham Bamisaye, John Adeolu Falode, Ikenna Maximillian Odoh, Kabirat Iyabode Adegbite, Oluwasayo Bosede Adegoke

**Study Type** : Animal Study

**Additional Links**

**Substances** : Rooibos : CK(161) : AC(76)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Inflammation : CK(15536) : AC(5279), Oxidative Stress : CK(13443) : AC(5499)

**Pharmacological Actions** : Anti-Inflammatory Agents : CK(35225) : AC(15297), Antioxidants : CK(32218) : AC(14161)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Fisetin attenuates arsenic and fluoride subacute co-exposure induced neurotoxicity.

**Pubmed Data** : Neurotoxicology. 2023 Jul ;97:133-149. Epub 2023 Jun 16. PMID: [37331635](#)

**Article Published Date** : Jun 30, 2023

**Authors** : Vitthal V Gopnar, Debarati Rakshit, Mounisha Bandakinda, Uttam Kulhari, Bidya Dhar Sahu, Awanish Mishra

**Study Type** : Animal Study

**Additional Links**

**Substances** : Fisetin : CK(441) : AC(275)

**Diseases** : Arsenic Poisoning : CK(383) : AC(129), Fluoride Toxicity : CK(1389) : AC(376)

**Pharmacological Actions** : Anti-Inflammatory Agents : CK(35225) : AC(15297), Tumor Necrosis Factor (TNF) Alpha Inhibitor : CK(10605) : AC(4670)

**Problem Substances** : Arsenic : CK(595) : AC(181), Sodium Fluoride : CK(1446) : AC(393)

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## Fluoridated tap water was associated with an increased risk of hepatic failure.

**Pubmed Data** : World J Pediatr. 2024 Oct ;20(10):1029-1042. Epub 2024 Jun 27. PMID: [38937407](#)

**Article Published Date** : Sep 30, 2024

**Authors** : Won Seok Lee, Ju Hee Kim, Boeun Han, Gi Chun Lee, Hye Ri Jung, Ye Jin Shin, Eun Kyo Ha, Eun Lee, Soonchul Lee, Man Yong Han

**Study Type** : Human Study

**Additional Links**

**Diseases** : Chemically-Induced Liver Damage : CK(2167) : AC(1069), Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Hepatotoxic : CK(400) : AC(124)

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## Fluoride and arsenic exposure affects spatial memory and activates the ERK/CREB signaling pathway in offspring rats.

**Pubmed Data** : Neurotoxicology. 2017 Mar ;59:56-64. Epub 2017 Jan 15. PMID: [28099871](#)

**Article Published Date** : Feb 28, 2017

**Authors** : Yu-Peng Zhu, Shu-Hua Xi, Ming-Yan Li, Ting-Ting Ding, Nan Liu, Fu-Yuan Cao, Yang Zeng, Xiao-Jing Liu, Jun-Wang Tong, Shou-Fang Jiang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Fluoride Toxicity : CK\(1389\) : AC\(376\)](#), [Memory Disorders : CK\(1570\) : AC\(514\)](#)

**Additional Keywords** : [Synergistic Toxicity : CK\(226\) : AC\(109\)](#)

**Problem Substances** : [Arsenic : CK\(595\) : AC\(181\)](#), [Sodium Fluoride : CK\(1446\) : AC\(393\)](#)

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## Fluoride and arsenic exposure impairs learning and memory and decreases mGluR5 expression in the hippocampus and cortex in rats.

**Pubmed Data** : PLoS One. 2014 ;9(4):e96041. Epub 2014 Apr 23. PMID: [24759735](#)

**Article Published Date** : Dec 31, 2013

**Authors** : Shoufang Jiang, Jing Su, Sanqiao Yao, Yanshu Zhang, Fuyuan Cao, Fei Wang, Huihui Wang, Jun Li, Shuhua Xi

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Fluoride Toxicity : CK\(1389\) : AC\(376\)](#), [Learning disorders : CK\(517\) : AC\(155\)](#), [Memory Disorders : CK\(1570\) : AC\(514\)](#)

**Additional Keywords** : [Synergistic Toxicity : CK\(226\) : AC\(109\)](#)

**Problem Substances** : [Arsenic : CK\(595\) : AC\(181\)](#), [Sodium Fluoride : CK\(1446\) : AC\(393\)](#)

**Adverse Pharmacological Actions** : [Neurotoxic : CK\(2838\) : AC\(702\)](#)

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## Fluoride can damage the spleen of mice by perturbing Th1/Th2 cell balance.

**Pubmed Data** : Biol Trace Elem Res. 2021 Apr ;199(4):1493-1500. Epub 2020 Jul 24. PMID: [32710348](#)

**Article Published Date** : Mar 31, 2021

**Authors** : Yanyan Li, Xiaoping Du, Yangfei Zhao, Jinming Wang, Jundong Wang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Fluoride Toxicity : CK\(1389\) : AC\(376\)](#)

**Problem Substances** : [Sodium Fluoride : CK\(1446\) : AC\(393\)](#)

**Adverse Pharmacological Actions** : [Immunotoxic : CK\(507\) : AC\(127\)](#)

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## Fluoride can suppress the activation of p38MAPK pathway in mice spleen lymphocytes and further influences the function of the immune system.

**Pubmed Data** : Biol Trace Elem Res. 2016 Oct ;173(2):333-8. Epub 2016 Feb 23. PMID: [26906276](#)

**Article Published Date** : Sep 30, 2016

**Authors** : Zeyu Shi, Yaqi Zhan, Junxing Zhao, Jinming Wang, Haili Ma

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Fluoride Toxicity : CK\(1389\) : AC\(376\)](#), [Spleen Damage: Chemically Induced : CK\(2\) : AC\(9\)](#)

**Problem Substances** : [Sodium Fluoride : CK\(1446\) : AC\(393\)](#)

**Adverse Pharmacological Actions** : [Immunotoxic : CK\(507\) : AC\(127\)](#)

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## Fluoride concentration in ground water and prevalence of dental fluorosis in Ethiopian Rift Valley.

**Pubmed Data** : BMC Public Health. 2019 Oct 16 ;19(1):1298. Epub 2019 Oct 16. PMID: [31619212](#)

**Article Published Date** : Oct 15, 2019

**Authors** : Habtamu Demelash, Abebe Beyene, Zewdu Abebe, Addisu Melese

**Study Type** : Meta Analysis, Review

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Fluorosis](#) : CK(262) : AC(42)

**Additional Keywords** : [Water Fluoridation](#) : CK(34) : AC(5)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Fluoride content in bottled drinking waters, carbonated soft drinks and fruit juices in Davangere city, India.

**Pubmed Data** : Indian J Dent Res. 2010 ;21(4):528-30. PMID: [21187619](#)

**Article Published Date** : Dec 31, 2009

**Authors** : H M Thippeswamy, Nanditha Kumar, S R Anand, G M Prashant, G N Chandu

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Additional Keywords** : [Bottled Water](#) : CK(22) : AC(19)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393), [Sugar Sweetened Beverages](#) : CK(1467) : AC(153)

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## Fluoride content in bottled waters, juices and carbonated soft drinks in Mexico City, Mexico.

**Pubmed Data** : Int J Paediatr Dent. 2004 Jul ;14(4):260-6. PMID: [15242382](#)

**Article Published Date** : Jun 30, 2004

**Authors** : M D Jimenez-Farfan, J C Hernandez-Guerrero, J P Loyola-Rodriguez, C Ledesma-Montes

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Additional Keywords** : [Bottled Water](#) : CK(22) : AC(19)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393), [Sugar Sweetened Beverages](#) : CK(1467) : AC(153)

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## Fluoride could pose a great threat to thyroid endocrine system.

**Pubmed Data** : Aquat Toxicol. 2016 Feb ;171:48-58. Epub 2015 Dec 24. PMID: [26748264](#)

**Article Published Date** : Jan 31, 2016

**Authors** : Chen Jianjie, Xue Wenjuan, Cao Jinling, Song Jie, Jia Ruhui, Li Meiyang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Problem Substances** : [Fluoride](#) : CK(1815) : AC(454), [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Endocrine Disruptor: Thyroid](#) : CK(139) : AC(34)

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## Fluoride depletes acidogenic taxa in oral but not gut microbial communities in mice.

**Pubmed Data** : mSystems. 2017 Jul-Aug;2(4). Epub 2017 Aug 8. PMID: [28808691](#)

**Article Published Date** : Jun 30, 2017

**Authors** : Koji Yasuda, Tiffany Hsu, Carey A Gallini, Lauren J McIver, Emma Schwager, Andy Shi, Casey R DuLong, Randall N Schwager, Galeb S Abu-Ali, Eric A Franzosa, Wendy S Garrett, Curtis Huttenhower, Xochitl C Morgan

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Fluoride deposits in the pineal gland with age and is associated with enhanced gland calcification.

**Pubmed Data** : Caries Res. 2001 Mar-Apr;35(2):125-8. PMID: [11275672](#)

**Article Published Date** : Mar 01, 2001

**Authors** : J Luke

**Study Type** : Human Study

**Additional Links**

**Diseases** : Ectopic Calcification : CK(1125) : AC(185), Fluoride Toxicity : CK(1389) : AC(376), Pineal Gland Calcification : CK(233) : AC(31), Pineal Gland Diseases : CK(23) : AC(5)

**Problem Substances** : Fluoride : CK(1815) : AC(454)

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## Fluoride effects on cell viability and ENaC expression in kidney epithelial cells.

**Pubmed Data** : Toxicol Mech Methods. 2021 Oct ;31(8):566-571. Epub 2021 Jun 21. PMID: [34151709](#)

**Article Published Date** : Sep 30, 2021

**Authors** : Mariana R Santesso, Flávia A Oliveira, Cintia K Tokuhara, Gabriela S N Oliveira, Flávia M Levy, Lígia S Antonio, Marília A R Buzalaf, Rodrigo C Oliveira

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Kidney Damage: Chemically-Induced : CK(542) : AC(270)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Fluoride enhances polystyrene nanoparticles cytotoxicity in colonocytes in vitro model.

**Pubmed Data** : Chem Biol Interact. 2022 Nov 1 ;367:110169. Epub 2022 Sep 20. PMID: [36165825](#)

**Article Published Date** : Oct 31, 2022

**Authors** : Karol P Steckiewicz, Anna Adamska, Magdalena Narajczyk, Elżbieta Megiel, Iwona Inkielewicz-Stepniak

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Microplastic Toxicity : CK(714) : AC(342)

**Additional Keywords** : Synergistic Toxicity : CK(226) : AC(109)

**Problem Substances** : Nano Plastic-and Micro-Particles : CK(198) : AC(91), Polystyrene nanoparticles : CK(427) : AC(212), Sodium Fluoride : CK(1446) : AC(393)

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## Fluoride exposure alters the ultra-structure of sperm flagellum via reducing key protein expressions in testis.

**Pubmed Data** : Chemosphere. 2020 May ;246:125772. Epub 2019 Dec 30. PMID: [31901658](#)

**Article Published Date** : Apr 30, 2020

**Authors** : Chen Liang, Yuyang He, Yu Liu, Yan Gao, Yongli Han, Xiang Li, Yangfei Zhao, Jundong Wang, Jianhai Zhang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Sperm Quality: Low : CK(611) : AC(121), Testicular Injury: Chemical/Metal Induced : CK(754) : AC(374)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Fluoride exposure and cognitive neurodevelopment.

**Pubmed Data** : Environ Res. 2023 Mar 15 ;221:115239. Epub 2023 Jan 10. PMID: [36639015](#)

**Article Published Date** : Mar 14, 2023

**Authors** : Federica Veneri, Marco Vinceti, Luigi Generali, Maria Edvige Giannone, Elena Mazzoleni, Linda S Birnbaum, Ugo Consolo, Tommaso Filippini

**Study Type** : Meta Analysis, Review

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Intelligence Quotient (IQ): Low/Impaired : CK(312) : AC(27)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Fluoride exposure and indicators of thyroid functioning in the Canadian population.

**Pubmed Data** : J Epidemiol Community Health. 2017 Oct ;71(10):1019-1025. Epub 2017 Aug 24. PMID: [28839078](#)

**Article Published Date** : Sep 30, 2017

**Authors** : Amanda M Barberio, F Shaun Hosein, Carlos Quiñonez, Lindsay McLaren

**Study Type** : Human Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Hypothyroidism : CK(847) : AC(148)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Fluoride exposure and prevalence of osteochondroma in drinking water Endemic fluorosis areas of Heilongjiang Province, China.

**Pubmed Data** : Int J Environ Health Res. 2023 Nov 3:1-14. Epub 2023 Nov 3. PMID: [37921081](#)

**Article Published Date** : Nov 02, 2023

**Authors** : Yongzheng Ma, Yang Liu, Xiaona Liu, Mang Li, Jing Cui, Zhizhong Guan, Junrui Pei, Yanhui Gao

**Study Type** : Human Study

**Additional Links**

**Diseases** : Bone Diseases : CK(325) : AC(101), Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Fluoride exposure arrests the acrosome formation during spermatogenesis.

**Pubmed Data** : Chemosphere. 2019 Jul ;226:874-882. Epub 2019 Apr 5. PMID: [31509916](#)

**Article Published Date** : Jun 30, 2019

**Authors** : Shanshan Jiang, Chen Liang, Yan Gao, Yu Liu, Yongli Han, Jundong Wang, Jianhai Zhang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Infertility: Male : CK(1668) : AC(424), Testicular Injury: Chemical/Metal Induced : CK(754) : AC(374)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Fluoride exposure cause colon microbiota dysbiosis by destroyed microenvironment and disturbed antimicrobial peptides expression in colon.

**Pubmed Data** : Environ Pollut. 2022 Jan 1 ;292(Pt B):118381. Epub 2021 Oct 18. PMID: [34673156](#)

**Article Published Date** : Dec 31, 2021

**Authors** : Shi-Quan Zhu, Jing Liu, Bo Han, Wen-Peng Zhao, Bian-Hua Zhou, Jing Zhao, Hong-Wei Wang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Dysbiosis : CK(2010) : AC(579), Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Gastrotoxic : CK(190) : AC(68)

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## Fluoride exposure changed the structure and the expressions of Y chromosome related genes in testes.

**Pubmed Data** : Chemosphere. 2016 Oct ;161:292-299. Epub 2016 Jul 18. PMID: [27441988](#)

**Article Published Date** : Sep 30, 2016

**Authors** : Jinling Cao, Yan Chen, Jianjie Chen, Hanghang Yan, Meiyang Li, Jundong Wang

**Study Type** : Animal Study



#### Additional Links

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Testicular Injury: Chemical/Metal Induced : CK(754) : AC(374)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Fluoride exposure could lead to impaired iodine absorption and iodine deficiency.

**Pubmed Data** : Int J Environ Res Public Health. 2019 03 26 ;16(6). Epub 2019 Mar 26. PMID: [30917615](#)

**Article Published Date** : Jan 25, 2019

**Authors** : Declan Timothy Waugh

**Study Type** : In Vitro Study

#### Additional Links

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Iodine Deficiency : CK(110) : AC(18)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Fluoride exposure decreased neurite formation on cerebral cortical neurons of SD rats in vitro.

**Pubmed Data** : Environ Sci Pollut Res Int. 2021 Oct ;28(37):50975-50982. Epub 2021 May 11. PMID: [33977427](#)

**Article Published Date** : Sep 30, 2021

**Authors** : Hongmei Ning, Chong Li, Zhihong Yin, Dongfang Hu, Yaming Ge, Lingli Chen

**Study Type** : In Vitro Study

#### Additional Links

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Fluoride exposure disrupts the cytoskeletal arrangement and ATP synthesis of HT-22 cell.

**Pubmed Data** : Ecotoxicol Environ Saf. 2023 Apr 1 ;254:114718. Epub 2023 Mar 10. PMID: [36950989](#)

**Article Published Date** : Mar 31, 2023

**Authors** : Lingli Chen, Penghuan Jia, Yuye Liu, Rui Wang, Zhihong Yin, Dongfang Hu, Hongmei Ning, Yaming Ge

**Study Type** : Review

#### Additional Links

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Fluoride exposure during development affects both cognition and emotion in mice.

**Pubmed Data** : Physiol Behav. 2014 Jan 30 ;124:1-7. Epub 2013 Oct 30. PMID: [24184405](#)

**Article Published Date** : Jan 29, 2014

**Authors** : Fei Liu, Jing Ma, Hui Zhang, Peng Liu, You-Ping Liu, Bo Xing, Yong-Hui Dang

**Study Type** : Animal Study

#### Additional Links

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Learning disorders : CK(517) : AC(155), Prenatal Chemical Exposures : CK(2428) : AC(530)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Fluoride exposure during pregnancy and lactation triggers oxidative stress and molecular changes in hippocampus of offspring rats.

**Pubmed Data** : Ecotoxicol Environ Saf. 2021 Jan 15 ;208:111437. Epub 2020 Oct 20. PMID: [33096359](#)

**Article Published Date** : Jan 14, 2021

**Authors** : Maria Karolina Martins Ferreira, Walessa Alana Bragança Aragão, Leonardo Oliveira Bittencourt, Bruna Puty, Aline Dionizio, Michel Platini Caldas de Souza, Marília Afonso Rabelo Buzalaf, Edivaldo Herculano de Oliveira, Maria Elena Crespo-Lopez, Rafael Rodrigues Lima

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Lipid Peroxidation : CK(1901) : AC(774), Oxidative Stress : CK(13443) : AC(5499), Prenatal Chemical Exposures : CK(2428) : AC(530)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Fluoride exposure in early life as the possible root cause of disease in later life.

**Pubmed Data** : J Clin Pediatr Dent. 2018 ;42(5):325-330. Epub 2018 May 15. PMID: [29763350](#)

**Article Published Date** : Dec 31, 2017

**Authors** : Tetsuo Nakamoto, H Ralph Rawls

**Study Type** : Review

**Additional Links**

**Diseases** : Fetal Origin of Adult Disease : CK(249) : AC(62), Fluoride Toxicity : CK(1389) : AC(376), Prenatal Chemical Exposures : CK(2428) : AC(530)

**Problem Substances** : Fluoride : CK(1815) : AC(454)

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## Fluoride exposure induces mitochondrial damage and mitophagy via activation of the IL-17A pathway in hepatocytes.

**Pubmed Data** : Sci Total Environ. 2022 Jan 15 ;804:150184. Epub 2021 Sep 8. PMID: [34517333](#)

**Article Published Date** : Jan 14, 2022

**Authors** : Yangfei Zhao, Jinming Wang, Jianhai Zhang, Zilong Sun, Ruiyan Niu, Ram Kumar Manthari, Mohammad Mehdi Ommati, Shaolin Wang, Jundong Wang

**Study Type** : Animal Study, In Vitro Study

**Additional Links**

**Diseases** : Chemically-Induced Liver Damage : CK(2167) : AC(1069), Fluoride Toxicity : CK(1389) : AC(376), Mitochondrial Dysfunction : CK(618) : AC(262)

**Problem Substances** : Fluoride : CK(1815) : AC(454), Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Hepatotoxic : CK(400) : AC(124)

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## Fluoride exposure may contribute to changes in sleep cycle regulation and sleep behaviors among older adolescents in the US.

**Pubmed Data** : Environ Health. 2019 Dec 9 ;18(1):106. Epub 2019 Dec 9. PMID: [31818308](#)

**Article Published Date** : Dec 08, 2019

**Authors** : Ashley J Malin, Sonali Bose, Stefanie A Busgang, Chris Gennings, Michael Thorpy, Robert O Wright, Rosalind J Wright, Manish Arora

**Study Type** : Human Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Sleep Disorders : CK(1811) : AC(256)

**Problem Substances** : Fluoride : CK(1815) : AC(454)

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## Fluoride exposure may contribute to sleeping less than the recommended duration among older adolescents and adults in Canada.

**Pubmed Data** : Environ Health. 2021 Feb 18 ;20(1):16. Epub 2021 Feb 18. PMID: [33602214](#)

**Article Published Date** : Feb 17, 2021

**Authors** : Jasmyn E A Cunningham, Hugh McCague, Ashley J Malin, David Flora, Christine Till

**Study Type** : Human Study

**Additional Links**



**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Sleep Disorders : CK(1811) : AC(256)  
**Problem Substances** : Fluoride : CK(1815) : AC(454)

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## Fluoride exposure over several generations results in adverse histopathological and biochemical changes in lung tissue.

**Pubmed Data** : J Appl Toxicol. 2003 Nov-Dec;23(6):437-46. PMID: [14635268](#)

**Article Published Date** : Nov 01, 2003

**Authors** : Gülsen Aydin, Ekrem Çiçek, Mehmet Akdoğan, Osman Gökçalp

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances** : Fluoride : CK(1815) : AC(454), Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Teratogenic : CK(325) : AC(66)

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## Fluoride exposure provokes mitochondria-mediated apoptosis and increases mitophagy in osteocytes.

**Pubmed Data** : Biol Trace Elem Res. 2023 Aug ;201(8):3994-4007. Epub 2022 Oct 18. PMID: [36255553](#)

**Article Published Date** : Jul 31, 2023

**Authors** : Yun Zhang, Fanhe Dong, Zihan Wang, Bingbing Xu, Tao Zhang, Qiqi Wang, Qiao Lin

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Fluorosis : CK(262) : AC(42), Oxidative Stress : CK(13443) : AC(5499)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Apoptotic : CK(278) : AC(120)

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## Fluoride exposure was associated with alterations in maternal thyroid hormone levels.

**Pubmed Data** : Environ Int. 2024 Jan 12 ;184:108442. Epub 2024 Jan 12. PMID: [38237505](#)

**Article Published Date** : Jan 11, 2024

**Authors** : Meaghan Hall, Rick Hornung, Jonathan Chevrier, Pierre Ayotte, Bruce Lanphear, Christine Till

**Study Type** : Human Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Prenatal Chemical Exposures : CK(2428) : AC(530), Thyroid Dysfunction : CK(86) : AC(13)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Fluoride has impacts on TSH, T3 hormones even in the standard concentration of less than 0.5 mg/L.

**Pubmed Data** : Sci Rep. 2018 Feb 8 ;8(1):2674. Epub 2018 Feb 8. PMID: [29422493](#)

**Article Published Date** : Feb 07, 2018

**Authors** : Zohreh Kheradpisheh, Masoud Mirzaei, Amir Hossein Mahvi, Mehdi Mokhtari, Reyhane Azizi, Hossein Fallahzadeh, Mohammad Hassan Ehrampoush

**Study Type** : Human: Case Report

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Hypothyroidism : CK(847) : AC(148)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Fluoride impairs mitochondrial translation by targeting miR-221-3p/c-Fos/RMND1 axis contributing to neurodevelopment defects.

**Pubmed Data** : Sci Total Environ. 2023 Apr 15 ;869:161738. Epub 2023 Jan 21. PMID: [36690096](#)

**Article Published Date** : Apr 14, 2023

**Authors** : Dongjie Li, Qian Zhao, Li Xie, Chenxi Wang, Zhiyuan Tian, Huayang Tang, Tao Xia, Aiguo Wang

**Study Type** : Human Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Neurodevelopmental Disorders : CK(470) : AC(85)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Fluoride impairs ovary development by affecting oogenesis and inducing oxidative stress and apoptosis in female zebrafish.

**Pubmed Data** : Chemosphere. 2020 Oct ;256:127105. Epub 2020 May 17. PMID: [32450357](#)

**Article Published Date** : Sep 30, 2020

**Authors** : Meiyun Li, Jinling Cao, Yangfei Zhao, Panhong Wu, Xuehua Li, Forouzan Khodaei, Yongli Han, Jundong Wang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Infertility: Female : CK(741) : AC(180), Oxidative Stress : CK(13443) : AC(5499)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Fluoride in drinking water and skeletal fluorosis: a review of the global impact.

**Pubmed Data** : Curr Environ Health Rep. 2020 Jun ;7(2):140-146. PMID: [32207100](#)

**Article Published Date** : May 31, 2020

**Authors** : Sakshi Srivastava, S J S Flora

**Study Type** : Review

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Fluorosis : CK(262) : AC(42)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Fluoride in drinking water may produce developmental neurotoxicity

**Pubmed Data** : Neurotoxicol Teratol. 2015 ;47:96-101. Epub 2014 Nov 8. PMID: [25446012](#)

**Article Published Date** : Dec 31, 2014

**Authors** : Anna L Choi, Ying Zhang, Guifan Sun, David C Bellinger, Kanglin Wang, Xiao Jing Yang, Jin Shu Li, Quanmei Zheng, Yuanli Fu, Philippe Grandjean

**Study Type** : Human Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Neurodevelopmental Disorders : CK(470) : AC(85)

**Additional Keywords** : Dose Response : CK(1769) : AC(700)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Fluoride in drinking water was associated with increased risk of hypothyroidism in pregnant women.

**Pubmed Data** : Sci Total Environ. 2023 Apr 15 ;869:161149. Epub 2023 Feb 9. PMID: [36764861](#)

**Article Published Date** : Apr 14, 2023

**Authors** : Meaghan Hall, Bruce Lanphear, Jonathan Chevrier, Rick Hornung, Rivka Green, Carly Goodman, Pierre Ayotte, Esperanza Angeles Martinez-Mier, R Thomas Zoeller, Christine Till

**Study Type** : Human Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Hypothyroidism : CK(847) : AC(148)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Fluoride in drinking water was associated with reduced visual acuity and alterations in cardiac autonomic function in infancy.

**Pubmed Data** : Environ Int. 2024 Jan ;183:108336. Epub 2023 Nov 27. PMID: [38064923](#)

**Article Published Date** : Dec 31, 2023

**Authors** : John E Krzeczowski, Meaghan Hall, Dave Saint-Amour, Youssef Oulhote, Taylor McGuckin, Carly V Goodman, Rivka Green, Gina Muckle, Bruce Lanphear, Christine Till

**Study Type** : Human Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Prenatal Chemical Exposures](#) : CK(2428) : AC(530)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Fluoride in drinking water was negatively associated with cognitive function.

**Pubmed Data** : Neurotoxicol Teratol. 2023 ;100:107293. Epub 2023 Sep 9. PMID: [37690675](#)

**Article Published Date** : Dec 31, 2022

**Authors** : Tewodros Rango Godebo, Marc Jeuland, Redda Tekle-Haimanot, Biniyam Alemayehu, Arti Shankar, Amy Wolfe, Nati Phan

**Study Type** : Human Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Neurotoxic](#) : CK(2838) : AC(702)

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## Fluoride increases the susceptibility of developmental dysplasia of the hip.

**Pubmed Data** : Ecotoxicol Environ Saf. 2022 Apr 1 ;234:113408. Epub 2022 Mar 14. PMID: [35298972](#)

**Article Published Date** : Mar 31, 2022

**Authors** : Weizheng Zhou, Wenting Luo, Dan Liu, Federico Canavese, Lianyong Li, Qun Zhao

**Study Type** : Animal Study, In Vitro Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Hip Dysplasia: Congenital](#) : CK(3) : AC(1), [Oxidative Stress](#) : CK(13443) : AC(5499)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Fluoride induced leaky gut and bloom of Erysipelatoclostridium ramosum mediate the exacerbation of obesity.

**Pubmed Data** : J Adv Res. 2023 Aug ;50:35-54. Epub 2022 Oct 29. PMID: [36341987](#)

**Article Published Date** : Jul 31, 2023

**Authors** : Guijie Chen, Yujia Peng, Yujie Huang, Minhao Xie, Zhuqing Dai, Huimei Cai, Wei Dong, Weiqi Xu, Zhiyong Xie, Dan Chen, Xia Fan, Wangting Zhou, Xuhui Kan, Tingting Yang, Chunxu Chen, Yi Sun, Xiaoxiong Zeng, Zhonghua Liu

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Obesity](#) : CK(9664) : AC(2579)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Fluoride induced neurobehavioral impairments in experimental animals.

**Pubmed Data** : Biol Trace Elem Res. 2023 Mar ;201(3):1214-1236. Epub 2022 Apr 30. PMID: [35488996](#)

**Article Published Date** : Feb 28, 2023

**Authors** : Harsheema Ottappillakkil, Srija Babu, Satheeswaran Balasubramanian, Suryaa Manoharan, Ekambaram

Perumal

**Study Type** : Review

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Neurodegenerative Diseases](#) : CK(12159) : AC(4162)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Neurotoxic](#) : CK(2838) : AC(702)

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## Fluoride induced testicular toxicities in adult Wistar rats.

**Pubmed Data** : Toxicol Mech Methods. 2021 Jun ;31(5):383-392. Epub 2021 Feb 28. PMID: [33641618](#)

**Article Published Date** : May 31, 2021

**Authors** : Priyankar Pal, Prabir Kumar Mukhopadhyay

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Oxidative Stress](#) : CK(13443) : AC(5499), [Testicular Injury: Chemical/Metal Induced](#) : CK(754) : AC(374)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Fluoride induced tissue hypercalcemia, IL-17 mediated inflammation and apoptosis lead to cardiomyopathy.

**Pubmed Data** : Toxicology. 2018 Aug 1 ;406-407:44-57. Epub 2018 May 22. PMID: [29800585](#)

**Article Published Date** : Jul 31, 2018

**Authors** : Javed Ahsan Quadri, Saba Sarwar, Pinky, Parmita Kar, Seema Singh, Saumya Ranjan Mallick, Sudheer Arava, Tapash Chand Nag, Tara Sankar Roy, A Shariff

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Cardiomyopathy](#) : CK(358) : AC(160), [Fluoride Toxicity](#) : CK(1389) : AC(376), [Inflammation](#) : CK(15536) : AC(5279)

**Problem Substances** : [Fluoride](#) : CK(1815) : AC(454), [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Apoptotic](#) : CK(278) : AC(120), [Cardiotoxic](#) : CK(1168) : AC(209), [Inflammatory](#) : CK(541) : AC(169)

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## Fluoride induces apoptosis and alters collagen I expression in rat osteoblasts.

**Pubmed Data** : Toxicol Lett. 2011 Feb 5 ;200(3):133-8. Epub 2010 Nov 18. PMID: [21093551](#)

**Article Published Date** : Feb 04, 2011

**Authors** : Xiaoyan Yan, Xiaoting Yan, Alex Morrison, Tianlong Han, Qinglin Chen, Ji Li, Jundong Wang

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Apoptotic](#) : CK(278) : AC(120)

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## Fluoride induces apoptosis in mammalian cells.

**Pubmed Data** : Anticancer Res. 2017 Sep ;37(9):4767-4777. PMID: [28870895](#)

**Article Published Date** : Aug 31, 2017

**Authors** : Daniel Araki Ribeiro, Caroline Margonato Cardoso, Veronica Quispe Yujra, Milena DE Barros Viana, Odair Aguiar, Luciana Pellegrini Pisani, Celina Tizuko Fujiyama Oshima

**Study Type** : Review

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Apoptotic](#) : CK(278) : AC(120)

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## Fluoride induces autoimmune orchitis involved with enhanced IL-17A secretion in mice testis.

**Pubmed Data** : J Agric Food Chem. 2019 Nov 8. Epub 2019 Nov 8. PMID: [31703480](#)

**Article Published Date** : Nov 07, 2019

**Authors** : Panhong Wu, Zilong Sun, Xiaoqian Lv, Xuejing Pei, Ram Kumar Manthari, Jundong Wang

**Study Type** : Animal Study

### Additional Links

**Diseases** : Autoimmune Diseases : CK(11878) : AC(2631), Fluoride Toxicity : CK(1389) : AC(376), Orchitis : CK(19) : AC(5)

**Additional Keywords** : Risk Factors : CK(14728) : AC(2072)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Fluoride induces neutrophil extracellular traps and aggravates brain inflammation by disrupting neutrophil calcium homeostasis and causing ferroptosis.

**Pubmed Data** : Environ Pollut. 2023 Aug 15 ;331(Pt 1):121847. Epub 2023 May 18. PMID: [37209896](#)

**Article Published Date** : Aug 14, 2023

**Authors** : Dongxu Wang, Kai Yin, Yue Zhang, Hongmin Lu, Lulu Hou, Hongjing Zhao, Mingwei Xing

**Study Type** : In Vitro Study

### Additional Links

**Diseases** : Brain Inflammation : CK(1650) : AC(901), Fluoride Toxicity : CK(1389) : AC(376), Inflammation : CK(15536) : AC(5279)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Fluoride induces oxidative damage and SIRT1/autophagy through ROS-mediated JNK signaling.

**Pubmed Data** : Free Radic Biol Med. 2015 Dec ;89:369-78. Epub 2015 Sep 30. PMID: [26431905](#)

**Article Published Date** : Nov 30, 2015

**Authors** : Maiko Suzuki, Cheryl Bandoski, John D Bartlett

**Study Type** : In Vitro Study

### Additional Links

**Diseases** : DNA damage : CK(2255) : AC(824), Fluoride Toxicity : CK(1389) : AC(376), Oxidative Stress : CK(13443) : AC(5499)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Fluoride induces pyroptosis via IL-17A-mediated caspase-1/11-dependent pathways and Bifidobacterium intervention in testis.

**Pubmed Data** : Sci Total Environ. 2024 May 20 ;926:172036. Epub 2024 Mar 28. PMID: [38554964](#)

**Article Published Date** : May 19, 2024

**Authors** : Ao Cheng, Huifeng Luo, Bingchao Fan, Qing Xiang, Zhaochen Nie, Shuang Feng, Yurou Qiao, Yue Wu, Qianlong Zhu, Rongxiu Liu, Xiaochao Song, Xiang Li, Jianhai Zhang

**Study Type** : Animal Study

### Additional Links

**Substances** : Bifidobacterium : CK(1540) : AC(254)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Testicular Injury: Chemical/Metal Induced : CK(754) : AC(374)

**Pharmacological Actions** : Anti-Inflammatory Agents : CK(35225) : AC(15297), Interleukin-17 downregulation : CK(484) : AC(187)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Apoptotic : CK(278) : AC(120)

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## Fluoride induces thyroid dysfunction in rats, which may be attenuated

## by protein and calcium supplementation.

**Pubmed Data** : Toxicol Ind Health. 2009 Feb;25(1):49-57. PMID: [19318504](#)

**Article Published Date** : Feb 01, 2009

**Authors** : H Wang, Z Yang, B Zhou, H Gao, X Yan, J Wang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Problem Substances** : [Fluoride](#) : CK(1815) : AC(454), [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Endocrine Disruptor](#) : CK(529) : AC(106)

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## Fluoride inhibits longitudinal bone growth by acting directly at the growth plate in cultured neonatal rat metatarsal bones.

**Pubmed Data** : Biol Trace Elem Res. 2020 Oct ;197(2):522-532. Epub 2019 Dec 14. PMID: [31838736](#)

**Article Published Date** : Sep 30, 2020

**Authors** : Rui Ma, Shuang Liu, Tingting Qiao, Demin Li, Ruixue Zhang, Xiaoying Guo

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Fluoride interferes with the sperm fertilizing ability.

**Pubmed Data** : J Agric Food Chem. 2019 May 8 ;67(18):5240-5249. Epub 2019 Apr 29. PMID: [31008594](#)

**Article Published Date** : May 07, 2019

**Authors** : Yu Liu, Chen Liang, Yan Gao, Shanshan Jiang, Yuyang He, Yongli Han, Ali Olfati, Ram Kumar Manthari, Jundong Wang, Jianhai Zhang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Infertility: Male](#) : CK(1668) : AC(424)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Fluoride is inversely associated with intelligence.

**Pubmed Data** : Environ Int. 2021 Oct ;155:106681. Epub 2021 Jun 4. PMID: [34098334](#)

**Article Published Date** : Sep 30, 2021

**Authors** : Xingchen Yu, Lu Xia, Shun Zhang, Guoyu Zhou, Yonggang Li, Hongliang Liu, Changchun Hou, Qian Zhao, Lixin Dong, Yushan Cui, Qiang Zeng, Aiguo Wang, Li Liu

**Study Type** : Human Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Learning disorders](#) : CK(517) : AC(155)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Fluoride levels in the 100-200 ppm range results in neurotoxicity in rats.

**Pubmed Data** : Biol Trace Elem Res. 2010 Jul 24. Epub 2010 Jul 24. PMID: [20658207](#)

**Article Published Date** : Jul 24, 2010

**Authors** : P Mahaboob Basha, Puja Rai, Shabana Begum

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Additional Keywords** : [Multi-Generational Effects](#) : CK(4) : AC(2)

**Problem Substances** : [Fluoride](#) : CK(1815) : AC(454)

**Adverse Pharmacological Actions** : [Neurotoxic](#) : CK(2838) : AC(702)

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## Fluoride produces can decrease trabecular bone strength by changing the elasticity of the trabecular bone.

**Pubmed Data** : Biol Trace Elem Res. 2018 Feb 2. Epub 2018 Feb 2. PMID: [29396777](#)

**Article Published Date** : Feb 01, 2018

**Authors** : Brenda Lorena Fina, Maela Lupo, Eugenia Rocío Da Ros, Mercedes Lombarte, Alfredo Rigalli

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Fluoride promotes the secretion of inflammatory factors in microglia.

**Pubmed Data** : Environ Sci Pollut Res Int. 2024 Mar ;31(13):19844-19855. Epub 2024 Feb 17. PMID: [38367109](#)

**Article Published Date** : Feb 29, 2024

**Authors** : Qiuyi Zhang, Tao Li, Ruili Shi, Ruifang Qi, Xiaoqiong Hao, Baohui Ma

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Inflammation](#) : CK(15536) : AC(5279)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Inflammatory](#) : CK(541) : AC(169)

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## Fluoride showed potent neuronal toxicity as evidenced by alterations of various molecular markers.

**Pubmed Data** : J Trace Elem Med Biol. 2024 Aug 23 ;86:127511. Epub 2024 Aug 23. PMID: [39216433](#)

**Article Published Date** : Aug 22, 2024

**Authors** : Sachindra Kumar, Ravindra Shantakumar Swamy, Rashmi Bhushan, Vishal Chhabra, Smita Shenoy, Krishna Murti, Shubhankar Kumar Singh, Nitesh Kumar

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Neurotoxic](#) : CK(2838) : AC(702)

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## Fluoride stimulates anxiety and depression-like behaviors.

**Pubmed Data** : J Agric Food Chem. 2021 Nov 17 ;69(45):13618-13627. Epub 2021 Nov 4. PMID: [34735150](#)

**Article Published Date** : Nov 16, 2021

**Authors** : Guoyu Zhou, Yue Hu, Anqi Wang, Meng Guo, Yuhui Du, Yongxiang Gong, Limin Ding, Zichen Feng, Xiangbo Hou, Kaihong Xu, Fangfang Yu, Zhiyuan Li, Yue Ba

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Anxiety](#) : CK(4195) : AC(743), [Depression](#) : CK(8817) : AC(1715), [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Fluoride-elicited developmental testicular toxicity in rats: roles of endoplasmic reticulum stress and inflammatory response.

**Pubmed Data** : Toxicol Appl Pharmacol. 2013 Sep 1 ;271(2):206-15. Epub 2013 May 22. PMID: [23707774](#)

**Article Published Date** : Aug 31, 2013

**Authors** : Shun Zhang, Chunyang Jiang, Hongliang Liu, Zhizhong Guan, Qiang Zeng, Cheng Zhang, Rongrong Lei, Tao Xia, Hui Gao, Lu Yang, Yihu Chen, Xue Wu, Xiaofei Zhang, Yushan Cui, Linyu Yu, Zhenglun Wang, Aiguo Wang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Infertility: Male](#) : CK(1668) : AC(424), [Inflammation](#) : CK(15536) : AC(5279)



**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Fluoride-induced alterations of synapse-related proteins in the cerebral cortex of ICR offspring mouse brain.

**Pubmed Data** : Chemosphere. 2018 Jun ;201:874-883. Epub 2018 Feb 27. PMID: [29567471](#)

**Article Published Date** : May 31, 2018

**Authors** : Yaming Ge, Lingli Chen, Zhihong Yin, Xiaochao Song, Tao Ruan, Liushuai Hua, Junwei Liu, Jundong Wang, Hongmei Ning

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Fluoride-induced apoptosis in non-skeletal tissues of experimental animals.

**Pubmed Data** : Heliyon. 2023 Aug ;9(8):e18646. Epub 2023 Jul 29. PMID: [37560699](#)

**Article Published Date** : Jul 31, 2023

**Authors** : Linet Musungu Angwa, Sylvester Dodzi Nyadanu, Anne Murugi Kanyugo, Timothy Adampah, Gavin Pereira

**Study Type** : Meta Analysis, Review

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Apoptotic : CK(278) : AC(120)

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## Fluoride-induced cortical toxicity in rats: the role of excessive endoplasmic reticulum stress and its mediated defective autophagy.

**Pubmed Data** : Biol Trace Elem Res. 2023 Aug ;201(8):3850-3860. Epub 2022 Nov 3. PMID: [36327065](#)

**Article Published Date** : Jul 31, 2023

**Authors** : Jingjing Zhang, Yanling Tang, Wanjing Xu, Zeyu Hu, Shangzhi Xu, Qiang Niu

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Fluoride-induced hepatic and cardio-renal toxicity in a concentration-dependent manner.

**Pubmed Data** : Biol Trace Elem Res. 2023 Jan ;201(1):229-241. Epub 2022 Jan 12. PMID: [35023047](#)

**Article Published Date** : Dec 31, 2022

**Authors** : Priyanka Sharma, Pawan Kumar Verma, Shilpa Sood, Maninder Singh, Deepika Verma

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Chemically-Induced Liver Damage : CK(2167) : AC(1069), Fluoride Toxicity : CK(1389) : AC(376), Kidney Damage: Chemically-Induced : CK(542) : AC(270), Lipid Peroxidation : CK(1901) : AC(774), Oxidative Stress : CK(13443) : AC(5499)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Fluoride-induced mitochondrial dysfunction.

**Pubmed Data** : Biol Trace Elem Res. 2024 Mar ;202(3):835-849. Epub 2023 Jun 10. PMID: [37300595](#)



**Article Published Date** : Feb 29, 2024

**Authors** : Sachindra Kumar, Smita Shenoy, Ravindra Shantakumar Swamy, V Ravichandiran, Nitesh Kumar

**Study Type** : Review

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Mitochondrial Diseases : CK(607) : AC(262), Oxidative Stress : CK(13443) : AC(5499)

**Pharmacological Actions** : Apoptotic : CK(9052) : AC(7284)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Fluoride-induced neuron apoptosis and expressions of inflammatory factors by activating microglia in rat brain.

**Pubmed Data** : Mol Neurobiol. 2016 Sep ;53(7):4449-60. Epub 2015 Aug 8. PMID: [26253724](#)

**Article Published Date** : Aug 31, 2016

**Authors** : Nan Yan, Yan Liu, Shengnan Liu, Siqi Cao, Fei Wang, Zhengdong Wang, Shuhua Xi

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Inflammation : CK(15536) : AC(5279)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Inflammatory : CK(541) : AC(169), Neurotoxic : CK(2838) : AC(702)

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## Fluoride-induced testicular degeneration and sperm quality deteriorations.

**Pubmed Data** : Rev Int Androl. 2020 Jul 20. Epub 2020 Jul 20. PMID: [32703668](#)

**Article Published Date** : Jul 19, 2020

**Authors** : Sunday Aderemi Adelakun, Olalekan Wasiu Akintunde, Babatunde Ogunlade

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Infertility: Male : CK(1668) : AC(424)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Fluorosilicic acid and cotinine, separately and in combination, induce genotoxicity and telomeric reduction in human osteoblast cell line MG63.

**Pubmed Data** : Mutat Res Genet Toxicol Environ Mutagen. 2022 ;876-877:503474. Epub 2022 Feb 17. PMID: [35483789](#)

**Article Published Date** : Dec 31, 2021

**Authors** : Ana L H Garcia, Cristina A Matzenbacher, Solange Soares, Paula Rohr, Juliana da Silva

**Study Type** : Human In Vitro

**Additional Links**

**Diseases** : DNA damage : CK(2255) : AC(824), Fluoride Toxicity : CK(1389) : AC(376), Fluorosis : CK(262) : AC(42)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Fluorosilicic acid induces DNA damage and oxidative stress in bone marrow mesenchymal stem cells.

**Pubmed Data** : Mutat Res Genet Toxicol Environ Mutagen. 2021 ;861-862:503297. Epub 2020 Nov 21. PMID: [33551106](#)

**Article Published Date** : Dec 31, 2020

**Authors** : Ana L H Garcia, Juliana Picinini, Maiele D Silveira, Melissa Camassola, Ana P V Visentim, Mirian Salvador, Juliana da Silva

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : DNA damage : CK(2255) : AC(824), Fluoride Toxicity : CK(1389) : AC(376), Lipid Peroxidation : CK(1901) : AC(774), Oxidative Stress : CK(13443) : AC(5499)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Fluorosis is associated with impaired cognition in children.

**Pubmed Data** : Ann Indian Acad Neurol. 2021 ;24(5):715-720. Epub 2020 Nov 6. PMID: [35002129](#)

**Article Published Date** : Dec 31, 2020

**Authors** : Anjana Prabhakar, Kabeer Abdulkhayarkutty, Shaji Velayudhan Cheruvallil, Prasanth Sudhakaran

**Study Type** : Human Study

**Additional Links**

**Diseases** : Childhood Cognitive Disorders : CK(316) : AC(27), Fluoride Toxicity : CK(1389) : AC(376), Fluorosis : CK(262) : AC(42)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Folic acid ameliorates the declining quality of sodium fluoride-exposed mouse oocytes.

**Pubmed Data** : Aging Dis. 2022 Oct 1 ;13(5):1471-1487. Epub 2022 Oct 1. PMID: [36186127](#)

**Article Published Date** : Sep 30, 2022

**Authors** : Xiaoyuan Lin, Beibei Fu, Yan Xiong, Shiyao Xu, Jin Liu, Mohamed Y Zaky, Dan Qiu, Haibo Wu

**Study Type** : Animal Study

**Additional Links**

**Substances** : Folic Acid : CK(1317) : AC(206)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Fruits of A. carambola are useful as a dietary supplement in regulation of fluoride induced hyperglycemia, hyperlipemia and oxidative stress.

**Pubmed Data** : Interdiscip Toxicol. 2014 Jun ;7(2):103-10. Epub 2014 Nov 15. PMID: [26109886](#)

**Article Published Date** : May 31, 2014

**Authors** : Rupal A Vasant, A V R L Narasimhacharya

**Study Type** : Animal Study

**Additional Links**

**Substances** : Star Fruit : CK(17) : AC(5)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Hyperglycemia : CK(2107) : AC(692), Hyperlipidemia : CK(2133) : AC(550), Oxidative Stress : CK(13443) : AC(5499)

**Pharmacological Actions** : Antioxidants : CK(32218) : AC(14161), Hypoglycemic Agents : CK(8194) : AC(2019), Hypolipidemic : CK(8317) : AC(1985)

**Additional Keywords** : Supplementation : CK(413) : AC(60)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Gene expression and alterations of antioxidant enzymes in spleen of rats exposed to fluoride.

**Pubmed Data** : J Trace Elem Med Biol. 2022 Jul ;72:126966. Epub 2022 Mar 9. PMID: [35286942](#)

**Article Published Date** : Jun 30, 2022

**Authors** : A Shashi, Sukanya Thakur

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Oxidative Stress : CK(13443) : AC(5499), Spleen Damage: Chemically Induced : CK(2) : AC(9)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Genotoxicity of fluoride subacute exposure in rats and selenium intervention.

**Pubmed Data** : Chemosphere. 2021 Mar ;266:128978. Epub 2020 Nov 17. PMID: [33298328](#)

**Article Published Date** : Feb 28, 2021

**Authors** : Jelena Radovanović, Biljana Antonijević, Stoimir Kolarević, Sanja Milutinović-Smiljanić, Jelena Mandić, Branka Vuković-Gačić, Zorica Bulat, Marijana Ćurčić, Margareta Kračun-Kolarević, Karolina Sunjog, Jovana Kostić-Vuković, Jovana Jovanović Marić, Evica Antonijević-Miljaković, Danijela Đukić-Ćosić, Aleksandra Buha Djordjevic, Dragana Javorac, Katarina Baralić, Zoran Mandinić

**Study Type** : In Vitro Study

**Additional Links**

**Substances** : Selenium : CK(1706) : AC(389)

**Diseases** : Chemically-Induced Liver Damage : CK(2167) : AC(1069), DNA damage : CK(2255) : AC(824), Fluoride Toxicity : CK(1389) : AC(376), Spleen Damage: Chemically Induced : CK(2) : AC(9)

**Pharmacological Actions** : Genoprotective : CK(522) : AC(203)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Genotoxic : CK(545) : AC(184), Neurotoxic : CK(2838) : AC(702)

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## Gestational exposure to fluoride impairs cognition in C57 BL/6 J male offspring mice.

**Pubmed Data** : Ecotoxicol Environ Saf. 2022 Jul 1 ;239:113682. Epub 2022 May 25. PMID: [35643027](#)

**Article Published Date** : Jun 30, 2022

**Authors** : Weisheng Li, Likui Lu, Dan Zhu, Jingliu Liu, Yajun Shi, Hongtao Zeng, Xi Yu, Jun Guo, Bin Wei, Yongle Cai, Miao Sun

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Prenatal Chemical Exposures : CK(2428) : AC(530)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Grape seed proanthocyanidin extract as a naturally occurring prophylactic treatment for fluoride-induced hepatotoxicity associated with iron overload.

**Pubmed Data** : J Toxicol Sci. 2018 ;43(5):311-319. PMID: [29743442](#)

**Article Published Date** : Dec 31, 2017

**Authors** : Qiang Niu, Ping He, Shangzhi Xu, Ruling Ma, Yusong Ding, Lati Mu, Shugang Li

**Study Type** : Animal Study

**Additional Links**

**Substances** : Grape Seed Extract : CK(1047) : AC(329)

**Diseases** : Chemically-Induced Liver Damage : CK(2167) : AC(1069), Fluoride Toxicity : CK(1389) : AC(376), Iron Overload : CK(218) : AC(78)

**Pharmacological Actions** : Antioxidants : CK(32218) : AC(14161), Hepatoprotective : CK(8320) : AC(3765)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Grape seed proanthocyanins protect fluoride-induced hepatotoxicity.

**Pubmed Data** : Toxicol Res (Camb). 2024 Apr ;13(2):tfae039. Epub 2024 Mar 15. PMID: [38500515](#)

**Article Published Date** : Mar 31, 2024

**Authors** : Ran Wei, Guan Fang Ping, Zhe Tao Lang, Er Hui Wang

**Study Type** : In Vitro Study

**Additional Links**

**Substances** : Grape Seed Extract : CK(1047) : AC(329)

**Diseases** : Chemically-Induced Liver Damage : CK(2167) : AC(1069), Fluoride Toxicity : CK(1389) : AC(376)

**Pharmacological Actions** : Anti-Apoptotic : CK(4942) : AC(3051), Antioxidants : CK(32218) : AC(14161), Hepatoprotective : CK(8320) : AC(3765), Nrf2 activation : CK(2908) : AC(1762)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Grape seed procyanidin extract attenuate sodium fluoride-induced oxidative damage and apoptosis in rat kidneys.

**Pubmed Data** : Biomed Environ Sci. 2020 Jun 20 ;33(6):454-457. PMID: [32641209](#)

**Article Published Date** : Jun 19, 2020

**Authors** : Er Hui Wang, Zeng Li Yu, Guan Fang Ping, De Sheng Zhai

**Study Type** : Animal Study

**Additional Links**

**Substances** : [Grape Seed Extract](#) : CK(1047) : AC(329)

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Kidney Damage: Chemically-Induced](#) : CK(542) : AC(270), [Oxidative Stress](#) : CK(13443) : AC(5499)

**Pharmacological Actions** : [Anti-Apoptotic](#) : CK(4942) : AC(3051), [Renoprotective](#) : CK(4133) : AC(1932)

**Additional Keywords** : [Proanthocyanidins](#) : CK(494) : AC(157)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Health effects of groundwater fluoride contamination.

**Pubmed Data** : Clin Toxicol (Phila). 2009 Apr ;47(4):292-5. PMID: [19274500](#)

**Article Published Date** : Mar 31, 2009

**Authors** : Bishwajit Nayak, Madan Mohan Roy, Bhaskar Das, Arup Pal, Mrinal Kumar Sengupta, Shankar Prasad De, Dipankar Chakraborti

**Study Type** : Human Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Fluorosis](#) : CK(262) : AC(42)

**Problem Substances** : [Fluorosis](#) : CK(262) : AC(42), [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Health impact of supplying safe drinking water containing fluoride below permissible level on flourosis patients in a fluoride-endemic rural area of West Bengal.

**Pubmed Data** : Indian J Public Health. 2011 ;55(4):303-8. PMID: [22298140](#)

**Article Published Date** : Dec 31, 2010

**Authors** : Kunal Kanti Majumdar

**Study Type** : Human Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Fluorosis](#) : CK(262) : AC(42)

**Additional Keywords** : [Water Fluoridation](#) : CK(34) : AC(5)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Hesperidin attenuates oxidative stress, inflammation, apoptosis, and cardiac dysfunction in sodium fluoride-induced cardiotoxicity.

**Pubmed Data** : Cardiovasc Toxicol. 2022 Aug ;22(8):727-735. Epub 2022 May 23. PMID: [35606666](#)

**Article Published Date** : Jul 31, 2022

**Authors** : Behçet Varışlı, Ekrem Darendelioğlu, Cuneyt Caglayan, Fatih Mehmet Kandemir, Adnan Ayna, Aydın Genç, Özge Kandemir

**Study Type** : Animal Study

**Additional Links**

**Substances** : [Hesperidin](#) : CK(845) : AC(358)

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Inflammation](#) : CK(15536) : AC(5279), [Oxidative Stress](#) : CK(13443) : AC(5499)

**Pharmacological Actions** : [Anti-Apoptotic](#) : CK(4942) : AC(3051), [Bcl-2 protein down-regulation](#) : CK(687) : AC(522), [NF-kappaB Inhibitor](#) : CK(5541) : AC(3374), [Superoxide Dismutase Up-regulation](#) : CK(2327) : AC(896), [Tumor Necrosis Factor \(TNF\) Alpha Inhibitor](#) : CK(10605) : AC(4670), [Tumor Suppressor Protein p53 Upregulation](#) : CK(748) : AC(549)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Hesperidin/chitosan nanogel mitigates apoptosis and endoplasmic reticulum stress in fluoride and aluminum-induced testicular injury.

**Pubmed Data** : Biol Trace Elem Res. 2023 Dec 13. Epub 2023 Dec 13. PMID: [38087036](#)

**Article Published Date** : Dec 12, 2023

**Authors** : Nora S Deiab, Ahmad S Kodous, Mohamed K Mahfouz, Alshaimaa M Said, Mohamed Mohamady Ghobashy, Omayma A R Abozaid

**Study Type** : Animal Study

**Additional Links**

**Substances** : [Hesperidin](#) : CK(845) : AC(358)

**Diseases** : [Aluminum Toxicity](#) : CK(685) : AC(308), [Fluoride Toxicity](#) : CK(1389) : AC(376), [Testicular Injury: Chemical/Metal Induced](#) : CK(754) : AC(374)

**Pharmacological Actions** : [Anti-Apoptotic](#) : CK(4942) : AC(3051), [Antioxidants](#) : CK(32218) : AC(14161)

**Problem Substances** : [Aluminum](#) : CK(1061) : AC(349), [Sodium Fluoride](#) : CK(1446) : AC(393)

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## High concentration of sodium fluoride in drinking water induce hypertrophy versus atrophy in mouse skeletal muscle.

**Pubmed Data** : J Hazard Mater. 2022 Jun 15 ;432:128654. Epub 2022 Mar 9. PMID: [35286933](#)

**Article Published Date** : Jun 14, 2022

**Authors** : Apoorva H Nagendra, Mohd Altaf Najar, Bipasha Bose, P Sudheer Shenoy

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## High fluoride exposure has multigenerational and cumulative adverse effects on thyroid status, brain health and learning memory in rats.

**Pubmed Data** : Biol Trace Elem Res. 2011 Jul 14. Epub 2011 Jul 14. PMID: [21755305](#)

**Article Published Date** : Jul 14, 2011

**Authors** : Piler Mahaboob Basha, Puja Rai, Shabana Begum

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Hypothyroidism](#) : CK(847) : AC(148), [Prenatal Chemical Exposures](#) : CK(2428) : AC(530), [Prenatal Nutrition: Learning/Intelligence of Offspring](#) : CK(116) : AC(14)

**Problem Substances** : [Fluoride](#) : CK(1815) : AC(454)

**Adverse Pharmacological Actions** : [Neurotoxic](#) : CK(2838) : AC(702)

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## High fluoride ingestion impairs bone fracture healing.

**Pubmed Data** : Front Bioeng Biotechnol. 2022 ;10:791433. Epub 2022 May 20. PMID: [35669059](#)

**Article Published Date** : Dec 31, 2021

**Authors** : Chengcheng Du, Pengcheng Xiao, Shengqiang Gao, Shengwen Chen, Bowen Chen, Wei Huang, Chen Zhao

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Fractures: Bone](#) : CK(255) : AC(34)

**Additional Keywords** : [Increased Risk](#) : CK(8492) : AC(1109)

**Problem Substances** : [Fluoride](#) : CK(1815) : AC(454), [Sodium Fluoride](#) : CK(1446) : AC(393)

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## High prevalence of dental fluorosis among schoolchildren in three villages in Sri Lanka.

**Pubmed Data** : Ceylon Med J. 2017 12 26 ;62(4):218-221. PMID: [29390597](#)

**Article Published Date** : Jan 25, 2017

**Authors** : P S Rajapakse, W M Jayawardhane, A Lokubandara, R Gamage, A P Dasanayake, C Goonaratna

**Study Type** : Human Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Fluorosis](#) : CK(262) : AC(42)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Human cultured IMR-32 neuronal-like and U87 glial-like cells have different patterns of toxicity under fluoride exposure.

**Pubmed Data** : PLoS One. 2021 ;16(6):e0251200. Epub 2021 Jun 17. PMID: [34138870](#)

**Article Published Date** : Dec 31, 2020

**Authors** : Bruna Puty, Leonardo Oliveira Bittencourt, Iago Cesar Nogueira, Marília Afonso Rabelo Buzalaf, Edivaldo Herculano Oliveira, Rafael Rodrigues Lima

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Apoptotic](#) : CK(278) : AC(120), [Neurotoxic](#) : CK(2838) : AC(702)

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## Impacts of fluoride neurotoxicity and mitochondrial dysfunction on cognition and mental health.

**Pubmed Data** : Int J Environ Res Public Health. 2021 Dec 7 ;18(24). Epub 2021 Dec 7. PMID: [34948493](#)

**Article Published Date** : Dec 06, 2021

**Authors** : Emily A Adkins, Kelly J Brunst

**Study Type** : Review

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Neurodegenerative Diseases](#) : CK(12159) : AC(4162)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Neurotoxic](#) : CK(2838) : AC(702)

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## Impairment of learning and memory in mouse offspring induced by perinatal fluoride exposure may partly result from the enhanced miR-124 and miR-132.

**Pubmed Data** : Chemosphere. 2018 Jan 8 ;197:117-122. Epub 2018 Jan 8. PMID: [29334651](#)

**Article Published Date** : Jan 07, 2018

**Authors** : Jixiang Wang, Yuliang Zhang, Zhenzhen Guo, Rui Li, Xingchen Xue, Zilong Sun, Ruiyan Niu

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Learning disorders](#) : CK(517) : AC(155), [Prenatal Chemical Exposures](#) : CK(2428) : AC(530)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## In silico prediction of microRNAs on fluoride induced sperm toxicity in mice.

**Pubmed Data** : Food Chem Toxicol. 2016 Dec ;98(Pt A):34-49. Epub 2016 Mar 21. PMID: [27012587](#)

**Article Published Date** : Nov 30, 2016

**Authors** : Azhwar Raghunath, Dhivyalakshmi Jeyabaskar, Kiruthika Sundarraj, Lakshmikanthan Panneerselvam, Ekambaram Perumal

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Infertility: Male](#) : CK(1668) : AC(424)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Infant formula consumption may be associated with an increased risk of developing at least some detectable level of enamel fluorosis.

**Pubmed Data** : Evid Based Dent. 2009;10(3):73. PMID: [19820737](#)



**Article Published Date** : Jan 01, 2009

**Authors** : Maura Edwards

**Study Type** : Meta Analysis

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Fluorosis](#) : CK(262) : AC(42)

**Problem Substances** : [Fluoride](#) : CK(1815) : AC(454), [Infant Formula](#) : CK(659) : AC(97)

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## Infants fully formula-fed on formulae prepared with optimally fluoridated water (0.7-1.0 mg/L) have a high probability of exceeding the upper limit for fluoride and are at increased risk of dental fluorosis.

**Pubmed Data** : J Public Health Dent. 2010 Jun 2. Epub 2010 Jun 2. PMID: [20545827](#)

**Article Published Date** : Jun 02, 2010

**Authors** : Peter Cressey

**Study Type** : Human Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Fluorosis](#) : CK(262) : AC(42)

**Problem Substances** : [Fluoride](#) : CK(1815) : AC(454), [Infant Formula](#) : CK(659) : AC(97), [Public Drinking Water](#) : CK(49) : AC(16)

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## Inferring the fluoride hydrogeochemistry and effect of consuming fluoride-contaminated drinking water on human health.

**Pubmed Data** : Environ Geochem Health. 2016 Apr ;38(2):557-76. Epub 2015 Jul 12. PMID: [26164468](#)

**Article Published Date** : Mar 31, 2016

**Authors** : D Mondal, G Dutta, S Gupta

**Study Type** : Human Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Intelligence Quotient \(IQ\): Low/Impaired](#) : CK(312) : AC(27)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Inorganic fluoride and functions of brain.

**Pubmed Data** : Crit Rev Toxicol. 2020 Jan ;50(1):28-46. Epub 2020 Feb 19. PMID: [32073339](#)

**Article Published Date** : Dec 31, 2019

**Authors** : N I Agalakova, O V Nadei

**Study Type** : Review

**Additional Links**

**Diseases** : [Cognitive Decline/Dysfunction](#) : CK(5061) : AC(1005), [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Neurotoxic](#) : CK(2838) : AC(702)

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## Iodine status modifies the association between fluoride exposure in pregnancy and preschool boys' intelligence.

**Pubmed Data** : Nutrients. 2022 Jul 16 ;14(14). Epub 2022 Jul 16. PMID: [35889877](#)

**Article Published Date** : Jul 15, 2022

**Authors** : Carly V Goodman, Meaghan Hall, Rivka Green, Jonathan Chevrier, Pierre Ayotte, Esperanza Angeles Martinez-Mier, Taylor McGuckin, John Krzeczkowski, David Flora, Richard Hornung, Bruce Lanphear, Christine Till

**Study Type** : Human Study

**Additional Links**

**Substances** : [Iodine](#) : CK(182) : AC(32)

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Iodine Deficiency](#) : CK(110) : AC(18), [Learning disorders](#) : CK(517) : AC(155)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Neurotoxic](#) : CK(2838) : AC(702)

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## Lactobacillus johnsonii BS15 improves intestinal environment against fluoride-induced memory impairment.

**Pubmed Data** : PeerJ. 2020 ;8:e10125. Epub 2020 Oct 7. PMID: [33083147](#)

**Article Published Date** : Dec 31, 2019

**Authors** : Jinge Xin, Dong Zeng, Hesong Wang, Ning Sun, Abdul Khaliq, Ying Zhao, Liqian Wu, Kangcheng Pan, Bo Jing, Xueqin Ni

**Study Type** : Animal Study

### Additional Links

**Substances** : Lactobacillus probiotics : CK(5310) : AC(1187)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Memory Disorders : CK(1570) : AC(514)

**Pharmacological Actions** : Gastrointestinal Agents : CK(6875) : AC(2212), Neuroprotective Agents : CK(17667) : AC(7641)

**Additional Keywords** : Gut-brain Axis : CK(675) : AC(281)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Lead enhances fluoride influence on apoptotic processes in the HepG2 liver cell line.

**Pubmed Data** : Toxicol Ind Health. 2016 Mar ;32(3):517-25. Epub 2013 Nov 5. PMID: [24193047](#)

**Article Published Date** : Feb 29, 2016

**Authors** : Izabela Gutowska, Irena Baranowska-Bosiacka, Ewa Siwiec, Małgorzata Szczuko, Agnieszka Kolasa, Anna Kondarewicz, Marta Rybicka, Małgorzata Dunaj-Stańczyk, Ireneusz Wiernicki, Dariusz Chlubek, Ewa Stachowska

**Study Type** : In Vitro Study

### Additional Links

**Diseases** : Chemically-Induced Liver Damage : CK(2167) : AC(1069), Fluoride Toxicity : CK(1389) : AC(376), Lead Poisoning : CK(479) : AC(180)

**Additional Keywords** : Synergistic Toxicity : CK(226) : AC(109)

**Problem Substances** : Fluoride : CK(1815) : AC(454), Lead : CK(684) : AC(227), Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Hepatotoxic : CK(400) : AC(124)

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## Low glucose utilization and neurodegenerative changes caused by sodium fluoride exposure in rat's developmental brain.

**Pubmed Data** : Neuromolecular Med. 2014 Mar ;16(1):94-105. Epub 2013 Aug 28. PMID: [23982469](#)

**Article Published Date** : Feb 28, 2014

**Authors** : Chunyang Jiang, Shun Zhang, Hongliang Liu, Zhizhong Guan, Qiang Zeng, Cheng Zhang, Rongrong Lei, Tao Xia, Zhenglun Wang, Lu Yang, Yihu Chen, Xue Wu, Xiaofei Zhang, Yushan Cui, Linyu Yu, Aiguo Wang

**Study Type** : Animal Study

### Additional Links

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Memory Disorders : CK(1570) : AC(514)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Low levels of fluoride exposure in drinking water had negative effects on children's intelligence.

**Pubmed Data** : J Hazard Mater. 2011 Feb 28 ;186(2-3):1942-6. Epub 2010 Dec 25. PMID: [21237562](#)

**Article Published Date** : Feb 27, 2011

**Authors** : Yunpeng Ding, Yanhui Gao, Huixin Sun, Hepeng Han, Wei Wang, Xiaohong Ji, Xuehui Liu, Dianjun Sun

**Study Type** : Human Study

### Additional Links

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Intelligence Quotient (IQ): Low/Impaired : CK(312) : AC(27)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Low-moderate fluoride exposure is associated with alterations in



## childhood thyroid function.

**Pubmed Data** : Environ Int. 2020 Jan ;134:105229. Epub 2019 Nov 4. PMID: [31698198](#)

**Article Published Date** : Dec 31, 2019

**Authors** : Mengwei Wang, Ling Liu, Huijun Li, Yonggang Li, Hongliang Liu, Changchun Hou, Qiang Zeng, Pei Li, Qian Zhao, Lixin Dong, Guoyu Zhou, Xingchen Yu, Li Liu, Qing Guan, Shun Zhang, Aiguo Wang

**Study Type** : Human Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Thyroid Dysfunction](#) : CK(86) : AC(13)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Low-to-moderate fluoride exposure was associated with dysfunction of cholinergic system for children.

**Pubmed Data** : Ecotoxicol Environ Saf. 2021 Nov 20 ;228:112959. Epub 2021 Nov 20. PMID: [34808511](#)

**Article Published Date** : Nov 19, 2021

**Authors** : Sumei Wang, Qian Zhao, Gaochun Li, Mengwei Wang, Hongliang Liu, Xingchen Yu, Jingwen Chen, Pei Li, Lixin Dong, Guoyu Zhou, Yushan Cui, Mengru Wang, Li Liu, Aiguo Wang

**Study Type** : Human Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Learning disorders](#) : CK(517) : AC(155)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Neurotoxic](#) : CK(2838) : AC(702)

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## Luteolin may be a promising lead for the treatment of drug-induced gastroenteropathy.

**Pubmed Data** : Drug Chem Toxicol. 2020 Aug 5:1-13. Epub 2020 Aug 5. PMID: [32757682](#)

**Article Published Date** : Aug 04, 2020

**Authors** : Akinleye S Akinrinde, Kehinde O Soetan, Monsuru O Tijani

**Study Type** : Animal Study

**Additional Links**

**Substances** : [Luteolin](#) : CK(707) : AC(390)

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Pharmacological Actions** : [Gastroprotective](#) : CK(1653) : AC(686)

**Additional Keywords** : [Synergistic Toxicity](#) : CK(226) : AC(109)

**Problem Substances** : [Diclofenac](#) : CK(231) : AC(52), [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Gastrotoxic](#) : CK(190) : AC(68)

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## Luteolin-mediated Kim-1/NF-kB/Nrf2 signaling pathways protects sodium fluoride-induced hypertension and cardiovascular complications.

**Pubmed Data** : Biofactors. 2018 Nov ;44(6):518-531. Epub 2018 Nov 26. PMID: [30474894](#)

**Article Published Date** : Oct 31, 2018

**Authors** : Ademola Adetokunbo Oyagbemi, Temidayo Olutayo Omobowale, Olufunke Eunice Ola-Davies, Ebunoluwa Racheal Asenuga, Temitayo Olabisi Ajibade, Olumuyiwa Abiola Adejumobi, Jeremiah Moyinoluwa Afolabi, Blessing Seun Ogunpolu, Olufunke Olubunmi Falayi, Adebowale Bernard Saba, Adeolu Alex Adedapo, Momoh Audu Yakubu

**Study Type** : Animal Study

**Additional Links**

**Substances** : [Luteolin](#) : CK(707) : AC(390)

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Hypertension](#) : CK(8603) : AC(1329), [Oxidative Stress](#) : CK(13443) : AC(5499)

**Pharmacological Actions** : [Antihypertensive Agents](#) : CK(6936) : AC(1007), [Malondialdehyde Down-regulation](#) : CK(2826) : AC(965), [Nrf2 activation](#) : CK(2908) : AC(1762), [Superoxide Dismutase Up-regulation](#) : CK(2327) : AC(896)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Lycopene significantly combated sodium fluoride induced ameloblasts apoptosis and dental fluorosis.

**Pubmed Data** : Chem Biol Interact. 2016 Nov 18 ;261:27-34. Epub 2016 Nov 18. PMID: [27871895](#)

**Article Published Date** : Nov 17, 2016

**Authors** : Weishan Li, Binghua Jiang, Xianglin Cao, Yongjiang Xie, Ting Huang

**Study Type** : Animal Study

**Additional Links**

**Substances** : Lycopene : CK(1265) : AC(371)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Fluorosis : CK(262) : AC(42)

**Pharmacological Actions** : Anti-Apoptotic : CK(4942) : AC(3051), Antioxidants : CK(32218) : AC(14161), Superoxide Dismutase Up-regulation : CK(2327) : AC(896)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Maternal exposure to drinking water throughout pregnancy fluoridated at the level of 0.7 mg/L was associated with poorer inhibitory control and cognitive flexibility.

**Pubmed Data** : Sci Total Environ. 2023 Sep 15 ;891:164322. Epub 2023 May 25. PMID: [37236475](#)

**Article Published Date** : Sep 14, 2023

**Authors** : Deborah Dewey, Gillian England-Mason, Henry Ntanda, Andrea J Deane, Mandakini Jain, Nadia Barnieh, Gerald F Giesbrecht, Nicole Letourneau,

**Study Type** : Human Study

**Additional Links**

**Diseases** : Developmental Disorder: Children : CK(148) : AC(19), Fluoride Toxicity : CK(1389) : AC(376), Prenatal Chemical Exposures : CK(2428) : AC(530)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Maternal exposure to higher levels of fluoride during pregnancy was associated with lower IQ scores in children aged 3 to 4 years.

**Pubmed Data** : JAMA Pediatr. 2019 Oct 1 ;173(10):940-948. PMID: [31424532](#)

**Article Published Date** : Sep 30, 2019

**Authors** : Rivka Green, Bruce Lanphear, Richard Hornung, David Flora, E Angeles Martinez-Mier, Raichel Neufeld, Pierre Ayotte, Gina Muckle, Christine Till

**Study Type** : Human Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Prenatal Chemical Exposures : CK(2428) : AC(530)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Maternal fluoride exposure during gestation and lactation decreased learning and memory ability of mouse pups.

**Pubmed Data** : Hum Exp Toxicol. 2018 Jan ;37(1):87-93. Epub 2017 Feb 13. PMID: [29187078](#)

**Article Published Date** : Dec 31, 2017

**Authors** : Z Sun, Y Zhang, X Xue, R Niu, J Wang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Learning disorders : CK(517) : AC(155), Prenatal Chemical Exposures : CK(2428) : AC(530)

**Additional Keywords** : Risk Factors : CK(14728) : AC(2072)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Melatonin alleviated fluoride-induced impairment of spermatogenesis

## and sperm maturation process.

**Pubmed Data** : Food Chem Toxicol. 2023 Aug ;178:113867. Epub 2023 Jun 1. PMID: [37269891](#)

**Article Published Date** : Jul 31, 2023

**Authors** : Huifeng Luo, Rongxiu Liu, Yilin Lang, Jinhui Zhao, Cuicui Zhuang, Jundong Wang, Chen Liang, Jianhai Zhang

**Study Type** : Animal Study

**Additional Links**

**Substances** : Melatonin : CK(2743) : AC(904)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Infertility: Male : CK(1668) : AC(424)

**Pharmacological Actions** : Fertility Agents: Male : CK(369) : AC(101)

**Additional Keywords** : Gene Expression Regulation : CK(1399) : AC(621)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Memory impairment induced by sodium fluoride is associated with changes in brain monoamine levels.

**Pubmed Data** : Neurotox Res. 2011 Jan ;19(1):55-62. Epub 2009 Dec 3. PMID: [19957215](#)

**Article Published Date** : Dec 31, 2010

**Authors** : Marcela Pereira, Patrícia A Dombrowski, Estela M Losso, Lea R Chioca, Cláudio Da Cunha, Roberto Andreatini

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Memory Disorders : CK(1570) : AC(514)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Mitigation of honokiol on fluoride-induced mitochondrial oxidative stress, mitochondrial dysfunction, and cognitive deficits.

**Pubmed Data** : J Hazard Mater. 2022 09 5 ;437:129381. Epub 2022 Jun 16. PMID: [35752048](#)

**Article Published Date** : Jan 04, 2022

**Authors** : Dongmei Wang, Luyang Cao, Xiang Zhou, Gang Wang, Yilu Ma, Xueqin Hao, Hua Fan

**Study Type** : Animal Study

**Additional Links**

**Substances** : Honokiol : CK(435) : AC(271)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Mitochondrial Dysfunction : CK(618) : AC(262), Oxidative Stress : CK(13443) : AC(5499)

**Pharmacological Actions** : Antioxidants : CK(32218) : AC(14161), Neuroprotective Agents : CK(17667) : AC(7641)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Mitochondrial respiratory chain dysfunction mediated by ROS is a primary point of fluoride-induced damage in Hepa1-6 cells.

**Pubmed Data** : Environ Pollut. 2019 Dec ;255(Pt 3):113359. Epub 2019 Oct 7. PMID: [31614248](#)

**Article Published Date** : Nov 30, 2019

**Authors** : Hong-Wei Wang, Yan Zhang, Pan-Pan Tan, Liu-Shu Jia, Yu Chen, Bian-Hua Zhou

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : Chemically-Induced Liver Damage : CK(2167) : AC(1069), Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances** : Fluoride : CK(1815) : AC(454)

**Adverse Pharmacological Actions** : Apoptotic : CK(278) : AC(120), Hepatotoxic : CK(400) : AC(124)

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## Modifying effect of COMT gene polymorphism and a predictive role for proteomics analysis in children's intelligence in endemic fluorosis area in Tianjin, China.

**Pubmed Data** : Toxicol Sci. 2015 Apr ;144(2):238-45. Epub 2015 Jan 1. PMID: [25556215](#)

**Article Published Date** : Mar 31, 2015

**Authors** : Shun Zhang, Xiaofei Zhang, Hongliang Liu, Weidong Qu, Zhizhong Guan, Qiang Zeng, Chunyang Jiang, Hui Gao, Cheng Zhang, Rongrong Lei, Tao Xia, Zhenglun Wang, Lu Yang, Yihu Chen, Xue Wu, Yushan Cui, Linyu Yu, Aiguo Wang

**Study Type** : Human Study

**Additional Links**

**Diseases** : [Cognitive Decline/Dysfunction](#) : CK(5061) : AC(1005), [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Additional Keywords** : [Genomic Variation](#) : CK(302) : AC(38)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Modulation of the Nrf-2 and HO-1 signalling axis is associated with Betaine's abatement of fluoride-induced hepatorenal toxicities in rats.

**Pubmed Data** : Naunyn Schmiedebergs Arch Pharmacol. 2024 Oct ;397(10):7725-7745. Epub 2024 May 7. PMID: [38713257](#)

**Article Published Date** : Sep 30, 2024

**Authors** : Solomon Owumi, Harieme Agbarogi, Bayode J Oluwawibe, Moses T Otunla, Mayowa M Anifowose, Uche O Arunsi

**Study Type** : Animal Study

**Additional Links**

**Substances** : [Betaine](#) : CK(134) : AC(35)

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Oxidative Stress](#) : CK(13443) : AC(5499)

**Pharmacological Actions** : [Antioxidants](#) : CK(32218) : AC(14161), [Heme oxygenase-1 up-regulation](#) : CK(1225) : AC(756), [Nrf2 activation](#) : CK(2908) : AC(1762)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Morphological changes and mitochondrial alterations on cardiomyocytes exposed to fluoride.

**Pubmed Data** : P R Health Sci J. 2023 Jun ;42(2):132-138. PMID: [37352535](#)

**Article Published Date** : May 31, 2023

**Authors** : Areli Limon-Rojas, Amaury Pozos-Guillén, Roberto Salgado-Delgado, Margarita Rodríguez Y Domínguez, Diana María Escobar-García

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Mitochondrial Dysfunction](#) : CK(618) : AC(262)

**Additional Keywords** : [Dose Response](#) : CK(1769) : AC(700)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Cardiotoxic](#) : CK(1168) : AC(209)

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## Multiple myeloma patients with high 18F-sodium fluoride metabolic active volume had shorter overall survival.

**Pubmed Data** : Am J Nucl Med Mol Imaging. 2020 ;10(4):151-160. Epub 2020 Aug 25. PMID: [32929393](#)

**Article Published Date** : Dec 31, 2019

**Authors** : Mahdi Zirakchian Zadeh, Siavash Mehdizadeh Seraj, Brian Østergaard, Stephanie Mimms, William Y Raynor, Mahmoud Aly, Austin J Borja, Leila S Arani, Oke Gerke, Thomas J Werner, Hongming Zhuang, Mona-Elisabeth Revheim, Niels Abildgaard, Poul Flemming Højlund-Carlsen, Abass Alavi

**Study Type** : Human Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Multiple Myeloma](#) : CK(414) : AC(159)

**Additional Keywords** : [Risk Factors](#) : CK(14728) : AC(2072)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## N-acetylcysteine alleviates fluoride-induced testicular apoptosis by modulating IRE1 $\alpha$ /JNK signaling and nuclear Nrf2 activation.

**Pubmed Data** : Reprod Toxicol. 2019 03 ;84:98-107. Epub 2019 Jan 8. PMID: [30633982](#)

**Article Published Date** : Dec 31, 2018

**Authors** : Yazhen Hu, Yawei Wang, Ting Yan, Demin Feng, Yue Ba, Huizhen Zhang, Jingyuan Zhu, Xuemin Cheng, Liuxin Cui, Hui Huang

**Study Type** : Animal Study

**Additional Links**

**Substances** : NAC (N-acetyl-L-cysteine) : CK(1429) : AC(366)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Oxidative Stress : CK(13443) : AC(5499), Testicular Injury: Chemical/Metal Induced : CK(754) : AC(374)

**Pharmacological Actions** : Anti-Apoptotic : CK(4942) : AC(3051), Antioxidants : CK(32218) : AC(14161), Nrf2 activation : CK(2908) : AC(1762)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## N-acetylcysteine and thymoquinone have renoprotective effects of against the toxicity of fluoride via multiple mechanisms.

**Pubmed Data** : Biomed Res Int. 2018 ;2018:5614803. Epub 2018 Jun 28. PMID: [30050936](#)

**Article Published Date** : Dec 31, 2017

**Authors** : Ahlam M Alhusaini, Laila M Faddah, Naglaa F El Orabi, Iman H Hasan

**Study Type** : Animal Study

**Additional Links**

**Substances** : Cysteine (see N-Acetylcysteine) : CK(111) : AC(33), Thymoquinone : CK(1178) : AC(692)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Kidney Damage: Chemically-Induced : CK(542) : AC(270)

**Pharmacological Actions** : Anti-Inflammatory Agents : CK(35225) : AC(15297), Antioxidants : CK(32218) : AC(14161), Glutathione Upregulation : CK(357) : AC(109), Nrf2 activation : CK(2908) : AC(1762), Renoprotective : CK(4133) : AC(1932), Superoxide Dismutase Up-regulation : CK(2327) : AC(896), Tumor Necrosis Factor (TNF) Alpha Inhibitor : CK(10605) : AC(4670)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## NaF-induced gut microbiota alteration mediates severe intestinal cell injury.

**Pubmed Data** : Ecotoxicol Environ Saf. 2024 Sep 15 ;283:116816. Epub 2024 Aug 2. PMID: [39096685](#)

**Article Published Date** : Sep 14, 2024

**Authors** : Haonan Huang, Yu Lin, Jinge Xin, Ning Sun, Zhifang Zhao, Hesong Wang, Lixiao Duan, Yanxi Zhou, Xingmei Liu, Jing Fang, Bo Jing, Kangcheng Pan, Yan Zeng, Dong Zeng, Hao Li, Hailin Ma, Yang Bai, Limin Wei, Xueqin Ni

**Study Type** : Animal Study, In Vitro Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances** : Antibiotics : CK(847) : AC(171), Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Gastrotoxic : CK(190) : AC(68)

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## NaF-induced neurotoxicity via activation of the IL-1 $\beta$ /JNK signaling pathway.

**Pubmed Data** : Toxicology. 2022 Mar 15 ;469:153132. Epub 2022 Feb 13. PMID: [35172196](#)

**Article Published Date** : Mar 14, 2022

**Authors** : Chengzhi Zhang, Yanmei Yang, Yanhui Gao, Dianjun Sun

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Inflammation : CK(15536) : AC(5279), Learning disorders : CK(517) : AC(155)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Naringin alleviates fluoride-induced neurological impairment.

**Pubmed Data** : Sci Total Environ. 2024 Oct 22:177073. Epub 2024 Oct 22. PMID: [39447898](#)

**Article Published Date** : Oct 21, 2024

**Authors** : Yuhui Du, Guoqing Wang, Bin Liu, Meng Guo, Xi Yan, Ming Dou, Fangfang Yu, Yue Ba, Guoyu Zhou

**Study Type** : Animal Study

**Additional Links**

**Substances** : Citrus naringin : CK(440) : AC(245)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376)

**Pharmacological Actions** : Anti-Apoptotic : CK(4942) : AC(3051), Neuroprotective Agents : CK(17667) : AC(7641)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Naringin can be a useful treatment to avoid the neurological effects of fluoride.

**Pubmed Data** : Biomed Rep. 2024 Jun ;20(6):97. Epub 2024 Apr 29. PMID: [38765862](#)

**Article Published Date** : May 31, 2024

**Authors** : Ravindra Shantakumar Swamy, Nitesh Kumar, Smita Shenoy, Naveen Kumar, Vanishree Rao

**Study Type** : Animal Study

**Additional Links**

**Substances** : Citrus naringin : CK(440) : AC(245)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376)

**Pharmacological Actions** : Neuroprotective Agents : CK(17667) : AC(7641)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Nigella sativa oil restores hormonal levels, and endocrine signals among thyroid, ovarian, and uterine tissues.

**Pubmed Data** : Biomed Pharmacother. 2023 Dec 25 ;170:116080. Epub 2023 Dec 25. PMID: [38147737](#)

**Article Published Date** : Dec 24, 2023

**Authors** : Mona M Elghareeb, Gehad E Elshopakey, Shaymaa Rezk, Ahmed Ateya, Eman S El-Ashry, Mustafa Shukry, Heba I Ghamry, Badriyah S Alotaibi, Nada M A Hashem

**Study Type** : Animal Study

**Additional Links**

**Substances** : Nigella sativa (aka Black Seed) : CK(1911) : AC(493)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376)

**Pharmacological Actions** : Anti-Apoptotic : CK(4942) : AC(3051), Antioxidants : CK(32218) : AC(14161)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Novel pathways of fluoride-induced hepatotoxicity: P53-dependent ferroptosis induced by the SIRT1/FOXOs pathway and Nrf2/HO-1 pathway.

**Pubmed Data** : Comp Biochem Physiol C Toxicol Pharmacol. 2023 Feb ;264:109526. Epub 2022 Nov 29. PMID: [36455829](#)

**Article Published Date** : Jan 31, 2023

**Authors** : Dongxu Wang, Kai Yin, Yue Zhang, Hongmin Lu, Lulu Hou, Hongjing Zhao, Mingwei Xing

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : Chemically-Induced Liver Damage : CK(2167) : AC(1069), Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## PRKAA1 induces aberrant mitophagy in a PINK1/Parkin-dependent manner, contributing to fluoride-induced developmental neurotoxicity.

**Pubmed Data** : Ecotoxicol Environ Saf. 2023 Apr 15 ;255:114772. Epub 2023 Mar 14. PMID: [36924562](#)

**Article Published Date** : Apr 14, 2023

**Authors** : Yanling Tang, Jingjing Zhang, Zeyu Hu, Wanjing Xu, Panpan Xu, Yue Ma, Hengrui Xing, Qiang Niu

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Neurodegenerative Diseases : CK(12159) : AC(4162),



Neurodevelopmental Disorders : CK(470) : AC(85)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Apoptotic : CK(278) : AC(120), Neurotoxic : CK(2838) : AC(702)

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## Physiologic conditions affect toxicity of ingested industrial fluoride.

**Pubmed Data** : J Environ Public Health. 2013 ;2013:439490. Epub 2013 Jun 6. PMID: [23840230](#)

**Article Published Date** : Jan 01, 2013

**Authors** : Richard Sauerheber

**Study Type** : Review

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376)

**Additional Keywords** : Public Drinking Water : CK(37) : AC(7)

**Problem Substances** : Fluoride : CK(1815) : AC(454), Sodium Fluoride : CK(1446) : AC(393)

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## Pomegranate juice could protect against sodium fluoride induced oxidative injury.

**Pubmed Data** : Can J Physiol Pharmacol. 2016 Feb 12:1-10. Epub 2016 Feb 12. PMID: [27124270](#)

**Article Published Date** : Feb 11, 2016

**Authors** : Asma Bouasla, Ihcène Bouasla, Amel Boumendjel, Cherif Abdennour, Abdelfattah El Feki, Mahfoud Messarah

**Study Type** : Animal Study

**Additional Links**

**Substances** : Pomegranate : CK(1779) : AC(570)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376)

**Pharmacological Actions** : Antioxidants : CK(32218) : AC(14161), Prophylactic Agents : CK(1334) : AC(313)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Potential ameliorative effect of Artemisia absinthium supplement against sodium fluoride-induced prostatic toxicity.

**Pubmed Data** : Arch Razi Inst. 2022 04 ;77(2):907-913. Epub 2022 Apr 30. PMID: [36284952](#)

**Article Published Date** : Dec 31, 2021

**Authors** : H Shakir Saleh, S Yahya Kraidi, W Ali Mahdi

**Study Type** : Animal Study

**Additional Links**

**Substances** : Wormwood : CK(102) : AC(47)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376)

**Pharmacological Actions** : Cytoprotective : CK(797) : AC(393)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Potential risk of dental fluorosis associated with different baby formulas and water brands marketed in Spain.

**Pubmed Data** : J Clin Pediatr Dent. 2024 Jan ;48(1):111-119. Epub 2024 Jan 3. PMID: [38239163](#)

**Article Published Date** : Dec 31, 2023

**Authors** : Sandra M Gallego-Reyes, Jaime A Cury, Amparo Pérez-Silva, Clara Serna-Muñoz, Icíar Fernández-Pizarro, Yolanda Martínez-Beneyto, Antonio J Ortiz-Ruiz

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Fluorosis : CK(262) : AC(42)

**Problem Substances** : Infant Formula : CK(659) : AC(97), Sodium Fluoride : CK(1446) : AC(393)

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## Potential role of fluoride in the etiopathogenesis of Alzheimer's disease.

**Pubmed Data** : Int J Mol Sci. 2018 Dec 9 ;19(12). Epub 2018 Dec 9. PMID: [30544885](#)

**Article Published Date** : Dec 08, 2018

**Authors** : Marta Goschorska, Irena Baranowska-Bosiacka, Izabela Gutowska, Emilia Metryka, Marta Skórka-Majewicz, Dariusz Chlubek

**Study Type** : Review

**Additional Links**

**Diseases** : Alzheimer's Disease : CK(4948) : AC(2148), Fluoride Toxicity : CK(1389) : AC(376), Inflammation : CK(15536) : AC(5279), Oxidative Stress : CK(13443) : AC(5499)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Prenatal fluoride exposure and attention deficit hyperactivity disorder (ADHD) symptoms in children.

**Pubmed Data** : Environ Int. 2018 Dec ;121(Pt 1):658-666. Epub 2018 Oct 10. PMID: [30316181](#)

**Article Published Date** : Nov 30, 2018

**Authors** : Morteza Bashash, Maelle Marchand, Howard Hu, Christine Till, E Angeles Martinez-Mier, Brisa N Sanchez, Niladri Basu, Karen E Peterson, Rivka Green, Lourdes Schnaas, Adriana Mercado-García, Mauricio Hernández-Avila, Martha María Téllez-Rojo

**Study Type** : Human Study

**Additional Links**

**Diseases** : Attention Deficit Disorder with Hyperactivity : CK(633) : AC(84), Fluoride Toxicity : CK(1389) : AC(376), Prenatal Chemical Exposures : CK(2428) : AC(530)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Prenatal fluoride exposure and cognitive outcomes in children at 4 and 6-12 years of age in Mexico.

**Pubmed Data** : Environ Health Perspect. 2017 Sep 19 ;125(9):097017. Epub 2017 Sep 19. PMID: [28937959](#)

**Article Published Date** : Sep 18, 2017

**Authors** : Morteza Bashash, Deena Thomas, Howard Hu, E Angeles Martinez-Mier, Brisa N Sanchez, Niladri Basu, Karen E Peterson, Adrienne S Ettinger, Robert Wright, Zhenzhen Zhang, Yun Liu, Lourdes Schnaas, Adriana Mercado-García, Martha María Téllez-Rojo, Mauricio Hernández-Avila

**Study Type** : Human Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Learning disorders : CK(517) : AC(155), Prenatal Chemical Exposures : CK(2428) : AC(530)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Probiotic alleviate fluoride-induced memory impairment by reconstructing gut microbiota in mice.

**Pubmed Data** : Ecotoxicol Environ Saf. 2021 Jun 1 ;215:112108. Epub 2021 Mar 30. PMID: [33799132](#)

**Article Published Date** : May 31, 2021

**Authors** : Jinge Xin, Hesong Wang, Ning Sun, Shamsuddin Bughio, Dong Zeng, Lianxin Li, Yanyan Wang, Abdul Khaliq, Yan Zeng, Kangcheng Pan, Bo Jing, Hailin Ma, Yang Bai, Xueqin Ni

**Study Type** : Animal Study

**Additional Links**

**Substances** : Probiotics : CK(9684) : AC(1696)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Memory Disorders : CK(1570) : AC(514)

**Pharmacological Actions** : Tumor Necrosis Factor (TNF) Alpha Inhibitor : CK(10605) : AC(4670)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Prolonged fluoride exposure alters neurotransmission and oxidative stress in the zebrafish brain.

**Pubmed Data** : Neurotoxicology. 2022 Mar ;89:92-98. Epub 2022 Jan 20. PMID: [35065950](#)



**Article Published Date** : Feb 28, 2022

**Authors** : Eduardo Ronconi Dondossola, Suzielen Damin Pacheco, Sulingue Casagrande Visentin, Niuany Viel Mendes, Samira Leila Baldin, Henrique Teza Bernardo, Rahisa Scussel, Eduardo Pacheco Rico

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Oxidative Stress](#) : CK(13443) : AC(5499)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Neurotoxic](#) : CK(2838) : AC(702)

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## Prolonged fluoride exposure induces spatial-memory deficit and hippocampal dysfunction by inhibiting small heat shock protein 22 in mice.

**Pubmed Data** : J Hazard Mater. 2023 Aug 15 ;456:131595. Epub 2023 May 7. PMID: [37224709](#)

**Article Published Date** : Aug 14, 2023

**Authors** : Jinge Xin, Bin Zhu, Hesong Wang, Yong Zhang, Ning Sun, Xi Cao, Liqin Zheng, Yanxi Zhou, Jing Fang, Bo Jing, Kangcheng Pan, Yan Zeng, Dong Zeng, Fali Li, Yang Xia, Peng Xu, Xueqin Ni

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Memory Disorders](#) : CK(1570) : AC(514)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Prolonged ingestion of fluoride through drinking water, particularly with high doses, induced significant histopathological and biochemical changes leading to myocardial tissue damage.

**Pubmed Data** : Hum Exp Toxicol. 2005 Feb;24(2):79-87. PMID: [15850282](#)

**Article Published Date** : Feb 01, 2005

**Authors** : Ekrem Cicek, Gulsen Aydin, Mehmet Akdogan, Huseyin Okutan

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Problem Substances** : [Fluoride](#) : CK(1815) : AC(454), [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Cardiotoxic](#) : CK(1168) : AC(209)

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## Protective effect of curcumin on hippocampal and behaviour changes in rats exposed to fluoride during pre- and post-natal period.

**Pubmed Data** : Basic Clin Neurosci. 2020 May-Jun;11(3):289-299. Epub 2020 May 1. PMID: [32963722](#)

**Article Published Date** : Apr 30, 2020

**Authors** : Nagapuri Kiran Kumar, Mesram Nageshwar, Karnati Pratap Reddy

**Study Type** : Animal Study

**Additional Links**

**Substances** : [Curcumin](#) : CK(6902) : AC(3215)

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Prenatal Chemical Exposures](#) : CK(2428) : AC(530)

**Pharmacological Actions** : [Neuroprotective Agents](#) : CK(17667) : AC(7641)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Protective effect of quercetin and ginger extract against dimethoate potentiated fluoride-induced nephrotoxicity.

**Pubmed Data** : Foods. 2023 May 5 ;12(9). Epub 2023 May 5. PMID: [37174437](#)

**Article Published Date** : May 04, 2023

**Authors** : Priyanka Sharma, Pawan Kumar Verma, Shilpa Sood, Rasia Yousuf, Amit Kumar, Rajinder Raina, Muhammad Asim Shabbir, Zuhaib F Bhat

**Study Type** : Animal Study

**Additional Links**

**Substances** : [Ginger](#) : CK(1591) : AC(477), [Quercetin](#) : CK(1864) : AC(847)

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Kidney Damage: Chemically-Induced](#) : CK(542) : AC(270)

**Pharmacological Actions** : [Antioxidants](#) : CK(32218) : AC(14161), [Renoprotective](#) : CK(4133) : AC(1932)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Purple corn anthocyanins protect against fluoride-induced oxidative damage of liver and kidney in rats.

**Pubmed Data** : Int J Environ Res Public Health. 2014 Jan 13 ;11(1):1020-33. Epub 2014 Jan 13. PMID: [24419046](#)

**Article Published Date** : Jan 12, 2014

**Authors** : Zhuo Zhang, Bo Zhou, Hiaohong Wang, Fei Wang, Yingli Song, Shengnan Liu, Shuhua Xi

**Study Type** : Animal Study

**Additional Links**

**Substances** : [Corn: Purple](#) : CK(32) : AC(18)

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Lipid Peroxidation](#) : CK(1901) : AC(774), [Oxidative Stress](#) : CK(13443) : AC(5499)

**Pharmacological Actions** : [Antioxidants](#) : CK(32218) : AC(14161), [Hepatoprotective](#) : CK(8320) : AC(3765), [Renoprotective](#) : CK(4133) : AC(1932)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Quercetin has a protective effect against sodium fluoride induced oxidative stress in rat's heart.

**Pubmed Data** : Food Funct. 2012 Feb 8. Epub 2012 Feb 8. PMID: [22314573](#)

**Article Published Date** : Feb 08, 2012

**Authors** : Seyed Fazel Nabavi, Seyed Mohammad Nabavi, Morteza Mirzaei, Akbar Hajizadeh Moghaddam

**Study Type** : Animal Study

**Additional Links**

**Substances** : [Quercetin](#) : CK(1864) : AC(847)

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Pharmacological Actions** : [Antioxidants](#) : CK(32218) : AC(14161), [Cardioprotective](#) : CK(8685) : AC(2877)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Cardiotoxic](#) : CK(1168) : AC(209), [Oxidant](#) : CK(646) : AC(246)

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## Relation between dental fluorosis and intelligence quotient in school children of Bagalkot district.

**Pubmed Data** : J Indian Soc Pedod Prev Dent. 2011 ;29(2):117-20. PMID: [21911949](#)

**Article Published Date** : Dec 31, 2010

**Authors** : P K Shivaprakash, Kushagra Ohri, Hina Noorani

**Study Type** : Human Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Intelligence Quotient \(IQ\): Low/Impaired](#) : CK(312) : AC(27)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Relationship between dental fluorosis and intelligence quotient of school going children.

**Pubmed Data** : J Clin Diagn Res. 2015 Nov ;9(11):ZC10-5. Epub 2015 Nov 1. PMID: [26673535](#)

**Article Published Date** : Oct 31, 2015

**Authors** : Suleman Abbas Khan, Rahul Kumar Singh, Saumya Navit, Dheera Chadha, Nikita Johri, Pragati Navit, Anshul Sharma, Rachana Bahuguna

**Study Type** : Human Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Intelligence Quotient \(IQ\): Low/Impaired](#) : CK(312) : AC(27)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Relatively low fluoride in drinking water increases risk of knee osteoarthritis.

**Pubmed Data** : Environ Geochem Health. 2023 Nov ;45(11):8735-8747. Epub 2023 Sep 16. PMID: [37715839](#)

**Article Published Date** : Oct 31, 2023

**Authors** : Xinyue Meng, Jian Wang, Yang Liu, Mang Li, Zhizhong Guan, Alphonse Sowanoua, Dan Yang, Junrui Pei, Yanhui Gao

**Study Type** : Human Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Osteoarthritis: Knee : CK(2278) : AC(267)

**Additional Keywords** : Increased Risk : CK(8492) : AC(1109)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Riboflavin alleviates fluoride-induced ferroptosis by IL-17A-independent system Xc-/GPX4 pathway and iron metabolism in testicular Leydig cells.

**Pubmed Data** : Environ Pollut. 2024 Jan 8 ;344:123332. Epub 2024 Jan 8. PMID: [38199481](#)

**Article Published Date** : Jan 07, 2024

**Authors** : Xiang Li, Jie Yang, Erbao Shi, Yiguang Lu, Xiaochao Song, Huifeng Luo, Jundong Wang, Chen Liang, Jianhai Zhang

**Study Type** : Animal Study

**Additional Links**

**Substances** : Riboflavin (Vitamin B-2) : CK(409) : AC(71)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Testicular Injury: Chemical/Metal Induced : CK(754) : AC(374)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Risk assessment of fluoride intake from tea in the republic of Ireland and its implications for public health and water fluoridation.

**Pubmed Data** : Int J Environ Res Public Health. 2016 Feb 26 ;13(3). Epub 2016 Feb 26. PMID: [26927146](#)

**Article Published Date** : Feb 25, 2016

**Authors** : Declan T Waugh, William Potter, Hardy Limeback, Michael Godfrey

**Study Type** : In Vitro Study

**Additional Links**

**Substances** : Black Tea : CK(1050) : AC(265)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376)

**Additional Keywords** : Water Fluoridation : CK(34) : AC(5)

**Problem Substances** : Fluoride : CK(1815) : AC(454), Sodium Fluoride : CK(1446) : AC(393)

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## Role of Spirulina in mitigating hemato-toxicity in Swiss albino mice exposed to aluminum and aluminum fluoride.

**Pubmed Data** : Environ Sci Pollut Res Int. 2016 Dec ;23(24):25280-25287. Epub 2016 Sep 29. PMID: [27687764](#)

**Article Published Date** : Nov 30, 2016

**Authors** : Shweta Sharma, K P Sharma, Subhasini Sharma

**Study Type** : Animal Study

**Additional Links**

**Substances** : Spirulina : CK(1017) : AC(292)

**Diseases** : Aluminum Toxicity : CK(685) : AC(308), Fluoride Toxicity : CK(1389) : AC(376)

**Pharmacological Actions** : Cytoprotective : CK(797) : AC(393)

**Problem Substances** : Aluminum : CK(1061) : AC(349), Sodium Fluoride : CK(1446) : AC(393)

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## Role of fluoride induced histone trimethylation in development of skeletal fluorosis.

**Pubmed Data** : Environ Toxicol Pharmacol. 2018 Jan ;57:159-165. Epub 2017 Dec 17. PMID: [29275289](#)

**Article Published Date** : Dec 31, 2017

**Authors** : Atul P Daiwile, Saravanadevi Sivanesan, Prashant Tarale, Pravin K Naoghare, Amit Bafana, Devendra Parmar, Krishnamurthi Kannan

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Fluorosis : CK(262) : AC(42)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Royal jelly reduces fluoride induced testicular damage and infertility.

**Pubmed Data** : Reprod Sci. 2023 May 12. Epub 2023 May 12. PMID: [37171774](#)

**Article Published Date** : May 11, 2023

**Authors** : Gozde Parlak, Abdullah Aslan, Gaffari Turk, Tuncay Kuloglu, Merve Kavak Balgetir, Ozlem Gok, Seda Beyaz, Akif Evren Parlak, Serap Dayan Cinkara

**Study Type** : Animal Study

**Additional Links**

**Substances** : Royal Jelly : CK(634) : AC(234)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Testicular Injury: Chemical/Metal Induced : CK(754) : AC(374)

**Pharmacological Actions** : Antioxidants : CK(32218) : AC(14161), Nrf2 activation : CK(2908) : AC(1762)

**Problem Substances** : Fluoride : CK(1815) : AC(454)

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## Royal jelly regulates the caspase, Bax and COX-2, TNF- $\alpha$ protein pathways in the fluoride exposed lung damage in rats.

**Pubmed Data** : Tissue Cell. 2022 Feb 7 ;76:101754. Epub 2022 Feb 7. PMID: [35158127](#)

**Article Published Date** : Feb 06, 2022

**Authors** : Abdullah Aslan, Ozlem Gok, Seda Beyaz, Muhammed Ismail Can, Gozde Parlak, Ramazan Gundogdu, Ibrahim Hanifi Ozercan, Serpil Baspinar

**Study Type** : Animal Study

**Additional Links**

**Substances** : Royal Jelly : CK(634) : AC(234)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Lung Damage : CK(390) : AC(167)

**Pharmacological Actions** : Anti-Inflammatory Agents : CK(35225) : AC(15297), Cyclooxygenase 2 Inhibitors : CK(2067) : AC(1279), Tumor Necrosis Factor (TNF) Alpha Inhibitor : CK(10605) : AC(4670)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## School children residing in area with higher than normal water fluoride level demonstrated more impaired development of intelligence.

**Pubmed Data** : J Indian Soc Pedod Prev Dent. 2015 ;33(4):307-11. PMID: [26381633](#)

**Article Published Date** : Dec 31, 2014

**Authors** : Shibu Thomas Sebastian, S Sunitha

**Study Type** : Human Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Intelligence Quotient (IQ): Low/Impaired : CK(312) : AC(27)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Selenium attenuates apoptosis and p-AMPK expressions in fluoride-induced NRK-52E cells.

**Pubmed Data** : Environ Sci Pollut Res Int. 2019 May ;26(15):15685-15697. Epub 2019 Apr 4. PMID: [30949948](#)

**Article Published Date** : Apr 30, 2019

**Authors** : Jiping Gao, Yu Wang, Guoqiang Xu, Jianing Wei, Kai Chang, Xiaolin Tian, Maolin Liu, Xiaoyan Yan, Meijun Huo, Guohua Song

**Study Type** : In Vitro Study

**Additional Links**

**Substances** : Selenium : CK(1706) : AC(389)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Kidney Damage: Chemically-Induced : CK(542) : AC(270)

**Pharmacological Actions** : Anti-Apoptotic : CK(4942) : AC(3051), Renoprotective : CK(4133) : AC(1932)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Selenium exerts protective effects against fluoride-induced apoptosis and oxidative stress.

**Pubmed Data** : Biol Trace Elem Res. 2020 Jul 1. Epub 2020 Jul 1. PMID: [32613488](#)

**Article Published Date** : Jun 30, 2020

**Authors** : Jiping Gao, Xiaolin Tian, Xiaoru Yan, Yu Wang, Jianing Wei, Xiaotang Wang, Xiaoyan Yan, Guohua Song

**Study Type** : In Vitro Study

**Additional Links**

**Substances** : Selenium : CK(1706) : AC(389)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376)

**Pharmacological Actions** : Anti-Apoptotic : CK(4942) : AC(3051), Antioxidants : CK(32218) : AC(14161)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Sesamin alleviated fluoride - induced thyroid endocrine disruption.

**Pubmed Data** : Aquat Toxicol. 2023 Aug ;261:106625. Epub 2023 Jul 4. PMID: [37407302](#)

**Article Published Date** : Jul 31, 2023

**Authors** : Tianyu Wang, Shanshan Wu, Jianjie Chen, Lijuan Li, Jinling Cao

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Thyroid Diseases : CK(348) : AC(52)

**Pharmacological Actions** : Cytoprotective : CK(797) : AC(393)

**Additional Keywords** : Gene Expression Regulation : CK(1399) : AC(621)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Sesamin plays an important role in maintaining hepatic health and preventing liver from toxic damage caused by fluoride.

**Pubmed Data** : Fish Shellfish Immunol. 2020 Nov ;106:715-723. Epub 2020 Aug 26. PMID: [32860904](#)

**Article Published Date** : Oct 31, 2020

**Authors** : Jinling Cao, Cuiping Feng, Lingtian Xie, Lijuan Li, Jianjie Chen, Shaojun Yun, Wenjing Guo, Tianyu Wang, Yijie Wu, Rui Meng, Guodong Wang, Xinjing He, Yongju Luo

**Study Type** : Animal Study

**Additional Links**

**Substances** : Sesamin : CK(207) : AC(94)

**Diseases** : Chemically-Induced Liver Damage : CK(2167) : AC(1069), Fluoride Toxicity : CK(1389) : AC(376), Oxidative Stress : CK(13443) : AC(5499)

**Pharmacological Actions** : Antioxidants : CK(32218) : AC(14161), Hepatoprotective : CK(8320) : AC(3765)

**Problem Substances** : Fluoride : CK(1815) : AC(454)

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## Sodium fluoride exposure during pregnancy may interfere with normal development and increase the risk of neurological and psychiatric disorders in adulthood.

**Pubmed Data** : Eur Rev Med Pharmacol Sci. 2010 Jun;14(6):507-12. PMID: [20712257](#)

**Article Published Date** : Jun 01, 2010

**Authors** : P Flace, V Benagiano, D Vermesan, R Sabatini, A M Inchingolo, A Inchingolo, P Auteri, G Ambrosi, A Tarullo, R Cagiano

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Huntington Disease : CK(222) : AC(103), Obsessive-Compulsive Disorder : CK(421) : AC(77), Prenatal Chemical Exposures : CK(2428) : AC(530), Schizophrenia : CK(1080) : AC(191), Tourette Syndrome : CK(207) : AC(30)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Genotoxic : CK(545) : AC(184), Teratogenic : CK(325) : AC(66)

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## Sodium fluoride (NaF) causes toxic effects on splenic development in mice.

**Pubmed Data** : Oncotarget. 2017 Jan 17 ;8(3):4703-4717. PMID: [28002795](#)

**Article Published Date** : Jan 16, 2017

**Authors** : Ping Kuang, Huidan Deng, Hengmin Cui, Lian Chen, Jing Fang, Zhicai Zuo, Junliang Deng, Xun Wang, Ling Zhao

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Spleen Damage: Chemically Induced : CK(2) : AC(9)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Sodium fluoride activates ERK and JNK via induction of oxidative stress to promote apoptosis and impairs ovarian function in rats.

**Pubmed Data** : J Hazard Mater. 2014 May 15 ;272:75-82. Epub 2014 Mar 18. PMID: [24681588](#)

**Article Published Date** : May 14, 2014

**Authors** : Yanqing Geng, Yiwen Qiu, Xueqing Liu, Xuemei Chen, Yubin Ding, Shangjing Liu, Yi Zhao, Rufei Gao, Yingxiong Wang, Junlin He

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Infertility: Female : CK(741) : AC(180), Oxidative Stress : CK(13443) : AC(5499)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Sodium fluoride administered in drinking water of 2, 4, and 6 ppm concentration for 6 months to male rats adversely affected their fertility and reproductive system.

**Pubmed Data** : Toxicol Ind Health. 2007 Oct;23(9):507-13. PMID: [18681235](#)

**Article Published Date** : Oct 01, 2007

**Authors** : R S Gupta, T I Khan, D Agrawal, J B S Kachhawa

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Infertility: Male : CK(1668) : AC(424), Sperm Quality: Low : CK(611) : AC(121)

**Problem Substances** : Fluoride : CK(1815) : AC(454), Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Anti-Fertility : CK(112) : AC(21)

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## Sodium fluoride adversely affects ovarian development and reproduction in Drosophila melanogaster.

**Pubmed Data** : Chemosphere. 2017 Jul 29 ;186:51-61. Epub 2017 Jul 29. PMID: [28763637](#)

**Article Published Date** : Jul 28, 2017

**Authors** : Salma Khatun, Prem Rajak, Moumita Dutta, Sumedha Roy

**Study Type** : In Vitro Study

**Additional Links**



**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376)  
**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Sodium fluoride and fluoride contaminated ground water induced altered reproductive performances in male rats.

**Pubmed Data** : Biol Trace Elem Res. 2020 Jun ;195(2):544-550. Epub 2019 Aug 28. PMID: [31463763](#)

**Article Published Date** : May 31, 2020

**Authors** : B Chaithra, H N Sarjan, Shivabasavaiah

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Sperm Quality: Low](#) : CK(611) : AC(121)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Sodium fluoride caused hepatic inflammatory responses and significantly inhibited the production of anti-inflammatory mediators.

**Pubmed Data** : Biol Trace Elem Res. 2018 Jul 30. Epub 2018 Jul 30. PMID: [30062462](#)

**Article Published Date** : Jul 29, 2018

**Authors** : Linlin Chen, Ping Kuang, Huan Liu, Qin Wei, Hengmin Cui, Jing Fang, Zhicai Zuo, Junliang Deng, Yinglun Li, Xun Wang, Ling Zhao

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Chemically-Induced Liver Damage](#) : CK(2167) : AC(1069), [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Inflammatory](#) : CK(541) : AC(169)

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## Sodium fluoride causes oxidative stress and apoptosis in cementoblasts.

**Pubmed Data** : Chem Biol Interact. 2018 Aug 18 ;294:34-39. Epub 2018 Aug 18. PMID: [30130527](#)

**Article Published Date** : Aug 17, 2018

**Authors** : Jing Ni, Yiming Li, Wu Zhang, Rong Shu, Zhe Zhong

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Gingivitis](#) : CK(595) : AC(86)

**Additional Keywords** : [Risk Factors](#) : CK(14728) : AC(2072)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Apoptotic](#) : CK(278) : AC(120), [Oxidant](#) : CK(646) : AC(246)

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## Sodium fluoride causes oxidative stress and apoptosis in the mouse liver.

**Pubmed Data** : Aging (Albany NY). 2017 Jun 27 ;9(6):1623-1639. PMID: [28657544](#)

**Article Published Date** : Jun 26, 2017

**Authors** : Yujiao Lu, Qin Luo, Hengmin Cui, Huidan Deng, Ping Kuang, Huan Liu, Jing Fang, Zhicai Zuo, Junliang Deng, Yinglun Li, Xun Wang, Ling Zhao

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Chemically-Induced Liver Damage](#) : CK(2167) : AC(1069), [Fluoride Toxicity](#) : CK(1389) : AC(376), [Oxidative Stress](#) : CK(13443) : AC(5499)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Apoptotic](#) : CK(278) : AC(120), [Hepatotoxic](#) : CK(400) : AC(124)

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## Sodium fluoride could induce apoptosis in splenic lymphocytes.

**Pubmed Data** : Oncotarget. 2016 Sep 16. Epub 2016 Sep 16. PMID: [27655720](#)

**Article Published Date** : Sep 15, 2016

**Authors** : Huidan Deng, Ping Kuang, Hengmin Cui, Lian Chen, Jing Fang, Zhicai Zuo, Junliang Deng, Xun Wang, Ling Zhao

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Sodium fluoride disrupts testosterone biosynthesis by affecting the steroidogenic pathway in TM3 Leydig cells.

**Pubmed Data** : Chemosphere. 2018 Dec ;212:447-455. Epub 2018 Aug 22. PMID: [30165274](#)

**Article Published Date** : Nov 30, 2018

**Authors** : Banu Orta Yilmaz, Ahu Korkut, Melike Erkan

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Low Testosterone](#) : CK(852) : AC(140), [Testicular Injury: Chemical/Metal Induced](#) : CK(754) : AC(374)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Sodium fluoride disturbs DNA methylation of NNAT and declines oocyte quality by impairing glucose transport in porcine oocytes.

**Pubmed Data** : Environ Mol Mutagen. 2017 Dec 29. Epub 2017 Dec 29. PMID: [29285797](#)

**Article Published Date** : Dec 28, 2017

**Authors** : Xiaoyan Liu, Zheng-Wen Nie, Ying-Ying Gao, Li Chen, Shu-Yuan Yin, Xia Zhang, Cuifang Hao, Yi-Liang Miao

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Infertility: Female](#) : CK(741) : AC(180)

**Additional Keywords** : [Risk Factors](#) : CK(14728) : AC(2072)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Sodium fluoride during gestation and lactation increased mandibular area and bone volume of pups.

**Pubmed Data** : Biol Trace Elem Res. 2018 Feb 6. Epub 2018 Feb 6. PMID: [29411324](#)

**Article Published Date** : Feb 05, 2018

**Authors** : Victoria Interlandi, Pablo A Fontanetti, Rubén H Ponce, Raquel V Gallará, Viviana A Centeno

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Prenatal Chemical Exposures](#) : CK(2428) : AC(530)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Sodium fluoride exposure changed histological structure and ultrastructure of hypothalamus-pituitary-testicular axis and significantly increased the malformation ratio of sperm.

**Pubmed Data** : Chemosphere. 2015 Sep ;135:297-303. Epub 2015 May 15. PMID: [25966048](#)

**Article Published Date** : Aug 31, 2015

**Authors** : Haijun Han, Zilong Sun, Guangying Luo, Chong Wang, Ruifen Wei, Jundong Wang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Infertility: Male](#) : CK(1668) : AC(424), [Sperm Quality: Low](#) : CK(611) : AC(121)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)



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## Sodium fluoride exposure exerts toxic effects on porcine oocyte maturation.

**Pubmed Data** : Sci Rep. 2017 Dec 6 ;7(1):17082. Epub 2017 Dec 6. PMID: [29213094](#)

**Article Published Date** : Dec 05, 2017

**Authors** : Shuang Liang, Zheng-Wen Nie, Minghui Zhao, Ying-Jie Niu, Kyung-Tae Shin, Xiang-Shun Cui

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : DNA damage : CK(2255) : AC(824), Fluoride Toxicity : CK(1389) : AC(376), Infertility: Female : CK(741) : AC(180), Oxidative Stress : CK(13443) : AC(5499)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Sodium fluoride impairs splenic innate immunity via inactivation of TLR2/MyD88 signaling pathway in mice.

**Pubmed Data** : Chemosphere. 2019 Dec ;237:124437. Epub 2019 Jul 23. PMID: [31356994](#)

**Article Published Date** : Nov 30, 2019

**Authors** : Ping Kuang, Hongrui Guo, Huidan Deng, Hengmin Cui, Jing Fang, Zhicai Zuo, Junliang Deng, Yinglun Li, Xun Wang, Ling Zhao

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Spleen Damage: Chemically Induced : CK(2) : AC(9)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Sodium fluoride induced skeletal muscle changes: Degradation of proteins and signaling mechanism.

**Pubmed Data** : Environ Pollut. 2019 Jan ;244:534-548. Epub 2018 Oct 10. PMID: [30384060](#)

**Article Published Date** : Dec 31, 2018

**Authors** : P Sudheer Shenoy, Utsav Sen, Saketh Kapoor, Anu V Ranade, Chitta R Chowdhury, Bipasha Bose

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Inflammation : CK(15536) : AC(5279)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Sodium fluoride induces apoptosis in H9c2 cardiomyocytes.

**Pubmed Data** : Biol Trace Elem Res. 2015 Aug ;166(2):210-5. Epub 2015 Feb 25. PMID: [25707396](#)

**Article Published Date** : Jul 31, 2015

**Authors** : Xiaoyan Yan, Xia Yang, Xianhui Hao, Qiurong Ren, Jiping Gao, Yu Wang, Na Chang, Yulan Qiu, Guohua Song

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Apoptotic : CK(278) : AC(120), Cardiotoxic : CK(1168) : AC(209)

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## Sodium fluoride induces apoptosis in mouse embryonic stem cells through ROS-dependent and caspase- and JNK-mediated pathways.

**Pubmed Data** : Toxicol Appl Pharmacol. 2012 Mar 15 ;259(3):329-37. Epub 2012 Jan 21. PMID: [22285274](#)

**Article Published Date** : Mar 14, 2012

**Authors** : Tam Dan Nguyen Ngoc, Young-Ok Son, Shin-Saeng Lim, Xianglin Shi, Jong-Ghee Kim, Jung Sun Heo, Youngji Choe, Young-Mi Jeon, Jeong-Chae Lee

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376)  
**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)  
**Adverse Pharmacological Actions** : [Apoptotic](#) : CK(278) : AC(120)

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## Sodium fluoride induces apoptosis in mouse splenocytes by activating ROS-dependent NF-κB signaling.

**Pubmed Data** : Oncotarget. 2017 Dec 29 ;8(70):114428-114441. Epub 2017 Dec 1. PMID: [29383091](#)

**Article Published Date** : Dec 28, 2017

**Authors** : Huidan Deng, Ping Kuang, Hengmin Cui, Qin Luo, Huan Liu, Yujiao Lu, Jing Fang, Zhicai Zuo, Junliang Deng, Yinglun Li, Xun Wang, Ling Zhao

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Apoptotic](#) : CK(278) : AC(120), [Immunotoxic](#) : CK(507) : AC(127)

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## Sodium fluoride induces apoptosis in the kidney of rats through caspase-mediated pathways and DNA damage.

**Pubmed Data** : J Physiol Biochem. 2014 Sep ;70(3):857-68. Epub 2014 Aug 27. PMID: [25158646](#)

**Article Published Date** : Aug 31, 2014

**Authors** : Guo Hua Song, Ji Ping Gao, Chun Fang Wang, Chao Yang Chen, Xiao Yan Yan, Min Guo, Yu Wang, Fu Bing Huang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [DNA damage](#) : CK(2255) : AC(824), [Fluoride Toxicity](#) : CK(1389) : AC(376), [Fluorosis](#) : CK(262) : AC(42), [Kidney Damage: Chemically-Induced](#) : CK(542) : AC(270)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Apoptotic](#) : CK(278) : AC(120), [Renotoxic](#) : CK(56) : AC(20)

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## Sodium fluoride induces hypertension and cardiac complications in animals.

**Pubmed Data** : Environ Toxicol. 2016 Jul 5. Epub 2016 Jul 5. PMID: [27378751](#)

**Article Published Date** : Jul 04, 2016

**Authors** : Ademola Adetokunbo Oyagbemi, Temidayo Olutayo Omobowale, Egunoluwa Racheal Asenuga, Abiola Olumuyiwa Adejumobi, Temitayo Olabisi Ajibade, Temitope Moses Ige, Blessing Seun Ogunpolu, Adeolu Alex Adedapo, Momoh Audu Yakubu

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Cardiotoxic](#) : CK(1168) : AC(209), [Hypertensive](#) : CK(266) : AC(30), [Inflammatory](#) : CK(541) : AC(169)

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## Sodium fluoride induces nephrotoxicity via oxidative stress-regulated mitochondrial SIRT3 signaling pathway.

**Pubmed Data** : Sci Rep. 2017 Apr 6 ;7(1):672. Epub 2017 Apr 6. PMID: [28386112](#)

**Article Published Date** : Apr 05, 2017

**Authors** : Chao Song, Beibei Fu, Jingcheng Zhang, Jiamin Zhao, Mengke Yuan, Wei Peng, Yong Zhang, Haibo Wu

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Kidney Damage: Chemically-Induced](#) : CK(542) : AC(270), [Oxidative Stress](#) : CK(13443) : AC(5499)

**Problem Substances** : [Fluoride](#) : CK(1815) : AC(454), [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Renotoxic : CK(56) : AC(20)

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## Sodium fluoride induces renal inflammatory responses and reduces anti-inflammatory cytokine expression in mice.

**Pubmed Data** : Oncotarget. 2017 Oct 6 ;8(46):80192-80207. Epub 2017 Jul 5. PMID: [29113295](#)

**Article Published Date** : Oct 05, 2017

**Authors** : Qin Luo, Hengmin Cui, Huidan Deng, Ping Kuang, Huan Liu, Yujiao Lu, Jing Fang, Zhicai Zuo, Junliang Deng, Yinglun Li, Xun Wang, Ling Zhao

**Study Type** : Animal Study

### Additional Links

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Inflammation : CK(15536) : AC(5279)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Sodium fluoride induces skeletal muscle atrophy.

**Pubmed Data** : PLoS One. 2022 ;17(12):e0279261. Epub 2022 Dec 22. PMID: [36548359](#)

**Article Published Date** : Dec 31, 2021

**Authors** : Apoorva H Nagendra, Animikh Ray, Debajit Chaudhury, Akash Mitra, Anu Vinod Ranade, Bipasha Bose, Sudheer Shenoy P

**Study Type** : Animal Study

### Additional Links

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Muscle Atrophy : CK(287) : AC(121)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Sodium fluoride induces the splenic apoptosis.

**Pubmed Data** : Aging (Albany NY). 2016 Dec 27 ;8(12):3552-3567. PMID: [28039491](#)

**Article Published Date** : Dec 26, 2016

**Authors** : Huidan Deng, Ping Kuang, Hengmin Cui, Lian Chen, Qin Luo, Jing Fang, Zhicai Zuo, Junliang Deng, Xun Wang, Ling Zhao

**Study Type** : Animal Study, In Vitro Study

### Additional Links

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Spleen Damage: Chemically Induced : CK(2) : AC(9)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Apoptotic : CK(278) : AC(120)

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## Sodium fluoride may adversely affect early embryonic development by disrupting the methylation of H19 and Peg3 through downregulation of DNMT1.

**Pubmed Data** : Cytogenet Genome Res. 2015 Dec 4. Epub 2015 Dec 4. PMID: [26633825](#)

**Article Published Date** : Dec 03, 2015

**Authors** : Lei Zhao, Sheng Zhang, Xinglan An, Wentao Tan, Bo Tang, Xueming Zhang, Ziyi Li

**Study Type** : Animal Study

### Additional Links

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376)

**Additional Keywords** : Methylation Downregulation : CK(5) : AC(3), Transgenerational Epigenetic Modification : CK(241) : AC(91)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Sodium fluoride promotes apoptosis by generation of reactive oxygen species in human lymphocytes.

**Pubmed Data** : J Toxicol Environ Health A. 2014 ;77(21):1269-80. PMID: [25268553](#)

**Article Published Date** : Dec 31, 2013

**Authors** : Manivannan Jothiramajayam, Sonali Sinha, Manosij Ghosh, Anish Nag, Aditi Jana, Anita Mukherjee

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : DNA damage : CK(2255) : AC(824), Fluoride Toxicity : CK(1389) : AC(376), Oxidative Stress : CK(13443) : AC(5499)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Apoptotic : CK(278) : AC(120), Genotoxic : CK(545) : AC(184)

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## Sodium fluoride suppresses spleen development through MAPK/ERK signaling pathway in mice.

**Pubmed Data** : Ecotoxicol Environ Saf. 2022 Aug ;241:113764. Epub 2022 Jun 13. PMID: [35709673](#)

**Article Published Date** : Jul 31, 2022

**Authors** : Ping Kuang, Hengmin Cui, Li Yu

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Prenatal Chemical Exposures : CK(2428) : AC(530), Spleen Damage: Chemically Induced : CK(2) : AC(9)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Soft drinks as a dietary source of fluoride exposure.

**Pubmed Data** : Biol Trace Elem Res. 2024 Aug ;202(8):3816-3828. Epub 2023 Nov 3. PMID: [37922070](#)

**Article Published Date** : Jul 31, 2024

**Authors** : Samuel Alejandro-Vega, Arturo Hardisson, Carmen Rubio, Ángel J Gutiérrez, Juan R Jaudenes-Marrero, Soraya Paz-Montelongo

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393), Sugar Sweetened Beverages : CK(1467) : AC(153)

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## Spirulina and tamarind fruit pulp reduced fluoride toxicity and led to better recovery of treated mice after withdrawal.

**Pubmed Data** : Indian J Exp Biol. 2016 Jan ;54(1):44-55. PMID: [26891552](#)

**Article Published Date** : Dec 31, 2015

**Authors** : N Yadav, Shweta Sharma, K p Sharma, A Pandey, P Pareek, Subhasini Sharma

**Study Type** : Animal Study

**Additional Links**

**Substances** : Spirulina : CK(1017) : AC(292), Tamarind : CK(143) : AC(41)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376)

**Pharmacological Actions** : Renoprotective : CK(4133) : AC(1932)

**Additional Keywords** : Natural Substance Synergy : CK(1339) : AC(657)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Supplementation of ginseng and banaba leaf extracts exhibited protective effects on fluoride toxicated STZ induced nephrotoxicity in mice.

**Pubmed Data** : Indian J Med Res. 2013 Feb ;137(2):370-9. PMID: [23563382](#)

**Article Published Date** : Jan 31, 2013

**Authors** : Mahaboob P Basha, S M Saumya

**Study Type** : Animal Study

**Additional Links**

**Substances** : Banaba : CK(36) : AC(20), Ginseng : CK(4190) : AC(1902)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Oxidative Stress : CK(13443) : AC(5499)  
**Pharmacological Actions** : Antioxidants : CK(32218) : AC(14161), Renoprotective : CK(4133) : AC(1932)  
**Additional Keywords** : Plant Extracts : CK(18030) : AC(6728)  
**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)  
**Adverse Pharmacological Actions** : Diabetogenic : CK(340) : AC(58)

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## Suppressive effects of sodium fluoride on cultured splenic lymphocyte proliferation in mice.

**Pubmed Data** : Oncotarget. 2016 Sep 20 ;7(38):61905-61915. PMID: [27542206](#)

**Article Published Date** : Sep 19, 2016

**Authors** : Ping Kuang, Huidan Deng, Hengmin Cui, Lian Chen, Hongrui Guo, Jing Fang, Zhicai Zuo, Junliang Deng, Xun Wang, Ling Zhao

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Spleen Damage: Chemically Induced : CK(2) : AC(9)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Synergistic effects of arsenic and fluoride on oxidative stress and apoptotic pathway in Leydig and Sertoli cells.

**Pubmed Data** : Toxicology. 2022 Jun 15 ;475:153241. Epub 2022 Jun 14. PMID: [35714946](#)

**Article Published Date** : Jun 14, 2022

**Authors** : Yasemin Aydin, Banu Orta-Yilmaz

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : Arsenic Poisoning : CK(383) : AC(129), Fluoride Toxicity : CK(1389) : AC(376), Oxidative Stress : CK(13443) : AC(5499)

**Additional Keywords** : Synergistic Toxicity : CK(226) : AC(109)

**Problem Substances** : Arsenic : CK(595) : AC(181), Sodium Fluoride : CK(1446) : AC(393)

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## Synergistic oxidative impact of aluminum chloride and sodium fluoride exposure during early stages of brain development.

**Pubmed Data** : Environ Sci Pollut Res Int. 2019 Feb 20. Epub 2019 Feb 20. PMID: [30788699](#)

**Article Published Date** : Feb 19, 2019

**Authors** : Amal A Kinawy

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Aluminum Toxicity : CK(685) : AC(308), Brain: Oxidative Stress : CK(635) : AC(345), Fluoride Toxicity : CK(1389) : AC(376)

**Additional Keywords** : Synergistic Toxicity : CK(226) : AC(109)

**Problem Substances** : Aluminum Chloride : CK(171) : AC(92), Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Systematic impacts of fluoride exposure on the metabolomics of rats.

**Pubmed Data** : Ecotoxicol Environ Saf. 2022 Sep 1 ;242:113888. Epub 2022 Jul 21. PMID: [35872488](#)

**Article Published Date** : Aug 31, 2022

**Authors** : Shiyuan Zhao, Jinxiu Guo, Hongjia Xue, Junjun Meng, Dadi Xie, Xi Liu, Qingqing Yu, Haitao Zhong, Pei Jiang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Inflammation : CK(15536) : AC(5279), Mitochondrial Dysfunction : CK(618) : AC(262), Oxidative Stress : CK(13443) : AC(5499)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Systematic review of epidemiological and toxicological evidence on health effects of fluoride in drinking water.

**Pubmed Data** : Crit Rev Toxicol. 2024 Feb 6:1-33. Epub 2024 Feb 6. PMID: [38318766](#)

**Article Published Date** : Feb 05, 2024

**Authors** : Mohamed Kadry Taher, Franco Momoli, Jennifer Go, Shintaro Hagiwara, Siva Ramoju, Xuefeng Hu, Natalie Jensen, Rowan Terrell, Alex Hemmerich, Daniel Krewski

**Study Type** : Review

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Learning disorders : CK(517) : AC(155), Neurodevelopmental Disorders : CK(470) : AC(85)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## TFE3-mediated impairment of lysosomal biogenesis and defective autophagy contribute to fluoride-induced hepatotoxicity.

**Pubmed Data** : Ecotoxicol Environ Saf. 2023 Mar 15 ;253:114674. Epub 2023 Feb 22. PMID: [36827899](#)

**Article Published Date** : Mar 14, 2023

**Authors** : Zeyu Hu, Wanjing Xu, Jingjing Zhang, Yanling Tang, Hengrui Xing, Panpan Xu, Yue Ma, Qiang Niu

**Study Type** : Animal Study, In Vitro Study

**Additional Links**

**Substances** : Melatonin : CK(2743) : AC(904)

**Diseases** : Chemically-Induced Liver Damage : CK(2167) : AC(1069), Fluoride Toxicity : CK(1389) : AC(376)

**Pharmacological Actions** : Hepatoprotective : CK(8320) : AC(3765)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Taurine protected against sodium fluoride induced neurotoxicity.

**Pubmed Data** : Chem Biol Interact. 2016 Nov 11 ;261:1-10. Epub 2016 Nov 11. PMID: [27840156](#)

**Article Published Date** : Nov 10, 2016

**Authors** : Isaac A Adedara, Amos O Abolaji, Umar F Idris, Bolanle F Olabiyi, Esther M Onibiyo, Teminijesu D Ojuade, Ebenezer O Farombi

**Study Type** : Animal Study

**Additional Links**

**Substances** : Taurine : CK(246) : AC(71)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376)

**Pharmacological Actions** : Neuroprotective Agents : CK(17667) : AC(7641)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Terminalia arjuna protects mouse hearts against sodium fluoride induced toxicity.

**Pubmed Data** : J Med Food. 2008 Dec;11(4):733-40. PMID: [19053867](#)

**Article Published Date** : Dec 01, 2008

**Authors** : Mahua Sinha, Prasenjit Manna, Parames C Sil

**Study Type** : Animal Study

**Additional Links**

**Substances** : Arjuna : CK(19) : AC(6), Terminalia : CK(85) : AC(49)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376)

**Pharmacological Actions** : Cardioprotective : CK(8685) : AC(2877)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Cardiotoxic : CK(1168) : AC(209)

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## Th17-related cytokines involved in fluoride-induced cecal and rectal



## barrier damage.

**Pubmed Data** : Biol Trace Elem Res. 2023 Sep ;201(9):4497-4507. Epub 2022 Dec 20. PMID: [36538210](#)

**Article Published Date** : Aug 31, 2023

**Authors** : Xiao-Ying Gao, Ye Jin, Jing Zhao, Yu-Ling Zhang, Hong-Wei Wang, Bian-Hua Zhou

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Gastrointestinal Inflammation](#) : CK(324) : AC(153)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## The accumulation of sodium fluoride alters the neurological function which leads to neurodegenerative disorders.

**Pubmed Data** : Biol Trace Elem Res. 2020 Aug 31. Epub 2020 Aug 31. PMID: [32865723](#)

**Article Published Date** : Aug 30, 2020

**Authors** : Yugandhar P Reddy, Santosh Tiwari, Lomas K Tomar, Nalini Desai, Varun Kumar Sharma

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Brain Inflammation](#) : CK(1650) : AC(901), [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## The cognitive functions could be impaired in the older people living in high fluoride drinking water areas.

**Pubmed Data** : BMC Public Health. 2021 Dec 9 ;21(1):2237. Epub 2021 Dec 9. PMID: [34886821](#)

**Article Published Date** : Dec 08, 2021

**Authors** : Chao Ren, Peng Zhang, Xiao-Yan Yao, Hui-Hua Li, Rui Chen, Cai-Yi Zhang, De-Qin Geng

**Study Type** : Human Study

**Additional Links**

**Diseases** : [Cognitive Decline/Dysfunction](#) : CK(5061) : AC(1005), [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## The dose-response effect of fluoride exposure on the gut microbiome.

**Pubmed Data** : Metabolites. 2023 Nov 17 ;13(11). Epub 2023 Nov 17. PMID: [37999254](#)

**Article Published Date** : Nov 16, 2023

**Authors** : Zhe Mo, Jian Wang, Xinyue Meng, Ailin Li, Zhe Li, Wenjun Que, Tuo Wang, Korto Fatti Tarnue, Xu Ma, Ying Liu, Shirui Yan, Lei Wu, Rui Zhang, Junrui Pei, Xiaofeng Wang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Gastrotoxic](#) : CK(190) : AC(68)

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## The effect of lycopene on DNA damage and repair in fluoride-treated NRK-52E cell line.

**Pubmed Data** : Biol Trace Elem Res. 2021 May ;199(5):1979-1985. Epub 2020 Aug 8. PMID: [32770329](#)

**Article Published Date** : Apr 30, 2021

**Authors** : Sedat Çetin, Ayşe Usta, Veysel Yüksek

**Study Type** : In Vitro Study

**Additional Links**

**Substances** : [Lycopene](#) : CK(1265) : AC(371)

**Diseases** : [DNA damage](#) : CK(2255) : AC(824), [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Pharmacological Actions** : [Antioxidants](#) : CK(32218) : AC(14161), [Genoprotective](#) : CK(522) : AC(203)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## The effect of vitamin E and selenium combination in repairing fluoride-induced DNA damage to NRK-52E cells.

**Pubmed Data** : Mol Biol Rep. 2020 Oct ;47(10):7761-7770. Epub 2020 Oct 6. PMID: [33025505](#)

**Article Published Date** : Sep 30, 2020

**Authors** : Veysel Yüksek, Sedat Çetin, Ayşe Usta

**Study Type** : In Vitro Study

**Additional Links**

**Substances** : Selenium : CK(1706) : AC(389), Vitamin E : CK(3039) : AC(570)

**Diseases** : DNA damage : CK(2255) : AC(824), Fluoride Toxicity : CK(1389) : AC(376), Fluorosis : CK(262) : AC(42)

**Pharmacological Actions** : DNA Repair Up-regulation : CK(110) : AC(34), Genoprotective : CK(522) : AC(203)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## The footprints of mitochondrial fission and apoptosis in fluoride-induced renal dysfunction.

**Pubmed Data** : Biol Trace Elem Res. 2024 Sep ;202(9):4125-4135. Epub 2023 Dec 7. PMID: [38057486](#)

**Article Published Date** : Aug 31, 2024

**Authors** : Qiyong Zuo, Lin Lin, Yuling Zhang, Mohammad Mehdi Ommati, Hongwei Wang, Jing Zhao

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Kidney Damage: Chemically-Induced : CK(542) : AC(270)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Apoptotic : CK(278) : AC(120)

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## The influence of fluoride in drinking water on the incidence of fluorosis and intelligence of elementary school students in Palu City.

**Pubmed Data** : Gac Sanit. 2021 ;35 Suppl 2:S159-S163. PMID: [34929801](#)

**Article Published Date** : Dec 31, 2020

**Authors** : Sri Indah Yani, Arifin Seweng, Anwar Mallongi, Rosmala Nur, Muh Tahir Abdullah, Ummu Salmah, Saifudin Sirajuddin, Muhammad Basir-Cyio, Mahfudz, Alam Anshary

**Study Type** : Human Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Learning disorders : CK(517) : AC(155)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## The influence of fluorides on mouse sperm capacitation.

**Pubmed Data** : Anim Reprod Sci. 2008 Oct ;108(1-2):157-70. Epub 2007 Aug 6. PMID: [17884311](#)

**Article Published Date** : Sep 30, 2008

**Authors** : K Dvoráková-Hortová, M Sandera, M Jursová, J Vasinová, J Peknicová

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Infertility: Male : CK(1668) : AC(424)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## The present study reveals that exposure to fluoride in early stages of rat development leads to impairment of memory in young offspring.

**Pubmed Data** : Int J Toxicol. 2019 ;38(5):405-414. Epub 2019 Jun 20. PMID: [31220985](#)

**Article Published Date** : Dec 31, 2018

**Authors** : Mariana Bartos, Fernanda Gumilar, Cristina E Gallegos, Cristina Bras, Sergio Dominguez, Liliana M Cancela, Alejandra Minetti



**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Oxidative Stress : CK(13443) : AC(5499), Prenatal Chemical Exposures : CK(2428) : AC(530)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## The relationship between fluoride exposure and cognitive outcomes from gestation to adulthood-A systematic review.

**Pubmed Data** : Int J Environ Res Public Health. 2022 Dec 20 ;20(1). Epub 2022 Dec 20. PMID: [36612346](#)

**Article Published Date** : Dec 19, 2022

**Authors** : Banu Preethi Gopu, Liane B Azevedo, Ralph M Duckworth, Murali K P Subramanian, Sherley John, Fatemeh Vida Zohoori

**Study Type** : Review

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances** : Fluoride : CK(1815) : AC(454)

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## The results suggest that overexposure to fluoride (160-320 µM) can induce cytotoxicity and regulate relevant genes expression.

**Pubmed Data** : Biol Trace Elem Res. 2015 Mar 1. Epub 2015 Mar 1. PMID: [25726004](#)

**Article Published Date** : Feb 28, 2015

**Authors** : Hong He, Hongmei Wang, Yuguo Jiao, Congli Ma, Han Zhang, Zhou Zhou

**Study Type** : Human In Vitro

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376)

**Additional Keywords** : Dose Response : CK(1769) : AC(700), Gene Expression : CK(282) : AC(104)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## The therapeutic effects of Prunella vulgaris against fluoride-induced oxidative damage by using the metabolomics method.

**Pubmed Data** : Environ Toxicol. 2021 Jun 5. Epub 2021 Jun 5. PMID: [34089294](#)

**Article Published Date** : Jun 04, 2021

**Authors** : Li Li, Li-Mei Lin, Jing Deng, Xiu-Lian Lin, Ya-Mei Li, Bo-Hou Xia

**Study Type** : Animal Study

**Additional Links**

**Substances** : Prunella vulgaris : CK(158) : AC(84)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376)

**Pharmacological Actions** : Antioxidants : CK(32218) : AC(14161)

**Problem Substances** : Fluoride : CK(1815) : AC(454), Sodium Fluoride : CK(1446) : AC(393)

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## The use of fluoride supplements during the first 6 years of life is associated with a significant increase in the risk of developing dental fluorosis.

**Pubmed Data** : Community Dent Oral Epidemiol. 1999 Feb ;27(1):48-56. PMID: [10086926](#)

**Article Published Date** : Jan 31, 1999

**Authors** : A I Ismail, R R Bandekar

**Study Type** : Meta Analysis

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Fluorosis : CK(262) : AC(42)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## The use of hydrofluorosilicic acid contaminated with heavy metals creates a regulatory blind spot that jeopardizes any safe use of fluoride additives

**Pubmed Data** : Int J Occup Environ Health. 2014 Apr-Jun;20(2):157-66. Epub 2014 Mar 20. PMID: [24999851](#)

**Article Published Date** : Apr 01, 2014

**Authors** : Phyllis J Mullenix

**Study Type** : Review

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Problem Substances** : [Fluoride](#) : CK(1815) : AC(454), [Hydrofluorosilicic acid \(HFS\)](#) : CK(3) : AC(2)

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## There is an increased risk of knee arthritis in patients with elevated blood fluoride levels.

**Pubmed Data** : Malays Orthop J. 2020 Nov ;14(3):151-154. PMID: [33403076](#)

**Article Published Date** : Oct 31, 2020

**Authors** : V K Singh, K S Rathore, G Khan, A Rahim, A Rashid, S Chauhan

**Study Type** : Human Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Osteoarthritis: Knee](#) : CK(2278) : AC(267)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## These findings demonstrate that a fluoride-free diet encouraged pinealocyte proliferation and pineal gland growth in aged animals.

**Pubmed Data** : Biol Trace Elem Res. 2020 Sep ;197(1):175-183. Epub 2019 Nov 12. PMID: [31713773](#)

**Article Published Date** : Aug 31, 2020

**Authors** : Aaron Mrvelj, Mark D Womble

**Study Type** : Animal Study

**Additional Links**

**Substances** : [Melatonin](#) : CK(2743) : AC(904)

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Pineal Gland Calcification](#) : CK(233) : AC(31)

**Problem Substances** : [Fluoride](#) : CK(1815) : AC(454)

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## These findings indicate that chronic consumption of high concentrations of fluoride leads to a decrease in nerve conduction velocity.

**Pubmed Data** : Int J Toxicol. 2024 Nov 6:10915818241297082. Epub 2024 Nov 6. PMID: [39501888](#)

**Article Published Date** : Nov 05, 2024

**Authors** : Fernanda Marlen Enríquez-Sánchez, Miguel Ángel López-Vázquez, María Esther Olvera-Cortés, Liliana Valdez-Jiménez, Paola Trinidad Villalobos-Gutiérrez, María Isabel Pérez-Vega

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Neurotoxic](#) : CK(2838) : AC(702), [Neurotransmitter Interference](#) : CK(32) : AC(8)

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## These findings provided a theoretical basis that melatonin mitigated sodium fluoride induced hepatotoxicity.

**Pubmed Data** : Free Radic Biol Med. 2017 Nov ;112:616-630. Epub 2017 Sep 11. PMID: [28912098](#)

**Article Published Date** : Oct 31, 2017

**Authors** : Chao Song, Jiamin Zhao, Beibei Fu, Dan Li, Tingchao Mao, Wei Peng, Haibo Wu, Yong Zhang

**Study Type** : In Vitro Study

**Additional Links**

**Substances** : [Melatonin](#) : CK(2743) : AC(904)

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Pharmacological Actions** : [Hepatoprotective](#) : CK(8320) : AC(3765)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## These findings reveal that acute fluoride exposure causes sudden heart failure.

**Pubmed Data** : Int J Cardiol. 2017 Feb 15 ;229:96-101. Epub 2016 Nov 9. PMID: [27863940](#)

**Article Published Date** : Feb 14, 2017

**Authors** : Lakshmikanthan Panneerselvam, Azhwar Raghunath, Ekambaram Perumal

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Heart Failure](#) : CK(1884) : AC(327)

**Problem Substances** : [Fluoride](#) : CK(1815) : AC(454), [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Cardiotoxic](#) : CK(1168) : AC(209)

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## These results indicated that EGCG possesses a protective effect against fluoride toxicity.

**Pubmed Data** : Toxicol. 2024 Aug 28 ;247:107857. Epub 2024 Jul 10. PMID: [38996976](#)

**Article Published Date** : Aug 27, 2024

**Authors** : Qian Zhang, Xiuzhi Fei, Yue Li, Hengwei Zhang, Lu Chen, Jianping Ruan, Ning Dong

**Study Type** : In Vitro Study

**Additional Links**

**Substances** : [EGCG \(Epigallocatechin gallate\)](#) : CK(1503) : AC(818)

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Pharmacological Actions** : [Anti-Apoptotic](#) : CK(4942) : AC(3051)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## These results provide new insights into the mechanism of fluoride-induced hypertension.

**Pubmed Data** : Ecotoxicol Environ Saf. 2024 Aug ;281:116681. Epub 2024 Jul 4. PMID: [38964063](#)

**Article Published Date** : Jul 31, 2024

**Authors** : Wenjing Yang, Chunqing Lu, Fang Chu, Keming Bu, Hao Ma, Qiaoyu Wang, Zhe Jiao, Sheng Wang, Xiyue Yang, Yanhui Gao, Dianjun Sun, Hongna Sun

**Study Type** : Animal Study, In Vitro Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Hypertension](#) : CK(8603) : AC(1329)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## These results show that sodium fluoride can reduce blood cellular and humoral immune function in mice.

**Pubmed Data** : Oncotarget. 2017 Oct 17 ;8(49):85504-85515. Epub 2017 Aug 10. PMID: [29156736](#)

**Article Published Date** : Oct 16, 2017

**Authors** : Hongrui Guo, Ping Kuang, Qin Luo, Hengmin Cui, Huidan Deng, Huan Liu, Yujiao Lu, Jing Fang, Zhicai Zuo, Junliang Deng, Yinglun Li, Xun Wang, Ling Zhao

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Immunosuppressive : CK(289) : AC(55)

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## These results suggest that fluoride generates reactive species that cause extensive oxidative modifications in human red blood cells.

**Pubmed Data** : Ecotoxicol Environ Saf. 2021 Jan 15 ;208:111611. Epub 2020 Nov 10. PMID: [33396131](#)

**Article Published Date** : Jan 14, 2021

**Authors** : Nikhil Maheshwari, Neha Qasim, Ruhi Anjum, Riaz Mahmood

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Oxidant](#) : CK(646) : AC(246)

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## These results suggest that there are striking differences in salivary microbiome between healthy controls and dental fluorosis patients.

**Pubmed Data** : J Oral Microbiol. 2023 ;15(1):2180927. Epub 2023 Feb 20. PMID: [36844898](#)

**Article Published Date** : Dec 31, 2022

**Authors** : Shanshan Liu, Qiangsheng Song, Chenchen Zhang, Mengwan Li, Zhenzhen Li, Yudong Liu, Li Xu, Xiaofei Xie, Lili Zhao, Rongxiu Zhang, Qinglong Wang, Guojin Zeng, Yifan Zhang, Kai Zhang

**Study Type** : Human Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## These results suggest that water fluoridation appears to be producing less impactful effects on oral health.

**Pubmed Data** : Evid Based Dent. 2024 Sep ;25(3):121-122. Epub 2024 Jul 3. PMID: [38961311](#)

**Article Published Date** : Aug 31, 2024

**Authors** : Darshini Ramasubbu, Jonathan Lewney, Brett Duane

**Study Type** : Human Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## This demonstrated ability of fluorine to exert genotoxic effects on bone cells.

**Pubmed Data** : Toxicol Res. 2020 Oct ;36(4):337-342. Epub 2020 Feb 24. PMID: [33005593](#)

**Article Published Date** : Sep 30, 2020

**Authors** : V P Volobaev, E S Serdyukova, E E Kalyuzhnaya, E A Schetnikova, A D Korotkova, A A Naik, S N Bach, A Y Prosekov, A V Larionov

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Osteosarcoma](#) : CK(422) : AC(285)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## This indicated that along with low sperm quality, sperm mtDNA copy number is also a sensitive biomarker to reflect the sperm toxicity of fluoride.

**Pubmed Data** : Biochem Biophys Res Commun. 2017 10 21 ;492(3):295-299. Epub 2017 Aug 31. PMID: [28864413](#)

**Article Published Date** : Jan 20, 2017

**Authors** : Zilong Sun, Xingchen Xue, Yuliang Zhang, Ruiyan Niu, Jundong Wang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Infertility: Male : CK(1668) : AC(424), Sperm Quality: Low : CK(611) : AC(121)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## This study explored the possible mechanism of fluoride induced endothelial cell injury.

**Pubmed Data** : Toxicology. 2023 Jun 15 ;492:153530. Epub 2023 Apr 28. PMID: [37121536](#)

**Article Published Date** : Jun 14, 2023

**Authors** : Chao Zhang, Yue Wang, Fengya Huang, Yaoyuan Zhang, Yunzhu Liu, Qingbo Wang, Xiaodi Zhang, Bingyun Li, Linet Angwa, Yuting Jiang, Yanhui Gao

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : Cardiovascular Diseases : CK(17124) : AC(2826), Endothelial Dysfunction : CK(2710) : AC(571), Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## This study has provided new evidence for the role of FGF21/ERK in fluoride-induced skeletal muscle damage.

**Pubmed Data** : Ecotoxicol Environ Saf. 2023 Mar 1 ;252:114626. Epub 2023 Feb 8. PMID: [36764073](#)

**Article Published Date** : Feb 28, 2023

**Authors** : Lan Ma, Chengmei Zhang, Yu Gui, Tingling Zou, Shuhua Xi, Xiaoying Guo

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Fluorosis : CK(262) : AC(42), Muscle Damage : CK(258) : AC(83)

**Problem Substances** : Fluoride : CK(1815) : AC(454), Sodium Fluoride : CK(1446) : AC(393)

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## This study proved that oxidative stress probably play a major role in NaF-induced apoptosis of Sertoli cells.

**Pubmed Data** : Int J Environ Health Res. 2015 ;25(1):1-9. Epub 2014 Feb 13. PMID: [24521312](#)

**Article Published Date** : Dec 31, 2014

**Authors** : Yang Yang, Hui Huang, Yue Ba, Xue-Min Cheng, Liu-Xin Cui

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Oxidative Stress : CK(13443) : AC(5499), Testicular Injury: Chemical/Metal Induced : CK(754) : AC(374)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Apoptotic : CK(278) : AC(120)

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## This study shows the protective effect of neem on sodium fluoride induced hypertension and genotoxicity.

**Pubmed Data** : J Basic Clin Physiol Pharmacol. 2017 Oct 5. Epub 2017 Oct 5. PMID: [28981443](#)

**Article Published Date** : Oct 04, 2017

**Authors** : Temidayo Olutayo Omóbòwálé, Ademola Adetokunbo Oyagbemi, Bukola Ayokunmi Alaba, Olufunke Eunice Ola-Davies, Olumuyiwa Abiola Adejumobi, Ebunoluwa Racheal Asenuga, Temitayo Olabisi Ajibade, Adeolu Alex Adedapo, Momoh Audu Yakubu

**Study Type** : Animal Study

**Additional Links**

**Substances** : Neem : CK(296) : AC(148)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376)

**Pharmacological Actions** : Antihypertensive Agents : CK(6936) : AC(1007), Antioxidants : CK(32218) : AC(14161), Genoprotective : CK(522) : AC(203)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Threshold effects of moderately excessive fluoride exposure on children's health.

**Pubmed Data** : Environ Int. 2018 Sep ;118:116-124. Epub 2018 Jun 2. PMID: [29870912](#)

**Article Published Date** : Aug 31, 2018

**Authors** : Xingchen Yu, Jingwen Chen, Yonggang Li, Hongliang Liu, Changchun Hou, Qiang Zeng, Yushan Cui, Liang Zhao, Pei Li, Ziquan Zhou, Shuo Pang, Sha Tang, Kunming Tian, Qian Zhao, Lixin Dong, Chunyan Xu, Xiao Zhang, Shun Zhang, Li Liu, Aiguo Wang

**Study Type** : Human Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Intelligence Quotient (IQ): Low/Impaired : CK(312) : AC(27)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Treadmill exercise could restore the molecular changes caused by excessive sodium fluoride exposure.

**Pubmed Data** : Biol Trace Elem Res. 2023 Mar 8. Epub 2023 Mar 8. PMID: [36884125](#)

**Article Published Date** : Mar 07, 2023

**Authors** : Ke Liu, Lei Chai, Taotao Zhao, Shaosan Zhang, Jixiang Wang, Yanghuan Yu, Ruiyan Niu, Zilong Sun

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Chemically-Induced Liver Damage : CK(2167) : AC(1069), Fluoride Toxicity : CK(1389) : AC(376)

**Therapeutic Actions** : Exercise : CK(6247) : AC(999), Exercise: Running : CK(593) : AC(71)

**Pharmacological Actions** : Anti-Apoptotic : CK(4942) : AC(3051), Hepatoprotective : CK(8320) : AC(3765)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Treatment with rutin against sodium fluoride intoxication has a significant role in protecting F-induced cardiotoxicity, blood toxicity and dyslipidemia in rats.

**Pubmed Data** : Toxicol Mech Methods. 2015 Feb ;25(2):143-9. Epub 2015 Feb 11. PMID: [25560802](#)

**Article Published Date** : Jan 31, 2015

**Authors** : V Umarani, Sudhakar Muvvala, A Ramesh, B V S Lakshmi, N Sravanthi

**Study Type** : Animal Study

**Additional Links**

**Substances** : Rutin : CK(460) : AC(221)

**Diseases** : Dyslipidemias : CK(1583) : AC(326), Fluoride Toxicity : CK(1389) : AC(376), Oxidative Stress : CK(13443) : AC(5499)

**Pharmacological Actions** : Cardioprotective : CK(8685) : AC(2877), Hypolipidemic : CK(8317) : AC(1985)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Virgin coconut oil complements with its polyphenol components mitigate sodium fluoride toxicity in vitro and in vivo.

**Pubmed Data** : Drug Chem Toxicol. 2021 Aug 18:1-7. Epub 2021 Aug 18. PMID: [34407699](#)

**Article Published Date** : Aug 17, 2021

**Authors** : Soorya Parathodi Illam, Sruthi Panniyani Kandiyil, Arunaksharan Narayanankutty, Soumya Valappan Veetil, Thekkekara Devassy Babu, Rao M Uppu, Achuthan C Raghavamenon

**Study Type** : Animal Study, In Vitro Study

**Additional Links**

**Substances** : Coconut Oil : CK(478) : AC(106), Polyphenols : CK(2728) : AC(996)

**Diseases** : Chemically-Induced Liver Damage : CK(2167) : AC(1069), Fluoride Toxicity : CK(1389) : AC(376)  
**Pharmacological Actions** : Antioxidants : CK(32218) : AC(14161), Hepatoprotective : CK(8320) : AC(3765)  
**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Vitamin C attenuates sodium fluoride-induced mitochondrial oxidative stress and apoptosis.

**Pubmed Data** : Biol Trace Elem Res. 2018 Dec 18. Epub 2018 Dec 18. PMID: [30565018](#)

**Article Published Date** : Dec 17, 2018

**Authors** : Wei Peng, Shangrong Xu, Jun Zhang, Yong Zhang

**Study Type** : In Vitro Study

### Additional Links

**Substances** : Vitamin C : CK(6030) : AC(1400)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376)

**Pharmacological Actions** : Anti-Apoptotic : CK(4942) : AC(3051), Antioxidants : CK(32218) : AC(14161)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Vitamin D may assist the UPR against sodium fluoride-induced damage.

**Pubmed Data** : J Trace Elem Med Biol. 2023 Dec ;80:127293. Epub 2023 Aug 26. PMID: [37677921](#)

**Article Published Date** : Nov 30, 2023

**Authors** : Veysel Yüksek, Semiha Dede, Sedat Çetin, Ayşe Usta, Mehmet Taşpınar

**Study Type** : In Vitro Study

### Additional Links

**Substances** : Vitamin D : CK(11555) : AC(1679)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Oxidative Stress : CK(13443) : AC(5499)

**Pharmacological Actions** : Anti-Apoptotic : CK(4942) : AC(3051), Antioxidants : CK(32218) : AC(14161)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Vitamin E and lycopene reduce coal burning fluorosis-induced spermatogenic cell apoptosis.

**Pubmed Data** : Biosci Rep. 2017 Dec 22. Epub 2017 Dec 22. PMID: [29273675](#)

**Article Published Date** : Dec 21, 2017

**Authors** : Yuan Tian, Yuehai Xiao, Bolin Wang, Chao Sun, Kaifa Tang, Fa Sun

**Study Type** : Animal Study

### Additional Links

**Substances** : Lycopene : CK(1265) : AC(371), Vitamin E : CK(3039) : AC(570)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Fluorosis (AC 37) (CK 228)

### A comparative evaluation of the fluoride content in commercially available infant formulae in India.

**Pubmed Data** : J Indian Soc Pedod Prev Dent. 2023 Oct 1 ;41(4):328-334. Epub 2024 Jan 18. PMID: [38235820](#)

**Article Published Date** : Sep 30, 2023

**Authors** : Asha Supriya Satti, Radhika Muppa, Ravichandra Sekhar Kotha, Srikanth Koya, Mrudhula J N Kantipudi, Ch Deepthi Siva Harika

**Study Type** : In Vitro Study



#### Additional Links

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Fluorosis : CK(262) : AC(42)

**Additional Keywords** : Water Fluoridation : CK(34) : AC(5)

**Problem Substances** : Infant Formula : CK(659) : AC(97), Sodium Fluoride : CK(1446) : AC(393)

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## A relationship was identified between drinking fluoridated water from wells and the prevalence of fluorosis in individuals up to 18 years old.

**Pubmed Data** : Acta Odontol Latinoam. 2023 Dec 31 ;36(3):169-176. PMID: [38345279](#)

**Article Published Date** : Dec 30, 2023

**Authors** : Francineudo Oliveira Chagas, Lidia A Rocha Voladas, Ana Sorazabal, Adeyinka Dayo, Jhereza Cf Botelho Dantas, Aldo Squassi

**Study Type** : Review

#### Additional Links

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Fluorosis : CK(262) : AC(42)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## A review of the effects of chronic fluorosis on the brain.

**Pubmed Data** : Ecotoxicol Environ Saf. 2022 Oct 1 ;244:114021. Epub 2022 Aug 29. PMID: [36049331](#)

**Article Published Date** : Sep 30, 2022

**Authors** : Chao Ren, Hui-Hua Li, Cai-Yi Zhang, Xi-Cheng Song

**Study Type** : Review

#### Additional Links

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Fluorosis : CK(262) : AC(42), Learning disorders : CK(517) : AC(155), Memory Disorders : CK(1570) : AC(514), Oxidative Stress : CK(13443) : AC(5499)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## An intervention with safe drinking water for 5 years in intervention group-mitigated clinical and subclinical symptoms of fluorosis.

**Pubmed Data** : Environ Monit Assess. 2018 Feb 2 ;190(3):110. Epub 2018 Feb 2. PMID: [29396763](#)

**Article Published Date** : Feb 01, 2018

**Authors** : Arjun L Khandare, Vakdevi Validandi, Shankar Rao Gourineni, Viswanathan Gopalan, Balakrishna Nagalla

**Study Type** : Human Study

#### Additional Links

**Substances** : Water : CK(209) : AC(47)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Fluorosis : CK(262) : AC(42)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## An interventional clinical trial investigating the effects of Spirulina platensis on dental fluorosis and antioxidant system.

**Pubmed Data** : Sci Rep. 2023 Oct 6 ;13(1):16858. Epub 2023 Oct 6. PMID: [37803131](#)

**Article Published Date** : Oct 05, 2023

**Authors** : Abdellatif Rahim, Mounia Sibaoueih, Adekhalid Essamadi, Bouchra El Amiri

**Study Type** : Animal Study

#### Additional Links

**Substances** : Spirulina : CK(1017) : AC(292)

**Diseases** : Spirulina : CK(1017) : AC(292), Fluoride Toxicity : CK(1389) : AC(376), Fluorosis : CK(262) : AC(42)

**Pharmacological Actions** : Antioxidants : CK(32218) : AC(14161)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Apoptosis and inflammation involved with fluoride-induced bone



## injuries.

**Pubmed Data** : Nutrients. 2024 Jul 31 ;16(15). Epub 2024 Jul 31. PMID: [39125380](#)

**Article Published Date** : Jul 30, 2024

**Authors** : Miao Wang, Kangting Luo, Tongtong Sha, Qian Li, Zaichao Dong, Yanjie Dou, Huanxia Zhang, Guoyu Zhou, Yue Ba, Fangfang Yu

**Study Type** : Review

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Fluorosis](#) : CK(262) : AC(42), [Inflammation](#) : CK(15536) : AC(5279)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Apoptotic](#) : CK(278) : AC(120)

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## Calcium and vitamin D supplementation effectively alleviates dental and skeletal fluorosis and retain elemental homeostasis in mice.

**Pubmed Data** : Biol Trace Elem Res. 2021 Aug ;199(8):3035-3044. Epub 2020 Oct 14. PMID: [33057951](#)

**Article Published Date** : Jul 31, 2021

**Authors** : Arpan Dey Bhowmik, Pallab Shaw, Paritosh Mondal, Anindita Chakraborty, Muthammal Sudarshan, Ansuman Chattopadhyay

**Study Type** : Animal Study

**Additional Links**

**Substances** : [Calcium](#) : CK(444) : AC(68), [Vitamin D](#) : CK(11555) : AC(1679)

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Fluorosis](#) : CK(262) : AC(42)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Cognitive decline of rats with chronic fluorosis is associated with alterations in hippocampal calpain signaling.

**Pubmed Data** : Biol Trace Elem Res. 2020 Oct ;197(2):495-506. Epub 2019 Dec 3. PMID: [31797207](#)

**Article Published Date** : Sep 30, 2020

**Authors** : Olga V Nadei, Irina A Khvorova, Natalia I Agalakova

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Fluorosis](#) : CK(262) : AC(42)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Neurotoxic](#) : CK(2838) : AC(702)

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## Dental fluorosis results from fluoride intake by different sources.

**Pubmed Data** : Gac Med Mex. 2009 Jul-Aug;145(4):263-7. PMID: [20073427](#)

**Article Published Date** : Jul 01, 2009

**Authors** : Luis Fernando Galicia Chacón, María Lilia Adriana Juárez López, Nelly Molina Frechero

**Study Type** : Human Study

**Additional Links**

**Diseases** : [Fluorosis](#) : CK(262) : AC(42)

**Problem Substances** : [Fluoride](#) : CK(1815) : AC(454), [Sodium Fluoride](#) : CK(1446) : AC(393), [Sugary soda](#) : CK(211) : AC(27)

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## Effect of Moringa oleifera leaves on hematological profile of fluorosis affected rats.

**Pubmed Data** : Bioinformation. 2022 ;18(1):14-18. Epub 2022 Jan 31. PMID: [35815197](#)

**Article Published Date** : Dec 31, 2021

**Authors** : Pravallika Pagadala, M S Vinutha Shankar, A Hemalatha, K N Shashidhar

**Study Type** : Animal Study

**Additional Links**

**Substances** : [Moringa oleifera](#) : CK(748) : AC(377)

**Diseases** : Fluorosis : CK(262) : AC(42)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Effect of fluoride exposure on mRNA expression of cav1.2 and calcium signal pathway apoptosis regulators in PC12 cells.

**Pubmed Data** : Environ Toxicol Pharmacol. 2017 Sep ;54:74-79. Epub 2017 Jun 30. PMID: [28697452](#)

**Article Published Date** : Aug 31, 2017

**Authors** : Qiuxia Liao, Rui Zhang, Xiaoyu Wang, Weiwei Nian, Lulu Ke, Wei Ouyang, Zigui Zhang

**Study Type** : In Vitro Study

### Additional Links

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Fluorosis : CK(262) : AC(42)

**Problem Substances** : Fluoride : CK(1815) : AC(454), Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Apoptotic : CK(278) : AC(120), Neurotoxic : CK(2838) : AC(702)

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## Excessive fluoride in water causes severe dental fluorosis and raises fracture risks, urging defluoridation in affected areas.

**Pubmed Data** : Ecotoxicol Environ Saf. 2024 Sep 1 ;282:116705. Epub 2024 Jul 13. PMID: [39003868](#)

**Article Published Date** : Sep 01, 2024

**Authors** : Zeynab Ghaemi, Masoud Noshadi

**Study Type** : Human Study

### Additional Links

**Diseases** : Bone Fractures : CK(697) : AC(121), Fluorosis : CK(262) : AC(42)

**Problem Substances** : Fluoride : CK(1815) : AC(454)

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## Exposure to high levels of fluoride may adversely influence children's intelligence development.

**Pubmed Data** : Zhongguo Dang Dai Er Ke Za Zhi. 2008 Dec;10(6):723-5. PMID: [19102839](#)

**Article Published Date** : Dec 01, 2008

**Authors** : Ming Liu, Cong Qian

**Study Type** : Meta Analysis

### Additional Links

**Diseases** : Childhood Cognitive Disorders : CK(316) : AC(27), Cognitive Decline/Dysfunction : CK(5061) : AC(1005), Fluoride Toxicity : CK(1389) : AC(376), Fluorosis : CK(262) : AC(42), Intelligence Quotient (IQ): Low/Impaired : CK(312) : AC(27), Prenatal Nutrition: Learning/Intelligence of Offspring : CK(116) : AC(14)

**Problem Substances** : Fluoride : CK(1815) : AC(454)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Exposure to high-fluoride resulted in lower body weight and exercise capacity in mice.

**Pubmed Data** : Sci Rep. 2018 Feb 16 ;8(1):3211. Epub 2018 Feb 16. PMID: [29453343](#)

**Article Published Date** : Feb 15, 2018

**Authors** : Sandra L Amaral, Liane B Azevedo, Marilia A R Buzalaf, Mayara F Fabricio, Mileni S Fernandes, Ruth A Valentine, Anne Maguire, Fatemeh V Zohoori

**Study Type** : Animal Study

### Additional Links

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Fluorosis : CK(262) : AC(42)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Fluoride concentration in ground water and prevalence of dental fluorosis in Ethiopian Rift Valley.

**Pubmed Data** : BMC Public Health. 2019 Oct 16 ;19(1):1298. Epub 2019 Oct 16. PMID: [31619212](#)

**Article Published Date** : Oct 15, 2019

**Authors** : Habtamu Demelash, Abebe Beyene, Zewdu Abebe, Addisu Melese

**Study Type** : Meta Analysis, Review

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Fluorosis](#) : CK(262) : AC(42)

**Additional Keywords** : [Water Fluoridation](#) : CK(34) : AC(5)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Fluoride exposure provokes mitochondria-mediated apoptosis and increases mitophagy in osteocytes.

**Pubmed Data** : Biol Trace Elem Res. 2023 Aug ;201(8):3994-4007. Epub 2022 Oct 18. PMID: [36255553](#)

**Article Published Date** : Jul 31, 2023

**Authors** : Yun Zhang, Fanhe Dong, Zihan Wang, Bingbing Xu, Tao Zhang, Qiqi Wang, Qiao Lin

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Fluorosis](#) : CK(262) : AC(42), [Oxidative Stress](#) : CK(13443) : AC(5499)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Apoptotic](#) : CK(278) : AC(120)

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## Fluoride in drinking water and skeletal fluorosis: a review of the global impact.

**Pubmed Data** : Curr Environ Health Rep. 2020 Jun ;7(2):140-146. PMID: [32207100](#)

**Article Published Date** : May 31, 2020

**Authors** : Sakshi Srivastava, S J S Flora

**Study Type** : Review

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Fluorosis](#) : CK(262) : AC(42)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Fluoride induces apoptosis in H9c2 cardiomyocytes.

**Pubmed Data** : Chemosphere. 2017 May 1 ;182:159-165. Epub 2017 May 1. PMID: [28494360](#)

**Article Published Date** : Apr 30, 2017

**Authors** : Xiaoyan Yan, Lu Wang, Xia Yang, Yulan Qiu, Xiaolin Tian, Yi Lv, Fengjie Tian, Guohua Song, Tong Wang

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : [Fluorosis](#) : CK(262) : AC(42)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Cardiotoxic](#) : CK(1168) : AC(209)

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## Fluorosilicic acid and cotinine, separately and in combination, induce genotoxicity and telomeric reduction in human osteoblast cell line MG63.

**Pubmed Data** : Mutat Res Genet Toxicol Environ Mutagen. 2022 ;876-877:503474. Epub 2022 Feb 17. PMID: [35483789](#)

**Article Published Date** : Dec 31, 2021

**Authors** : Ana L H Garcia, Cristina A Matzenbacher, Solange Soares, Paula Rohr, Juliana da Silva

**Study Type** : Human In Vitro

**Additional Links**

**Diseases** : [DNA damage](#) : CK(2255) : AC(824), [Fluoride Toxicity](#) : CK(1389) : AC(376), [Fluorosis](#) : CK(262) : AC(42)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Fluorosis is associated with impaired cognition in children.

**Pubmed Data** : Ann Indian Acad Neurol. 2021 ;24(5):715-720. Epub 2020 Nov 6. PMID: [35002129](#)

**Article Published Date** : Dec 31, 2020

**Authors** : Anjana Prabhakar, Kabeer Abdulkhayarkutty, Shaji Velayudhan Cheruvallil, Prasanth Sudhakaran

**Study Type** : Human Study

**Additional Links**

**Diseases** : Childhood Cognitive Disorders : CK(316) : AC(27), Fluoride Toxicity : CK(1389) : AC(376), Fluorosis : CK(262) : AC(42)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Gastrodin alleviates bone damage by modulating protein expression and tissue redox state.

**Pubmed Data** : FEBS Open Bio. 2020 11 ;10(11):2404-2416. Epub 2020 Oct 21. PMID: [33010109](#)

**Article Published Date** : Jan 10, 2020

**Authors** : Bowen Zheng, Chunling Shi, Fenik K Muhammed, Jia He, Adil O Abdullah, Yi Liu

**Study Type** : Animal Study

**Additional Links**

**Substances** : Gastrodin : CK(253) : AC(129)

**Diseases** : Fluorosis : CK(262) : AC(42)

**Pharmacological Actions** : Antioxidants : CK(32218) : AC(14161), Osteoprotective : CK(2007) : AC(674)

**Problem Substances** : Fluoride : CK(1815) : AC(454)

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## Health effects of groundwater fluoride contamination.

**Pubmed Data** : Clin Toxicol (Phila). 2009 Apr ;47(4):292-5. PMID: [19274500](#)

**Article Published Date** : Mar 31, 2009

**Authors** : Bishwajit Nayak, Madan Mohan Roy, Bhaskar Das, Arup Pal, Mrinal Kumar Sengupta, Shankar Prasad De, Dipankar Chakraborti

**Study Type** : Human Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Fluorosis : CK(262) : AC(42)

**Problem Substances** : Fluorosis : CK(262) : AC(42), Sodium Fluoride : CK(1446) : AC(393)

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## Health impact of supplying safe drinking water containing fluoride below permissible level on fluorosis patients in a fluoride-endemic rural area of West Bengal.

**Pubmed Data** : Indian J Public Health. 2011 ;55(4):303-8. PMID: [22298140](#)

**Article Published Date** : Dec 31, 2010

**Authors** : Kunal Kanti Majumdar

**Study Type** : Human Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Fluorosis : CK(262) : AC(42)

**Additional Keywords** : Water Fluoridation : CK(34) : AC(5)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## High prevalence of dental fluorosis among schoolchildren in three villages in Sri Lanka.

**Pubmed Data** : Ceylon Med J. 2017 12 26 ;62(4):218-221. PMID: [29390597](#)

**Article Published Date** : Jan 25, 2017

**Authors** : P S Rajapakse, W M Jayawardhane, A Lokubandara, R Gamage, A P Dasanayake, C Goonaratna

**Study Type** : Human Study

#### Additional Links

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Fluorosis : CK(262) : AC(42)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Infant formula consumption may be associated with an increased risk of developing at least some detectable level of enamel fluorosis.

**Pubmed Data** : Evid Based Dent. 2009;10(3):73. PMID: [19820737](#)

**Article Published Date** : Jan 01, 2009

**Authors** : Maura Edwards

**Study Type** : Meta Analysis

#### Additional Links

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Fluorosis : CK(262) : AC(42)

**Problem Substances** : Fluoride : CK(1815) : AC(454), Infant Formula : CK(659) : AC(97)

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## Infants fully formula-fed on formulae prepared with optimally fluoridated water (0.7-1.0 mg/L) have a high probability of exceeding the upper limit for fluoride and are at increased risk of dental fluorosis.

**Pubmed Data** : J Public Health Dent. 2010 Jun 2. Epub 2010 Jun 2. PMID: [20545827](#)

**Article Published Date** : Jun 02, 2010

**Authors** : Peter Cressey

**Study Type** : Human Study

#### Additional Links

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Fluorosis : CK(262) : AC(42)

**Problem Substances** : Fluoride : CK(1815) : AC(454), Infant Formula : CK(659) : AC(97), Public Drinking Water : CK(49) : AC(16)

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## Lycopene significantly combated sodium fluoride induced ameloblasts apoptosis and dental fluorosis.

**Pubmed Data** : Chem Biol Interact. 2016 Nov 18 ;261:27-34. Epub 2016 Nov 18. PMID: [27871895](#)

**Article Published Date** : Nov 17, 2016

**Authors** : Weishan Li, Binghua Jiang, Xianglin Cao, Yongjiang Xie, Ting Huang

**Study Type** : Animal Study

#### Additional Links

**Substances** : Lycopene : CK(1265) : AC(371)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Fluorosis : CK(262) : AC(42)

**Pharmacological Actions** : Anti-Apoptotic : CK(4942) : AC(3051), Antioxidants : CK(32218) : AC(14161), Superoxide Dismutase Up-regulation : CK(2327) : AC(896)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Neuroprotective effect by naringin against fluorosis-induced neurodegeneration.

**Pubmed Data** : Neuroreport. 2023 Jun 7 ;34(9):449-456. Epub 2023 Apr 28. PMID: [37161984](#)

**Article Published Date** : Jun 06, 2023

**Authors** : Ravindra Shantakumar Swamy, Naveen Kumar, Smita Shenoy, Sri Pragnya Cheruku, Vanishree Rao, Nitesh Kumar, Sachindra Kumar, Velayutham Ravichandiran

**Study Type** : Animal Study

#### Additional Links

**Substances** : Citrus naringin : CK(440) : AC(245)

**Diseases** : Fluorosis : CK(262) : AC(42)

**Pharmacological Actions** : Neuroprotective Agents : CK(17667) : AC(7641)

**Problem Substances** : Fluoride : CK(1815) : AC(454)

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## Potential risk of dental fluorosis associated with different baby formulas and water brands marketed in Spain.

**Pubmed Data** : J Clin Pediatr Dent. 2024 Jan ;48(1):111-119. Epub 2024 Jan 3. PMID: [38239163](#)

**Article Published Date** : Dec 31, 2023

**Authors** : Sandra M Gallego-Reyes, Jaime A Cury, Amparo Pérez-Silva, Clara Serna-Muñoz, Iciar Fernández-Pizarro, Yolanda Martínez-Beneyto, Antonio J Ortiz-Ruiz

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Fluorosis](#) : CK(262) : AC(42)

**Problem Substances** : [Infant Formula](#) : CK(659) : AC(97), [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Reversal of fluorosis in children with ascorbic acid, calcium and vitamin D3.

**Pubmed Data** : Acta Paediatr Jpn. 1996 Oct ;38(5):513-9. PMID: [8942013](#)

**Article Published Date** : Sep 30, 1996

**Authors** : S K Gupta, R C Gupta, A K Seth, A Gupta

**Study Type** : Human Study

**Additional Links**

**Substances** : [Calcium](#) : CK(444) : AC(68), [Vitamin C](#) : CK(6030) : AC(1400), [Vitamin D](#) : CK(11555) : AC(1679)

**Diseases** : [Fluorosis](#) : CK(262) : AC(42)

**Pharmacological Actions** : [Detoxifier](#) : CK(853) : AC(252)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Role of fluoride induced histone trimethylation in development of skeletal fluorosis.

**Pubmed Data** : Environ Toxicol Pharmacol. 2018 Jan ;57:159-165. Epub 2017 Dec 17. PMID: [29275289](#)

**Article Published Date** : Dec 31, 2017

**Authors** : Atul P Daiwile, Saravanadevi Sivanesan, Prashant Tarale, Pravin K Naoghare, Amit Bafana, Devendra Parmar, Krishnamurthi Kannan

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Fluorosis](#) : CK(262) : AC(42)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Sodium fluoride exposure induces developmental toxicity and cardiotoxicity in zebrafish embryos.

**Pubmed Data** : Biol Trace Elem Res. 2024 Sep 17. Epub 2024 Sep 17. PMID: [39287768](#)

**Article Published Date** : Sep 16, 2024

**Authors** : Feiqing Wang, Fa Chen, Wen Song, Yanju Li, Haiyan Wu, Tingting Tian, Mengxian Tian, Dongxin Tang, Yang Liu

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Fluorosis](#) : CK(262) : AC(42)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Cardiotoxic](#) : CK(1168) : AC(209)

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## Sodium fluoride induces apoptosis in the kidney of rats through caspase-mediated pathways and DNA damage.

**Pubmed Data** : J Physiol Biochem. 2014 Sep ;70(3):857-68. Epub 2014 Aug 27. PMID: [25158646](#)

**Article Published Date** : Aug 31, 2014

**Authors** : Guo Hua Song, Ji Ping Gao, Chun Fang Wang, Chao Yang Chen, Xiao Yan Yan, Min Guo, Yu Wang, Fu Bing

Huang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : DNA damage : CK(2255) : AC(824), Fluoride Toxicity : CK(1389) : AC(376), Fluorosis : CK(262) : AC(42), Kidney Damage: Chemically-Induced : CK(542) : AC(270)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Apoptotic : CK(278) : AC(120), Renotoxic : CK(56) : AC(20)

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## The effect of vitamin E and selenium combination in repairing fluoride-induced DNA damage to NRK-52E cells.

**Pubmed Data** : Mol Biol Rep. 2020 Oct ;47(10):7761-7770. Epub 2020 Oct 6. PMID: [33025505](#)

**Article Published Date** : Sep 30, 2020

**Authors** : Veysel Yüksek, Sedat Çetin, Ayşe Usta

**Study Type** : In Vitro Study

**Additional Links**

**Substances** : Selenium : CK(1706) : AC(389), Vitamin E : CK(3039) : AC(570)

**Diseases** : DNA damage : CK(2255) : AC(824), Fluoride Toxicity : CK(1389) : AC(376), Fluorosis : CK(262) : AC(42)

**Pharmacological Actions** : DNA Repair Up-regulation : CK(110) : AC(34), Genoprotective : CK(522) : AC(203)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## The use of fluoride supplements during the first 6 years of life is associated with a significant increase in the risk of developing dental fluorosis.

**Pubmed Data** : Community Dent Oral Epidemiol. 1999 Feb ;27(1):48-56. PMID: [10086926](#)

**Article Published Date** : Jan 31, 1999

**Authors** : A I Ismail, R R Bandekar

**Study Type** : Meta Analysis

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Fluorosis : CK(262) : AC(42)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## This study has provided new evidence for the role of FGF21/ERK in fluoride-induced skeletal muscle damage.

**Pubmed Data** : Ecotoxicol Environ Saf. 2023 Mar 1 ;252:114626. Epub 2023 Feb 8. PMID: [36764073](#)

**Article Published Date** : Feb 28, 2023

**Authors** : Lan Ma, Chengmei Zhang, Yu Gui, Tingling Zou, Shuhua Xi, Xiaoying Guo

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Fluorosis : CK(262) : AC(42), Muscle Damage : CK(258) : AC(83)

**Problem Substances** : Fluoride : CK(1815) : AC(454), Sodium Fluoride : CK(1446) : AC(393)

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## Water fluoridation less effective now than in past.

**Pubmed Data** : Cochrane Database Syst Rev. 2024 Oct 4 ;10(10):CD010856. Epub 2024 Oct 4. PMID: [39362658](#)

**Article Published Date** : Oct 03, 2024

**Authors** : Zipporah Ihezor-Ejiofor, Tanya Walsh, Sharon R Lewis, Philip Riley, Dwayne Boyers, Janet E Clarkson, Helen V Worthington, Anne-Marie Glenny, Lucy O'Malley

**Study Type** : Meta Analysis

**Additional Links**

**Diseases** : Dental Caries : CK(700) : AC(127), Fluorosis : CK(262) : AC(42)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Fractures: Bone (AC 1) (CK 1)

### High fluoride ingestion impairs bone fracture healing.

**Pubmed Data** : Front Bioeng Biotechnol. 2022 ;10:791433. Epub 2022 May 20. PMID: [35669059](#)

**Article Published Date** : Dec 31, 2021

**Authors** : Chengcheng Du, Pengcheng Xiao, Shengqiang Gao, Shengwen Chen, Bowen Chen, Wei Huang, Chen Zhao

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Fractures: Bone : CK(255) : AC(34)

**Additional Keywords** : Increased Risk : CK(8492) : AC(1109)

**Problem Substances** : Fluoride : CK(1815) : AC(454), Sodium Fluoride : CK(1446) : AC(393)

## Gastrointestinal Inflammation (AC 1) (CK 2)

### Th17-related cytokines involved in fluoride-induced cecal and rectal barrier damage.

**Pubmed Data** : Biol Trace Elem Res. 2023 Sep ;201(9):4497-4507. Epub 2022 Dec 20. PMID: [36538210](#)

**Article Published Date** : Aug 31, 2023

**Authors** : Xiao-Ying Gao, Ye Jin, Jing Zhao, Yu-Ling Zhang, Hong-Wei Wang, Bian-Hua Zhou

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Gastrointestinal Inflammation : CK(324) : AC(153)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

## Gingivitis (AC 3) (CK 21)

### Green tea showed greater reduction of gingival inflammation and improved periodontal parameters than fluoride-triclosan dentifrice.

**Pubmed Data** : Int J Dent Hyg. 2015 Feb 17. Epub 2015 Feb 17. PMID: [25690541](#)

**Article Published Date** : Feb 16, 2015

**Authors** : Ts Hrishi, Pp Kundapur, A Naha, Bs Thomas, S Kamath, Gs Bhat

**Study Type** : Human Study

**Additional Links**

**Substances** : Green Tea : CK(4441) : AC(1370)

**Diseases** : Gingivitis : CK(595) : AC(86), Inflammation : CK(15536) : AC(5279), Periodontitis : CK(1081) : AC(266)

**Pharmacological Actions** : Anti-Inflammatory Agents : CK(35225) : AC(15297), Antioxidants : CK(32218) : AC(14161)

**Problem Substances** : Fluoride : CK(1815) : AC(454)

### Sodium fluoride causes oxidative stress and apoptosis in



## cementoblasts.

**Pubmed Data** : Chem Biol Interact. 2018 Aug 18 ;294:34-39. Epub 2018 Aug 18. PMID: [30130527](#)

**Article Published Date** : Aug 17, 2018

**Authors** : Jing Ni, Yiming Li, Wu Zhang, Rong Shu, Zhe Zhong

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Gingivitis : CK(595) : AC(86)

**Additional Keywords** : Risk Factors : CK(14728) : AC(2072)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Apoptotic : CK(278) : AC(120), Oxidant : CK(646) : AC(246)

## The effectiveness of 0.5% C. sinensis extract was more compared to 0.05% sodium fluoride and 0.2% chlorhexidine gluconate mouth rinses.

**Pubmed Data** : J Int Soc Prev Community Dent. 2015 May-Jun;5(3):218-26. PMID: [26236682](#)

**Article Published Date** : Apr 30, 2015

**Authors** : Chaitali U Hambire, Rashmi Jawade, Amol Patil, Vaibhav R Wani, Ankur A Kulkarni, Parag B Nehete

**Study Type** : Human Study

**Additional Links**

**Substances** : Green Tea : CK(4441) : AC(1370)

**Diseases** : Dental Caries : CK(700) : AC(127), Dental Caries: Children : CK(174) : AC(20), Dental Plaque : CK(355) : AC(42), Gingivitis : CK(595) : AC(86)

**Pharmacological Actions** : Anti-Bacterial Agents : CK(4114) : AC(1943)

**Additional Keywords** : Natural Substances Versus Drugs : CK(2773) : AC(556), Superiority of Natural Substances versus Drugs : CK(1855) : AC(392)

**Problem Substances** : Chlorhexidine gluconate : CK(52) : AC(7), Sodium Fluoride : CK(1446) : AC(393)

## Goiter: Exophthalmic (AC 1) (CK 21)

### Exposure to high-fluoride drinking water appears to non-linearly affect thyroid function and increase TSH release in children.

**Pubmed Data** : Environ Res. 2024 Feb 1 ;242:117759. Epub 2023 Nov 28. PMID: [38029816](#)

**Article Published Date** : Jan 31, 2024

**Authors** : Inga Iamandii, Lisa De Pasquale, Maria Edvige Giannone, Federica Veneri, Luigi Generali, Ugo Consolo, Linda S Birnbaum, Jacqueline Castenmiller, Thorhallur I Halldorsson, Tommaso Filippini, Marco Vinceti

**Study Type** : Meta Analysis, Review

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Goiter: Exophthalmic : CK(32) : AC(3), Hypothyroidism : CK(847) : AC(148), Thyroid Dysfunction : CK(86) : AC(13)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

## Hair Loss (AC 1) (CK 1)

### Sodium fluoride exposure compromises hair follicle growth and

## accelerates programmed cell death.

**Pubmed Data** : Biol Trace Elem Res. 2010 Jan 5. Epub 2010 Jan 5. PMID: [20049553](#)

**Article Published Date** : Jan 05, 2010

**Authors** : Zheng-hui Wang, Xiao-li Li, Zhuang-qun Yang, Min Xu

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : [Hair Loss](#) : CK(763) : AC(143), [Hair Quality Problems](#) : CK(32) : AC(5)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Apoptotic](#) : CK(278) : AC(120), [Oxidant](#) : CK(646) : AC(246)

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## Hair Quality Problems (AC 1) (CK 1)

### Sodium fluoride exposure compromises hair follicle growth and accelerates programmed cell death.

**Pubmed Data** : Biol Trace Elem Res. 2010 Jan 5. Epub 2010 Jan 5. PMID: [20049553](#)

**Article Published Date** : Jan 05, 2010

**Authors** : Zheng-hui Wang, Xiao-li Li, Zhuang-qun Yang, Min Xu

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : [Hair Loss](#) : CK(763) : AC(143), [Hair Quality Problems](#) : CK(32) : AC(5)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Apoptotic](#) : CK(278) : AC(120), [Oxidant](#) : CK(646) : AC(246)

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## Heart Failure (AC 1) (CK 2)

### These findings reveal that acute fluoride exposure causes sudden heart failure.

**Pubmed Data** : Int J Cardiol. 2017 Feb 15 ;229:96-101. Epub 2016 Nov 9. PMID: [27863940](#)

**Article Published Date** : Feb 14, 2017

**Authors** : Lakshmikanthan Panneerselvam, Azhwar Raghunath, Ekambaram Perumal

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Heart Failure](#) : CK(1884) : AC(327)

**Problem Substances** : [Fluoride](#) : CK(1815) : AC(454), [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Cardiotoxic](#) : CK(1168) : AC(209)

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## Heavy Metal Toxicity (AC 2) (CK 3)

## Pharmacological implications of ipriflavone against environmental metal-induced neurodegeneration and dementia.

**Pubmed Data** : Environ Sci Pollut Res Int. 2021 Jul 7. Epub 2021 Jul 7. PMID: [34235690](#)

**Article Published Date** : Jul 06, 2021

**Authors** : Hend M Hussien, Doaa A Ghareeb, Hany E A Ahmed, Hani S Hafez, Samar R Saleh

**Study Type** : Animal Study

**Additional Links**

**Substances** : Ipriflavone : CK(49) : AC(14)

**Diseases** : Dementia : CK(2180) : AC(375), Heavy Metal Toxicity : CK(2713) : AC(1019)

**Pharmacological Actions** : Neuroprotective Agents : CK(17667) : AC(7641)

**Problem Substances** : Aluminum : CK(1061) : AC(349), Cadmium : CK(562) : AC(265), Fluoride : CK(1815) : AC(454)

## This study suggests that excitotoxicity may be the central mechanism of autism spectrum disorders and that excitotoxins like aluminum, fluoride, and mercury may exacerbate excitotoxicity.

**Pubmed Data** : Curr Med Chem. 2009 ;16(2):157-70. PMID: [19149568](#)

**Article Published Date** : Jan 01, 2009

**Authors** : R L Blaylock, A Strunecka

**Study Type** : Review

**Additional Links**

**Diseases** : Autism : CK(942) : AC(162), Autism Spectrum Disorders : CK(3676) : AC(557), Brain: Microglial Activation : CK(192) : AC(114), Heavy Metal Toxicity : CK(2713) : AC(1019)

**Additional Keywords** : Heavy Metals and Autism : CK(89) : AC(15), Vaccine Research : CK(571) : AC(113)

**Problem Substances** : Aluminum : CK(1061) : AC(349), Fluoride : CK(1815) : AC(454), Mercury : CK(885) : AC(213)

**Adverse Pharmacological Actions** : Excitotoxic : CK(40) : AC(10), Neurotoxic : CK(2838) : AC(702)

## Hip Dysplasia: Congenital (AC 1) (CK 3)

### Fluoride increases the susceptibility of developmental dysplasia of the hip.

**Pubmed Data** : Ecotoxicol Environ Saf. 2022 Apr 1 ;234:113408. Epub 2022 Mar 14. PMID: [35298972](#)

**Article Published Date** : Mar 31, 2022

**Authors** : Weizheng Zhou, Wenting Luo, Dan Liu, Federico Canavese, Lianyong Li, Qun Zhao

**Study Type** : Animal Study, In Vitro Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Hip Dysplasia: Congenital : CK(3) : AC(1), Oxidative Stress : CK(13443) : AC(5499)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

## Hormone Insufficiency (AC 1) (CK 2)

### Sodium fluoride during gestation and lactation affects male

## reproduction in adult rats by decreasing spermatogenesis and steroidogenesis.

**Pubmed Data** : Naturwissenschaften. 2007 Jul;94(7):607-11. Epub 2007 Feb 22. PMID: [17318612](#)

**Article Published Date** : Jul 01, 2007

**Authors** : P Sreedhar Reddy, T Pushpalatha, P Sreenivasula Reddy

**Study Type** : Animal Study

### Additional Links

**Diseases** : Breastfeeding Concerns: Chemical Exposure : CK(123) : AC(19), Hormone Insufficiency : CK(30) : AC(8), Infertility: Male : CK(1668) : AC(424), Prenatal Chemical Exposures : CK(2428) : AC(530)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Endocrine Disruptor : CK(529) : AC(106)

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## Huntington Disease (AC 1) (CK 2)

### Sodium flouride exposure during pregnancy may interfere with normal development and increase the risk of neurological and psychiatric disorders in adulthood.

**Pubmed Data** : Eur Rev Med Pharmacol Sci. 2010 Jun;14(6):507-12. PMID: [20712257](#)

**Article Published Date** : Jun 01, 2010

**Authors** : P Flace, V Benagiano, D Vermesan, R Sabatini, A M Inchingolo, A Inchingolo, P Auteri, G Ambrosi, A Tarullo, R Cagiano

**Study Type** : Animal Study

### Additional Links

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Huntington Disease : CK(222) : AC(103), Obsessive-Compulsive Disorder : CK(421) : AC(77), Prenatal Chemical Exposures : CK(2428) : AC(530), Schizophrenia : CK(1080) : AC(191), Tourette Syndrome : CK(207) : AC(30)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Genotoxic : CK(545) : AC(184), Teratogenic : CK(325) : AC(66)

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## Hypercalcemia (AC 1) (CK 2)

### Sodium fluoride influences calcium metabolism via osteoclastic activation in goldfish.

**Pubmed Data** : Comp Biochem Physiol C Toxicol Pharmacol. 2016 Jul 27. Epub 2016 Jul 27. PMID: [27475026](#)

**Article Published Date** : Jul 26, 2016

**Authors** : Masayuki Sato, Taizo Hanmoto, Koji Yachiguchi, Yoshiaki Tabuchi, Takashi Kondo, Masato Endo, Yoichiro Kitani, Toshio Sekiguchi, Makoto Urata, Tran Ngoc Hai, Ajai K Srivastav, Hiroyuki Mishima, Atsuhiko Hattori, Nobuo Suzuki

**Study Type** : Animal Study

### Additional Links

**Diseases** : Hypercalcemia : CK(17) : AC(5)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Hyperglycemia (AC 1) (CK 2)

**Fruits of *A. carambola* are useful as a dietary supplement in regulation of fluoride induced hyperglycemia, hyperlipemia and oxidative stress.**

**Pubmed Data** : Interdiscip Toxicol. 2014 Jun ;7(2):103-10. Epub 2014 Nov 15. PMID: [26109886](#)

**Article Published Date** : May 31, 2014

**Authors** : Rupal A Vasant, A V R L Narasimhacharya

**Study Type** : Animal Study

**Additional Links**

**Substances** : Star Fruit : CK(17) : AC(5)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Hyperglycemia : CK(2107) : AC(692), Hyperlipidemia : CK(2133) : AC(550), Oxidative Stress : CK(13443) : AC(5499)

**Pharmacological Actions** : Antioxidants : CK(32218) : AC(14161), Hypoglycemic Agents : CK(8194) : AC(2019), Hypolipidemic : CK(8317) : AC(1985)

**Additional Keywords** : Supplementation : CK(413) : AC(60)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

## Hyperlipidemia (AC 1) (CK 2)

**Fruits of *A. carambola* are useful as a dietary supplement in regulation of fluoride induced hyperglycemia, hyperlipemia and oxidative stress.**

**Pubmed Data** : Interdiscip Toxicol. 2014 Jun ;7(2):103-10. Epub 2014 Nov 15. PMID: [26109886](#)

**Article Published Date** : May 31, 2014

**Authors** : Rupal A Vasant, A V R L Narasimhacharya

**Study Type** : Animal Study

**Additional Links**

**Substances** : Star Fruit : CK(17) : AC(5)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Hyperglycemia : CK(2107) : AC(692), Hyperlipidemia : CK(2133) : AC(550), Oxidative Stress : CK(13443) : AC(5499)

**Pharmacological Actions** : Antioxidants : CK(32218) : AC(14161), Hypoglycemic Agents : CK(8194) : AC(2019), Hypolipidemic : CK(8317) : AC(1985)

**Additional Keywords** : Supplementation : CK(413) : AC(60)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

## Hypertension (AC 4) (CK 17)

**Elevated serum fluoride levels in perimenopausal women are related to the components of metabolic syndrome.**

**Pubmed Data** : Eur Rev Med Pharmacol Sci. 2021 Sep ;25(17):5474-5482. PMID: [34533791](#)

**Article Published Date** : Aug 31, 2021

**Authors** : D Schneider-Matyka, I Gutowska, M Panczyk, E Grochans, M Szkup

**Study Type** : Human Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Hypertension](#) : CK(8603) : AC(1329), [Metabolic Diseases](#) : CK(1252) : AC(263)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Fluoride exposure has been implicated as a potential risk factor for hypertension.

**Pubmed Data** : Cell Immunol. 1975 Oct ;19(2):194-200. PMID: [S0147-6513\(24\)00757-7](#)

**Article Published Date** : Oct 01, 1975

**Authors** : J L Theodor, R Senelar

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Hypertension](#) : CK(8603) : AC(1329)

**Problem Substances** : [Fluoride](#) : CK(1815) : AC(454)

**Adverse Pharmacological Actions** : [Hypertensive](#) : CK(266) : AC(30)

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## Luteolin-mediated Kim-1/NF-kB/Nrf2 signaling pathways protects sodium fluoride-induced hypertension and cardiovascular complications.

**Pubmed Data** : Biofactors. 2018 Nov ;44(6):518-531. Epub 2018 Nov 26. PMID: [30474894](#)

**Article Published Date** : Oct 31, 2018

**Authors** : Ademola Adetokunbo Oyagbemi, Temidayo Olutayo Omobowale, Olufunke Eunice Ola-Davies, Egunoluwa Racheal Asenuga, Temitayo Olabisi Ajibade, Olumuyiwa Abiola Adejumobi, Jeremiah Moyinoluwa Afolabi, Blessing Seun Ogunpolu, Olufunke Olubunmi Falayi, Adebowale Bernard Saba, Adeolu Alex Adedapo, Momoh Audu Yakubu

**Study Type** : Animal Study

**Additional Links**

**Substances** : [Luteolin](#) : CK(707) : AC(390)

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Hypertension](#) : CK(8603) : AC(1329), [Oxidative Stress](#) : CK(13443) : AC(5499)

**Pharmacological Actions** : [Antihypertensive Agents](#) : CK(6936) : AC(1007), [Malondialdehyde Down-regulation](#) : CK(2826) : AC(965), [Nrf2 activation](#) : CK(2908) : AC(1762), [Superoxide Dismutase Up-regulation](#) : CK(2327) : AC(896)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## These results provide new insights into the mechanism of fluoride-induced hypertension.

**Pubmed Data** : Ecotoxicol Environ Saf. 2024 Aug ;281:116681. Epub 2024 Jul 4. PMID: [38964063](#)

**Article Published Date** : Jul 31, 2024

**Authors** : Wenjing Yang, Chunqing Lu, Fang Chu, Keming Bu, Hao Ma, Qiaoyu Wang, Zhe Jiao, Sheng Wang, Xiyue Yang, Yanhui Gao, Dianjun Sun, Hongna Sun

**Study Type** : Animal Study, In Vitro Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Hypertension](#) : CK(8603) : AC(1329)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Hypothyroidism (AC 6) (CK 47)

Due to the ability of fluoride to inhibit the production of thyroid

## hormones, a transition to low exposure may result in hyperthyroidism associated psychosis.

**Pubmed Data** : Med Hypotheses. 2009 May;72(5):501-3. Epub 2009 Feb 7. PMID: [19201548](#)

**Article Published Date** : May 01, 2009

**Authors** : Karl Erik Zachariassen, Trond Peder Flaten

**Study Type** : Review

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Hypothyroidism : CK(847) : AC(148)

**Problem Substances** : Fluoride : CK(1815) : AC(454)

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## Exposure to high-fluoride drinking water appears to non-linearly affect thyroid function and increase TSH release in children.

**Pubmed Data** : Environ Res. 2024 Feb 1 ;242:117759. Epub 2023 Nov 28. PMID: [38029816](#)

**Article Published Date** : Jan 31, 2024

**Authors** : Inga Iamandii, Lisa De Pasquale, Maria Edvige Giannone, Federica Veneri, Luigi Generali, Ugo Consolo, Linda S Birnbaum, Jacqueline Castenmiller, Thorhallur I Halldorsson, Tommaso Filippini, Marco Vinceti

**Study Type** : Meta Analysis, Review

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Goiter: Exophthalmic : CK(32) : AC(3), Hypothyroidism : CK(847) : AC(148), Thyroid Dysfunction : CK(86) : AC(13)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Fluoride exposure and indicators of thyroid functioning in the Canadian population.

**Pubmed Data** : J Epidemiol Community Health. 2017 Oct ;71(10):1019-1025. Epub 2017 Aug 24. PMID: [28839078](#)

**Article Published Date** : Sep 30, 2017

**Authors** : Amanda M Barberio, F Shaun Hosein, Carlos Quiñonez, Lindsay McLaren

**Study Type** : Human Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Hypothyroidism : CK(847) : AC(148)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Fluoride has impacts on TSH, T3 hormones even in the standard concentration of less than 0.5 mg/L.

**Pubmed Data** : Sci Rep. 2018 Feb 8 ;8(1):2674. Epub 2018 Feb 8. PMID: [29422493](#)

**Article Published Date** : Feb 07, 2018

**Authors** : Zohreh Kheradpisheh, Masoud Mirzaei, Amir Hossein Mahvi, Mehdi Mokhtari, Reyhane Azizi, Hossein Fallahzadeh, Mohammad Hassan Ehrampoush

**Study Type** : Human: Case Report

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Hypothyroidism : CK(847) : AC(148)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Fluoride in drinking water was associated with increased risk of hypothyroidism in pregnant women.

**Pubmed Data** : Sci Total Environ. 2023 Apr 15 ;869:161149. Epub 2023 Feb 9. PMID: [36764861](#)

**Article Published Date** : Apr 14, 2023

**Authors** : Meaghan Hall, Bruce Lanphear, Jonathan Chevrier, Rick Hornung, Rivka Green, Carly Goodman, Pierre Ayotte, Esperanza Angeles Martinez-Mier, R Thomas Zoeller, Christine Till

**Study Type** : Human Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Hypothyroidism : CK(847) : AC(148)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## High fluoride exposure has multigenerational and cumulative adverse effects on thyroid status, brain health and learning memory in rats.

**Pubmed Data** : Biol Trace Elem Res. 2011 Jul 14. Epub 2011 Jul 14. PMID: [21755305](#)

**Article Published Date** : Jul 14, 2011

**Authors** : Piler Mahaboob Basha, Puja Rai, Shabana Begum

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Hypothyroidism : CK(847) : AC(148), Prenatal Chemical Exposures : CK(2428) : AC(530), Prenatal Nutrition: Learning/Intelligence of Offspring : CK(116) : AC(14)

**Problem Substances** : Fluoride : CK(1815) : AC(454)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Infertility (AC 1) (CK 2)

### Sodium fluoride epigenetically impaired mouse oocyte maturation and embryonic development.

**Pubmed Data** : Environ Sci Technol. 2014 Sep 2 ;48(17):10398-405. Epub 2014 Aug 14. PMID: [25102367](#)

**Article Published Date** : Sep 01, 2014

**Authors** : Mingzhe Fu, Xinying Wu, Jie He, Yong Zhang, Song Hua

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Infertility : CK(2481) : AC(656)

**Additional Keywords** : Dose Response : CK(1769) : AC(700), Embryonic Development : CK(3) : AC(2), Gene Expression : CK(282) : AC(104), Prenatal Epigenetic Programming : CK(66) : AC(18)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Anti-Fertility : CK(112) : AC(21)

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## Infertility: Female (AC 12) (CK 66)

### An increased risk of spontaneous abortion among fabrication workers has been linked to fluoride compound and photoresist and developed solvents (PDS) exposure.

**Pubmed Data** : Am J Ind Med. 1995 Dec ;28(6):751-69. PMID: [8588562](#)

**Article Published Date** : Dec 01, 1995

**Authors** : S H Swan, J J Beaumont, S K Hammond, J VonBehren, R S Green, M F Hallock, S R Woskie, C J Hines, M B Schenker

**Study Type** : Human Study

**Additional Links**

**Diseases** : Abortion: Spontaneous : CK(325) : AC(42), Infertility: Female : CK(741) : AC(180)



**Problem Substances** : Fluoride : CK(1815) : AC(454), Photoresist and developed solvents (PDS) : CK(10) : AC(1)  
**Adverse Pharmacological Actions** : Abortive : CK(57) : AC(9), Anti-Fertility : CK(112) : AC(21)

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## Effect of sodium fluoride on reproductive function through regulating reproductive hormone level.

**Pubmed Data** : Biol Trace Elem Res. 2023 Apr ;201(4):1825-1836. Epub 2022 May 10. PMID: [35538195](#)

**Article Published Date** : Mar 31, 2023

**Authors** : Siyuan Dong, Yanni Yang, Biqi He, Zhao Xu, Zhaoqiang Zhou, Jinhai Wang, Chen Chen, Qun Chen

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Infertility: Female : CK(741) : AC(180)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Effects of fluoride toxicity on female reproductive system of mammals.

**Pubmed Data** : Biol Trace Elem Res. 2024 May 6. Epub 2024 May 6. PMID: [38709367](#)

**Article Published Date** : May 05, 2024

**Authors** : Aditi Fishta, Ruhi Thakur, Krishan Chander Sharma, Neha Thakur, Bhavna Patial

**Study Type** : Meta Analysis

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Infertility: Female : CK(741) : AC(180)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Exposure to high fluoride concentrations in drinking water is associated with decreased birth rates.

**Pubmed Data** : J Toxicol Environ Health. 1994 May ;42(1):109-21. PMID: [8169995](#)

**Article Published Date** : May 01, 1994

**Authors** : S C Freni

**Study Type** : Meta Analysis

**Additional Links**

**Diseases** : Infertility: Female : CK(741) : AC(180), Infertility: Male : CK(1668) : AC(424)

**Additional Keywords** : Causes Of Decreased Birth Rates : CK(20) : AC(1)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Anti-Fertility : CK(112) : AC(21)

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## Female reproductive function is inhibited by NaF and that exposure to NaF causes ovarian and uterine structural damage.

**Pubmed Data** : Food Chem Toxicol. 2013 Feb 28. Epub 2013 Feb 28. PMID: [23459146](#)

**Article Published Date** : Feb 28, 2013

**Authors** : Yongjiang Zhou, Hailing Zhang, Junlin He, Xuemei Chen, Yubing Ding, Yingxiong Wang Xueqing Liu

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Infertility: Female : CK(741) : AC(180), Ovarian Diseases : CK(33) : AC(16), Uterine Diseases : CK(1291) : AC(335)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Anti-Fertility : CK(112) : AC(21)

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## Fertility impairment in mice on a low fluoride intake has been observed.

**Pubmed Data** : Science. 1972 Sep 8 ;177(4052):893-4. PMID: [5054644](#)

**Article Published Date** : Sep 08, 1972

**Authors** : H H Messer, W D Armstrong, L Singer

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Infertility: Female : CK(741) : AC(180)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Anti-Fertility : CK(112) : AC(21)

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## Fluoride impairs ovary development by affecting oogenesis and inducing oxidative stress and apoptosis in female zebrafish.

**Pubmed Data** : Chemosphere. 2020 Oct ;256:127105. Epub 2020 May 17. PMID: [32450357](#)

**Article Published Date** : Sep 30, 2020

**Authors** : Meiyang Li, Jinling Cao, Yangfei Zhao, Panhong Wu, Xuehua Li, Forouzan Khodaei, Yongli Han, Jundong Wang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Infertility: Female : CK(741) : AC(180), Oxidative Stress : CK(13443) : AC(5499)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Sodium fluoride activates ERK and JNK via induction of oxidative stress to promote apoptosis and impairs ovarian function in rats.

**Pubmed Data** : J Hazard Mater. 2014 May 15 ;272:75-82. Epub 2014 Mar 18. PMID: [24681588](#)

**Article Published Date** : May 14, 2014

**Authors** : Yanqing Geng, Yiwen Qiu, Xueqing Liu, Xuemei Chen, Yubin Ding, Shangjing Liu, Yi Zhao, Rufe Gao, Yingxiong Wang, Junlin He

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Infertility: Female : CK(741) : AC(180), Oxidative Stress : CK(13443) : AC(5499)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Sodium fluoride disturbs DNA methylation of NNAT and declines oocyte quality by impairing glucose transport in porcine oocytes.

**Pubmed Data** : Environ Mol Mutagen. 2017 Dec 29. Epub 2017 Dec 29. PMID: [29285797](#)

**Article Published Date** : Dec 28, 2017

**Authors** : Xiaoyan Liu, Zheng-Wen Nie, Ying-Ying Gao, Li Chen, Shu-Yuan Yin, Xia Zhang, Cuifang Hao, Yi-Liang Miao

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Infertility: Female : CK(741) : AC(180)

**Additional Keywords** : Risk Factors : CK(14728) : AC(2072)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Sodium fluoride exposure exerts toxic effects on porcine oocyte maturation.

**Pubmed Data** : Sci Rep. 2017 Dec 6 ;7(1):17082. Epub 2017 Dec 6. PMID: [29213094](#)

**Article Published Date** : Dec 05, 2017

**Authors** : Shuang Liang, Zheng-Wen Nie, Minghui Zhao, Ying-Jie Niu, Kyung-Tae Shin, Xiang-Shun Cui

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : DNA damage : CK(2255) : AC(824), Fluoride Toxicity : CK(1389) : AC(376), Infertility: Female : CK(741) : AC(180), Oxidative Stress : CK(13443) : AC(5499)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Sodium fluoride treatment impairs the subsequent embryonic developmental potential of the oocytes.

**Pubmed Data** : Environ Toxicol. 2015 May 26. Epub 2015 May 26. PMID: [26011085](#)

**Article Published Date** : May 25, 2015

**Authors** : Shuang Liang, Ming-Hui Zhao, Sun A Ock, Nam-Hyung Kim, Xiang-Shun Cui

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Infertility: Female : CK(741) : AC(180), Mitochondrial Dysfunction : CK(618) : AC(262)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Anti-Fertility : CK(112) : AC(21)

## The administration of high concentrations of fluoride to female mice results in ovarian damage and significantly reduces the number and the fertilization potential of mature oocytes.

**Pubmed Data** : PLoS One. 2015 ;10(6):e0129594. Epub 2015 Jun 8. PMID: [26053026](#)

**Article Published Date** : Dec 31, 2014

**Authors** : Songna Yin, Chao Song, Haibo Wu, Xin Chen, Yong Zhang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Female Reproductive Development Abnormalities : CK(86) : AC(31), Infertility: Female : CK(741) : AC(180)

**Additional Keywords** : Gene Expression : CK(282) : AC(104)

**Problem Substances** : Fluoride : CK(1815) : AC(454), Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Anti-Fertility : CK(112) : AC(21)

## Infertility: Male (AC 22) (CK 59)

### "Decreased in vitro fertility in male rats exposed to fluoride-induced oxidative stress damage and mitochondrial transmembrane potential loss."

**Pubmed Data** : Toxicol Appl Pharmacol. 2008 Aug 1 ;230(3):352-7. Epub 2008 Mar 28. PMID: [18455746](#)

**Article Published Date** : Aug 01, 2008

**Authors** : Jeannett A Izquierdo-Vega, Manuel Sánchez-Gutiérrez, Luz María Del Razo

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Infertility: Male : CK(1668) : AC(424), Oxidative Stress : CK(13443) : AC(5499), Sperm Quality: Low : CK(611) : AC(121)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Anti-Fertility : CK(112) : AC(21), Oxidant : CK(646) : AC(246)

## Alpha-lipoic acid plays a protective role in fluoride-induced reproductive lesion.

**Pubmed Data** : Zhonghua Yi Xue Za Zhi. 2020 Dec 15 ;100(46):3706-3711. PMID: [33342149](#)

**Article Published Date** : Dec 14, 2020

**Authors** : Y Yang, H Huang, L X Cui, F Q Li

**Study Type** : Animal Study

**Additional Links**

**Substances** : Alpha-Lipoic Acid : CK(1499) : AC(365)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Infertility: Male : CK(1668) : AC(424), Oxidative Stress : CK(13443) : AC(5499)

**Pharmacological Actions** : Anti-Apoptotic : CK(4942) : AC(3051), Antioxidants : CK(32218) : AC(14161), Malondialdehyde Down-regulation : CK(2826) : AC(965)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Combined Exposure to Fluoride and Microplastics Causes Sertoli Cell Damage and Reproductive Toxicity

**Pubmed Data** : Toxicology. 2024 Aug ;506:153849. Epub 2024 May 29. PMID: [38821197](#)

**Article Published Date** : Aug 01, 2024

**Authors** : Tan Ma, Huixian Cheng, Liang Kong, Chenghao Shen, Haibo Jin, Hongliang Li, Chun Pan, Jingyan Liang

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : Infertility: Male : CK(1668) : AC(424)

**Pharmacological Actions** : Apoptotic : CK(9052) : AC(7284)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Endocrine Disruptor: Testes : CK(56) : AC(12)

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## Dose and time-dependent effects of sodium fluoride on sperm motility.

**Pubmed Data** : Toxicol Ind Health. 2018 Dec ;34(12):813-818. Epub 2018 Oct 25. PMID: [30360691](#)

**Article Published Date** : Nov 30, 2018

**Authors** : Basavalingappa Chaithra, Halugudde Nagaraja Sarjan, Shivabasavaiah

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Infertility: Male : CK(1668) : AC(424), Sperm Quality: Low : CK(611) : AC(121)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Exposure to high fluoride concentrations in drinking water is associated with decreased birth rates.

**Pubmed Data** : J Toxicol Environ Health. 1994 May ;42(1):109-21. PMID: [8169995](#)

**Article Published Date** : May 01, 1994

**Authors** : S C Freni

**Study Type** : Meta Analysis

**Additional Links**

**Diseases** : Infertility: Female : CK(741) : AC(180), Infertility: Male : CK(1668) : AC(424)

**Additional Keywords** : Causes Of Decreased Birth Rates : CK(20) : AC(1)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Anti-Fertility : CK(112) : AC(21)

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## Fluoride exposure arrests the acrosome formation during spermatogenesis.

**Pubmed Data** : Chemosphere. 2019 Jul ;226:874-882. Epub 2019 Apr 5. PMID: [31509916](#)

**Article Published Date** : Jun 30, 2019

**Authors** : Shanshan Jiang, Chen Liang, Yan Gao, Yu Liu, Yongli Han, Jundong Wang, Jianhai Zhang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Infertility: Male : CK(1668) : AC(424), Testicular Injury: Chemical/Metal Induced : CK(754) : AC(374)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Fluoride has various detrimental effects on male reproductive system and overall reproductive health.

**Pubmed Data** : J Trace Elem Med Biol. 2024 Sep 7 ;86:127522. Epub 2024 Sep 7. PMID: [39276446](#)

**Article Published Date** : Sep 07, 2024

**Authors** : Bhavna Patial, Imtiaza Khan, Ruhi Thakur, Aditi Fishta

**Study Type** : Review

**Additional Links**

**Diseases** : Infertility: Male : CK(1668) : AC(424)

**Additional Keywords** : Infertility: Male : CK(1668) : AC(424)

**Problem Substances** : Fluoride : CK(1815) : AC(454)

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## Fluoride interferes with the sperm fertilizing ability.

**Pubmed Data** : J Agric Food Chem. 2019 May 8 ;67(18):5240-5249. Epub 2019 Apr 29. PMID: [31008594](#)

**Article Published Date** : May 07, 2019

**Authors** : Yu Liu, Chen Liang, Yan Gao, Shanshan Jiang, Yuyang He, Yongli Han, Ali Olfati, Ram Kumar Manthari, Jundong Wang, Jianhai Zhang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Infertility: Male : CK(1668) : AC(424)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Fluoride-elicited developmental testicular toxicity in rats: roles of endoplasmic reticulum stress and inflammatory response.

**Pubmed Data** : Toxicol Appl Pharmacol. 2013 Sep 1 ;271(2):206-15. Epub 2013 May 22. PMID: [23707774](#)

**Article Published Date** : Aug 31, 2013

**Authors** : Shun Zhang, Chunyang Jiang, Hongliang Liu, Zhizhong Guan, Qiang Zeng, Cheng Zhang, Rongrong Lei, Tao Xia, Hui Gao, Lu Yang, Yihu Chen, Xue Wu, Xiaofei Zhang, Yushan Cui, Linyu Yu, Zhenglun Wang, Aiguo Wang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Infertility: Male : CK(1668) : AC(424), Inflammation : CK(15536) : AC(5279)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Fluoride-induced apoptosis and gene expression profiling in mice sperm in vivo has been observed.

**Pubmed Data** : Arch Toxicol. 2011 Nov ;85(11):1441-52. Epub 2011 Feb 22. PMID: [21340527](#)

**Article Published Date** : Nov 01, 2011

**Authors** : Zilong Sun, Ruiyan Niu, Bin Wang, Zhibin Jiao, Jinming Wang, Jianhai Zhang, Shaolin Wang, Jundong Wang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Azoospermic : CK(4) : AC(2), Infertility: Male : CK(1668) : AC(424), Oxidative Stress : CK(13443) : AC(5499), Sperm Count: Low : CK(116) : AC(25), Sperm Quality: Low : CK(611) : AC(121)

**Pharmacological Actions** : Antioxidants : CK(32218) : AC(14161), Apoptotic : CK(9052) : AC(7284)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Anti-Fertility : CK(112) : AC(21)

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## Fluoride-induced testicular degeneration and sperm quality deteriorations.

**Pubmed Data** : Rev Int Androl. 2020 Jul 20. Epub 2020 Jul 20. PMID: [32703668](#)

**Article Published Date** : Jul 19, 2020

**Authors** : Sunday Aderemi Adelakun, Olalekan Wasuu Akintunde, Babatunde Ogunlade

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Infertility: Male : CK(1668) : AC(424)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## In silico prediction of microRNAs on fluoride induced sperm toxicity in mice.

**Pubmed Data** : Food Chem Toxicol. 2016 Dec ;98(Pt A):34-49. Epub 2016 Mar 21. PMID: [27012587](#)

**Article Published Date** : Nov 30, 2016

**Authors** : Azhwar Raghunath, Dhivyalakshmi Jeyabaskar, Kiruthika Sundarraj, Lakshmikanthan Panneerselvam, Ekambaram Perumal

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Infertility: Male : CK(1668) : AC(424)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Melatonin alleviated fluoride-induced impairment of spermatogenesis and sperm maturation process.

**Pubmed Data** : Food Chem Toxicol. 2023 Aug ;178:113867. Epub 2023 Jun 1. PMID: [37269891](#)

**Article Published Date** : Jul 31, 2023

**Authors** : Huifeng Luo, Rongxiu Liu, Yilin Lang, Jinhui Zhao, Cuicui Zhuang, Jundong Wang, Chen Liang, Jianhai Zhang

**Study Type** : Animal Study

**Additional Links**

**Substances** : Melatonin : CK(2743) : AC(904)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Infertility: Male : CK(1668) : AC(424)

**Pharmacological Actions** : Fertility Agents: Male : CK(369) : AC(101)

**Additional Keywords** : Gene Expression Regulation : CK(1399) : AC(621)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Microdose vasal injection of sodium fluoride in the rat interferes with fertility.

**Pubmed Data** : Reprod Toxicol. 1991 ;5(6):505-12. PMID: [1839778](#)

**Article Published Date** : Jan 01, 1991

**Authors** : N J Chinoy, M V Rao, M V Narayana, E Neelakanta

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Infertility: Male : CK(1668) : AC(424), Sperm Quality: Low : CK(611) : AC(121)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Anti-Fertility : CK(112) : AC(21)

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## Sodium fluoride administrated in drinking water of 2, 4, and 6 ppm concentration for 6 months to male rats adversely affected their fertility and reproductive system.

**Pubmed Data** : Toxicol Ind Health. 2007 Oct;23(9):507-13. PMID: [18681235](#)

**Article Published Date** : Oct 01, 2007

**Authors** : R S Gupta, T I Khan, D Agrawal, J B S Kachhawa

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Infertility: Male : CK(1668) : AC(424), Sperm Quality: Low : CK(611) : AC(121)

**Problem Substances** : Fluoride : CK(1815) : AC(454), Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Anti-Fertility : CK(112) : AC(21)

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## Sodium fluoride affected male reproduction by disturbing blood-testis barrier in mice.

**Pubmed Data** : Food Chem Toxicol. 2016 May 27 ;94:103-111. Epub 2016 May 27. PMID: [27237588](#)

**Article Published Date** : May 26, 2016

**Authors** : Jianhai Zhang, Zhihui Li, Mingli Qie, Ruibo Zheng, Jagathpala Shetty, Jundong Wang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Infertility: Male : CK(1668) : AC(424), Sperm Quality: Low : CK(611) : AC(121)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Sodium fluoride could reduce sperm motility, capacitation, and the acrosome reaction leading to poor fertilization and suppressed embryonic development.

**Pubmed Data** : Andrology. 2015 Apr 8. Epub 2015 Apr 8. PMID: [25854509](#)

**Article Published Date** : Apr 07, 2015

**Authors** : Jin Kim, Woo-Sung Kwon, Md Saidur Rahman, June-Sub Lee, Sung-Jae Yoon, Yoo-Jin Park, Young-Ah You, Myung-Geol Pang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Infertility: Male : CK(1668) : AC(424)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Anti-Fertility : CK(112) : AC(21)

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## Sodium fluoride during gestation and lactation affects male reproduction in adult rats by decreasing spermatogenesis and steroidogenesis.

**Pubmed Data** : Naturwissenschaften. 2007 Jul;94(7):607-11. Epub 2007 Feb 22. PMID: [17318612](#)

**Article Published Date** : Jul 01, 2007

**Authors** : P Sreedhar Reddy, T Pushpalatha, P Sreenivasula Reddy

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Breastfeeding Concerns: Chemical Exposure : CK(123) : AC(19), Hormone Insufficiency : CK(30) : AC(8), Infertility: Male : CK(1668) : AC(424), Prenatal Chemical Exposures : CK(2428) : AC(530)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Endocrine Disruptor : CK(529) : AC(106)

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## Sodium fluoride exposure changed histological structure and ultrastructure of hypothalamus-pituitary-testicular axis and significantly increased the malformation ratio of sperm.

**Pubmed Data** : Chemosphere. 2015 Sep ;135:297-303. Epub 2015 May 15. PMID: [25966048](#)

**Article Published Date** : Aug 31, 2015

**Authors** : Haijun Han, Zilong Sun, Guangying Luo, Chong Wang, Ruifen Wei, Jundong Wang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Infertility: Male : CK(1668) : AC(424), Sperm Quality: Low : CK(611) : AC(121)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Sodium fluoride induces testicular and sperm abnormalities through



## the involvement of HSPs especially during the pubertal period.

**Pubmed Data** : Chemosphere. 2017 Oct ;184:1080-1088. Epub 2017 Jun 12. PMID: [28672688](#)

**Article Published Date** : Sep 30, 2017

**Authors** : Yangfei Zhao, Jun Zhao, Jinming Wang, Jundong Wang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Infertility: Male : CK(1668) : AC(424)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## The influence of fluorides on mouse sperm capacitation.

**Pubmed Data** : Anim Reprod Sci. 2008 Oct ;108(1-2):157-70. Epub 2007 Aug 6. PMID: [17884311](#)

**Article Published Date** : Sep 30, 2008

**Authors** : K Dvoráková-Hortová, M Sandera, M Jursová, J Vasinová, J Peknicová

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Infertility: Male : CK(1668) : AC(424)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## This indicated that along with low sperm quality, sperm mtDNA copy number is also a sensitive biomarker to reflect the sperm toxicity of fluoride.

**Pubmed Data** : Biochem Biophys Res Commun. 2017 10 21 ;492(3):295-299. Epub 2017 Aug 31. PMID: [28864413](#)

**Article Published Date** : Jan 20, 2017

**Authors** : Zilong Sun, Xingchen Xue, Yuliang Zhang, Ruiyan Niu, Jundong Wang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Infertility: Male : CK(1668) : AC(424), Sperm Quality: Low : CK(611) : AC(121)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Inflammation (AC 21) (CK 65)

### Apoptosis and inflammation involved with fluoride-induced bone injuries.

**Pubmed Data** : Nutrients. 2024 Jul 31 ;16(15). Epub 2024 Jul 31. PMID: [39125380](#)

**Article Published Date** : Jul 30, 2024

**Authors** : Miao Wang, Kangting Luo, Tongtong Sha, Qian Li, Zaichao Dong, Yanjie Dou, Huanxia Zhang, Guoyu Zhou, Yue Ba, Fangfang Yu

**Study Type** : Review

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Fluorosis : CK(262) : AC(42), Inflammation : CK(15536) : AC(5279)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Apoptotic : CK(278) : AC(120)

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### Arsenic and fluoride co-exposure affects the expression of apoptotic and inflammatory genes and proteins in mononuclear cells from



## children.

**Pubmed Data** : Mutat Res Genet Toxicol Environ Mutagen. 2014 Feb ;761:27-34. Epub 2014 Jan 21. PMID: [24456662](#)

**Article Published Date** : Jan 31, 2014

**Authors** : B L Estrada-Capetillo, M D Ortiz-Pérez, M Salgado-Bustamante, E Calderón-Aranda, C J Rodríguez-Pinal, E Reynaga-Hernández, N E Corral-Fernández, R González-Amaro, D P Portales-Pérez

**Study Type** : Human In Vitro, Human Study

**Additional Links**

**Diseases** : [Arsenic Poisoning](#) : CK(383) : AC(129), [Fluoride Toxicity](#) : CK(1389) : AC(376), [Inflammation](#) : CK(15536) : AC(5279)

**Additional Keywords** : [Synergistic Toxicity](#) : CK(226) : AC(109)

**Problem Substances** : [Arsenic](#) : CK(595) : AC(181), [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Association between dental fluorosis prevalence and inflammation levels in school-aged children with low-to-moderate fluoride exposure.

**Pubmed Data** : Environ Pollut. 2023 Mar 1 ;320:120995. Epub 2023 Jan 2. PMID: [36603756](#)

**Article Published Date** : Feb 28, 2023

**Authors** : Huayang Tang, Mengru Wang, Gaochun Li, Mengwei Wang, Chen Luo, Guoyu Zhou, Qian Zhao, Lixin Dong, Hongliang Liu, Yushan Cui, Li Liu, Shun Zhang, Aiguo Wang

**Study Type** : Human Study

**Additional Links**

**Diseases** : [C-Reactive Protein](#) : CK(3920) : AC(389), [C-Reactive Protein](#) : CK(3920) : AC(389), [Fluoride Toxicity](#) : CK(1389) : AC(376), [Inflammation](#) : CK(15536) : AC(5279)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Inflammatory](#) : CK(541) : AC(169)

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## Expression of SDF-1/CXCR4 and related inflammatory factors in sodium fluoride-treated hepatocytes.

**Pubmed Data** : PLoS One. 2024 ;19(6):e0302530. Epub 2024 Jun 21. PMID: [38905184](#)

**Article Published Date** : Dec 31, 2023

**Authors** : Rui Yang, Hongting Shen, Mingjun Wang, Yaqian Zhao, Shiling Zhu, Hong Jiang, Yanan Li, Guanglan Pu, Xun Chen, Ping Chen, Qing Lu, Jing Ma, Qiang Zhang

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : [Chemically-Induced Liver Damage](#) : CK(2167) : AC(1069), [Fluoride Toxicity](#) : CK(1389) : AC(376), [Inflammation](#) : CK(15536) : AC(5279)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Interleukin-1 up-regulation](#) : CK(8) : AC(3), [Interleukin-6 up-regulation](#) : CK(41) : AC(10), [Tumor necrosis factor \$\alpha\$  \(TNF \$\alpha\$ \) up-regulation](#) : CK(65) : AC(11)

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## Fermented rooibos tea ameliorates sodium fluoride-induced cardiorenal toxicity, oxidative stress, and inflammation.

**Pubmed Data** : Cardiovasc Toxicol. 2024 Feb 5. Epub 2024 Feb 5. PMID: [38315346](#)

**Article Published Date** : Feb 04, 2024

**Authors** : Olawale Razaq Ajuwon, Toyosi Abiodun Adeleke, Basiru Olaitan Ajiboye, Akeem Olalekan Lawal, Ibukun Folorunso, Bartholomew Brai, Fisayo Abraham Bamisaye, John Adeolu Falode, Ikenna Maximillian Odoh, Kabirat Iyabode Adegbite, Oluwasayo Bosede Adegoke

**Study Type** : Animal Study

**Additional Links**

**Substances** : [Rooibos](#) : CK(161) : AC(76)

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Inflammation](#) : CK(15536) : AC(5279), [Oxidative Stress](#) : CK(13443) : AC(5499)

**Pharmacological Actions** : [Anti-Inflammatory Agents](#) : CK(35225) : AC(15297), [Antioxidants](#) : CK(32218) : AC(14161)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Fluoride induced tissue hypercalcemia, IL-17 mediated inflammation and apoptosis lead to cardiomyopathy.

**Pubmed Data** : Toxicology. 2018 Aug 1 ;406-407:44-57. Epub 2018 May 22. PMID: [29800585](#)

**Article Published Date** : Jul 31, 2018

**Authors** : Javed Ahsan Quadri, Saba Sarwar, Pinky, Parmita Kar, Seema Singh, Saumya Ranjan Mallick, Sudheer Arava, Tapash Chand Nag, Tara Sankar Roy, A Shariff

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Cardiomyopathy : CK(358) : AC(160), Fluoride Toxicity : CK(1389) : AC(376), Inflammation : CK(15536) : AC(5279)

**Problem Substances** : Fluoride : CK(1815) : AC(454), Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Apoptotic : CK(278) : AC(120), Cardiotoxic : CK(1168) : AC(209), Inflammatory : CK(541) : AC(169)

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## Fluoride induces neutrophil extracellular traps and aggravates brain inflammation by disrupting neutrophil calcium homeostasis and causing ferroptosis.

**Pubmed Data** : Environ Pollut. 2023 Aug 15 ;331(Pt 1):121847. Epub 2023 May 18. PMID: [37209896](#)

**Article Published Date** : Aug 14, 2023

**Authors** : Dongxu Wang, Kai Yin, Yue Zhang, Hongmin Lu, Lulu Hou, Hongjing Zhao, Mingwei Xing

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : Brain Inflammation : CK(1650) : AC(901), Fluoride Toxicity : CK(1389) : AC(376), Inflammation : CK(15536) : AC(5279)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Fluoride promotes the secretion of inflammatory factors in microglia.

**Pubmed Data** : Environ Sci Pollut Res Int. 2024 Mar ;31(13):19844-19855. Epub 2024 Feb 17. PMID: [38367109](#)

**Article Published Date** : Feb 29, 2024

**Authors** : Qiuyi Zhang, Tao Li, Ruili Shi, Ruifang Qi, Xiaoqiong Hao, Baohui Ma

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Inflammation : CK(15536) : AC(5279)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Inflammatory : CK(541) : AC(169)

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## Fluoride-elicited developmental testicular toxicity in rats: roles of endoplasmic reticulum stress and inflammatory response.

**Pubmed Data** : Toxicol Appl Pharmacol. 2013 Sep 1 ;271(2):206-15. Epub 2013 May 22. PMID: [23707774](#)

**Article Published Date** : Aug 31, 2013

**Authors** : Shun Zhang, Chunyang Jiang, Hongliang Liu, Zhizhong Guan, Qiang Zeng, Cheng Zhang, Rongrong Lei, Tao Xia, Hui Gao, Lu Yang, Yihu Chen, Xue Wu, Xiaofei Zhang, Yushan Cui, Linyu Yu, Zhenglun Wang, Aiguo Wang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Infertility: Male : CK(1668) : AC(424), Inflammation : CK(15536) : AC(5279)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Fluoride-induced neuron apoptosis and expressions of inflammatory factors by activating microglia in rat brain.

**Pubmed Data** : Mol Neurobiol. 2016 Sep ;53(7):4449-60. Epub 2015 Aug 8. PMID: [26253724](#)

**Article Published Date** : Aug 31, 2016

**Authors** : Nan Yan, Yan Liu, Shengnan Liu, Siqi Cao, Fei Wang, Zhengdong Wang, Shuhua Xi

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Inflammation : CK(15536) : AC(5279)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Inflammatory : CK(541) : AC(169), Neurotoxic : CK(2838) : AC(702)

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## Green tea showed greater reduction of gingival inflammation and improved periodontal parameters than fluoride-triclosan dentifrice.

**Pubmed Data** : Int J Dent Hyg. 2015 Feb 17. Epub 2015 Feb 17. PMID: [25690541](#)

**Article Published Date** : Feb 16, 2015

**Authors** : Ts Hrishi, Pp Kundapur, A Naha, Bs Thomas, S Kamath, Gs Bhat

**Study Type** : Human Study

**Additional Links**

**Substances** : Green Tea : CK(4441) : AC(1370)

**Diseases** : Gingivitis : CK(595) : AC(86), Inflammation : CK(15536) : AC(5279), Periodontitis : CK(1081) : AC(266)

**Pharmacological Actions** : Anti-Inflammatory Agents : CK(35225) : AC(15297), Antioxidants : CK(32218) : AC(14161)

**Problem Substances** : Fluoride : CK(1815) : AC(454)

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## Hesperidin attenuates oxidative stress, inflammation, apoptosis, and cardiac dysfunction in sodium fluoride-induced cardiotoxicity.

**Pubmed Data** : Cardiovasc Toxicol. 2022 Aug ;22(8):727-735. Epub 2022 May 23. PMID: [35606666](#)

**Article Published Date** : Jul 31, 2022

**Authors** : Behçet Varışlı, Ekrem Darendelioğlu, Cuneyt Caglayan, Fatih Mehmet Kandemir, Adnan Ayna, Aydın Genç, Özge Kandemir

**Study Type** : Animal Study

**Additional Links**

**Substances** : Hesperidin : CK(845) : AC(358)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Inflammation : CK(15536) : AC(5279), Oxidative Stress : CK(13443) : AC(5499)

**Pharmacological Actions** : Anti-Apoptotic : CK(4942) : AC(3051), Bcl-2 protein down-regulation : CK(687) : AC(522), NF-kappaB Inhibitor : CK(5541) : AC(3374), Superoxide Dismutase Up-regulation : CK(2327) : AC(896), Tumor Necrosis Factor (TNF) Alpha Inhibitor : CK(10605) : AC(4670), Tumor Suppressor Protein p53 Upregulation : CK(748) : AC(549)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Hesperidin protects liver and kidney against sodium fluoride-induced toxicity.

**Pubmed Data** : Life Sci. 2021 Sep 15 ;281:119730. Epub 2021 Jun 17. PMID: [34147482](#)

**Article Published Date** : Sep 14, 2021

**Authors** : Cuneyt Caglayan, Fatih Mehmet Kandemir, Ekrem Darendelioğlu, Sefa Küçükler, Adnan Ayna

**Study Type** : In Vitro Study

**Additional Links**

**Substances** : Hesperidin : CK(845) : AC(358)

**Diseases** : Chemically-Induced Liver Damage : CK(2167) : AC(1069), Inflammation : CK(15536) : AC(5279), Kidney Damage: Chemically-Induced : CK(542) : AC(270), Oxidative Stress : CK(13443) : AC(5499)

**Pharmacological Actions** : Anti-Apoptotic : CK(4942) : AC(3051), Anti-Inflammatory Agents : CK(35225) : AC(15297), Antioxidants : CK(32218) : AC(14161), Hepatoprotective : CK(8320) : AC(3765), Renoprotective : CK(4133) : AC(1932)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## NaF-induced neurotoxicity via activation of the IL-1 $\beta$ /JNK signaling pathway.

**Pubmed Data** : Toxicology. 2022 Mar 15 ;469:153132. Epub 2022 Feb 13. PMID: [35172196](#)

**Article Published Date** : Mar 14, 2022

**Authors** : Chengzhi Zhang, Yanmei Yang, Yanhui Gao, Dianjun Sun

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Inflammation](#) : CK(15536) : AC(5279), [Learning disorders](#) : CK(517) : AC(155)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Potential role of fluoride in the etiopathogenesis of Alzheimer's disease.

**Pubmed Data** : Int J Mol Sci. 2018 Dec 9 ;19(12). Epub 2018 Dec 9. PMID: [30544885](#)

**Article Published Date** : Dec 08, 2018

**Authors** : Marta Goschorska, Irena Baranowska-Bosiacka, Izabela Gutowska, Emilia Metryka, Marta Skórka-Majewicz, Dariusz Chlubek

**Study Type** : Review

**Additional Links**

**Diseases** : [Alzheimer's Disease](#) : CK(4948) : AC(2148), [Fluoride Toxicity](#) : CK(1389) : AC(376), [Inflammation](#) : CK(15536) : AC(5279), [Oxidative Stress](#) : CK(13443) : AC(5499)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Neurotoxic](#) : CK(2838) : AC(702)

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## Rutin attenuates neurobehavioral deficits, oxidative stress, neuro-inflammation and apoptosis in fluoride treated rats.

**Pubmed Data** : Neurosci Lett. 2018 Aug 24 ;682:92-99. Epub 2018 Jun 13. PMID: [29908257](#)

**Article Published Date** : Aug 23, 2018

**Authors** : Kpobari W Nkpa, Godspower I Onyeso

**Study Type** : Animal Study

**Additional Links**

**Substances** : [Rutin](#) : CK(460) : AC(221)

**Diseases** : [Inflammation](#) : CK(15536) : AC(5279), [Lipid Peroxidation](#) : CK(1901) : AC(774), [Oxidative Stress](#) : CK(13443) : AC(5499)

**Pharmacological Actions** : [Anti-Apoptotic](#) : CK(4942) : AC(3051), [Antioxidants](#) : CK(32218) : AC(14161), [Neuroprotective Agents](#) : CK(17667) : AC(7641)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Neurotoxic](#) : CK(2838) : AC(702)

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## Rutin mitigates fluoride-induced nephrotoxicity by inhibiting ROS-mediated lysosomal membrane permeabilization.

**Pubmed Data** : Ecotoxicol Environ Saf. 2024 Apr 1 ;274:116195. Epub 2024 Mar 12. PMID: [38479315](#)

**Article Published Date** : Mar 31, 2024

**Authors** : Yue Ma, Panpan Xu, Hengrui Xing, Yue Zhang, Tingting Li, Xueman Ding, Li Liu, Qiang Niu

**Study Type** : Animal Study, In Vitro Study

**Additional Links**

**Substances** : [Rutin](#) : CK(460) : AC(221)

**Diseases** : [Inflammation](#) : CK(15536) : AC(5279), [Kidney Damage: Chemically-Induced](#) : CK(542) : AC(270)

**Pharmacological Actions** : [Anti-Inflammatory Agents](#) : CK(35225) : AC(15297), [Antioxidants](#) : CK(32218) : AC(14161), [Renoprotective](#) : CK(4133) : AC(1932)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Sodium fluoride induced skeletal muscle changes: Degradation of proteins and signaling mechanism.

**Pubmed Data** : Environ Pollut. 2019 Jan ;244:534-548. Epub 2018 Oct 10. PMID: [30384060](#)

**Article Published Date** : Dec 31, 2018

**Authors** : P Sudheer Shenoy, Utsav Sen, Saketh Kapoor, Anu V Ranade, Chitta R Chowdhury, Bipasha Bose

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Inflammation : CK(15536) : AC(5279)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Sodium fluoride induces renal inflammatory responses and reduces anti-inflammatory cytokine expression in mice.

**Pubmed Data** : Oncotarget. 2017 Oct 6 ;8(46):80192-80207. Epub 2017 Jul 5. PMID: [29113295](#)

**Article Published Date** : Oct 05, 2017

**Authors** : Qin Luo, Hengmin Cui, Huidan Deng, Ping Kuang, Huan Liu, Yujiao Lu, Jing Fang, Zhicai Zuo, Junliang Deng, Yinglun Li, Xun Wang, Ling Zhao

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Inflammation : CK(15536) : AC(5279)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Sodium fluoride induces renal inflammatory responses by activating NF-κB signaling pathway and reducing anti-inflammatory cytokine expression.

**Pubmed Data** : Oncotarget. 2017 Jul 5. Epub 2017 Jul 5. PMID: [28708587](#)

**Article Published Date** : Jul 04, 2017

**Authors** : Qin Luo, Hengmin Cui, Huidan Deng, Ping Kuang, Huan Liu, Yujiao Lu, Jing Fang, Zhicai Zuo, Junliang Deng, Yinglun Li, Xun Wang, Ling Zhao

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Inflammation : CK(15536) : AC(5279)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Inflammatory : CK(541) : AC(169)

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## Systematic impacts of fluoride exposure on the metabolomics of rats.

**Pubmed Data** : Ecotoxicol Environ Saf. 2022 Sep 1 ;242:113888. Epub 2022 Jul 21. PMID: [35872488](#)

**Article Published Date** : Aug 31, 2022

**Authors** : Shiyuan Zhao, Jinxiu Guo, Hongjia Xue, Junjun Meng, Dadi Xie, Xi Liu, Qingqing Yu, Haitao Zhong, Pei Jiang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Inflammation : CK(15536) : AC(5279), Mitochondrial Dysfunction : CK(618) : AC(262), Oxidative Stress : CK(13443) : AC(5499)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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# Intelligence Quotient (IQ): Low/Impaired (AC 22) (CK 252)

## A significant inverse relationship was found between the fluoride concentration in drinking water and IQ.

**Pubmed Data** : J Int Soc Prev Community Dent. 2016 Dec ;6(Suppl 3):S237-S242. PMID: [28217543](#)

**Article Published Date** : Nov 30, 2016

**Authors** : A Aravind, R S Dhanya, Ajay Narayan, George Sam, V J Adarsh, M Kiran

**Study Type** : Human Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Intelligence Quotient (IQ): Low/Impaired : CK(312) : AC(27)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Association between low fluoride exposure and children's intelligence.

**Pubmed Data** : Public Health. 2023 Jun ;219:73-84. Epub 2023 Apr 28. PMID: [37120936](#)

**Article Published Date** : May 31, 2023

**Authors** : Jayanth V Kumar, Mark E Moss, Honghu Liu, Susan Fisher-Owens

**Study Type** : Meta Analysis

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Intelligence Quotient (IQ): Low/Impaired : CK(312) : AC(27)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Children in endemic areas of fluorosis are at risk for impaired development of intelligence.

**Pubmed Data** : J Neurosci Rural Pract. 2012 May ;3(2):144-9. PMID: [22865964](#)

**Article Published Date** : Apr 30, 2012

**Authors** : Sudhanshu Saxena, Anjali Sahay, Pankaj Goel

**Study Type** : Human Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Intelligence Quotient (IQ): Low/Impaired : CK(312) : AC(27)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Children residing in areas with higher than normal water fluoride levels demonstrated more impaired development of intelligence.

**Pubmed Data** : J Dent (Tehran). 2012 ;9(3):221-9. Epub 2012 Sep 30. PMID: [23119131](#)

**Article Published Date** : Dec 31, 2011

**Authors** : B Seraj, M Shahrabi, M Shadfar, R Ahmadi, M Fallahzadeh, H Farrokh Eslamli, M J Kharazifard

**Study Type** : Human Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Intelligence Quotient (IQ): Low/Impaired : CK(312) : AC(27)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Children who live in a fluorosis area have 5 times higher odds of developing low IQ than those who live in a nonfluorosis area or a slight fluorosis area.

**Pubmed Data** : Biol Trace Elem Res. 2008;126(1-3):115-20. Epub 2008 Aug 10. PMID: [18695947](#)

**Article Published Date** : Jan 01, 2008

**Authors** : Qin-Qing Tang, Jun Du, Heng-Hui Ma, Shao-Jun Jiang, Xiao-Jun Zhou

**Study Type** : Meta Analysis

**Additional Links**

**Diseases** : Childhood Cognitive Disorders : CK(316) : AC(27), Cognitive Decline/Dysfunction : CK(5061) : AC(1005), Intelligence Quotient (IQ): Low/Impaired : CK(312) : AC(27), Prenatal Nutrition: Learning/Intelligence of Offspring : CK(116) : AC(14)

**Problem Substances** : Fluoride : CK(1815) : AC(454)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Children's growth and intelligence can be adversely affected by



## fluoride and arsenic exposure in drinking water.

**Pubmed Data** : Environ Health Perspect. 2007 Apr;115(4):643-7. Epub 2007 Jan 9. PMID: [17450237](#)

**Article Published Date** : Apr 01, 2007

**Authors** : San-Xiang Wang, Zheng-Hui Wang, Xiao-Tian Cheng, Jun Li, Zhi-Ping Sang, Xiang-Dong Zhang, Ling-Ling Han, Xiao-Yan Qiao, Zhao-Ming Wu, Zhi-Quan Wang

**Study Type** : Human Study

### Additional Links

**Diseases** : Childhood Chemical Exposures : CK(165) : AC(17), Childhood Cognitive Disorders : CK(316) : AC(27), Children: Impaired Growth : CK(50) : AC(4), Intelligence Quotient (IQ): Low/Impaired : CK(312) : AC(27)

**Problem Substances** : Arsenic : CK(595) : AC(181), Fluoride : CK(1815) : AC(454)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Chronic exposure to high levels of fluoride in water was observed to be associated with lower intelligence quotient.

**Pubmed Data** : Iran J Public Health. 2013 Aug ;42(8):813-8. PMID: [26056634](#)

**Article Published Date** : Jul 31, 2013

**Authors** : Ramesh Nagarajappa, Piyush Pujara, Archana J Sharda, Kailash Asawa, Mridula Tak, Pankaj Aapaliya, Nikhil Bhanushali

**Study Type** : Human Study

### Additional Links

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Intelligence Quotient (IQ): Low/Impaired : CK(312) : AC(27)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Concentration of Fluoride in the ingested water was significantly associated with the IQ of children.

**Pubmed Data** : J Int Soc Prev Community Dent. 2017 ;7(5):252-258. Epub 2017 Sep 18. PMID: [29026697](#)

**Article Published Date** : Dec 31, 2016

**Authors** : Priyanka Razdan, Basavaraj Patthi, Jishnu Krishna Kumar, Nikhil Agnihotri, Prajakta Chaudhari, Monika Prasad

**Study Type** : Human Study

### Additional Links

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Intelligence Quotient (IQ): Low/Impaired : CK(312) : AC(27), Learning disorders : CK(517) : AC(155)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Dental fluorosis and urinary fluoride concentration as a reflection of fluoride exposure and its impact on IQ level and BMI of children.

**Pubmed Data** : Environ Monit Assess. 2016 Apr ;188(4):218. Epub 2016 Mar 9. PMID: [26960765](#)

**Article Published Date** : Mar 31, 2016

**Authors** : Kousik Das, Naba Kumar Mondal

**Study Type** : Human Study

### Additional Links

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Intelligence Quotient (IQ): Low/Impaired : CK(312) : AC(27)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Dopamine receptor D2 gene polymorphism, urine fluoride, and intelligence impairment of children in China.

**Pubmed Data** : Ecotoxicol Environ Saf. 2018 Dec 15 ;165:270-277. Epub 2018 Sep 8. PMID: [30205328](#)

**Article Published Date** : Dec 14, 2018

**Authors** : Yushan Cui, Bin Zhang, Jing Ma, Yang Wang, Liang Zhao, Changchun Hou, Jingwen Yu, Yang Zhao, Zushan

Zhang, Junyan Nie, Tongning Gao, Guoli Zhou, Hongliang Liu

**Study Type** : Human Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Intelligence Quotient (IQ): Low/Impaired : CK(312) : AC(27)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Exposure to fluoride and arsenic in drinking water is associated with decreased intelligence in children.

**Pubmed Data** : Cad Saude Publica. 2007;23 Suppl 4:S579-87. PMID: [18038039](#)

**Article Published Date** : Jan 01, 2007

**Authors** : Diana Rocha-Amador, Maria Elena Navarro, Leticia Carrizales, Raúl Morales, Jaqueline Calderón

**Study Type** : Human Study

**Additional Links**

**Diseases** : Childhood Chemical Exposures : CK(165) : AC(17), Childhood Cognitive Disorders : CK(316) : AC(27), Intelligence Quotient (IQ): Low/Impaired : CK(312) : AC(27)

**Problem Substances** : Arsenic : CK(595) : AC(181), Fluoride : CK(1815) : AC(454)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Exposure to high levels of fluoride may adversely influence children's intelligence development.

**Pubmed Data** : Zhongguo Dang Dai Er Ke Za Zhi. 2008 Dec;10(6):723-5. PMID: [19102839](#)

**Article Published Date** : Dec 01, 2008

**Authors** : Ming Liu, Cong Qian

**Study Type** : Meta Analysis

**Additional Links**

**Diseases** : Childhood Cognitive Disorders : CK(316) : AC(27), Cognitive Decline/Dysfunction : CK(5061) : AC(1005), Fluoride Toxicity : CK(1389) : AC(376), Fluorosis : CK(262) : AC(42), Intelligence Quotient (IQ): Low/Impaired : CK(312) : AC(27), Prenatal Nutrition: Learning/Intelligence of Offspring : CK(116) : AC(14)

**Problem Substances** : Fluoride : CK(1815) : AC(454)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Exposure to increasing levels of fluoride in tap water was associated with diminished non-verbal intellectual abilities.

**Pubmed Data** : Environ Int. 2020 Jan ;134:105315. Epub 2019 Nov 16. PMID: [31743803](#)

**Article Published Date** : Dec 31, 2019

**Authors** : Christine Till, Rivka Green, David Flora, Richard Hornung, E Angeles Martinez-Mier, Maddy Blazer, Linda Farmus, Pierre Ayotte, Gina Muckle, Bruce Lanphear

**Study Type** : Human Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Intelligence Quotient (IQ): Low/Impaired : CK(312) : AC(27)

**Problem Substances** : Infant Formula : CK(659) : AC(97), Sodium Fluoride : CK(1446) : AC(393)

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## Fluoride exposure and cognitive neurodevelopment.

**Pubmed Data** : Environ Res. 2023 Mar 15 ;221:115239. Epub 2023 Jan 10. PMID: [36639015](#)

**Article Published Date** : Mar 14, 2023

**Authors** : Federica Veneri, Marco Vinceti, Luigi Generali, Maria Edvige Giannone, Elena Mazzoleni, Linda S Birnbaum, Ugo Consolo, Tommaso Filippini

**Study Type** : Meta Analysis, Review

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Intelligence Quotient (IQ): Low/Impaired : CK(312) : AC(27)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## High iodine and high fluorine adversely effects the intelligence and health of children.

**Pubmed Data** : Zhonghua Liu Xing Bing Xue Za Zhi. 1994 Oct;15(5):296-8. PMID: [7859263](#)

**Article Published Date** : Oct 01, 1994

**Authors** : Y Yang, X Wang, X Guo

**Study Type** : Human Study

### Additional Links

**Diseases** : Childhood Chemical Exposures : CK(165) : AC(17), Childhood Cognitive Disorders : CK(316) : AC(27), Intelligence Quotient (IQ): Low/Impaired : CK(312) : AC(27), TSH: Elevated : CK(20) : AC(2)

**Problem Substances** : Fluoride : CK(1815) : AC(454), Iodine: Excess : CK(10) : AC(1)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Inferring the fluoride hydrogeochemistry and effect of consuming fluoride-contaminated drinking water on human health.

**Pubmed Data** : Environ Geochem Health. 2016 Apr ;38(2):557-76. Epub 2015 Jul 12. PMID: [26164468](#)

**Article Published Date** : Mar 31, 2016

**Authors** : D Mondal, G Dutta, S Gupta

**Study Type** : Human Study

### Additional Links

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Intelligence Quotient (IQ): Low/Impaired : CK(312) : AC(27)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Low levels of fluoride exposure in drinking water had negative effects on children's intelligence.

**Pubmed Data** : J Hazard Mater. 2011 Feb 28 ;186(2-3):1942-6. Epub 2010 Dec 25. PMID: [21237562](#)

**Article Published Date** : Feb 27, 2011

**Authors** : Yunpeng Ding, YanhuiGao, Huixin Sun, Hepeng Han, Wei Wang, Xiaohong Ji, Xuehui Liu, Dianjun Sun

**Study Type** : Human Study

### Additional Links

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Intelligence Quotient (IQ): Low/Impaired : CK(312) : AC(27)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Relation between dental fluorosis and intelligence quotient in school children of Bagalkot district.

**Pubmed Data** : J Indian Soc Pedod Prev Dent. 2011 ;29(2):117-20. PMID: [21911949](#)

**Article Published Date** : Dec 31, 2010

**Authors** : P K Shivaprakash, Kushagra Ohri, Hina Noorani

**Study Type** : Human Study

### Additional Links

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Intelligence Quotient (IQ): Low/Impaired : CK(312) : AC(27)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Relationship between dental fluorosis and intelligence quotient of school going children.

**Pubmed Data** : J Clin Diagn Res. 2015 Nov ;9(11):ZC10-5. Epub 2015 Nov 1. PMID: [26673535](#)

**Article Published Date** : Oct 31, 2015

**Authors** : Suleman Abbas Khan, Rahul Kumar Singh, Saumya Navit, Dheera Chadha, Nikita Johri, Pragati Navit, Anshul Sharma, Rachana Bahuguna

**Study Type** : Human Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Intelligence Quotient (IQ): Low/Impaired : CK(312) : AC(27)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## School children residing in area with higher than normal water fluoride level demonstrated more impaired development of intelligence.

**Pubmed Data** : J Indian Soc Pedod Prev Dent. 2015 ;33(4):307-11. PMID: [26381633](#)

**Article Published Date** : Dec 31, 2014

**Authors** : Shibu Thomas Sebastian, S Sunitha

**Study Type** : Human Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Intelligence Quotient (IQ): Low/Impaired : CK(312) : AC(27)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## This review finds, with moderate confidence, that higher estimated fluoride exposures are consistently associated with lower IQ in children.

**Pubmed Data** : NTP Monogr. 2024 Aug(8). PMID: [39172715](#)

**Article Published Date** : Aug 01, 2024

**Authors** :

**Study Type** : Review

**Additional Links**

**Diseases** : Intelligence Quotient (IQ): Low/Impaired : CK(312) : AC(27)

**Problem Substances** : Fluoride : CK(1815) : AC(454)

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## Threshold effects of moderately excessive fluoride exposure on children's health.

**Pubmed Data** : Environ Int. 2018 Sep ;118:116-124. Epub 2018 Jun 2. PMID: [29870912](#)

**Article Published Date** : Aug 31, 2018

**Authors** : Xingchen Yu, Jingwen Chen, Yonggang Li, Hongliang Liu, Changchun Hou, Qiang Zeng, Yushan Cui, Liang Zhao, Pei Li, Ziquan Zhou, Shuo Pang, Sha Tang, Kunming Tian, Qian Zhao, Lixin Dong, Chunyan Xu, Xiao Zhang, Shun Zhang, Li Liu, Aiguo Wang

**Study Type** : Human Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Intelligence Quotient (IQ): Low/Impaired : CK(312) : AC(27)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Iodine Deficiency (AC 2) (CK 11)

### Fluoride exposure could lead to impaired iodine absorption and iodine deficiency.

**Pubmed Data** : Int J Environ Res Public Health. 2019 03 26 ;16(6). Epub 2019 Mar 26. PMID: [30917615](#)

**Article Published Date** : Jan 25, 2019

**Authors** : Declan Timothy Waugh

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Iodine Deficiency : CK(110) : AC(18)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Iodine status modifies the association between fluoride exposure in pregnancy and preschool boys' intelligence.

**Pubmed Data** : Nutrients. 2022 Jul 16 ;14(14). Epub 2022 Jul 16. PMID: [35889877](#)

**Article Published Date** : Jul 15, 2022

**Authors** : Carly V Goodman, Meaghan Hall, Rivka Green, Jonathan Chevrier, Pierre Ayotte, Esperanza Angeles Martinez-Mier, Taylor McGuckin, John Krzeczowski, David Flora, Richard Hornung, Bruce Lanphear, Christine Till

**Study Type** : Human Study

**Additional Links**

**Substances** : Iodine : CK(182) : AC(32)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Iodine Deficiency : CK(110) : AC(18), Learning disorders : CK(517) : AC(155)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Iron Overload (AC 1) (CK 2)

### Grape seed proanthocyanidin extract as a naturally occurring prophylactic treatment for fluoride-induced hepatotoxicity associated with iron overload.

**Pubmed Data** : J Toxicol Sci. 2018 ;43(5):311-319. PMID: [29743442](#)

**Article Published Date** : Dec 31, 2017

**Authors** : Qiang Niu, Ping He, Shangzhi Xu, Ruling Ma, Yusong Ding, Lati Mu, Shugang Li

**Study Type** : Animal Study

**Additional Links**

**Substances** : Grape Seed Extract : CK(1047) : AC(329)

**Diseases** : Chemically-Induced Liver Damage : CK(2167) : AC(1069), Fluoride Toxicity : CK(1389) : AC(376), Iron Overload : CK(218) : AC(78)

**Pharmacological Actions** : Antioxidants : CK(32218) : AC(14161), Hepatoprotective : CK(8320) : AC(3765)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Kidney Damage (AC 1) (CK 1)

### Excess fluoride in drinking water and in the locally grown food in the affected areas might lead to chronic kidney diseases.

**Pubmed Data** : Environ Health Prev Med. 2015 Jul ;20(4):237-42. Epub 2015 Apr 28. PMID: [25916575](#)

**Article Published Date** : Jun 30, 2015

**Authors** : Ranjith W Dharmaratne

**Study Type** : Commentary

**Additional Links**

**Diseases** : Chronic Kidney Disease (CKD) : CK(1176) : AC(210), Fluoride Toxicity : CK(1389) : AC(376), Kidney Damage : CK(780) : AC(347)

**Additional Keywords** : Risk Factors : CK(14728) : AC(2072)

**Problem Substances** : Fluoride : CK(1815) : AC(454), Sodium Fluoride : CK(1446) : AC(393)

## Kidney Damage: Chemically-Induced (AC 19) (CK 43)

### Ameliorative effect of traditional polyherbal formulation on TNF- $\alpha$ , IL-1 $\beta$ and Caspase-3 expression in kidneys.

**Pubmed Data** : J Ethnopharmacol. 2023 Jul 11 ;318(Pt A):116900. Epub 2023 Jul 11. PMID: [37442489](#)

**Article Published Date** : Jul 10, 2023

**Authors** : Mohammad Umar Khan, Parakh Basist, Gaurav, Sultan Zahiruddin, Naveen Reddy Penumallu, Sayeed Ahmad

**Study Type** : Animal Study, In Vitro Study

**Additional Links**

**Substances** : Apigenin : CK(432) : AC(391), Ellagic Acid : CK(537) : AC(292), Ferulic acid : CK(259) : AC(145), Quercetin : CK(1864) : AC(847)

**Diseases** : Chronic Kidney Disease (CKD) : CK(1176) : AC(210), Kidney Damage: Chemically-Induced : CK(542) : AC(270)

**Pharmacological Actions** : Anti-Inflammatory Agents : CK(35225) : AC(15297), Antioxidants : CK(32218) : AC(14161), Interleukin-1 beta downregulation : CK(5277) : AC(2851), Renoprotective : CK(4133) : AC(1932), Tumor Necrosis Factor (TNF) Alpha Inhibitor : CK(10605) : AC(4670)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

### Calcium alleviates fluoride-induced kidney damage.

**Pubmed Data** : Ecotoxicol Environ Saf. 2021 Dec 15 ;226:112851. Epub 2021 Oct 4. PMID: [34619480](#)

**Article Published Date** : Dec 14, 2021

**Authors** : Haojie Li, Junjiang Fan, Yangfei Zhao, Jiarong Yang, Huimiao Xu, Ram Kumar Manthari, Xiaofang Cheng, Jundong Wang, Jinming Wang

**Study Type** : Animal Study

**Additional Links**

**Substances** : Calcium : CK(444) : AC(68)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Kidney Damage: Chemically-Induced : CK(542) : AC(270)

**Pharmacological Actions** : Anti-Apoptotic : CK(4942) : AC(3051), Renoprotective : CK(4133) : AC(1932), Tumor Necrosis Factor (TNF) Alpha Inhibitor : CK(10605) : AC(4670)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

### Combination of fluoride and SO<sub>2</sub> induce DNA damage and morphological alterations in male rat kidney.

**Pubmed Data** : Cell Physiol Biochem. 2018 ;50(2):734-744. Epub 2018 Oct 11. PMID: [30308495](#)

**Article Published Date** : Dec 31, 2017

**Authors** : Yan Gao, Chen Liang, Jianhai Zhang, Junjie Ma, Jinming Wang, Ruiyan Niu, Chiranjeevi Tikka, Yewei Wang, Jundong Wang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Air Pollution Linked Toxicity : CK(4951) : AC(731), DNA damage : CK(2255) : AC(824), Fluoride Toxicity : CK(1389) : AC(376), Kidney Damage: Chemically-Induced : CK(542) : AC(270)

**Additional Keywords** : Synergistic Toxicity : CK(226) : AC(109)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

## Evaluation of kidney injury biomarkers in an adult Mexican population environmentally exposed to fluoride and low arsenic levels.

**Pubmed Data** : Toxicol Appl Pharmacol. 2018 Aug 1 ;352:97-106. Epub 2018 May 22. PMID: [29800643](#)

**Article Published Date** : Jul 31, 2018

**Authors** : Monica I Jiménez-Córdova, Mariana Cárdenas-González, Guadalupe Aguilar-Madrid, Luz C Sanchez-Peña, Ángel Barrera-Hernández, Iván A Domínguez-Guerrero, Carmen González-Horta, Olivier C Barbier, Luz M Del Razo

**Study Type** : Human Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Kidney Damage: Chemically-Induced : CK(542) : AC(270)

**Additional Keywords** : Synergistic Toxicity : CK(226) : AC(109)

**Problem Substances** : Arsenic : CK(595) : AC(181), Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Renotoxic : CK(56) : AC(20)

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## Exposure to fluoride induces apoptosis in the liver, kidney, and heart of *Xenopus laevis*.

**Pubmed Data** : Acta Histochem. 2023 Apr ;125(3):151999. Epub 2023 Mar 9. PMID: [36905872](#)

**Article Published Date** : Mar 31, 2023

**Authors** : Siting Wang, Hongmei Ning, Liushuai Hua, Fei Ren, Lingli Chen, Zhisheng Ma, Rongbo Li, Yaming Ge, Zhihong Yin

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Chemically-Induced Liver Damage : CK(2167) : AC(1069), Fluoride Toxicity : CK(1389) : AC(376), Kidney Damage: Chemically-Induced : CK(542) : AC(270)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Hepatotoxic : CK(400) : AC(124), Renotoxic : CK(56) : AC(20)

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## Fluoride effects on cell viability and ENaC expression in kidney epithelial cells.

**Pubmed Data** : Toxicol Mech Methods. 2021 Oct ;31(8):566-571. Epub 2021 Jun 21. PMID: [34151709](#)

**Article Published Date** : Sep 30, 2021

**Authors** : Mariana R Santesso, Flávia A Oliveira, Cintia K Tokuhara, Gabriela S N Oliveira, Flávia M Levy, Lígia S Antonio, Marília A R Buzalaf, Rodrigo C Oliveira

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Kidney Damage: Chemically-Induced : CK(542) : AC(270)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Fluoride-induced hepatic and cardio-renal toxicity in a concentration-dependent manner.

**Pubmed Data** : Biol Trace Elem Res. 2023 Jan ;201(1):229-241. Epub 2022 Jan 12. PMID: [35023047](#)

**Article Published Date** : Dec 31, 2022

**Authors** : Priyanka Sharma, Pawan Kumar Verma, Shilpa Sood, Maninder Singh, Deepika Verma

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Chemically-Induced Liver Damage : CK(2167) : AC(1069), Fluoride Toxicity : CK(1389) : AC(376), Kidney Damage: Chemically-Induced : CK(542) : AC(270), Lipid Peroxidation : CK(1901) : AC(774), Oxidative Stress : CK(13443) : AC(5499)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Grape seed procyanidin extract attenuate sodium fluoride-induced oxidative damage and apoptosis in rat kidneys.

**Pubmed Data** : Biomed Environ Sci. 2020 Jun 20 ;33(6):454-457. PMID: [32641209](#)

**Article Published Date** : Jun 19, 2020

**Authors** : Er Hui Wang, Zeng Li Yu, Guan Fang Ping, De Sheng Zhai

**Study Type** : Animal Study

**Additional Links**

**Substances** : Grape Seed Extract : CK(1047) : AC(329)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Kidney Damage: Chemically-Induced : CK(542) : AC(270), Oxidative Stress : CK(13443) : AC(5499)

**Pharmacological Actions** : Anti-Apoptotic : CK(4942) : AC(3051), Renoprotective : CK(4133) : AC(1932)

**Additional Keywords** : Proanthocyanidins : CK(494) : AC(157)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Hesperidin protects liver and kidney against sodium fluoride-induced toxicity.

**Pubmed Data** : Life Sci. 2021 Sep 15 ;281:119730. Epub 2021 Jun 17. PMID: [34147482](#)

**Article Published Date** : Sep 14, 2021

**Authors** : Cuneyt Caglayan, Fatih Mehmet Kandemir, Ekrem Darendelioğlu, Sefa Küçükler, Adnan Ayna

**Study Type** : In Vitro Study

**Additional Links**

**Substances** : Hesperidin : CK(845) : AC(358)

**Diseases** : Chemically-Induced Liver Damage : CK(2167) : AC(1069), Inflammation : CK(15536) : AC(5279), Kidney Damage: Chemically-Induced : CK(542) : AC(270), Oxidative Stress : CK(13443) : AC(5499)

**Pharmacological Actions** : Anti-Apoptotic : CK(4942) : AC(3051), Anti-Inflammatory Agents : CK(35225) : AC(15297),

Antioxidants : CK(32218) : AC(14161), Hepatoprotective : CK(8320) : AC(3765), Renoprotective : CK(4133) : AC(1932)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## High fluoride exposure damages kidney and liver function, triggering oxidative stress, apoptosis, and inflammation.

**Pubmed Data** : J Oral Biol Craniofac Res. 2024 ;14(6):735-745. Epub 2024 Oct 15. PMID: [39484005](#)

**Article Published Date** : Jan 01, 2024

**Authors** : Sirigala Lavanya, Kasirajan Hema Shree, Prathiba Ramani

**Study Type** : Review

**Additional Links**

**Diseases** : Kidney Damage: Chemically-Induced : CK(542) : AC(270)

**Problem Substances** : Fluoride : CK(1815) : AC(454)

**Adverse Pharmacological Actions** : Hepatotoxic : CK(400) : AC(124)

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## N-acetylcysteine and thymoquinone have renoprotective effects of against the toxicity of fluoride via multiple mechanisms.

**Pubmed Data** : Biomed Res Int. 2018 ;2018:5614803. Epub 2018 Jun 28. PMID: [30050936](#)

**Article Published Date** : Dec 31, 2017

**Authors** : Ahlam M Alhusaini, Laila M Faddah, Naglaa F El Orabi, Iman H Hasan

**Study Type** : Animal Study

**Additional Links**

**Substances** : Cysteine (see N-Acetylcysteine) : CK(111) : AC(33), Thymoquinone : CK(1178) : AC(692)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Kidney Damage: Chemically-Induced : CK(542) : AC(270)

**Pharmacological Actions** : Anti-Inflammatory Agents : CK(35225) : AC(15297), Antioxidants : CK(32218) : AC(14161), Glutathione Upregulation : CK(357) : AC(109), Nrf2 activation : CK(2908) : AC(1762), Renoprotective : CK(4133) : AC(1932), Superoxide Dismutase Up-regulation : CK(2327) : AC(896), Tumor Necrosis Factor (TNF) Alpha Inhibitor : CK(10605) : AC(4670)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Protective effect of quercetin and ginger extract against dimethoate

## potentiated fluoride-induced nephrotoxicity.

**Pubmed Data** : Foods. 2023 May 5 ;12(9). Epub 2023 May 5. PMID: [37174437](#)

**Article Published Date** : May 04, 2023

**Authors** : Priyanka Sharma, Pawan Kumar Verma, Shilpa Sood, Rasia Yousuf, Amit Kumar, Rajinder Raina, Muhammad Asim Shabbir, Zuhaib F Bhat

**Study Type** : Animal Study

### Additional Links

**Substances** : [Ginger](#) : CK(1591) : AC(477), [Quercetin](#) : CK(1864) : AC(847)

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Kidney Damage: Chemically-Induced](#) : CK(542) : AC(270)

**Pharmacological Actions** : [Antioxidants](#) : CK(32218) : AC(14161), [Renoprotective](#) : CK(4133) : AC(1932)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Protective effect of royal jelly on fluoride-induced nephrotoxicity.

**Pubmed Data** : Biomarkers. 2022 Jun 23:1-14. Epub 2022 Jun 23. PMID: [35735023](#)

**Article Published Date** : Jun 22, 2022

**Authors** : Abdullah Aslan, Seda Beyaz, Ozlem Gok, Muhammed Ismail Can, Gozde Parlak, Ramazan Gundogdu, Ibrahim Hanifi Ozercan, Serpil Baspinar

**Study Type** : Animal Study

### Additional Links

**Substances** : [Royal Jelly](#) : CK(634) : AC(234)

**Diseases** : [Kidney Damage: Chemically-Induced](#) : CK(542) : AC(270)

**Pharmacological Actions** : [Renoprotective](#) : CK(4133) : AC(1932)

**Problem Substances** : [Fluoride](#) : CK(1815) : AC(454)

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## Rutin mitigates fluoride-induced nephrotoxicity by inhibiting ROS-mediated lysosomal membrane permeabilization.

**Pubmed Data** : Ecotoxicol Environ Saf. 2024 Apr 1 ;274:116195. Epub 2024 Mar 12. PMID: [38479315](#)

**Article Published Date** : Mar 31, 2024

**Authors** : Yue Ma, Panpan Xu, Hengrui Xing, Yue Zhang, Tingting Li, Xueman Ding, Li Liu, Qiang Niu

**Study Type** : Animal Study, In Vitro Study

### Additional Links

**Substances** : [Rutin](#) : CK(460) : AC(221)

**Diseases** : [Inflammation](#) : CK(15536) : AC(5279), [Kidney Damage: Chemically-Induced](#) : CK(542) : AC(270)

**Pharmacological Actions** : [Anti-Inflammatory Agents](#) : CK(35225) : AC(15297), [Antioxidants](#) : CK(32218) : AC(14161), [Renoprotective](#) : CK(4133) : AC(1932)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Selenium attenuates apoptosis and p-AMPK expressions in fluoride-induced NRK-52E cells.

**Pubmed Data** : Environ Sci Pollut Res Int. 2019 May ;26(15):15685-15697. Epub 2019 Apr 4. PMID: [30949948](#)

**Article Published Date** : Apr 30, 2019

**Authors** : Jiping Gao, Yu Wang, Guoqiang Xu, Jianing Wei, Kai Chang, Xiaolin Tian, Maolin Liu, Xiaoyan Yan, Meijun Huo, Guohua Song

**Study Type** : In Vitro Study

### Additional Links

**Substances** : [Selenium](#) : CK(1706) : AC(389)

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Kidney Damage: Chemically-Induced](#) : CK(542) : AC(270)

**Pharmacological Actions** : [Anti-Apoptotic](#) : CK(4942) : AC(3051), [Renoprotective](#) : CK(4133) : AC(1932)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Sodium fluoride has adverse effects in the fetal kidney during pregnancy.



**Pubmed Data** : Environ Toxicol Pharmacol. 2024 Sep ;110:104545. Epub 2024 Aug 28. PMID: [39208996](#)

**Article Published Date** : Sep 01, 2024

**Authors** : Esaú Montañez-Rodriguez, Sabino Hazael Avila-Rojas, Ariana Guadalupe Jimenez-Dorantes, Juan Carlos León-Contreras, Rogelio Hernandez-Pando, JoséManuel Arreola-Guerra, Casimiro Gerarduzzi, María Estela Meléndez-Camargo, Luz M Del Razo, Olivier Christophe Barbier

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Kidney Damage: Chemically-Induced](#) : CK(542) : AC(270)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Nephrotoxic](#) : CK(203) : AC(52)

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## Sodium fluoride induces apoptosis in the kidney of rats through caspase-mediated pathways and DNA damage.

**Pubmed Data** : J Physiol Biochem. 2014 Sep ;70(3):857-68. Epub 2014 Aug 27. PMID: [25158646](#)

**Article Published Date** : Aug 31, 2014

**Authors** : Guo Hua Song, Ji Ping Gao, Chun Fang Wang, Chao Yang Chen, Xiao Yan Yan, Min Guo, Yu Wang, Fu Bing Huang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [DNA damage](#) : CK(2255) : AC(824), [Fluoride Toxicity](#) : CK(1389) : AC(376), [Fluorosis](#) : CK(262) : AC(42), [Kidney Damage: Chemically-Induced](#) : CK(542) : AC(270)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Apoptotic](#) : CK(278) : AC(120), [Renotoxic](#) : CK(56) : AC(20)

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## Sodium fluoride induces nephrotoxicity via oxidative stress-regulated mitochondrial SIRT3 signaling pathway.

**Pubmed Data** : Sci Rep. 2017 Apr 6 ;7(1):672. Epub 2017 Apr 6. PMID: [28386112](#)

**Article Published Date** : Apr 05, 2017

**Authors** : Chao Song, Beibei Fu, Jingcheng Zhang, Jiamin Zhao, Mengke Yuan, Wei Peng, Yong Zhang, Haibo Wu

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Kidney Damage: Chemically-Induced](#) : CK(542) : AC(270), [Oxidative Stress](#) : CK(13443) : AC(5499)

**Problem Substances** : [Fluoride](#) : CK(1815) : AC(454), [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Renotoxic](#) : CK(56) : AC(20)

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## The footprints of mitochondrial fission and apoptosis in fluoride-induced renal dysfunction.

**Pubmed Data** : Biol Trace Elem Res. 2024 Sep ;202(9):4125-4135. Epub 2023 Dec 7. PMID: [38057486](#)

**Article Published Date** : Aug 31, 2024

**Authors** : Qiyong Zuo, Lin Lin, Yuling Zhang, Mohammad Mehdi Ommati, Hongwei Wang, Jing Zhao

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Kidney Damage: Chemically-Induced](#) : CK(542) : AC(270)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Apoptotic](#) : CK(278) : AC(120)

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**Lead Poisoning (AC 3) (CK 13)**



## Flouride increases lead concentrations in whole blood and in calcified tissues from lead-exposed rats.

**Pubmed Data** : Toxicology. 2010 Feb 25. Epub 2010 Feb 25. PMID: [20188782](#)

**Article Published Date** : Feb 25, 2010

**Authors** : Rosangela M M Sawan, Giselle A S Leite, Maria C P Saraiva, Fernando Barbosa, Jose E Tanus-Santos, Raquel F Gerlach

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Lead Poisoning](#) : CK(479) : AC(180)

**Problem Substances** : [Fluoride](#) : CK(1815) : AC(454), [Lead](#) : CK(684) : AC(227)

## Fluoridation of water contributes to elevated blood levels and other disorders in children.

**Pubmed Data** : Neurotoxicology. 2007 Sep;28(5):1032-42. Epub 2007 Mar 1. PMID: [17420053](#)

**Article Published Date** : Sep 01, 2007

**Authors** : Myron J Coplan, Steven C Patch, Roger D Masters, Marcia S Bachman

**Study Type** : Human Study

**Additional Links**

**Diseases** : [Childhood Chemical Exposures](#) : CK(165) : AC(17), [Lead Poisoning](#) : CK(479) : AC(180)

**Additional Keywords** : [Fluoride In The Water](#) : CK(13) : AC(3)

**Problem Substances** : [Fluoride](#) : CK(1815) : AC(454)

## Lead enhances fluoride influence on apoptotic processes in the HepG2 liver cell line.

**Pubmed Data** : Toxicol Ind Health. 2016 Mar ;32(3):517-25. Epub 2013 Nov 5. PMID: [24193047](#)

**Article Published Date** : Feb 29, 2016

**Authors** : Izabela Gutowska, Irena Baranowska-Bosiacka, Ewa Siwiec, Małgorzata Szczuko, Agnieszka Kolasa, Anna Kondarewicz, Marta Rybicka, Małgorzata Dunaj-Stańczyk, Ireneusz Wiernicki, Dariusz Chlubek, Ewa Stachowska

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : [Chemically-Induced Liver Damage](#) : CK(2167) : AC(1069), [Fluoride Toxicity](#) : CK(1389) : AC(376), [Lead Poisoning](#) : CK(479) : AC(180)

**Additional Keywords** : [Synergistic Toxicity](#) : CK(226) : AC(109)

**Problem Substances** : [Fluoride](#) : CK(1815) : AC(454), [Lead](#) : CK(684) : AC(227), [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Hepatotoxic](#) : CK(400) : AC(124)

## Learning disorders (AC 18) (CK 106)

### A review of the effects of chronic fluorosis on the brain.

**Pubmed Data** : Ecotoxicol Environ Saf. 2022 Oct 1 ;244:114021. Epub 2022 Aug 29. PMID: [36049331](#)

**Article Published Date** : Sep 30, 2022

**Authors** : Chao Ren, Hui-Hua Li, Cai-Yi Zhang, Xi-Cheng Song

**Study Type** : Review

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Fluorosis](#) : CK(262) : AC(42), [Learning disorders](#) : CK(517) : AC(155), [Memory Disorders](#) : CK(1570) : AC(514), [Oxidative Stress](#) : CK(13443) : AC(5499)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Neurotoxic](#) : CK(2838) : AC(702)

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## Autophagy may be involved in fluoride-induced learning impairment in rats.

**Pubmed Data** : Biol Trace Elem Res. 2020 Feb ;193(2):502-507. Epub 2019 May 20. PMID: [31111310](#)

**Article Published Date** : Jan 31, 2020

**Authors** : Chengzhi Zhang, Simeng Huo, Yumei Fan, Yanhui Gao, Yanmei Yang, Dianjun Sun

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Learning disorders : CK(517) : AC(155), Neurodegenerative Diseases : CK(12159) : AC(4162)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Children with fluorosis in coal-burning areas had impaired IQ and obviously had impaired verbal intelligence quotient.

**Pubmed Data** : Biol Trace Elem Res. 2021 Feb ;199(2):482-489. Epub 2020 May 3. PMID: [32363519](#)

**Article Published Date** : Jan 31, 2021

**Authors** : Didong Lou, Yan Luo, Jing Liu, Dan Zheng, Rongrong Ma, Fangping Chen, Yanni Yu, Zhizhong Guan

**Study Type** : Human Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Learning disorders : CK(517) : AC(155)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Concentration of Fluoride in the ingested water was significantly associated with the IQ of children.

**Pubmed Data** : J Int Soc Prev Community Dent. 2017 ;7(5):252-258. Epub 2017 Sep 18. PMID: [29026697](#)

**Article Published Date** : Dec 31, 2016

**Authors** : Priyanka Razdan, Basavaraj Patthi, Jishnu Krishna Kumar, Nikhil Agnihotri, Prajakta Chaudhari, Monika Prasad

**Study Type** : Human Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Intelligence Quotient (IQ): Low/Impaired : CK(312) : AC(27), Learning disorders : CK(517) : AC(155)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Development of nonverbal abilities in males may be more vulnerable to prenatal fluoride exposure than language or motor abilities, even at levels within the recommended intake range.

**Pubmed Data** : Neurotoxicology. 2021 Dec ;87:86-93. Epub 2021 Aug 31. PMID: [34478773](#)

**Article Published Date** : Nov 30, 2021

**Authors** : Alejandra Cantoral, Martha M Téllez-Rojo, Ashley J Malin, Lourdes Schnaas, Erika Osorio-Valencia, Adriana Mercado, EÁngeles Martínez-Mier, Robert O Wright, Christine Till

**Study Type** : Human Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Learning disorders : CK(517) : AC(155)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Effects of neuron autophagy induced by arsenic and fluoride on spatial learning and memory in offspring rats.

**Pubmed Data** : Chemosphere. 2022 Dec ;308(Pt 2):136341. Epub 2022 Sep 7. PMID: [36087721](#)

**Article Published Date** : Nov 30, 2022

**Authors** : Qiuyi Zhao, Weizhe Pan, Jia Li, Shengnan Yu, Yan Liu, Xiaoli Zhang, Ruodi Qu, Qian Zhang, Ben Li, Xiaoyan Yan, Xuefeng Ren, Yulan Qiu

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Learning disorders](#) : CK(517) : AC(155), [Memory Disorders](#) : CK(1570) : AC(514), [Neurodegenerative Diseases](#) : CK(12159) : AC(4162), [Prenatal Chemical Exposures](#) : CK(2428) : AC(530)

**Problem Substances** : [Arsenic](#) : CK(595) : AC(181), [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Neurotoxic](#) : CK(2838) : AC(702)

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## Excessive fluoride exposure may have adverse effects on children's intelligence.

**Pubmed Data** : Chin Med J (Engl). 2022 Aug 5 ;135(15):1846-1854. Epub 2022 Aug 5. PMID: [35838408](#)

**Article Published Date** : Aug 04, 2022

**Authors** : Zichen Feng, Ning An, Fangfang Yu, Jun Ma, Na Li, Yuhui Du, Meng Guo, Kaihong Xu, Xiangbo Hou, Zhiyuan Li, Guoyu Zhou, Yue Ba

**Study Type** : Human Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Learning disorders](#) : CK(517) : AC(155)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Fluoride and arsenic exposure impairs learning and memory and decreases mGluR5 expression in the hippocampus and cortex in rats.

**Pubmed Data** : PLoS One. 2014 ;9(4):e96041. Epub 2014 Apr 23. PMID: [24759735](#)

**Article Published Date** : Dec 31, 2013

**Authors** : Shoufang Jiang, Jing Su, Sanqiao Yao, Yanshu Zhang, Fuyuan Cao, Fei Wang, Huihui Wang, Jun Li, Shuhua Xi

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Learning disorders](#) : CK(517) : AC(155), [Memory Disorders](#) : CK(1570) : AC(514)

**Additional Keywords** : [Synergistic Toxicity](#) : CK(226) : AC(109)

**Problem Substances** : [Arsenic](#) : CK(595) : AC(181), [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Neurotoxic](#) : CK(2838) : AC(702)

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## Fluoride exposure during development affects both cognition and emotion in mice.

**Pubmed Data** : Physiol Behav. 2014 Jan 30 ;124:1-7. Epub 2013 Oct 30. PMID: [24184405](#)

**Article Published Date** : Jan 29, 2014

**Authors** : Fei Liu, Jing Ma, Hui Zhang, Peng Liu, You-Ping Liu, Bo Xing, Yong-Hui Dang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Learning disorders](#) : CK(517) : AC(155), [Prenatal Chemical Exposures](#) : CK(2428) : AC(530)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Fluoride is inversely associated with intelligence.

**Pubmed Data** : Environ Int. 2021 Oct ;155:106681. Epub 2021 Jun 4. PMID: [34098334](#)

**Article Published Date** : Sep 30, 2021

**Authors** : Xingchen Yu, Lu Xia, Shun Zhang, Guoyu Zhou, Yonggang Li, Hongliang Liu, Changchun Hou, Qian Zhao, Lixin Dong, Yushan Cui, Qiang Zeng, Aiguo Wang, Li Liu

**Study Type** : Human Study

#### Additional Links

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Learning disorders](#) : CK(517) : AC(155)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Impairment of learning and memory in mouse offspring induced by perinatal fluoride exposure may partly result from the enhanced miR-124 and miR-132.

**Pubmed Data** : Chemosphere. 2018 Jan 8 ;197:117-122. Epub 2018 Jan 8. PMID: [29334651](#)

**Article Published Date** : Jan 07, 2018

**Authors** : Jixiang Wang, Yuliang Zhang, Zhenzhen Guo, Rui Li, Xingchen Xue, Zilong Sun, Ruiyan Niu

**Study Type** : Animal Study

#### Additional Links

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Learning disorders](#) : CK(517) : AC(155), [Prenatal Chemical Exposures](#) : CK(2428) : AC(530)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Iodine status modifies the association between fluoride exposure in pregnancy and preschool boys' intelligence.

**Pubmed Data** : Nutrients. 2022 Jul 16 ;14(14). Epub 2022 Jul 16. PMID: [35889877](#)

**Article Published Date** : Jul 15, 2022

**Authors** : Carly V Goodman, Meaghan Hall, Rivka Green, Jonathan Chevrier, Pierre Ayotte, Esperanza Angeles Martinez-Mier, Taylor McGuckin, John Krzeczowski, David Flora, Richard Hornung, Bruce Lanphear, Christine Till

**Study Type** : Human Study

#### Additional Links

**Substances** : [Iodine](#) : CK(182) : AC(32)

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Iodine Deficiency](#) : CK(110) : AC(18), [Learning disorders](#) : CK(517) : AC(155)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Neurotoxic](#) : CK(2838) : AC(702)

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## Low-to-moderate fluoride exposure was associated with dysfunction of cholinergic system for children.

**Pubmed Data** : Ecotoxicol Environ Saf. 2021 Nov 20 ;228:112959. Epub 2021 Nov 20. PMID: [34808511](#)

**Article Published Date** : Nov 19, 2021

**Authors** : Sumei Wang, Qian Zhao, Gaochun Li, Mengwei Wang, Hongliang Liu, Xingchen Yu, Jingwen Chen, Pei Li, Lixin Dong, Guoyu Zhou, Yushan Cui, Mengru Wang, Li Liu, Aiguo Wang

**Study Type** : Human Study

#### Additional Links

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Learning disorders](#) : CK(517) : AC(155)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Neurotoxic](#) : CK(2838) : AC(702)

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## Maternal fluoride exposure during gestation and lactation decreased learning and memory ability of mouse pups.

**Pubmed Data** : Hum Exp Toxicol. 2018 Jan ;37(1):87-93. Epub 2017 Feb 13. PMID: [29187078](#)

**Article Published Date** : Dec 31, 2017

**Authors** : Z Sun, Y Zhang, X Xue, R Niu, J Wang

**Study Type** : Animal Study

#### Additional Links

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Learning disorders](#) : CK(517) : AC(155), [Prenatal Chemical Exposures](#) : CK(2428) : AC(530)

**Additional Keywords** : [Risk Factors](#) : CK(14728) : AC(2072)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## NaF-induced neurotoxicity via activation of the IL-1 $\beta$ /JNK signaling pathway.

**Pubmed Data** : Toxicology. 2022 Mar 15 ;469:153132. Epub 2022 Feb 13. PMID: [35172196](#)

**Article Published Date** : Mar 14, 2022

**Authors** : Chengzhi Zhang, Yanmei Yang, Yanhui Gao, Dianjun Sun

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Inflammation : CK(15536) : AC(5279), Learning disorders : CK(517) : AC(155)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Prenatal fluoride exposure and cognitive outcomes in children at 4 and 6-12 years of age in Mexico.

**Pubmed Data** : Environ Health Perspect. 2017 Sep 19 ;125(9):097017. Epub 2017 Sep 19. PMID: [28937959](#)

**Article Published Date** : Sep 18, 2017

**Authors** : Morteza Bashash, Deena Thomas, Howard Hu, E Angeles Martinez-Mier, Brisa N Sanchez, Niladri Basu, Karen E Peterson, Adrienne S Ettinger, Robert Wright, Zhenzhen Zhang, Yun Liu, Lourdes Schnaas, Adriana Mercado-García, Martha María Téllez-Rojo, Mauricio Hernández-Avila

**Study Type** : Human Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Learning disorders : CK(517) : AC(155), Prenatal Chemical Exposures : CK(2428) : AC(530)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Systematic review of epidemiological and toxicological evidence on health effects of fluoride in drinking water.

**Pubmed Data** : Crit Rev Toxicol. 2024 Feb 6:1-33. Epub 2024 Feb 6. PMID: [38318766](#)

**Article Published Date** : Feb 05, 2024

**Authors** : Mohamed Kadry Taher, Franco Momoli, Jennifer Go, Shintaro Hagiwara, Siva Ramoju, Xuefeng Hu, Natalie Jensen, Rowan Terrell, Alex Hemmerich, Daniel Krewski

**Study Type** : Review

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Learning disorders : CK(517) : AC(155), Neurodevelopmental Disorders : CK(470) : AC(85)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## The influence of fluoride in drinking water on the incidence of fluorosis and intelligence of elementary school students in Palu City.

**Pubmed Data** : Gac Sanit. 2021 ;35 Suppl 2:S159-S163. PMID: [34929801](#)

**Article Published Date** : Dec 31, 2020

**Authors** : Sri Indah Yani, Arifin Seweng, Anwar Mallongi, Rosmala Nur, Muh Tahir Abdullah, Ummu Salmah, Saifudin Sirajuddin, Muhammad Basir-Cyio, Mahfudz, Alam Anshary

**Study Type** : Human Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Learning disorders : CK(517) : AC(155)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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# Lipid Peroxidation (AC 7) (CK 13)

## Aluminum appears to enhance the neurotoxic hazards caused by fluoride.

**Pubmed Data** : Drug Chem Toxicol. 2009 ;32(3):215-21. PMID: [19538017](#)

**Article Published Date** : Dec 31, 2008

**Authors** : Tanzeer Kaur, Rakesh K Bijarnia, Bimla Nehru

**Study Type** : Animal Study

### Additional Links

**Diseases** : Aluminum Toxicity : CK(685) : AC(308), Lipid Peroxidation : CK(1901) : AC(774), Oxidative Stress : CK(13443) : AC(5499)

**Additional Keywords** : Synergistic Toxicity : CK(226) : AC(109)

**Problem Substances** : Aluminum : CK(1061) : AC(349), Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

## Curcumin attenuates neurotoxicity induced by fluoride: An in vivo evidence.

**Pubmed Data** : Pharmacogn Mag. 2014 Jan ;10(37):61-5. PMID: [24696547](#)

**Article Published Date** : Dec 31, 2013

**Authors** : Chhavi Sharma, Pooja Suhalka, Piyu Sukhwal, Neha Jaiswal, Maheep Bhatnagar

**Study Type** : Animal Study

### Additional Links

**Substances** : Curcumin : CK(6902) : AC(3215)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Lipid Peroxidation : CK(1901) : AC(774), Oxidative Stress : CK(13443) : AC(5499)

**Pharmacological Actions** : Neuroprotective Agents : CK(17667) : AC(7641)

**Problem Substances** : Fluoride : CK(1815) : AC(454), Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

## Fluoride exposure during pregnancy and lactation triggers oxidative stress and molecular changes in hippocampus of offspring rats.

**Pubmed Data** : Ecotoxicol Environ Saf. 2021 Jan 15 ;208:111437. Epub 2020 Oct 20. PMID: [33096359](#)

**Article Published Date** : Jan 14, 2021

**Authors** : Maria Karolina Martins Ferreira, Walessa Alana Bragança Aragão, Leonardo Oliveira Bittencourt, Bruna Puty, Aline Dionizio, Michel Platini Caldas de Souza, Marília Afonso Rabelo Buzalaf, Edivaldo Herculano de Oliveira, Maria Elena Crespo-Lopez, Rafael Rodrigues Lima

**Study Type** : Animal Study

### Additional Links

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Lipid Peroxidation : CK(1901) : AC(774), Oxidative Stress : CK(13443) : AC(5499), Prenatal Chemical Exposures : CK(2428) : AC(530)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

## Fluoride-induced hepatic and cardio-renal toxicity in a concentration-dependent manner.

**Pubmed Data** : Biol Trace Elem Res. 2023 Jan ;201(1):229-241. Epub 2022 Jan 12. PMID: [35023047](#)

**Article Published Date** : Dec 31, 2022

**Authors** : Priyanka Sharma, Pawan Kumar Verma, Shilpa Sood, Maninder Singh, Deepika Verma

**Study Type** : Animal Study

### Additional Links

**Diseases** : Chemically-Induced Liver Damage : CK(2167) : AC(1069), Fluoride Toxicity : CK(1389) : AC(376), Kidney Damage: Chemically-Induced : CK(542) : AC(270), Lipid Peroxidation : CK(1901) : AC(774), Oxidative Stress : CK(13443) :

AC(5499)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Fluorosilicic acid induces DNA damage and oxidative stress in bone marrow mesenchymal stem cells.

**Pubmed Data** : Mutat Res Genet Toxicol Environ Mutagen. 2021 ;861-862:503297. Epub 2020 Nov 21. PMID: [33551106](#)

**Article Published Date** : Dec 31, 2020

**Authors** : Ana L H Garcia, Juliana Picinini, Maiele D Silveira, Melissa Camassola, Ana P V Visentim, Mirian Salvador, Juliana da Silva

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : DNA damage : CK(2255) : AC(824), Fluoride Toxicity : CK(1389) : AC(376), Lipid Peroxidation : CK(1901) : AC(774), Oxidative Stress : CK(13443) : AC(5499)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Purple corn anthocyanins protect against fluoride-induced oxidative damage of liver and kidney in rats.

**Pubmed Data** : Int J Environ Res Public Health. 2014 Jan 13 ;11(1):1020-33. Epub 2014 Jan 13. PMID: [24419046](#)

**Article Published Date** : Jan 12, 2014

**Authors** : Zhuo Zhang, Bo Zhou, Hiaohong Wang, Fei Wang, Yingli Song, Shengnan Liu, Shuhua Xi

**Study Type** : Animal Study

**Additional Links**

**Substances** : Corn: Purple : CK(32) : AC(18)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Lipid Peroxidation : CK(1901) : AC(774), Oxidative Stress : CK(13443) : AC(5499)

**Pharmacological Actions** : Antioxidants : CK(32218) : AC(14161), Hepatoprotective : CK(8320) : AC(3765), Renoprotective : CK(4133) : AC(1932)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Rutin attenuates neurobehavioral deficits, oxidative stress, neuro-inflammation and apoptosis in fluoride treated rats.

**Pubmed Data** : Neurosci Lett. 2018 Aug 24 ;682:92-99. Epub 2018 Jun 13. PMID: [29908257](#)

**Article Published Date** : Aug 23, 2018

**Authors** : Kpobari W Nkpaa, Godspower I Onyeso

**Study Type** : Animal Study

**Additional Links**

**Substances** : Rutin : CK(460) : AC(221)

**Diseases** : Inflammation : CK(15536) : AC(5279), Lipid Peroxidation : CK(1901) : AC(774), Oxidative Stress : CK(13443) : AC(5499)

**Pharmacological Actions** : Anti-Apoptotic : CK(4942) : AC(3051), Antioxidants : CK(32218) : AC(14161), Neuroprotective Agents : CK(17667) : AC(7641)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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**Low Immune Function: Chemically-Induced (AC 1) (CK 2)**



## Fluoride induces immunotoxicity by regulating riboflavin transport and metabolism partly through IL-17A in the spleen.

**Pubmed Data** : J Hazard Mater. 2024 Sep 5 ;476:135085. Epub 2024 Jul 2. PMID: [38968825](#)

**Article Published Date** : Sep 05, 2024

**Authors** : Yurou Qiao, Yukun Cui, Yanjia Tan, Cuicui Zhuang, Xiang Li, Yufei Yong, Xinying Zhang, Xuting Ren, Miaomiao Cai, Jie Yang, Yilin Lang, Jundong Wang, Chen Liang, Jianhai Zhang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Drug-Induced Nutrient Depletion: Riboflavin (B-2) : CK(2) : AC(1), Low Immune Function: Chemically-Induced : CK(4) : AC(2), Mitochondrial Dysfunction : CK(618) : AC(262), Spleen Damage: Chemically Induced : CK(2) : AC(9)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Immunotoxic : CK(507) : AC(127)

## Low Testosterone (AC 2) (CK 3)

### Ameliorative effects of nano Moringa on fluoride-induced testicular damage via down regulation of the StAR gene and altered steroid hormones.

**Pubmed Data** : Reprod Biol. 2022 Dec 21 ;23(1):100724. Epub 2022 Dec 21. PMID: [36563520](#)

**Article Published Date** : Dec 21, 2022

**Authors** : Entsar R Abd-Allah, Heba Ali Abd El-Rahman

**Study Type** : Animal Study

**Additional Links**

**Substances** : Moringa oleifera : CK(748) : AC(377)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Low Testosterone : CK(852) : AC(140), Sperm Quality: Low : CK(611) : AC(121)

**Problem Substances** : Fluoride : CK(1815) : AC(454)

### Sodium fluoride disrupts testosterone biosynthesis by affecting the steroidogenic pathway in TM3 Leydig cells.

**Pubmed Data** : Chemosphere. 2018 Dec ;212:447-455. Epub 2018 Aug 22. PMID: [30165274](#)

**Article Published Date** : Nov 30, 2018

**Authors** : Banu Orta Yilmaz, Ahu Korkut, Melike Erkan

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Low Testosterone : CK(852) : AC(140), Testicular Injury: Chemical/Metal Induced : CK(754) : AC(374)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

## Lung Damage (AC 1) (CK 2)

### Royal jelly regulates the caspase, Bax and COX-2, TNF- $\alpha$ protein



## pathways in the fluoride exposed lung damage in rats.

**Pubmed Data** : Tissue Cell. 2022 Feb 7 ;76:101754. Epub 2022 Feb 7. PMID: [35158127](#)

**Article Published Date** : Feb 06, 2022

**Authors** : Abdullah Aslan, Ozlem Gok, Seda Beyaz, Muhammed Ismail Can, Gozde Parlak, Ramazan Gundogdu, Ibrahim Hanifi Ozercan, Serpil Baspinar

**Study Type** : Animal Study

### Additional Links

**Substances** : Royal Jelly : CK(634) : AC(234)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Lung Damage : CK(390) : AC(167)

**Pharmacological Actions** : Anti-Inflammatory Agents : CK(35225) : AC(15297), Cyclooxygenase 2 Inhibitors : CK(2067) : AC(1279), Tumor Necrosis Factor (TNF) Alpha Inhibitor : CK(10605) : AC(4670)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

## Male Reproductive Development Abnormalities (AC 1) (CK 2)

### Developmental sodium fluoride exposure induced an enhanced testicular apoptosis in rats.

**Pubmed Data** : Environ Pollut. 2016 Jan 31 ;212:97-104. Epub 2016 Jan 31. PMID: [26840522](#)

**Article Published Date** : Jan 30, 2016

**Authors** : Shun Zhang, Qiang Niu, Hui Gao, Rulin Ma, Rongrong Lei, Cheng Zhang, Tao Xia, Pei Li, Chunyan Xu, Chao Wang, Jingwen Chen, Lixing Dong, Qian Zhao, Aiguo Wang

**Study Type** : Animal Study

### Additional Links

**Diseases** : Male Reproductive Development Abnormalities : CK(91) : AC(47)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

## Memory Disorders (AC 11) (CK 21)

### A review of the effects of chronic fluorosis on the brain.

**Pubmed Data** : Ecotoxicol Environ Saf. 2022 Oct 1 ;244:114021. Epub 2022 Aug 29. PMID: [36049331](#)

**Article Published Date** : Sep 30, 2022

**Authors** : Chao Ren, Hui-Hua Li, Cai-Yi Zhang, Xi-Cheng Song

**Study Type** : Review

### Additional Links

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Fluorosis : CK(262) : AC(42), Learning disorders : CK(517) : AC(155), Memory Disorders : CK(1570) : AC(514), Oxidative Stress : CK(13443) : AC(5499)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

### Effect of hesperidin on fluoride-induced neurobehavioral and biochemical changes in rats.

**Pubmed Data** : J Biochem Mol Toxicol. 2020 Nov ;34(11):e22575. Epub 2020 Jul 5. PMID: [32627286](#)

**Article Published Date** : Oct 31, 2020

**Authors** : Pawan Jaiswal, Mukesh Mandal, Awanish Mishra

**Study Type** : Animal Study

**Additional Links**

**Substances** : [Hesperidin](#) : CK(845) : AC(358)

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Memory Disorders](#) : CK(1570) : AC(514)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Neurotoxic](#) : CK(2838) : AC(702)

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## Effects of neuron autophagy induced by arsenic and fluoride on spatial learning and memory in offspring rats.

**Pubmed Data** : Chemosphere. 2022 Dec ;308(Pt 2):136341. Epub 2022 Sep 7. PMID: [36087721](#)

**Article Published Date** : Nov 30, 2022

**Authors** : Qiuyi Zhao, Weizhe Pan, Jia Li, Shengnan Yu, Yan Liu, Xiaoli Zhang, Ruodi Qu, Qian Zhang, Ben Li, Xiaoyan Yan, Xuefeng Ren, Yulan Qiu

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Learning disorders](#) : CK(517) : AC(155), [Memory Disorders](#) : CK(1570) : AC(514), [Neurodegenerative Diseases](#) : CK(12159) : AC(4162), [Prenatal Chemical Exposures](#) : CK(2428) : AC(530)

**Problem Substances** : [Arsenic](#) : CK(595) : AC(181), [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Neurotoxic](#) : CK(2838) : AC(702)

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## Exercise alleviates fluoride-induced learning and memory impairment.

**Pubmed Data** : Biol Trace Elem Res. 2024 Jan 20. Epub 2024 Jan 20. PMID: [38244175](#)

**Article Published Date** : Jan 19, 2024

**Authors** : Lei Chai, Qiqi Cao, Ke Liu, Run Zhu, Hao Li, Yanghuan Yu, Jixiang Wang, Ruiyan Niu, Ding Zhang, Bo Yang, Mohammad Mehdi Ommati, Zilong Sun

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Memory Disorders](#) : CK(1570) : AC(514)

**Therapeutic Actions** : [Exercise](#) : CK(6247) : AC(999)

**Pharmacological Actions** : [Neuroprotective Agents](#) : CK(17667) : AC(7641)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Neurotoxic](#) : CK(2838) : AC(702)

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## Fluoride and arsenic exposure affects spatial memory and activates the ERK/CREB signaling pathway in offspring rats.

**Pubmed Data** : Neurotoxicology. 2017 Mar ;59:56-64. Epub 2017 Jan 15. PMID: [28099871](#)

**Article Published Date** : Feb 28, 2017

**Authors** : Yu-Peng Zhu, Shu-Hua Xi, Ming-Yan Li, Ting-Ting Ding, Nan Liu, Fu-Yuan Cao, Yang Zeng, Xiao-Jing Liu, Jun-Wang Tong, Shou-Fang Jiang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Memory Disorders](#) : CK(1570) : AC(514)

**Additional Keywords** : [Synergistic Toxicity](#) : CK(226) : AC(109)

**Problem Substances** : [Arsenic](#) : CK(595) : AC(181), [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Fluoride and arsenic exposure impairs learning and memory and decreases mGluR5 expression in the hippocampus and cortex in rats.

**Pubmed Data** : PLoS One. 2014 ;9(4):e96041. Epub 2014 Apr 23. PMID: [24759735](#)

**Article Published Date** : Dec 31, 2013

**Authors** : Shoufang Jiang, Jing Su, Sanqiao Yao, Yanshu Zhang, Fuyuan Cao, Fei Wang, Huihui Wang, Jun Li, Shuhua Xi

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Learning disorders : CK(517) : AC(155), Memory Disorders : CK(1570) : AC(514)

**Additional Keywords** : Synergistic Toxicity : CK(226) : AC(109)

**Problem Substances** : Arsenic : CK(595) : AC(181), Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Lactobacillus johnsonii BS15 improves intestinal environment against fluoride-induced memory impairment.

**Pubmed Data** : PeerJ. 2020 ;8:e10125. Epub 2020 Oct 7. PMID: [33083147](#)

**Article Published Date** : Dec 31, 2019

**Authors** : Jinge Xin, Dong Zeng, Hesong Wang, Ning Sun, Abdul Khaliq, Ying Zhao, Liqian Wu, Kangcheng Pan, Bo Jing, Xueqin Ni

**Study Type** : Animal Study

**Additional Links**

**Substances** : Lactobacillus probiotics : CK(5310) : AC(1187)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Memory Disorders : CK(1570) : AC(514)

**Pharmacological Actions** : Gastrointestinal Agents : CK(6875) : AC(2212), Neuroprotective Agents : CK(17667) : AC(7641)

**Additional Keywords** : Gut-brain Axis : CK(675) : AC(281)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Low glucose utilization and neurodegenerative changes caused by sodium fluoride exposure in rat's developmental brain.

**Pubmed Data** : Neuromolecular Med. 2014 Mar ;16(1):94-105. Epub 2013 Aug 28. PMID: [23982469](#)

**Article Published Date** : Feb 28, 2014

**Authors** : Chunyang Jiang, Shun Zhang, Hongliang Liu, Zhizhong Guan, Qiang Zeng, Cheng Zhang, Rongrong Lei, Tao Xia, Zhenglun Wang, Lu Yang, Yihu Chen, Xue Wu, Xiaofei Zhang, Yushan Cui, Linyu Yu, Aiguo Wang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Memory Disorders : CK(1570) : AC(514)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Memory impairment induced by sodium fluoride is associated with changes in brain monoamine levels.

**Pubmed Data** : Neurotox Res. 2011 Jan ;19(1):55-62. Epub 2009 Dec 3. PMID: [19957215](#)

**Article Published Date** : Dec 31, 2010

**Authors** : Marcela Pereira, Patrícia A Dombrowski, Estela M Losso, Lea R Chioca, Cláudio Da Cunha, Roberto Andreatini

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Memory Disorders : CK(1570) : AC(514)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Probiotic alleviate fluoride-induced memory impairment by reconstructing gut microbiota in mice.

**Pubmed Data** : Ecotoxicol Environ Saf. 2021 Jun 1 ;215:112108. Epub 2021 Mar 30. PMID: [33799132](#)

**Article Published Date** : May 31, 2021

**Authors** : Jinge Xin, Hesong Wang, Ning Sun, Shamsuddin Bughio, Dong Zeng, Lianxin Li, Yanyan Wang, Abdul Khaliq, Yan Zeng, Kangcheng Pan, Bo Jing, Hailin Ma, Yang Bai, Xueqin Ni

**Study Type** : Animal Study

**Additional Links**

**Substances** : Probiotics : CK(9684) : AC(1696)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Memory Disorders : CK(1570) : AC(514)

**Pharmacological Actions** : Tumor Necrosis Factor (TNF) Alpha Inhibitor : CK(10605) : AC(4670)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

## Prolonged fluoride exposure induces spatial-memory deficit and hippocampal dysfunction by inhibiting small heat shock protein 22 in mice.

**Pubmed Data** : J Hazard Mater. 2023 Aug 15 ;456:131595. Epub 2023 May 7. PMID: [37224709](#)

**Article Published Date** : Aug 14, 2023

**Authors** : Jinge Xin, Bin Zhu, Hesong Wang, Yong Zhang, Ning Sun, Xi Cao, Liqin Zheng, Yanxi Zhou, Jing Fang, Bo Jing, Kangcheng Pan, Yan Zeng, Dong Zeng, Fali Li, Yang Xia, Peng Xu, Xueqin Ni

**Study Type** : Animal Study

### Additional Links

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Memory Disorders : CK(1570) : AC(514)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

## Metabolic Diseases (AC 1) (CK 10)

### Elevated serum fluoride levels in perimenopausal women are related to the components of metabolic syndrome.

**Pubmed Data** : Eur Rev Med Pharmacol Sci. 2021 Sep ;25(17):5474-5482. PMID: [34533791](#)

**Article Published Date** : Aug 31, 2021

**Authors** : D Schneider-Matyka, I Gutowska, M Panczyk, E Grochans, M Szkup

**Study Type** : Human Study

### Additional Links

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Hypertension : CK(8603) : AC(1329), Metabolic Diseases : CK(1252) : AC(263)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

## Microplastic Toxicity (AC 1) (CK 1)

### Fluoride enhances polystyrene nanoparticles cytotoxicity in colonocytes in vitro model.

**Pubmed Data** : Chem Biol Interact. 2022 Nov 1 ;367:110169. Epub 2022 Sep 20. PMID: [36165825](#)

**Article Published Date** : Oct 31, 2022

**Authors** : Karol P Steckiewicz, Anna Adamska, Magdalena Narajczyk, Elżbieta Megiel, Iwona Inkielewicz-Stepniak

**Study Type** : In Vitro Study

### Additional Links

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Microplastic Toxicity : CK(714) : AC(342)

**Additional Keywords** : Synergistic Toxicity : CK(226) : AC(109)

**Problem Substances** : Nano Plastic-and Micro-Particles : CK(198) : AC(91), Polystyrene nanoparticles : CK(427) : AC(212), Sodium Fluoride : CK(1446) : AC(393)

## Mineral Deficiencies (AC 1) (CK 2)

### Fluoride Ingestion Impairs Mineral Absorption by Forming Chelating Macromolecular Complexes in the Gut.

**Pubmed Data** : Biol Trace Elem Res. 2024 Oct 8. Epub 2024 Oct 8. PMID: [39377957](#)

**Article Published Date** : Oct 08, 2024

**Authors** : Saba Sarwar, Javed Ahsan Quadri, A Shariff

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Mineral Deficiencies](#) : CK(1175) : AC(153)

**Problem Substances** : [Fluoride](#) : CK(1815) : AC(454)

## Mitochondrial Diseases (AC 1) (CK 1)

### Fluoride-induced mitochondrial dysfunction.

**Pubmed Data** : Biol Trace Elem Res. 2024 Mar ;202(3):835-849. Epub 2023 Jun 10. PMID: [37300595](#)

**Article Published Date** : Feb 29, 2024

**Authors** : Sachindra Kumar, Smita Shenoy, Ravindra Shantakumar Swamy, V Ravichandiran, Nitesh Kumar

**Study Type** : Review

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Mitochondrial Diseases](#) : CK(607) : AC(262), [Oxidative Stress](#) : CK(13443) : AC(5499)

**Pharmacological Actions** : [Apoptotic](#) : CK(9052) : AC(7284)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

## Mitochondrial Dysfunction (AC 10) (CK 16)

### Effect of fluoride on cytotoxicity involved in mitochondrial dysfunction.

**Pubmed Data** : Front Vet Sci. 2022 ;9:850771. Epub 2022 Apr 19. PMID: [35518640](#)

**Article Published Date** : Dec 31, 2021

**Authors** : Mingbang Wei, Yourong Ye, Muhammad Muddassir Ali, Yangzom Chamba, Jia Tang, Peng Shang

**Study Type** : Review

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Mitochondrial Dysfunction](#) : CK(618) : AC(262)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

### Effects of fluoride exposure on mitochondrial function: Energy metabolism, dynamics, biogenesis and mitophagy.

**Pubmed Data** : Environ Toxicol Pharmacol. 2022 Aug ;94:103916. Epub 2022 Jun 20. PMID: [35738460](#)

**Article Published Date** : Jul 31, 2022

**Authors** : Sabino Hazael Avila-Rojas, Omar Emiliano Aparicio-Trejo, Marco Antonio Sanchez-Guerra, Olivier Christophe Barbier

**Study Type** : Review

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Mitochondrial Dysfunction : CK(618) : AC(262), Oxidative Stress : CK(13443) : AC(5499)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Fluoride exposure induces mitochondrial damage and mitophagy via activation of the IL-17A pathway in hepatocytes.

**Pubmed Data** : Sci Total Environ. 2022 Jan 15 ;804:150184. Epub 2021 Sep 8. PMID: [34517333](#)

**Article Published Date** : Jan 14, 2022

**Authors** : Yangfei Zhao, Jinming Wang, Jianhai Zhang, Zilong Sun, Ruiyan Niu, Ram Kumar Manthari, Mohammad Mehdi Ommati, Shaolin Wang, Jundong Wang

**Study Type** : Animal Study, In Vitro Study

**Additional Links**

**Diseases** : Chemically-Induced Liver Damage : CK(2167) : AC(1069), Fluoride Toxicity : CK(1389) : AC(376), Mitochondrial Dysfunction : CK(618) : AC(262)

**Problem Substances** : Fluoride : CK(1815) : AC(454), Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Hepatotoxic : CK(400) : AC(124)

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## Fluoride induces immunotoxicity by regulating riboflavin transport and metabolism partly through IL-17A in the spleen.

**Pubmed Data** : J Hazard Mater. 2024 Sep 5 ;476:135085. Epub 2024 Jul 2. PMID: [38968825](#)

**Article Published Date** : Sep 05, 2024

**Authors** : Yurou Qiao, Yukun Cui, Yanjia Tan, Cuicui Zhuang, Xiang Li, Yufei Yong, Xinying Zhang, Xuting Ren, Miaomiao Cai, Jie Yang, Yilin Lang, Jundong Wang, Chen Liang, Jianhai Zhang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Drug-Induced Nutrient Depletion: Riboflavin (B-2) : CK(2) : AC(1), Low Immune Function: Chemically-Induced : CK(4) : AC(2), Mitochondrial Dysfunction : CK(618) : AC(262), Spleen Damage: Chemically Induced : CK(2) : AC(9)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Immunotoxic : CK(507) : AC(127)

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## Focus on cognitive impairment induced by excessive fluoride: An update review.

**Pubmed Data** : Neuroscience. 2024 Oct 18 ;558:22-29. Epub 2024 Aug 11. PMID: [39137871](#)

**Article Published Date** : Oct 18, 2024

**Authors** : Yuhang Zhang, Yanhui Gao, Xiaona Liu

**Study Type** : Review

**Additional Links**

**Diseases** : Cognitive Decline/Dysfunction : CK(5061) : AC(1005), Mitochondrial Dysfunction : CK(618) : AC(262), Neurotoxicity : CK(49) : AC(27), Oxidative Stress : CK(13443) : AC(5499)

**Problem Substances** : Fluoride : CK(1815) : AC(454)

**Adverse Pharmacological Actions** : Oxidant : CK(646) : AC(246)

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## Low-Level Sodium Fluoride Impairs Mitochondrial Function and Viability in Human Platelets, Affecting Wound Healing Potential.

**Pubmed Data** : Front Toxicol. 2024 ;6:1421184. Epub 2024 Sep 5. PMID: [39301511](#)

**Article Published Date** : Jan 01, 2024

**Authors** : Tetsuhiro Tsujino, Tomoni Kasahara, Hideo Kawabata, Taisuke Watanabe, Koji Nishiyama, Yutaka Kitamura, Takao Watanabe, Hajime Okudera, Tomoharu Mochizuki, Takashi Ushiki, Tomoyuki Kawase

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : [Mitochondrial Dysfunction](#) : CK(618) : AC(262)

**Problem Substances** : [Fluoride](#) : CK(1815) : AC(454)

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## Mitigation of honokiol on fluoride-induced mitochondrial oxidative stress, mitochondrial dysfunction, and cognitive deficits.

**Pubmed Data** : J Hazard Mater. 2022 09 5 ;437:129381. Epub 2022 Jun 16. PMID: [35752048](#)

**Article Published Date** : Jan 04, 2022

**Authors** : Dongmei Wang, Luyang Cao, Xiang Zhou, Gang Wang, Yilu Ma, Xueqin Hao, Hua Fan

**Study Type** : Animal Study

**Additional Links**

**Substances** : [Honokiol](#) : CK(435) : AC(271)

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Mitochondrial Dysfunction](#) : CK(618) : AC(262), [Oxidative Stress](#) : CK(13443) : AC(5499)

**Pharmacological Actions** : [Antioxidants](#) : CK(32218) : AC(14161), [Neuroprotective Agents](#) : CK(17667) : AC(7641)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Morphological changes and mitochondrial alterations on cardiomyocytes exposed to fluoride.

**Pubmed Data** : P R Health Sci J. 2023 Jun ;42(2):132-138. PMID: [37352535](#)

**Article Published Date** : May 31, 2023

**Authors** : Areli Limon-Rojas, Amaury Pozos-Guillén, Roberto Salgado-Delgado, Margarita Rodríguez Y Domínguez, Diana María Escobar-García

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Mitochondrial Dysfunction](#) : CK(618) : AC(262)

**Additional Keywords** : [Dose Response](#) : CK(1769) : AC(700)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Cardiotoxic](#) : CK(1168) : AC(209)

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## Sodium fluoride treatment impairs the subsequent embryonic developmental potential of the oocytes.

**Pubmed Data** : Environ Toxicol. 2015 May 26. Epub 2015 May 26. PMID: [26011085](#)

**Article Published Date** : May 25, 2015

**Authors** : Shuang Liang, Ming-Hui Zhao, Sun A Ock, Nam-Hyung Kim, Xiang-Shun Cui

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Infertility: Female](#) : CK(741) : AC(180), [Mitochondrial Dysfunction](#) : CK(618) : AC(262)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Anti-Fertility](#) : CK(112) : AC(21)

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## Systematic impacts of fluoride exposure on the metabolomics of rats.

**Pubmed Data** : Ecotoxicol Environ Saf. 2022 Sep 1 ;242:113888. Epub 2022 Jul 21. PMID: [35872488](#)

**Article Published Date** : Aug 31, 2022

**Authors** : Shiyuan Zhao, Jinxiu Guo, Hongjia Xue, Junjun Meng, Dadi Xie, Xi Liu, Qingqing Yu, Haitao Zhong, Pei Jiang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Inflammation](#) : CK(15536) : AC(5279), [Mitochondrial Dysfunction](#) : CK(618) : AC(262), [Oxidative Stress](#) : CK(13443) : AC(5499)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)



## Multiple Myeloma (AC 1) (CK 10)

**Multiple myeloma patients with high 18F-sodium fluoride metabolic active volume had shorter overall survival.**

**Pubmed Data** : Am J Nucl Med Mol Imaging. 2020 ;10(4):151-160. Epub 2020 Aug 25. PMID: [32929393](#)

**Article Published Date** : Dec 31, 2019

**Authors** : Mahdi Zirakchian Zadeh, Siavash Mehdizadeh Seraj, Brian Østergaard, Stephanie Mimms, William Y Raynor, Mahmoud Aly, Austin J Borja, Leila S Arani, Oke Gerke, Thomas J Werner, Hongming Zhuang, Mona-Elisabeth Revheim, Niels Abildgaard, Poul Flemming Høilund-Carlsen, Abass Alavi

**Study Type** : Human Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Multiple Myeloma](#) : CK(414) : AC(159)

**Additional Keywords** : [Risk Factors](#) : CK(14728) : AC(2072)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

## Muscle Atrophy (AC 1) (CK 2)

**Sodium fluoride induces skeletal muscle atrophy.**

**Pubmed Data** : PLoS One. 2022 ;17(12):e0279261. Epub 2022 Dec 22. PMID: [36548359](#)

**Article Published Date** : Dec 31, 2021

**Authors** : Apoorva H Nagendra, Animikh Ray, Debajit Chaudhury, Akash Mitra, Anu Vinod Ranade, Bipasha Bose, Sudheer Shenoy P

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Muscle Atrophy](#) : CK(287) : AC(121)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

## Muscle Damage (AC 1) (CK 1)

**This study has provided new evidence for the role of FGF21/ERK in fluoride-induced skeletal muscle damage.**

**Pubmed Data** : Ecotoxicol Environ Saf. 2023 Mar 1 ;252:114626. Epub 2023 Feb 8. PMID: [36764073](#)

**Article Published Date** : Feb 28, 2023

**Authors** : Lan Ma, Chengmei Zhang, Yu Gui, Tingling Zou, Shuhua Xi, Xiaoying Guo

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Fluorosis](#) : CK(262) : AC(42), [Muscle Damage](#) : CK(258) : AC(83)

**Problem Substances** : [Fluoride](#) : CK(1815) : AC(454), [Sodium Fluoride](#) : CK(1446) : AC(393)



## Neurodegenerative Diseases (AC 13) (CK 22)

### Aluminium, fluoride and a combination of aluminium-fluoride treatments caused an increase in brain lipid peroxidation products and reactive oxygen species formation.

**Pubmed Data** : Pathophysiology. 2015 Mar ;22(1):39-48. Epub 2014 Dec 13. PMID: [25577494](#)

**Article Published Date** : Feb 28, 2015

**Authors** : Ibukun Dorcas Akinrinade, Adejoke Elizabeth Memudu, Olalekan Michael Ogundele, Olanrewaju Ibrahim Ajetunmobi

**Study Type** : Animal Study

#### Additional Links

**Diseases** : Aluminum Toxicity : CK(685) : AC(308), Brain Inflammation : CK(1650) : AC(901), Fluoride Toxicity : CK(1389) : AC(376), Neurodegenerative Diseases : CK(12159) : AC(4162), Oxidative Stress : CK(13443) : AC(5499)

**Additional Keywords** : Increased Risk : CK(8492) : AC(1109), Synergistic Toxicity : CK(226) : AC(109)

**Problem Substances** : Aluminum : CK(1061) : AC(349), Fluoride : CK(1815) : AC(454), Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

### Autophagy may be involved in fluoride-induced learning impairment in rats.

**Pubmed Data** : Biol Trace Elem Res. 2020 Feb ;193(2):502-507. Epub 2019 May 20. PMID: [31111310](#)

**Article Published Date** : Jan 31, 2020

**Authors** : Chengzhi Zhang, Simeng Huo, Yumei Fan, Yanhui Gao, Yanmei Yang, Dianjun Sun

**Study Type** : Animal Study

#### Additional Links

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Learning disorders : CK(517) : AC(155), Neurodegenerative Diseases : CK(12159) : AC(4162)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

### Chronic exposure to fluoride affects GSH level and NOX4 expression.

**Pubmed Data** : Biomolecules. 2020 Mar 9 ;10(3). Epub 2020 Mar 9. PMID: [32182821](#)

**Article Published Date** : Mar 08, 2020

**Authors** : Karolina Dec, Agnieszka Łukomska, Karolina Skonieczna-Żydecka, Karolina Jakubczyk, Maciej Tarnowski, Anna Lubkowska, Irena Baranowska-Bosiacka, Daniel Styburski, Marta Skórka-Majewicz, Dominika Maciejewska, Izabela Gutowska

**Study Type** : Animal Study

#### Additional Links

**Diseases** : Neurodegenerative Diseases : CK(12159) : AC(4162), Oxidative Stress : CK(13443) : AC(5499)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

### Chronic fluoride exposure and the risk of autism spectrum disorder.

**Pubmed Data** : Int J Environ Res Public Health. 2019 Sep 16 ;16(18). Epub 2019 Sep 16. PMID: [31527457](#)

**Article Published Date** : Sep 15, 2019

**Authors** : Anna Strunecka, Otakar Strunecky

**Study Type** : Review

#### Additional Links

**Diseases** : Autism Spectrum Disorders : CK(3676) : AC(557), Neurodegenerative Diseases : CK(12159) : AC(4162)  
**Additional Keywords** : Synergistic Toxicity : CK(226) : AC(109)  
**Problem Substances** : Aluminum : CK(1061) : AC(349), Sodium Fluoride : CK(1446) : AC(393)

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## Effects of neuron autophagy induced by arsenic and fluoride on spatial learning and memory in offspring rats.

**Pubmed Data** : Chemosphere. 2022 Dec ;308(Pt 2):136341. Epub 2022 Sep 7. PMID: [36087721](#)

**Article Published Date** : Nov 30, 2022

**Authors** : Qiuyi Zhao, Weizhe Pan, Jia Li, Shengnan Yu, Yan Liu, Xiaoli Zhang, Ruodi Qu, Qian Zhang, Ben Li, Xiaoyan Yan, Xuefeng Ren, Yulan Qiu

**Study Type** : Animal Study

### Additional Links

**Diseases** : Learning disorders : CK(517) : AC(155), Memory Disorders : CK(1570) : AC(514), Neurodegenerative Diseases : CK(12159) : AC(4162), Prenatal Chemical Exposures : CK(2428) : AC(530)

**Problem Substances** : Arsenic : CK(595) : AC(181), Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Excessive fluoride and aluminium intake induces the progression of cell death which inhibit AChE activities and trigger the release of lysosomal and cell cycle proteins.

**Pubmed Data** : Pathophysiology. 2015 Jun ;22(2):105-15. Epub 2015 Apr 2. PMID: [25863844](#)

**Article Published Date** : May 31, 2015

**Authors** : Ibukun Dorcas Akinrinade, Adejoke Elizabeth Memudu, Olalekan Michael Ogundele

**Study Type** : Animal Study

### Additional Links

**Diseases** : Neurodegenerative Diseases : CK(12159) : AC(4162)

**Additional Keywords** : Increased Risk : CK(8492) : AC(1109)

**Problem Substances** : Aluminum : CK(1061) : AC(349), Fluoride : CK(1815) : AC(454), Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Excessive lysosomal stress response and consequently impaired autophagy contribute to fluoride-induced developmental neurotoxicity.

**Pubmed Data** : Biol Trace Elem Res. 2023 Sep ;201(9):4472-4483. Epub 2022 Dec 5. PMID: [36464725](#)

**Article Published Date** : Aug 31, 2023

**Authors** : Wanjing Xu, Zeyu Hu, Yanling Tang, Jingjing Zhang, Shangzhi Xu, Qiang Niu

**Study Type** : Animal Study

### Additional Links

**Diseases** : Developmental Disorder: Children : CK(148) : AC(19), Neurodegenerative Diseases : CK(12159) : AC(4162)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Exposure to fluoride in the prenatal and neonatal period result in the increase in COX2 activity and increase in PGE2 concentration in rats brain.

**Pubmed Data** : Neurotoxicology. 2019 Sep ;74:81-90. Epub 2019 Jun 5. PMID: [31175943](#)

**Article Published Date** : Aug 31, 2019

**Authors** : Karolina Dec, Agnieszka Łukomska, Karolina Skonieczna-Żydecka, Agnieszka Kolasa-Wołoskiuk, Maciej Tarnowski, Irena Baranowska-Bosiacka, Izabela Gutowska

**Study Type** : Animal Study

### Additional Links

**Diseases** : Brain Inflammation : CK(1650) : AC(901), Fluoride Toxicity : CK(1389) : AC(376), Neurodegenerative Diseases : CK(12159) : AC(4162), Prenatal Chemical Exposures : CK(2428) : AC(530)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Inflammatory : CK(541) : AC(169)

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## Fluoride induced neurobehavioral impairments in experimental animals.

**Pubmed Data** : Biol Trace Elem Res. 2023 Mar ;201(3):1214-1236. Epub 2022 Apr 30. PMID: [35488996](#)

**Article Published Date** : Feb 28, 2023

**Authors** : Harsheema Ottappilakkil, Srija Babu, Satheeswaran Balasubramanian, Suryaa Manoharan, Ekambaram Perumal

**Study Type** : Review

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Neurodegenerative Diseases : CK(12159) : AC(4162)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Impacts of fluoride neurotoxicity and mitochondrial dysfunction on cognition and mental health.

**Pubmed Data** : Int J Environ Res Public Health. 2021 Dec 7 ;18(24). Epub 2021 Dec 7. PMID: [34948493](#)

**Article Published Date** : Dec 06, 2021

**Authors** : Emily A Adkins, Kelly J Brunst

**Study Type** : Review

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Neurodegenerative Diseases : CK(12159) : AC(4162)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Neuromodulatory effects of hesperidin against sodium fluoride-induced neurotoxicity.

**Pubmed Data** : Neurotoxicology. 2022 May ;90:197-204. Epub 2022 Apr 10. PMID: [35413380](#)

**Article Published Date** : Apr 30, 2022

**Authors** : Mustafa Onur Yıldız, Hamit Çelik, Cuneyt Caglayan, Fatih Mehmet Kandemir, Cihan Gür, İbrahim Bayav, Aydın Genç, Özge Kandemir

**Study Type** : Animal Study

**Additional Links**

**Substances** : Hesperidin : CK(845) : AC(358)

**Diseases** : Neurodegenerative Diseases : CK(12159) : AC(4162), Oxidative Stress : CK(13443) : AC(5499)

**Pharmacological Actions** : Anti-Apoptotic : CK(4942) : AC(3051), Anti-Inflammatory Agents : CK(35225) : AC(15297), Interleukin-1 beta downregulation : CK(5277) : AC(2851), Tumor Necrosis Factor (TNF) Alpha Inhibitor : CK(10605) : AC(4670)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## PRKAA1 induces aberrant mitophagy in a PINK1/Parkin-dependent manner, contributing to fluoride-induced developmental neurotoxicity.

**Pubmed Data** : Ecotoxicol Environ Saf. 2023 Apr 15 ;255:114772. Epub 2023 Mar 14. PMID: [36924562](#)

**Article Published Date** : Apr 14, 2023

**Authors** : Yanling Tang, Jingjing Zhang, Zeyu Hu, Wanjing Xu, Panpan Xu, Yue Ma, Hengrui Xing, Qiang Niu

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Neurodegenerative Diseases : CK(12159) : AC(4162), Neurodevelopmental Disorders : CK(470) : AC(85)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Apoptotic : CK(278) : AC(120), Neurotoxic : CK(2838) : AC(702)

## The toxic effects of fluoride on the central nervous system may be related to the activation of microglia cells.

**Pubmed Data** : Mediators Inflamm. 2012 ;2012:102954. Epub 2012 Aug 13. PMID: [22933830](#)

**Article Published Date** : Jan 01, 2012

**Authors** : Xi Shuhua, Liu Ziyou, Yan Ling, Wang Fei, Guifan Sun

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : Brain: Microglial Activation : CK(192) : AC(114), Neurodegenerative Diseases : CK(12159) : AC(4162)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702), Oxidant : CK(646) : AC(246)

## Neurodevelopmental Disorders (AC 5) (CK 33)

### Domain-specific effects of prenatal fluoride exposure on child IQ at 4, 5, and 6-12 years.

**Pubmed Data** : Environ Res. 2022 Aug ;211:112993. Epub 2022 Mar 9. PMID: [35276192](#)

**Article Published Date** : Jul 31, 2022

**Authors** : Carly V Goodman, Morteza Bashash, Rivka Green, Peter Song, Karen E Peterson, Lourdes Schnaas, Adriana Mercado-García, Sandra Martínez-Medina, Mauricio Hernández-Avila, Angeles Martinez-Mier, Martha M Téllez-Rojo, Howard Hu, Christine Till

**Study Type** : Human Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Neurodevelopmental Disorders : CK(470) : AC(85), Prenatal Chemical Exposures : CK(2428) : AC(530)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

### Fluoride impairs mitochondrial translation by targeting miR-221-3p/c-Fos/RMND1 axis contributing to neurodevelopment defects.

**Pubmed Data** : Sci Total Environ. 2023 Apr 15 ;869:161738. Epub 2023 Jan 21. PMID: [36690096](#)

**Article Published Date** : Apr 14, 2023

**Authors** : Dongjie Li, Qian Zhao, Li Xie, Chenxi Wang, Zhiyuan Tian, Huayang Tang, Tao Xia, Aiguo Wang

**Study Type** : Human Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Neurodevelopmental Disorders : CK(470) : AC(85)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

### Fluoride in drinking water may produce developmental neurotoxicity

**Pubmed Data** : Neurotoxicol Teratol. 2015 ;47:96-101. Epub 2014 Nov 8. PMID: [25446012](#)

**Article Published Date** : Dec 31, 2014

**Authors** : Anna L Choi, Ying Zhang, Guifan Sun, David C Bellinger, Kanglin Wang, Xiao Jing Yang, Jin Shu Li, Quanmei Zheng, Yuanli Fu, Philippe Grandjean

**Study Type** : Human Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Neurodevelopmental Disorders : CK(470) : AC(85)

**Additional Keywords** : Dose Response : CK(1769) : AC(700)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)  
**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

## PRKAA1 induces aberrant mitophagy in a PINK1/Parkin-dependent manner, contributing to fluoride-induced developmental neurotoxicity.

**Pubmed Data** : Ecotoxicol Environ Saf. 2023 Apr 15 ;255:114772. Epub 2023 Mar 14. PMID: [36924562](#)

**Article Published Date** : Apr 14, 2023

**Authors** : Yanling Tang, Jingjing Zhang, Zeyu Hu, Wanjing Xu, Panpan Xu, Yue Ma, Hengrui Xing, Qiang Niu

**Study Type** : Animal Study

### Additional Links

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Neurodegenerative Diseases : CK(12159) : AC(4162),

Neurodevelopmental Disorders : CK(470) : AC(85)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Apoptotic : CK(278) : AC(120), Neurotoxic : CK(2838) : AC(702)

## Systematic review of epidemiological and toxicological evidence on health effects of fluoride in drinking water.

**Pubmed Data** : Crit Rev Toxicol. 2024 Feb 6:1-33. Epub 2024 Feb 6. PMID: [38318766](#)

**Article Published Date** : Feb 05, 2024

**Authors** : Mohamed Kadry Taher, Franco Momoli, Jennifer Go, Shintaro Hagiwara, Siva Ramoju, Xuefeng Hu, Natalie Jensen, Rowan Terrell, Alex Hemmerich, Daniel Krewski

**Study Type** : Review

### Additional Links

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Learning disorders : CK(517) : AC(155), Neurodevelopmental Disorders : CK(470) : AC(85)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

## Neurotoxicity (AC 1) (CK 1)

### Focus on cognitive impairment induced by excessive fluoride: An update review.

**Pubmed Data** : Neuroscience. 2024 Oct 18 ;558:22-29. Epub 2024 Aug 11. PMID: [39137871](#)

**Article Published Date** : Oct 18, 2024

**Authors** : Yuhang Zhang, Yanhui Gao, Xiaona Liu

**Study Type** : Review

### Additional Links

**Diseases** : Cognitive Decline/Dysfunction : CK(5061) : AC(1005), Mitochondrial Dysfunction : CK(618) : AC(262),

Neurotoxicity : CK(49) : AC(27), Oxidative Stress : CK(13443) : AC(5499)

**Problem Substances** : Fluoride : CK(1815) : AC(454)

**Adverse Pharmacological Actions** : Oxidant : CK(646) : AC(246)

## Obesity (AC 1) (CK 2)

## Fluoride induced leaky gut and bloom of Erysipelatoclostridium ramosum mediate the exacerbation of obesity.

**Pubmed Data** : J Adv Res. 2023 Aug ;50:35-54. Epub 2022 Oct 29. PMID: [36341987](#)

**Article Published Date** : Jul 31, 2023

**Authors** : Guijie Chen, Yujia Peng, Yujie Huang, Minhao Xie, Zhuqing Dai, Huimei Cai, Wei Dong, Weiqi Xu, Zhiyong Xie, Dan Chen, Xia Fan, Wangting Zhou, Xuhui Kan, Tingting Yang, Chunxu Chen, Yi Sun, Xiaoxiong Zeng, Zhonghua Liu

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Obesity : CK(9664) : AC(2579)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

## Obsessive-Compulsive Disorder (AC 1) (CK 2)

### Sodium flouride exposure during pregnancy may interfere with normal development and increase the risk of neurological and psychiatric disorders in adulthood.

**Pubmed Data** : Eur Rev Med Pharmacol Sci. 2010 Jun;14(6):507-12. PMID: [20712257](#)

**Article Published Date** : Jun 01, 2010

**Authors** : P Flace, V Benagiano, D Vermesan, R Sabatini, A M Inchingolo, A Inchingolo, P Auteri, G Ambrosi, A Tarullo, R Cagiano

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Huntington Disease : CK(222) : AC(103), Obsessive-Compulsive Disorder : CK(421) : AC(77), Prenatal Chemical Exposures : CK(2428) : AC(530), Schizophrenia : CK(1080) : AC(191), Tourette Syndrome : CK(207) : AC(30)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Genotoxic : CK(545) : AC(184), Teratogenic : CK(325) : AC(66)

## Orchitis (AC 1) (CK 2)

### Fluoride induces autoimmune orchitis involved with enhanced IL-17A secretion in mice testis.

**Pubmed Data** : J Agric Food Chem. 2019 Nov 8. Epub 2019 Nov 8. PMID: [31703480](#)

**Article Published Date** : Nov 07, 2019

**Authors** : Panhong Wu, Zilong Sun, Xiaoqian Lv, Xuejing Pei, Ram Kumar Manthari, Jundong Wang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Autoimmune Diseases : CK(11878) : AC(2631), Fluoride Toxicity : CK(1389) : AC(376), Orchitis : CK(19) : AC(5)

**Additional Keywords** : Risk Factors : CK(14728) : AC(2072)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

## Osteoarthritis (AC 1) (CK 10)

### Excessive exposure of water fluoride may increase osteoarthritis risk.

**Pubmed Data** : Biol Trace Elem Res. 2022 Jul ;200(7):3107-3116. Epub 2021 Sep 28. PMID: [34581970](#)

**Article Published Date** : Jun 30, 2022

**Authors** : Alphonse Sowanou, Xinyue Meng, Nan Zhong, Yongzheng Ma, Ailin Li, Jian Wang, Hanying Li, Junrui Pei, Yanhui Gao

**Study Type** : Human Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Osteoarthritis](#) : CK(1971) : AC(607)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

## Osteoarthritis: Knee (AC 2) (CK 20)

### Relatively low fluoride in drinking water increases risk of knee osteoarthritis.

**Pubmed Data** : Environ Geochem Health. 2023 Nov ;45(11):8735-8747. Epub 2023 Sep 16. PMID: [37715839](#)

**Article Published Date** : Oct 31, 2023

**Authors** : Xinyue Meng, Jian Wang, Yang Liu, Mang Li, Zhizhong Guan, Alphonse Sowanou, Dan Yang, Junrui Pei, Yanhui Gao

**Study Type** : Human Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Osteoarthritis: Knee](#) : CK(2278) : AC(267)

**Additional Keywords** : [Increased Risk](#) : CK(8492) : AC(1109)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

### There is an increased risk of knee arthritis in patients with elevated blood fluoride levels.

**Pubmed Data** : Malays Orthop J. 2020 Nov ;14(3):151-154. PMID: [33403076](#)

**Article Published Date** : Oct 31, 2020

**Authors** : V K Singh, K S Rathore, G Khan, A Rahim, A Rashid, S Chauhan

**Study Type** : Human Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Osteoarthritis: Knee](#) : CK(2278) : AC(267)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

## Osteosarcoma (AC 1) (CK 1)

### This demonstrated ability of fluorine to exert genotoxic effects on bone cells.



**Pubmed Data** : Toxicol Res. 2020 Oct ;36(4):337-342. Epub 2020 Feb 24. PMID: [33005593](#)

**Article Published Date** : Sep 30, 2020

**Authors** : V P Volobaev, E S Serdyukova, E E Kalyuzhnaya, E A Schetnikova, A D Korotkova, A A Naik, S N Bach, A Y Prosekov, A V Larionov

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Osteosarcoma](#) : CK(422) : AC(285)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

## Ovarian Diseases (AC 3) (CK 5)

### Chronic fluoride exposure induces ovarian dysfunction and potential association with premature ovarian failure.

**Pubmed Data** : Biol Trace Elem Res. 2023 Oct 13. Epub 2023 Oct 13. PMID: [37828391](#)

**Article Published Date** : Oct 12, 2023

**Authors** : Xiaoke Tang, Hongjuan Li, Yali Wang, Li Zeng, Ling Long, Yajun Qu, Hui Yang, Xiaolin Zhang, Yanmin Li, Yanni Yu, Qi Zhou, Man Luo

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Ovarian Diseases](#) : CK(33) : AC(16)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

### Excessive fluoride induces ovarian function impairment.

**Pubmed Data** : Reprod Toxicol. 2024 Feb 9:108556. Epub 2024 Feb 9. PMID: [38342390](#)

**Article Published Date** : Feb 08, 2024

**Authors** : Nan Geng, Siyuan Dong, Pengpeng Xie, Yi Zhang, Rong Shi, Chen Chen, Zhao Xu, Qun Chen

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Ovarian Diseases](#) : CK(33) : AC(16)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

### Female reproductive function is inhibited by NaF and that exposure to NaF causes ovarian and uterine structural damage.

**Pubmed Data** : Food Chem Toxicol. 2013 Feb 28. Epub 2013 Feb 28. PMID: [23459146](#)

**Article Published Date** : Feb 28, 2013

**Authors** : Yongjiang Zhou, Hailing Zhang, Junlin He, Xuemei Chen, Yubing Ding, Yingxiong Wang Xueqing Liu

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Infertility: Female](#) : CK(741) : AC(180), [Ovarian Diseases](#) : CK(33) : AC(16), [Uterine Diseases](#) : CK(1291) : AC(335)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Anti-Fertility](#) : CK(112) : AC(21)

## Oxidative Stress (AC 55) (CK 95)



## "Decreased in vitro fertility in male rats exposed to fluoride-induced oxidative stress damage and mitochondrial transmembrane potential loss."

**Pubmed Data** : Toxicol Appl Pharmacol. 2008 Aug 1 ;230(3):352-7. Epub 2008 Mar 28. PMID: [18455746](#)

**Article Published Date** : Aug 01, 2008

**Authors** : Jeannett A Izquierdo-Vega, Manuel Sánchez-Gutiérrez, Luz María Del Razo

**Study Type** : Animal Study

### **Additional Links**

**Diseases** : Infertility: Male : CK(1668) : AC(424), Oxidative Stress : CK(13443) : AC(5499), Sperm Quality: Low : CK(611) : AC(121)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Anti-Fertility : CK(112) : AC(21), Oxidant : CK(646) : AC(246)

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## A review of the effects of chronic fluorosis on the brain.

**Pubmed Data** : Ecotoxicol Environ Saf. 2022 Oct 1 ;244:114021. Epub 2022 Aug 29. PMID: [36049331](#)

**Article Published Date** : Sep 30, 2022

**Authors** : Chao Ren, Hui-Hua Li, Cai-Yi Zhang, Xi-Cheng Song

**Study Type** : Review

### **Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Fluorosis : CK(262) : AC(42), Learning disorders : CK(517) : AC(155), Memory Disorders : CK(1570) : AC(514), Oxidative Stress : CK(13443) : AC(5499)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Administration of calcium to female rats can ameliorate the hazardous effects of fluoride observed in the biochemical, hormonal, and histological parameters.

**Pubmed Data** : Biol Trace Elem Res. 2015 Jul 23. Epub 2015 Jul 23. PMID: [26198134](#)

**Article Published Date** : Jul 22, 2015

**Authors** : N E Mohamed

**Study Type** : Animal Study

### **Additional Links**

**Substances** : Calcium : CK(444) : AC(68)

**Diseases** : Oxidative Stress : CK(13443) : AC(5499)

**Pharmacological Actions** : Hepatoprotective : CK(8320) : AC(3765), Renoprotective : CK(4133) : AC(1932)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Alpha-lipoic acid plays a protective role in fluoride-induced reproductive lesion.

**Pubmed Data** : Zhonghua Yi Xue Za Zhi. 2020 Dec 15 ;100(46):3706-3711. PMID: [33342149](#)

**Article Published Date** : Dec 14, 2020

**Authors** : Y Yang, H Huang, L X Cui, F Q Li

**Study Type** : Animal Study

### **Additional Links**

**Substances** : Alpha-Lipoic Acid : CK(1499) : AC(365)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Infertility: Male : CK(1668) : AC(424), Oxidative Stress : CK(13443) : AC(5499)

**Pharmacological Actions** : Anti-Apoptotic : CK(4942) : AC(3051), Antioxidants : CK(32218) : AC(14161), Malondialdehyde Down-regulation : CK(2826) : AC(965)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Aluminium, fluoride and a combination of aluminium-fluoride treatments caused an increase in brain lipid peroxidation products and reactive oxygen species formation.

**Pubmed Data** : Pathophysiology. 2015 Mar ;22(1):39-48. Epub 2014 Dec 13. PMID: [25577494](#)

**Article Published Date** : Feb 28, 2015

**Authors** : Ibukun Dorcas Akinrinade, Adejoke Elizabeth Memudu, Olalekan Michael Ogundele, Olanrewaju Ibrahim Ajetunmobi

**Study Type** : Animal Study

### Additional Links

**Diseases** : Aluminum Toxicity : CK(685) : AC(308), Brain Inflammation : CK(1650) : AC(901), Fluoride Toxicity : CK(1389) : AC(376), Neurodegenerative Diseases : CK(12159) : AC(4162), Oxidative Stress : CK(13443) : AC(5499)

**Additional Keywords** : Increased Risk : CK(8492) : AC(1109), Synergistic Toxicity : CK(226) : AC(109)

**Problem Substances** : Aluminum : CK(1061) : AC(349), Fluoride : CK(1815) : AC(454), Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Aluminum appears to enhance the neurotoxic hazards caused by fluoride.

**Pubmed Data** : Drug Chem Toxicol. 2009 ;32(3):215-21. PMID: [19538017](#)

**Article Published Date** : Dec 31, 2008

**Authors** : Tanzeer Kaur, Rakesh K Bijarnia, Bimla Nehru

**Study Type** : Animal Study

### Additional Links

**Diseases** : Aluminum Toxicity : CK(685) : AC(308), Lipid Peroxidation : CK(1901) : AC(774), Oxidative Stress : CK(13443) : AC(5499)

**Additional Keywords** : Synergistic Toxicity : CK(226) : AC(109)

**Problem Substances** : Aluminum : CK(1061) : AC(349), Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Blackberry juice and quercetin together significantly reduced sodium fluoride induced oxidative and histological changes in rats.

**Pubmed Data** : J Basic Clin Physiol Pharmacol. 2015 May 1 ;26(3):237-51. PMID: [25918918](#)

**Article Published Date** : Apr 30, 2015

**Authors** : Reham Z Hamza, Nahla S El-Shenawy, Hayat A A Ismail

**Study Type** : Animal Study

### Additional Links

**Substances** : Blackberry : CK(120) : AC(64), Quercetin : CK(1864) : AC(847)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Oxidative Stress : CK(13443) : AC(5499)

**Pharmacological Actions** : Antioxidants : CK(32218) : AC(14161), Cytoprotective : CK(797) : AC(393), Hepatoprotective : CK(8320) : AC(3765), Renoprotective : CK(4133) : AC(1932)

**Additional Keywords** : Natural Substance Synergy : CK(1339) : AC(657)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Caffeic acid supplementation has a protective effect against fluoride induced hepatotoxicity in rats.

**Pubmed Data** : Biofactors. 2015 Mar-Apr;41(2):90-100. Epub 2015 Apr 2. PMID: [25845575](#)

**Article Published Date** : Feb 28, 2015

**Authors** : Vishnu Vignesh Kanagaraj, Lakshmikanthan Panneerselvam, Vimal Govindarajan, Jaishabanu Ameeramja, Ekambaram Perumal

**Study Type** : Animal Study

### Additional Links

**Substances** : Caffeic Acid : CK(136) : AC(87), Coffee : CK(1649) : AC(207)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Oxidative Stress : CK(13443) : AC(5499)

**Pharmacological Actions** : Antioxidants : CK(32218) : AC(14161), Hepatoprotective : CK(8320) : AC(3765)  
**Problem Substances** : Fluoride : CK(1815) : AC(454), Sodium Fluoride : CK(1446) : AC(393)

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## Chronic exposure to fluoride affects GSH level and NOX4 expression.

**Pubmed Data** : Biomolecules. 2020 Mar 9 ;10(3). Epub 2020 Mar 9. PMID: [32182821](#)

**Article Published Date** : Mar 08, 2020

**Authors** : Karolina Dec, Agnieszka Łukomska, Karolina Skonieczna-Żydecka, Karolina Jakubczyk, Maciej Tarnowski, Anna Lubkowska, Irena Baranowska-Bosiacka, Daniel Styburski, Marta Skórka-Majewicz, Dominika Maciejewska, Izabela Gutowska

**Study Type** : Animal Study

### Additional Links

**Diseases** : Neurodegenerative Diseases : CK(12159) : AC(4162), Oxidative Stress : CK(13443) : AC(5499)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Combined effect of arsenic and fluoride at environmentally relevant concentrations in zebrafish (Danio rerio) brain.

**Pubmed Data** : Chemosphere. 2021 Apr ;269:128678. Epub 2020 Oct 21. PMID: [33127104](#)

**Article Published Date** : Mar 31, 2021

**Authors** : Paritosh Mondal, Pallab Shaw, Arpan Dey Bhowmik, Arindam Bandyopadhyay, Muthammal Sudarshan, Anindita Chakraborty, Ansuman Chattopadhyay

**Study Type** : Animal Study

### Additional Links

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Oxidative Stress : CK(13443) : AC(5499)

**Additional Keywords** : Synergistic Toxicity : CK(226) : AC(109)

**Problem Substances** : Arsenic : CK(595) : AC(181), Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Curcumin attenuates neurotoxicity induced by fluoride: An in vivo evidence.

**Pubmed Data** : Pharmacogn Mag. 2014 Jan ;10(37):61-5. PMID: [24696547](#)

**Article Published Date** : Dec 31, 2013

**Authors** : Chhavi Sharma, Pooja Suhalka, Piyu Sukhwai, Neha Jaiswal, Maheep Bhatnagar

**Study Type** : Animal Study

### Additional Links

**Substances** : Curcumin : CK(6902) : AC(3215)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Lipid Peroxidation : CK(1901) : AC(774), Oxidative Stress : CK(13443) : AC(5499)

**Pharmacological Actions** : Neuroprotective Agents : CK(17667) : AC(7641)

**Problem Substances** : Fluoride : CK(1815) : AC(454), Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Effects of fluoride exposure on mitochondrial function: Energy metabolism, dynamics, biogenesis and mitophagy.

**Pubmed Data** : Environ Toxicol Pharmacol. 2022 Aug ;94:103916. Epub 2022 Jun 20. PMID: [35738460](#)

**Article Published Date** : Jul 31, 2022

**Authors** : Sabino Hazael Avila-Rojas, Omar Emiliano Aparicio-Trejo, Marco Antonio Sanchez-Guerra, Olivier Christophe Barbier

**Study Type** : Review

### Additional Links

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Mitochondrial Dysfunction : CK(618) : AC(262), Oxidative Stress : CK(13443) : AC(5499)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Fermented rooibos tea ameliorates sodium fluoride-induced cardiorenal toxicity, oxidative stress, and inflammation.

**Pubmed Data** : Cardiovasc Toxicol. 2024 Feb 5. Epub 2024 Feb 5. PMID: [38315346](#)

**Article Published Date** : Feb 04, 2024

**Authors** : Olawale Razaq Ajuwon, Toyosi Abiodun Adeleke, Basiru Olaitan Ajiboye, Akeem Olalekan Lawal, Ibukun Folorunso, Bartholomew Brai, Fisayo Abraham Bamisaye, John Adeolu Falode, Ikenna Maximillian Odoh, Kabirat Iyabode Adegbite, Oluwasayo Bosede Adegoke

**Study Type** : Animal Study

**Additional Links**

**Substances** : Rooibos : CK(161) : AC(76)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Inflammation : CK(15536) : AC(5279), Oxidative Stress : CK(13443) : AC(5499)

**Pharmacological Actions** : Anti-Inflammatory Agents : CK(35225) : AC(15297), Antioxidants : CK(32218) : AC(14161)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Fluoride exposure during pregnancy and lactation triggers oxidative stress and molecular changes in hippocampus of offspring rats.

**Pubmed Data** : Ecotoxicol Environ Saf. 2021 Jan 15 ;208:111437. Epub 2020 Oct 20. PMID: [33096359](#)

**Article Published Date** : Jan 14, 2021

**Authors** : Maria Karolina Martins Ferreira, Walessa Alana Bragança Aragão, Leonardo Oliveira Bittencourt, Bruna Puty, Aline Dionizio, Michel Platini Caldas de Souza, Marília Afonso Rabelo Buzalaf, Edivaldo Herculano de Oliveira, Maria Elena Crespo-Lopez, Rafael Rodrigues Lima

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Lipid Peroxidation : CK(1901) : AC(774), Oxidative Stress : CK(13443) : AC(5499), Prenatal Chemical Exposures : CK(2428) : AC(530)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Fluoride exposure provokes mitochondria-mediated apoptosis and increases mitophagy in osteocytes.

**Pubmed Data** : Biol Trace Elem Res. 2023 Aug ;201(8):3994-4007. Epub 2022 Oct 18. PMID: [36255553](#)

**Article Published Date** : Jul 31, 2023

**Authors** : Yun Zhang, Fanhe Dong, Zihan Wang, Bingbing Xu, Tao Zhang, Qiqi Wang, Qiao Lin

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Fluorosis : CK(262) : AC(42), Oxidative Stress : CK(13443) : AC(5499)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Apoptotic : CK(278) : AC(120)

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## Fluoride impairs ovary development by affecting oogenesis and inducing oxidative stress and apoptosis in female zebrafish.

**Pubmed Data** : Chemosphere. 2020 Oct ;256:127105. Epub 2020 May 17. PMID: [32450357](#)

**Article Published Date** : Sep 30, 2020

**Authors** : Meiyang Li, Jinling Cao, Yangfei Zhao, Panhong Wu, Xuehua Li, Forouzan Khodaei, Yongli Han, Jundong Wang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Infertility: Female : CK(741) : AC(180), Oxidative Stress : CK(13443) : AC(5499)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Fluoride increases the susceptibility of developmental dysplasia of the

## hip.

**Pubmed Data** : Ecotoxicol Environ Saf. 2022 Apr 1 ;234:113408. Epub 2022 Mar 14. PMID: [35298972](#)

**Article Published Date** : Mar 31, 2022

**Authors** : Weizheng Zhou, Wenting Luo, Dan Liu, Federico Canavese, Lianyong Li, Qun Zhao

**Study Type** : Animal Study, In Vitro Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Hip Dysplasia: Congenital : CK(3) : AC(1), Oxidative Stress : CK(13443) : AC(5499)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Fluoride induced testicular toxicities in adult Wistar rats.

**Pubmed Data** : Toxicol Mech Methods. 2021 Jun ;31(5):383-392. Epub 2021 Feb 28. PMID: [33641618](#)

**Article Published Date** : May 31, 2021

**Authors** : Priyankar Pal, Prabir Kumar Mukhopadhyay

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Oxidative Stress : CK(13443) : AC(5499), Testicular Injury: Chemical/Metal Induced : CK(754) : AC(374)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Fluoride induces oxidative damage and SIRT1/autophagy through ROS-mediated JNK signaling.

**Pubmed Data** : Free Radic Biol Med. 2015 Dec ;89:369-78. Epub 2015 Sep 30. PMID: [26431905](#)

**Article Published Date** : Nov 30, 2015

**Authors** : Maiko Suzuki, Cheryl Bandoski, John D Bartlett

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : DNA damage : CK(2255) : AC(824), Fluoride Toxicity : CK(1389) : AC(376), Oxidative Stress : CK(13443) : AC(5499)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Fluoride-induced apoptosis and gene expression profiling in mice sperm in vivo has been observed.

**Pubmed Data** : Arch Toxicol. 2011 Nov ;85(11):1441-52. Epub 2011 Feb 22. PMID: [21340527](#)

**Article Published Date** : Nov 01, 2011

**Authors** : Zilong Sun, Ruiyan Niu, Bin Wang, Zhibin Jiao, Jinming Wang, Jianhai Zhang, Shaolin Wang, Jundong Wang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Azoospermic : CK(4) : AC(2), Infertility: Male : CK(1668) : AC(424), Oxidative Stress : CK(13443) : AC(5499), Sperm Count: Low : CK(116) : AC(25), Sperm Quality: Low : CK(611) : AC(121)

**Pharmacological Actions** : Antioxidants : CK(32218) : AC(14161), Apoptotic : CK(9052) : AC(7284)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Anti-Fertility : CK(112) : AC(21)

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## Fluoride-induced hepatic and cardio-renal toxicity in a concentration-dependent manner.

**Pubmed Data** : Biol Trace Elem Res. 2023 Jan ;201(1):229-241. Epub 2022 Jan 12. PMID: [35023047](#)

**Article Published Date** : Dec 31, 2022

**Authors** : Priyanka Sharma, Pawan Kumar Verma, Shilpa Sood, Maninder Singh, Deepika Verma

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Chemically-Induced Liver Damage : CK(2167) : AC(1069), Fluoride Toxicity : CK(1389) : AC(376), Kidney Damage: Chemically-Induced : CK(542) : AC(270), Lipid Peroxidation : CK(1901) : AC(774), Oxidative Stress : CK(13443) : AC(5499)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Fluoride-induced mitochondrial dysfunction.

**Pubmed Data** : Biol Trace Elem Res. 2024 Mar ;202(3):835-849. Epub 2023 Jun 10. PMID: [37300595](#)

**Article Published Date** : Feb 29, 2024

**Authors** : Sachindra Kumar, Smita Shenoy, Ravindra Shantakumar Swamy, V Ravichandiran, Nitesh Kumar

**Study Type** : Review

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Mitochondrial Diseases : CK(607) : AC(262), Oxidative Stress : CK(13443) : AC(5499)

**Pharmacological Actions** : Apoptotic : CK(9052) : AC(7284)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Fluorosilicic acid induces DNA damage and oxidative stress in bone marrow mesenchymal stem cells.

**Pubmed Data** : Mutat Res Genet Toxicol Environ Mutagen. 2021 ;861-862:503297. Epub 2020 Nov 21. PMID: [33551106](#)

**Article Published Date** : Dec 31, 2020

**Authors** : Ana L H Garcia, Juliana Picinini, Maiele D Silveira, Melissa Camassola, Ana P V Visentim, Mirian Salvador, Juliana da Silva

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : DNA damage : CK(2255) : AC(824), Fluoride Toxicity : CK(1389) : AC(376), Lipid Peroxidation : CK(1901) : AC(774), Oxidative Stress : CK(13443) : AC(5499)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Focus on cognitive impairment induced by excessive fluoride: An update review.

**Pubmed Data** : Neuroscience. 2024 Oct 18 ;558:22-29. Epub 2024 Aug 11. PMID: [39137871](#)

**Article Published Date** : Oct 18, 2024

**Authors** : Yuhang Zhang, Yanhui Gao, Xiaona Liu

**Study Type** : Review

**Additional Links**

**Diseases** : Cognitive Decline/Dysfunction : CK(5061) : AC(1005), Mitochondrial Dysfunction : CK(618) : AC(262), Neurotoxicity : CK(49) : AC(27), Oxidative Stress : CK(13443) : AC(5499)

**Problem Substances** : Fluoride : CK(1815) : AC(454)

**Adverse Pharmacological Actions** : Oxidant : CK(646) : AC(246)

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## Fruits of A. carambola are useful as a dietary supplement in regulation of fluoride induced hyperglycemia, hyperlipemia and oxidative stress.

**Pubmed Data** : Interdiscip Toxicol. 2014 Jun ;7(2):103-10. Epub 2014 Nov 15. PMID: [26109886](#)

**Article Published Date** : May 31, 2014

**Authors** : Rupal A Vasant, A V R L Narasimhacharya

**Study Type** : Animal Study

**Additional Links**

**Substances** : Star Fruit : CK(17) : AC(5)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Hyperglycemia : CK(2107) : AC(692), Hyperlipidemia : CK(2133) : AC(550), Oxidative Stress : CK(13443) : AC(5499)

**Pharmacological Actions** : Antioxidants : CK(32218) : AC(14161), Hypoglycemic Agents : CK(8194) : AC(2019), Hypolipidemic : CK(8317) : AC(1985)

**Additional Keywords** : Supplementation : CK(413) : AC(60)



**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Gene expression and alterations of antioxidant enzymes in spleen of rats exposed to fluoride.

**Pubmed Data** : J Trace Elem Med Biol. 2022 Jul ;72:126966. Epub 2022 Mar 9. PMID: [35286942](#)

**Article Published Date** : Jun 30, 2022

**Authors** : A Shashi, Sukanya Thakur

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Oxidative Stress : CK(13443) : AC(5499), Spleen Damage: Chemically Induced : CK(2) : AC(9)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Grape seed procyanidin extract attenuate sodium fluoride-induced oxidative damage and apoptosis in rat kidneys.

**Pubmed Data** : Biomed Environ Sci. 2020 Jun 20 ;33(6):454-457. PMID: [32641209](#)

**Article Published Date** : Jun 19, 2020

**Authors** : Er Hui Wang, Zeng Li Yu, Guan Fang Ping, De Sheng Zhai

**Study Type** : Animal Study

**Additional Links**

**Substances** : Grape Seed Extract : CK(1047) : AC(329)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Kidney Damage: Chemically-Induced : CK(542) : AC(270), Oxidative Stress : CK(13443) : AC(5499)

**Pharmacological Actions** : Anti-Apoptotic : CK(4942) : AC(3051), Renoprotective : CK(4133) : AC(1932)

**Additional Keywords** : Proanthocyanidins : CK(494) : AC(157)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Hesperidin attenuates oxidative stress, inflammation, apoptosis, and cardiac dysfunction in sodium fluoride-induced cardiotoxicity.

**Pubmed Data** : Cardiovasc Toxicol. 2022 Aug ;22(8):727-735. Epub 2022 May 23. PMID: [35606666](#)

**Article Published Date** : Jul 31, 2022

**Authors** : Behçet Varışlı, Ekrem Darendelioğlu, Cuneyt Caglayan, Fatih Mehmet Kandemir, Adnan Ayna, Aydın Genç, Özge Kandemir

**Study Type** : Animal Study

**Additional Links**

**Substances** : Hesperidin : CK(845) : AC(358)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Inflammation : CK(15536) : AC(5279), Oxidative Stress : CK(13443) : AC(5499)

**Pharmacological Actions** : Anti-Apoptotic : CK(4942) : AC(3051), Bcl-2 protein down-regulation : CK(687) : AC(522), NF-kappaB Inhibitor : CK(5541) : AC(3374), Superoxide Dismutase Up-regulation : CK(2327) : AC(896), Tumor Necrosis Factor (TNF) Alpha Inhibitor : CK(10605) : AC(4670), Tumor Suppressor Protein p53 Upregulation : CK(748) : AC(549)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Hesperidin protects liver and kidney against sodium fluoride-induced toxicity.

**Pubmed Data** : Life Sci. 2021 Sep 15 ;281:119730. Epub 2021 Jun 17. PMID: [34147482](#)

**Article Published Date** : Sep 14, 2021

**Authors** : Cuneyt Caglayan, Fatih Mehmet Kandemir, Ekrem Darendelioğlu, Sefa Küçükler, Adnan Ayna

**Study Type** : In Vitro Study

**Additional Links**

**Substances** : Hesperidin : CK(845) : AC(358)

**Diseases** : Chemically-Induced Liver Damage : CK(2167) : AC(1069), Inflammation : CK(15536) : AC(5279), Kidney Damage: Chemically-Induced : CK(542) : AC(270), Oxidative Stress : CK(13443) : AC(5499)

**Pharmacological Actions** : Anti-Apoptotic : CK(4942) : AC(3051), Anti-Inflammatory Agents : CK(35225) : AC(15297), Antioxidants : CK(32218) : AC(14161), Hepatoprotective : CK(8320) : AC(3765), Renoprotective : CK(4133) : AC(1932)  
**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## High fluoride aggravates cadmium-mediated nephrotoxicity of renal tubular epithelial cells.

**Pubmed Data** : Sci Total Environ. 2024 Nov 25 ;953:175927. Epub 2024 Sep 3. PMID: [39236818](#)

**Article Published Date** : Nov 25, 2024

**Authors** : Dashuan Li, Chaolian Yang, Lu Sun, Zhenqin Zhao, Jiaqi Liu, Cheng Zhang, Dali Sun, Qinghai Zhang

**Study Type** : In Vitro Study

### Additional Links

**Diseases** : Oxidative Stress : CK(13443) : AC(5499)

**Pharmacological Actions** : Apoptotic : CK(9052) : AC(7284)

**Problem Substances** : Fluoride : CK(1815) : AC(454)

**Adverse Pharmacological Actions** : Nephrotoxic : CK(203) : AC(52)

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## Luteolin-mediated Kim-1/NF-kB/Nrf2 signaling pathways protects sodium fluoride-induced hypertension and cardiovascular complications.

**Pubmed Data** : Biofactors. 2018 Nov ;44(6):518-531. Epub 2018 Nov 26. PMID: [30474894](#)

**Article Published Date** : Oct 31, 2018

**Authors** : Ademola Adetokunbo Oyagbemi, Temidayo Olutayo Omobowale, Olufunke Eunice Ola-Davies, Egunoluwa Racheal Asenuga, Temitayo Olabisi Ajibade, Olumuyiwa Abiola Adejumobi, Jeremiah Moyinoluwa Afolabi, Blessing Seun Ogunpolu, Olufunke Olubunmi Falayi, Adebowale Bernard Saba, Adeolu Alex Adedapo, Momoh Audu Yakubu

**Study Type** : Animal Study

### Additional Links

**Substances** : Luteolin : CK(707) : AC(390)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Hypertension : CK(8603) : AC(1329), Oxidative Stress : CK(13443) : AC(5499)

**Pharmacological Actions** : Antihypertensive Agents : CK(6936) : AC(1007), Malondialdehyde Down-regulation : CK(2826) : AC(965), Nrf2 activation : CK(2908) : AC(1762), Superoxide Dismutase Up-regulation : CK(2327) : AC(896)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Mitigation of honokiol on fluoride-induced mitochondrial oxidative stress, mitochondrial dysfunction, and cognitive deficits.

**Pubmed Data** : J Hazard Mater. 2022 09 5 ;437:129381. Epub 2022 Jun 16. PMID: [35752048](#)

**Article Published Date** : Jan 04, 2022

**Authors** : Dongmei Wang, Luyang Cao, Xiang Zhou, Gang Wang, Yilu Ma, Xueqin Hao, Hua Fan

**Study Type** : Animal Study

### Additional Links

**Substances** : Honokiol : CK(435) : AC(271)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Mitochondrial Dysfunction : CK(618) : AC(262), Oxidative Stress : CK(13443) : AC(5499)

**Pharmacological Actions** : Antioxidants : CK(32218) : AC(14161), Neuroprotective Agents : CK(17667) : AC(7641)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Modulation of the Nrf-2 and HO-1 signalling axis is associated with Betaine's abatement of fluoride-induced hepatorenal toxicities in rats.

**Pubmed Data** : Naunyn Schmiedebergs Arch Pharmacol. 2024 Oct ;397(10):7725-7745. Epub 2024 May 7. PMID: [38713257](#)

**Article Published Date** : Sep 30, 2024

**Authors** : Solomon Owumi, Harieme Agbarogi, Bayode J Oluwawibe, Moses T Otunla, Mayowa M Anifowose, Uche O



Arunsi

**Study Type** : Animal Study

**Additional Links**

**Substances** : Betaine : CK(134) : AC(35)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Oxidative Stress : CK(13443) : AC(5499)

**Pharmacological Actions** : Antioxidants : CK(32218) : AC(14161), Heme oxygenase-1 up-regulation : CK(1225) : AC(756), Nrf2 activation : CK(2908) : AC(1762)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## N-acetylcysteine alleviates fluoride-induced testicular apoptosis by modulating IRE1 $\alpha$ /JNK signaling and nuclear Nrf2 activation.

**Pubmed Data** : Reprod Toxicol. 2019 03 ;84:98-107. Epub 2019 Jan 8. PMID: [30633982](#)

**Article Published Date** : Dec 31, 2018

**Authors** : Yazhen Hu, Yawei Wang, Ting Yan, Demin Feng, Yue Ba, Huizhen Zhang, Jingyuan Zhu, Xuemin Cheng, Liuxin Cui, Hui Huang

**Study Type** : Animal Study

**Additional Links**

**Substances** : NAC (N-acetyl-L-cysteine) : CK(1429) : AC(366)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Oxidative Stress : CK(13443) : AC(5499), Testicular Injury: Chemical/Metal Induced : CK(754) : AC(374)

**Pharmacological Actions** : Anti-Apoptotic : CK(4942) : AC(3051), Antioxidants : CK(32218) : AC(14161), Nrf2 activation : CK(2908) : AC(1762)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Neuromodulatory effects of hesperidin against sodium fluoride-induced neurotoxicity.

**Pubmed Data** : Neurotoxicology. 2022 May ;90:197-204. Epub 2022 Apr 10. PMID: [35413380](#)

**Article Published Date** : Apr 30, 2022

**Authors** : Mustafa Onur Yıldız, Hamit Çelik, Cuneyt Caglayan, Fatih Mehmet Kandemir, Cihan Gür, İbrahim Bayav, Aydın Genç, Özge Kandemir

**Study Type** : Animal Study

**Additional Links**

**Substances** : Hesperidin : CK(845) : AC(358)

**Diseases** : Neurodegenerative Diseases : CK(12159) : AC(4162), Oxidative Stress : CK(13443) : AC(5499)

**Pharmacological Actions** : Anti-Apoptotic : CK(4942) : AC(3051), Anti-Inflammatory Agents : CK(35225) : AC(15297), Interleukin-1 beta downregulation : CK(5277) : AC(2851), Tumor Necrosis Factor (TNF) Alpha Inhibitor : CK(10605) : AC(4670)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Potential role of fluoride in the etiopathogenesis of Alzheimer's disease.

**Pubmed Data** : Int J Mol Sci. 2018 Dec 9 ;19(12). Epub 2018 Dec 9. PMID: [30544885](#)

**Article Published Date** : Dec 08, 2018

**Authors** : Marta Goschorska, Irena Baranowska-Bosiacka, Izabela Gutowska, Emilia Metryka, Marta Skórka-Majewicz, Dariusz Chlubek

**Study Type** : Review

**Additional Links**

**Diseases** : Alzheimer's Disease : CK(4948) : AC(2148), Fluoride Toxicity : CK(1389) : AC(376), Inflammation : CK(15536) : AC(5279), Oxidative Stress : CK(13443) : AC(5499)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Prolonged fluoride exposure alters neurotransmission and oxidative stress in the zebrafish brain.

**Pubmed Data** : Neurotoxicology. 2022 Mar ;89:92-98. Epub 2022 Jan 20. PMID: [35065950](#)

**Article Published Date** : Feb 28, 2022

**Authors** : Eduardo Ronconi Dondossola, Suzielen Damin Pacheco, Sulingue Casagrande Visentin, Niuany Viel Mendes, Samira Leila Baldin, Henrique Teza Bernardo, Rahisa Scussel, Eduardo Pacheco Rico

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Oxidative Stress : CK(13443) : AC(5499)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Purple corn anthocyanins protect against fluoride-induced oxidative damage of liver and kidney in rats.

**Pubmed Data** : Int J Environ Res Public Health. 2014 Jan 13 ;11(1):1020-33. Epub 2014 Jan 13. PMID: [24419046](#)

**Article Published Date** : Jan 12, 2014

**Authors** : Zhuo Zhang, Bo Zhou, Hiaohong Wang, Fei Wang, Yingli Song, Shengnan Liu, Shuhua Xi

**Study Type** : Animal Study

**Additional Links**

**Substances** : Corn: Purple : CK(32) : AC(18)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Lipid Peroxidation : CK(1901) : AC(774), Oxidative Stress : CK(13443) : AC(5499)

**Pharmacological Actions** : Antioxidants : CK(32218) : AC(14161), Hepatoprotective : CK(8320) : AC(3765), Renoprotective : CK(4133) : AC(1932)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Rutin attenuates neurobehavioral deficits, oxidative stress, neuro-inflammation and apoptosis in fluoride treated rats.

**Pubmed Data** : Neurosci Lett. 2018 Aug 24 ;682:92-99. Epub 2018 Jun 13. PMID: [29908257](#)

**Article Published Date** : Aug 23, 2018

**Authors** : Kpobari W Nkpaa, Godspower I Onyeso

**Study Type** : Animal Study

**Additional Links**

**Substances** : Rutin : CK(460) : AC(221)

**Diseases** : Inflammation : CK(15536) : AC(5279), Lipid Peroxidation : CK(1901) : AC(774), Oxidative Stress : CK(13443) : AC(5499)

**Pharmacological Actions** : Anti-Apoptotic : CK(4942) : AC(3051), Antioxidants : CK(32218) : AC(14161), Neuroprotective Agents : CK(17667) : AC(7641)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Sesamin plays an important role in maintaining hepatic health and preventing liver from toxic damage caused by fluoride.

**Pubmed Data** : Fish Shellfish Immunol. 2020 Nov ;106:715-723. Epub 2020 Aug 26. PMID: [32860904](#)

**Article Published Date** : Oct 31, 2020

**Authors** : Jinling Cao, Cuiping Feng, Lingtian Xie, Lijuan Li, Jianjie Chen, Shaojun Yun, Wenjing Guo, Tianyu Wang, Yijie Wu, Rui Meng, Guodong Wang, Xinjing He, Yongju Luo

**Study Type** : Animal Study

**Additional Links**

**Substances** : Sesamin : CK(207) : AC(94)

**Diseases** : Chemically-Induced Liver Damage : CK(2167) : AC(1069), Fluoride Toxicity : CK(1389) : AC(376), Oxidative Stress : CK(13443) : AC(5499)

**Pharmacological Actions** : Antioxidants : CK(32218) : AC(14161), Hepatoprotective : CK(8320) : AC(3765)

**Problem Substances** : Fluoride : CK(1815) : AC(454)

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## Sodium fluoride activates ERK and JNK via induction of oxidative stress

## to promote apoptosis and impairs ovarian function in rats.

**Pubmed Data** : J Hazard Mater. 2014 May 15 ;272:75-82. Epub 2014 Mar 18. PMID: [24681588](#)

**Article Published Date** : May 14, 2014

**Authors** : Yanqing Geng, Yiwen Qiu, Xueqing Liu, Xuemei Chen, Yubin Ding, Shangjing Liu, Yi Zhao, Rufe Gao, Yingxiong Wang, Junlin He

**Study Type** : Animal Study

### Additional Links

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Infertility: Female](#) : CK(741) : AC(180), [Oxidative Stress](#) : CK(13443) : AC(5499)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Sodium fluoride and rotenone may interact synergistically leading to oxidative damage and neuronal cell loss.

**Pubmed Data** : Neurol Res. 2023 Nov ;45(11):979-987. Epub 2023 Sep 12. PMID: [37699078](#)

**Article Published Date** : Oct 31, 2023

**Authors** : Yilmaz Kocak, Gokhan Oto, Zubeyir Huyut, Hamit Hakan Alp, Fikret Turkan, Ezgi Onay

**Study Type** : Animal Study

### Additional Links

**Diseases** : [DNA damage](#) : CK(2255) : AC(824), [Oxidative Stress](#) : CK(13443) : AC(5499)

**Pharmacological Actions** : [Antioxidants](#) : CK(32218) : AC(14161)

**Additional Keywords** : [Synergistic Toxicity](#) : CK(226) : AC(109)

**Problem Substances** : [Rotenone](#) : CK(57) : AC(32), [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Sodium fluoride causes oxidative stress and apoptosis in the mouse liver.

**Pubmed Data** : Aging (Albany NY). 2017 Jun 27 ;9(6):1623-1639. PMID: [28657544](#)

**Article Published Date** : Jun 26, 2017

**Authors** : Yujiao Lu, Qin Luo, Hengmin Cui, Huidan Deng, Ping Kuang, Huan Liu, Jing Fang, Zhicai Zuo, Junliang Deng, Yinglun Li, Xun Wang, Ling Zhao

**Study Type** : Animal Study

### Additional Links

**Diseases** : [Chemically-Induced Liver Damage](#) : CK(2167) : AC(1069), [Fluoride Toxicity](#) : CK(1389) : AC(376), [Oxidative Stress](#) : CK(13443) : AC(5499)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Apoptotic](#) : CK(278) : AC(120), [Hepatotoxic](#) : CK(400) : AC(124)

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## Sodium fluoride exposure exerts toxic effects on porcine oocyte maturation.

**Pubmed Data** : Sci Rep. 2017 Dec 6 ;7(1):17082. Epub 2017 Dec 6. PMID: [29213094](#)

**Article Published Date** : Dec 05, 2017

**Authors** : Shuang Liang, Zheng-Wen Nie, Minghui Zhao, Ying-Jie Niu, Kyung-Tae Shin, Xiang-Shun Cui

**Study Type** : In Vitro Study

### Additional Links

**Diseases** : [DNA damage](#) : CK(2255) : AC(824), [Fluoride Toxicity](#) : CK(1389) : AC(376), [Infertility: Female](#) : CK(741) : AC(180), [Oxidative Stress](#) : CK(13443) : AC(5499)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Sodium fluoride exposure may result in increased oxidative stress and increased reaction oxygen species (ROS) production.

**Pubmed Data** : Toxicol Lett. 2010 Jul 1;196(2):74-9. Epub 2010 Apr 22. PMID: [20399260](#)

**Article Published Date** : Jul 01, 2010

**Authors** : I Gutowska, I Baranowska-Bosiacka, M Bańkiewicz, B Milo, A Siennicka, M Marchlewicz, B Wiszniewska, B Machaliński, E Stachowska

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : [Oxidative Stress](#) : CK(13443) : AC(5499)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Atherogenic](#) : CK(25) : AC(5), [Cardiotoxic](#) : CK(1168) : AC(209), [Inflammatory](#) : CK(541) : AC(169)

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## Sodium fluoride induces nephrotoxicity via oxidative stress-regulated mitochondrial SIRT3 signaling pathway.

**Pubmed Data** : Sci Rep. 2017 Apr 6 ;7(1):672. Epub 2017 Apr 6. PMID: [28386112](#)

**Article Published Date** : Apr 05, 2017

**Authors** : Chao Song, Beibei Fu, Jingcheng Zhang, Jiamin Zhao, Mengke Yuan, Wei Peng, Yong Zhang, Haibo Wu

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Kidney Damage: Chemically-Induced](#) : CK(542) : AC(270), [Oxidative Stress](#) : CK(13443) : AC(5499)

**Problem Substances** : [Fluoride](#) : CK(1815) : AC(454), [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Renotoxic](#) : CK(56) : AC(20)

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## Sodium fluoride led to a significant decrease in vitamin A levels in rats exposed to 20ppm.

**Pubmed Data** : Int J Dev Neurosci. 2015 Sep 18. Epub 2015 Sep 18. PMID: [26390955](#)

**Article Published Date** : Sep 17, 2015

**Authors** : Rajkiran Reddy Reddy Banala, Karnati Pratap Reddy

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Oxidative Stress](#) : CK(13443) : AC(5499), [Vitamin A Deficiency](#) : CK(137) : AC(28)

**Additional Keywords** : [Increased Risk](#) : CK(8492) : AC(1109)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

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## Sodium fluoride promotes apoptosis by generation of reactive oxygen species in human lymphocytes.

**Pubmed Data** : J Toxicol Environ Health A. 2014 ;77(21):1269-80. PMID: [25268553](#)

**Article Published Date** : Dec 31, 2013

**Authors** : Manivannan Jothiramajayam, Sonali Sinha, Manosij Ghosh, Anish Nag, Aditi Jana, Anita Mukherjee

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : [DNA damage](#) : CK(2255) : AC(824), [Fluoride Toxicity](#) : CK(1389) : AC(376), [Oxidative Stress](#) : CK(13443) : AC(5499)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Apoptotic](#) : CK(278) : AC(120), [Genotoxic](#) : CK(545) : AC(184)

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## Supplementation of ginseng and banaba leaf extracts exhibited protective effects on fluoride toxicated STZ induced nephrotoxicity in mice.

**Pubmed Data** : Indian J Med Res. 2013 Feb ;137(2):370-9. PMID: [23563382](#)

**Article Published Date** : Jan 31, 2013

**Authors** : Mahaboob P Basha, S M Saumya

**Study Type** : Animal Study

**Additional Links**

**Substances** : Banaba : CK(36) : AC(20), Ginseng : CK(4190) : AC(1902)  
**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Oxidative Stress : CK(13443) : AC(5499)  
**Pharmacological Actions** : Antioxidants : CK(32218) : AC(14161), Renoprotective : CK(4133) : AC(1932)  
**Additional Keywords** : Plant Extracts : CK(18030) : AC(6728)  
**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)  
**Adverse Pharmacological Actions** : Diabetogenic : CK(340) : AC(58)

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## Synergistic effects of arsenic and fluoride on oxidative stress and apoptotic pathway in Leydig and Sertoli cells.

**Pubmed Data** : Toxicology. 2022 Jun 15 ;475:153241. Epub 2022 Jun 14. PMID: [35714946](#)

**Article Published Date** : Jun 14, 2022

**Authors** : Yasemin Aydin, Banu Orta-Yilmaz

**Study Type** : In Vitro Study

### Additional Links

**Diseases** : Arsenic Poisoning : CK(383) : AC(129), Fluoride Toxicity : CK(1389) : AC(376), Oxidative Stress : CK(13443) : AC(5499)

**Additional Keywords** : Synergistic Toxicity : CK(226) : AC(109)

**Problem Substances** : Arsenic : CK(595) : AC(181), Sodium Fluoride : CK(1446) : AC(393)

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## Systematic impacts of fluoride exposure on the metabolomics of rats.

**Pubmed Data** : Ecotoxicol Environ Saf. 2022 Sep 1 ;242:113888. Epub 2022 Jul 21. PMID: [35872488](#)

**Article Published Date** : Aug 31, 2022

**Authors** : Shiyuan Zhao, Jinxiu Guo, Hongjia Xue, Junjun Meng, Dadi Xie, Xi Liu, Qingqing Yu, Haitao Zhong, Pei Jiang

**Study Type** : Animal Study

### Additional Links

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Inflammation : CK(15536) : AC(5279), Mitochondrial Dysfunction : CK(618) : AC(262), Oxidative Stress : CK(13443) : AC(5499)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## The present study reveals that exposure to fluoride in early stages of rat development leads to impairment of memory in young offspring.

**Pubmed Data** : Int J Toxicol. 2019 ;38(5):405-414. Epub 2019 Jun 20. PMID: [31220985](#)

**Article Published Date** : Dec 31, 2018

**Authors** : Mariana Bartos, Fernanda Gumilar, Cristina E Gallegos, Cristina Bras, Sergio Dominguez, Liliana M Cancela, Alejandra Minetti

**Study Type** : Animal Study

### Additional Links

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Oxidative Stress : CK(13443) : AC(5499), Prenatal Chemical Exposures : CK(2428) : AC(530)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## This study proved that oxidative stress probably play a major role in NaF-induced apoptosis of Sertoli cells.

**Pubmed Data** : Int J Environ Health Res. 2015 ;25(1):1-9. Epub 2014 Feb 13. PMID: [24521312](#)

**Article Published Date** : Dec 31, 2014

**Authors** : Yang Yang, Hui Huang, Yue Ba, Xue-Min Cheng, Liu-Xin Cui

**Study Type** : Animal Study

### Additional Links

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Oxidative Stress : CK(13443) : AC(5499), Testicular Injury: Chemical/Metal Induced : CK(754) : AC(374)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Apoptotic : CK(278) : AC(120)

## Treatment with rutin against sodium fluoride intoxication has a significant role in protecting F-induced cardiotoxicity, blood toxicity and dyslipidemia in rats.

**Pubmed Data** : Toxicol Mech Methods. 2015 Feb ;25(2):143-9. Epub 2015 Feb 11. PMID: [25560802](#)

**Article Published Date** : Jan 31, 2015

**Authors** : V Umarani, Sudhakar Muvvala, A Ramesh, B V S Lakshmi, N Sravanthi

**Study Type** : Animal Study

**Additional Links**

**Substances** : Rutin : CK(460) : AC(221)

**Diseases** : Dyslipidemias : CK(1583) : AC(326), Fluoride Toxicity : CK(1389) : AC(376), Oxidative Stress : CK(13443) : AC(5499)

**Pharmacological Actions** : Cardioprotective : CK(8685) : AC(2877), Hypolipidemic : CK(8317) : AC(1985)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

## Vitamin D may assist the UPR against sodium fluoride-induced damage.

**Pubmed Data** : J Trace Elem Med Biol. 2023 Dec ;80:127293. Epub 2023 Aug 26. PMID: [37677921](#)

**Article Published Date** : Nov 30, 2023

**Authors** : Veysel Yüksek, Semiha Dede, Sedat Çetin, Ayşe Usta, Mehmet Taşpınar

**Study Type** : In Vitro Study

**Additional Links**

**Substances** : Vitamin D : CK(11555) : AC(1679)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Oxidative Stress : CK(13443) : AC(5499)

**Pharmacological Actions** : Anti-Apoptotic : CK(4942) : AC(3051), Antioxidants : CK(32218) : AC(14161)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

## Pancreatic Diseases (AC 1) (CK 20)

### Fluoride-Induced Alterations in the Pancreas of Mammals: A Meta-analysis

**Pubmed Data** : Biol Trace Elem Res. 2024 Aug 20. Epub 2024 Aug 20. PMID: [39162920](#)

**Article Published Date** : Aug 20, 2024

**Authors** : Srishti Rana, Neha Thakur, Ruhi Thakur

**Study Type** : Meta Analysis

**Additional Links**

**Diseases** : Pancreatic Diseases : CK(52) : AC(11)

**Problem Substances** : Fluoride : CK(1815) : AC(454)

## Periodontitis (AC 1) (CK 10)

Green tea showed greater reduction of gingival inflammation and improved periodontal parameters than fluoride-triclosan dentifrice.

**Pubmed Data** : Int J Dent Hyg. 2015 Feb 17. Epub 2015 Feb 17. PMID: [25690541](#)

**Article Published Date** : Feb 16, 2015

**Authors** : Ts Hrishi, Pp Kundapur, A Naha, Bs Thomas, S Kamath, Gs Bhat

**Study Type** : Human Study

**Additional Links**

**Substances** : [Green Tea](#) : CK(4441) : AC(1370)

**Diseases** : [Gingivitis](#) : CK(595) : AC(86), [Inflammation](#) : CK(15536) : AC(5279), [Periodontitis](#) : CK(1081) : AC(266)

**Pharmacological Actions** : [Anti-Inflammatory Agents](#) : CK(35225) : AC(15297), [Antioxidants](#) : CK(32218) : AC(14161)

**Problem Substances** : [Fluoride](#) : CK(1815) : AC(454)

## Pineal Gland Calcification (AC 2) (CK 12)

**Fluoride deposits in the pineal gland with age and is associated with enhanced gland calcification.**

**Pubmed Data** : Caries Res. 2001 Mar-Apr;35(2):125-8. PMID: [11275672](#)

**Article Published Date** : Mar 01, 2001

**Authors** : J Luke

**Study Type** : Human Study

**Additional Links**

**Diseases** : [Ectopic Calcification](#) : CK(1125) : AC(185), [Fluoride Toxicity](#) : CK(1389) : AC(376), [Pineal Gland Calcification](#) : CK(233) : AC(31), [Pineal Gland Diseases](#) : CK(23) : AC(5)

**Problem Substances** : [Fluoride](#) : CK(1815) : AC(454)

**These findings demonstrate that a fluoride-free diet encouraged pinealocyte proliferation and pineal gland growth in aged animals.**

**Pubmed Data** : Biol Trace Elem Res. 2020 Sep ;197(1):175-183. Epub 2019 Nov 12. PMID: [31713773](#)

**Article Published Date** : Aug 31, 2020

**Authors** : Aaron Mrvelj, Mark D Womble

**Study Type** : Animal Study

**Additional Links**

**Substances** : [Melatonin](#) : CK(2743) : AC(904)

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Pineal Gland Calcification](#) : CK(233) : AC(31)

**Problem Substances** : [Fluoride](#) : CK(1815) : AC(454)

## Pineal Gland Diseases (AC 1) (CK 10)

**Fluoride deposits in the pineal gland with age and is associated with enhanced gland calcification.**

**Pubmed Data** : Caries Res. 2001 Mar-Apr;35(2):125-8. PMID: [11275672](#)

**Article Published Date** : Mar 01, 2001

**Authors** : J Luke

**Study Type** : Human Study

**Additional Links**



**Diseases** : Ectopic Calcification : CK(1125) : AC(185), Fluoride Toxicity : CK(1389) : AC(376), Pineal Gland Calcification : CK(233) : AC(31), Pineal Gland Diseases : CK(23) : AC(5)  
**Problem Substances** : Fluoride : CK(1815) : AC(454)

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## Porphyromonas gingivalis (AC 1) (CK 1)

### Effect of sodium fluoride on the murine splenic immune response to Porphyromonas gingivalis in vitro.

**Pubmed Data** : Immunopharmacol Immunotoxicol. 2003 Feb ;25(1):123-7. PMID: [12675204](#)

**Article Published Date** : Jan 31, 2003

**Authors** : Wihaskoro Sosroseno

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Porphyromonas gingivalis : CK(46) : AC(41)

**Additional Keywords** : Risk Factors : CK(14728) : AC(2072)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Prenatal Chemical Exposures (AC 27) (CK 116)

### Aloe vera protects against fluoride-induced teratogenic effects during pre- and postnatal development in mice.

**Pubmed Data** : Environ Sci Pollut Res Int. 2022 Sep ;29(42):63577-63587. Epub 2022 Apr 23. PMID: [35460489](#)

**Article Published Date** : Aug 31, 2022

**Authors** : Priyanka Mathur, Shilpa Choudhary, Pradeep Bhatnagar

**Study Type** : Animal Study

**Additional Links**

**Substances** : Aloe Vera : CK(878) : AC(253)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Prenatal Chemical Exposures : CK(2428) : AC(530)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Teratogenic : CK(325) : AC(66)

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### Co-exposure to arsenic-fluoride results in endoplasmic reticulum stress-induced apoptosis through the PERK signaling pathway in the liver of offspring rats.

**Pubmed Data** : Biol Trace Elem Res. 2020 Sep ;197(1):192-201. Epub 2019 Nov 25. PMID: [31768761](#)

**Article Published Date** : Aug 31, 2020

**Authors** : Nisha Dong, Jing Feng, Jiaxin Xie, Xiaolin Tian, Meng Li, Penghui Liu, Yannan Zhao, Cailing Wei, Yi Gao, Ben Li, Yulan Qiu, Xiaoyan Yan

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Arsenic Poisoning : CK(383) : AC(129), Chemically-Induced Liver Damage : CK(2167) : AC(1069), Fluoride Toxicity : CK(1389) : AC(376), Prenatal Chemical Exposures : CK(2428) : AC(530)

**Pharmacological Actions** : Apoptotic : CK(9052) : AC(7284)

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**Problem Substances** : Fluoride : CK(1815) : AC(454), Sodium Fluoride : CK(1446) : AC(393)

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## Cognitive alterations in children born from exposed mothers to F could start in early prenatal stages of life.

**Pubmed Data** : Neurotoxicology. 2017 Mar ;59:65-70. Epub 2017 Jan 8. PMID: [28077305](#)

**Article Published Date** : Feb 28, 2017

**Authors** : L Valdez Jiménez, O D López Guzmán, M Cervantes Flores, R Costilla-Salazar, J Calderón Hernández, Y Alcaraz Contreras, D O Rocha-Amador

**Study Type** : Human Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Prenatal Chemical Exposures : CK(2428) : AC(530)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Developmental fluoride neurotoxicity: an updated review.

**Pubmed Data** : Environ Health. 2019 Dec 19 ;18(1):110. Epub 2019 Dec 19. PMID: [31856837](#)

**Article Published Date** : Dec 18, 2019

**Authors** : Philippe Grandjean

**Study Type** : Review

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Prenatal Chemical Exposures : CK(2428) : AC(530)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Domain-specific effects of prenatal fluoride exposure on child IQ at 4, 5, and 6-12 years.

**Pubmed Data** : Environ Res. 2022 Aug ;211:112993. Epub 2022 Mar 9. PMID: [35276192](#)

**Article Published Date** : Jul 31, 2022

**Authors** : Carly V Goodman, Morteza Bashash, Rivka Green, Peter Song, Karen E Peterson, Lourdes Schnaas, Adriana Mercado-García, Sandra Martínez-Medina, Mauricio Hernández-Avila, Angeles Martinez-Mier, Martha M Téllez-Rojo, Howard Hu, Christine Till

**Study Type** : Human Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Neurodevelopmental Disorders : CK(470) : AC(85), Prenatal Chemical Exposures : CK(2428) : AC(530)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Effects of neuron autophagy induced by arsenic and fluoride on spatial learning and memory in offspring rats.

**Pubmed Data** : Chemosphere. 2022 Dec ;308(Pt 2):136341. Epub 2022 Sep 7. PMID: [36087721](#)

**Article Published Date** : Nov 30, 2022

**Authors** : Qiuyi Zhao, Weizhe Pan, Jia Li, Shengnan Yu, Yan Liu, Xiaoli Zhang, Ruodi Qu, Qian Zhang, Ben Li, Xiaoyan Yan, Xuefeng Ren, Yulan Qiu

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Learning disorders : CK(517) : AC(155), Memory Disorders : CK(1570) : AC(514), Neurodegenerative Diseases : CK(12159) : AC(4162), Prenatal Chemical Exposures : CK(2428) : AC(530)

**Problem Substances** : Arsenic : CK(595) : AC(181), Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Exposure to fluoride in the prenatal and neonatal period result in the increase in COX2 activity and increase in PGE2 concentration in rats

## brain.

**Pubmed Data** : Neurotoxicology. 2019 Sep ;74:81-90. Epub 2019 Jun 5. PMID: [31175943](#)

**Article Published Date** : Aug 31, 2019

**Authors** : Karolina Dec, Agnieszka Łukomska, Karolina Skonieczna-Żydecka, Agnieszka Kolasa-Wołoskiuk, Maciej Tarnowski, Irena Baranowska-Bosiacka, Izabela Gutowska

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Brain Inflammation : CK(1650) : AC(901), Fluoride Toxicity : CK(1389) : AC(376), Neurodegenerative Diseases : CK(12159) : AC(4162), Prenatal Chemical Exposures : CK(2428) : AC(530)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Inflammatory : CK(541) : AC(169)

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## Fluoride exposure during development affects both cognition and emotion in mice.

**Pubmed Data** : Physiol Behav. 2014 Jan 30 ;124:1-7. Epub 2013 Oct 30. PMID: [24184405](#)

**Article Published Date** : Jan 29, 2014

**Authors** : Fei Liu, Jing Ma, Hui Zhang, Peng Liu, You-Ping Liu, Bo Xing, Yong-Hui Dang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Learning disorders : CK(517) : AC(155), Prenatal Chemical Exposures : CK(2428) : AC(530)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Fluoride exposure during pregnancy and lactation triggers oxidative stress and molecular changes in hippocampus of offspring rats.

**Pubmed Data** : Ecotoxicol Environ Saf. 2021 Jan 15 ;208:111437. Epub 2020 Oct 20. PMID: [33096359](#)

**Article Published Date** : Jan 14, 2021

**Authors** : Maria Karolina Martins Ferreira, Walessa Alana Bragança Aragão, Leonardo Oliveira Bittencourt, Bruna Puty, Aline Dionizio, Michel Platini Caldas de Souza, Marilia Afonso Rabelo Buzalaf, Edivaldo Herculano de Oliveira, Maria Elena Crespo-Lopez, Rafael Rodrigues Lima

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Lipid Peroxidation : CK(1901) : AC(774), Oxidative Stress : CK(13443) : AC(5499), Prenatal Chemical Exposures : CK(2428) : AC(530)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Fluoride exposure in early life as the possible root cause of disease in later life.

**Pubmed Data** : J Clin Pediatr Dent. 2018 ;42(5):325-330. Epub 2018 May 15. PMID: [29763350](#)

**Article Published Date** : Dec 31, 2017

**Authors** : Tetsuo Nakamoto, H Ralph Rawls

**Study Type** : Review

**Additional Links**

**Diseases** : Fetal Origin of Adult Disease : CK(249) : AC(62), Fluoride Toxicity : CK(1389) : AC(376), Prenatal Chemical Exposures : CK(2428) : AC(530)

**Problem Substances** : Fluoride : CK(1815) : AC(454)

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## Fluoride exposure was associated with alterations in maternal thyroid hormone levels.

**Pubmed Data** : Environ Int. 2024 Jan 12 ;184:108442. Epub 2024 Jan 12. PMID: [38237505](#)

**Article Published Date** : Jan 11, 2024

**Authors** : Meaghan Hall, Rick Hornung, Jonathan Chevrier, Pierre Ayotte, Bruce Lanphear, Christine Till

**Study Type** : Human Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Prenatal Chemical Exposures : CK(2428) : AC(530), Thyroid Dysfunction : CK(86) : AC(13)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Fluoride in drinking water was associated with reduced visual acuity and alterations in cardiac autonomic function in infancy.

**Pubmed Data** : Environ Int. 2024 Jan ;183:108336. Epub 2023 Nov 27. PMID: [38064923](#)

**Article Published Date** : Dec 31, 2023

**Authors** : John E Krzeczowski, Meaghan Hall, Dave Saint-Amour, Youssef Oulhote, Taylor McGuckin, Carly V Goodman, Rivka Green, Gina Muckle, Bruce Lanphear, Christine Till

**Study Type** : Human Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Prenatal Chemical Exposures : CK(2428) : AC(530)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Gestational exposure to fluoride impairs cognition in C57 BL/6 J male offspring mice.

**Pubmed Data** : Ecotoxicol Environ Saf. 2022 Jul 1 ;239:113682. Epub 2022 May 25. PMID: [35643027](#)

**Article Published Date** : Jun 30, 2022

**Authors** : Weisheng Li, Likui Lu, Dan Zhu, Jingliu Liu, Yajun Shi, Hongtao Zeng, Xi Yu, Jun Guo, Bin Wei, Yongle Cai, Miao Sun

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Prenatal Chemical Exposures : CK(2428) : AC(530)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## High fluoride exposure has multigenerational and cumulative adverse effects on thyroid status, brain health and learning memory in rats.

**Pubmed Data** : Biol Trace Elem Res. 2011 Jul 14. Epub 2011 Jul 14. PMID: [21755305](#)

**Article Published Date** : Jul 14, 2011

**Authors** : Piler Mahaboob Basha, Puja Rai, Shabana Begum

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Hypothyroidism : CK(847) : AC(148), Prenatal Chemical Exposures : CK(2428) : AC(530), Prenatal Nutrition: Learning/Intelligence of Offspring : CK(116) : AC(14)

**Problem Substances** : Fluoride : CK(1815) : AC(454)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Impairment of learning and memory in mouse offspring induced by perinatal fluoride exposure may partly result from the enhanced miR-124 and miR-132.

**Pubmed Data** : Chemosphere. 2018 Jan 8 ;197:117-122. Epub 2018 Jan 8. PMID: [29334651](#)

**Article Published Date** : Jan 07, 2018

**Authors** : Jixiang Wang, Yuliang Zhang, Zhenzhen Guo, Rui Li, Xingchen Xue, Zilong Sun, Ruiyan Niu

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Learning disorders : CK(517) : AC(155), Prenatal Chemical Exposures : CK(2428) : AC(530)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Low levels of selenium, fluoride and arsenic are toxic to rat embryos.

**Pubmed Data** : Wei Sheng Yan Jiu. 1999 Mar 30;28(2):74-6. PMID: [11939006](#)

**Article Published Date** : Mar 30, 1999

**Authors** : Y Li, M Sun, D Wu, X Chen

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Birth Defects : CK(267) : AC(52), Prenatal Chemical Exposures : CK(2428) : AC(530)

**Additional Keywords** : Drug Synergy : CK(389) : AC(174)

**Problem Substances** : Arsenic : CK(595) : AC(181), Fluoride : CK(1815) : AC(454), Sodium Selenate : CK(11) : AC(8), Sodium Selenite : CK(23) : AC(16)

**Adverse Pharmacological Actions** : Teratogenic : CK(325) : AC(66)

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## Maternal exposure to drinking water throughout pregnancy fluoridated at the level of 0.7 mg/L was associated with poorer inhibitory control and cognitive flexibility.

**Pubmed Data** : Sci Total Environ. 2023 Sep 15 ;891:164322. Epub 2023 May 25. PMID: [37236475](#)

**Article Published Date** : Sep 14, 2023

**Authors** : Deborah Dewey, Gillian England-Mason, Henry Ntanda, Andrea J Deane, Mandakini Jain, Nadia Barnieh, Gerald F Giesbrecht, Nicole Letourneau,

**Study Type** : Human Study

**Additional Links**

**Diseases** : Developmental Disorder: Children : CK(148) : AC(19), Fluoride Toxicity : CK(1389) : AC(376), Prenatal Chemical Exposures : CK(2428) : AC(530)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Maternal exposure to higher levels of fluoride during pregnancy was associated with lower IQ scores in children aged 3 to 4 years.

**Pubmed Data** : JAMA Pediatr. 2019 Oct 1 ;173(10):940-948. PMID: [31424532](#)

**Article Published Date** : Sep 30, 2019

**Authors** : Rivka Green, Bruce Lanphear, Richard Hornung, David Flora, E Angeles Martinez-Mier, Raichel Neufeld, Pierre Ayotte, Gina Muckle, Christine Till

**Study Type** : Human Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Prenatal Chemical Exposures : CK(2428) : AC(530)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Maternal fluoride exposure during gestation and lactation decreased learning and memory ability of mouse pups.

**Pubmed Data** : Hum Exp Toxicol. 2018 Jan ;37(1):87-93. Epub 2017 Feb 13. PMID: [29187078](#)

**Article Published Date** : Dec 31, 2017

**Authors** : Z Sun, Y Zhang, X Xue, R Niu, J Wang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Learning disorders : CK(517) : AC(155), Prenatal Chemical Exposures : CK(2428) : AC(530)

**Additional Keywords** : Risk Factors : CK(14728) : AC(2072)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Prenatal fluoride exposure and attention deficit hyperactivity disorder

## (ADHD) symptoms in children.

**Pubmed Data** : Environ Int. 2018 Dec ;121(Pt 1):658-666. Epub 2018 Oct 10. PMID: [30316181](#)

**Article Published Date** : Nov 30, 2018

**Authors** : Morteza Bashash, Maelle Marchand, Howard Hu, Christine Till, E Angeles Martinez-Mier, Brisa N Sanchez, Niladri Basu, Karen E Peterson, Rivka Green, Lourdes Schnaas, Adriana Mercado-García, Mauricio Hernández-Avila, Martha María Téllez-Rojo

**Study Type** : Human Study

**Additional Links**

**Diseases** : Attention Deficit Disorder with Hyperactivity : CK(633) : AC(84), Fluoride Toxicity : CK(1389) : AC(376), Prenatal Chemical Exposures : CK(2428) : AC(530)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Prenatal fluoride exposure and cognitive outcomes in children at 4 and 6-12 years of age in Mexico.

**Pubmed Data** : Environ Health Perspect. 2017 Sep 19 ;125(9):097017. Epub 2017 Sep 19. PMID: [28937959](#)

**Article Published Date** : Sep 18, 2017

**Authors** : Morteza Bashash, Deena Thomas, Howard Hu, E Angeles Martinez-Mier, Brisa N Sanchez, Niladri Basu, Karen E Peterson, Adrienne S Ettinger, Robert Wright, Zhenzhen Zhang, Yun Liu, Lourdes Schnaas, Adriana Mercado-García, Martha María Téllez-Rojo, Mauricio Hernández-Avila

**Study Type** : Human Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Learning disorders : CK(517) : AC(155), Prenatal Chemical Exposures : CK(2428) : AC(530)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Protective effect of curcumin on hippocampal and behaviour changes in rats exposed to fluoride during pre- and post-natal period.

**Pubmed Data** : Basic Clin Neurosci. 2020 May-Jun;11(3):289-299. Epub 2020 May 1. PMID: [32963722](#)

**Article Published Date** : Apr 30, 2020

**Authors** : Nagapuri Kiran Kumar, Mesram Nageshwar, Karnati Pratap Reddy

**Study Type** : Animal Study

**Additional Links**

**Substances** : Curcumin : CK(6902) : AC(3215)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Prenatal Chemical Exposures : CK(2428) : AC(530)

**Pharmacological Actions** : Neuroprotective Agents : CK(17667) : AC(7641)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Sodium fluoride exposure during pregnancy may interfere with normal development and increase the risk of neurological and psychiatric disorders in adulthood.

**Pubmed Data** : Eur Rev Med Pharmacol Sci. 2010 Jun;14(6):507-12. PMID: [20712257](#)

**Article Published Date** : Jun 01, 2010

**Authors** : P Flace, V Benagiano, D Vermesan, R Sabatini, A M Inchingolo, A Inchingolo, P Auteri, G Ambrosi, A Tarullo, R Cagiano

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Huntington Disease : CK(222) : AC(103), Obsessive-Compulsive Disorder : CK(421) : AC(77), Prenatal Chemical Exposures : CK(2428) : AC(530), Schizophrenia : CK(1080) : AC(191), Tourette Syndrome : CK(207) : AC(30)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Genotoxic : CK(545) : AC(184), Teratogenic : CK(325) : AC(66)

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## Sodium fluoride during gestation and lactation affects male reproduction in adult rats by decreasing spermatogenesis and steroidogenesis.

**Pubmed Data** : Naturwissenschaften. 2007 Jul;94(7):607-11. Epub 2007 Feb 22. PMID: [17318612](#)

**Article Published Date** : Jul 01, 2007

**Authors** : P Sreedhar Reddy, T Pushpalatha, P Sreenivasula Reddy

**Study Type** : Animal Study

### Additional Links

**Diseases** : Breastfeeding Concerns: Chemical Exposure : CK(123) : AC(19), Hormone Insufficiency : CK(30) : AC(8), Infertility: Male : CK(1668) : AC(424), Prenatal Chemical Exposures : CK(2428) : AC(530)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Endocrine Disruptor : CK(529) : AC(106)

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## Sodium fluoride during gestation and lactation increased mandibular area and bone volume of pups.

**Pubmed Data** : Biol Trace Elem Res. 2018 Feb 6. Epub 2018 Feb 6. PMID: [29411324](#)

**Article Published Date** : Feb 05, 2018

**Authors** : Victoria Interlandi, Pablo A Fontanetti, Rubén H Ponce, Raquel V Gallará, Viviana A Centeno

**Study Type** : Animal Study

### Additional Links

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Prenatal Chemical Exposures : CK(2428) : AC(530)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Sodium fluoride suppresses spleen development through MAPK/ERK signaling pathway in mice.

**Pubmed Data** : Ecotoxicol Environ Saf. 2022 Aug ;241:113764. Epub 2022 Jun 13. PMID: [35709673](#)

**Article Published Date** : Jul 31, 2022

**Authors** : Ping Kuang, Hengmin Cui, Li Yu

**Study Type** : Animal Study

### Additional Links

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Prenatal Chemical Exposures : CK(2428) : AC(530), Spleen Damage: Chemically Induced : CK(2) : AC(9)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## The present study reveals that exposure to fluoride in early stages of rat development leads to impairment of memory in young offspring.

**Pubmed Data** : Int J Toxicol. 2019 ;38(5):405-414. Epub 2019 Jun 20. PMID: [31220985](#)

**Article Published Date** : Dec 31, 2018

**Authors** : Mariana Bartos, Fernanda Gumilar, Cristina E Gallegos, Cristina Bras, Sergio Dominguez, Liliana M Cancela, Alejandra Minetti

**Study Type** : Animal Study

### Additional Links

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Oxidative Stress : CK(13443) : AC(5499), Prenatal Chemical Exposures : CK(2428) : AC(530)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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# Prenatal Nutrition: Learning/Intelligence of Offspring (AC 4) (CK 44)

**Children who live in a fluorosis area have 5 times higher odds of developing low IQ than those who live in a nonfluorosis area or a slight fluorosis area.**

**Pubmed Data** : Biol Trace Elem Res. 2008;126(1-3):115-20. Epub 2008 Aug 10. PMID: [18695947](#)

**Article Published Date** : Jan 01, 2008

**Authors** : Qin-Qing Tang, Jun Du, Heng-Hui Ma, Shao-Jun Jiang, Xiao-Jun Zhou

**Study Type** : Meta Analysis

**Additional Links**

**Diseases** : Childhood Cognitive Disorders : CK(316) : AC(27), Cognitive Decline/Dysfunction : CK(5061) : AC(1005), Intelligence Quotient (IQ): Low/Impaired : CK(312) : AC(27), Prenatal Nutrition: Learning/Intelligence of Offspring : CK(116) : AC(14)

**Problem Substances** : Fluoride : CK(1815) : AC(454)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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**Exposure to high levels of fluoride may adversely influence children's intelligence development.**

**Pubmed Data** : Zhongguo Dang Dai Er Ke Za Zhi. 2008 Dec;10(6):723-5. PMID: [19102839](#)

**Article Published Date** : Dec 01, 2008

**Authors** : Ming Liu, Cong Qian

**Study Type** : Meta Analysis

**Additional Links**

**Diseases** : Childhood Cognitive Disorders : CK(316) : AC(27), Cognitive Decline/Dysfunction : CK(5061) : AC(1005), Fluoride Toxicity : CK(1389) : AC(376), Fluorosis : CK(262) : AC(42), Intelligence Quotient (IQ): Low/Impaired : CK(312) : AC(27), Prenatal Nutrition: Learning/Intelligence of Offspring : CK(116) : AC(14)

**Problem Substances** : Fluoride : CK(1815) : AC(454)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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**High fluoride exposure has multigenerational and cumulative adverse effects on thyroid status, brain health and learning memory in rats.**

**Pubmed Data** : Biol Trace Elem Res. 2011 Jul 14. Epub 2011 Jul 14. PMID: [21755305](#)

**Article Published Date** : Jul 14, 2011

**Authors** : Piler Mahaboob Basha, Puja Rai, Shabana Begum

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Hypothyroidism : CK(847) : AC(148), Prenatal Chemical Exposures : CK(2428) : AC(530), Prenatal Nutrition: Learning/Intelligence of Offspring : CK(116) : AC(14)

**Problem Substances** : Fluoride : CK(1815) : AC(454)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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**Rats exposed to low iodine and high fluoride exhibit changes in brain proteins that may be associated with neurotoxicity.**

**Pubmed Data** : Arch Toxicol. 2010 Apr 3. Epub 2010 Apr 3. PMID: [20364248](#)

**Article Published Date** : Apr 03, 2010

**Authors** : Yaming Ge, Ruiyan Niu, Jianhai Zhang, Jundong Wang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Cognitive Decline/Dysfunction : CK(5061) : AC(1005), Prenatal Nutrition: Learning/Intelligence of Offspring : CK(116) : AC(14)

**Problem Substances** : Fluoride : CK(1815) : AC(454)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Schizophrenia (AC 1) (CK 2)

**Sodium flouride exposure during pregnancy may interfere with normal development and increase the risk of neurological and psychiatric disorders in adulthood.**

**Pubmed Data** : Eur Rev Med Pharmacol Sci. 2010 Jun;14(6):507-12. PMID: [20712257](#)

**Article Published Date** : Jun 01, 2010

**Authors** : P Flace, V Benagiano, D Vermesan, R Sabatini, A M Inchingolo, A Inchingolo, P Auteri, G Ambrosi, A Tarullo, R Cagiano

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Huntington Disease : CK(222) : AC(103), Obsessive-Compulsive Disorder : CK(421) : AC(77), Prenatal Chemical Exposures : CK(2428) : AC(530), Schizophrenia : CK(1080) : AC(191), Tourette Syndrome : CK(207) : AC(30)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Genotoxic : CK(545) : AC(184), Teratogenic : CK(325) : AC(66)

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## Sleep Disorders (AC 2) (CK 20)

**Fluoride exposure may contribute to changes in sleep cycle regulation and sleep behaviors among older adolescents in the US.**

**Pubmed Data** : Environ Health. 2019 Dec 9 ;18(1):106. Epub 2019 Dec 9. PMID: [31818308](#)

**Article Published Date** : Dec 08, 2019

**Authors** : Ashley J Malin, Sonali Bose, Stefanie A Busgang, Chris Gennings, Michael Thorpy, Robert O Wright, Rosalind J Wright, Manish Arora

**Study Type** : Human Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Sleep Disorders : CK(1811) : AC(256)

**Problem Substances** : Fluoride : CK(1815) : AC(454)

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**Fluoride exposure may contribute to sleeping less than the recommended duration among older adolescents and adults in Canada.**

**Pubmed Data** : Environ Health. 2021 Feb 18 ;20(1):16. Epub 2021 Feb 18. PMID: [33602214](#)

**Article Published Date** : Feb 17, 2021

**Authors** : Jasmyn E A Cunningham, Hugh McCague, Ashley J Malin, David Flora, Christine Till

**Study Type** : Human Study

**Additional Links**



**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Sleep Disorders : CK(1811) : AC(256)  
**Problem Substances** : Fluoride : CK(1815) : AC(454)

## Sperm Count: Low (AC 1) (CK 2)

### Fluoride-induced apoptosis and gene expression profiling in mice sperm in vivo has been observed.

**Pubmed Data** : Arch Toxicol. 2011 Nov ;85(11):1441-52. Epub 2011 Feb 22. PMID: [21340527](#)

**Article Published Date** : Nov 01, 2011

**Authors** : Zilong Sun, Ruiyan Niu, Bin Wang, Zhibin Jiao, Jinming Wang, Jianhai Zhang, Shaolin Wang, Jundong Wang

**Study Type** : Animal Study

#### Additional Links

**Diseases** : Azoospermic : CK(4) : AC(2), Infertility: Male : CK(1668) : AC(424), Oxidative Stress : CK(13443) : AC(5499), Sperm Count: Low : CK(116) : AC(25), Sperm Quality: Low : CK(611) : AC(121)

**Pharmacological Actions** : Antioxidants : CK(32218) : AC(14161), Apoptotic : CK(9052) : AC(7284)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Anti-Fertility : CK(112) : AC(21)

## Sperm Quality: Low (AC 12) (CK 22)

### "Decreased in vitro fertility in male rats exposed to fluoride-induced oxidative stress damage and mitochondrial transmembrane potential loss."

**Pubmed Data** : Toxicol Appl Pharmacol. 2008 Aug 1 ;230(3):352-7. Epub 2008 Mar 28. PMID: [18455746](#)

**Article Published Date** : Aug 01, 2008

**Authors** : Jeannett A Izquierdo-Vega, Manuel Sánchez-Gutiérrez, Luz María Del Razo

**Study Type** : Animal Study

#### Additional Links

**Diseases** : Infertility: Male : CK(1668) : AC(424), Oxidative Stress : CK(13443) : AC(5499), Sperm Quality: Low : CK(611) : AC(121)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Anti-Fertility : CK(112) : AC(21), Oxidant : CK(646) : AC(246)

### Ameliorative effects of nano Moringa on fluoride-induced testicular damage via down regulation of the StAR gene and altered steroid hormones.

**Pubmed Data** : Reprod Biol. 2022 Dec 21 ;23(1):100724. Epub 2022 Dec 21. PMID: [36563520](#)

**Article Published Date** : Dec 21, 2022

**Authors** : Entsar R Abd-Allah, Heba Ali Abd El-Rahman

**Study Type** : Animal Study

#### Additional Links

**Substances** : Moringa oleifera : CK(748) : AC(377)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Low Testosterone : CK(852) : AC(140), Sperm Quality: Low : CK(611) :

AC(121)

**Problem Substances** : Fluoride : CK(1815) : AC(454)

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## Dose and time-dependent effects of sodium fluoride on sperm motility.

**Pubmed Data** : Toxicol Ind Health. 2018 Dec ;34(12):813-818. Epub 2018 Oct 25. PMID: [30360691](#)

**Article Published Date** : Nov 30, 2018

**Authors** : Basavalingappa Chaithra, Halugudde Nagaraja Sarjan, Shivabasavaiah

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Infertility: Male : CK(1668) : AC(424), Sperm Quality: Low : CK(611) : AC(121)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Fluoride exposure alters the ultra-structure of sperm flagellum via reducing key protein expressions in testis.

**Pubmed Data** : Chemosphere. 2020 May ;246:125772. Epub 2019 Dec 30. PMID: [31901658](#)

**Article Published Date** : Apr 30, 2020

**Authors** : Chen Liang, Yuyang He, Yu Liu, Yan Gao, Yongli Han, Xiang Li, Yangfei Zhao, Jundong Wang, Jianhai Zhang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Sperm Quality: Low : CK(611) : AC(121), Testicular Injury: Chemical/Metal Induced : CK(754) : AC(374)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Fluoride-induced apoptosis and gene expression profiling in mice sperm in vivo has been observed.

**Pubmed Data** : Arch Toxicol. 2011 Nov ;85(11):1441-52. Epub 2011 Feb 22. PMID: [21340527](#)

**Article Published Date** : Nov 01, 2011

**Authors** : Zilong Sun, Ruiyan Niu, Bin Wang, Zhibin Jiao, Jinming Wang, Jianhai Zhang, Shaolin Wang, Jundong Wang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Azoospermic : CK(4) : AC(2), Infertility: Male : CK(1668) : AC(424), Oxidative Stress : CK(13443) : AC(5499), Sperm Count: Low : CK(116) : AC(25), Sperm Quality: Low : CK(611) : AC(121)

**Pharmacological Actions** : Antioxidants : CK(32218) : AC(14161), Apoptotic : CK(9052) : AC(7284)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Anti-Fertility : CK(112) : AC(21)

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## Fluoride-induced sperm damage and HuR-mediated excessive apoptosis and autophagy in spermatocytes.

**Pubmed Data** : Biol Trace Elem Res. 2023 Jan ;201(1):295-305. Epub 2022 Feb 28. PMID: [35226278](#)

**Article Published Date** : Dec 31, 2022

**Authors** : Yanyan Li, Jianbin Zhang, Linlin Sun, Hongyu Zhao, Xiaohan Jia, Yingri Zhang, Yuanbin Li

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : Sperm Quality: Low : CK(611) : AC(121)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Microdose vasal injection of sodium fluoride in the rat interferes with fertility.

**Pubmed Data** : Reprod Toxicol. 1991 ;5(6):505-12. PMID: [1839778](#)

**Article Published Date** : Jan 01, 1991

**Authors** : N J Chinoy, M V Rao, M V Narayana, E Neelakanta

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Infertility: Male : CK(1668) : AC(424), Sperm Quality: Low : CK(611) : AC(121)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Anti-Fertility : CK(112) : AC(21)

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## Sodium fluoride administered in drinking water of 2, 4, and 6 ppm concentration for 6 months to male rats adversely affected their fertility and reproductive system.

**Pubmed Data** : Toxicol Ind Health. 2007 Oct;23(9):507-13. PMID: [18681235](#)

**Article Published Date** : Oct 01, 2007

**Authors** : R S Gupta, T I Khan, D Agrawal, J B S Kachhawa

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Infertility: Male : CK(1668) : AC(424), Sperm Quality: Low : CK(611) : AC(121)

**Problem Substances** : Fluoride : CK(1815) : AC(454), Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Anti-Fertility : CK(112) : AC(21)

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## Sodium fluoride affected male reproduction by disturbing blood-testis barrier in mice.

**Pubmed Data** : Food Chem Toxicol. 2016 May 27 ;94:103-111. Epub 2016 May 27. PMID: [27237588](#)

**Article Published Date** : May 26, 2016

**Authors** : Jianhai Zhang, Zhihui Li, Mingli Qie, Ruibo Zheng, Jagathpala Shetty, Jundong Wang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Infertility: Male : CK(1668) : AC(424), Sperm Quality: Low : CK(611) : AC(121)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Sodium fluoride and fluoride contaminated ground water induced altered reproductive performances in male rats.

**Pubmed Data** : Biol Trace Elem Res. 2020 Jun ;195(2):544-550. Epub 2019 Aug 28. PMID: [31463763](#)

**Article Published Date** : May 31, 2020

**Authors** : B Chaithra, H N Sarjan, Shivabasavaiah

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Sperm Quality: Low : CK(611) : AC(121)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Sodium fluoride exposure changed histological structure and ultrastructure of hypothalamus-pituitary-testicular axis and significantly increased the malformation ratio of sperm.

**Pubmed Data** : Chemosphere. 2015 Sep ;135:297-303. Epub 2015 May 15. PMID: [25966048](#)

**Article Published Date** : Aug 31, 2015

**Authors** : Haijun Han, Zilong Sun, Guangying Luo, Chong Wang, Ruifen Wei, Jundong Wang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Infertility: Male : CK(1668) : AC(424), Sperm Quality: Low : CK(611) : AC(121)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**This indicated that along with low sperm quality, sperm mtDNA copy number is also a sensitive biomarker to reflect the sperm toxicity of fluoride.**

**Pubmed Data** : Biochem Biophys Res Commun. 2017 10 21 ;492(3):295-299. Epub 2017 Aug 31. PMID: [28864413](#)

**Article Published Date** : Jan 20, 2017

**Authors** : Zilong Sun, Xingchen Xue, Yuliang Zhang, Ruiyan Niu, Jundong Wang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Infertility: Male : CK(1668) : AC(424), Sperm Quality: Low : CK(611) : AC(121)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

## Spleen Damage: Chemically Induced (AC 9) (CK 18)

**Fluoride can suppress the activation of p38MAPK pathway in mice spleen lymphocytes and further influences the function of the immune system.**

**Pubmed Data** : Biol Trace Elem Res. 2016 Oct ;173(2):333-8. Epub 2016 Feb 23. PMID: [26906276](#)

**Article Published Date** : Sep 30, 2016

**Authors** : Zeyu Shi, Yaqi Zhan, Junxing Zhao, Jinming Wang, Haili Ma

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Spleen Damage: Chemically Induced : CK(2) : AC(9)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Immunotoxic : CK(507) : AC(127)

**Fluoride induces immunotoxicity by regulating riboflavin transport and metabolism partly through IL-17A in the spleen.**

**Pubmed Data** : J Hazard Mater. 2024 Sep 5 ;476:135085. Epub 2024 Jul 2. PMID: [38968825](#)

**Article Published Date** : Sep 05, 2024

**Authors** : Yurou Qiao, Yukun Cui, Yanjia Tan, Cuicui Zhuang, Xiang Li, Yufei Yong, Xinying Zhang, Xuting Ren, Miaomiao Cai, Jie Yang, Yilin Lang, Jundong Wang, Chen Liang, Jianhai Zhang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Drug-Induced Nutrient Depletion: Riboflavin (B-2) : CK(2) : AC(1), Low Immune Function: Chemically-Induced : CK(4) : AC(2), Mitochondrial Dysfunction : CK(618) : AC(262), Spleen Damage: Chemically Induced : CK(2) : AC(9)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Immunotoxic : CK(507) : AC(127)

**Gene expression and alterations of antioxidant enzymes in spleen of rats exposed to fluoride.**

**Pubmed Data** : J Trace Elem Med Biol. 2022 Jul ;72:126966. Epub 2022 Mar 9. PMID: [35286942](#)

**Article Published Date** : Jun 30, 2022

**Authors** : A Shashi, Sukanya Thakur

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Fluoride Toxicity : CK\(1389\) : AC\(376\)](#), [Oxidative Stress : CK\(13443\) : AC\(5499\)](#), [Spleen Damage: Chemically Induced : CK\(2\) : AC\(9\)](#)

**Problem Substances** : [Sodium Fluoride : CK\(1446\) : AC\(393\)](#)

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## Genotoxicity of fluoride subacute exposure in rats and selenium intervention.

**Pubmed Data** : Chemosphere. 2021 Mar ;266:128978. Epub 2020 Nov 17. PMID: [33298328](#)

**Article Published Date** : Feb 28, 2021

**Authors** : Jelena Radovanović, Biljana Antonijević, Stoimir Kolarević, Sanja Milutinović-Smiljanić, Jelena Mandić, Branka Vuković-Gačić, Zorica Bulat, Marijana Ćurčić, Margareta Kračun-Kolarević, Karolina Sunjog, Jovana Kostić-Vuković, Jovana Jovanović Marić, Evica Antonijević-Miljaković, Danijela Đukić-Ćosić, Aleksandra Buha Djordjevic, Dragana Javorac, Katarina Baralić, Zoran Mandinić

**Study Type** : In Vitro Study

**Additional Links**

**Substances** : [Selenium : CK\(1706\) : AC\(389\)](#)

**Diseases** : [Chemically-Induced Liver Damage : CK\(2167\) : AC\(1069\)](#), [DNA damage : CK\(2255\) : AC\(824\)](#), [Fluoride Toxicity : CK\(1389\) : AC\(376\)](#), [Spleen Damage: Chemically Induced : CK\(2\) : AC\(9\)](#)

**Pharmacological Actions** : [Genoprotective : CK\(522\) : AC\(203\)](#)

**Problem Substances** : [Sodium Fluoride : CK\(1446\) : AC\(393\)](#)

**Adverse Pharmacological Actions** : [Genotoxic : CK\(545\) : AC\(184\)](#), [Neurotoxic : CK\(2838\) : AC\(702\)](#)

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## Sodium fluoride (NaF) causes toxic effects on splenic development in mice.

**Pubmed Data** : Oncotarget. 2017 Jan 17 ;8(3):4703-4717. PMID: [28002795](#)

**Article Published Date** : Jan 16, 2017

**Authors** : Ping Kuang, Huidan Deng, Hengmin Cui, Lian Chen, Jing Fang, Zhicai Zuo, Junliang Deng, Xun Wang, Ling Zhao

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Fluoride Toxicity : CK\(1389\) : AC\(376\)](#), [Spleen Damage: Chemically Induced : CK\(2\) : AC\(9\)](#)

**Problem Substances** : [Sodium Fluoride : CK\(1446\) : AC\(393\)](#)

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## Sodium fluoride impairs splenic innate immunity via inactivation of TLR2/MyD88 signaling pathway in mice.

**Pubmed Data** : Chemosphere. 2019 Dec ;237:124437. Epub 2019 Jul 23. PMID: [31356994](#)

**Article Published Date** : Nov 30, 2019

**Authors** : Ping Kuang, Hongrui Guo, Huidan Deng, Hengmin Cui, Jing Fang, Zhicai Zuo, Junliang Deng, Yinglun Li, Xun Wang, Ling Zhao

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Fluoride Toxicity : CK\(1389\) : AC\(376\)](#), [Spleen Damage: Chemically Induced : CK\(2\) : AC\(9\)](#)

**Problem Substances** : [Sodium Fluoride : CK\(1446\) : AC\(393\)](#)

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## Sodium fluoride induces the splenic apoptosis.

**Pubmed Data** : Aging (Albany NY). 2016 Dec 27 ;8(12):3552-3567. PMID: [28039491](#)

**Article Published Date** : Dec 26, 2016

**Authors** : Huidan Deng, Ping Kuang, Hengmin Cui, Lian Chen, Qin Luo, Jing Fang, Zhicai Zuo, Junliang Deng, Xun Wang, Ling Zhao

**Study Type** : Animal Study, In Vitro Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Spleen Damage: Chemically Induced : CK(2) : AC(9)  
**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)  
**Adverse Pharmacological Actions** : Apoptotic : CK(278) : AC(120)

## Sodium fluoride suppresses spleen development through MAPK/ERK signaling pathway in mice.

**Pubmed Data** : Ecotoxicol Environ Saf. 2022 Aug ;241:113764. Epub 2022 Jun 13. PMID: [35709673](#)

**Article Published Date** : Jul 31, 2022

**Authors** : Ping Kuang, Hengmin Cui, Li Yu

**Study Type** : Animal Study

### Additional Links

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Prenatal Chemical Exposures : CK(2428) : AC(530), Spleen Damage: Chemically Induced : CK(2) : AC(9)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

## Suppressive effects of sodium fluoride on cultured splenic lymphocyte proliferation in mice.

**Pubmed Data** : Oncotarget. 2016 Sep 20 ;7(38):61905-61915. PMID: [27542206](#)

**Article Published Date** : Sep 19, 2016

**Authors** : Ping Kuang, Huidan Deng, Hengmin Cui, Lian Chen, Hongrui Guo, Jing Fang, Zhicai Zuo, Junliang Deng, Xun Wang, Ling Zhao

**Study Type** : Animal Study

### Additional Links

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Spleen Damage: Chemically Induced : CK(2) : AC(9)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

## Streptococcus Mutans Infections (AC 1) (CK 1)

### Theobromine though nonfluoridated toothpaste showed greater zones of inhibition than other commercially available fluoridated kid's toothpastes.

**Pubmed Data** : Dent Res J (Isfahan). 2019 Mar-Apr;16(2):76-80. PMID: [30820200](#)

**Article Published Date** : Feb 28, 2019

**Authors** : Arthi Lakshmi, C Vishnurekha, Parisa Norouzi Baghkomeh

**Study Type** : In Vitro Study

### Additional Links

**Substances** : Cocoa : CK(1608) : AC(214)

**Diseases** : Enterococcus Infections : CK(76) : AC(62), Streptococcus Mutans Infections : CK(467) : AC(157)

**Pharmacological Actions** : Antimicrobial : CK(1531) : AC(781)

**Additional Keywords** : Superiority of Natural Substances versus Drugs : CK(1855) : AC(392)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

## Stroke (AC 1) (CK 10)

## Long-term excessive fluoride exposure from drinking water may increase the risk of stroke prevalence, indicating fluoride overexposure as a potential risk factor for stroke.

**Pubmed Data** : Toxics. 2024 Sep 18 ;12(9). Epub 2024 Sep 18. PMID: [39330607](#)

**Article Published Date** : Sep 18, 2024

**Authors** : Lin Yuan, Hongna Sun, Yue Li, Zhifeng Xing, Shihui Yin, Fengyu Xie, Jing Zhou, Shuang Li, Liaowei Wu, Wei Huang, Teng Wang, Yanhui Gao, Lijun Zhao, Dianjun Sun

**Study Type** : Human Study

**Additional Links**

**Diseases** : [Stroke](#) : CK(4172) : AC(718)

**Problem Substances** : [Fluoride](#) : CK(1815) : AC(454)

## TSH: Elevated (AC 1) (CK 10)

### High iodine and high fluorine adversely effects the intelligence and health of children.

**Pubmed Data** : Zhonghua Liu Xing Bing Xue Za Zhi. 1994 Oct;15(5):296-8. PMID: [7859263](#)

**Article Published Date** : Oct 01, 1994

**Authors** : Y Yang, X Wang, X Guo

**Study Type** : Human Study

**Additional Links**

**Diseases** : [Childhood Chemical Exposures](#) : CK(165) : AC(17), [Childhood Cognitive Disorders](#) : CK(316) : AC(27), [Intelligence Quotient \(IQ\): Low/Impaired](#) : CK(312) : AC(27), [TSH: Elevated](#) : CK(20) : AC(2)

**Problem Substances** : [Fluoride](#) : CK(1815) : AC(454), [Iodine: Excess](#) : CK(10) : AC(1)

**Adverse Pharmacological Actions** : [Neurotoxic](#) : CK(2838) : AC(702)

## Testicular Injury: Chemical/Metal Induced (AC 17) (CK 33)

### Abnormal spermatogenesis following sodium fluoride exposure is associated with the downregulation of CREM and ACT in the mouse testis.

**Pubmed Data** : Toxicol Ind Health. 2018 Apr ;34(4):219-227. Epub 2018 Mar 12. PMID: [29529942](#)

**Article Published Date** : Mar 31, 2018

**Authors** : Chong Wang, Yan Chen, Ram Kumar Manthari, Jundong Wang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Testicular Injury: Chemical/Metal Induced](#) : CK(754) : AC(374)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)



## Cell cycle arrest and gene expression profiling of testis in mice exposed to fluoride.

**Pubmed Data** : Environ Toxicol. 2017 May ;32(5):1558-1565. Epub 2016 Nov 14. PMID: [27862939](#)

**Article Published Date** : Apr 30, 2017

**Authors** : Kai Su, Zilong Sun, Ruiyan Niu, Ying Lei, Jing Cheng, Jundong Wang

**Study Type** : Animal Study

### Additional Links

**Diseases** : DNA damage : CK(2255) : AC(824), Fluoride Toxicity : CK(1389) : AC(376), Testicular Injury: Chemical/Metal Induced : CK(754) : AC(374)

**Problem Substances** : Fluoride : CK(1815) : AC(454), Sodium Fluoride : CK(1446) : AC(393)

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## Effects of fluoride on PIWI-interacting RNA expression profiling in testis of mice.

**Pubmed Data** : Chemosphere. 2021 Apr ;269:128727. Epub 2020 Oct 24. PMID: [33213873](#)

**Article Published Date** : Mar 31, 2021

**Authors** : Yanyan Li, Min Cheng, Yangfei Zhao, Jinming Wang, Jundong Wang

**Study Type** : Animal Study

### Additional Links

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Testicular Injury: Chemical/Metal Induced : CK(754) : AC(374)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Exposure of fluoride with streptozotocin-induced diabetes aggravates testicular damage and spermatozoa parameters in mice.

**Pubmed Data** : J Toxicol. 2019 ;2019:5269380. Epub 2019 Dec 3. PMID: [31885555](#)

**Article Published Date** : Dec 31, 2018

**Authors** : Manuel Sánchez-Gutiérrez, Evelia Martínez-Loredo, Eduardo Osiris Madrigal-Santillán, Gabriel Betanzos-Cabrera, Araceli Hernández-Zavala, María Angélica Mojica-Villegas, Jeannett Alejandra Izquierdo-Vega

**Study Type** : Animal Study

### Additional Links

**Diseases** : Diabetic Complications : CK(4283) : AC(1544), Fluoride Toxicity : CK(1389) : AC(376), Testicular Injury: Chemical/Metal Induced : CK(754) : AC(374)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Fluoride exposure alters the ultra-structure of sperm flagellum via reducing key protein expressions in testis.

**Pubmed Data** : Chemosphere. 2020 May ;246:125772. Epub 2019 Dec 30. PMID: [31901658](#)

**Article Published Date** : Apr 30, 2020

**Authors** : Chen Liang, Yuyang He, Yu Liu, Yan Gao, Yongli Han, Xiang Li, Yangfei Zhao, Jundong Wang, Jianhai Zhang

**Study Type** : Animal Study

### Additional Links

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Sperm Quality: Low : CK(611) : AC(121), Testicular Injury: Chemical/Metal Induced : CK(754) : AC(374)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Fluoride exposure arrests the acrosome formation during spermatogenesis.

**Pubmed Data** : Chemosphere. 2019 Jul ;226:874-882. Epub 2019 Apr 5. PMID: [31509916](#)

**Article Published Date** : Jun 30, 2019

**Authors** : Shanshan Jiang, Chen Liang, Yan Gao, Yu Liu, Yongli Han, Jundong Wang, Jianhai Zhang



**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Infertility: Male : CK(1668) : AC(424), Testicular Injury: Chemical/Metal Induced : CK(754) : AC(374)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Fluoride exposure changed the structure and the expressions of Y chromosome related genes in testes.

**Pubmed Data** : Chemosphere. 2016 Oct ;161:292-299. Epub 2016 Jul 18. PMID: [27441988](#)

**Article Published Date** : Sep 30, 2016

**Authors** : Jinling Cao, Yan Chen, Jianjie Chen, Hanghang Yan, Meiyang Li, Jundong Wang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Testicular Injury: Chemical/Metal Induced : CK(754) : AC(374)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Fluoride induced testicular toxicities in adult Wistar rats.

**Pubmed Data** : Toxicol Mech Methods. 2021 Jun ;31(5):383-392. Epub 2021 Feb 28. PMID: [33641618](#)

**Article Published Date** : May 31, 2021

**Authors** : Priyanka Pal, Prabir Kumar Mukhopadhyay

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Oxidative Stress : CK(13443) : AC(5499), Testicular Injury: Chemical/Metal Induced : CK(754) : AC(374)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Fluoride induces pyroptosis via IL-17A-mediated caspase-1/11-dependent pathways and Bifidobacterium intervention in testis.

**Pubmed Data** : Sci Total Environ. 2024 May 20 ;926:172036. Epub 2024 Mar 28. PMID: [38554964](#)

**Article Published Date** : May 19, 2024

**Authors** : Ao Cheng, Huifeng Luo, Bingchao Fan, Qing Xiang, Zhaochen Nie, Shuang Feng, Yurou Qiao, Yue Wu, Qianlong Zhu, Rongxiu Liu, Xiaochao Song, Xiang Li, Jianhai Zhang

**Study Type** : Animal Study

**Additional Links**

**Substances** : Bifidobacterium : CK(1540) : AC(254)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Testicular Injury: Chemical/Metal Induced : CK(754) : AC(374)

**Pharmacological Actions** : Anti-Inflammatory Agents : CK(35225) : AC(15297), Interleukin-17 downregulation : CK(484) : AC(187)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Apoptotic : CK(278) : AC(120)

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## Ginseng and banaba leaf extracts could protect against fluoride induced testicular damage.

**Pubmed Data** : Biol Trace Elem Res. 2017 Jun ;177(2):331-344. Epub 2016 Nov 16. PMID: [27854046](#)

**Article Published Date** : May 31, 2017

**Authors** : Saumya Sm, P Mahaboob Basha

**Study Type** : Animal Study

**Additional Links**

**Substances** : Banaba : CK(36) : AC(20), Ginseng : CK(4190) : AC(1902)

**Diseases** : Testicular Injury: Chemical/Metal Induced : CK(754) : AC(374)

**Pharmacological Actions** : Cytoprotective : CK(797) : AC(393)

**Additional Keywords** : Plant Extracts : CK(18030) : AC(6728)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Hesperidin/chitosan nanogel mitigates apoptosis and endoplasmic reticulum stress in fluoride and aluminum-induced testicular injury.

**Pubmed Data** : Biol Trace Elem Res. 2023 Dec 13. Epub 2023 Dec 13. PMID: [38087036](#)

**Article Published Date** : Dec 12, 2023

**Authors** : Nora S Deiab, Ahmad S Kodous, Mohamed K Mahfouz, Alshaimaa M Said, Mohamed Mohamady Ghobashy, Omayma A R Abozaid

**Study Type** : Animal Study

**Additional Links**

**Substances** : Hesperidin : CK(845) : AC(358)

**Diseases** : Aluminum Toxicity : CK(685) : AC(308), Fluoride Toxicity : CK(1389) : AC(376), Testicular Injury: Chemical/Metal Induced : CK(754) : AC(374)

**Pharmacological Actions** : Anti-Apoptotic : CK(4942) : AC(3051), Antioxidants : CK(32218) : AC(14161)

**Problem Substances** : Aluminum : CK(1061) : AC(349), Sodium Fluoride : CK(1446) : AC(393)

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## Melatonin ameliorated sodium fluoride-induced testicular metabolic stress.

**Pubmed Data** : Biol Trace Elem Res. 2019 Dec 11. Epub 2019 Dec 11. PMID: [31828722](#)

**Article Published Date** : Dec 10, 2019

**Authors** : Jitendra Kumar, Chandana Haldar, Rakesh Verma

**Study Type** : Animal Study

**Additional Links**

**Substances** : Melatonin : CK(2743) : AC(904)

**Diseases** : Testicular Injury: Chemical/Metal Induced : CK(754) : AC(374)

**Pharmacological Actions** : Anti-Inflammatory Agents : CK(35225) : AC(15297), Antioxidants : CK(32218) : AC(14161), Cyclooxygenase 2 Inhibitors : CK(2067) : AC(1279), Heme oxygenase-1 up-regulation : CK(1225) : AC(756), NF-kappaB Inhibitor : CK(5541) : AC(3374), Nrf2 activation : CK(2908) : AC(1762)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## N-acetylcysteine alleviates fluoride-induced testicular apoptosis by modulating IRE1 $\alpha$ /JNK signaling and nuclear Nrf2 activation.

**Pubmed Data** : Reprod Toxicol. 2019 03 ;84:98-107. Epub 2019 Jan 8. PMID: [30633982](#)

**Article Published Date** : Dec 31, 2018

**Authors** : Yazhen Hu, Yawei Wang, Ting Yan, Demin Feng, Yue Ba, Huizhen Zhang, Jingyuan Zhu, Xuemin Cheng, Liuxin Cui, Hui Huang

**Study Type** : Animal Study

**Additional Links**

**Substances** : NAC (N-acetyl-L-cysteine) : CK(1429) : AC(366)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Oxidative Stress : CK(13443) : AC(5499), Testicular Injury: Chemical/Metal Induced : CK(754) : AC(374)

**Pharmacological Actions** : Anti-Apoptotic : CK(4942) : AC(3051), Antioxidants : CK(32218) : AC(14161), Nrf2 activation : CK(2908) : AC(1762)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Riboflavin alleviates fluoride-induced ferroptosis by IL-17A-independent system Xc-/GPX4 pathway and iron metabolism in testicular Leydig cells.

**Pubmed Data** : Environ Pollut. 2024 Jan 8 ;344:123332. Epub 2024 Jan 8. PMID: [38199481](#)

**Article Published Date** : Jan 07, 2024

**Authors** : Xiang Li, Jie Yang, Erbao Shi, Yiguang Lu, Xiaochao Song, Huifeng Luo, Jundong Wang, Chen Liang, Jianhai Zhang

**Study Type** : Animal Study

**Additional Links**

**Substances** : Riboflavin (Vitamin B-2) : CK(409) : AC(71)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Testicular Injury: Chemical/Metal Induced : CK(754) : AC(374)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Royal jelly reduces fluoride induced testicular damage and infertility.

**Pubmed Data** : Reprod Sci. 2023 May 12. Epub 2023 May 12. PMID: [37171774](#)

**Article Published Date** : May 11, 2023

**Authors** : Gozde Parlak, Abdullah Aslan, Gaffari Turk, Tuncay Kuloglu, Merve Kavak Balgetir, Ozlem Gok, Seda Beyaz, Akif Evren Parlak, Serap Dayan Cinkara

**Study Type** : Animal Study

**Additional Links**

**Substances** : Royal Jelly : CK(634) : AC(234)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Testicular Injury: Chemical/Metal Induced : CK(754) : AC(374)

**Pharmacological Actions** : Antioxidants : CK(32218) : AC(14161), Nrf2 activation : CK(2908) : AC(1762)

**Problem Substances** : Fluoride : CK(1815) : AC(454)

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## Sodium fluoride disrupts testosterone biosynthesis by affecting the steroidogenic pathway in TM3 Leydig cells.

**Pubmed Data** : Chemosphere. 2018 Dec ;212:447-455. Epub 2018 Aug 22. PMID: [30165274](#)

**Article Published Date** : Nov 30, 2018

**Authors** : Banu Orta Yilmaz, Ahu Korkut, Melike Erkan

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Low Testosterone : CK(852) : AC(140), Testicular Injury: Chemical/Metal Induced : CK(754) : AC(374)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## This study proved that oxidative stress probably play a major role in NaF-induced apoptosis of Sertoli cells.

**Pubmed Data** : Int J Environ Health Res. 2015 ;25(1):1-9. Epub 2014 Feb 13. PMID: [24521312](#)

**Article Published Date** : Dec 31, 2014

**Authors** : Yang Yang, Hui Huang, Yue Ba, Xue-Min Cheng, Liu-Xin Cui

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Oxidative Stress : CK(13443) : AC(5499), Testicular Injury: Chemical/Metal Induced : CK(754) : AC(374)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Apoptotic : CK(278) : AC(120)

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## Testicular Injury: Fluoride-Induced (AC 1) (CK 2)

### Fluoride exposure during puberty induces testicular impairment via ER stress-triggered apoptosis in mice.

**Pubmed Data** : Food Chem Toxicol. 2024 Jul ;189:114773. Epub 2024 May 31. PMID: [38823497](#)

**Article Published Date** : Jul 01, 2024

**Authors** : Rong Wang, Wenjing Gong, Yumeng Jiang, Qizi Yin, Ziyue Wang, Jie Wu, Mingming Zhang, Mengyuan Li, Yehao Liu, Juan Wang, Yuanhua Chen, Yanli Ji

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Testicular Injury: Fluoride-Induced : CK(2) : AC(1)

**Pharmacological Actions** : Apoptotic : CK(9052) : AC(7284)

**Problem Substances** : Fluoride : CK(1815) : AC(454)

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## Thyroid Diseases (AC 1) (CK 2)

### Sesamin alleviated fluoride - induced thyroid endocrine disruption.

**Pubmed Data** : Aquat Toxicol. 2023 Aug ;261:106625. Epub 2023 Jul 4. PMID: [37407302](#)

**Article Published Date** : Jul 31, 2023

**Authors** : Tianyu Wang, Shanshan Wu, Jianjie Chen, Lijuan Li, Jinling Cao

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Thyroid Diseases : CK(348) : AC(52)

**Pharmacological Actions** : Cytoprotective : CK(797) : AC(393)

**Additional Keywords** : Gene Expression Regulation : CK(1399) : AC(621)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Thyroid Dysfunction (AC 3) (CK 41)

### Exposure to high-fluoride drinking water appears to non-linearly affect thyroid function and increase TSH release in children.

**Pubmed Data** : Environ Res. 2024 Feb 1 ;242:117759. Epub 2023 Nov 28. PMID: [38029816](#)

**Article Published Date** : Jan 31, 2024

**Authors** : Inga Iamandii, Lisa De Pasquale, Maria Edvige Giannone, Federica Veneri, Luigi Generali, Ugo Consolo, Linda S Birnbaum, Jacqueline Castenmiller, Thorhallur I Halldorsson, Tommaso Filippini, Marco Vinceti

**Study Type** : Meta Analysis, Review

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Goiter: Exophthalmic : CK(32) : AC(3), Hypothyroidism : CK(847) : AC(148), Thyroid Dysfunction : CK(86) : AC(13)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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### Fluoride exposure was associated with alterations in maternal thyroid hormone levels.

**Pubmed Data** : Environ Int. 2024 Jan 12 ;184:108442. Epub 2024 Jan 12. PMID: [38237505](#)

**Article Published Date** : Jan 11, 2024

**Authors** : Meaghan Hall, Rick Hornung, Jonathan Chevrier, Pierre Ayotte, Bruce Lanphear, Christine Till

**Study Type** : Human Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Prenatal Chemical Exposures : CK(2428) : AC(530), Thyroid Dysfunction : CK(86) : AC(13)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Low-moderate fluoride exposure is associated with alterations in childhood thyroid function.

**Pubmed Data** : Environ Int. 2020 Jan ;134:105229. Epub 2019 Nov 4. PMID: [31698198](#)

**Article Published Date** : Dec 31, 2019

**Authors** : Mengwei Wang, Ling Liu, Huijun Li, Yonggang Li, Hongliang Liu, Changchun Hou, Qiang Zeng, Pei Li, Qian Zhao, Lixin Dong, Guoyu Zhou, Xingchen Yu, Li Liu, Qing Guan, Shun Zhang, Aiguo Wang

**Study Type** : Human Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Thyroid Dysfunction : CK(86) : AC(13)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

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## Tourette Syndrome (AC 1) (CK 2)

### Sodium fluoride exposure during pregnancy may interfere with normal development and increase the risk of neurological and psychiatric disorders in adulthood.

**Pubmed Data** : Eur Rev Med Pharmacol Sci. 2010 Jun;14(6):507-12. PMID: [20712257](#)

**Article Published Date** : Jun 01, 2010

**Authors** : P Flace, V Benagiano, D Vermesan, R Sabatini, A M Inchingolo, A Inchingolo, P Auteri, G Ambrosi, A Tarullo, R Cagiano

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Huntington Disease : CK(222) : AC(103), Obsessive-Compulsive Disorder : CK(421) : AC(77), Prenatal Chemical Exposures : CK(2428) : AC(530), Schizophrenia : CK(1080) : AC(191), Tourette Syndrome : CK(207) : AC(30)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Genotoxic : CK(545) : AC(184), Teratogenic : CK(325) : AC(66)

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## Uterine Diseases (AC 1) (CK 2)

### Female reproductive function is inhibited by NaF and that exposure to NaF causes ovarian and uterine structural damage.

**Pubmed Data** : Food Chem Toxicol. 2013 Feb 28. Epub 2013 Feb 28. PMID: [23459146](#)

**Article Published Date** : Feb 28, 2013

**Authors** : Yongjiang Zhou, Hailing Zhang, Junlin He, Xuemei Chen, Yubing Ding, Yingxiong Wang, Xueqing Liu

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Infertility: Female : CK(741) : AC(180), Ovarian Diseases : CK(33) : AC(16), Uterine Diseases : CK(1291) : AC(335)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Anti-Fertility : CK(112) : AC(21)

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## Vascular Calcification (AC 1) (CK 10)

**There is an association of vascular fluoride uptake with vascular calcification and coronary artery disease.**

**Pubmed Data** : Nucl Med Commun. 2012 Jan ;33(1):14-20. PMID: [21946616](#)

**Article Published Date** : Jan 01, 2012

**Authors** : Yuxin Li, Gholam R Berenji, Wisam F Shaba, Bashir Tafti, Ella Yevdayev, Simin Dadparvar

**Study Type** : Human Study

**Additional Links**

**Diseases** : Arterial Calcification : CK(268) : AC(45), Ectopic Calcification : CK(1125) : AC(185), Vascular Calcification : CK(443) : AC(82)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

## Vitamin A Deficiency (AC 1) (CK 2)

**Sodium fluoride led to a significant decrease in vitamin A levels in rats exposed to 20ppm.**

**Pubmed Data** : Int J Dev Neurosci. 2015 Sep 18. Epub 2015 Sep 18. PMID: [26390955](#)

**Article Published Date** : Sep 17, 2015

**Authors** : Rajkiran Reddy Reddy Banala, Karnati Pratap Reddy

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Oxidative Stress : CK(13443) : AC(5499), Vitamin A Deficiency : CK(137) : AC(28)

**Additional Keywords** : Increased Risk : CK(8492) : AC(1109)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

## Category : Adverse Pharmacological Actions

## Abortive (AC 1) (CK 10)

**An increased risk of spontaneous abortion among fabrication workers has been linked to fluoride compound and photoresist and developed solvents (PDS) exposure.**

**Pubmed Data** : Am J Ind Med. 1995 Dec ;28(6):751-69. PMID: [8588562](#)

**Article Published Date** : Dec 01, 1995

**Authors** : S H Swan, JJ Beaumont, S K Hammond, J VonBehren, R S Green, M F Hallock, S R Woskie, C J Hines, M B Schenker

**Study Type** : Human Study

**Additional Links**

**Diseases** : Abortion: Spontaneous : CK(325) : AC(42), Infertility: Female : CK(741) : AC(180)

**Problem Substances** : Fluoride : CK(1815) : AC(454), Photoresist and developed solvents (PDS) : CK(10) : AC(1)

**Adverse Pharmacological Actions** : Abortive : CK(57) : AC(9), Anti-Fertility : CK(112) : AC(21)

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## Acetylcholinesterase inhibitor (xenobiotic) (AC 1) (CK 2)

**Fluoride may go through the blood-brain barrier and accumulate in rat hippocampus, and inhibit the activity of cholinesterase.**

**Pubmed Data** : Zhonghua Lao Dong Wei Sheng Zhi Ye Bing Za Zhi. 2003 Apr ;21(2):102-4. PMID: [14761523](#)

**Article Published Date** : Apr 01, 2003

**Authors** : Jin-xia Zhai, Zhi-yong Guo, Chuan-lai Hu, Qi-nan Wang, Qi-xing Zhu

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Blood-Brain-Barrier Disorders : CK(31) : AC(18), Brain Injury: Hippocampal Damage : CK(44) : AC(21)

**Problem Substances** : Fluoride : CK(1815) : AC(454)

**Adverse Pharmacological Actions** : Acetylcholinesterase inhibitor (xenobiotic) : CK(8) : AC(4), Neurotoxic : CK(2838) : AC(702)

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## Anti-Fertility (AC 12) (CK 50)

**"Decreased in vitro fertility in male rats exposed to fluoride-induced oxidative stress damage and mitochondrial transmembrane potential loss."**

**Pubmed Data** : Toxicol Appl Pharmacol. 2008 Aug 1 ;230(3):352-7. Epub 2008 Mar 28. PMID: [18455746](#)

**Article Published Date** : Aug 01, 2008

**Authors** : Jeannett A Izquierdo-Vega, Manuel Sánchez-Gutiérrez, Luz María Del Razo

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Infertility: Male : CK(1668) : AC(424), Oxidative Stress : CK(13443) : AC(5499), Sperm Quality: Low : CK(611) : AC(121)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Anti-Fertility : CK(112) : AC(21), Oxidant : CK(646) : AC(246)

---

**An increased risk of spontaneous abortion among fabrication workers has been linked to fluoride compound and photoresist and developed solvents (PDS) exposure.**

**Pubmed Data** : Am J Ind Med. 1995 Dec ;28(6):751-69. PMID: [8588562](#)

**Article Published Date** : Dec 01, 1995

**Authors** : S H Swan, J J Beaumont, S K Hammond, J VonBehren, R S Green, M F Hallock, S R Woskie, C J Hines, M B Schenker



**Study Type** : Human Study

**Additional Links**

**Diseases** : Abortion: Spontaneous : CK(325) : AC(42), Infertility: Female : CK(741) : AC(180)

**Problem Substances** : Fluoride : CK(1815) : AC(454), Photoresist and developed solvents (PDS) : CK(10) : AC(1)

**Adverse Pharmacological Actions** : Abortive : CK(57) : AC(9), Anti-Fertility : CK(112) : AC(21)

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## Exposure to high fluoride concentrations in drinking water is associated with decreased birth rates.

**Pubmed Data** : J Toxicol Environ Health. 1994 May ;42(1):109-21. PMID: [8169995](#)

**Article Published Date** : May 01, 1994

**Authors** : S C Freni

**Study Type** : Meta Analysis

**Additional Links**

**Diseases** : Infertility: Female : CK(741) : AC(180), Infertility: Male : CK(1668) : AC(424)

**Additional Keywords** : Causes Of Decreased Birth Rates : CK(20) : AC(1)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Anti-Fertility : CK(112) : AC(21)

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## Female reproductive function is inhibited by NaF and that exposure to NaF causes ovarian and uterine structural damage.

**Pubmed Data** : Food Chem Toxicol. 2013 Feb 28. Epub 2013 Feb 28. PMID: [23459146](#)

**Article Published Date** : Feb 28, 2013

**Authors** : Yongjiang Zhou, Hailing Zhang, Junlin He, Xuemei Chen, Yubing Ding, Yingxiong Wang Xueqing Liu

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Infertility: Female : CK(741) : AC(180), Ovarian Diseases : CK(33) : AC(16), Uterine Diseases : CK(1291) : AC(335)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Anti-Fertility : CK(112) : AC(21)

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## Fertility impairment in mice on a low fluoride intake has been observed.

**Pubmed Data** : Science. 1972 Sep 8 ;177(4052):893-4. PMID: [5054644](#)

**Article Published Date** : Sep 08, 1972

**Authors** : H H Messer, W D Armstrong, L Singer

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Infertility: Female : CK(741) : AC(180)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Anti-Fertility : CK(112) : AC(21)

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## Fluoride-induced apoptosis and gene expression profiling in mice sperm in vivo has been observed.

**Pubmed Data** : Arch Toxicol. 2011 Nov ;85(11):1441-52. Epub 2011 Feb 22. PMID: [21340527](#)

**Article Published Date** : Nov 01, 2011

**Authors** : Zilong Sun, Ruiyan Niu, Bin Wang, Zhibin Jiao, Jinming Wang, Jianhai Zhang, Shaolin Wang, Jundong Wang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Azoospermic : CK(4) : AC(2), Infertility: Male : CK(1668) : AC(424), Oxidative Stress : CK(13443) : AC(5499),

Sperm Count: Low : CK(116) : AC(25), Sperm Quality: Low : CK(611) : AC(121)

**Pharmacological Actions** : Antioxidants : CK(32218) : AC(14161), Apoptotic : CK(9052) : AC(7284)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Anti-Fertility : CK(112) : AC(21)

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## Microdose vasal injection of sodium fluoride in the rat interferes with fertility.

**Pubmed Data** : Reprod Toxicol. 1991 ;5(6):505-12. PMID: [1839778](#)

**Article Published Date** : Jan 01, 1991

**Authors** : N J Chinoy, M V Rao, M V Narayana, E Neelakanta

**Study Type** : Animal Study

### Additional Links

**Diseases** : Infertility: Male : CK(1668) : AC(424), Sperm Quality: Low : CK(611) : AC(121)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Anti-Fertility : CK(112) : AC(21)

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## Sodium fluoride administrated in drinking water of 2, 4, and 6 ppm concentration for 6 months to male rats adversely affected their fertility and reproductive system.

**Pubmed Data** : Toxicol Ind Health. 2007 Oct;23(9):507-13. PMID: [18681235](#)

**Article Published Date** : Oct 01, 2007

**Authors** : R S Gupta, T I Khan, D Agrawal, J B S Kachhawa

**Study Type** : Animal Study

### Additional Links

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Infertility: Male : CK(1668) : AC(424), Sperm Quality: Low : CK(611) : AC(121)

**Problem Substances** : Fluoride : CK(1815) : AC(454), Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Anti-Fertility : CK(112) : AC(21)

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## Sodium fluoride could reduce sperm motility, capacitation, and the acrosome reaction leading to poor fertilization and suppressed embryonic development.

**Pubmed Data** : Andrology. 2015 Apr 8. Epub 2015 Apr 8. PMID: [25854509](#)

**Article Published Date** : Apr 07, 2015

**Authors** : Jin Kim, Woo-Sung Kwon, Md Saidur Rahman, June-Sub Lee, Sung-Jae Yoon, Yoo-Jin Park, Young-Ah You, Myung-Geol Pang

**Study Type** : Animal Study

### Additional Links

**Diseases** : Infertility: Male : CK(1668) : AC(424)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Anti-Fertility : CK(112) : AC(21)

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## Sodium fluoride epigenetically impaired mouse oocyte maturation and embryonic development.

**Pubmed Data** : Environ Sci Technol. 2014 Sep 2 ;48(17):10398-405. Epub 2014 Aug 14. PMID: [25102367](#)

**Article Published Date** : Sep 01, 2014

**Authors** : Mingzhe Fu, Xinying Wu, Jie He, Yong Zhang, Song Hua

**Study Type** : Animal Study

### Additional Links

**Diseases** : Infertility : CK(2481) : AC(656)

**Additional Keywords** : Dose Response : CK(1769) : AC(700), Embryonic Development : CK(3) : AC(2), Gene Expression : CK(282) : AC(104), Prenatal Epigenetic Programming : CK(66) : AC(18)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Anti-Fertility : CK(112) : AC(21)

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## Sodium fluoride treatment impairs the subsequent embryonic developmental potential of the oocytes.

**Pubmed Data** : Environ Toxicol. 2015 May 26. Epub 2015 May 26. PMID: [26011085](#)

**Article Published Date** : May 25, 2015

**Authors** : Shuang Liang, Ming-Hui Zhao, Sun A Ock, Nam-Hyung Kim, Xiang-Shun Cui

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Infertility: Female : CK(741) : AC(180), Mitochondrial Dysfunction : CK(618) : AC(262)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Anti-Fertility : CK(112) : AC(21)

## The administration of high concentrations of fluoride to female mice results in ovarian damage and significantly reduces the number and the fertilization potential of mature oocytes.

**Pubmed Data** : PLoS One. 2015 ;10(6):e0129594. Epub 2015 Jun 8. PMID: [26053026](#)

**Article Published Date** : Dec 31, 2014

**Authors** : Songna Yin, Chao Song, Haibo Wu, Xin Chen, Yong Zhang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Female Reproductive Development Abnormalities : CK(86) : AC(31), Infertility: Female : CK(741) : AC(180)

**Additional Keywords** : Gene Expression : CK(282) : AC(104)

**Problem Substances** : Fluoride : CK(1815) : AC(454), Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Anti-Fertility : CK(112) : AC(21)

## Apoptotic (AC 29) (CK 62)

### A mini review of fluoride-induced apoptotic pathways.

**Pubmed Data** : Environ Sci Pollut Res Int. 2018 Dec ;25(34):33926-33935. Epub 2018 Oct 18. PMID: [30338467](#)

**Article Published Date** : Nov 30, 2018

**Authors** : Qin Wei, Huidan Deng, Hengmin Cui, Jing Fang, Zhicai Zuo, Junliang Deng, Yinglun Li, Xun Wang, Ling Zhao

**Study Type** : Review

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376)

**Pharmacological Actions** : Apoptotic : CK(9052) : AC(7284)

**Problem Substances** : Fluoride : CK(1815) : AC(454), Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Apoptotic : CK(278) : AC(120)

### Apoptosis and inflammation involved with fluoride-induced bone injuries.

**Pubmed Data** : Nutrients. 2024 Jul 31 ;16(15). Epub 2024 Jul 31. PMID: [39125380](#)

**Article Published Date** : Jul 30, 2024

**Authors** : Miao Wang, Kangting Luo, Tongtong Sha, Qian Li, Zaichao Dong, Yanjie Dou, Huanxia Zhang, Guoyu Zhou, Yue Ba, Fangfang Yu

**Study Type** : Review

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Fluorosis : CK(262) : AC(42), Inflammation : CK(15536) : AC(5279)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Apoptotic : CK(278) : AC(120)

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## Arsenic-fluoride co-exposure induced endoplasmic reticulum stress resulting in apoptosis in rat heart and H9c2 cells.

**Pubmed Data** : Chemosphere. 2022 Feb ;288(Pt 2):132518. Epub 2021 Oct 9. PMID: [34637859](#)

**Article Published Date** : Jan 31, 2022

**Authors** : Meng Li, Jing Feng, Ying Cheng, Nisha Dong, Xiaolin Tian, Penghui Liu, Yannan Zhao, Yulan Qiu, Fengjie Tian, Yi Lyu, Qian Zhao, Cailing Wei, Meng Wang, Jiyu Yuan, Xiaodong Ying, Xuefeng Ren, Xiaoyan Yan

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : Arsenic Poisoning : CK(383) : AC(129), Fluoride Toxicity : CK(1389) : AC(376)

**Additional Keywords** : Synergistic Toxicity : CK(226) : AC(109)

**Problem Substances** : Arsenic : CK(595) : AC(181), Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Apoptotic : CK(278) : AC(120), Cardiotoxic : CK(1168) : AC(209)

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## Chronic fluoride exposure induces neuronal apoptosis and impairs neurogenesis and synaptic plasticity.

**Pubmed Data** : Chemosphere. 2019 Jan ;214:430-435. Epub 2018 Sep 17. PMID: [30273876](#)

**Article Published Date** : Dec 31, 2018

**Authors** : Pei Jiang, Gongying Li, Xueyuan Zhou, Changshui Wang, Yi Qiao, Dehua Liao, Dongmei Shi

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Apoptotic : CK(278) : AC(120), Neurotoxic : CK(2838) : AC(702)

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## Different effects of fluoride exposure on the three major bone cell types.

**Pubmed Data** : Biol Trace Elem Res. 2020 Jan ;193(1):226-233. Epub 2019 Mar 14. PMID: [30877522](#)

**Article Published Date** : Dec 31, 2019

**Authors** : Ningning Jiang, Fengyang Guo, Boyao Sun, Xiuyun Zhang, Hui Xu

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : Bone Diseases : CK(325) : AC(101), Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Apoptotic : CK(278) : AC(120)

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## Effect of fluoride exposure on mRNA expression of cav1.2 and calcium signal pathway apoptosis regulators in PC12 cells.

**Pubmed Data** : Environ Toxicol Pharmacol. 2017 Sep ;54:74-79. Epub 2017 Jun 30. PMID: [28697452](#)

**Article Published Date** : Aug 31, 2017

**Authors** : Qiuxia Liao, Rui Zhang, Xiaoyu Wang, Weiwei Nian, Lulu Ke, Wei Ouyang, Zigui Zhang

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Fluorosis : CK(262) : AC(42)

**Problem Substances** : Fluoride : CK(1815) : AC(454), Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Apoptotic : CK(278) : AC(120), Neurotoxic : CK(2838) : AC(702)

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## Effects of fluoride on DNA damage and caspase-mediated apoptosis in the liver of rats.

**Pubmed Data** : Biol Trace Elem Res. 2015 Aug ;166(2):173-82. Epub 2015 Feb 20. PMID: [25693680](#)

**Article Published Date** : Jul 31, 2015

**Authors** : Guo Hua Song, Fu Bing Huang, Ji Ping Gao, Mao Lin Liu, Wen Biao Pang, Wei bin Li, Xiao Yan Yan, Mei Jun Huo, Xia Yang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Chemically-Induced Liver Damage](#) : CK(2167) : AC(1069), [DNA damage](#) : CK(2255) : AC(824), [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Apoptotic](#) : CK(278) : AC(120), [Hepatotoxic](#) : CK(400) : AC(124)

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## Excessive-fluoride intake can induce thyroid injury.

**Pubmed Data** : Zhonghua Yu Fang Yi Xue Za Zhi. 2018 Nov 6 ;52(11):1182-1187. PMID: [30419706](#)

**Article Published Date** : Nov 05, 2018

**Authors** : L Y Yu, Y S Cui, H L Liu

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Apoptotic](#) : CK(278) : AC(120)

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## Fluoride exposure provokes mitochondria-mediated apoptosis and increases mitophagy in osteocytes.

**Pubmed Data** : Biol Trace Elem Res. 2023 Aug ;201(8):3994-4007. Epub 2022 Oct 18. PMID: [36255553](#)

**Article Published Date** : Jul 31, 2023

**Authors** : Yun Zhang, Fanhe Dong, Zihan Wang, Bingbing Xu, Tao Zhang, Qiqi Wang, Qiao Lin

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Fluorosis](#) : CK(262) : AC(42), [Oxidative Stress](#) : CK(13443) : AC(5499)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Apoptotic](#) : CK(278) : AC(120)

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## Fluoride induced tissue hypercalcemia, IL-17 mediated inflammation and apoptosis lead to cardiomyopathy.

**Pubmed Data** : Toxicology. 2018 Aug 1 ;406-407:44-57. Epub 2018 May 22. PMID: [29800585](#)

**Article Published Date** : Jul 31, 2018

**Authors** : Javed Ahsan Quadri, Saba Sarwar, Pinky, Parmita Kar, Seema Singh, Saumya Ranjan Mallick, Sudheer Arava, Tapash Chand Nag, Tara Sankar Roy, A Shariff

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Cardiomyopathy](#) : CK(358) : AC(160), [Fluoride Toxicity](#) : CK(1389) : AC(376), [Inflammation](#) : CK(15536) : AC(5279)

**Problem Substances** : [Fluoride](#) : CK(1815) : AC(454), [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Apoptotic](#) : CK(278) : AC(120), [Cardiotoxic](#) : CK(1168) : AC(209), [Inflammatory](#) : CK(541) : AC(169)

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## Fluoride induces apoptosis and alters collagen I expression in rat osteoblasts.

**Pubmed Data** : Toxicol Lett. 2011 Feb 5 ;200(3):133-8. Epub 2010 Nov 18. PMID: [21093551](#)

**Article Published Date** : Feb 04, 2011

**Authors** : Xiaoyan Yan, Xiaoting Yan, Alex Morrison, Tianlong Han, Qinglin Chen, Ji Li, Jundong Wang

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376)  
**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)  
**Adverse Pharmacological Actions** : [Apoptotic](#) : CK(278) : AC(120)

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## Fluoride induces apoptosis in mammalian cells.

**Pubmed Data** : Anticancer Res. 2017 Sep ;37(9):4767-4777. PMID: [28870895](#)

**Article Published Date** : Aug 31, 2017

**Authors** : Daniel Araki Ribeiro, Caroline Margonato Cardoso, Veronica Quispe Yujra, Milena DE Barros Viana, Odair Aguiar, Luciana Pellegrini Pisani, Celina Tizuko Fujiyama Oshima

**Study Type** : Review

### Additional Links

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376)  
**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)  
**Adverse Pharmacological Actions** : [Apoptotic](#) : CK(278) : AC(120)

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## Fluoride induces pyroptosis via IL-17A-mediated caspase-1/11-dependent pathways and Bifidobacterium intervention in testis.

**Pubmed Data** : Sci Total Environ. 2024 May 20 ;926:172036. Epub 2024 Mar 28. PMID: [38554964](#)

**Article Published Date** : May 19, 2024

**Authors** : Ao Cheng, Huifeng Luo, Bingchao Fan, Qing Xiang, Zhaochen Nie, Shuang Feng, Yurou Qiao, Yue Wu, Qianlong Zhu, Rongxiu Liu, Xiaochao Song, Xiang Li, Jianhai Zhang

**Study Type** : Animal Study

### Additional Links

**Substances** : [Bifidobacterium](#) : CK(1540) : AC(254)  
**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Testicular Injury: Chemical/Metal Induced](#) : CK(754) : AC(374)  
**Pharmacological Actions** : [Anti-Inflammatory Agents](#) : CK(35225) : AC(15297), [Interleukin-17 downregulation](#) : CK(484) : AC(187)  
**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)  
**Adverse Pharmacological Actions** : [Apoptotic](#) : CK(278) : AC(120)

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## Fluoride-induced apoptosis in non-skeletal tissues of experimental animals.

**Pubmed Data** : Heliyon. 2023 Aug ;9(8):e18646. Epub 2023 Jul 29. PMID: [37560699](#)

**Article Published Date** : Jul 31, 2023

**Authors** : Linet Musungu Angwa, Sylvester Dodzi Nyadanu, Anne Murugi Kanyugo, Timothy Adampah, Gavin Pereira

**Study Type** : Meta Analysis, Review

### Additional Links

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376)  
**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)  
**Adverse Pharmacological Actions** : [Apoptotic](#) : CK(278) : AC(120)

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## Human cultured IMR-32 neuronal-like and U87 glial-like cells have different patterns of toxicity under fluoride exposure.

**Pubmed Data** : PLoS One. 2021 ;16(6):e0251200. Epub 2021 Jun 17. PMID: [34138870](#)

**Article Published Date** : Dec 31, 2020

**Authors** : Bruna Puty, Leonardo Oliveira Bittencourt, Iago Cesar Nogueira, Marília Afonso Rabelo Buzalaf, Edivaldo Herculano Oliveira, Rafael Rodrigues Lima

**Study Type** : In Vitro Study

### Additional Links

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376)  
**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)  
**Adverse Pharmacological Actions** : [Apoptotic](#) : CK(278) : AC(120), [Neurotoxic](#) : CK(2838) : AC(702)

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## Mitochondrial respiratory chain dysfunction mediated by ROS is a primary point of fluoride-induced damage in Hepa1-6 cells.

**Pubmed Data** : Environ Pollut. 2019 Dec ;255(Pt 3):113359. Epub 2019 Oct 7. PMID: [31614248](#)

**Article Published Date** : Nov 30, 2019

**Authors** : Hong-Wei Wang, Yan Zhang, Pan-Pan Tan, Liu-Shu Jia, Yu Chen, Bian-Hua Zhou

**Study Type** : In Vitro Study

### Additional Links

**Diseases** : [Chemically-Induced Liver Damage](#) : CK(2167) : AC(1069), [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Problem Substances** : [Fluoride](#) : CK(1815) : AC(454)

**Adverse Pharmacological Actions** : [Apoptotic](#) : CK(278) : AC(120), [Hepatotoxic](#) : CK(400) : AC(124)

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## PRKAA1 induces aberrant mitophagy in a PINK1/Parkin-dependent manner, contributing to fluoride-induced developmental neurotoxicity.

**Pubmed Data** : Ecotoxicol Environ Saf. 2023 Apr 15 ;255:114772. Epub 2023 Mar 14. PMID: [36924562](#)

**Article Published Date** : Apr 14, 2023

**Authors** : Yanling Tang, Jingjing Zhang, Zeyu Hu, Wanjing Xu, Panpan Xu, Yue Ma, Hengrui Xing, Qiang Niu

**Study Type** : Animal Study

### Additional Links

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Neurodegenerative Diseases](#) : CK(12159) : AC(4162),

[Neurodevelopmental Disorders](#) : CK(470) : AC(85)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Apoptotic](#) : CK(278) : AC(120), [Neurotoxic](#) : CK(2838) : AC(702)

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## Sodium fluoride causes oxidative stress and apoptosis in cementoblasts.

**Pubmed Data** : Chem Biol Interact. 2018 Aug 18 ;294:34-39. Epub 2018 Aug 18. PMID: [30130527](#)

**Article Published Date** : Aug 17, 2018

**Authors** : Jing Ni, Yiming Li, Wu Zhang, Rong Shu, Zhe Zhong

**Study Type** : In Vitro Study

### Additional Links

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Gingivitis](#) : CK(595) : AC(86)

**Additional Keywords** : [Risk Factors](#) : CK(14728) : AC(2072)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Apoptotic](#) : CK(278) : AC(120), [Oxidant](#) : CK(646) : AC(246)

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## Sodium fluoride causes oxidative stress and apoptosis in the mouse liver.

**Pubmed Data** : Aging (Albany NY). 2017 Jun 27 ;9(6):1623-1639. PMID: [28657544](#)

**Article Published Date** : Jun 26, 2017

**Authors** : Yujiao Lu, Qin Luo, Hengmin Cui, Huidan Deng, Ping Kuang, Huan Liu, Jing Fang, Zhicai Zuo, Junliang Deng, Yinglun Li, Xun Wang, Ling Zhao

**Study Type** : Animal Study

### Additional Links

**Diseases** : [Chemically-Induced Liver Damage](#) : CK(2167) : AC(1069), [Fluoride Toxicity](#) : CK(1389) : AC(376), [Oxidative Stress](#) : CK(13443) : AC(5499)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Apoptotic](#) : CK(278) : AC(120), [Hepatotoxic](#) : CK(400) : AC(124)

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## Sodium fluoride exposure compromises hair follicle growth and accelerates programmed cell death.

**Pubmed Data** : Biol Trace Elem Res. 2010 Jan 5. Epub 2010 Jan 5. PMID: [20049553](#)



**Article Published Date** : Jan 05, 2010

**Authors** : Zheng-hui Wang, Xiao-li Li, Zhuang-qun Yang, Min Xu

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : [Hair Loss](#) : CK(763) : AC(143), [Hair Quality Problems](#) : CK(32) : AC(5)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Apoptotic](#) : CK(278) : AC(120), [Oxidant](#) : CK(646) : AC(246)

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## Sodium fluoride induces apoptosis in H9c2 cardiomyocytes.

**Pubmed Data** : Biol Trace Elem Res. 2015 Aug ;166(2):210-5. Epub 2015 Feb 25. PMID: [25707396](#)

**Article Published Date** : Jul 31, 2015

**Authors** : Xiaoyan Yan, Xia Yang, Xianhui Hao, Qiurong Ren, Jiping Gao, Yu Wang, Na Chang, Yulan Qiu, Guohua Song

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Apoptotic](#) : CK(278) : AC(120), [Cardiotoxic](#) : CK(1168) : AC(209)

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## Sodium fluoride induces apoptosis in mouse embryonic stem cells through ROS-dependent and caspase- and JNK-mediated pathways.

**Pubmed Data** : Toxicol Appl Pharmacol. 2012 Mar 15 ;259(3):329-37. Epub 2012 Jan 21. PMID: [22285274](#)

**Article Published Date** : Mar 14, 2012

**Authors** : Tam Dan Nguyen Ngoc, Young-Ok Son, Shin-Saeng Lim, Xianglin Shi, Jong-Ghee Kim, Jung Sun Heo, Youngji Choe, Young-Mi Jeon, Jeong-Chae Lee

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Apoptotic](#) : CK(278) : AC(120)

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## Sodium fluoride induces apoptosis in mouse splenocytes by activating ROS-dependent NF-κB signaling.

**Pubmed Data** : Oncotarget. 2017 Dec 29 ;8(70):114428-114441. Epub 2017 Dec 1. PMID: [29383091](#)

**Article Published Date** : Dec 28, 2017

**Authors** : Huidan Deng, Ping Kuang, Hengmin Cui, Qin Luo, Huan Liu, Yujiao Lu, Jing Fang, Zhicai Zuo, Junliang Deng, Yinglun Li, Xun Wang, Ling Zhao

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Apoptotic](#) : CK(278) : AC(120), [Immunotoxic](#) : CK(507) : AC(127)

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## Sodium fluoride induces apoptosis in the kidney of rats through caspase-mediated pathways and DNA damage.

**Pubmed Data** : J Physiol Biochem. 2014 Sep ;70(3):857-68. Epub 2014 Aug 27. PMID: [25158646](#)

**Article Published Date** : Aug 31, 2014

**Authors** : Guo Hua Song, Ji Ping Gao, Chun Fang Wang, Chao Yang Chen, Xiao Yan Yan, Min Guo, Yu Wang, Fu Bing Huang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [DNA damage](#) : CK(2255) : AC(824), [Fluoride Toxicity](#) : CK(1389) : AC(376), [Fluorosis](#) : CK(262) : AC(42), [Kidney Damage: Chemically-Induced](#) : CK(542) : AC(270)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Apoptotic : CK(278) : AC(120), Renotoxic : CK(56) : AC(20)

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## Sodium fluoride induces the splenic apoptosis.

**Pubmed Data** : Aging (Albany NY). 2016 Dec 27 ;8(12):3552-3567. PMID: [28039491](#)

**Article Published Date** : Dec 26, 2016

**Authors** : Huidan Deng, Ping Kuang, Hengmin Cui, Lian Chen, Qin Luo, Jing Fang, Zhicai Zuo, Junliang Deng, Xun Wang, Ling Zhao

**Study Type** : Animal Study, In Vitro Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Spleen Damage: Chemically Induced : CK(2) : AC(9)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Apoptotic : CK(278) : AC(120)

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## Sodium fluoride may interfere with odontogenesis by inhibiting antioxidative enzymes and inducing programmed cell death.

**Pubmed Data** : J Oral Pathol Med. 2010 Aug 3. Epub 2010 Aug 3. PMID: [20738751](#)

**Article Published Date** : Aug 03, 2010

**Authors** : L F Jacinto-Alemán, J C Hernández-Guerrero, C Trejo-Solís, M D Jiménez-Farfán, A M Fernández-Presas

**Study Type** : In Vitro Study

**Additional Links**

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Apoptotic : CK(278) : AC(120), Oxidant : CK(646) : AC(246)

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## Sodium fluoride promotes apoptosis by generation of reactive oxygen species in human lymphocytes.

**Pubmed Data** : J Toxicol Environ Health A. 2014 ;77(21):1269-80. PMID: [25268553](#)

**Article Published Date** : Dec 31, 2013

**Authors** : Manivannan Jothiramajayam, Sonali Sinha, Manosij Ghosh, Anish Nag, Aditi Jana, Anita Mukherjee

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : DNA damage : CK(2255) : AC(824), Fluoride Toxicity : CK(1389) : AC(376), Oxidative Stress : CK(13443) : AC(5499)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Apoptotic : CK(278) : AC(120), Genotoxic : CK(545) : AC(184)

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## The footprints of mitochondrial fission and apoptosis in fluoride-induced renal dysfunction.

**Pubmed Data** : Biol Trace Elem Res. 2024 Sep ;202(9):4125-4135. Epub 2023 Dec 7. PMID: [38057486](#)

**Article Published Date** : Aug 31, 2024

**Authors** : Qiyong Zuo, Lin Lin, Yuling Zhang, Mohammad Mehdi Ommati, Hongwei Wang, Jing Zhao

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Kidney Damage: Chemically-Induced : CK(542) : AC(270)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Apoptotic : CK(278) : AC(120)

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## This study proved that oxidative stress probably play a major role in NaF-induced apoptosis of Sertoli cells.

**Pubmed Data** : Int J Environ Health Res. 2015 ;25(1):1-9. Epub 2014 Feb 13. PMID: [24521312](#)

**Article Published Date** : Dec 31, 2014



**Authors** : Yang Yang, Hui Huang, Yue Ba, Xue-Min Cheng, Liu-Xin Cui

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Oxidative Stress](#) : CK(13443) : AC(5499), [Testicular Injury: Chemical/Metal Induced](#) : CK(754) : AC(374)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Apoptotic](#) : CK(278) : AC(120)

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## Atherogenic (AC 1) (CK 1)

### Sodium fluoride exposure may result in increased oxidative stress and increased reaction oxygen species (ROS) production.

**Pubmed Data** : Toxicol Lett. 2010 Jul 1;196(2):74-9. Epub 2010 Apr 22. PMID: [20399260](#)

**Article Published Date** : Jul 01, 2010

**Authors** : I Gutowska, I Baranowska-Bosiacka, M Bańkiewicz, B Milo, A Siennicka, M Marchlewicz, B Wiszniewska, B Machaliński, E Stachowska

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : [Oxidative Stress](#) : CK(13443) : AC(5499)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Atherogenic](#) : CK(25) : AC(5), [Cardiotoxic](#) : CK(1168) : AC(209), [Inflammatory](#) : CK(541) : AC(169)

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## Cardiotoxic (AC 18) (CK 38)

### A new insight into fluoride induces cardiotoxicity.

**Pubmed Data** : Toxicology. 2024 Jan ;501:153688. Epub 2023 Nov 28. PMID: [38036095](#)

**Article Published Date** : Dec 31, 2023

**Authors** : Lulu Hou, Haiyan Dong, Enyu Zhang, Hongmin Lu, Yue Zhang, Hongjing Zhao, Mingwei Xing

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Cardiotoxic](#) : CK(1168) : AC(209)

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### Arsenic-fluoride co-exposure induced endoplasmic reticulum stress resulting in apoptosis in rat heart and H9c2 cells.

**Pubmed Data** : Chemosphere. 2022 Feb ;288(Pt 2):132518. Epub 2021 Oct 9. PMID: [34637859](#)

**Article Published Date** : Jan 31, 2022

**Authors** : Meng Li, Jing Feng, Ying Cheng, Nisha Dong, Xiaolin Tian, Penghui Liu, Yannan Zhao, Yulan Qiu, Fengjie Tian, Yi Lyu, Qian Zhao, Cailing Wei, Meng Wang, Jiyu Yuan, Xiaodong Ying, Xuefeng Ren, Xiaoyan Yan

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : [Arsenic Poisoning](#) : CK(383) : AC(129), [Fluoride Toxicity](#) : CK(1389) : AC(376)

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**Additional Keywords :** Synergistic Toxicity : CK(226) : AC(109)

**Problem Substances :** Arsenic : CK(595) : AC(181), Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions :** Apoptotic : CK(278) : AC(120), Cardiotoxic : CK(1168) : AC(209)

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## Chronic fluoride exposure has an important role in pathogenesis of coronary artery ectasia.

**Pubmed Data :** Biol Trace Elem Res. 2011 Nov ;143(2):695-701. Epub 2010 Dec 7. PMID: [21136197](#)

**Article Published Date :** Nov 01, 2011

**Authors :** Ozkan Dede, Ercan Varol, Ahmet Altinbas, Simge Varol

**Study Type :** Human Study

**Additional Links**

**Diseases :** Coronary Artery Ectasia : CK(10) : AC(1)

**Problem Substances :** Fluoride : CK(1815) : AC(454), Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions :** Cardiotoxic : CK(1168) : AC(209)

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## Chronic fluoride exposure is associated with myocardial damage which is attenuated with selenium and vitamin E.

**Pubmed Data :** Toxicol Int. 2011 Jul ;18(2):99-104. PMID: [21976813](#)

**Article Published Date :** Jul 01, 2011

**Authors :** Mahaboob P Basha, N S Sujitha

**Study Type :** Animal Study

**Additional Links**

**Substances :** Selenium : CK(1706) : AC(389), Vitamin E : CK(3039) : AC(570)

**Pharmacological Actions :** Cardioprotective : CK(8685) : AC(2877)

**Problem Substances :** Fluoride : CK(1815) : AC(454)

**Adverse Pharmacological Actions :** Cardiotoxic : CK(1168) : AC(209)

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## Effect of water fluoridation on the development of medial vascular calcification in uremic rats.

**Pubmed Data :** Toxicology. 2014 Apr 6 ;318:40-50. Epub 2014 Feb 18. PMID: [24561004](#)

**Article Published Date :** Apr 06, 2014

**Authors :** Ana Martín-Pardillos, Cecilia Sosa, Ángel Millán, Víctor Sorribas

**Study Type :** Animal Study

**Additional Links**

**Diseases :** Arterial Calcification : CK(268) : AC(45), Atheroma : CK(17) : AC(5), Atherosclerosis : CK(1964) : AC(771), Chronic Kidney Disease (CKD) : CK(1176) : AC(210), Ectopic Calcification : CK(1125) : AC(185), Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances :** Fluoride : CK(1815) : AC(454)

**Adverse Pharmacological Actions :** Cardiotoxic : CK(1168) : AC(209)

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## Fluoride and arsenic exhibit cardiotoxic properties related to their pro-inflammatory effect.

**Pubmed Data :** Arch Toxicol. 2012 Mar 16. Epub 2012 Mar 16. PMID: [22422340](#)

**Article Published Date :** Mar 16, 2012

**Authors :** Yanqin Ma, Ruiyan Niu, Zilong Sun, Jinming Wang, Guangying Luo, Jianhai Zhang, Jundong Wang

**Study Type :** Animal Study

**Additional Links**

**Diseases :** Cardiovascular Diseases : CK(17124) : AC(2826)

**Problem Substances :** Arsenic : CK(595) : AC(181), Fluoride : CK(1815) : AC(454)

**Adverse Pharmacological Actions :** Cardiotoxic : CK(1168) : AC(209), Inflammatory : CK(541) : AC(169), Interleukin-6 up-regulation : CK(41) : AC(10), Interleukin-8 up-regulation : CK(2) : AC(1), MCP-1 (CCL2) up-regulation : CK(7) : AC(2), P-selectin upregulation : CK(2) : AC(1), Vascular Cell Adhesion Molecule-1 (VCAM-1) Up-Regulation : CK(4) : AC(2)

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## Fluoride induced tissue hypercalcemia, IL-17 mediated inflammation and apoptosis lead to cardiomyopathy.

**Pubmed Data** : Toxicology. 2018 Aug 1 ;406-407:44-57. Epub 2018 May 22. PMID: [29800585](#)

**Article Published Date** : Jul 31, 2018

**Authors** : Javed Ahsan Quadri, Saba Sarwar, Pinky, Parmita Kar, Seema Singh, Saumya Ranjan Mallick, Sudheer Arava, Tapash Chand Nag, Tara Sankar Roy, A Shariff

**Study Type** : Animal Study

### Additional Links

**Diseases** : [Cardiomyopathy](#) : CK(358) : AC(160), [Fluoride Toxicity](#) : CK(1389) : AC(376), [Inflammation](#) : CK(15536) : AC(5279)

**Problem Substances** : [Fluoride](#) : CK(1815) : AC(454), [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Apoptotic](#) : CK(278) : AC(120), [Cardiotoxic](#) : CK(1168) : AC(209), [Inflammatory](#) : CK(541) : AC(169)

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## Fluoride induces apoptosis in H9c2 cardiomyocytes.

**Pubmed Data** : Chemosphere. 2017 May 1 ;182:159-165. Epub 2017 May 1. PMID: [28494360](#)

**Article Published Date** : Apr 30, 2017

**Authors** : Xiaoyan Yan, Lu Wang, Xia Yang, Yulan Qiu, Xiaolin Tian, Yi Lv, Fengjie Tian, Guohua Song, Tong Wang

**Study Type** : In Vitro Study

### Additional Links

**Diseases** : [Fluorosis](#) : CK(262) : AC(42)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Cardiotoxic](#) : CK(1168) : AC(209)

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## Fluorine is a factor in premature aging, and related adverse health effects.

**Pubmed Data** : Ann Acad Med Stetin. 2004 ;50 Suppl 1:9-13. PMID: [16892576](#)

**Article Published Date** : Jan 01, 2004

**Authors** : Anna Machoy-Mokrzyńska

**Study Type** : Review

### Additional Links

**Diseases** : [Aging](#) : CK(5992) : AC(1444), [Arterial Calcification](#) : CK(268) : AC(45)

**Problem Substances** : [Fluoride](#) : CK(1815) : AC(454), [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Cardiotoxic](#) : CK(1168) : AC(209)

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## Morphological changes and mitochondrial alterations on cardiomyocytes exposed to fluoride.

**Pubmed Data** : P R Health Sci J. 2023 Jun ;42(2):132-138. PMID: [37352535](#)

**Article Published Date** : May 31, 2023

**Authors** : Areli Limon-Rojas, Amaury Pozos-Guillén, Roberto Salgado-Delgado, Margarita Rodríguez Y Domínguez, Diana María Escobar-García

**Study Type** : In Vitro Study

### Additional Links

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Mitochondrial Dysfunction](#) : CK(618) : AC(262)

**Additional Keywords** : [Dose Response](#) : CK(1769) : AC(700)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Cardiotoxic](#) : CK(1168) : AC(209)

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## Prolonged ingestion of fluoride through drinking water, particularly with high doses, induced significant histopathological and biochemical changes leading to myocardial tissue damage.

**Pubmed Data** : Hum Exp Toxicol. 2005 Feb;24(2):79-87. PMID: [15850282](#)

**Article Published Date** : Feb 01, 2005

**Authors** : Ekrem Cicek, Gulsen Aydin, Mehmet Akdogan, Huseyin Okutan

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Problem Substances** : [Fluoride](#) : CK(1815) : AC(454), [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Cardiotoxic](#) : CK(1168) : AC(209)

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## Quercetin has a protective effect against sodium fluoride induced oxidative stress in rat's heart.

**Pubmed Data** : Food Funct. 2012 Feb 8. Epub 2012 Feb 8. PMID: [22314573](#)

**Article Published Date** : Feb 08, 2012

**Authors** : Seyed Fazel Nabavi, Seyed Mohammad Nabavi, Morteza Mirzaei, Akbar Hajizadeh Moghaddam

**Study Type** : Animal Study

**Additional Links**

**Substances** : [Quercetin](#) : CK(1864) : AC(847)

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Pharmacological Actions** : [Antioxidants](#) : CK(32218) : AC(14161), [Cardioprotective](#) : CK(8685) : AC(2877)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Cardiotoxic](#) : CK(1168) : AC(209), [Oxidant](#) : CK(646) : AC(246)

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## Sodium fluoride exposure induces developmental toxicity and cardiotoxicity in zebrafish embryos.

**Pubmed Data** : Biol Trace Elem Res. 2024 Sep 17. Epub 2024 Sep 17. PMID: [39287768](#)

**Article Published Date** : Sep 16, 2024

**Authors** : Feiqing Wang, Fa Chen, Wen Song, Yanju Li, Haiyan Wu, Tingting Tian, Mengxian Tian, Dongxin Tang, Yang Liu

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Fluorosis](#) : CK(262) : AC(42)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Cardiotoxic](#) : CK(1168) : AC(209)

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## Sodium fluoride exposure may result in increased oxidative stress and increased reaction oxygen species (ROS) production.

**Pubmed Data** : Toxicol Lett. 2010 Jul 1;196(2):74-9. Epub 2010 Apr 22. PMID: [20399260](#)

**Article Published Date** : Jul 01, 2010

**Authors** : I Gutowska, I Baranowska-Bosiacka, M Bańkiewicz, B Milo, A Siennicka, M Marchlewicz, B Wiszniewska, B Machaliński, E Stachowska

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : [Oxidative Stress](#) : CK(13443) : AC(5499)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Atherogenic](#) : CK(25) : AC(5), [Cardiotoxic](#) : CK(1168) : AC(209), [Inflammatory](#) : CK(541) : AC(169)

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## Sodium fluoride induces apoptosis in H9c2 cardiomyocytes.

**Pubmed Data** : Biol Trace Elem Res. 2015 Aug ;166(2):210-5. Epub 2015 Feb 25. PMID: [25707396](#)

**Article Published Date** : Jul 31, 2015

**Authors** : Xiaoyan Yan, Xia Yang, Xianhui Hao, Qiurong Ren, Jiping Gao, Yu Wang, Na Chang, Yulan Qiu, Guohua Song

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Apoptotic : CK(278) : AC(120), Cardiotoxic : CK(1168) : AC(209)

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## Sodium fluoride induces hypertension and cardiac complications in animals.

**Pubmed Data** : Environ Toxicol. 2016 Jul 5. Epub 2016 Jul 5. PMID: [27378751](#)

**Article Published Date** : Jul 04, 2016

**Authors** : Ademola Adetokunbo Oyagbemi, Temidayo Olutayo Omobowale, Ebunoluwa Racheal Asenuga, Abiola Olumuyiwa Adejumobi, Temitayo Olabisi Ajibade, Temitope Moses Ige, Blessing Seun Ogunpolu, Adeolu Alex Adedapo, Momoh Audu Yakubu

**Study Type** : Animal Study

### Additional Links

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Cardiotoxic : CK(1168) : AC(209), Hypertensive : CK(266) : AC(30), Inflammatory : CK(541) : AC(169)

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## Terminalia arjuna protects mouse hearts against sodium fluoride induced toxicity.

**Pubmed Data** : J Med Food. 2008 Dec;11(4):733-40. PMID: [19053867](#)

**Article Published Date** : Dec 01, 2008

**Authors** : Mahua Sinha, Prasenjit Manna, Parames C Sil

**Study Type** : Animal Study

### Additional Links

**Substances** : Arjuna : CK(19) : AC(6), Terminalia : CK(85) : AC(49)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376)

**Pharmacological Actions** : Cardioprotective : CK(8685) : AC(2877)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Cardiotoxic : CK(1168) : AC(209)

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## These findings reveal that acute fluoride exposure causes sudden heart failure.

**Pubmed Data** : Int J Cardiol. 2017 Feb 15 ;229:96-101. Epub 2016 Nov 9. PMID: [27863940](#)

**Article Published Date** : Feb 14, 2017

**Authors** : Lakshmikanthan Panneerselvam, Azhwar Raghunath, Ekambaram Perumal

**Study Type** : Animal Study

### Additional Links

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Heart Failure : CK(1884) : AC(327)

**Problem Substances** : Fluoride : CK(1815) : AC(454), Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Cardiotoxic : CK(1168) : AC(209)

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## Cytotoxic (AC 2) (CK 2)

### Cytotoxicity of the ingredients of commonly used toothpastes and mouthwashes on human gingival fibroblasts.

**Pubmed Data** : Front Dent. 2019 Nov-Dec;16(6):450-457. Epub 2019 Dec 20. PMID: [33089246](#)

**Article Published Date** : Oct 31, 2019

**Authors** : Masoumeh Hasani Tabatabaei, Farzaneh Sadeghi Mahounak, Nafiseh Asgari, Zohreh Moradi

**Study Type** : In Vitro Study

**Additional Links**

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393), Sodium lauryl sulfate : CK(47) : AC(8)

**Adverse Pharmacological Actions** : Cytotoxic : CK(285) : AC(125)

## Sodium fluoride may exert its cytotoxic effects by disturbing tissue formation due to altered cell interactions.

**Pubmed Data** : Cell Biol Toxicol. 2010 Aug 1. Epub 2010 Aug 1. PMID: [20680429](#)

**Article Published Date** : Aug 01, 2010

**Authors** : Euridice Prado, Tilmann Wurtz, Didier Ferbus, El-Hassan Shabana, Nadine Forest, Ariane Berald

**Study Type** : In Vitro Study

**Additional Links**

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Cytotoxic : CK(285) : AC(125)

## Diabetogenic (AC 1) (CK 2)

### Supplementation of ginseng and banaba leaf extracts exhibited protective effects on fluoride toxicated STZ induced nephrotoxicity in mice.

**Pubmed Data** : Indian J Med Res. 2013 Feb ;137(2):370-9. PMID: [23563382](#)

**Article Published Date** : Jan 31, 2013

**Authors** : Mahaboob P Basha, S M Saumya

**Study Type** : Animal Study

**Additional Links**

**Substances** : Banaba : CK(36) : AC(20), Ginseng : CK(4190) : AC(1902)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Oxidative Stress : CK(13443) : AC(5499)

**Pharmacological Actions** : Antioxidants : CK(32218) : AC(14161), Renoprotective : CK(4133) : AC(1932)

**Additional Keywords** : Plant Extracts : CK(18030) : AC(6728)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Diabetogenic : CK(340) : AC(58)

## Dysbiotic (AC 1) (CK 2)

### Alleviation of fluoride-induced colitis by tea polysaccharides.

**Pubmed Data** : J Hazard Mater. 2024 Sep 5 ;476:134858. Epub 2024 Jun 7. PMID: [38905983](#)

**Article Published Date** : Sep 05, 2024

**Authors** : Chenjun Zhao, Guijie Chen, Ying Huang, Yuxuan Zhang, Sichen Li, Zhiliang Jiang, Huihui Peng, Juan Wang, Daxiang Li, Ruyan Hou, Chuanyi Peng, Xiaochun Wan, Huimei Cai

**Study Type** : Animal Study

**Additional Links**

**Substances** : Tea : CK(4517) : AC(940)

**Diseases** : Colitis : CK(1495) : AC(715), Dysbiosis : CK(2010) : AC(579)

**Problem Substances** : Fluoride : CK(1815) : AC(454)

**Adverse Pharmacological Actions** : Dysbiotic : CK(2) : AC(1)

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## Embryotoxic (AC 1) (CK 2)

### Effects of water fluoridation on early embryonic development of zebrafish.

**Pubmed Data** : Ecotoxicol Environ Saf. 2024 Jan 15 ;270:115907. Epub 2024 Jan 4. PMID: [38176185](#)

**Article Published Date** : Jan 14, 2024

**Authors** : Ya-Lan Wei, Xin-Chen Lin, Ying-Ying Liu, Yu-Qing Lei, Xu-Dong Zhuang, Hai-Tao Zhang, Xin-Rui Wang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances** : Fluoride : CK(1815) : AC(454), Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Embryotoxic : CK(20) : AC(11)

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## Endocrine Disruptor (AC 3) (CK 6)

### Fluoride induces thyroid dysfunction in rats, which may be attenuated by protein and calcium supplementation.

**Pubmed Data** : Toxicol Ind Health. 2009 Feb;25(1):49-57. PMID: [19318504](#)

**Article Published Date** : Feb 01, 2009

**Authors** : H Wang, Z Yang, B Zhou, H Gao, X Yan, J Wang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances** : Fluoride : CK(1815) : AC(454), Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Endocrine Disruptor : CK(529) : AC(106)

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### Sodium fluoride during gestation and lactation affects male reproduction in adult rats by decreasing spermatogenesis and steroidogenesis.

**Pubmed Data** : Naturwissenschaften. 2007 Jul;94(7):607-11. Epub 2007 Feb 22. PMID: [17318612](#)

**Article Published Date** : Jul 01, 2007

**Authors** : P Sreedhar Reddy, T Pushpalatha, P Sreenivasula Reddy

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Breastfeeding Concerns: Chemical Exposure : CK(123) : AC(19), Hormone Insufficiency : CK(30) : AC(8), Infertility: Male : CK(1668) : AC(424), Prenatal Chemical Exposures : CK(2428) : AC(530)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Endocrine Disruptor : CK(529) : AC(106)



## Sodium fluoride may disrupt key genetic markers in developing embryos, potentially affecting normal growth.

**Pubmed Data** : Arch Toxicol. 2014 Feb ;88(2):241-8. Epub 2013 Sep 13. PMID: [24030355](#)

**Article Published Date** : Feb 01, 2014

**Authors** : Jia-Qiao Zhu, Yang-Jun Si, Lai-Yang Cheng, Bao-Zeng Xu, Qi-Wen Wang, Xiao Zhang, Heng Wang, Zong-Ping Liu

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Fetal Origin of Adult Disease](#) : CK(249) : AC(62)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Endocrine Disruptor](#) : CK(529) : AC(106)

## Endocrine Disruptor: Testes (AC 1) (CK 1)

### Combined Exposure to Fluoride and Microplastics Causes Sertoli Cell Damage and Reproductive Toxicity

**Pubmed Data** : Toxicology. 2024 Aug ;506:153849. Epub 2024 May 29. PMID: [38821197](#)

**Article Published Date** : Aug 01, 2024

**Authors** : Tan Ma, Huixian Cheng, Liang Kong, Chenghao Shen, Haibo Jin, Hongliang Li, Chun Pan, Jingyan Liang

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : [Infertility: Male](#) : CK(1668) : AC(424)

**Pharmacological Actions** : [Apoptotic](#) : CK(9052) : AC(7284)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Endocrine Disruptor: Testes](#) : CK(56) : AC(12)

## Endocrine Disruptor: Thyroid (AC 1) (CK 2)

### Fluoride could pose a great threat to thyroid endocrine system.

**Pubmed Data** : Aquat Toxicol. 2016 Feb ;171:48-58. Epub 2015 Dec 24. PMID: [26748264](#)

**Article Published Date** : Jan 31, 2016

**Authors** : Chen Jianjie, Xue Wenjuan, Cao Jinling, Song Jie, Jia Ruhui, Li Meiyang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Problem Substances** : [Fluoride](#) : CK(1815) : AC(454), [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Endocrine Disruptor: Thyroid](#) : CK(139) : AC(34)

## Excitotoxic (AC 1) (CK 1)



**This study suggests that excitotoxicity may be the central mechanism of autism spectrum disorders and that excitotoxins like aluminum, fluoride, and mercury may exacerbate excitotoxicity.**

**Pubmed Data** : Curr Med Chem. 2009 ;16(2):157-70. PMID: [19149568](#)

**Article Published Date** : Jan 01, 2009

**Authors** : R L Blaylock, A Strunecka

**Study Type** : Review

**Additional Links**

**Diseases** : Autism : CK(942) : AC(162), Autism Spectrum Disorders : CK(3676) : AC(557), Brain: Microglial Activation : CK(192) : AC(114), Heavy Metal Toxicity : CK(2713) : AC(1019)

**Additional Keywords** : Heavy Metals and Autism : CK(89) : AC(15), Vaccine Research : CK(571) : AC(113)

**Problem Substances** : Aluminum : CK(1061) : AC(349), Fluoride : CK(1815) : AC(454), Mercury : CK(885) : AC(213)

**Adverse Pharmacological Actions** : Excitotoxic : CK(40) : AC(10), Neurotoxic : CK(2838) : AC(702)

## Gastrotoxic (AC 5) (CK 10)

**Does fluoride exposure impact on the human microbiome?**

**Pubmed Data** : Toxicol Lett. 2023 Apr 15 ;379:11-19. Epub 2023 Mar 4. PMID: [36871794](#)

**Article Published Date** : Apr 14, 2023

**Authors** : Gary P Moran, Lina Zgaga, Blánaid Daly, Mairead Harding, Therese Montgomery

**Study Type** : Review

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Gastrotoxic : CK(190) : AC(68)

**Fluoride exposure cause colon microbiota dysbiosis by destroyed microenvironment and disturbed antimicrobial peptides expression in colon.**

**Pubmed Data** : Environ Pollut. 2022 Jan 1 ;292(Pt B):118381. Epub 2021 Oct 18. PMID: [34673156](#)

**Article Published Date** : Dec 31, 2021

**Authors** : Shi-Quan Zhu, Jing Liu, Bo Han, Wen-Peng Zhao, Bian-Hua Zhou, Jing Zhao, Hong-Wei Wang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Dysbiosis : CK(2010) : AC(579), Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Gastrotoxic : CK(190) : AC(68)

**Luteolin may be a promising lead for the treatment of drug-induced gastroenteropathy.**

**Pubmed Data** : Drug Chem Toxicol. 2020 Aug 5:1-13. Epub 2020 Aug 5. PMID: [32757682](#)

**Article Published Date** : Aug 04, 2020

**Authors** : Akinleye S Akinrinde, Kehinde O Soetan, Monsuru O Tijani

**Study Type** : Animal Study

**Additional Links**

**Substances** : Luteolin : CK(707) : AC(390)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376)

**Pharmacological Actions** : Gastroprotective : CK(1653) : AC(686)

**Additional Keywords** : Synergistic Toxicity : CK(226) : AC(109)

**Problem Substances** : Diclofenac : CK(231) : AC(52), Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Gastrotoxic : CK(190) : AC(68)

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## NaF-induced gut microbiota alteration mediates severe intestinal cell injury.

**Pubmed Data** : Ecotoxicol Environ Saf. 2024 Sep 15 ;283:116816. Epub 2024 Aug 2. PMID: [39096685](#)

**Article Published Date** : Sep 14, 2024

**Authors** : Haonan Huang, Yu Lin, Jinge Xin, Ning Sun, Zhifang Zhao, Hesong Wang, Lixiao Duan, Yanxi Zhou, Xingmei Liu, Jing Fang, Bo Jing, Kangcheng Pan, Yan Zeng, Dong Zeng, Hao Li, Hailin Ma, Yang Bai, Limin Wei, Xueqin Ni

**Study Type** : Animal Study, In Vitro Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances** : Antibiotics : CK(847) : AC(171), Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Gastrotoxic : CK(190) : AC(68)

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## The dose-response effect of fluoride exposure on the gut microbiome.

**Pubmed Data** : Metabolites. 2023 Nov 17 ;13(11). Epub 2023 Nov 17. PMID: [37999254](#)

**Article Published Date** : Nov 16, 2023

**Authors** : Zhe Mo, Jian Wang, Xinyue Meng, Ailin Li, Zhe Li, Wenjun Que, Tuo Wang, Korto Fatti Tarnue, Xu Ma, Ying Liu, Shirui Yan, Lei Wu, Rui Zhang, Junrui Pei, Xiaofeng Wang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Gastrotoxic : CK(190) : AC(68)

# Genotoxic (AC 3) (CK 4)

## Genotoxicity of fluoride subacute exposure in rats and selenium intervention.

**Pubmed Data** : Chemosphere. 2021 Mar ;266:128978. Epub 2020 Nov 17. PMID: [33298328](#)

**Article Published Date** : Feb 28, 2021

**Authors** : Jelena Radovanović, Biljana Antonijević, Stoimir Kolarević, Sanja Milutinović-Smiljanić, Jelena Mandić, Branka Vuković-Gačić, Zorica Bulat, Marijana Ćurčić, Margareta Kračun-Kolarević, Karolina Sunjog, Jovana Kostić-Vuković, Jovana Jovanović Marić, Evica Antonijević-Miljaković, Danijela Đukić-Ćosić, Aleksandra Buha Djordjevic, Dragana Javorac, Katarina Baralić, Zoran Mandinić

**Study Type** : In Vitro Study

**Additional Links**

**Substances** : Selenium : CK(1706) : AC(389)

**Diseases** : Chemically-Induced Liver Damage : CK(2167) : AC(1069), DNA damage : CK(2255) : AC(824), Fluoride Toxicity : CK(1389) : AC(376), Spleen Damage: Chemically Induced : CK(2) : AC(9)

**Pharmacological Actions** : Genoprotective : CK(522) : AC(203)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Genotoxic : CK(545) : AC(184), Neurotoxic : CK(2838) : AC(702)

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## Sodium flouride exposure during pregnancy may interfere with normal

## development and increase the risk of neurological and psychiatric disorders in adulthood.

**Pubmed Data** : Eur Rev Med Pharmacol Sci. 2010 Jun;14(6):507-12. PMID: [20712257](#)

**Article Published Date** : Jun 01, 2010

**Authors** : P Flace, V Benagiano, D Vermesan, R Sabatini, A M Inchingolo, A Inchingolo, P Auteri, G Ambrosi, A Tarullo, R Cagiano

**Study Type** : Animal Study

### Additional Links

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Huntington Disease : CK(222) : AC(103), Obsessive-Compulsive Disorder : CK(421) : AC(77), Prenatal Chemical Exposures : CK(2428) : AC(530), Schizophrenia : CK(1080) : AC(191), Tourette Syndrome : CK(207) : AC(30)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Genotoxic : CK(545) : AC(184), Teratogenic : CK(325) : AC(66)

## Sodium fluoride promotes apoptosis by generation of reactive oxygen species in human lymphocytes.

**Pubmed Data** : J Toxicol Environ Health A. 2014 ;77(21):1269-80. PMID: [25268553](#)

**Article Published Date** : Dec 31, 2013

**Authors** : Manivannan Jothiramajayam, Sonali Sinha, Manosij Ghosh, Anish Nag, Aditi Jana, Anita Mukherjee

**Study Type** : In Vitro Study

### Additional Links

**Diseases** : DNA damage : CK(2255) : AC(824), Fluoride Toxicity : CK(1389) : AC(376), Oxidative Stress : CK(13443) : AC(5499)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Apoptotic : CK(278) : AC(120), Genotoxic : CK(545) : AC(184)

## Hepatotoxic (AC 9) (CK 24)

### Effects of fluoride on DNA damage and caspase-mediated apoptosis in the liver of rats.

**Pubmed Data** : Biol Trace Elem Res. 2015 Aug ;166(2):173-82. Epub 2015 Feb 20. PMID: [25693680](#)

**Article Published Date** : Jul 31, 2015

**Authors** : Guo Hua Song, Fu Bing Huang, Ji Ping Gao, Mao Lin Liu, Wen Biao Pang, Wei bin Li, Xiao Yan Yan, Mei Jun Huo, Xia Yang

**Study Type** : Animal Study

### Additional Links

**Diseases** : Chemically-Induced Liver Damage : CK(2167) : AC(1069), DNA damage : CK(2255) : AC(824), Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Apoptotic : CK(278) : AC(120), Hepatotoxic : CK(400) : AC(124)

### Exposure to fluoride induces apoptosis in the liver, kidney, and heart of *Xenopus laevis*.

**Pubmed Data** : Acta Histochem. 2023 Apr ;125(3):151999. Epub 2023 Mar 9. PMID: [36905872](#)

**Article Published Date** : Mar 31, 2023

**Authors** : Siting Wang, Hongmei Ning, Liushuai Hua, Fei Ren, Lingli Chen, Zhisheng Ma, Rongbo Li, Yaming Ge, Zhihong Yin

**Study Type** : Animal Study

#### Additional Links

**Diseases** : [Chemically-Induced Liver Damage](#) : CK(2167) : AC(1069), [Fluoride Toxicity](#) : CK(1389) : AC(376), [Kidney Damage: Chemically-Induced](#) : CK(542) : AC(270)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Hepatotoxic](#) : CK(400) : AC(124), [Renotoxic](#) : CK(56) : AC(20)

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## Fluoridated tap water was associated with an increased risk of hepatic failure.

**Pubmed Data** : World J Pediatr. 2024 Oct ;20(10):1029-1042. Epub 2024 Jun 27. PMID: [38937407](#)

**Article Published Date** : Sep 30, 2024

**Authors** : Won Seok Lee, Ju Hee Kim, Boeun Han, Gi Chun Lee, Hye Ri Jung, Ye Jin Shin, Eun Kyo Ha, Eun Lee, Soonchul Lee, Man Yong Han

**Study Type** : Human Study

#### Additional Links

**Diseases** : [Chemically-Induced Liver Damage](#) : CK(2167) : AC(1069), [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Hepatotoxic](#) : CK(400) : AC(124)

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## Fluoride exposure induces mitochondrial damage and mitophagy via activation of the IL-17A pathway in hepatocytes.

**Pubmed Data** : Sci Total Environ. 2022 Jan 15 ;804:150184. Epub 2021 Sep 8. PMID: [34517333](#)

**Article Published Date** : Jan 14, 2022

**Authors** : Yangfei Zhao, Jinming Wang, Jianhai Zhang, Zilong Sun, Ruiyan Niu, Ram Kumar Manthari, Mohammad Mehdi Ommati, Shaolin Wang, Jundong Wang

**Study Type** : Animal Study, In Vitro Study

#### Additional Links

**Diseases** : [Chemically-Induced Liver Damage](#) : CK(2167) : AC(1069), [Fluoride Toxicity](#) : CK(1389) : AC(376), [Mitochondrial Dysfunction](#) : CK(618) : AC(262)

**Problem Substances** : [Fluoride](#) : CK(1815) : AC(454), [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Hepatotoxic](#) : CK(400) : AC(124)

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## High fluoride exposure damages kidney and liver function, triggering oxidative stress, apoptosis, and inflammation.

**Pubmed Data** : J Oral Biol Craniofac Res. 2024 ;14(6):735-745. Epub 2024 Oct 15. PMID: [39484005](#)

**Article Published Date** : Jan 01, 2024

**Authors** : Sirigala Lavanya, Kasirajan Hema Shree, Prathiba Ramani

**Study Type** : Review

#### Additional Links

**Diseases** : [Kidney Damage: Chemically-Induced](#) : CK(542) : AC(270)

**Problem Substances** : [Fluoride](#) : CK(1815) : AC(454)

**Adverse Pharmacological Actions** : [Hepatotoxic](#) : CK(400) : AC(124)

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## Lead enhances fluoride influence on apoptotic processes in the HepG2 liver cell line.

**Pubmed Data** : Toxicol Ind Health. 2016 Mar ;32(3):517-25. Epub 2013 Nov 5. PMID: [24193047](#)

**Article Published Date** : Feb 29, 2016

**Authors** : Izabela Gutowska, Irena Baranowska-Bosiacka, Ewa Siwec, Małgorzata Szczuko, Agnieszka Kolasa, Anna Kondarewicz, Marta Rybicka, Małgorzata Dunaj-Stańczyk, Ireneusz Wiernicki, Dariusz Chlubek, Ewa Stachowska

**Study Type** : In Vitro Study

#### Additional Links

**Diseases** : [Chemically-Induced Liver Damage](#) : CK(2167) : AC(1069), [Fluoride Toxicity](#) : CK(1389) : AC(376), [Lead Poisoning](#) : CK(479) : AC(180)

**Additional Keywords** : [Synergistic Toxicity](#) : CK(226) : AC(109)

**Problem Substances** : Fluoride : CK(1815) : AC(454), Lead : CK(684) : AC(227), Sodium Fluoride : CK(1446) : AC(393)  
**Adverse Pharmacological Actions** : Hepatotoxic : CK(400) : AC(124)

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## Mitochondrial respiratory chain dysfunction mediated by ROS is a primary point of fluoride-induced damage in Hepa1-6 cells.

**Pubmed Data** : Environ Pollut. 2019 Dec ;255(Pt 3):113359. Epub 2019 Oct 7. PMID: [31614248](#)

**Article Published Date** : Nov 30, 2019

**Authors** : Hong-Wei Wang, Yan Zhang, Pan-Pan Tan, Liu-Shu Jia, Yu Chen, Bian-Hua Zhou

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : Chemically-Induced Liver Damage : CK(2167) : AC(1069), Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances** : Fluoride : CK(1815) : AC(454)

**Adverse Pharmacological Actions** : Apoptotic : CK(278) : AC(120), Hepatotoxic : CK(400) : AC(124)

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## Sodium fluoride administered through drinking water exhibits liver and kidney toxicity in mice.

**Pubmed Data** : Arch Toxicol. 2010 Sep 22. Epub 2010 Sep 22. PMID: [20859737](#)

**Article Published Date** : Sep 22, 2010

**Authors** : Ansuman Chattopadhyay, Santosh Podder, Soumik Agarwal, Shelley Bhattacharya

**Study Type** : Animal Study

**Additional Links**

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Hepatotoxic : CK(400) : AC(124), Nephrotoxic : CK(203) : AC(52)

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## Sodium fluoride causes oxidative stress and apoptosis in the mouse liver.

**Pubmed Data** : Aging (Albany NY). 2017 Jun 27 ;9(6):1623-1639. PMID: [28657544](#)

**Article Published Date** : Jun 26, 2017

**Authors** : Yujiao Lu, Qin Luo, Hengmin Cui, Huidan Deng, Ping Kuang, Huan Liu, Jing Fang, Zhicai Zuo, Junliang Deng, Yinglun Li, Xun Wang, Ling Zhao

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Chemically-Induced Liver Damage : CK(2167) : AC(1069), Fluoride Toxicity : CK(1389) : AC(376), Oxidative Stress : CK(13443) : AC(5499)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Apoptotic : CK(278) : AC(120), Hepatotoxic : CK(400) : AC(124)

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## Hypermethylation (AC 1) (CK 10)

**Fluoride affects the epigenome of children including differentially methylated regions (DMRs) and CpG loci mapping to genes with key roles in psychiatric outcomes, social interaction, and cognition, as well as immunologic and metabolic phenotypes.**

**Pubmed Data** : Sci Total Environ. 2024 Oct 20 ;948:174916. Epub 2024 Jul 20. PMID: [39038671](#)

**Article Published Date** : Oct 20, 2024

**Authors** : Anna K Ruehlmann, Kim M Cecil, Frank Lippert, Kimberly Yolton, Patrick H Ryan, Kelly J Brunst

**Study Type** : Human Study

**Additional Links**

**Diseases** :

**Additional Keywords** : Epigenetic Modification : CK(546) : AC(206)

**Problem Substances** : Fluoride : CK(1815) : AC(454)

**Adverse Pharmacological Actions** : Hypermethylation : CK(21) : AC(3)

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## Hypertensive (AC 2) (CK 4)

**Fluoride exposure has been implicated as a potential risk factor for hypertension.**

**Pubmed Data** : Cell Immunol. 1975 Oct ;19(2):194-200. PMID: [S0147-6513\(24\)00757-7](#)

**Article Published Date** : Oct 01, 1975

**Authors** : J L Theodor, R Senelar

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Hypertension : CK(8603) : AC(1329)

**Problem Substances** : Fluoride : CK(1815) : AC(454)

**Adverse Pharmacological Actions** : Hypertensive : CK(266) : AC(30)

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**Sodium fluoride induces hypertension and cardiac complications in animals.**

**Pubmed Data** : Environ Toxicol. 2016 Jul 5. Epub 2016 Jul 5. PMID: [27378751](#)

**Article Published Date** : Jul 04, 2016

**Authors** : Ademola Adetokunbo Oyagbemi, Temidayo Olutayo Omobowale, Ebunoluwa Racheal Asenuga, Abiola Olumuyiwa Adejumobi, Temitayo Olabisi Ajibade, Temitope Moses Ige, Blessing Seun Ogunpolu, Adeolu Alex Adedapo, Momoh Audu Yakubu

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Cardiotoxic : CK(1168) : AC(209), Hypertensive : CK(266) : AC(30), Inflammatory : CK(541) : AC(169)

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## Immunoreactive (AC 1) (CK 2)

**High concentrations of fluoride to mice induces a decrease in CD4+ and CD8+ thymus T cells by harming TECs leading to the dysfunction of the thymus.**

**Pubmed Data** : Biol Trace Elem Res. 2015 Aug 13. Epub 2015 Aug 13. PMID: [26267553](#)

**Article Published Date** : Aug 12, 2015

**Authors** : Songna Yin, Haibo Wu, Chao Song, Xin Chen, Yong Zhang

**Study Type** : Animal Study

#### Additional Links

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Immunoreactive](#) : CK(261) : AC(59)

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## Immunosuppressive (AC 1) (CK 2)

**These results show that sodium fluoride can reduce blood cellular and humoral immune function in mice.**

**Pubmed Data** : Oncotarget. 2017 Oct 17 ;8(49):85504-85515. Epub 2017 Aug 10. PMID: [29156736](#)

**Article Published Date** : Oct 16, 2017

**Authors** : Hongrui Guo, Ping Kuang, Qin Luo, Hengmin Cui, Huidan Deng, Huan Liu, Yujiao Lu, Jing Fang, Zhicai Zuo, Junliang Deng, Yinglun Li, Xun Wang, Ling Zhao

**Study Type** : Animal Study

#### Additional Links

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Immunosuppressive](#) : CK(289) : AC(55)

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## Immunotoxic (AC 6) (CK 20)

**Effect of fluoride exposure on different immune parameters in humans.**

**Pubmed Data** : Immunopharmacol Immunotoxicol. 2011 Mar ;33(1):169-77. Epub 2010 Jun 10. PMID: [20536340](#)

**Article Published Date** : Feb 28, 2011

**Authors** : Berenice Hernández-Castro, Mónica Vigna-Pérez, Lesly Doníz-Padilla, María D Ortiz-Pérez, Esther Jiménez-Capdeville, Roberto González-Amaro, Lourdes Baranda

**Study Type** : Human Study

#### Additional Links

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Immunotoxic](#) : CK(507) : AC(127)

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**Effects of prolonged fluoride exposure on innate immunity, intestinal mechanical, and immune barriers in mice.**

**Pubmed Data** : Res Vet Sci. 2023 Nov ;164:105019. Epub 2023 Sep 14. PMID: [37729784](#)

**Article Published Date** : Oct 31, 2023

**Authors** : Yan Wang, Jing Xu, Hang Chen, Yuanbin Shu, Weiqi Peng, Chunxiao Lai, Ruiyang Kong, Ruiyang Lan, Lijing Huang, Jinge Xin, Ning Sun, Xueqin Ni, Yang Bai, Bangyuan Wu

**Study Type** : Animal Study

#### Additional Links

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Immunotoxic](#) : CK(507) : AC(127)

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## Fluoride can damage the spleen of mice by perturbing Th1/Th2 cell balance.

**Pubmed Data** : Biol Trace Elem Res. 2021 Apr ;199(4):1493-1500. Epub 2020 Jul 24. PMID: [32710348](#)

**Article Published Date** : Mar 31, 2021

**Authors** : Yanyan Li, Xiaoping Du, Yangfei Zhao, Jinming Wang, Jundong Wang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Immunotoxic](#) : CK(507) : AC(127)

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## Fluoride can suppress the activation of p38MAPK pathway in mice spleen lymphocytes and further influences the function of the immune system.

**Pubmed Data** : Biol Trace Elem Res. 2016 Oct ;173(2):333-8. Epub 2016 Feb 23. PMID: [26906276](#)

**Article Published Date** : Sep 30, 2016

**Authors** : Zeyu Shi, Yaqi Zhan, Junxing Zhao, Jinming Wang, Haili Ma

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Spleen Damage: Chemically Induced](#) : CK(2) : AC(9)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Immunotoxic](#) : CK(507) : AC(127)

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## Fluoride induces immunotoxicity by regulating riboflavin transport and metabolism partly through IL-17A in the spleen.

**Pubmed Data** : J Hazard Mater. 2024 Sep 5 ;476:135085. Epub 2024 Jul 2. PMID: [38968825](#)

**Article Published Date** : Sep 05, 2024

**Authors** : Yurou Qiao, Yukun Cui, Yanjia Tan, Cuicui Zhuang, Xiang Li, Yufei Yong, Xinying Zhang, Xuting Ren, Miaomiao Cai, Jie Yang, Yilin Lang, Jundong Wang, Chen Liang, Jianhai Zhang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Drug-Induced Nutrient Depletion: Riboflavin \(B-2\)](#) : CK(2) : AC(1), [Low Immune Function: Chemically-Induced](#) : CK(4) : AC(2), [Mitochondrial Dysfunction](#) : CK(618) : AC(262), [Spleen Damage: Chemically Induced](#) : CK(2) : AC(9)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Immunotoxic](#) : CK(507) : AC(127)

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## Sodium fluoride induces apoptosis in mouse splenocytes by activating ROS-dependent NF-κB signaling.

**Pubmed Data** : Oncotarget. 2017 Dec 29 ;8(70):114428-114441. Epub 2017 Dec 1. PMID: [29383091](#)

**Article Published Date** : Dec 28, 2017

**Authors** : Huidan Deng, Ping Kuang, Hengmin Cui, Qin Luo, Huan Liu, Yujiao Lu, Jing Fang, Zhicai Zuo, Junliang Deng, Yinglun Li, Xun Wang, Ling Zhao

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Apoptotic](#) : CK(278) : AC(120), [Immunotoxic](#) : CK(507) : AC(127)

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# Inflammatory (AC 10) (CK 26)

## Association between dental fluorosis prevalence and inflammation levels in school-aged children with low-to-moderate fluoride exposure.

**Pubmed Data** : Environ Pollut. 2023 Mar 1 ;320:120995. Epub 2023 Jan 2. PMID: [36603756](#)

**Article Published Date** : Feb 28, 2023

**Authors** : Huayang Tang, Mengru Wang, Gaochun Li, Mengwei Wang, Chen Luo, Guoyu Zhou, Qian Zhao, Lixin Dong, Hongliang Liu, Yushan Cui, Li Liu, Shun Zhang, Aiguo Wang

**Study Type** : Human Study

**Additional Links**

**Diseases** : C-Reactive Protein : CK(3920) : AC(389), C-Reactive Protein : CK(3920) : AC(389), Fluoride Toxicity : CK(1389) : AC(376), Inflammation : CK(15536) : AC(5279)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Inflammatory : CK(541) : AC(169)

## Exposure to fluoride in the prenatal and neonatal period result in the increase in COX2 activity and increase in PGE2 concentration in rats brain.

**Pubmed Data** : Neurotoxicology. 2019 Sep ;74:81-90. Epub 2019 Jun 5. PMID: [31175943](#)

**Article Published Date** : Aug 31, 2019

**Authors** : Karolina Dec, Agnieszka Łukomska, Karolina Skonieczna-Żydecka, Agnieszka Kolasa-Wołoskiuk, Maciej Tarnowski, Irena Baranowska-Bosiacka, Izabela Gutowska

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Brain Inflammation : CK(1650) : AC(901), Fluoride Toxicity : CK(1389) : AC(376), Neurodegenerative Diseases : CK(12159) : AC(4162), Prenatal Chemical Exposures : CK(2428) : AC(530)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Inflammatory : CK(541) : AC(169)

## Fluoride and arsenic exhibit cardiotoxic properties related to their pro-inflammatory effect.

**Pubmed Data** : Arch Toxicol. 2012 Mar 16. Epub 2012 Mar 16. PMID: [22422340](#)

**Article Published Date** : Mar 16, 2012

**Authors** : Yanqin Ma, Ruiyan Niu, Zilong Sun, Jinming Wang, Guangying Luo, Jianhai Zhang, Jundong Wang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Cardiovascular Diseases : CK(17124) : AC(2826)

**Problem Substances** : Arsenic : CK(595) : AC(181), Fluoride : CK(1815) : AC(454)

**Adverse Pharmacological Actions** : Cardiotoxic : CK(1168) : AC(209), Inflammatory : CK(541) : AC(169), Interleukin-6 up-regulation : CK(41) : AC(10), Interleukin-8 up-regulation : CK(2) : AC(1), MCP-1 (CCL2) up-regulation : CK(7) : AC(2), P-selectin upregulation : CK(2) : AC(1), Vascular Cell Adhesion Molecule-1 (VCAM-1) Up-Regulation : CK(4) : AC(2)

## Fluoride induced tissue hypercalcemia, IL-17 mediated inflammation and apoptosis lead to cardiomyopathy.

**Pubmed Data** : Toxicology. 2018 Aug 1 ;406-407:44-57. Epub 2018 May 22. PMID: [29800585](#)

**Article Published Date** : Jul 31, 2018

**Authors** : Javed Ahsan Quadri, Saba Sarwar, Pinky, Parmita Kar, Seema Singh, Saumya Ranjan Mallick, Sudheer Arava, Tapash Chand Nag, Tara Sankar Roy, A Shariff

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Cardiomyopathy : CK(358) : AC(160), Fluoride Toxicity : CK(1389) : AC(376), Inflammation : CK(15536) : AC(5279)

**Problem Substances** : Fluoride : CK(1815) : AC(454), Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Apoptotic : CK(278) : AC(120), Cardiotoxic : CK(1168) : AC(209), Inflammatory : CK(541) : AC(169)

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## Fluoride promotes the secretion of inflammatory factors in microglia.

**Pubmed Data** : Environ Sci Pollut Res Int. 2024 Mar ;31(13):19844-19855. Epub 2024 Feb 17. PMID: [38367109](#)

**Article Published Date** : Feb 29, 2024

**Authors** : Qiuyi Zhang, Tao Li, Ruili Shi, Ruifang Qi, Xiaoqiong Hao, Baohui Ma

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Inflammation : CK(15536) : AC(5279)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Inflammatory : CK(541) : AC(169)

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## Fluoride-induced neuron apoptosis and expressions of inflammatory factors by activating microglia in rat brain.

**Pubmed Data** : Mol Neurobiol. 2016 Sep ;53(7):4449-60. Epub 2015 Aug 8. PMID: [26253724](#)

**Article Published Date** : Aug 31, 2016

**Authors** : Nan Yan, Yan Liu, Shengnan Liu, Siqi Cao, Fei Wang, Zhengdong Wang, Shuhua Xi

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Inflammation : CK(15536) : AC(5279)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Inflammatory : CK(541) : AC(169), Neurotoxic : CK(2838) : AC(702)

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## Sodium fluoride caused hepatic inflammatory responses and significantly inhibited the production of anti-inflammatory mediators.

**Pubmed Data** : Biol Trace Elem Res. 2018 Jul 30. Epub 2018 Jul 30. PMID: [30062462](#)

**Article Published Date** : Jul 29, 2018

**Authors** : Linlin Chen, Ping Kuang, Huan Liu, Qin Wei, Hengmin Cui, Jing Fang, Zhicai Zuo, Junliang Deng, Yinglun Li, Xun Wang, Ling Zhao

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Chemically-Induced Liver Damage : CK(2167) : AC(1069), Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Inflammatory : CK(541) : AC(169)

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## Sodium fluoride exposure may result in increased oxidative stress and increased reaction oxygen species (ROS) production.

**Pubmed Data** : Toxicol Lett. 2010 Jul 1;196(2):74-9. Epub 2010 Apr 22. PMID: [20399260](#)

**Article Published Date** : Jul 01, 2010

**Authors** : I Gutowska, I Baranowska-Bosiacka, M Bańkiewicz, B Milo, A Siennicka, M Marchlewicz, B Wiszniewska, B Machaliński, E Stachowska

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : Oxidative Stress : CK(13443) : AC(5499)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Atherogenic : CK(25) : AC(5), Cardiotoxic : CK(1168) : AC(209), Inflammatory : CK(541) : AC(169)

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## Sodium fluoride induces hypertension and cardiac complications in

## animals.

**Pubmed Data** : Environ Toxicol. 2016 Jul 5. Epub 2016 Jul 5. PMID: [27378751](#)

**Article Published Date** : Jul 04, 2016

**Authors** : Ademola Adetokunbo Oyagbemi, Temidayo Olutayo Omobowale, Ebunoluwa Racheal Asenuga, Abiola Olumuyiwa Adejumobi, Temitayo Olabisi Ajibade, Temitope Moses Ige, Blessing Seun Ogunpolu, Adeolu Alex Adedapo, Momoh Audu Yakubu

**Study Type** : Animal Study

### Additional Links

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Cardiotoxic](#) : CK(1168) : AC(209), [Hypertensive](#) : CK(266) : AC(30), [Inflammatory](#) : CK(541) : AC(169)

## Sodium fluoride induces renal inflammatory responses by activating NF- $\kappa$ B signaling pathway and reducing anti-inflammatory cytokine expression.

**Pubmed Data** : Oncotarget. 2017 Jul 5. Epub 2017 Jul 5. PMID: [28708587](#)

**Article Published Date** : Jul 04, 2017

**Authors** : Qin Luo, Hengmin Cui, Huidan Deng, Ping Kuang, Huan Liu, Yujiao Lu, Jing Fang, Zhicai Zuo, Junliang Deng, Yinglun Li, Xun Wang, Ling Zhao

**Study Type** : Animal Study

### Additional Links

**Diseases** : [Inflammation](#) : CK(15536) : AC(5279)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Inflammatory](#) : CK(541) : AC(169)

## Interleukin-1 up-regulation (AC 1) (CK 1)

### Expression of SDF-1/CXCR4 and related inflammatory factors in sodium fluoride-treated hepatocytes.

**Pubmed Data** : PLoS One. 2024 ;19(6):e0302530. Epub 2024 Jun 21. PMID: [38905184](#)

**Article Published Date** : Dec 31, 2023

**Authors** : Rui Yang, Hongting Shen, Mingjun Wang, Yaqian Zhao, Shiling Zhu, Hong Jiang, Yanan Li, Guanglan Pu, Xun Chen, Ping Chen, Qing Lu, Jing Ma, Qiang Zhang

**Study Type** : In Vitro Study

### Additional Links

**Diseases** : [Chemically-Induced Liver Damage](#) : CK(2167) : AC(1069), [Fluoride Toxicity](#) : CK(1389) : AC(376), [Inflammation](#) : CK(15536) : AC(5279)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Interleukin-1 up-regulation](#) : CK(8) : AC(3), [Interleukin-6 up-regulation](#) : CK(41) : AC(10), [Tumor necrosis factor \$\alpha\$  \(TNF \$\alpha\$ \) up-regulation](#) : CK(65) : AC(11)

## Interleukin-6 up-regulation (AC 2) (CK 3)

## Expression of SDF-1/CXCR4 and related inflammatory factors in sodium fluoride-treated hepatocytes.

**Pubmed Data** : PLoS One. 2024 ;19(6):e0302530. Epub 2024 Jun 21. PMID: [38905184](#)

**Article Published Date** : Dec 31, 2023

**Authors** : Rui Yang, Hongting Shen, Mingjun Wang, Yaqian Zhao, Shiling Zhu, Hong Jiang, Yanan Li, Guanglan Pu, Xun Chen, Ping Chen, Qing Lu, Jing Ma, Qiang Zhang

**Study Type** : In Vitro Study

### Additional Links

**Diseases** : Chemically-Induced Liver Damage : CK(2167) : AC(1069), Fluoride Toxicity : CK(1389) : AC(376), Inflammation : CK(15536) : AC(5279)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Interleukin-1 up-regulation : CK(8) : AC(3), Interleukin-6 up-regulation : CK(41) : AC(10), Tumor necrosis factor $\alpha$  (TNF $\alpha$ ) up-regulation : CK(65) : AC(11)

## Fluoride and arsenic exhibit cardiotoxic properties related to their pro-inflammatory effect.

**Pubmed Data** : Arch Toxicol. 2012 Mar 16. Epub 2012 Mar 16. PMID: [22422340](#)

**Article Published Date** : Mar 16, 2012

**Authors** : Yanqin Ma, Ruiyan Niu, Zilong Sun, Jinming Wang, Guangying Luo, Jianhai Zhang, Jundong Wang

**Study Type** : Animal Study

### Additional Links

**Diseases** : Cardiovascular Diseases : CK(17124) : AC(2826)

**Problem Substances** : Arsenic : CK(595) : AC(181), Fluoride : CK(1815) : AC(454)

**Adverse Pharmacological Actions** : Cardiotoxic : CK(1168) : AC(209), Inflammatory : CK(541) : AC(169), Interleukin-6 up-regulation : CK(41) : AC(10), Interleukin-8 up-regulation : CK(2) : AC(1), MCP-1 (CCL2) up-regulation : CK(7) : AC(2), P-selectin upregulation : CK(2) : AC(1), Vascular Cell Adhesion Molecule-1 (VCAM-1) Up-Regulation : CK(4) : AC(2)

## Interleukin-8 up-regulation (AC 1) (CK 2)

## Fluoride and arsenic exhibit cardiotoxic properties related to their pro-inflammatory effect.

**Pubmed Data** : Arch Toxicol. 2012 Mar 16. Epub 2012 Mar 16. PMID: [22422340](#)

**Article Published Date** : Mar 16, 2012

**Authors** : Yanqin Ma, Ruiyan Niu, Zilong Sun, Jinming Wang, Guangying Luo, Jianhai Zhang, Jundong Wang

**Study Type** : Animal Study

### Additional Links

**Diseases** : Cardiovascular Diseases : CK(17124) : AC(2826)

**Problem Substances** : Arsenic : CK(595) : AC(181), Fluoride : CK(1815) : AC(454)

**Adverse Pharmacological Actions** : Cardiotoxic : CK(1168) : AC(209), Inflammatory : CK(541) : AC(169), Interleukin-6 up-regulation : CK(41) : AC(10), Interleukin-8 up-regulation : CK(2) : AC(1), MCP-1 (CCL2) up-regulation : CK(7) : AC(2), P-selectin upregulation : CK(2) : AC(1), Vascular Cell Adhesion Molecule-1 (VCAM-1) Up-Regulation : CK(4) : AC(2)

## MCP-1 (CCL2) up-regulation (AC 1) (CK 2)

## Fluoride and arsenic exhibit cardiotoxic properties related to their pro-inflammatory effect.

**Pubmed Data** : Arch Toxicol. 2012 Mar 16. Epub 2012 Mar 16. PMID: [22422340](#)

**Article Published Date** : Mar 16, 2012

**Authors** : Yanqin Ma, Ruiyan Niu, Zilong Sun, Jinming Wang, Guangying Luo, Jianhai Zhang, Jundong Wang

**Study Type** : Animal Study

### Additional Links

**Diseases** : Cardiovascular Diseases : CK(17124) : AC(2826)

**Problem Substances** : Arsenic : CK(595) : AC(181), Fluoride : CK(1815) : AC(454)

**Adverse Pharmacological Actions** : Cardiotoxic : CK(1168) : AC(209), Inflammatory : CK(541) : AC(169), Interleukin-6 up-regulation : CK(41) : AC(10), Interleukin-8 up-regulation : CK(2) : AC(1), MCP-1 (CCL2) up-regulation : CK(7) : AC(2), P-selectin upregulation : CK(2) : AC(1), Vascular Cell Adhesion Molecule-1 (VCAM-1) Up-Regulation : CK(4) : AC(2)

## Nephrotoxic (AC 3) (CK 5)

### High fluoride aggravates cadmium-mediated nephrotoxicity of renal tubular epithelial cells.

**Pubmed Data** : Sci Total Environ. 2024 Nov 25 ;953:175927. Epub 2024 Sep 3. PMID: [39236818](#)

**Article Published Date** : Nov 25, 2024

**Authors** : Dashuan Li, Chaolian Yang, Lu Sun, Zhenqin Zhao, Jiaqi Liu, Cheng Zhang, Dali Sun, Qinghai Zhang

**Study Type** : In Vitro Study

### Additional Links

**Diseases** : Oxidative Stress : CK(13443) : AC(5499)

**Pharmacological Actions** : Apoptotic : CK(9052) : AC(7284)

**Problem Substances** : Fluoride : CK(1815) : AC(454)

**Adverse Pharmacological Actions** : Nephrotoxic : CK(203) : AC(52)

### Sodium fluoride administered through drinking water exhibits liver and kidney toxicity in mice.

**Pubmed Data** : Arch Toxicol. 2010 Sep 22. Epub 2010 Sep 22. PMID: [20859737](#)

**Article Published Date** : Sep 22, 2010

**Authors** : Ansuman Chattopadhyay, Santosh Podder, Soumik Agarwal, Shelley Bhattacharya

**Study Type** : Animal Study

### Additional Links

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Hepatotoxic : CK(400) : AC(124), Nephrotoxic : CK(203) : AC(52)

### Sodium fluoride has adverse effects in the fetal kidney during pregnancy.

**Pubmed Data** : Environ Toxicol Pharmacol. 2024 Sep ;110:104545. Epub 2024 Aug 28. PMID: [39208996](#)

**Article Published Date** : Sep 01, 2024

**Authors** : Esaú Montañez-Rodríguez, Sabino Hazael Avila-Rojas, Ariana Guadalupe Jimenez-Dorantes, Juan Carlos León-Contreras, Rogelio Hernandez-Pando, JoséManuel Arreola-Guerra, Casimiro Gerarduzzi, María Estela Meléndez-Camargo, Luz M Del Razo, Olivier Christophe Barbier

**Study Type** : Animal Study

### Additional Links

**Diseases** : Kidney Damage: Chemically-Induced : CK(542) : AC(270)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)  
**Adverse Pharmacological Actions** : Nephrotoxic : CK(203) : AC(52)

## Neurotoxic (AC 68) (CK 278)

### A review of the effects of chronic fluorosis on the brain.

**Pubmed Data** : Ecotoxicol Environ Saf. 2022 Oct 1 ;244:114021. Epub 2022 Aug 29. PMID: [36049331](#)

**Article Published Date** : Sep 30, 2022

**Authors** : Chao Ren, Hui-Hua Li, Cai-Yi Zhang, Xi-Cheng Song

**Study Type** : Review

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Fluorosis : CK(262) : AC(42), Learning disorders : CK(517) : AC(155), Memory Disorders : CK(1570) : AC(514), Oxidative Stress : CK(13443) : AC(5499)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

### Aluminium, fluoride and a combination of aluminium-fluoride treatments caused an increase in brain lipid peroxidation products and reactive oxygen species formation.

**Pubmed Data** : Pathophysiology. 2015 Mar ;22(1):39-48. Epub 2014 Dec 13. PMID: [25577494](#)

**Article Published Date** : Feb 28, 2015

**Authors** : Ibukun Dorcas Akinrinade, Adejoke Elizabeth Memudu, Olalekan Michael Ogundele, Olanrewaju Ibrahim Ajetunmobi

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Aluminum Toxicity : CK(685) : AC(308), Brain Inflammation : CK(1650) : AC(901), Fluoride Toxicity : CK(1389) : AC(376), Neurodegenerative Diseases : CK(12159) : AC(4162), Oxidative Stress : CK(13443) : AC(5499)

**Additional Keywords** : Increased Risk : CK(8492) : AC(1109), Synergistic Toxicity : CK(226) : AC(109)

**Problem Substances** : Aluminum : CK(1061) : AC(349), Fluoride : CK(1815) : AC(454), Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

### Aluminum appears to enhance the neurotoxic hazards caused by fluoride.

**Pubmed Data** : Drug Chem Toxicol. 2009 ;32(3):215-21. PMID: [19538017](#)

**Article Published Date** : Dec 31, 2008

**Authors** : Tanzeer Kaur, Rakesh K Bijarnia, Bimla Nehru

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Aluminum Toxicity : CK(685) : AC(308), Lipid Peroxidation : CK(1901) : AC(774), Oxidative Stress : CK(13443) : AC(5499)

**Additional Keywords** : Synergistic Toxicity : CK(226) : AC(109)

**Problem Substances** : Aluminum : CK(1061) : AC(349), Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

### Autophagy may be involved in fluoride-induced learning impairment in rats.

**Pubmed Data** : Biol Trace Elem Res. 2020 Feb ;193(2):502-507. Epub 2019 May 20. PMID: [31111310](#)

**Article Published Date** : Jan 31, 2020

**Authors** : Chengzhi Zhang, Simeng Huo, Yumei Fan, Yanhui Gao, Yanmei Yang, Dianjun Sun

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Learning disorders : CK(517) : AC(155), Neurodegenerative Diseases : CK(12159) : AC(4162)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Children residing in areas with higher than normal water fluoride levels demonstrated more impaired development of intelligence.

**Pubmed Data** : J Dent (Tehran). 2012 ;9(3):221-9. Epub 2012 Sep 30. PMID: [23119131](#)

**Article Published Date** : Dec 31, 2011

**Authors** : B Seraj, M Shahrabi, M Shadfar, R Ahmadi, M Fallahzadeh, H Farrokh Eslamli, M J Kharazifard

**Study Type** : Human Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Intelligence Quotient (IQ): Low/Impaired : CK(312) : AC(27)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Children who live in a fluorosis area have 5 times higher odds of developing low IQ than those who live in a nonfluorosis area or a slight fluorosis area.

**Pubmed Data** : Biol Trace Elem Res. 2008;126(1-3):115-20. Epub 2008 Aug 10. PMID: [18695947](#)

**Article Published Date** : Jan 01, 2008

**Authors** : Qin-Qing Tang, Jun Du, Heng-Hui Ma, Shao-Jun Jiang, Xiao-Jun Zhou

**Study Type** : Meta Analysis

**Additional Links**

**Diseases** : Childhood Cognitive Disorders : CK(316) : AC(27), Cognitive Decline/Dysfunction : CK(5061) : AC(1005),

Intelligence Quotient (IQ): Low/Impaired : CK(312) : AC(27), Prenatal Nutrition: Learning/Intelligence of Offspring : CK(116) : AC(14)

**Problem Substances** : Fluoride : CK(1815) : AC(454)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Children with fluorosis in coal-burning areas had impaired IQ and obviously had impaired verbal intelligence quotient.

**Pubmed Data** : Biol Trace Elem Res. 2021 Feb ;199(2):482-489. Epub 2020 May 3. PMID: [32363519](#)

**Article Published Date** : Jan 31, 2021

**Authors** : Didong Lou, Yan Luo, Jing Liu, Dan Zheng, Rongrong Ma, Fangping Chen, Yanni Yu, Zhizhong Guan

**Study Type** : Human Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Learning disorders : CK(517) : AC(155)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Children's growth and intelligence can be adversely affected by fluoride and arsenic exposure in drinking water.

**Pubmed Data** : Environ Health Perspect. 2007 Apr;115(4):643-7. Epub 2007 Jan 9. PMID: [17450237](#)

**Article Published Date** : Apr 01, 2007

**Authors** : San-Xiang Wang, Zheng-Hui Wang, Xiao-Tian Cheng, Jun Li, Zhi-Ping Sang, Xiang-Dong Zhang, Ling-Ling Han, Xiao-Yan Qiao, Zhao-Ming Wu, Zhi-Quan Wang

**Study Type** : Human Study



#### **Additional Links**

**Diseases** : Childhood Chemical Exposures : CK(165) : AC(17), Childhood Cognitive Disorders : CK(316) : AC(27), Children: Impaired Growth : CK(50) : AC(4), Intelligence Quotient (IQ): Low/Impaired : CK(312) : AC(27)

**Problem Substances** : Arsenic : CK(595) : AC(181), Fluoride : CK(1815) : AC(454)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## **Chronic exposure to fluoride affects GSH level and NOX4 expression.**

**Pubmed Data** : Biomolecules. 2020 Mar 9 ;10(3). Epub 2020 Mar 9. PMID: [32182821](#)

**Article Published Date** : Mar 08, 2020

**Authors** : Karolina Dec, Agnieszka Łukomska, Karolina Skonieczna-Żydecka, Karolina Jakubczyk, Maciej Tarnowski, Anna Lubkowska, Irena Baranowska-Bosiacka, Daniel Styburski, Marta Skórka-Majewicz, Dominika Maciejewska, Izabela Gutowska

**Study Type** : Animal Study

#### **Additional Links**

**Diseases** : Neurodegenerative Diseases : CK(12159) : AC(4162), Oxidative Stress : CK(13443) : AC(5499)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## **Chronic exposure to high levels of fluoride in water was observed to be associated with lower intelligence quotient.**

**Pubmed Data** : Iran J Public Health. 2013 Aug ;42(8):813-8. PMID: [26056634](#)

**Article Published Date** : Jul 31, 2013

**Authors** : Ramesh Nagarajappa, Piyush Pujara, Archana J Sharda, Kailash Asawa, Mridula Tak, Pankaj Aapaliya, Nikhil Bhanushali

**Study Type** : Human Study

#### **Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Intelligence Quotient (IQ): Low/Impaired : CK(312) : AC(27)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## **Chronic fluoride exposure induces neuronal apoptosis and impairs neurogenesis and synaptic plasticity.**

**Pubmed Data** : Chemosphere. 2019 Jan ;214:430-435. Epub 2018 Sep 17. PMID: [30273876](#)

**Article Published Date** : Dec 31, 2018

**Authors** : Pei Jiang, Gongying Li, Xueyuan Zhou, Changshui Wang, Yi Qiao, Dehua Liao, Dongmei Shi

**Study Type** : Animal Study

#### **Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Apoptotic : CK(278) : AC(120), Neurotoxic : CK(2838) : AC(702)

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## **Circulating levels of autophagy markers were low in children with higher fluoride body burden and lower intelligence quotient scores.**

**Pubmed Data** : Toxicol Appl Pharmacol. 2019 Sep 1 ;378:114608. Epub 2019 Jun 5. PMID: [31173788](#)

**Article Published Date** : Aug 31, 2019

**Authors** : Guoyu Zhou, Sha Tang, Lu Yang, Qiang Niu, Jingwen Chen, Tao Xia, Sumei Wang, Mengwei Wang, Qian Zhao, Ling Liu, Pei Li, Lixin Dong, Kedi Yang, Shun Zhang, Aiguo Wang

**Study Type** : Human Study

#### **Additional Links**

**Diseases** : Cognitive Decline/Dysfunction : CK(5061) : AC(1005), Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Cognitive decline of rats with chronic fluorosis is associated with alterations in hippocampal calpain signaling.

**Pubmed Data** : Biol Trace Elem Res. 2020 Oct ;197(2):495-506. Epub 2019 Dec 3. PMID: [31797207](#)

**Article Published Date** : Sep 30, 2020

**Authors** : Olga V Nadei, Irina A Khvorova, Natalia I Agalakova

**Study Type** : Animal Study

### Additional Links

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Fluorosis](#) : CK(262) : AC(42)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Neurotoxic](#) : CK(2838) : AC(702)

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## Combined effect of arsenic and fluoride at environmentally relevant concentrations in zebrafish (Danio rerio) brain.

**Pubmed Data** : Chemosphere. 2021 Apr ;269:128678. Epub 2020 Oct 21. PMID: [33127104](#)

**Article Published Date** : Mar 31, 2021

**Authors** : Paritosh Mondal, Pallab Shaw, Arpan Dey Bhowmik, Arindam Bandyopadhyay, Muthammal Sudarshan, Anindita Chakraborty, Ansuman Chattopadhyay

**Study Type** : Animal Study

### Additional Links

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Oxidative Stress](#) : CK(13443) : AC(5499)

**Additional Keywords** : [Synergistic Toxicity](#) : CK(226) : AC(109)

**Problem Substances** : [Arsenic](#) : CK(595) : AC(181), [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Neurotoxic](#) : CK(2838) : AC(702)

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## Concentration of Fluoride in the ingested water was significantly associated with the IQ of children.

**Pubmed Data** : J Int Soc Prev Community Dent. 2017 ;7(5):252-258. Epub 2017 Sep 18. PMID: [29026697](#)

**Article Published Date** : Dec 31, 2016

**Authors** : Priyanka Razdan, Basavaraj Patthi, Jishnu Krishna Kumar, Nikhil Agnihotri, Prajakta Chaudhari, Monika Prasad

**Study Type** : Human Study

### Additional Links

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Intelligence Quotient \(IQ\): Low/Impaired](#) : CK(312) : AC(27), [Learning disorders](#) : CK(517) : AC(155)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Neurotoxic](#) : CK(2838) : AC(702)

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## Curcumin attenuates neurotoxicity induced by fluoride: An in vivo evidence.

**Pubmed Data** : Pharmacogn Mag. 2014 Jan ;10(37):61-5. PMID: [24696547](#)

**Article Published Date** : Dec 31, 2013

**Authors** : Chhavi Sharma, Pooja Suhalka, Piyu Sukhwal, Neha Jaiswal, Maheep Bhatnagar

**Study Type** : Animal Study

### Additional Links

**Substances** : [Curcumin](#) : CK(6902) : AC(3215)

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Lipid Peroxidation](#) : CK(1901) : AC(774), [Oxidative Stress](#) : CK(13443) : AC(5499)

**Pharmacological Actions** : [Neuroprotective Agents](#) : CK(17667) : AC(7641)

**Problem Substances** : [Fluoride](#) : CK(1815) : AC(454), [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Neurotoxic](#) : CK(2838) : AC(702)

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## Developmental fluoride neurotoxicity: an updated review.

**Pubmed Data** : Environ Health. 2019 Dec 19 ;18(1):110. Epub 2019 Dec 19. PMID: [31856837](#)

**Article Published Date** : Dec 18, 2019

**Authors** : Philippe Grandjean

**Study Type** : Review

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Prenatal Chemical Exposures](#) : CK(2428) : AC(530)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Neurotoxic](#) : CK(2838) : AC(702)

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## Early exposure to fluoride may have neurotoxic effects on neurodevelopment affecting behavioral, cognitive and psychosomatic symptoms related to ADHD diagnosis.

**Pubmed Data** : Medicina (Kaunas). 2023 Apr 19 ;59(4). Epub 2023 Apr 19. PMID: [37109754](#)

**Article Published Date** : Apr 18, 2023

**Authors** : Gianluca Fiore, Federica Veneri, Rosaria Di Lorenzo, Luigi Generali, Marco Vinceti, Tommaso Filippini

**Study Type** : Review

**Additional Links**

**Diseases** : [Attention Deficit Disorder with Hyperactivity](#) : CK(633) : AC(84), [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Neurotoxic](#) : CK(2838) : AC(702)

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## Effect of fluoride exposure on mRNA expression of cav1.2 and calcium signal pathway apoptosis regulators in PC12 cells.

**Pubmed Data** : Environ Toxicol Pharmacol. 2017 Sep ;54:74-79. Epub 2017 Jun 30. PMID: [28697452](#)

**Article Published Date** : Aug 31, 2017

**Authors** : Qiuxia Liao, Rui Zhang, Xiaoyu Wang, Weiwei Nian, Lulu Ke, Wei Ouyang, Zigui Zhang

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Fluorosis](#) : CK(262) : AC(42)

**Problem Substances** : [Fluoride](#) : CK(1815) : AC(454), [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Apoptotic](#) : CK(278) : AC(120), [Neurotoxic](#) : CK(2838) : AC(702)

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## Effect of hesperidin on fluoride-induced neurobehavioral and biochemical changes in rats.

**Pubmed Data** : J Biochem Mol Toxicol. 2020 Nov ;34(11):e22575. Epub 2020 Jul 5. PMID: [32627286](#)

**Article Published Date** : Oct 31, 2020

**Authors** : Pawan Jaiswal, Mukesh Mandal, Awanish Mishra

**Study Type** : Animal Study

**Additional Links**

**Substances** : [Hesperidin](#) : CK(845) : AC(358)

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Memory Disorders](#) : CK(1570) : AC(514)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Neurotoxic](#) : CK(2838) : AC(702)

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## Effects of fluoride on synapse morphology and myelin damage in mouse hippocampus.

**Pubmed Data** : Chemosphere. 2018 Mar ;194:628-633. Epub 2017 Dec 6. PMID: [29241138](#)

**Article Published Date** : Feb 28, 2018

**Authors** : Ruiyan Niu, Huijuan Chen, Ram Kumar Manthari, Zilong Sun, Jinming Wang, Jianhai Zhang, Jundong Wang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376)  
**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)  
**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Effects of neuron autophagy induced by arsenic and fluoride on spatial learning and memory in offspring rats.

**Pubmed Data** : Chemosphere. 2022 Dec ;308(Pt 2):136341. Epub 2022 Sep 7. PMID: [36087721](#)

**Article Published Date** : Nov 30, 2022

**Authors** : Qiuyi Zhao, Weizhe Pan, Jia Li, Shengnan Yu, Yan Liu, Xiaoli Zhang, Ruodi Qu, Qian Zhang, Ben Li, Xiaoyan Yan, Xuefeng Ren, Yulan Qiu

**Study Type** : Animal Study

### Additional Links

**Diseases** : Learning disorders : CK(517) : AC(155), Memory Disorders : CK(1570) : AC(514), Neurodegenerative Diseases : CK(12159) : AC(4162), Prenatal Chemical Exposures : CK(2428) : AC(530)

**Problem Substances** : Arsenic : CK(595) : AC(181), Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Excessive fluoride and aluminium intake induces the progression of cell death which inhibit AChE activities and trigger the release of lysosomal and cell cycle proteins.

**Pubmed Data** : Pathophysiology. 2015 Jun ;22(2):105-15. Epub 2015 Apr 2. PMID: [25863844](#)

**Article Published Date** : May 31, 2015

**Authors** : Ibukun Dorcas Akinrinade, Adejoke Elizabeth Memudu, Olalekan Michael Ogundele

**Study Type** : Animal Study

### Additional Links

**Diseases** : Neurodegenerative Diseases : CK(12159) : AC(4162)

**Additional Keywords** : Increased Risk : CK(8492) : AC(1109)

**Problem Substances** : Aluminum : CK(1061) : AC(349), Fluoride : CK(1815) : AC(454), Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Excessive lysosomal stress response and consequently impaired autophagy contribute to fluoride-induced developmental neurotoxicity.

**Pubmed Data** : Biol Trace Elem Res. 2023 Sep ;201(9):4472-4483. Epub 2022 Dec 5. PMID: [36464725](#)

**Article Published Date** : Aug 31, 2023

**Authors** : Wanjing Xu, Zeyu Hu, Yanling Tang, Jingjing Zhang, Shangzhi Xu, Qiang Niu

**Study Type** : Animal Study

### Additional Links

**Diseases** : Developmental Disorder: Children : CK(148) : AC(19), Neurodegenerative Diseases : CK(12159) : AC(4162)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Exercise alleviates fluoride-induced learning and memory impairment.

**Pubmed Data** : Biol Trace Elem Res. 2024 Jan 20. Epub 2024 Jan 20. PMID: [38244175](#)

**Article Published Date** : Jan 19, 2024

**Authors** : Lei Chai, Qiqi Cao, Ke Liu, Run Zhu, Hao Li, Yanghuan Yu, Jixiang Wang, Ruiyan Niu, Ding Zhang, Bo Yang, Mohammad Mehdi Ommati, Zilong Sun

**Study Type** : Animal Study

### Additional Links

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Memory Disorders : CK(1570) : AC(514)

**Therapeutic Actions** : Exercise : CK(6247) : AC(999)

**Pharmacological Actions** : Neuroprotective Agents : CK(17667) : AC(7641)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)  
**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Exposure to fluoride and arsenic in drinking water is associated with decreased intelligence in children.

**Pubmed Data** : Cad Saude Publica. 2007;23 Suppl 4:S579-87. PMID: [18038039](#)

**Article Published Date** : Jan 01, 2007

**Authors** : Diana Rocha-Amador, Maria Elena Navarro, Leticia Carrizales, Raúl Morales, Jaqueline Calderón

**Study Type** : Human Study

**Additional Links**

**Diseases** : Childhood Chemical Exposures : CK(165) : AC(17), Childhood Cognitive Disorders : CK(316) : AC(27), Intelligence Quotient (IQ): Low/Impaired : CK(312) : AC(27)

**Problem Substances** : Arsenic : CK(595) : AC(181), Fluoride : CK(1815) : AC(454)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Exposure to high levels of fluoride may adversely influence children's intelligence development.

**Pubmed Data** : Zhongguo Dang Dai Er Ke Za Zhi. 2008 Dec;10(6):723-5. PMID: [19102839](#)

**Article Published Date** : Dec 01, 2008

**Authors** : Ming Liu, Cong Qian

**Study Type** : Meta Analysis

**Additional Links**

**Diseases** : Childhood Cognitive Disorders : CK(316) : AC(27), Cognitive Decline/Dysfunction : CK(5061) : AC(1005), Fluoride Toxicity : CK(1389) : AC(376), Fluorosis : CK(262) : AC(42), Intelligence Quotient (IQ): Low/Impaired : CK(312) : AC(27), Prenatal Nutrition: Learning/Intelligence of Offspring : CK(116) : AC(14)

**Problem Substances** : Fluoride : CK(1815) : AC(454)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Extract of Ginkgo biloba leaves attenuates neurotoxic damages from high levels of fluoride.

**Pubmed Data** : J Trace Elem Med Biol. 2022 Sep 30 ;75:127088. Epub 2022 Sep 30. PMID: [36265321](#)

**Article Published Date** : Sep 29, 2022

**Authors** : Jie Xiang, Yan-Lin Ma, Jian Zou, Xiao-Xiao Zeng, Xiao Xiao, Yan-Long Yu, Yang-Ting Dong, Long-Yan Ran, Xiao-Lan Qi, Wei Hong, Yan-Hui Gao, Zhi-Zhong Guan

**Study Type** : Animal Study, In Vitro Study

**Additional Links**

**Substances** : Ginkgo biloba : CK(2025) : AC(644)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376)

**Pharmacological Actions** : Neuroprotective Agents : CK(17667) : AC(7641)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Fluoride and arsenic exposure impairs learning and memory and decreases mGluR5 expression in the hippocampus and cortex in rats.

**Pubmed Data** : PLoS One. 2014 ;9(4):e96041. Epub 2014 Apr 23. PMID: [24759735](#)

**Article Published Date** : Dec 31, 2013

**Authors** : Shoufang Jiang, Jing Su, Sanqiao Yao, Yanshu Zhang, Fuyuan Cao, Fei Wang, Huihui Wang, Jun Li, Shuhua Xi

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Learning disorders : CK(517) : AC(155), Memory Disorders : CK(1570) : AC(514)

**Additional Keywords** : Synergistic Toxicity : CK(226) : AC(109)

**Problem Substances** : Arsenic : CK(595) : AC(181), Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Fluoride exposure decreased neurite formation on cerebral cortical neurons of SD rats in vitro.

**Pubmed Data** : Environ Sci Pollut Res Int. 2021 Oct ;28(37):50975-50982. Epub 2021 May 11. PMID: [33977427](#)

**Article Published Date** : Sep 30, 2021

**Authors** : Hongmei Ning, Chong Li, Zhihong Yin, Dongfang Hu, Yaming Ge, Lingli Chen

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Fluoride exposure disrupts the cytoskeletal arrangement and ATP synthesis of HT-22 cell.

**Pubmed Data** : Ecotoxicol Environ Saf. 2023 Apr 1 ;254:114718. Epub 2023 Mar 10. PMID: [36950989](#)

**Article Published Date** : Mar 31, 2023

**Authors** : Lingli Chen, Penghuan Jia, Yuye Liu, Rui Wang, Zhihong Yin, Dongfang Hu, Hongmei Ning, Yaming Ge

**Study Type** : Review

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Fluoride exposure induces neurotoxicity, leading to cell damage and emotional dysfunction, mitigated by physical activity in mice.

**Pubmed Data** : Biol Trace Elem Res. 2024 Oct 31. Epub 2024 Oct 31. PMID: [39480623](#)

**Article Published Date** : Oct 31, 2024

**Authors** : Mengjie Qi, Yue Wu, Han Shi, Jie Liu, Run Zhu, Jixiang Wang, Amna Rafique, Bo Yang, Ruiyan Niu, Ding Zhang, Zilong Sun

**Study Type** : Animal Study

**Additional Links**

**Problem Substances** : Fluoride : CK(1815) : AC(454), Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Fluoride in drinking water may produce developmental neurotoxicity

**Pubmed Data** : Neurotoxicol Teratol. 2015 ;47:96-101. Epub 2014 Nov 8. PMID: [25446012](#)

**Article Published Date** : Dec 31, 2014

**Authors** : Anna L Choi, Ying Zhang, Guifan Sun, David C Bellinger, Kanglin Wang, Xiao Jing Yang, Jin Shu Li, Quanmei Zheng, Yuanli Fu, Philippe Grandjean

**Study Type** : Human Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Neurodevelopmental Disorders : CK(470) : AC(85)

**Additional Keywords** : Dose Response : CK(1769) : AC(700)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Fluoride in drinking water was negatively associated with cognitive function.

**Pubmed Data** : Neurotoxicol Teratol. 2023 ;100:107293. Epub 2023 Sep 9. PMID: [37690675](#)

**Article Published Date** : Dec 31, 2022

**Authors** : Tewodros Rango Godebo, Marc Jeuland, Redda Tekle-Haimanot, Biniyam Alemayehu, Arti Shankar, Amy Wolfe, Nati Phan

**Study Type** : Human Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Neurotoxic](#) : CK(2838) : AC(702)

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## Fluoride induced neurobehavioral impairments in experimental animals.

**Pubmed Data** : Biol Trace Elem Res. 2023 Mar ;201(3):1214-1236. Epub 2022 Apr 30. PMID: [35488996](#)

**Article Published Date** : Feb 28, 2023

**Authors** : Harsheema Ottappilakkil, Srija Babu, Satheeswaran Balasubramanian, Suryaa Manoharan, Ekambaram Perumal

**Study Type** : Review

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Neurodegenerative Diseases](#) : CK(12159) : AC(4162)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Neurotoxic](#) : CK(2838) : AC(702)

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## Fluoride levels in the 100-200 ppm range results in neurotoxicity in rats.

**Pubmed Data** : Biol Trace Elem Res. 2010 Jul 24. Epub 2010 Jul 24. PMID: [20658207](#)

**Article Published Date** : Jul 24, 2010

**Authors** : P Mahaboob Basha, Puja Rai, Shabana Begum

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Additional Keywords** : [Multi-Generational Effects](#) : CK(4) : AC(2)

**Problem Substances** : [Fluoride](#) : CK(1815) : AC(454)

**Adverse Pharmacological Actions** : [Neurotoxic](#) : CK(2838) : AC(702)

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## Fluoride may go through the blood-brain barrier and accumulate in rat hippocampus, and inhibit the activity of cholinesterase.

**Pubmed Data** : Zhonghua Lao Dong Wei Sheng Zhi Ye Bing Za Zhi. 2003 Apr ;21(2):102-4. PMID: [14761523](#)

**Article Published Date** : Apr 01, 2003

**Authors** : Jin-xia Zhai, Zhi-yong Guo, Chuan-lai Hu, Qi-nan Wang, Qi-xing Zhu

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Blood-Brain-Barrier Disorders](#) : CK(31) : AC(18), [Brain Injury: Hippocampal Damage](#) : CK(44) : AC(21)

**Problem Substances** : [Fluoride](#) : CK(1815) : AC(454)

**Adverse Pharmacological Actions** : [Acetylcholinesterase inhibitor \(xenobiotic\)](#) : CK(8) : AC(4), [Neurotoxic](#) : CK(2838) : AC(702)

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## Fluoride showed potent neuronal toxicity as evidenced by alterations of various molecular markers.

**Pubmed Data** : J Trace Elem Med Biol. 2024 Aug 23 ;86:127511. Epub 2024 Aug 23. PMID: [39216433](#)

**Article Published Date** : Aug 22, 2024

**Authors** : Sachindra Kumar, Ravindra Shantakumar Swamy, Rashmi Bhushan, Vishal Chhabra, Smita Shenoy, Krishna Murti, Shubhankar Kumar Singh, Nitesh Kumar

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376)



**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)  
**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Fluoride-induced alterations of synapse-related proteins in the cerebral cortex of ICR offspring mouse brain.

**Pubmed Data** : Chemosphere. 2018 Jun ;201:874-883. Epub 2018 Feb 27. PMID: [29567471](#)

**Article Published Date** : May 31, 2018

**Authors** : Yaming Ge, Lingli Chen, Zhihong Yin, Xiaochao Song, Tao Ruan, Liushuai Hua, Junwei Liu, Jundong Wang, Hongmei Ning

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Fluoride-induced cortical toxicity in rats: the role of excessive endoplasmic reticulum stress and its mediated defective autophagy.

**Pubmed Data** : Biol Trace Elem Res. 2023 Aug ;201(8):3850-3860. Epub 2022 Nov 3. PMID: [36327065](#)

**Article Published Date** : Jul 31, 2023

**Authors** : Jingjing Zhang, Yanling Tang, Wanjing Xu, Zeyu Hu, Shangzhi Xu, Qiang Niu

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Fluoride-induced neuron apoptosis and expressions of inflammatory factors by activating microglia in rat brain.

**Pubmed Data** : Mol Neurobiol. 2016 Sep ;53(7):4449-60. Epub 2015 Aug 8. PMID: [26253724](#)

**Article Published Date** : Aug 31, 2016

**Authors** : Nan Yan, Yan Liu, Shengnan Liu, Siqi Cao, Fei Wang, Zhengdong Wang, Shuhua Xi

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Inflammation : CK(15536) : AC(5279)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Inflammatory : CK(541) : AC(169), Neurotoxic : CK(2838) : AC(702)

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## Genotoxicity of fluoride subacute exposure in rats and selenium intervention.

**Pubmed Data** : Chemosphere. 2021 Mar ;266:128978. Epub 2020 Nov 17. PMID: [33298328](#)

**Article Published Date** : Feb 28, 2021

**Authors** : Jelena Radovanović, Biljana Antonijević, Stoimir Kolarević, Sanja Milutinović-Smiljanić, Jelena Mandić, Branka Vuković-Gačić, Zorica Bulat, Marijana Ćurčić, Margareta Kračun-Kolarević, Karolina Sunjog, Jovana Kostić-Vuković, Jovana Jovanović Marić, Evica Antonijević-Miljaković, Danijela Đukić-Ćosić, Aleksandra Buha Djordjevic, Dragana Javorac, Katarina Baralić, Zoran Mandinić

**Study Type** : In Vitro Study

**Additional Links**

**Substances** : Selenium : CK(1706) : AC(389)

**Diseases** : Chemically-Induced Liver Damage : CK(2167) : AC(1069), DNA damage : CK(2255) : AC(824), Fluoride Toxicity : CK(1389) : AC(376), Spleen Damage: Chemically Induced : CK(2) : AC(9)

**Pharmacological Actions** : Genoprotective : CK(522) : AC(203)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Genotoxic : CK(545) : AC(184), Neurotoxic : CK(2838) : AC(702)

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## High fluoride exposure has multigenerational and cumulative adverse effects on thyroid status, brain health and learning memory in rats.

**Pubmed Data** : Biol Trace Elem Res. 2011 Jul 14. Epub 2011 Jul 14. PMID: [21755305](#)

**Article Published Date** : Jul 14, 2011

**Authors** : Piler Mahaboob Basha, Puja Rai, Shabana Begum

**Study Type** : Animal Study

### Additional Links

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Hypothyroidism : CK(847) : AC(148), Prenatal Chemical Exposures : CK(2428) : AC(530), Prenatal Nutrition: Learning/Intelligence of Offspring : CK(116) : AC(14)

**Problem Substances** : Fluoride : CK(1815) : AC(454)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## High iodine and high fluorine adversely effects the intelligence and health of children.

**Pubmed Data** : Zhonghua Liu Xing Bing Xue Za Zhi. 1994 Oct;15(5):296-8. PMID: [7859263](#)

**Article Published Date** : Oct 01, 1994

**Authors** : Y Yang, X Wang, X Guo

**Study Type** : Human Study

### Additional Links

**Diseases** : Childhood Chemical Exposures : CK(165) : AC(17), Childhood Cognitive Disorders : CK(316) : AC(27), Intelligence Quotient (IQ): Low/Impaired : CK(312) : AC(27), TSH: Elevated : CK(20) : AC(2)

**Problem Substances** : Fluoride : CK(1815) : AC(454), Iodine: Excess : CK(10) : AC(1)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Human cultured IMR-32 neuronal-like and U87 glial-like cells have different patterns of toxicity under fluoride exposure.

**Pubmed Data** : PLoS One. 2021 ;16(6):e0251200. Epub 2021 Jun 17. PMID: [34138870](#)

**Article Published Date** : Dec 31, 2020

**Authors** : Bruna Puty, Leonardo Oliveira Bittencourt, Iago Cesar Nogueira, Marília Afonso Rabelo Buzalaf, Edivaldo Herculano Oliveira, Rafael Rodrigues Lima

**Study Type** : In Vitro Study

### Additional Links

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Apoptotic : CK(278) : AC(120), Neurotoxic : CK(2838) : AC(702)

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## Impacts of fluoride neurotoxicity and mitochondrial dysfunction on cognition and mental health.

**Pubmed Data** : Int J Environ Res Public Health. 2021 Dec 7 ;18(24). Epub 2021 Dec 7. PMID: [34948493](#)

**Article Published Date** : Dec 06, 2021

**Authors** : Emily A Adkins, Kelly J Brunst

**Study Type** : Review

### Additional Links

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Neurodegenerative Diseases : CK(12159) : AC(4162)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Inorganic fluoride and functions of brain.

**Pubmed Data** : Crit Rev Toxicol. 2020 Jan ;50(1):28-46. Epub 2020 Feb 19. PMID: [32073339](#)



**Article Published Date** : Dec 31, 2019

**Authors** : N I Agalakova, O V Nadei

**Study Type** : Review

**Additional Links**

**Diseases** : [Cognitive Decline/Dysfunction](#) : CK(5061) : AC(1005), [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Neurotoxic](#) : CK(2838) : AC(702)

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## Iodine status modifies the association between fluoride exposure in pregnancy and preschool boys' intelligence.

**Pubmed Data** : Nutrients. 2022 Jul 16 ;14(14). Epub 2022 Jul 16. PMID: [35889877](#)

**Article Published Date** : Jul 15, 2022

**Authors** : Carly V Goodman, Meaghan Hall, Rivka Green, Jonathan Chevrier, Pierre Ayotte, Esperanza Angeles Martinez-Mier, Taylor McGuckin, John Krzeczowski, David Flora, Richard Hornung, Bruce Lanphear, Christine Till

**Study Type** : Human Study

**Additional Links**

**Substances** : [Iodine](#) : CK(182) : AC(32)

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Iodine Deficiency](#) : CK(110) : AC(18), [Learning disorders](#) : CK(517) : AC(155)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Neurotoxic](#) : CK(2838) : AC(702)

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## Low glucose utilization and neurodegenerative changes caused by sodium fluoride exposure in rat's developmental brain.

**Pubmed Data** : Neuromolecular Med. 2014 Mar ;16(1):94-105. Epub 2013 Aug 28. PMID: [23982469](#)

**Article Published Date** : Feb 28, 2014

**Authors** : Chunyang Jiang, Shun Zhang, Hongliang Liu, Zhizhong Guan, Qiang Zeng, Cheng Zhang, Rongrong Lei, Tao Xia, Zhenglun Wang, Lu Yang, Yihu Chen, Xue Wu, Xiaofei Zhang, Yushan Cui, Linyu Yu, Aiguo Wang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Memory Disorders](#) : CK(1570) : AC(514)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Neurotoxic](#) : CK(2838) : AC(702)

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## Low-to-moderate fluoride exposure was associated with dysfunction of cholinergic system for children.

**Pubmed Data** : Ecotoxicol Environ Saf. 2021 Nov 20 ;228:112959. Epub 2021 Nov 20. PMID: [34808511](#)

**Article Published Date** : Nov 19, 2021

**Authors** : Sumei Wang, Qian Zhao, Gaochun Li, Mengwei Wang, Hongliang Liu, Xingchen Yu, Jingwen Chen, Pei Li, Lixin Dong, Guoyu Zhou, Yushan Cui, Mengru Wang, Li Liu, Aiguo Wang

**Study Type** : Human Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Learning disorders](#) : CK(517) : AC(155)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Neurotoxic](#) : CK(2838) : AC(702)

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## Maternal exposure to drinking water throughout pregnancy fluoridated at the level of 0.7 mg/L was associated with poorer inhibitory control and cognitive flexibility.

**Pubmed Data** : Sci Total Environ. 2023 Sep 15 ;891:164322. Epub 2023 May 25. PMID: [37236475](#)

**Article Published Date** : Sep 14, 2023

**Authors** : Deborah Dewey, Gillian England-Mason, Henry Ntanda, Andrea J Deane, Mandakini Jain, Nadia Barnieh, Gerald

F Giesbrecht, Nicole Letourneau,

**Study Type** : Human Study

**Additional Links**

**Diseases** : [Developmental Disorder: Children](#) : CK(148) : AC(19), [Fluoride Toxicity](#) : CK(1389) : AC(376), [Prenatal Chemical Exposures](#) : CK(2428) : AC(530)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Neurotoxic](#) : CK(2838) : AC(702)

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## Naringin alleviates fluoride-induced neurological impairment.

**Pubmed Data** : Sci Total Environ. 2024 Oct 22:177073. Epub 2024 Oct 22. PMID: [39447898](#)

**Article Published Date** : Oct 21, 2024

**Authors** : Yuhui Du, Guoqing Wang, Bin Liu, Meng Guo, Xi Yan, Ming Dou, Fangfang Yu, Yue Ba, Guoyu Zhou

**Study Type** : Animal Study

**Additional Links**

**Substances** : [Citrus naringin](#) : CK(440) : AC(245)

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Pharmacological Actions** : [Anti-Apoptotic](#) : CK(4942) : AC(3051), [Neuroprotective Agents](#) : CK(17667) : AC(7641)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Neurotoxic](#) : CK(2838) : AC(702)

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## PRKAA1 induces aberrant mitophagy in a PINK1/Parkin-dependent manner, contributing to fluoride-induced developmental neurotoxicity.

**Pubmed Data** : Ecotoxicol Environ Saf. 2023 Apr 15 ;255:114772. Epub 2023 Mar 14. PMID: [36924562](#)

**Article Published Date** : Apr 14, 2023

**Authors** : Yanling Tang, Jingjing Zhang, Zeyu Hu, Wanjing Xu, Panpan Xu, Yue Ma, Hengrui Xing, Qiang Niu

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Neurodegenerative Diseases](#) : CK(12159) : AC(4162),

[Neurodevelopmental Disorders](#) : CK(470) : AC(85)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Apoptotic](#) : CK(278) : AC(120), [Neurotoxic](#) : CK(2838) : AC(702)

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## Potential role of fluoride in the etiopathogenesis of Alzheimer's disease.

**Pubmed Data** : Int J Mol Sci. 2018 Dec 9 ;19(12). Epub 2018 Dec 9. PMID: [30544885](#)

**Article Published Date** : Dec 08, 2018

**Authors** : Marta Goschorska, Irena Baranowska-Bosiacka, Izabela Gutowska, Emilia Metryka, Marta Skórka-Majewicz, Dariusz Chlubek

**Study Type** : Review

**Additional Links**

**Diseases** : [Alzheimer's Disease](#) : CK(4948) : AC(2148), [Fluoride Toxicity](#) : CK(1389) : AC(376), [Inflammation](#) : CK(15536) : AC(5279), [Oxidative Stress](#) : CK(13443) : AC(5499)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Neurotoxic](#) : CK(2838) : AC(702)

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## Prolonged fluoride exposure alters neurotransmission and oxidative stress in the zebrafish brain.

**Pubmed Data** : Neurotoxicology. 2022 Mar ;89:92-98. Epub 2022 Jan 20. PMID: [35065950](#)

**Article Published Date** : Feb 28, 2022

**Authors** : Eduardo Ronconi Dondossola, Suzielen Damin Pacheco, Sulingue Casagrande Visentin, Niuany Viel Mendes, Samira Leila Baldin, Henrique Teza Bernardo, Rahisa Scussel, Eduardo Pacheco Rico

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Oxidative Stress : CK(13443) : AC(5499)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Rats exposed to low iodine and high fluoride exhibit changes in brain proteins that may be associated with neurotoxicity.

**Pubmed Data** : Arch Toxicol. 2010 Apr 3. Epub 2010 Apr 3. PMID: [20364248](#)

**Article Published Date** : Apr 03, 2010

**Authors** : Yaming Ge, Ruiyan Niu, Jianhai Zhang, Jundong Wang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Cognitive Decline/Dysfunction : CK(5061) : AC(1005), Prenatal Nutrition: Learning/Intelligence of Offspring : CK(116) : AC(14)

**Problem Substances** : Fluoride : CK(1815) : AC(454)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Rutin attenuates neurobehavioral deficits, oxidative stress, neuro-inflammation and apoptosis in fluoride treated rats.

**Pubmed Data** : Neurosci Lett. 2018 Aug 24 ;682:92-99. Epub 2018 Jun 13. PMID: [29908257](#)

**Article Published Date** : Aug 23, 2018

**Authors** : Kpobari W Nkpa, Godspower I Onyeso

**Study Type** : Animal Study

**Additional Links**

**Substances** : Rutin : CK(460) : AC(221)

**Diseases** : Inflammation : CK(15536) : AC(5279), Lipid Peroxidation : CK(1901) : AC(774), Oxidative Stress : CK(13443) : AC(5499)

**Pharmacological Actions** : Anti-Apoptotic : CK(4942) : AC(3051), Antioxidants : CK(32218) : AC(14161), Neuroprotective Agents : CK(17667) : AC(7641)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## School children residing in area with higher than normal water fluoride level demonstrated more impaired development of intelligence.

**Pubmed Data** : J Indian Soc Pedod Prev Dent. 2015 ;33(4):307-11. PMID: [26381633](#)

**Article Published Date** : Dec 31, 2014

**Authors** : Shibu Thomas Sebastian, S Sunitha

**Study Type** : Human Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Intelligence Quotient (IQ): Low/Impaired : CK(312) : AC(27)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## Sirt3-mediated mitochondrial dysfunction is involved in fluoride-induced cognitive deficits.

**Pubmed Data** : Food Chem Toxicol. 2021 Dec ;158:112665. Epub 2021 Nov 12. PMID: [34780879](#)

**Article Published Date** : Nov 30, 2021

**Authors** : Dongmei Wang, Luyang Cao, Shunji Pan, Gang Wang, Lewei Wang, Ningyao Cao, Xueqin Hao

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Cognitive Decline/Dysfunction : CK(5061) : AC(1005), Cognitive Decline/Dysfunction : CK(5061) : AC(1005)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

## Sodium fluoride affects zebrafish behaviour and alters mRNA expressions of biomarker genes in the brain.

**Pubmed Data** : Environ Toxicol Pharmacol. 2015 Sep ;40(2):352-9. Epub 2015 Jul 14. PMID: [26245810](#)

**Article Published Date** : Aug 31, 2015

**Authors** : Debdip Mukhopadhyay, Pooja Priya, Ansuman Chattopadhyay

**Study Type** : Animal Study

**Additional Links**

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Neurotoxic](#) : CK(2838) : AC(702)

## Synergistic oxidative impact of aluminum chloride and sodium fluoride exposure during early stages of brain development.

**Pubmed Data** : Environ Sci Pollut Res Int. 2019 Feb 20. Epub 2019 Feb 20. PMID: [30788699](#)

**Article Published Date** : Feb 19, 2019

**Authors** : Amal A Kinawy

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Aluminum Toxicity](#) : CK(685) : AC(308), [Brain: Oxidative Stress](#) : CK(635) : AC(345), [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Additional Keywords** : [Synergistic Toxicity](#) : CK(226) : AC(109)

**Problem Substances** : [Aluminum Chloride](#) : CK(171) : AC(92), [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Neurotoxic](#) : CK(2838) : AC(702)

## Taurine protected against sodium fluoride induced neurotoxicity.

**Pubmed Data** : Chem Biol Interact. 2016 Nov 11 ;261:1-10. Epub 2016 Nov 11. PMID: [27840156](#)

**Article Published Date** : Nov 10, 2016

**Authors** : Isaac A Adedara, Amos O Abolaji, Umar F Idris, Bolanle F Olabiyi, Esther M Onibiyo, Teminijesu D Ojuade, Ebenezer O Farombi

**Study Type** : Animal Study

**Additional Links**

**Substances** : [Taurine](#) : CK(246) : AC(71)

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Pharmacological Actions** : [Neuroprotective Agents](#) : CK(17667) : AC(7641)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Neurotoxic](#) : CK(2838) : AC(702)

## The present study reveals that exposure to fluoride in early stages of rat development leads to impairment of memory in young offspring.

**Pubmed Data** : Int J Toxicol. 2019 ;38(5):405-414. Epub 2019 Jun 20. PMID: [31220985](#)

**Article Published Date** : Dec 31, 2018

**Authors** : Mariana Bartos, Fernanda Gumilar, Cristina E Gallegos, Cristina Bras, Sergio Dominguez, Liliana M Cancela, Alejandra Minetti

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Oxidative Stress](#) : CK(13443) : AC(5499), [Prenatal Chemical Exposures](#) : CK(2428) : AC(530)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Neurotoxic](#) : CK(2838) : AC(702)

## The toxic effects of fluoride on the central nervous system may be related to the activation of microglia cells.

**Pubmed Data** : Mediators Inflamm. 2012 ;2012:102954. Epub 2012 Aug 13. PMID: [22933830](#)

**Article Published Date** : Jan 01, 2012

**Authors** : Xi Shuhua, Liu Ziyou, Yan Ling, Wang Fei, Guifan Sun

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : Brain: Microglial Activation : CK(192) : AC(114), Neurodegenerative Diseases : CK(12159) : AC(4162)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702), Oxidant : CK(646) : AC(246)

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## These findings indicate that chronic consumption of high concentrations of fluoride leads to a decrease in nerve conduction velocity.

**Pubmed Data** : Int J Toxicol. 2024 Nov 6:10915818241297082. Epub 2024 Nov 6. PMID: [39501888](#)

**Article Published Date** : Nov 05, 2024

**Authors** : Fernanda Marlen Enríquez-Sánchez, Miguel Ángel López-Vázquez, María Esther Olvera-Cortés, Liliana Valdez-Jiménez, Paola Trinidad Villalobos-Gutiérrez, María Isabel Pérez-Vega

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702), Neurotransmitter Interference : CK(32) : AC(8)

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## These findings provide deeper insights into roles of sodium fluoride in neuron damage.

**Pubmed Data** : Chemosphere. 2017 Jun 30 ;185:589-594. Epub 2017 Jun 30. PMID: [28719878](#)

**Article Published Date** : Jun 29, 2017

**Authors** : Lingli Chen, Hongmei Ning, Zhihong Yin, Xiaochao Song, Yongchao Feng, Hao Qin, Yi Li, Jundong Wang, Yaming Ge, Wenkui Wang

**Study Type** : In Vitro Study

**Additional Links**

**Additional Keywords** : Dose Response : CK(1769) : AC(700)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## This study has empirically demonstrated an association between more widespread exposure to fluoridated water and increased ADHD prevalence in U.S. children and adolescents.

**Pubmed Data** : Environ Health. 2015 ;14(1):17. Epub 2015 Feb 27. PMID: [25890329](#)

**Article Published Date** : Dec 31, 2014

**Authors** : Ashley J Malin, Christine Till

**Study Type** : Human Study

**Additional Links**

**Diseases** : Attention Deficit Hyperactivity Disorder : CK(535) : AC(67)

**Additional Keywords** : Toxic Substance Synergy : CK(29) : AC(7)

**Problem Substances** : Lead : CK(684) : AC(227), Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702)

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## This study suggests that excitotoxicity may be the central mechanism of autism spectrum disorders and that excitotoxins like aluminum, fluoride, and mercury may exacerbate excitotoxicity.

**Pubmed Data** : Curr Med Chem. 2009 ;16(2):157-70. PMID: [19149568](#)

**Article Published Date** : Jan 01, 2009

**Authors** : R L Blaylock, A Strunecka

**Study Type** : Review

**Additional Links**

**Diseases** : Autism : CK(942) : AC(162), Autism Spectrum Disorders : CK(3676) : AC(557), Brain: Microglial Activation : CK(192) : AC(114), Heavy Metal Toxicity : CK(2713) : AC(1019)

**Additional Keywords** : Heavy Metals and Autism : CK(89) : AC(15), Vaccine Research : CK(571) : AC(113)

**Problem Substances** : Aluminum : CK(1061) : AC(349), Fluoride : CK(1815) : AC(454), Mercury : CK(885) : AC(213)

**Adverse Pharmacological Actions** : Excitotoxic : CK(40) : AC(10), Neurotoxic : CK(2838) : AC(702)

## Neurotransmitter Interference (AC 1) (CK 2)

**These findings indicate that chronic consumption of high concentrations of fluoride leads to a decrease in nerve conduction velocity.**

**Pubmed Data** : Int J Toxicol. 2024 Nov 6:10915818241297082. Epub 2024 Nov 6. PMID: [39501888](#)

**Article Published Date** : Nov 05, 2024

**Authors** : Fernanda Marlen Enríquez-Sánchez, Miguel Ángel López-Vázquez, María Esther Olvera-Cortés, Liliana Valdez-Jiménez, Paola Trinidad Villalobos-Gutiérrez, María Isabel Pérez-Vega

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702), Neurotransmitter Interference : CK(32) : AC(8)

## Oxidant (AC 9) (CK 12)

**"Decreased in vitro fertility in male rats exposed to fluoride-induced oxidative stress damage and mitochondrial transmembrane potential loss."**

**Pubmed Data** : Toxicol Appl Pharmacol. 2008 Aug 1 ;230(3):352-7. Epub 2008 Mar 28. PMID: [18455746](#)

**Article Published Date** : Aug 01, 2008

**Authors** : Jeannett A Izquierdo-Vega, Manuel Sánchez-Gutiérrez, Luz María Del Razo

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Infertility: Male : CK(1668) : AC(424), Oxidative Stress : CK(13443) : AC(5499), Sperm Quality: Low : CK(611) : AC(121)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Anti-Fertility : CK(112) : AC(21), Oxidant : CK(646) : AC(246)

**Focus on cognitive impairment induced by excessive fluoride: An update review.**

**Pubmed Data** : Neuroscience. 2024 Oct 18 ;558:22-29. Epub 2024 Aug 11. PMID: [39137871](#)



**Article Published Date** : Oct 18, 2024

**Authors** : Yuhang Zhang, Yanhui Gao, Xiaona Liu

**Study Type** : Review

**Additional Links**

**Diseases** : Cognitive Decline/Dysfunction : CK(5061) : AC(1005), Mitochondrial Dysfunction : CK(618) : AC(262), Neurotoxicity : CK(49) : AC(27), Oxidative Stress : CK(13443) : AC(5499)

**Problem Substances** : Fluoride : CK(1815) : AC(454)

**Adverse Pharmacological Actions** : Oxidant : CK(646) : AC(246)

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## Quercetin has a protective effect against sodium fluoride induced oxidative stress in rat's heart.

**Pubmed Data** : Food Funct. 2012 Feb 8. Epub 2012 Feb 8. PMID: [22314573](#)

**Article Published Date** : Feb 08, 2012

**Authors** : Seyed Fazel Nabavi, Seyed Mohammad Nabavi, Morteza Mirzaei, Akbar Hajizadeh Moghaddam

**Study Type** : Animal Study

**Additional Links**

**Substances** : Quercetin : CK(1864) : AC(847)

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376)

**Pharmacological Actions** : Antioxidants : CK(32218) : AC(14161), Cardioprotective : CK(8685) : AC(2877)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Cardiotoxic : CK(1168) : AC(209), Oxidant : CK(646) : AC(246)

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## Sodium fluoride causes oxidative stress and apoptosis in cementoblasts.

**Pubmed Data** : Chem Biol Interact. 2018 Aug 18 ;294:34-39. Epub 2018 Aug 18. PMID: [30130527](#)

**Article Published Date** : Aug 17, 2018

**Authors** : Jing Ni, Yiming Li, Wu Zhang, Rong Shu, Zhe Zhong

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Gingivitis : CK(595) : AC(86)

**Additional Keywords** : Risk Factors : CK(14728) : AC(2072)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Apoptotic : CK(278) : AC(120), Oxidant : CK(646) : AC(246)

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## Sodium fluoride exposure compromises hair follicle growth and accelerates programmed cell death.

**Pubmed Data** : Biol Trace Elem Res. 2010 Jan 5. Epub 2010 Jan 5. PMID: [20049553](#)

**Article Published Date** : Jan 05, 2010

**Authors** : Zheng-hui Wang, Xiao-li Li, Zhuang-qun Yang, Min Xu

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : Hair Loss : CK(763) : AC(143), Hair Quality Problems : CK(32) : AC(5)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Apoptotic : CK(278) : AC(120), Oxidant : CK(646) : AC(246)

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## Sodium fluoride may interfere with odontogenesis by inhibiting antioxidative enzymes and inducing programmed cell death.

**Pubmed Data** : J Oral Pathol Med. 2010 Aug 3. Epub 2010 Aug 3. PMID: [20738751](#)

**Article Published Date** : Aug 03, 2010

**Authors** : L F Jacinto-Alemán, J C Hernández-Guerrero, C Trejo-Solís, M D Jiménez-Farfán, A M Fernández-Presas

**Study Type** : In Vitro Study

**Additional Links**

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Apoptotic : CK(278) : AC(120), Oxidant : CK(646) : AC(246)

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## Sodium fluoride produces alterations in erythrocytes of the male rat through increased oxidative stress.

**Pubmed Data** : Int J Mol Sci. 2010;11(6):2443-52. Epub 2010 Jun 11. PMID: [20640162](#)

**Article Published Date** : Jan 01, 2010

**Authors** : José A Morales-González, José Gutiérrez-Salinas, Liliana García-Ortiz, María Del Carmen Chima-Galán, Eduardo Madrigal-Santillán, Jaime Esquivel-Soto, César Esquivel-Chirino, Manuel García-Luna Y González-Rubio

**Study Type** : Animal Study

**Additional Links**

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Oxidant : CK(646) : AC(246)

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## The toxic effects of fluoride on the central nervous system may be related to the activation of microglia cells.

**Pubmed Data** : Mediators Inflamm. 2012 ;2012:102954. Epub 2012 Aug 13. PMID: [22933830](#)

**Article Published Date** : Jan 01, 2012

**Authors** : Xi Shuhua, Liu Ziyou, Yan Ling, Wang Fei, Guifan Sun

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : Brain: Microglial Activation : CK(192) : AC(114), Neurodegenerative Diseases : CK(12159) : AC(4162)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Neurotoxic : CK(2838) : AC(702), Oxidant : CK(646) : AC(246)

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## These results suggest that fluoride generates reactive species that cause extensive oxidative modifications in human red blood cells.

**Pubmed Data** : Ecotoxicol Environ Saf. 2021 Jan 15 ;208:111611. Epub 2020 Nov 10. PMID: [33396131](#)

**Article Published Date** : Jan 14, 2021

**Authors** : Nikhil Maheshwari, Neha Qasim, Ruhi Anjum, Riaz Mahmood

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Oxidant : CK(646) : AC(246)

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## P-selectin upregulation (AC 1) (CK 2)

### Fluoride and arsenic exhibit cardiotoxic properties related to their pro-inflammatory effect.

**Pubmed Data** : Arch Toxicol. 2012 Mar 16. Epub 2012 Mar 16. PMID: [22422340](#)

**Article Published Date** : Mar 16, 2012

**Authors** : Yanqin Ma, Ruiyan Niu, Zilong Sun, Jinming Wang, Guangying Luo, Jianhai Zhang, Jundong Wang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Cardiovascular Diseases : CK(17124) : AC(2826)

**Problem Substances** : Arsenic : CK(595) : AC(181), Fluoride : CK(1815) : AC(454)



**Adverse Pharmacological Actions** : Cardiotoxic : CK(1168) : AC(209), Inflammatory : CK(541) : AC(169), Interleukin-6 up-regulation : CK(41) : AC(10), Interleukin-8 up-regulation : CK(2) : AC(1), MCP-1 (CCL2) up-regulation : CK(7) : AC(2), P-selectin upregulation : CK(2) : AC(1), Vascular Cell Adhesion Molecule-1 (VCAM-1) Up-Regulation : CK(4) : AC(2)

## Renotoxic (AC 4) (CK 15)

### Evaluation of kidney injury biomarkers in an adult Mexican population environmentally exposed to fluoride and low arsenic levels.

**Pubmed Data** : Toxicol Appl Pharmacol. 2018 Aug 1 ;352:97-106. Epub 2018 May 22. PMID: [29800643](#)

**Article Published Date** : Jul 31, 2018

**Authors** : Monica I Jiménez-Córdova, Mariana Cárdenas-González, Guadalupe Aguilar-Madrid, Luz C Sanchez-Peña, Ángel Barrera-Hernández, Iván A Domínguez-Guerrero, Carmen González-Horta, Olivier C Barbier, Luz M Del Razo

**Study Type** : Human Study

**Additional Links**

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Kidney Damage: Chemically-Induced : CK(542) : AC(270)

**Additional Keywords** : Synergistic Toxicity : CK(226) : AC(109)

**Problem Substances** : Arsenic : CK(595) : AC(181), Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Renotoxic : CK(56) : AC(20)

### Exposure to fluoride induces apoptosis in the liver, kidney, and heart of *Xenopus laevis*.

**Pubmed Data** : Acta Histochem. 2023 Apr ;125(3):151999. Epub 2023 Mar 9. PMID: [36905872](#)

**Article Published Date** : Mar 31, 2023

**Authors** : Siting Wang, Hongmei Ning, Liushuai Hua, Fei Ren, Lingli Chen, Zhisheng Ma, Rongbo Li, Yaming Ge, Zhihong Yin

**Study Type** : Animal Study

**Additional Links**

**Diseases** : Chemically-Induced Liver Damage : CK(2167) : AC(1069), Fluoride Toxicity : CK(1389) : AC(376), Kidney Damage: Chemically-Induced : CK(542) : AC(270)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Hepatotoxic : CK(400) : AC(124), Renotoxic : CK(56) : AC(20)

### Sodium fluoride induces apoptosis in the kidney of rats through caspase-mediated pathways and DNA damage.

**Pubmed Data** : J Physiol Biochem. 2014 Sep ;70(3):857-68. Epub 2014 Aug 27. PMID: [25158646](#)

**Article Published Date** : Aug 31, 2014

**Authors** : Guo Hua Song, Ji Ping Gao, Chun Fang Wang, Chao Yang Chen, Xiao Yan Yan, Min Guo, Yu Wang, Fu Bing Huang

**Study Type** : Animal Study

**Additional Links**

**Diseases** : DNA damage : CK(2255) : AC(824), Fluoride Toxicity : CK(1389) : AC(376), Fluorosis : CK(262) : AC(42), Kidney Damage: Chemically-Induced : CK(542) : AC(270)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Apoptotic : CK(278) : AC(120), Renotoxic : CK(56) : AC(20)

### Sodium fluoride induces nephrotoxicity via oxidative stress-regulated mitochondrial SIRT3 signaling pathway.

**Pubmed Data** : Sci Rep. 2017 Apr 6 ;7(1):672. Epub 2017 Apr 6. PMID: [28386112](#)

**Article Published Date** : Apr 05, 2017

**Authors** : Chao Song, Beibei Fu, Jingcheng Zhang, Jiamin Zhao, Mengke Yuan, Wei Peng, Yong Zhang, Haibo Wu

**Study Type** : In Vitro Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Kidney Damage: Chemically-Induced](#) : CK(542) : AC(270), [Oxidative Stress](#) : CK(13443) : AC(5499)

**Problem Substances** : [Fluoride](#) : CK(1815) : AC(454), [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Renotoxic](#) : CK(56) : AC(20)

## Teratogenic (AC 4) (CK 8)

### Aloe vera protects against fluoride-induced teratogenic effects during pre- and postnatal development in mice.

**Pubmed Data** : Environ Sci Pollut Res Int. 2022 Sep ;29(42):63577-63587. Epub 2022 Apr 23. PMID: [35460489](#)

**Article Published Date** : Aug 31, 2022

**Authors** : Priyanka Mathur, Shilpa Choudhary, Pradeep Bhatnagar

**Study Type** : Animal Study

**Additional Links**

**Substances** : [Aloe Vera](#) : CK(878) : AC(253)

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376), [Prenatal Chemical Exposures](#) : CK(2428) : AC(530)

**Problem Substances** : [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Teratogenic](#) : CK(325) : AC(66)

### Fluoride exposure over several generations results in adverse histopathological and biochemical changes in lung tissue.

**Pubmed Data** : J Appl Toxicol. 2003 Nov-Dec;23(6):437-46. PMID: [14635268](#)

**Article Published Date** : Nov 01, 2003

**Authors** : Gülsen Aydin, Ekrem Çiçek, Mehmet Akdoğan, Osman Gökalp

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Fluoride Toxicity](#) : CK(1389) : AC(376)

**Problem Substances** : [Fluoride](#) : CK(1815) : AC(454), [Sodium Fluoride](#) : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : [Teratogenic](#) : CK(325) : AC(66)

### Low levels of selenium, fluoride and arsenic are toxic to rat embryos.

**Pubmed Data** : Wei Sheng Yan Jiu. 1999 Mar 30;28(2):74-6. PMID: [11939006](#)

**Article Published Date** : Mar 30, 1999

**Authors** : Y Li, M Sun, D Wu, X Chen

**Study Type** : Animal Study

**Additional Links**

**Diseases** : [Birth Defects](#) : CK(267) : AC(52), [Prenatal Chemical Exposures](#) : CK(2428) : AC(530)

**Additional Keywords** : [Drug Synergy](#) : CK(389) : AC(174)

**Problem Substances** : [Arsenic](#) : CK(595) : AC(181), [Fluoride](#) : CK(1815) : AC(454), [Sodium Selenate](#) : CK(11) : AC(8), [Sodium Selenite](#) : CK(23) : AC(16)

**Adverse Pharmacological Actions** : [Teratogenic](#) : CK(325) : AC(66)

### Sodium flouride exposure during pregnancy may interfere with normal

## development and increase the risk of neurological and psychiatric disorders in adulthood.

**Pubmed Data** : Eur Rev Med Pharmacol Sci. 2010 Jun;14(6):507-12. PMID: [20712257](#)

**Article Published Date** : Jun 01, 2010

**Authors** : P Flace, V Benagiano, D Vermesan, R Sabatini, A M Inchingolo, A Inchingolo, P Auteri, G Ambrosi, A Tarullo, R Cagiano

**Study Type** : Animal Study

### Additional Links

**Diseases** : Fluoride Toxicity : CK(1389) : AC(376), Huntington Disease : CK(222) : AC(103), Obsessive-Compulsive Disorder : CK(421) : AC(77), Prenatal Chemical Exposures : CK(2428) : AC(530), Schizophrenia : CK(1080) : AC(191), Tourette Syndrome : CK(207) : AC(30)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Genotoxic : CK(545) : AC(184), Teratogenic : CK(325) : AC(66)

## Tumor necrosis factor $\alpha$ (TNF $\alpha$ ) up-regulation (AC 1) (CK 1)

### Expression of SDF-1/CXCR4 and related inflammatory factors in sodium fluoride-treated hepatocytes.

**Pubmed Data** : PLoS One. 2024 ;19(6):e0302530. Epub 2024 Jun 21. PMID: [38905184](#)

**Article Published Date** : Dec 31, 2023

**Authors** : Rui Yang, Hongting Shen, Mingjun Wang, Yaqian Zhao, Shiling Zhu, Hong Jiang, Yanan Li, Guanglan Pu, Xun Chen, Ping Chen, Qing Lu, Jing Ma, Qiang Zhang

**Study Type** : In Vitro Study

### Additional Links

**Diseases** : Chemically-Induced Liver Damage : CK(2167) : AC(1069), Fluoride Toxicity : CK(1389) : AC(376), Inflammation : CK(15536) : AC(5279)

**Problem Substances** : Sodium Fluoride : CK(1446) : AC(393)

**Adverse Pharmacological Actions** : Interleukin-1 up-regulation : CK(8) : AC(3), Interleukin-6 up-regulation : CK(41) : AC(10), Tumor necrosis factor $\alpha$  (TNF $\alpha$ ) up-regulation : CK(65) : AC(11)

## Vascular Cell Adhesion Molecule-1 (VCAM-1) Up-Regulation (AC 1) (CK 2)

### Fluoride and arsenic exhibit cardiotoxic properties related to their pro-inflammatory effect.

**Pubmed Data** : Arch Toxicol. 2012 Mar 16. Epub 2012 Mar 16. PMID: [22422340](#)

**Article Published Date** : Mar 16, 2012

**Authors** : Yanqin Ma, Ruiyan Niu, Zilong Sun, Jinming Wang, Guangying Luo, Jianhai Zhang, Jundong Wang

**Study Type** : Animal Study

### Additional Links

**Diseases** : Cardiovascular Diseases : CK(17124) : AC(2826)

**Problem Substances** : Arsenic : CK(595) : AC(181), Fluoride : CK(1815) : AC(454)

**Adverse Pharmacological Actions** : Cardiotoxic : CK(1168) : AC(209), Inflammatory : CK(541) : AC(169), Interleukin-6 up-regulation : CK(41) : AC(10), Interleukin-8 up-regulation : CK(2) : AC(1), MCP-1 (CCL2) up-regulation : CK(7) : AC(2), P-selectin upregulation : CK(2) : AC(1), Vascular Cell Adhesion Molecule-1 (VCAM-1) Up-Regulation : CK(4) : AC(2)

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Please have a read of the memorandum below. There is compelling information that might influence the council to abolish water fluoridation. We know the board cares deeply about the residents and have only good intentions for their health and well-being. New information should be weighed as it appears the potential harm to citizens as well as the liability to **the City of North Miami Beach** may be significant.

Key items contemplated:

- Sept. 24<sup>th</sup> Federal Judge ruling
- FL Statute 381.026
- FL Statute 859.01

## MEMORANDUM

**TO:** **NMB Mayor and Commissioners**

**FROM:** Scott Kiley

**DATE:** Jan 5th, 2024

**RE:** Legal Analysis of Water Fluoridation Under Florida Statute 859.01 (Poisoning Food or Water) and Florida Statute 381.026 (Informed Consent)

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## EXECUTIVE SUMMARY

This memorandum presents an updated analysis of the **legal implications of water fluoridation** in **NMB, Florida**, incorporating recent findings from **Federal Judge Edward M. Chen's September 24, 2024 ruling**. The ruling concludes that **fluoride exposure** is associated with **neurotoxicity**, specifically **reduced IQ in children**, a potentially severe adverse effect. These findings provide further support for an immediate **pause** in the City's water fluoridation program, given the heightened risks to public health and legal exposure under **Florida Statutes 859.01** (Poisoning Food or Water) and **381.026** (Informed Consent for Medical Treatment). I recommend that the City immediately reconsider its fluoridation practices pending a thorough legal and health risk review.

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## LEGAL FRAMEWORK

### A. Key Findings from Federal Judge Chen's Ruling

In the **September 24, 2024 ruling**, Judge **Edward M. Chen** of the U.S. District Court for the Northern District of California concluded that:

#### 1. Fluoride Exposure Linked to Neurotoxicity:

- The court found that **exposure to fluoride**—as used in **water fluoridation**—is associated with the **adverse effect** of **reduced IQ** in children, particularly **boys**.
- The ruling **does not require proof of direct causation** but instead identifies the **association** between fluoride exposure and adverse health effects (i.e., neurotoxicity).

- The **hazard identification step** was satisfied, with exposure to fluoride being linked to a significant public health concern: **neurodevelopmental damage**, including reductions in **IQ**.
2. **Implications for Public Health:**
- The court highlighted that **neurotoxicity**—particularly in vulnerable populations like children—poses an **unreasonable health risk**.
  - **Key finding:** Judge Chen emphasized that **exposure to fluoride** presents a **hazard** in terms of public health, particularly for **susceptible populations**.

Given these findings, the city’s current practice of **fluoridating drinking water** introduces a **health risk** that could be deemed unlawful under **Florida Statutes 859.01** and **381.026** (Informed Consent), which address the administration of potentially harmful substances to the public.

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## B. Updated Legal and Public Health Analysis

1. **Florida Statute 859.01: Poisoning Food or Water**
  - **Violation of Statutory Duty:** The updated findings in Judge Chen’s ruling bolster the argument that the practice of **water fluoridation** violates **Florida Statute 859.01**. If fluoridation chemicals are associated with **neurotoxicity**, **NMB** could face **legal challenges** for **introducing harmful substances** into the public water supply. This poses an **unreasonable risk to health**, particularly for **children**—a population that is specifically noted in the ruling as being vulnerable to reduced IQ from fluoride exposure.
  - The ruling’s identification of **fluoride exposure** as a **hazardous** chemical that causes **neurodevelopmental harm** can be directly applied to the **poisoning** statute. In light of the ruling, continuing fluoridation may expose the city to significant **legal liability** under this statute, particularly in relation to the risks posed to **children**.
2. **Florida Statute 381.026: Informed Consent for Medical Treatment**
  - **Fluoridation as Medical Treatment:** The court’s finding that **fluoride exposure** is linked to significant **health risks**—including neurotoxicity in children—supports the argument that **fluoridation** constitutes a **medical treatment** aimed at **preventing tooth decay**. Since it involves **exposure to a substance** that can cause harm (neurotoxicity, reduced IQ), and is provided **without individual consent**, this could be a violation of the **Florida Patient Bill of Rights** under **Statute 381.026**.
  - **Informed Consent:** As fluoridation introduces an **unreasonably risky substance** into the water supply, municipalities may be seen as violating individuals’ rights to make an informed choice about medical treatments. The **Florida Patient Bill of Rights** stipulates that a person must consent to a medical treatment, and this applies to interventions like fluoridation that could cause adverse health effects, particularly when the risks are now more clearly understood.

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## RISK ANALYSIS

1. **Increased Public Health Risk:**

With the **new evidence** of neurotoxic risks, especially to **children**, there is a clear public health risk in continuing the practice of fluoridation. The **association** between fluoride exposure and **reduced IQ** requires a serious reassessment of the city's responsibilities to its residents, particularly vulnerable groups like infants and young children.

2. **Legal Exposure and Liability:**

- Based on Judge Chen's ruling, the City could be exposed to substantial **liability** under both **Florida Statutes 859.01** and **381.026**. The risk of **neurotoxicity** associated with fluoride compounds—especially at the levels used in public water supplies—poses a **hazard** that could lead to **legal action**.
- The city could face lawsuits from residents or advocacy groups seeking redress for **harmful medical treatments** being administered without informed consent. **Parents** of affected children could argue that they were unknowingly exposing their children to a **neurotoxic substance** without the ability to opt out.

3. **Municipal Authority and Liability:**

- The **city council** may not have the authority to impose a **medical treatment** on the public in this manner, especially when such treatments involve **health risks**. The **Florida Patient Bill of Rights** and recent legal rulings highlight the need for **informed consent** in matters involving potential health harm.
- Given these risks, there may be growing pressure on the city council to **immediately suspend fluoridation** until a more thorough legal and public health analysis is conducted.

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## RECOMMENDATION

Based on the new findings from the **September 2024 federal court ruling**, I recommend that **the City of NMB**:

1. **Continue the pause of water fluoridation program** pending a **comprehensive legal review**.
  2. **Conduct a thorough legal analysis** of compliance with both **Florida Statute 859.01** (Poisoning Food or Water) and **Florida Statute 381.026** (Informed Consent for Medical Treatment).
  3. **Review potential health risks** associated with fluoridation, particularly the newly identified **neurotoxic effects** linked to fluoride exposure in children.
  4. Develop protocols for managing public inquiries and mitigating legal risks, including clear **risk communication strategies** to ensure transparency with residents.
- 

## Conclusion

Incorporating **Judge Chen's September 24, 2024 ruling** significantly strengthens the case against **water fluoridation** in **NMB**, Florida. The federal court's finding that fluoride is associated with **neurotoxic effects**, particularly **reduced IQ** in children, amplifies concerns about the public health risks of fluoridation. These findings support the recommendation to abolish the fluoridation program and a careful reassessment of the legal risks under **Florida Statutes 859.01** and **381.026**, which could expose the city to liability for administering a medical treatment without informed consent and exposing residents to hazardous substances.

**Scott Kiley**

Associate Director of Local Advocacy

Stand for Health Freedom

Cell: 847-366-7457

<https://twitter.com/SKtruthseeker>

[sjkiley@standforhealthfreedom.com](mailto:sjkiley@standforhealthfreedom.com)

[www.standforhealthfreedom.com](http://www.standforhealthfreedom.com)

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HEALTH FREEDOM

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## Justification for ending water fluoridation

(references at the end)

1. **Federal judge Chen's ruling** finding Sept. 24<sup>th</sup>, 2024, fluoridation of water at .7 mg/l the level presently considered optimal in the US poses an unreasonable risk of reduced IQ in children. This was a 7-year court battle where experts were brought in from all sides. The EPA has been ordered to eliminate the risk.
2. **Surgeon General Dr. Joseph Ladapo** Nov. 22<sup>nd</sup>, 2024 provided guidance against public water fluoridation. Dr. Ladapo cites numerous studies confirming fluoride exposure was associated with loss of IQ, thyroid issues, ADHD, skeletal fluorosis, sleep cycle disturbances, and premature menarche. He calls water fluoridation "public health malpractice."
3. **The August 2024 NTP** (national toxicology program) HHS found neuro-developmental issues at 1.5 mg/l, twice the level most cities provide; however, they state that risks to lowering IQ may be present below 1.5 mg/l.
4. **The EPA**, when it establishes a level of harm like with fluoride, sets a threshold below that level of harm, usually 10x, 30x, or 100x below the known level of harm. With fluoride, by the EPA's own threshold standard, community fluoridation should be at .15mg/L or less. This is picking the lowest of the 3 safety multipliers. Most water already has this level of fluoride present, which means communities should end fluoridation.
5. **Cannot dose fluoride.** It comes from many sources besides water fluoridation. Babies who consume mostly liquid are in grave danger of overexposure.
  - Crosses the placenta barrier & Crosses the blood-brain barrier
  - Countless studies now show neuro-developmental issues with a reduction in IQ of 5 to 10 points.
6. **Fluoride is present to treat people** unlike chlorine which is present to treat the water. The FDA says, if a treatment is to prevent a disease, in this case dental decay, it is a medical treatment. Medicine is being delivered via drinking water. This is totally unethical and unlawful in Florida. No informed consent given, No risk benefit analysis, No ability to opt out, and Violates FL statute 381.026
7. **Material safety data sheets:** What is added to the community water is hydrofluorosilicic acid. This toxic chemical compound is captured from pollution control stacks via pollution control water scrubbers. This toxin builds in a body over time and wreaks havoc on a person's health. Hydrofluorosilicic acid is not naturally occurring fluoride. Just review the MSDS sheets on file with your water department. In addition, this industrial waste is known to contain other toxic impurities such as arsenic and lead. It is adding a poison. The jig is up! This practice must end.
8. **Most of the world rejects water fluoridation:**  
The US fluoridates more citizens than the rest of the world combined with little to no statistical difference in dental health. In Florida, more than 20 counties do not fluoridate their water. Over the past year alone, an additional six cities and counties have ended water fluoridation. Marco Island, for example, has never added fluoride. Are these communities experiencing a crisis of chronic dental decay? **The answer is no.**

## 9. Low-income communities:

- Statistics prove highly fluoridated low-income areas still report a severe oral health crisis.
- Low-income citizens cannot afford to buy unfluoridated water.
- Low-income communities cannot afford to buy expensive filtration systems.
- Lower body weight means higher dosing of fluoride. Babies & children suffer most.
- Those most likely to suffer from poor nutrition, and thus more likely to be more vulnerable to fluoride's toxic effects, are the poor, who, unfortunately, are the very people being targeted by new fluoridation programs.
- Tooth decay reflects a lack of education and a greater need for access to dental care, not low fluoride intake.
- This most vulnerable population is not receiving informed consent, a risk/benefit analysis and the ability to opt out.

10. Removing fluoride from the city water will not prevent citizens from getting prescribed fluoride treatment from their dentist if their dentist suggests and approves such treatment and if the patient desires such treatment. Fluoride treatment remains available.

11. Florida statute 381.026: "This is the Florida Patient Bill of Rights," which requires informed consent, a risk/benefit analysis, and the ability to opt-out. Elected officials are not doctors. Fluoride is a medical treatment put in the water to treat tooth decay.

### **Conclusion:**

It is my belief that any city council or county commission can end water fluoridation immediately. Delaying brings additional harm. With the guidance from our Surgeon General Dr. Joseph Ladapo, the justification to end is obvious. Pause now. Invite public debate if you wish **after** the fluoridation has ended. The public's overwhelming desire (like the rest of the world) is to not put a neurotoxin in drinking water! **Pause now out of an abundance of caution for your citizens.** Should there be a change of heart to add back a poison to the drinking water, the city councilors or commissioners can always add it back. This will not happen.

### **Scott Kiley**

Associate Director of Local Advocacy  
Stand for Health Freedom  
Cell: 847-366-7457

<https://twitter.com/SKtruthseeker>

[sjkiley@standforhealthfreedom.com](mailto:sjkiley@standforhealthfreedom.com)

[www.standforhealthfreedom.com](http://www.standforhealthfreedom.com)

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Judge Chen's ruling

<https://storage.courtlistener.com/recap/gov.uscourts.cand.310380/gov.uscourts.cand.310380.445.0.pdf>

Dr. Ladapo guidance

<https://www.floridahealth.gov/newsroom/2024/11/20241122-fluoridation-guidance.pr.html>

NTP HHS August report

<https://ntp.niehs.nih.gov/publications/monographs/mgraph08>

<https://fluoridealert.org/news/what-does-the-national-toxicology-program-say-about-fluoride/>

Fluoride is a drug

<https://fluoridealert.org/researchers/fda/drug/>

Dosage is a huge issue

<https://fluoridealert.org/?s=dosage&origin=home>

EPA safety threshold

<https://www.youtube.com/watch?v=hRdBE5yRVAc&list=PLVtKbGyTdKsHcYzk7qZZrYctoAnbgMqT&index=1>

Other countries re: fluoridation

<https://fluoridealert.org/content/fan-ga-the-status-of-fluoridation-in-other-countries/>

FL statute 381.026

<https://flsenate.gov/Laws/Statutes/2021/0381.026>

hydrofluorosilicic acid

<https://fluoridealert.org/articles/fluoridation-chemicals/>

Low income communities

[https://lulac.org/advocacy/resolutions/2011/resolution\\_Civil\\_Rights\\_Violation\\_Regarding\\_Forced\\_Medicat ion/index.html](https://lulac.org/advocacy/resolutions/2011/resolution_Civil_Rights_Violation_Regarding_Forced_Medicat ion/index.html)

**Safety Data Sheet**  
**HYDROFLUOSILICIC ACID SOLUTION**

Version 1.5

Revision Date: 10/27/2022

**SECTION 1. PRODUCT AND COMPANY IDENTIFICATION****Product name** : HYDROFLUOSILICIC ACID SOLUTION**Recommended use of the chemical and restrictions on use**

Recommended use : Reserved for industrial and professional use.

**Manufacturer or supplier's details****Company** : Univar Solutions USA, Inc.  
**Address** : 3075 Highland Pkwy Suite 200  
Downers Grove, IL 60515  
United States of America (USA)**Emergency telephone number:**Transport North America: CHEMTREC (1-800-424-9300)  
CHEMTREC INTERNATIONAL Tel # 703-527-3887**Additional Information:** : Responsible Party: Product Compliance Department  
E-mail: SDSNA@univarsolutions.com  
SDS Requests: 1-855-429-2661  
Website: www.univarsolutions.com**SECTION 2. HAZARDS IDENTIFICATION****GHS Classification**

Corrosive to metals : Category 1

Acute toxicity (Oral) : Category 4

Acute toxicity (Dermal) : Category 3

Skin corrosion : Category 1

Serious eye damage : Category 1

**GHS label elements**

Hazard pictograms :



Signal word : Danger

Hazard statements : H290 May be corrosive to metals.  
H302 Harmful if swallowed.  
H311 Toxic in contact with skin.  
H314 Causes severe skin burns and eye damage.Precautionary statements : **Prevention:**  
P234 Keep only in original container.  
P264 Wash skin thoroughly after handling.  
P270 Do not eat, drink or smoke when using this product.

# Safety Data Sheet

## HYDROFLUOSILICIC ACID SOLUTION

Version 1.5

Revision Date: 10/27/2022

P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.

**Response:**

P301 + P312 + P330 IF SWALLOWED: Call a POISON CENTER/ doctor if you feel unwell. Rinse mouth.

P301 + P330 + P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.

P303 + P361 + P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/ shower.

P304 + P340 + P310 IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER/ doctor.

P305 + P351 + P338 + P310 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER/ doctor.

P362 Take off contaminated clothing and wash before reuse.

P390 Absorb spillage to prevent material damage.

**Storage:**

P405 Store locked up.

P406 Store in corrosive resistant container with a resistant inner liner.

**Disposal:**

P501 Dispose of contents/ container to an approved waste disposal plant.

**Other hazards**

None known.

### SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance / Mixture : Mixture

**Hazardous components**

CAS-No.	Chemical name	Weight percent
16961-83-4	Fluorosilicic Acid	20 - 25
7664-39-3	Hydrofluoric acid	0.1 - 1

Actual concentration is withheld as a trade secret

Any Concentration shown as a range is due to batch variation.

**Synonyms** : HFS; Fluorosilicic Acid; Hydrofluorosilicic Acid,

### SECTION 4. FIRST AID MEASURES

**General advice** : Move out of dangerous area.  
 Consult a physician.  
 Show this safety data sheet to the doctor in attendance.  
 Symptoms of poisoning may appear several hours later.  
 Do not leave the victim unattended.

**If inhaled** : If unconscious, place in recovery position and seek medical

**Safety Data Sheet**  
**HYDROFLUOSILICIC ACID SOLUTION**

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- advice.  
If symptoms persist, call a physician.
- In case of skin contact : Immediate medical treatment is necessary as untreated wounds from corrosion of the skin heal slowly and with difficulty.  
Take victim immediately to hospital.  
If on skin, rinse well with water.  
If on clothes, remove clothes.
- In case of eye contact : Small amounts splashed into eyes can cause irreversible tissue damage and blindness.  
In the case of contact with eyes, rinse immediately with plenty of water and seek medical advice.  
Continue rinsing eyes during transport to hospital.  
Remove contact lenses.  
Protect unharmed eye.  
Keep eye wide open while rinsing.  
If eye irritation persists, consult a specialist.  
Take victim immediately to hospital.
- If swallowed : Keep respiratory tract clear.  
Do not induce vomiting without medical advice.  
Do not give milk or alcoholic beverages.  
Never give anything by mouth to an unconscious person.  
If symptoms persist, call a physician.  
Take victim immediately to hospital.

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**SECTION 5. FIREFIGHTING MEASURES**

- Suitable extinguishing media : Carbon dioxide (CO<sub>2</sub>)  
Foam  
Dry powder  
Water mist
- Unsuitable extinguishing media : High volume water jet
- Specific hazards during fire-fighting : Do not allow run-off from fire fighting to enter drains or water courses.
- Hazardous combustion products : No hazardous combustion products are known
- Further information : Collect contaminated fire extinguishing water separately. This must not be discharged into drains.  
Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations.
- Special protective equipment for firefighters : Wear self-contained breathing apparatus for firefighting if necessary.

# Safety Data Sheet

## HYDROFLUOSILICIC ACID SOLUTION

Version 1.5

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### SECTION 6. ACCIDENTAL RELEASE MEASURES

- Personal precautions, protective equipment and emergency procedures : Use personal protective equipment.
- Environmental precautions : Prevent product from entering drains. Prevent further leakage or spillage if safe to do so. If the product contaminates rivers and lakes or drains inform respective authorities.
- Methods and materials for containment and cleaning up : Neutralize with chalk, alkali solution or ammonia. Soak up with inert absorbent material (e.g. sand, silica gel, acid binder, universal binder, sawdust). Keep in suitable, closed containers for disposal.

### SECTION 7. HANDLING AND STORAGE

- Advice on protection against fire and explosion : Normal measures for preventive fire protection.
- Advice on safe handling : Do not breathe vapours/dust. Avoid contact with skin and eyes. For personal protection see section 8. Smoking, eating and drinking should be prohibited in the application area. To avoid spills during handling keep bottle on a metal tray. Dispose of rinse water in accordance with local and national regulations.
- Conditions for safe storage : Prevent unauthorized access. Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage. Observe label precautions. Electrical installations / working materials must comply with the technological safety standards.
- Materials to avoid : Do not store near acids.

### SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

#### Components with workplace control parameters

CAS-No.	Components	Value type (Form of exposure)	Control parameters / Permissible concentration	Basis
7664-39-3	Hydrofluoric acid	TWA	0.5 ppm (Fluorine)	ACGIH
		C	2 ppm (Fluorine)	ACGIH

# Safety Data Sheet

## HYDROFLUOSILICIC ACID SOLUTION

Version 1.5

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		TWA	3 ppm 2.5 mg/m <sup>3</sup>	NIOSH REL
		C	6 ppm 5 mg/m <sup>3</sup>	NIOSH REL
		TWA	3 ppm	OSHA Z-2
		TWA	3 ppm (Fluorine)	OSHA P0
		STEL	6 ppm (Fluorine)	OSHA P0
		TWA	0.5 ppm (Fluorine)	ACGIH
		C	2 ppm (Fluorine)	ACGIH
		TWA	3 ppm (Fluorine)	OSHA P0
		STEL	6 ppm (Fluorine)	OSHA P0
		PEL	0.4 ppm 0.33 mg/m <sup>3</sup> (Fluorine)	CAL PEL
		STEL	1 ppm 0.83 mg/m <sup>3</sup> (Fluorine)	CAL PEL

### Personal protective equipment

#### Respiratory protection

: General and local exhaust ventilation is recommended to maintain vapor exposures below recommended limits. Where concentrations are above recommended limits or are unknown, appropriate respiratory protection should be worn. Follow OSHA respirator regulations (29 CFR 1910.134) and use NIOSH/MSHA approved respirators. Protection provided by air purifying respirators against exposure to any hazardous chemical is limited. Use a positive pressure air supplied respirator if there is any potential for uncontrolled release, exposure levels are unknown, or any other circumstance where air purifying respirators may not provide adequate protection.

#### Hand protection

##### Remarks

: The suitability for a specific workplace should be discussed with the producers of the protective gloves.

#### Eye protection

: Eye wash bottle with pure water  
Tightly fitting safety goggles  
Wear face-shield and protective suit for abnormal processing problems.

#### Skin and body protection

: Impervious clothing  
Choose body protection according to the amount and concentration of the dangerous substance at the work place.

#### Hygiene measures

: Avoid contact with skin, eyes and clothing.  
When using do not eat or drink.  
When using do not smoke.



**Safety Data Sheet**  
**HYDROFLUOSILICIC ACID SOLUTION**

Version 1.5

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Wash hands before breaks and immediately after handling the product.

**SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES**

Appearance	: liquid
Colour	: Clear, colorless, Straw color
Odour	: pungent
Odour Threshold	: No data available
pH	: 1 - 2
Freezing Point (Melting point/freezing point)	: -20 °C (-4 °F)
Boiling Point (Initial boiling point and boiling range)	: 136 - 163 °C (277 - 325 °F)
Flash point	: does not flash
Evaporation rate	: No data available
Flammability (solid, gas)	: No data available
Upper explosion limit	: No data available
Lower explosion limit	: No data available
Vapour pressure	: No data available
Relative vapour density	: No data available
Relative density	: 1.2 @ 25 °C (77 °F) Reference substance: (water = 1)
Density	: 10.17 lb/gal @ 20 °C (68 °F)
Solubility(ies) Water solubility	: Miscible
Solubility in other solvents	: No data available
Partition coefficient: n-octanol/water	: No data available
Auto-ignition temperature	: No data available
Thermal decomposition	: No data available

**Safety Data Sheet**  
**HYDROFLUOSILICIC ACID SOLUTION**

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**SECTION 10. STABILITY AND REACTIVITY**

- Reactivity : No dangerous reaction known under conditions of normal use.
- Chemical stability : Stable under normal conditions.
- Possibility of hazardous reactions : No decomposition if stored and applied as directed.
- Conditions to avoid : Keep away from heat, flame, sparks and other ignition sources.
- Incompatible materials : glass  
Strong oxidizing agents

**SECTION 11. TOXICOLOGICAL INFORMATION****Acute toxicity****Product:**

- Acute oral toxicity : Acute toxicity estimate: 500.1 mg/kg
- Acute inhalation toxicity : Acute toxicity estimate: 50.01 mg/l  
Exposure time: 4 h  
Test atmosphere: vapour
- Acute dermal toxicity : Acute toxicity estimate: 500.05 mg/kg

**Components:****7664-39-3:**

- Acute oral toxicity : Assessment: The component/mixture is highly toxic after single ingestion.  
Remarks: No data available
- Acute inhalation toxicity : LC50 (Rat): 1610 ppm  
Assessment: The component/mixture is highly toxic after short term inhalation.
- Acute dermal toxicity : Assessment: The component/mixture is extremely toxic after single contact with skin.  
Remarks: No data available

**Skin corrosion/irritation****Product:**

Remarks: Extremely corrosive and destructive to tissue.

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**Components:****16961-83-4:**

Species: Rat

Result: Causes burns.

**7664-39-3:**

Species: Rabbit

Result: Causes severe burns.

**Serious eye damage/eye irritation****Product:**

Remarks: May cause irreversible eye damage.

**Components:****7664-39-3:**

Species: Rabbit

Result: Risk of serious damage to eyes.

**Germ cell mutagenicity****Components:****7664-39-3:**

Genotoxicity in vitro

: Test Type: Ames test  
Species: Salmonella typhimurium  
Result: negative

Genotoxicity in vivo

: Test Type: In vivo micronucleus test  
Species: Mouse  
Result: negativeGerm cell mutagenicity -  
Assessment: Tests on bacterial or mammalian cell cultures did not show  
mutagenic effects.**Carcinogenicity****Components:****7664-39-3:**

Species: Rat

NOAEL: 25 mg/kg bw/day

Carcinogenicity - Assess-  
ment

: Not classifiable as a human carcinogen.

**IARC**No component of this product present at levels greater than or  
equal to 0.1% is identified as probable, possible or confirmed  
human carcinogen by IARC.**OSHA**No component of this product present at levels greater than or  
equal to 0.1% is on OSHA's list of regulated carcinogens.

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**NTP**

No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

**Reproductive toxicity****Components:****7664-39-3:**

Reproductive toxicity - Assessment

Fertility classification not possible from current data.

Teratogenicity - Assessment : Embryotoxicity classification not possible from current data.

**Further information****Product:**

Remarks: No data available

---

**SECTION 12. ECOLOGICAL INFORMATION****Ecotoxicity****Components:****7664-39-3:**

Toxicity to fish : Remarks: No data available

Toxicity to daphnia and other aquatic invertebrates : EC50 (Daphnia magna (Water flea)): 97 mg/l  
Exposure time: 48 h

Toxicity to algae : Remarks: No data available

**Persistence and degradability**

No data available

**Bioaccumulative potential**

No data available

**Mobility in soil**

No data available

**Other adverse effects****Product:**Ozone-Depletion Potential : Regulation: 40 CFR Protection of Environment; Part 82 Protection of Stratospheric Ozone - CAA Section 602 Class I Substances  
Remarks: This product neither contains, nor was manufactured with a Class I or Class II ODS as defined by the U.S.

# Safety Data Sheet

## HYDROFLUOSILICIC ACID SOLUTION

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Clean Air Act Section 602 (40 CFR 82, Subpt. A, App.A + B).

Additional ecological information : No data available

### SECTION 13. DISPOSAL CONSIDERATIONS

#### Disposal methods

Waste from residues : Dispose of in accordance with all applicable local, state and federal regulations.  
For assistance with your waste management needs - including disposal, recycling and waste stream reduction, contact Univar Solutions ChemCare: 1-800-637-7922

Do not dispose of waste into sewer.  
Do not contaminate ponds, waterways or ditches with chemical or used container.  
Send to a licensed waste management company.

Contaminated packaging : Empty remaining contents.  
Dispose of as unused product.  
Do not re-use empty containers.

### SECTION 14. TRANSPORT INFORMATION

**DOT (Department of Transportation):**  
UN1778, Fluorosilicic acid, 8, II

**IATA (International Air Transport Association):**  
UN1778, Fluorosilicic acid, 8, II

**IMDG (International Maritime Dangerous Goods):**  
UN1778, FLUOROSILICIC ACID, 8, II

### SECTION 15. REGULATORY INFORMATION

#### EPCRA - Emergency Planning and Community Right-to-Know Act

##### CERCLA Reportable Quantity

Components	CAS-No.	Component RQ (lbs)	Calculated product RQ (lbs)
Hydrofluoric acid	7664-39-3	100	10001
Hydrochloric acid	7647-01-0	5000	*

\*: Calculated RQ exceeds reasonably attainable upper limit.

##### SARA 304 Extremely Hazardous Substances Reportable Quantity

Components	CAS-No.	Component RQ	Calculated product RQ
------------	---------	--------------	-----------------------

# Safety Data Sheet

## HYDROFLUOSILICIC ACID SOLUTION

Version 1.5

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		(lbs)	(lbs)
Hydrofluoric acid	7664-39-3	100	10001
Hydrochloric acid	7647-01-0	5000	*

\*: Calculated RQ exceeds reasonably attainable upper limit.

**SARA 311/312 Hazards** : Corrosive to metals  
 Acute toxicity (any route of exposure)  
 Skin corrosion or irritation  
 Serious eye damage or eye irritation

**SARA 302** : This material does not contain any components with a section 302 EHS TPQ.

**SARA 313** : This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

### Clean Air Act

This product does not contain any hazardous air pollutants (HAP), as defined by the U.S. Clean Air Act Section 112 (40 CFR 61).

This product does not contain any chemicals listed under the U.S. Clean Air Act Section 112(r) for Accidental Release Prevention (40 CFR 68.130, Subpart F).

This product does not contain any chemicals listed under the U.S. Clean Air Act Section 111 SOCM I Intermediate or Final VOC's (40 CFR 60.489).

### Clean Water Act

The following Hazardous Substances are listed under the U.S. CleanWater Act, Section 311, Table 116.4A:

7647-01-0 Hydrochloric acid  
 7664-39-3 Hydrofluoric acid

The following Hazardous Chemicals are listed under the U.S. CleanWater Act, Section 311, Table 117.3:

7647-01-0 Hydrochloric acid  
 7664-39-3 Hydrofluoric acid

This product does not contain any toxic pollutants listed under the U.S. Clean Water Act Section 307

### Massachusetts Right To Know

16961-83-4 Fluorosilicic Acid  
 7647-01-0 Hydrochloric acid  
 7664-39-3 Hydrofluoric acid

### Pennsylvania Right To Know

7732-18-5 Water  
 16961-83-4 Fluorosilicic Acid  
 7647-01-0 Hydrochloric acid  
 7664-39-3 Hydrofluoric acid

**California Prop 65** : This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

### The components of this product are reported in the following inventories:

TSCA : On TSCA Inventory

# Safety Data Sheet

## HYDROFLUOSILICIC ACID SOLUTION

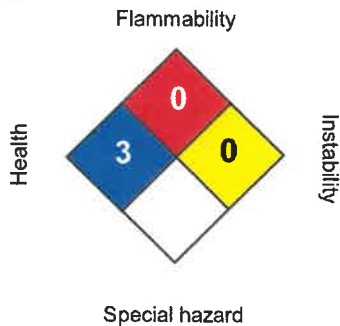
Version 1.5

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DSL	: All components of this product are on the Canadian DSL
AICS	: On the inventory, or in compliance with the inventory
NZIoC	: On the inventory, or in compliance with the inventory
ENCS	: On the inventory, or in compliance with the inventory
KECI	: On the inventory, or in compliance with the inventory
PICCS	: On the inventory, or in compliance with the inventory
IECSC	: On the inventory, or in compliance with the inventory

### SECTION 16. OTHER INFORMATION

#### NFPA:



#### HMIS III:

HEALTH	3/
FLAMMABILITY	0
PHYSICAL HAZARD	0

0 = not significant, 1 = Slight,  
2 = Moderate, 3 = High  
4 = Extreme, \* = Chronic

The information accumulated is based on the data of which we are aware and is believed to be correct as of the date hereof. Since this information may be applied under conditions beyond our control and with which we may be unfamiliar and since data made become available subsequently to the date hereof, we do not assume any responsibility for the results of its use. Recipients are advised to confirm in advance of need that the information is current, applicable, and suitable to their circumstances. This SDS has been prepared by Univar Solutions Product Compliance Department (1-855-429-2661) SDSNA@univarsolutions.com.

**Revision Date** 10/27/2022

#### Material number:

16166001, 16176538, 16170213, 16169394, 16171091, 16145665, 16144609, 16151122, 16148601, 16159674, 16166531, 16141271, 16148010, 16150746, 16145666, 16143932, 16147890, 16140484

## Safety Data Sheet

# HYDROFLUOSILICIC ACID SOLUTION

Version 1.5

Revision Date: 10/27/2022

ACGIH	American Conference of Government Industrial Hygienists	LD50	Lethal Dose 50%
AICS	Australia, Inventory of Chemical Substances	LOAEL	Lowest Observed Adverse Effect Level
DSL	Canada, Domestic Substances List	NFPA	National Fire Protection Agency
NDSL	Canada, Non-Domestic Substances List	NIOSH	National Institute for Occupational Safety & Health
CNS	Central Nervous System	NTP	National Toxicology Program
CAS	Chemical Abstract Service	NZIoC	New Zealand Inventory of Chemicals
EC50	Effective Concentration	NOAEL	No Observable Adverse Effect Level
EC50	Effective Concentration 50%	NOEC	No Observed Effect Concentration
EGEST	EOSCA Generic Exposure Scenario Tool	OSHA	Occupational Safety & Health Administration
EOSCA	European Oilfield Specialty Chemicals Association	PEL	Permissible Exposure Limit
EINECS	European Inventory of Existing Chemical Substances	PICCS	Philippines Inventory of Commercial Chemical Substances
MAK	Germany Maximum Concentration Values	PRNT	Presumed Not Toxic
GHS	Globally Harmonized System	RCRA	Resource Conservation Recovery Act
>=	Greater Than or Equal To	STEL	Short-term Exposure Limit
IC50	Inhibition Concentration 50%	SARA	Superfund Amendments and Reauthorization Act.
IARC	International Agency for Research on Cancer	TLV	Threshold Limit Value
IECSC	Inventory of Existing Chemical Substances in China	TWA	Time Weighted Average
ENCS	Japan, Inventory of Existing and New Chemical Substances	TSCA	Toxic Substance Control Act
KECI	Korea, Existing Chemical Inventory	UVCB	Unknown or Variable Composition, Complex Reaction Products, and Biological Materials
<=	Less Than or Equal To	WHMIS	Workplace Hazardous Materials Information System
LC50	Lethal Concentration 50%		



**From:** [Bernard, Andrise](#)  
**To:** [Cuebas, Terisha L.](#); [Monestime, Marline](#)  
**Subject:** FW: Department of Health recommending Municipalities to remove fluoride  
**Date:** Friday, January 10, 2025 12:28:05 PM  
**Attachments:** [image001.png](#)  
[image002.png](#)  
[image003.png](#)  
[image004.png](#)  
[image005.png](#)  
[image006.png](#)  
[image007.png](#)  
[image008.png](#)  
[image009.png](#)  
[image011.png](#)  
[image012.png](#)  
[image013.png](#)  
[image014.png](#)

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Good Afternoon,

Forwarding the email below for your information.



**Andrise Bernard** | MMC, City Clerk  
City of North Miami Beach  
Office of the City Clerk  
T (305) 787-6001, ext. 2000  
F (305) 787-6026

---

17011 NE 19<sup>th</sup> Avenue, North Miami Beach, FL 33162 | [www.citynmb.com](http://www.citynmb.com) | City NMB on Social Media:

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**From:** Su, Lynn <Lynn.Su@citynmb.com>  
**Sent:** Saturday, January 4, 2025 8:34 PM  
**To:** Diaz, Mario <Mario.Diaz@citynmb.com>  
**Cc:** Geller, Joseph <Joseph.Geller@citynmb.com>; Bernard, Andrise <Andrise.Bernard@citynmb.com>; Jeb <jeb@goldstocktrades.com>  
**Subject:** RE: Department of Health recommending Municipalities to remove fluoride

Dear CM,

Hope you are having a wonderful Saturday. Sending you a reminder about our conversation regarding fluoridation of our water supply be added to the agenda for a vote by the commission. If you have already done so, thank you for taking prompt action.

Should there be hesitations and you are looking for more information here are some articles you may find useful in this urgent matter.

- [Fluoride in water in Florida: List of counties that fluoridate](#)
- [Federal court rules against EPA in lawsuit over fluoride in water - CBS News](#)
- [Fluoride in Drinking Water Is Safe. Here's the Evidence | Scientific American](#)
- Palm Bay – Not add <https://www.wesh.com/article/palm-bay-fluoride-to-tap-water/63325016>
- Tavares – Removed <https://www.newsweek.com/florida-fluoride-tavares-2003618>
- Collier County and Winter Haven – not add [Florida health official advises communities to stop](#)

[adding fluoride to drinking water : Shots - Health News : NPR](#)

- [Fluoride water in Port St. Lucie, Fort Pierce, Vero Beach](#)

Some utilities don't add, will stop adding, will remove, on the other hand Leesburg is considering adding.

After thorough review and research, it appears that a fluoride concentration of 0.7 mg/L may present potential risks, though these risks remain inconclusive due to limited studies. My primary concern is the impact on vulnerable populations, particularly pregnant women and children, who may not have access to bottled water and rely on our tap water. Most of Europe has stopped water fluoridation. As you may know or not, Danish studies suggest that small amounts fluoride negatively affect brain development, further raising alarm. [Danish data support fluoride being toxic to brain development](#)

Given this uncertainty and the potential risks involved, I strongly urge that we take action in January 2025. At a minimum, I recommend temporarily halting the addition of fluoride to the water supply and maintaining levels of 0.1–0.2 mg/L, as noted in your previous email, until more conclusive research is available. We cannot afford to ignore the possibility that fluoride may pose a threat to public health. Look forward to hearing back from you.



**Lynn Su** | Commissioner

Mayor & Commission

City of North Miami Beach

T (305) 948-2986 x 2421

C (786) 599-6661

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**From:** Jeb <[jeb@goldstocktrades.com](mailto:jeb@goldstocktrades.com)>

**Sent:** Sunday, December 15, 2024 3:43 PM

**To:** Su, Lynn <[Lynn.Su@cityymb.com](mailto:Lynn.Su@cityymb.com)>

**Cc:** Commission All External <[CommissionAll@cityymb.com](mailto:CommissionAll@cityymb.com)>; Diaz, Mario <[Mario.Diaz@cityymb.com](mailto:Mario.Diaz@cityymb.com)>

**Subject:** Re: Department of Health recommending Municipalities to remove fluoride

Dear City Manager and City Nmb Commission,

1. Florida Surgeon General Ladapo has said on Nov. 22<sup>nd</sup>, 2024, with what we know today, fluoridating drinking water is **“public health malpractice”**. The harm to the human body is known and admitted by the CDC and the EPA. It is not theory.
2. The MSDS sheets are clear. (material data safety sheets) When you view these MSDS sheets from nmb water you will see for yourself the toxic poison being added to NMB water.
3. The only responsible party that has full control of the decision to fluoridate or not are the city of NMB commissioners. This decision IS NOT decided by the state or the federal government or the EPA. It is 100% decided by the city commissioners.
4. The fluoride added to municipal tap water systems most often comes in the form of

hydrofluosilicic acid (HFSA), a hazardous waste byproduct of phosphate fertilizer production. Proponents will say that fluoride is naturally occurring. What is being added to our water is not naturally occurring but an industrial chemical byproduct typically of the fertilizer industry. This misrepresentation should completely discredit pro-fluoridation advocates.

5. Due to the lack of processing, these chemicals are known to contain elevated levels of contaminants, particularly arsenic. In addition, recent research — including both epidemiological and laboratory investigations — have detected associations between the fluoridation of water with fluorosilicic acid and elevated lead exposure, particularly those living in houses with old pipes.
6. FL Statute 859.01 is “Poisoning of Food & Water”. Please know that to violate this statute requires willful intent. It is fully understood that the city commission is not committing willful intent to harm. It is my opinion and the opinion of attorneys I have consulted that once you are aware of the new evidence of harm and danger, if you continue to fluoridate, a case can be made that 859.01 is being violated.
7. On September 24, 2024, [a U.S. District Court ruled](#) that community water fluoridation at 0.7 milligrams per liter presents an unreasonable risk of injury to health under the [Amended Toxic Substances Control Act \(Amended TSCA\)](#) and the U.S. Environmental Protection Agency is obliged to take regulatory action in response.
8. Most of the world does not fluoridate their water. Dental decay statistics across these countries are as good or better than that of the USA.
9. Dr. Ladapo’s email notes the many adverse long term effects of the cumulation of this toxin in the body. We cannot substitute perceived or real dental protection for brain damage to our children. There are countless ways to receive fluoride outside of water fluoridation. It is especially important to NOT ingest fluoride.
10. The International Academy of Oral Medicine and Toxicology (IAOMT). In this link you will find a treasure trove of information around the toxic danger of public water fluoridation. <https://iaomt.org/resources/fluoride-facts/>
11. Toxins accumulate in the body over time and wreak havoc on a person’s health. Fluoride accumulates over time.
12. It is **not possible to dose fluoride** in the water because this depends on how much you drink relative to body mass. This is why babies and children are most vulnerable.
13. Fluoride is in so many products. Children, pregnant moms and their unborn babies are being overexposed to a level that is causing harm to their health. It is in water, process food, produce and we bath/shower in fluoridate water which is absorbed through our skin.
14. The toxic stew that is Hydrofluosilicic acid typically added to water has been known to be a neurotoxin for decades. It is an industrial waste product! It was used as rat poison prior to the public being dupped into public water fluoridation. It crosses the

blood brain barrier and the placenta.

15. **Neurotoxin = brain damage. Again, it is the cumulative effect of this toxin that deteriorates our citizen's health with children being the most vulnerable. It is obvious, we cannot substitute perceived dental health with damage to the brain!**

City Commissioners own the decision to fluoridate or not. They have a responsibility to protect the health and well-being of their citizens. With new information now available, liability and health risk is now known. A prudent step would be to **immediately suspend** water fluoridation. Operate with an abundance of caution. Suspend fluoride immediately.

Thank you,  
Jeb Handwerger  
Nmb resident  
3054699551

Sent from my iPhone

On Dec 12, 2024, at 2:33 PM, Su, Lynn <[Lynn.Su@citynmb.com](mailto:Lynn.Su@citynmb.com)> wrote:

Hi Jeb,

I hope this satisfies your inquiry. Feel free to reach back out to me with any further questions.

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# City of North Miami Beach



**Lynn Su** | Commissioner  
Mayor & Commission  
City of North Miami Beach  
T (305) 948-2986 x 2421  
C (786) 599-6661

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**From:** Diaz, Mario <[Mario.Diaz@citynmb.com](mailto:Mario.Diaz@citynmb.com)>  
**Sent:** Friday, December 6, 2024 12:17 PM  
**To:** Su, Lynn <[Lynn.Su@citynmb.com](mailto:Lynn.Su@citynmb.com)>  
**Cc:** Nikvan, Hamid <[hamid.nikvan@citynmb.com](mailto:hamid.nikvan@citynmb.com)>; Melo, Pedro D. <[Pedro.Melo@citynmb.com](mailto:Pedro.Melo@citynmb.com)>; Rossy, Karim <[Karim.Rossy@citynmb.com](mailto:Karim.Rossy@citynmb.com)>  
**Subject:** RE: Department of Health recommending Municipalities to remove fluoride

Commissioner,

Good afternoon. This is a debate that comes around every so often. The attached Miami Herald article covers the topic well and with the County. NMB follows the regulator requirements as dictated by the appropriate agencies, which I believe is the US Environmental Protection Agency (EPA). Should that change either at the Federal or State levels we will adjust. Below is a technical response from staff that explains what we do specifically.

Fluoridation is the deliberate addition of fluoride in potable water to augment the naturally occurring levels. At optimal levels, fluoride in potable water acts as an

inhibitor of dental caries or tooth decay. USEPA and the U.S. Department of Health and Human Services announced in January 2011 that a concentration of 0.7 mg/L of fluoride replaces the previous recommended range that was dependent upon temperature.

The naturally occurring levels of fluoride in the Biscayne and Floridan Aquifer are typically around 0.2 mg/L. It is expected that the membranes will reject a large percentage of fluoride, thus leaving a concentration of less than 0.1 mg/L in the permeate. Therefore, the expected concentration in the blend water should be approximately 0.1 mg/l. The blended water concentration of fluoride should be subtracted from the 0.7 mg/l target dosage to obtain the dosage amount.

Since the fluoride levels in the blended water are small, the system was designed for a dosage of 0.7 mg/L.

Regards,

**Mario Diaz** | *City Manager*

City of North Miami Beach

T (305) 948-2900

F (305) 787-6034



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**From:** Su, Lynn <[Lynn.Su@citynmb.com](mailto:Lynn.Su@citynmb.com)>  
**Sent:** Thursday, December 5, 2024 3:02 PM  
**To:** nmbwater <[nmbwater@citynmb.com](mailto:nmbwater@citynmb.com)>; Diaz, Mario <[Mario.Diaz@citynmb.com](mailto:Mario.Diaz@citynmb.com)>  
**Subject:** FW: Department of Health recommending Municipalities to remove fluoride

Dear NMB Water Team,

A concerned citizen has sent this to me and I would like your thoughts and/or our current practices regarding fluoride. Please advise.

---

# City of North Miami Beach



**Lynn Su** | Commissioner  
Mayor & Commission  
City of North Miami Beach  
T (305) 948-2986 x 2421  
C (786) 599-6661

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Social Media:



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**From:** Jeb <[jeb@goldstocktrades.com](mailto:jeb@goldstocktrades.com)>

**Sent:** Thursday, December 5, 2024 2:01 PM

**To:** Su, Lynn <[Lynn.Su@cityymb.com](mailto:Lynn.Su@cityymb.com)>

**Subject:** Fwd: Department of Health recommending Municipalities to remove fluoride

Sent from my iPhone

Begin forwarded message:

**From:** Jeb <[jeb@goldstocktrades.com](mailto:jeb@goldstocktrades.com)>

**Date:** December 5, 2024 at 3:20:13 AM EST

**To:** [CommissionAll@cityymb.com](mailto:CommissionAll@cityymb.com)

**Subject: Department of Health recommending Municipalities to remove fluoride**

Please consider the Florida surgeon general latest recommendations.

State Surgeon General Dr. Joseph A. Ladapo announced [guidance](#) recommending against community water fluoridation due to the neuropsychiatric risk associated with fluoride exposure.

currently many municipalities across the U.S. including in florida and several European countries, including Austria, Belgium, France, Germany, Italy, Norway, and Sweden, have [eliminated water fluoridation](#).

Nmb residents should be aware of safety concerns related to systemic fluoride exposure including:

- Adverse effects in children [reducing IQ](#), cognitive impairment, and [attention deficit hyperactivity disorder](#).
- Increased [neurobehavioral problems](#) in children whose mothers ingested fluoride during pregnancy.
- Accumulation of fluoride in the pineal gland, causing [sleep cycle disturbance](#).
- [Skeletal fluorosis](#), which could increase the risk of bone fracture.
- Potential risk of [premature menarche](#) in adolescent girls.
- Potential [suppression of the thyroid gland](#) by inhibiting iodine absorption.

"It is clear more research is necessary to address safety and efficacy concerns regarding community water fluoridation," said State Surgeon General Dr. Joseph A. Ladapo. "The previously considered benefit of community water fluoridation does not outweigh the current known risks, especially for special populations like pregnant women and children."

Nmb currently fluoridates its water and we need to make investments in our water plant as I've studied recent reports showing our water system could be improved to help our most vulnerable populations like children seniors and pregnant women by removing certain chemicals which are neurotoxins.



Could we put on agenda and vote to remove fluoride? Naples Florida just got rid of this toxin as well as many other cities in Florida.  
I will start educating residents about this issue. The health and safety of our city comes first.  
Which commissioner will stand up for health and make a motion?

I pray we can make nmb water great and pure again! Remove the chemical neurotoxins like fluoride.



[State Surgeon General Dr. Joseph A. Ladapo Issues Community Water Fluoridation Guidance | Florida Department of Health](#)  
[floridahealth.gov](http://floridahealth.gov)

Jeb Handwerger  
Nmb resident of 21 years (Monticello precinct 116)  
3054699551

Sent from my iPhone

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the Florida Statutes concerning public records. E-mail messages are covered under such laws and thus subject to disclosure. All e-mail sent and received is captured by our servers and kept as public record.

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# Fluoride

## Fact Sheet for Health Professionals

### Introduction

Fluoride, a mineral, is naturally present in many foods and available as a dietary supplement. Fluoride is the ionic form of the element fluorine, and it inhibits or reverses the initiation and progression of dental caries (tooth decay) and stimulates new bone formation [1].

Soil, water, plants, and foods contain trace amounts of fluoride. Most of the fluoride that people consume comes from fluoridated water, foods and beverages prepared with fluoridated water, and toothpaste and other dental products containing fluoride [2,3].

Approximately 80% or more of orally ingested fluoride is absorbed in the gastrointestinal tract [1]. In adults, about 50% of absorbed fluoride is retained in the body, with all but 1% stored in bones and teeth [1,3]. The other 50% is excreted in urine [1]. In young children, up to 80% of absorbed fluoride is retained because more is taken up by bones and teeth than in adults [1].

Individual fluoride status is not typically assessed, although fluoride concentrations can be measured in plasma, saliva, urine, bones, nails, hair, and teeth [4,5]. Criteria for adequate, high, or low levels of fluoride in the body have not been established.

### Recommended Intakes

Intake recommendations for fluoride and other nutrients are provided in the Dietary Reference Intakes (DRIs) developed by the Food and Nutrition Board (FNB) at the National Academies of Sciences, Engineering, and Medicine [1]. DRI is the general term for a set of reference values used for planning and assessing nutrient intakes of healthy people. These values, which vary by age and sex, include the following:

- Recommended Dietary Allowance (RDA): Average daily level of intake sufficient to meet the nutrient requirements of nearly all (97%–98%) healthy individuals; often used to plan nutritionally adequate diets for individuals
- Adequate Intake (AI): Intake at this level is assumed to ensure nutritional adequacy; established when evidence is insufficient to develop an RDA
- Estimated Average Requirement (EAR): Average daily level of intake estimated to meet the requirements of 50% of healthy individuals; usually used to assess the nutrient intakes of groups of people and to plan nutritionally adequate diets for them; can also be used to assess the nutrient intakes of individuals
- Tolerable Upper Intake Level (UL): Maximum daily intake unlikely to cause adverse health effects

The FNB found the data insufficient to derive EARs for fluoride. Therefore, the board established AIs for all ages using estimated intakes shown to maximize reductions in the incidence of dental caries without unwanted side effects, such as dental fluorosis, a chronic condition resulting from the consumption of too much fluoride when teeth are developing [1]. Table 1 lists the current AIs for fluoride for healthy individuals.

**Table 1: Daily Adequate Intakes (AIs) for Fluoride [1]**

Age	Male	Female	Pregnancy	Lactation
Birth to 6 months	0.01 mg	0.01 mg		
7–12 months	0.5 mg	0.5 mg		
1–3 years	0.7 mg	0.7 mg		
4–8 years	1 mg	1 mg		
9–13 years	2 mg	2 mg		
14–18 years	3 mg	3 mg	3 mg	3 mg
19+ years	4 mg	3 mg	3 mg	3 mg

## Sources of Fluoride

### Food

Brewed tea typically contains higher levels of fluoride than most foods, depending on the type of tea and its source, because tea plants take up fluoride from soil [1,3]. Fluoride levels can range from 0.3 to 6.5 mg/L (0.07 to 1.5 mg/cup) in brewed tea made with distilled water [3].

Fluoride concentrations in breast milk are so low that they cannot always be detected; when these levels can be measured, they range from less than 0.002 to 0.01 mg/L, even when mothers live in communities with fluoridated water [3]. Fluoride concentrations in cow's milk are also very low, ranging from 0.007 to 0.086 mg/L [3]. Fluoride levels in infant formulas in the United States vary, depending on the type of formula and the fluoride content of the water used to prepare the formula [3]. The typical fluoride concentration is less than 0.2 mg/L in milk-based infant formula and 0.2 to 0.3 mg/L in soy-based infant formula (not including contributions from tap water used to prepare the formula).

Only trace amounts of fluoride are naturally present in most foods, and most foods not prepared with fluoridated water provide less than 0.05 mg/100 g [1,6].

A variety of types of foods and their fluoride levels per serving are listed in Table 2.

**Table 2: Fluoride Content of Selected Foods [3,6,7]**

Food	Milligrams per Serving
Tea, black, brewed, 1 cup	0.07 to 1.5*
Coffee, brewed, 1 cup	0.22*
Shrimp, canned, 3 ounces	0.17

<b>Food</b>	<b>Milligrams per Serving</b>
Bottled water with added fluoride, 1 cup	≤0.17
Raisins, ¼ cup	0.08
Oatmeal, cooked, ½ cup	0.08*
Grapefruit juice, ¾ cup	0.08
Potatoes, russet, baked, 1 medium	0.08
Rice, cooked, ½ cup	0.04*
Cottage cheese, ½ cup	0.04
Pork chop, baked, 3 ounces	0.03
Yogurt, plain, low-fat, 1 cup	0.03
Lamb chop, cooked, 3 ounces	0.03
Tortilla, flour, 1 tortilla, approx. 10" diameter	0.02
Corn, canned, ½ cup	0.02
Beef, cooked, 3 ounces	0.02
Tuna, light, canned in water, 3 ounces	0.02
Cheese, cheddar, 1½ ounces	0.01
Bread, white or whole wheat, 1 slice	0.01
Asparagus, cooked, 4 spears	0.01
Chicken, cooked, 3 ounces	0.01
Milk, fat-free or 1%, 1 cup	0.01
Apple, raw, with skin, 1 medium	0.01
Avocado, raw, ½ cup sliced	0.01
Macaroni, plain, cooked, ½ cup	0.00*
Tomato, raw, 1 medium	0.00
Banana, 1 medium	0.00
Egg, cooked, 1 large	0.00
Carrots, raw, 1 medium	0.00
Peanut butter, 1 tbsp	0.00

\*Amounts of fluoride might vary by levels in the water used to prepare these foods and beverages.

## **Fluoridated drinking water** ✓

Since 1962, the U.S. Public Health Service has recommended the addition of fluoride to drinking (tap) water to reduce the risk and severity of dental caries, one of the most common chronic diseases in children [8]. Many countries around the world now adjust the fluoride concentration of community drinking water supplies to the level recommended for the prevention of dental caries [9].

Although the U.S. Public Health Service recommended fluoride concentrations of 0.7 in warmer climates (where children were expected to drink more water) to 1.2 mg/L in cooler climates to prevent

dental caries in 1962, it amended its recommended level in 2015 to 0.7 mg/L to maintain the ability to prevent caries while minimizing the risk of dental fluorosis [8,10]. In 1986, guidelines from the U.S. Environmental Protection Agency (EPA) established a maximum allowable concentration of 4.0 mg/L fluoride in public drinking water systems to prevent adverse effects from fluoride exposure (such as bone disease) and a recommended maximum concentration of 2.0 mg/L to prevent dental fluorosis [3,11]. A review of this regulation is a currently a low priority for the EPA [12].

Fluoridated municipal drinking water—including water that people drink as well as foods and beverages prepared using municipal drinking water—accounts for about 60% of fluoride intakes in the United States [3,8]. In 2020, 62.9% of the U.S. population had access to a fluoridated community water system [13]. The fluoride additives used to fluoridate drinking water in the United States are fluorosilicic acid, sodium fluorosilicate, and sodium fluoride [14]. The Centers for Disease Control and Prevention has a webpage ([https://nccd.cdc.gov/doh\\_mwf/Default/Default.aspx](https://nccd.cdc.gov/doh_mwf/Default/Default.aspx)) that lists fluoride levels in tap water by county [15]. Because of differences in amounts of fluoride in groundwater, private water sources (including well water) have variable fluoride concentrations [11].

Fluoride is not typically added to bottled drinking waters. However, when fluoride is added, the U.S. Food and Drug Administration (FDA) stipulates that the total amount of fluoride (added plus naturally occurring) cannot exceed 0.7 mg/L [7]. Previously allowable levels ranged from 0.8 to 1.7 mg/L. FDA notes that this rule does not apply to bottled water without added fluoride that contains fluoride naturally from its source water. The amount of fluoride contained in bottled water is not required to be listed on the product label unless the label makes a claim about the product's fluoride content [16].

## **Dietary supplements** ✓

Only a few dietary supplements contain fluoride, usually in the form of sodium fluoride [17]. Most of these products are multivitamin/mineral supplements, multivitamins plus fluoride, or supplements containing trace minerals only. Some fluoride supplements, usually intended for children, are in the form of drops. The most common amount of fluoride in supplements is 0.25 mg, although a few products contain 0.5 or 1 mg per serving [17].

## **Dental products** ✓

Most toothpaste sold in the United States contains fluoride in the form of sodium fluoride or monofluorophosphate, most commonly at a level of 1,000 to 1,100 mg/L (about 1.3 mg in a quarter teaspoon, a typical amount of toothpaste used for one brushing) [3]. The amount of fluoride ingested from toothpaste depends on the amount used, the person's swallowing control, and how often the person uses toothpaste. Estimated typical amounts of fluoride ingested daily from toothpaste are 0.1 mg to 0.25 mg for infants and children age 0 to 5 years, 0.2 to 0.3 mg for children age 6 to 12 years, and 0.1 mg for adults [3]. Fluoride in toothpaste, regardless of its form, is well absorbed [1].

Other dental products that provide fluoride include mouth rinses for home use, topical fluoride preparations applied in dentists' offices or through school-based programs, and dental devices (e.g., orthodontic bracket adhesives, glass-ionomer and some composite resin dental restorative materials, and some dental sealants and cavity liners) [3,18]. Gels used by dentists are typically applied one to

four times a year and can lead to ingestions of 1.3 to 31.2 mg fluoride each time; varnishes are least likely to produce a high bolus of fluoride [3].

## Medications

Some prescription medications contain fluoride, but not as the active ingredient. For example, voriconazole (VFEND or Vfend) is an oral antifungal medication used to treat several infectious conditions, including invasive aspergillosis, candidemia, and candidiasis [19]. Fluoride is a constituent of voriconazole and long-term use (e.g., for 4 months or more) of this medication can lead to high fluoride concentrations in serum and plasma [20-24]. The prescribing information for voriconazole advises discontinuation of voriconazole if skeletal fluorosis or periostitis (inflammation of the membrane surrounding and protecting the bones) develops [19].

## Fluoride Intakes and Status

Most people in the United States consume adequate amounts of fluoride through foods containing naturally occurring fluoride, fluoridated tap water, and food products made with fluoridated tap water. According to the EPA, typical daily fluoride intakes in the United States from foods and beverages (including fluoridated drinking water) are 1.2 to 1.6 mg for infants and toddlers younger than 4 years, 2.0 to 2.2 mg for children age 4–11 years, 2.4 mg for those age 11–14 years, and 2.9 mg for adults [10].

## Fluoride and Health

This section focuses on two conditions in which fluoride might play a role: dental caries and bone fractures.

### Dental caries

Dental caries occurs when cariogenic bacteria in the mouth ferment foods and produce acids that dissolve tooth mineral [25]. Over time, this tooth decay can cause pain and tooth loss. Without treatment, dental caries can cause infections, impair growth and weight gain during childhood, affect school performance, impair quality of life, and possibly result in death [26-29]. Adequate fluoride intakes reduce the risk of dental caries in its initial stages by inhibiting demineralization and the activity of bacteria in dental plaque and by enhancing tooth remineralization [27].

#### *Impact of water fluoridation on dental caries*

Water fluoridation protects teeth in two main ways—by preventing the development of caries through ingestion of drinking water during the tooth-forming years and through direct contact of fluoride with teeth throughout life [30,31].

A 2015 Cochrane Review included 20 prospective observational studies (most conducted before 1975) [9]. The results showed that children receiving fluoridated water had 35% fewer decayed, missing, and filled primary (baby) teeth, and 26% fewer decayed, missing, and filled permanent (adult) teeth than children receiving unfluoridated water. Fluoridation also increased the number of children with no decay in their baby teeth by 15% and the number of children with no decay in their permanent teeth by

14%. The authors concluded that water fluoridation is effective for reducing dental caries rates in both primary and permanent teeth in children. However, the reviewers were unable to assess the effectiveness of water fluoridation for preventing caries in adults because no evidence met the review's inclusion criteria (which required studies to include at least two groups, one receiving fluoridated water and one receiving unfluoridated water).

The Cochrane Review's findings were confirmed by a 2018 cross-sectional study on the associations between fluoridated community water and dental caries in the United States [32]. The authors analyzed data on 7,000 children age 2 to 8 years and 12,604 children and adolescents age 6 to 17 years who participated in the National Health and Nutrition Examination Study (NHANES) from 1999 to 2004 and 2011 to 2014, respectively. The results showed that living in a county in which 75% or more of the drinking water contained at least 0.7 mg/L fluoride was associated with a 30% reduction in the rate of caries in primary teeth and a 12% reduction in the rate of caries in permanent teeth.

Some evidence shows that the addition of fluoride to drinking water can also prevent dental caries in adults. An observational study included 3,779 individuals in Australia age 15 and older who participated in the Australian 2004–2006 National Survey of Adult Oral Health [33]. In adults exposed to fluoridated community water supplies for at least 14 years, rates of decayed, missing, or filled teeth were 11%–12% lower than in adults whose drinking water during this period had negligible amounts of fluoride. An earlier study in 876 Australian Defence Force members age 17–56 years found that the average rate of decayed, missing, and filled teeth was 24% lower in those with access to water containing 0.5 to 1 mg/L fluoride for at least half of their lifetime than in those exposed for less than 10% of their lifetime [34].

These findings show that fluoridated drinking water can prevent dental caries in children and adults.

### ***Impact of fluoride dietary supplements on dental caries in children***

Some studies have assessed the impact of fluoride supplements on caries development in children. For example, a 2011 Cochrane Review of 11 randomized or quasi-randomized studies in a total of 7,196 children (most living in communities lacking access to fluoridated drinking water) found that 0.25–1 mg/day supplemental fluoride for 24–55 months reduced rates of decayed, missing, and filled tooth surfaces by 24% [35]. The authors concluded that fluoride supplements were associated with a lower caries incidence rate in permanent teeth. A 2013 systematic review found an even greater preventive effect of fluoride supplements on the basis of one randomized and four nonrandomized clinical trials in children [28]. The results showed that 0.25–1 mg/day fluoride supplementation reduced caries incidence rates in primary teeth by 48%–72% in areas where water fluoridation levels were lower than 0.6 mg/L. In two of these trials that monitored the children for 6–10 years, supplements were associated with a 33%–80% reduction in the incidence of caries at age 7–10 years.

The U.S. Preventive Services Task Force (USPSTF) and the American Dental Association have issued fluoride supplement recommendations for children whose water supply contains little or no fluoride [26]. These recommendations are summarized in Table 3.

**Table 3: Expert Panel Recommendations for Fluoride Supplementation in Children**



Source	Age Range	Recommendation
USPSTF [26]	6 months and older	• Fluoride supplement (dose not specified) for children whose water supply contains little or no fluoride*
American Dental Association [36]**	6 months to 3 years	• Fluoride supplement (0.25 mg/day) for children whose water supply contains less than 0.3 ppm (0.3 mg/L) fluoride
	3–6 years	• Fluoride supplement (0.5 mg/day) for children whose water supply contains less than 0.3 ppm (0.3 mg/L) fluoride • Fluoride supplement (0.25 mg/day) for children whose water supply contains 0.3 to 0.6 ppm (0.3 to 0.6 mg/L) fluoride
	6–16 years	• Fluoride supplement (1 mg/day) for children whose water supply contains less than 0.3 ppm (0.3 mg/L) fluoride • Fluoride supplement (0.5 mg/day) for children whose water supply contains 0.3 to 0.6 ppm (0.3 to 0.6 mg/L) fluoride

\*No studies have addressed the dosage or duration of oral fluoride supplementation in this population.

\*\*Recommended doses are based on poor-quality evidence.

Overall, the available evidence suggests that dietary supplements containing fluoride can reduce rates of dental caries in children who lack access to fluoridated drinking water. No studies have assessed the impact of fluoride supplements on caries development in adults.

### ***Fluoride dietary supplements in pregnant women***

Like other nutrients, fluoride is transferred from a pregnant woman to her fetus, so a few studies have evaluated the use of fluoride supplements by pregnant women to prevent dental caries in their children. However, the authors of a 2017 Cochrane Review found only one randomized controlled trial published in 1997 that met the review's inclusion criteria [37]. This study assessed caries rates in 798 3-year-old children whose mothers had received 1 mg/day fluoride during the last 6 months of pregnancy [38]. The results showed no significant difference in the proportions of children who had decayed or filled primary tooth surfaces or who had caries. The authors of the Cochrane Review concluded that the 1997 study was of very low quality and that no evidence shows that fluoride supplementation in pregnant women prevents dental caries in their offspring.

### **Bone fractures** ✓

Because fluoride helps stimulate the formation of new bone, researchers have hypothesized that fluoride supplements might reduce bone fracture risk. However, research to date has provided only limited evidence supporting this hypothesis [39-41].

The findings of observational studies on the impact of fluoride levels in water on bone mineral density (BMD) and fracture risk have been mixed. A study of 7,129 white women found no significant differences in bone mineral density or risk of hip, vertebral, wrist, or humerus fracture between those exposed and those not exposed to fluoridated water between 1950 and 1994 [40]. In contrast, in a study in 8,266 Chinese residents age 50 years or older, people with access to water fluoride levels of

approximately 1 mg/L had a lower overall risk of fractures, but not of hip fractures, than those with access to water containing negligible fluoride levels [41].

Clinical trials have also had conflicting findings about the efficacy of fluoride dietary supplements to prevent bone fractures. For example, a meta-analysis of 25 randomized controlled trials in a total of 954 participants (four of the studies included people with osteoporosis) showed a significant reduction in vertebral and nonvertebral fracture risk with daily doses of up to 20 mg fluoride (in the form of monofluorophosphate or sodium fluoride), but not with higher doses [42]. A more recent randomized controlled trial found that 2.5, 5, or 10 mg/day fluoride for 1 year in 180 postmenopausal women did not change BMD at any site assessed [43].

## Health Risks from Excessive Fluoride

Long-term ingestion of excess fluoride in infancy and childhood, when the teeth are being formed, can lead to dental fluorosis [44]. The characteristics of this chronic condition usually vary from almost imperceptible white lines or flecks to white or brown stains on teeth [2]. Severe dental fluorosis can lead to pitting in tooth enamel. The risk of dental fluorosis increases with fluoride intakes above recommended amounts [45]. Severe enamel fluorosis is rare and there is no indication that it is caused by the recommended level of fluoride in public tap water [3,31].

Analysis of 1999–2004 NHANES clinical exam data showed that 20.8% of people age 6 to 49 had mild or very mild dental fluorosis, 2.0% had moderate fluorosis, and less than 1% had severe fluorosis [44]. The prevalence of any dental fluorosis was highest, 40.6%, in adolescents age 12 to 15 and lowest, 8.7%, in those age 40 to 49.

Subsequent analyses of NHANES data from 2001–2002 and 2011–2012 found that rates of dental fluorosis (from very mild to severe) increased during this 10-year period [46,47]. However, a report from the Centers for Disease Control and Prevention concluded that the reported increase in dental fluorosis prevalence between NHANES 2001–2004 and 2011–2014 is not biologically plausible [48]. The authors suggested that there may have been a change over time in how the examiners evaluated the level of fluorosis [48,49].

Analyses of more recent NHANES 2015-2016 data showed that about two-thirds of children and adolescents age 6 years and older had some dental fluorosis, most of which was very mild or mild [48,50,51]. Research indicates that very mild or mild fluorosis does not negatively affect oral health-related quality of life [52,53]. Moreover, fluorosis severity tends to decline during adolescence and young adulthood [54,55]. Based on NHANES 2015-2016 data, only 1.4 to 1.8% of children and adolescents age 6 years and older have moderate or severe fluorosis [48,50,51], and no evidence indicates that the recommended level of fluoride in public tap water leads to severe fluorosis [3,31].

High doses of fluoride (typically from rare accidents resulting in excessively high levels of fluoridation of water, unintentional ingestion of fluoride products intended for topical use in dentists' offices, or fluoride supplements inappropriately given to children) can result in nausea, vomiting, abdominal pain, diarrhea, periostitis, and even death in rare cases [3,19,56]. According to one estimate, the acute dose

that could cause serious systemic toxicity for fluoride is 5 mg/kg (e.g., 375 mg for someone who weighs 75 kg [165 pounds]) [56]. This dose would be virtually impossible to achieve from water or toothpaste containing standard levels of added fluoride.

Chronic, excess intakes of fluoride are also associated with skeletal fluorosis [57]. Its effects can range from occasional joint pain or stiffness to osteoporosis, muscle wasting, and neurological defects [1,58]. However, skeletal fluorosis is extremely rare in the United States and no evidence indicates that it is caused by the recommended level of fluoride in public tap water [1,57].

One study found an association between higher maternal urinary fluoride concentration (based on one spot urine sample) during the third trimester of pregnancy and higher rates of neurobehavioral problems in the child at 3 years of age [59]. However, another study found no association between exposure to fluoridated water during early childhood and subsequent emotional or behavioral development and executive functioning [60]. Other evidence suggests that higher fluoride intakes during early development, including during gestation, might be associated with a lower IQ and other cognitive impairments (e.g., delays in cognitive development) in children [61-64]. However, many experts, including the authors of a National Academies of Sciences, Engineering, and Medicine review, consider this evidence to be weak and methodologically flawed [65-76]. A 2023 meta-analysis of 8 studies found that fluoride exposure at concentrations similar to that used in fluoridated community drinking water in the United States is not associated with lower IQ scores [77]. Reported associations between exposure to higher levels of fluoride and neurodevelopment warrant additional research [77,78].

The FNB has established ULs for fluoride from all sources for healthy individuals (Table 4) based on levels associated with dental and skeletal fluorosis [1].

**Table 4: Daily Tolerable Upper Intake Levels for Fluoride [1]**

Age	Male	Female	Pregnancy	Lactation
Birth to 6 months	0.7 mg	0.7 mg		
7–12 months	0.9 mg	0.9 mg		
1–3 years	1.3 mg	1.3 mg		
4–8 years	2.2 mg	2.2 mg		
9–13 years	10 mg	10 mg		
14–18 years	10 mg	10 mg	10 mg	10 mg
19–51 years	10 mg	10 mg	10 mg	10 mg
51+ years	10 mg	10 mg		

## Interactions with Fluoride

Fluoride has no known, clinically relevant interactions with medications [79].

## Fluoride and Healthful Diets

The federal government's 2020–2025 *Dietary Guidelines for Americans* notes that “Because foods provide an array of nutrients and other components that have benefits for health, nutritional needs should be met primarily through foods. ... In some cases, fortified foods and dietary supplements are useful when it is not possible otherwise to meet needs for one or more nutrients (e.g., during specific life stages such as pregnancy).”

For more information about building a healthy dietary pattern, refer to the *Dietary Guidelines for Americans* (<https://www.dietaryguidelines.gov>), and the U.S. Department of Agriculture's *MyPlate*. (<https://www.choosemyplate.gov/>).

The *Dietary Guidelines for Americans* describes a healthy dietary pattern as one that

- Includes a variety of vegetables; fruits; grains (at least half whole grains); fat-free and low-fat milk, yogurt, and cheese; and oils.
- Includes a variety of protein foods such as lean meats; poultry; eggs; seafood; beans, peas, and lentils; nuts and seeds; and soy products.
- Limits foods and beverages higher in added sugars, saturated fat, and sodium.
- Limits alcoholic beverages.
- Stays within your daily calorie needs.

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**Updated:** June 26, 2024 [History of changes to this fact sheet](#)

### In Summary

The American Dental Association's support of community water fluoridation at optimal levels is well-documented. Recent statements are available from [9/25/2024](#) and [10/04/24](#).

### About the Effectiveness of Community Water Fluoridation

- Even with the wide-spread availability of fluoride toothpaste, studies show community water fluoridation continues to be effective in reducing tooth decay by about 25 percent in children and adults.
- Community water fluoridation has been hailed by the Centers for Disease Control as one of 10 great public health achievements of the 20th century.
- Critics of fluoride in drinking water routinely cite the adoption of fluoride toothpaste and other dental products as evidence that it no longer needs to be added. However, organizations like the CDC state that water fluoridation and fluoride toothpaste work together to help prevent tooth decay and offer more protection against decay than using either one alone.
  - Fluoridated water keeps a low level of fluoride in the mouth throughout the day, while fluoride toothpaste delivers higher concentrations at important times of the day, such as bedtime.

### About the EPA Case and Ruling

- Environmental nonprofit Food & Water Watch and anti-fluoride groups like the Fluoride Action Network brought the U.S. Environmental Protection Agency (EPA) to court after their petition to ban water fluoridation was denied by the EPA in 2017.
- A federal court ruled on Tuesday, Sept. 24, 2024, against the EPA, ordering the agency take action to further evaluate potential health risks from currently recommended fluoride levels in the U.S. drinking water supply. "Action" is undefined at this point, but examples of potential "action" are labeling notification or regulatory action to adjust the therapeutic level.
- Judge Edward Chen said his ruling does not conclude with certainty that fluoridated water is injurious to public health, but that the evidence of its potential risk is enough to force the EPA to act and that fluoride is hazardous at the therapeutic level of 0.7 parts fluoride per million parts water are too close to U.S. drinking water levels. Read the ADA statement from [9/25/2024](#).
- The judge's ruling cites a National Toxicology Program (NTP) review released in August, which concluded that "higher levels" of fluoride are linked to lowered IQ in children.

### About the NTP Report

- The National Toxicology Program's (NTP) review does not provide any new or conclusive evidence that should compel any changes in current U.S. community water fluoridation practices because it did not find harm associated with the current optimally fluoridated water level of 0.7 parts fluoride per million. The ADA's official statement on the NTP Report can be found [here](#).
- The studies in the review were conducted outside the U.S. in areas with high levels of naturally-occurring fluoride in water. The NTP acknowledged that studies of fluoride exposure at recommended levels have not reliably demonstrated effects on cognitive development.
- Despite its discussion of the alleged impact of fluoride on IQ, the NTP monograph itself acknowledges the weakness of evidence in its studies and cannot establish fluoride as the cause of affecting IQ.

### About the Cochrane Library Review

- The ADA believes that the review does not present any new or significant findings on water fluoridation's impact to help prevent tooth decay. [Read](#) the latest statement from 10/4/24.
- Dr. Anne-Marie Glenny, co-author of the review said to NBC News, "There's no evidence to suggest that where water fluoridation programs are in place, that they should necessarily be stopped...Contemporary studies are showing that water fluoridation is beneficial."<sup>1</sup>
- The National Fluoridation Advisory Committee (NFAC), an expert committee of the ADA, examined the review and noted important limitations in the findings.
  - There were only a few recent studies on which the review's conclusions are based. Many recent studies that show negative impacts on public health once fluoride is removed from the water supply were excluded.
  - The study's exclusion criteria means that highly relevant research from over the past decade that show significant increases in tooth decay in communities like Juneau, Alaska, Calgary, Canada and other countries after their decision to remove fluoride from water supplies were not included.
  - Of interest, Cochrane researchers note a significant cost-savings due to fluoridation, which was also not included in the summary. Communities that have fluoridated water save an average of \$32 per person a year by avoiding treatment for cavities according to the CDC.<sup>2</sup>
  - Scientific reviews on decay prevention should have evidence-based methodologies, be complete and impartial when conducting the overall analysis, and use measurements consistent with studies across the globe for clear interpretation of results.
- According to the CDC, water fluoridation and fluoride toothpaste work together to help prevent tooth decay and offer more protection against decay than using either one alone.
- The review advises that starting or stopping community water fluoridation requires careful consideration of the current evidence while also considering a population's oral health, diet, and consumption of tap water; movement or migration; and the availability and uptake of other cavity prevention strategies.

<sup>1</sup> <https://www.nbcnews.com/health/health-news/still-need-fluoride-drinking-water-benefits-may-waning-study-suggests-rcna173790>

<sup>2</sup> <https://www.cdc.gov/oral-health/data-research/facts-stats/fast-facts-community-water-fluoridation.html>

# Fighting cavities with water fluoridation



**Y**ou probably know that many oral health care products, like toothpastes and mouthrinses, have fluoride in them to help prevent cavities, but did you know that the drinking water in many cities and towns also contains cavity-fighting fluoride?

Some public water systems have fluoride in them naturally. If a water system does not have enough natural fluoride to fight cavities, the community can add fluoride to the public water supply so the water from the tap helps prevent cavities. This is called water fluoridation. As of 2020, nearly 3 of 4 people in the United States on municipal water supplies had fluoridated water.<sup>1</sup>

## HOW DOES WATER FLUORIDATION PREVENT CAVITIES?

Researchers have found that cavity prevention is better when drinking water has a fluoride level of 0.7 mg/L. This is the level cities and towns adjust the fluoride levels to for water fluoridation.

It is important to prevent cavities. Bacteria that live on your teeth turn the sugar in everything you eat or drink to acid. This acid attacks the outer tooth layer, or enamel, creating cavities. Cavities can be painful, cause tooth loss, and allow bacteria to enter the bloodstream and spread infection to your brain and other parts of the body.

Fluoridated water hardens tooth enamel to help prevent cavities. It can even repair enamel in the early stages of cavity formation.

## HOW EFFECTIVE IS WATER FLUORIDATION?

Even when common fluoride-containing oral health care products, such as toothpastes and mouthrinses, are used, fluoridated water reduces caries another 25% among children and adults.<sup>2</sup> In communities that stop their water fluoridation program, cavity rates increase, especially among children.<sup>1</sup>

Fluoridation reduces cavities on the enamel in adults from 20% through 40% and prevents them on the root surfaces of teeth that may be exposed, especially in older adults.<sup>3</sup> The development of cavities in children has been found to be 60% lower for children who drink fluoridated water.<sup>4</sup>

Another important feature of public water fluoridation is the benefit it offers to the entire community. Anyone, regardless of their income or age, for example, can increase their protection from cavities by drinking public tap water that is fluoridated.<sup>3</sup>

In addition, water fluoridation is a cost-effective way to prevent cavities. Researchers have suggested that access to

fluoridated water during a person's lifetime costs less than the cost of 1 restoration used to repair a cavity.<sup>1</sup>

## IS WATER FLUORIDATION SAFE?

Communities have been fluoridating public water systems for almost 80 years. Many health effects have been studied, and researchers have not found health problems associated with water fluoridated at the level of 0.7 mg/L.<sup>3</sup>

Adding fluoride to water is similar to adding minerals or vitamins to other foods and beverages.<sup>1</sup> For example, iodine is added to salt, vitamin D is in milk, and vitamin C levels are boosted in some orange juice brands.

## CONCLUSIONS

Cavities might not seem like a serious problem, but they can be painful and, when left untreated, they can cause tooth loss and infections. Water fluoridation is an easy approach to protecting entire communities from cavities. It is a safe, effective, and affordable way for anyone in a fluoridated community to prevent cavities. To find out if your community water supply has fluoride, go to My Water's Fluoride on the Centers for Disease Control and Prevention's website ([www.cdc.gov](http://www.cdc.gov)). ■

## DISCLOSURE

Ms. Mark did not report any disclosures.

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Prepared by Anita M. Mark, informationist, ADA Library & Archives, American Dental Association, Chicago, IL.

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"For the Patient" provides general information on dental treatments. It is designed to prompt discussion between dentist and patient about treatment options and does not substitute for the dentist's professional assessment based on the individual patient's needs and desires.

You can find more information for patients at [ADASTore.org](http://ADASTore.org) or at [MouthHealthy.org](http://MouthHealthy.org).

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# Fluoridation



[Adding fluoride](#) to public water supplies is a safe and effective way to prevent tooth decay and has played a major role in improving the public's dental health for more than 70 years.

"Fluoride's effectiveness in preventing tooth decay extends throughout one's life, resulting in fewer—and less severe—cavities," says former Surgeon General Vivek H. Murthy. Read on to learn more about what the

[Centers for Disease Control and Prevention](#) (CDC) has proclaimed as one of 10 great public health achievements of the 20th century.

## What Is Community Water Fluoridation?

[Fluoridation](#) of community water supplies is simply the adjustment of the existing, naturally occurring fluoride in drinking water to an [optimal level](#) for the prevention of tooth decay. Think of it this way: Water that has been fortified with fluoride is similar to fortifying milk with Vitamin D, table salt with iodine, and bread and cereals with folic acid. The [number of communities](#) who make the choice to fluoridate their water continues to grow. The latest data show that in 2014, 74.4% of the U.S. population on public water systems, or 211.4 million people, had access to optimally fluoridated water.

## How Much Fluoride Is Recommended In Community Water Systems?

It is recommended that community water systems adjust the amount of fluoride to 0.7 milligrams per liter of water. Use the chart below to see what that amount is equivalent to.

# Fluoride: Small Solution. Big Benefits.

The **U.S. Department of Health and Human Services** announced a recommendation that community water systems adjust the amount of fluoride to **0.7 mg/L** to achieve an optimal fluoride level to help prevent tooth decay.

**Just how much is 0.7 milligrams per liter of water? It's like ...**



**1 inch in 23 miles**



**1 minute in 1,000 days**



**1 cent in \$14,000**

**What difference does a little fluoride make?** The public health benefits are big. Before water fluoridation children had about **3 times** as many cavities.

For more information, visit [ADA.org/fluoride](http://ADA.org/fluoride).

**ADA American Dental Association®**  
America's leading advocate for oral health

## 5 Reasons Why Fluoride in Water is Good for Communities

1. **Prevents tooth decay.** Fluoride in water is the most efficient way to prevent one of the most common childhood diseases – tooth decay. One study has shown that children who live in communities without fluoridation are three times more likely to end up in the hospital to undergo dental surgery.
2. **Protects all ages against cavities.** Studies show that fluoride in community water systems prevents at least 25 percent of tooth decay in children and adults, even in an era with widespread availability of fluoride from other sources, such as fluoride toothpaste. Why fluoride is called [nature's cavity fighter](#).
3. **Safe and effective.** For more than 70 years, the best available scientific evidence consistently has indicated that community water fluoridation is safe and effective. It has been endorsed by numerous U.S. Surgeons General, and more than 100 health organizations recognize the health benefits of water fluoridation for preventing dental decay, including the [Centers for Disease Control and Prevention](#), the American Medical Association, the [World Health Organization](#) and the [American Dental Association](#).
4. **Saves money.** When it comes to the cost of treating dental disease, everyone pays. Not just those who need treatment, but the entire community – through higher health insurance premiums and higher taxes. The average lifetime cost per person to fluoridate a water supply is less than the cost of one dental filling.
5. **It's natural.** Fluoride is naturally present in groundwater and the oceans. Water fluoridation is the adjustment of fluoride to a recommended level for preventing tooth decay. It's similar to fortifying other foods and beverages, like fortifying salt with iodine, milk with vitamin D, orange juice with calcium and bread with folic acid.

If you have specific questions about your family's fluoride needs, please contact your family dentist, pediatrician or physician.

[Next: Why fluoride is like a superhero in your mouth >>](#)

For additional information on fluoridation visit:

- [A Mom's Guide to Fluoride](#): Learn more about fluoride from the perspective of Dr. Brittany Seymour, a mother and assistant professor at the Harvard School of Dental Medicine
- [The ADA's Fluoride and Fluoridation Website](#): General information on fluoridation
- [My Water's Fluoride](#): Learn if your public water system is fluoridated



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## **Community Water Fluoridation is Safe and Effective at Preventing Cavities**

TALLAHASSEE, Fla. (November 22, 2024) – The Florida Dental Association prioritizes the health and well-being of all Floridians and relies on research-proven methods to promote dental health across the state. A recent district court ruling against the Environmental Protection Agency (EPA) provides no scientific basis or new findings that change the Florida Dental Association’s view about community water fluoridation. The Florida Dental Association strongly supports community water fluoridation at optimal levels as an effective, safe and affordable method to prevent tooth decay across all age groups.

District Court Judge Edward Chen stated that his ruling against the EPA “does not conclude with any certainty that fluoridated water is injurious to public health.” Although the ruling requires the EPA to take regulatory action, it did not ban or limit the addition of fluoride to public drinking water supplies.

Health organizations in the U.S. and internationally, including the World Health Organization, American Dental Association, American Academy of Pediatrics and Centers for Disease Control and Prevention, endorse water fluoridation at optimal levels as an effective public health measure. The U.S. Public Health Service, a division of the U.S. Department of Health and Human Services, has established the optimal concentration for fluoride in water supplies to be 0.7 parts per million (ppm).

“Community water fluoridation is one of the most effective and affordable public health measures we can implement to protect our residents' oral health,” said Dr. Jeff Ottley, President of the Florida Dental Association. “Adding optimal amounts of fluoride into our community water supplies can prevent at least 25% of tooth decay in children and adults, reducing the need for costly dental treatments. Decades of sound scientific research proves the safety and effectiveness of fluoridation and underscores the importance of continuing community water fluoridation for the well-being of Florida residents.”

The Florida Dental Association recognizes that there are differing perspectives on fluoridation, often influenced by information and studies that may not reflect the broader scientific consensus. We remain committed to advocating for practices supported by extensive research and evidence to improve oral health across Florida.

Fluoride is naturally present in the water in many parts of the country, including Florida, and has been researched for more than 80 years. The overwhelming, credible scientific evidence consistently indicates that fluoridation of community water supplies is safe and effective at preventing and repairing tooth decay. As a result, fluoride has been added to community water supplies nationwide for over 75 years and the CDC considers community water fluoridation one of the greatest public health achievements of the 20th century.





July 2, 2015

RE: Comments Regarding the Cochrane Review of  
Water Fluoridation for the Prevention of Dental Caries

Dear Colleagues,

In June 2015, the Cochrane Oral Health Group released a publication on community water fluoridation. This review has attracted attention because it appears to reach different conclusions about the effectiveness of this community-based intervention than the final Public Health Service (PHS) recommendation recently released by the U.S. Department of Health and Human Services (HHS). The Centers for Disease Control and Prevention's (CDC) Division of Oral Health would like to provide some clarification on this issue in order to stress where key findings regarding the effectiveness of water fluoridation are in fact the same, and to explain where and why differences exist between the two documents. Above all, we want to assure you that HHS maintains its confidence in water fluoridation as a valuable tool to prevent tooth decay in children as well as adults, and views it as the basis for the primary prevention of tooth decay.

**The Cochrane review and the PHS recommendation both identified reductions in caries in children's permanent and primary teeth associated with community water fluoridation.** Further, data from national surveys conducted in the U.S. continue to show that the percentage of adolescents who have tooth decay has continued to decline across socio-economic and racial and ethnic groups. Both the Cochrane review and the PHS recommendation agree that dental caries continues to be a significant public health problem, and HHS is committed to reducing dental disease through evidence based interventions such as community water fluoridation.

In 2010, HHS convened a federal, interdepartmental, interagency panel of scientists to review the PHS 1962 recommendation that community water systems add fluoride to their drinking water to prevent tooth decay. The PHS review panel utilized the best available science in making their recommendations. The panel concluded that water fluoridation remains a safe and effective strategy to reduce tooth decay, and that it is the most cost effective and feasible way for communities to address dental disease. One key difference between this review and the Cochrane review is that Cochrane used more restrictive criteria for including studies in their analyses. A consequence of their approach was that studies included in the Cochrane review were primarily conducted before 1975. As a result, Cochrane found insufficient information available to determine if water fluoridation had an impact in an environment where fluoride products such as toothpaste are now widely used. Although valid, peer-reviewed studies document the effectiveness of community water fluoridation in children and adults even after the use of fluoride toothpaste became widespread, these studies were not considered by Cochrane. Another factor that impacted Cochrane's assessment of the quality of the evidence is that their methodology favors randomized controlled trials (RCTs). While RCTs are a preferred study design for studies comparing

different clinical treatments among individual patients, this research design is often not feasible for interventions that occur on a community level, like community water fluoridation.

A more detailed comparison of the findings between the Cochrane report and the PHS recommendation along with key references is attached. We hope you find this summary useful.

Sincerely,

A handwritten signature in cursive script that reads "Katherine Weno".

Katherine Weno, DDS, JD  
Director  
Division of Oral Health  
National Center for Chronic Disease Prevention  
and Health Promotion  
Centers for Disease Control and Prevention

Attachment: Summary Comparison of Findings

Attachment:

**Discussion of Community Water Fluoridation Systemic Reviews:**

- Cochrane Collaborative, [Water Fluoridation to Prevent Tooth Decay](#), 2015
- Public Health Service (PHS) [Recommendation for Fluoride Concentration in Drinking Water for the Prevention of Dental Caries](#), 2015

*(Note: The 2010 HHS Panel utilized reviews from the 2013 [Community Preventive Services Task Force](#) (Task Force) in the development of the 2015 PHS recommendation. The Task Force is an independent, nonfederal, unpaid panel of public health and prevention experts that provides evidence-based findings and recommendations about community preventive services, programs, and policies to improve health. Its members represent a broad range of research, practice, and policy expertise in community preventive services, public health, health promotion, and disease prevention.)*

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**Effectiveness of Community Water Fluoridation:**

Effectiveness of Water Fluoridation in Reducing Caries in Children:

- Cochrane found that water fluoridation is effective in reducing caries in primary and permanent teeth in children. The Cochrane review found that water fluoridation resulted in fewer teeth affected by cavities (about 2 primary teeth and 1 permanent tooth ), compared to communities that did not have water fluoridation. These differences indicate that initiation of water fluoridation can result in notable decreases, up to 35%, in cavities in children. In addition, water fluoridation resulted in higher percentages of children without any cavities (caries-free).
- These estimates of fewer teeth affected by cavities in fluoridated communities and a higher percentage of caries-free children are similar to findings of other evidence-based reviews (e.g., the Task Force in 2013).
- For adolescents, the prevalence of tooth decay in the permanent teeth decreased from 90% in the 1960's to 60% in recent national surveys; the number of teeth affected decreased from more than 6 to fewer than 3.

Effectiveness of Water Fluoridation in Reducing Caries in Adults:

- No studies met Cochrane's criteria regarding the effectiveness of water fluoridation in adults. Cochrane includes only studies where the outcomes are evaluated at two points in time in the same sample of adults. Clearly, such an evaluation over a long time period could be difficult.
- Research published in the peer-reviewed literature (in Australia and the United States) found differences in caries experience (i.e., numbers of teeth or tooth surfaces with caries) between adults who have access to community water fluoridation and those who do not. Although these studies used methods designed to control factors that might bias findings, they did not meet criteria established for the Cochrane review.

These studies opted to collect data at one point in time among adults with or without lifetime exposure to fluoridation and then look back to the time when their permanent teeth would have erupted free of tooth decay. In these studies, the researchers used statistical methods to control other factors, such as age, education, and other fluoride exposures, that could affect the relationship between fluoridation and tooth decay. Findings show that water fluoridation resulted in lower caries levels in adults who were exposed to fluoridation even after other sources of fluoride, such as fluoride toothpaste, became widely available.

- Griffin SO, Regnier E, Griffin PM, Huntley V. Effectiveness of fluoride in preventing caries in adults. *J Dent Res* 2007;86:410-5.
- Slade GD, Sanders AE, Do L, Roberts-Thompson K, Spencer AJ. Effects of fluoridated drinking water on dental caries in Australian adults. *J Dent Res* 2013;92:376-82.

### **Strength of the Evidence Supporting Community Water Fluoridation:**

- While other reviews, such as that done by the Task Force, concluded that the evidence supporting water fluoridation is strong, Cochrane interpreted this differently. Their selection criteria excluded most studies conducted after 1975, so they found insufficient evidence to determine if water fluoridation had an impact in an environment where fluoride products such as toothpaste are widely used. There are more recent peer reviewed, scientifically sound studies done after 1975 which have found that water fluoridation is effective in children and adults, but these studies did not meet Cochrane's criteria for inclusion.
  - Rugg-Gunn AJ, Do L. Effectiveness of water fluoridation in caries prevention. *Community Dent Oral Epidemiol* 2012;40(Suppl. 2):55-64.
  - Brunelle JA, Carlos JP. Recent trends in dental caries in U.S. children and the effect of water fluoridation. *J Dent Res* 1990;69(Spec Iss):723-727
  - Griffin SO, Regnier E, Griffin PM, Huntley V. Effectiveness of fluoride in preventing caries in adults. *J Dent Res* 2007;86:410-5.
  - Slade GD, Sanders AE, Do L, Roberts-Thompson K, Spencer AJ. Effects of fluoridated drinking water on dental caries in Australian adults. *J Dent Res* 2013;92:376-82.
- Of studies that were included in the review by Cochrane, only one – the most recent – showed no effect on severity of tooth decay. Cochrane noted in their discussion that this study had a low level of tooth decay at the beginning of the study and the shortest duration of follow-up. Cochrane also noted that the study was conducted in Australia – a country where water fluoridation is widespread. Low caries levels may reflect the diffusion of fluoride from fluoridated to non-fluoridated regions through the commercial distribution of processed foods and beverages.

### **Impact of Community Water Fluoridation on Disparate Populations:**

- Cochrane concluded that there was insufficient information to show that fluoridation works to reduce differences in tooth decay across socio-economic groups.
- Data from national surveys in the U.S. show that prevalence of tooth decay for groups of adolescents defined by poverty status or race/ethnicity has continued to decline over time. The biggest advantage of community water fluoridation is that it is the best method of delivering

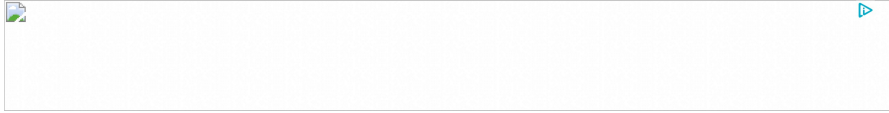
fluoride to all members of the community, regardless of age, education, income level or access to routine dental care.

- Furthermore, CDC recognized community water fluoridation as a major factor responsible for declines in the prevalence and severity of tooth decay over the past 70 years, and named it one of 10 great public health achievements during the 20th century.
  - For example, several studies at the state level have found that Medicaid costs for treatment of tooth decay were lower in fluoridated than non-fluoridated communities. The difference in annual per child treatment costs ranged from \$28 to \$67.

**Need for more Research:**

- Both the Cochrane Review and the latest review conducted by the Task Force identified the need for more research to address the effectiveness of fluoridation in the current environment of widespread use of fluoride toothpaste and other measures to prevent tooth decay, such as fluoride varnish and dental sealants.
  - In the U.S., the Centers for Disease Control and Prevention (CDC) uses data from the National Health and Nutrition Examination Survey (NHANES) to monitor the oral health of the population. NHANES began testing home water samples for fluoride content in 2013 and is also asking questions about use of other fluoride products, such as toothpaste and prescription fluoride drops/tablets, and residence history. Researchers also will continue to examine data for tooth decay as well as dental fluorosis on a national level and for selected socioeconomic and racial groups.

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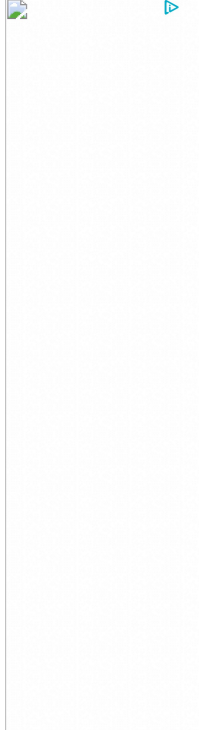
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## Fluoridation FAQs

There is a lot of misinformation in the media about fluoride. Here are science-based answers to questions you may have.

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### What is fluoride?



Fluoride is nature's cavity fighter and occurs naturally in varying amounts in water sources such as rivers, lakes and even the oceans. Fluoride is naturally present to some extent in certain foods and beverages but the levels vary widely. To help protect teeth from cavities, fluoride is also added to some dental products such as toothpaste.

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### How does fluoride protect teeth?



Fluoride benefits both children and adults. Here's how:

Before teeth break through the gums (erupt), the fluoride taken in from foods, beverages and dietary supplements makes tooth enamel (the hard surface of the tooth) stronger, making it easier to resist tooth decay. This provides what is called a "systemic" benefit.



After teeth erupt, fluoride helps rebuild (remineralize) weakened tooth enamel and reverses early signs of tooth decay. When you brush your teeth with fluoride toothpaste, or use other fluoride dental products, the fluoride is applied to the surface of your teeth. This provides what is called a "topical" benefit.

In addition, the fluoride you take in from foods and beverages continues to provide a topical benefit because it becomes part of your saliva, constantly bathing the teeth with tiny amounts of fluoride that help rebuild weakened tooth enamel.

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### What is water fluoridation?



Community water fluoridation is simply the addition of fluoride to drinking water to increase the natural fluoride level up to the recommended level that helps prevent cavities. Almost 75 percent of the U.S. population is served by fluoridated community water systems as of 2012.

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### Why would communities want to fluoridate tap water?



Communities fluoridate their water supply because it is a cost-effective public health method that helps prevent cavities. The average cost per year for U.S. communities to fluoridate the water ranges from \$.50 per person for large communities to \$3.00 per person for small communities.

Cavities are caused by a disease called "caries," which is five times more common than asthma and seven times more common than hayfever in 5-to-17-year-olds. The pain from untreated cavities can cause people to lose sleep, have trouble eating, speaking and paying attention at school or work.

A report from the U.S. Surgeon General in 2000 estimated that 51 million school hours are lost per year because of dental-related illness. Without water fluoridation, that number would likely be much higher.

The American Dental Association (ADA) supports community water fluoridation as the single most effective public health measure to prevent tooth decay. Studies prove water fluoridation continues to be effective in reducing dental decay by at least 25% in children and adults, even in the era of widespread availability of fluoride from other sources, such as fluoride toothpaste.

The ADA, the American Medical Association, the World Health Organization and many others support fluoridation of community water supplies. The U.S. Centers for Disease Control and Prevention (CDC) has cited community water fluoridation as one of 10 great public health achievements of the 20th century (along with vaccinations, infectious disease control and motor vehicle safety).

So, by simply drinking fluoridated water, you are doing something good for your oral health.

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### Is water fluoridation safe? How effective is it in preventing cavities?



Water fluoridation is safe, effective and healthy. Seventy years of research, thousands of studies and the experience of more than 210 million Americans tell us that water fluoridation is effective in preventing cavities and is safe for children and adults.

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### Is Fluoride, as provided by community water fluoridation, a toxic substance?



No. Fluoride in water at the recommended level is not toxic according to the best available scientific evidence.

Toxicity is related to dose. While large doses of fluoride could be toxic, it is important to recognize the difference between the effect of a massive dose of an extremely high level of fluoride versus the fluoride level currently recommended for public water systems. Like many common substances essential to life and good health - salt, iron, vitamins A and D, chlorine,

oxygen and even water itself - fluoride can be toxic in massive quantities.

Fluoride at the much lower recommended concentrations (0.7 mg/L) used in community water fluoridation is not harmful or toxic.

The single dose (consumed at one time) of fluoride that could cause acute fluoride toxicity is 5 mg/kg of body weight (11mg/kg of body weight of sodium fluoride). This dose is considered the probably toxic dose (PTD) which "is defined as the minimum dose that could cause serious or life-threatening systemic signs and symptoms and that should trigger immediate therapeutic intervention and hospitalization." Acute fluoride toxicity occurring from the ingestion of optimally fluoridated water is impossible. With water fluoridated at 1 mg/L, an individual would need to drink five (5) liters of water for every kilogram of body weight. For example, an adult male (155 pound/70.3 kilogram man), it would require that he consume more than 350 liters (nearly 93 gallons) of water at one time to reach an acute fluoride dose. With optimally water now set at 0.7 mg/L, it would take almost 30% more, or nearly 120 gallons (more than 1,900 eight ounce glasses) of water at one time to reach the acute dose.

Sources:

U.S. Department of Health and Human Services. Federal Panel on Community Water Fluoridation. U.S. Public Health Service recommendation for fluoride concentration in drinking water for the prevention of dental caries. Public Health Rep 2015; 130(4):318-331. Article at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4547570>. Accessed August 9, 2010.

Whitford GM. Acute toxicity of ingested fluoride. In Buzalaf MAR (ed): Fluoride and the Oral Environment. Monogor Oral Sci. Basel, Karger. 2011; 22:66-80. Abstract at: <https://www.ncbi.nlm.nih.gov/pubmed/21701192>. Accessed August 9, 2010.

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### What is dental enamel fluorosis?

Dental fluorosis is a change in the appearance of the tooth enamel that only occurs when younger children consume too much fluoride, from any source, over long periods when teeth are developing under the gums. Most commonly, these changes are not readily apparent to the affected individual or casual observer and require a trained specialist to detect. The type of fluorosis found in the United States has no effect on tooth function and may make the teeth more resistant to decay.

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### If fluorosis occurs when teeth are developing, is it okay to use fluoridated water to reconstitute infant formula?

Yes, it is safe to use fluoridated water to mix infant formula. If your baby is primarily fed infant formula, using fluoridated water might increase the chance for mild enamel fluorosis, but enamel fluorosis does not affect the health of your child or the health of your child's teeth. Parents and caregivers are encouraged to talk to their dentists about what's best for their child.

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### What can I do to decrease the chances that my child's teeth will develop fluorosis?

For infants,

- You can breast feed your child. The American Academy of Pediatrics recommends human milk for all infants (except for the few for whom breastfeeding is determined to be harmful). Breast milk is very low in fluoride. Nursing mothers or pregnant women who drink fluoridated water do not pass on significant amounts of fluoride to their child.
- You can use ready-to-feed formula. This type of formula contains little fluoride and does not contribute significantly to the development of mild dental fluorosis.
- You can use powdered or liquid concentrate formula mixed with water that either is fluoride-free or has low concentrations of fluoride. These bottled waters are labeled as de-ionized, purified, demineralized, or distilled.

Parents and caregivers should consult with their pediatrician or family physician on the most appropriate formula for their child.

The chance of development of fluorosis exists through approximate age eight when the teeth are still forming under the gums. Fluoride intake from other sources during this time such as toothpaste and mouthrinse may also contribute to the chance of fluorosis for children living in non-fluoridated and fluoridated communities.

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### **How can I get the benefits of fluoride and minimize the risk of fluorosis for my child?**



Getting the right amount of fluoride is best—not too much and not too little. Your dentist, pediatrician or family physician can help you determine the proper amount of fluoride for your child.

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### **What are the benefits of fluoridated water?**



Fluoridated water helps prevent tooth decay in children and adults. Studies prove water fluoridation continues to be effective in reducing tooth decay by at least 25% in children and adults, even in the of era widespread availability of fluoride from other sources, such as fluoride toothpaste. Simply by drinking water, people can benefit from fluoridation's cavity protection whether they are at home, work or school.

Because of its role in the prevention of tooth decay, the Centers for Disease Control and Prevention has proclaimed community water fluoridation as one of ten great public health achievements of the 20th century.

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### **What are the benefits of fluoride toothpaste?**



All toothpaste helps remove plaque, a film of bacteria that forms on teeth and gums every day. Plaque can cause gum disease and tooth decay. In addition to helping remove plaque, fluoride toothpaste provides an extra benefit in preventing tooth decay by making tooth enamel stronger.

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### **Should children use fluoride toothpaste?**



For children younger than 3 years, parents and caregivers should begin brushing children's teeth as soon as they begin to come into the mouth by using fluoride toothpaste in an amount no more than a smear or the size of a grain of rice.

For children 3 to 6 years of age, parents and caregivers should dispense no more than a pea-sized amount of fluoride toothpaste.

Teeth should be brushed thoroughly twice a day (morning and night) or as directed by a dentist or physician. Children's brushing should be supervised to ensure that they use the appropriate amount of toothpaste.

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### **What are the benefits of fluoride mouthrinse?**



A mouthrinse with fluoride helps reduce tooth decay by making teeth more resistant to decay. Unless you are advised to do so by a dentist or other health professional, the ADA does not recommend the use of fluoride mouthrinses for children younger than six years old. Many children younger than six have not yet fully developed their swallowing reflex and may be more likely to swallow fluoride mouthrinse rather than spitting it out.

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## What are the benefits of dietary fluoride supplements?



Dietary fluoride supplements can be as effective in preventing tooth decay as water fluoridation. With supplements, fluoride is incorporated into the tooth during its formation making the tooth more resistant to decay. In addition, supplements provide a topical benefit as teeth are bathed in fluoride while the lozenges or tablets are chewed. Once the fluoride is absorbed, it will be present in the saliva which delivers fluoride to the tooth surface to help repair the enamel.

Dietary fluoride supplements should be prescribed only for children living in areas without optimal levels of fluoride in their community drinking water and who are at high risk of developing cavities. Talk to your dentist, pediatrician or family physician about your child's specific fluoride needs.

Note: The ADA's dietary fluoride supplement recommendations remain unchanged in light of the new guidelines for community water fluoridation in the U.S. released in April 2015 by the U.S. Public Health Service. The recommendation for fluoride levels in drinking water is newly calibrated at 0.7 milligrams of fluoride per liter of water. The new recommendation, which was supported by the ADA, does not change the ADA Council on Scientific Affairs' [systematic review and clinical recommendation](#) for the use of dietary fluoride supplements that was released in 2010.

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## Where can I find more information about fluoride?



- Read the American Dental Association's [Fluoridation Facts](#).
- Review [Evidence-Based Clinical Practice Guidelines](#) related to fluoride and fluoridation.
- Visit the [Centers for Disease Control and Prevention](#).
- Visit the [American Academy of Pediatrics'](#) Campaign for Dental Health website.

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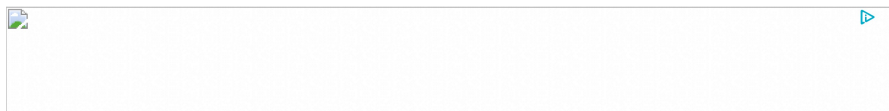
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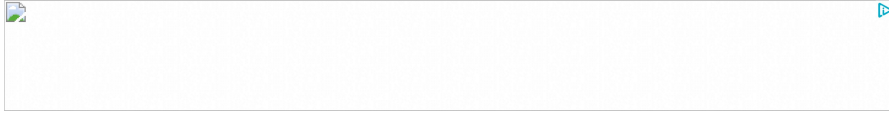
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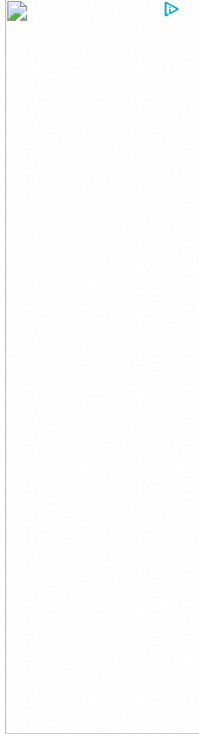
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## Community Water Fluoridation is Effective at Preventing Cavities

FOR IMMEDIATE RELEASE

**CHICAGO, October 4, 2024** — The American Dental Association (ADA) is aware of a recent review released from the Cochrane Library about water fluoridation's impact on the prevention of tooth decay. The ADA, along with other major health organizations such as the American Academy of Pediatrics and the U.S. Centers for Disease Control and Prevention, continue to endorse community water fluoridation at optimal levels to help prevent tooth decay. The ADA believes the review does not present any new or significant findings on the subject.

“Optimally fluoridated water is accessible to communities regardless of socioeconomic status, education or other social variables,” said Linda J. Edgar, D.D.S., president of the American Dental Association. “Even in an era with widespread availability of fluoride from various sources, other studies show that community water fluoridation prevents at least 25% of tooth decay in children and adults throughout their life span. The scientific weight of sound evidence around the benefit of community water fluoridation is clear and compelling.”

According to the U.S. Centers for Disease Control and Prevention, water fluoridation and fluoride toothpaste work *together* to help prevent tooth decay and offer more protection against decay than using either one alone. Fluoridated water keeps a low level of fluoride in the mouth throughout the day, while fluoride toothpaste delivers higher concentrations at important times of the day, such as bedtime.<sup>1</sup>

The National Fluoridation Advisory Committee (NFAC), an expert committee of the ADA, examined the review and noted important limitations in the criteria the investigators used for the inclusion of studies and omission of significant findings. It should be noted that a co-author of the study, Dr. Anne-Marie Glenny, was quoted as saying, "There's no evidence to suggest that where water fluoridation programs are in place, that they should necessarily be stopped...Contemporary studies are showing that water fluoridation is beneficial."

The ADA is aware of many other recent studies excluded from the Cochrane review that show negative impacts on public health once fluoride is removed from the water supply.

"The study's exclusion criteria means that highly relevant research from over the past decade that show significant increases in tooth decay in communities like Juneau, Alaska, Calgary, Canada and other countries after their decision to remove fluoride from water supplies were not included" says NFAC member Catherine Hayes, D.M.D., SM, DMSc.

The NFAC also notes that the review did not rely on enough high-quality studies. NFAC suggested the authors must emphasize caution in interpreting results based on the very small number of recent studies.

"Normally, meta-analyses and systematic reviews are only conducted with substantial numbers of relevant high-quality studies," Dr. Hayes states. "However, there were only a small number of recent studies on which the conclusions are based [only two for primary caries [cavities in baby teeth] outcomes and maybe a few more for permanent caries [cavities in adult teeth]," says Dr. Hayes.

"The analysts at Cochrane also excluded reliable studies because of the year of data collection rather than the quality and reliability of the data. This is an important oversight that cannot be ignored. In addition, Cochrane researchers noted a significant cost-savings due to fluoridation, and this was also not included in the summary," said Dr. Hayes.

The review advises, "the implementation or cessation of CWF [community water fluoridation] requires careful consideration of this current evidence, in the broader context of a population's oral health, diet and consumption of tap water, movement or migration, and the availability and uptake of other caries (cavity) prevention strategies."

"We welcome new research and must always carefully examine the evidence-based scientific methodology of each study and question whether or not the review is complete and impartial in conducting the overall analysis with similar outcomes (e.g. cavities prevention) measured consistently across the globe," said Dr. Hayes.

To learn more about the benefits of fluoride, please visit [MouthHealthy.org](https://www.mouthhealthy.org) or view Fluoridation Facts on the [ADA website](https://www.ada.org).

<sup>1</sup> <https://www.cdc.gov/fluoridation/faq/index.html>

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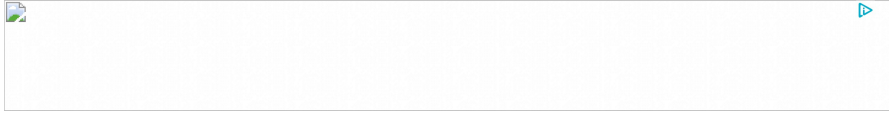
### **About the American Dental Association**

The not-for-profit ADA is the nation's largest dental association, representing 159,000 dentist members. The premier source of oral health information, the ADA has advocated for the public's health and promoted the art and science of dentistry since 1859. The ADA's state-of-the-art research facilities develop and test dental products and materials that have advanced the practice of dentistry and made the patient experience more positive. The ADA Seal of Acceptance has long been a valuable and respected guide to consumer dental care products. The [Journal of the American Dental Association \(JADA\)](https://www.jada.org), published monthly, is the ADA's flagship publication and the best-read scientific journal in dentistry. For more information about the ADA, visit [ADA.org](https://www.ada.org). For more information on oral health, including prevention, care and treatment of dental disease, visit the ADA's consumer website [MouthHealthy.org](https://www.mouthhealthy.org).

### **About the ADA Forsyth Institute**

[The ADA Forsyth Institute](https://www.ada.org/for-syth) was founded in 1910 as the Forsyth Dental Infirmary for Children (later, the Forsyth Institute), to provide dental care to the disadvantaged children of Boston. While continuing to serve children in need, yet recognizing the ultimate goal is to prevent dental disease, the Institute in 1915 began to focus on scientific research and is today the world's leader in oral health research. In October of 2023, the Institute joined with the American Dental Association to form the ADA Forsyth Institute, a 501(c)(3) entity dedicated to improving people's oral and overall health

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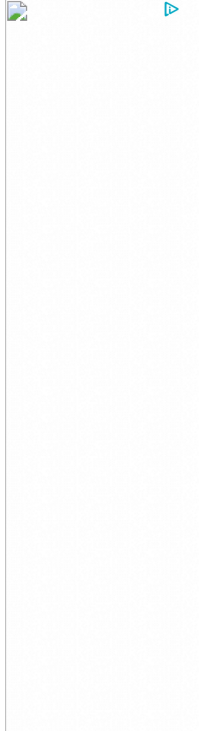
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September 25, 2024

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## Community Water Fluoridation at Optimal Levels is Safe and Effective

FOR IMMEDIATE RELEASE

**CHICAGO, September 25, 2024** — The American Dental Association (ADA) remains staunchly in support of community water fluoridation at optimal levels to help prevent tooth decay. The district court ruling against the Environmental Protection Agency (EPA) provides no scientific basis for the ADA to change its endorsement of community water fluoridation as safe and beneficial to oral health.

The key takeaway for the public and public health community from this ruling is that it “does not conclude with any certainty that fluoridated water is injurious to public health,” as stated by District Court Judge Edward Chen. Based on the ruling, the EPA is required to take a regulatory action, but the ruling did not ban or in any way limit the addition of fluoride to public drinking water supplies. Community water fluoridation at optimal levels is currently defined as 0.7 parts per million by the U.S. Public Health Service and supported by the Centers for Disease Control and Prevention (CDC) and many leading public health authorities.

“Oral health should not be a luxury; it’s essential. Optimally fluoridated water is accessible to communities regardless of socioeconomic status, education or other social variables” said Linda J. Edgar, D.D.S., president of the American Dental Association. “Even in an era with widespread availability of fluoride from various sources, studies show that community water fluoridation prevents at least 25% of tooth decay in children and adults throughout their life span. The scientific weight of sound evidence around the benefit of community water fluoridation is clear and compelling.”

For more than 75 years, public water systems across the country have adjusted the existing and naturally-occurring fluoride levels in drinking water to the recommended optimum concentration to help prevent tooth decay. Community water fluoridation has also been hailed by the CDC as one of 10 great public health achievements of the 20<sup>th</sup> century.

The ADA is aware there is widespread misinformation circulating online and in social media around community water fluoridation. The Association urges its members and the public to be cautious of “pseudo-scientific information”. This information is not always based on research conducted according to impartial and evidence-based scientific methodology; and the conclusions drawn from research are not always scientifically justifiable or without bias.

To learn more about the benefits of fluoride, please visit [MouthHealthy.org](https://www.mouthhealthy.org) or view Fluoridation Facts on the [ADA website](https://www.ada.org).

### About the American Dental Association

The not-for-profit ADA is the nation's largest dental association, representing 159,000 dentist members. The premier source of oral health information, the ADA has advocated for the public's health and promoted the art and science of dentistry since 1859. The ADA's state-of-the-art research facilities develop and test dental products and materials that have advanced the practice of dentistry and made the patient experience more positive. The ADA Seal of Acceptance has long been a valuable and respected guide to consumer dental care products. The [Journal of the American Dental Association \(JADA\)](https://www.jada.org), published monthly, is the ADA's flagship publication and the best-read scientific journal in dentistry. For more information about the ADA, visit [ADA.org](https://www.ada.org). For more information on oral health, including prevention, care and treatment of dental disease, visit the ADA's consumer website [MouthHealthy.org](https://www.mouthhealthy.org).

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[The ADA Forsyth Institute](https://www.ada.org/for-syth) was founded in 1910 as the Forsyth Dental Infirmary for Children (later, the Forsyth Institute), to provide dental care to the disadvantaged children of Boston. While continuing to serve children in need, yet recognizing the ultimate goal is to prevent dental disease, the Institute in 1915 began to focus on scientific research and is today the world's leader in oral health research. In October of 2023, the Institute joined with the American Dental Association to form the ADA Forsyth Institute, a 501(c)(3) entity dedicated to improving people's oral and overall health and powering the profession of dentistry through cutting-edge basic research, creative translational science, innovative clinical technologies, and global public health outreach. Consistent with the Institute's founding mission, the ADA ForsythKids mobile dental program continues to serve children in need.

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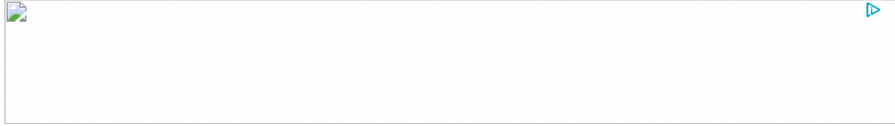
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# Judge orders EPA to address impacts of fluoride in drinking water

ADA says community water fluoridation is safe

by **Olivia Anderson**

September 26, 2024





The ADA has reaffirmed its stance that community water fluoridation is safe and beneficial to oral health, following a federal judge's ruling that the U.S. Environmental Protection Agency must take action regarding fluoride in drinking water. While the EPA is required to take action, the ruling did not ban or in any way limit the addition of fluoride to public drinking water supplies.

In a Sept. 25 [statement](#), the ADA said it remains “staunchly in support” of community water fluoridation at optimal levels to help prevent tooth decay.

“The district court ruling against the Environmental Protection Agency provides no scientific basis for the ADA to change its endorsement of community water fluoridation as safe and beneficial to oral health,” reads the release.

U.S. District Court Judge Edward Chen specified in his Sept. 24 [ruling](#) that although his finding does not “conclude with certainty” that fluoridated water is harmful to public health,

there is evidence that fluoride in drinking water poses a potential risk of cognitive decline.

“Given the seriousness of reduced IQ, and the ample support in the record that the United States population is at risk of experiencing IQ decrements of over four IQ points, the severity of the hazard at issue weights in favor of finding the risk at issue unreasonable,” wrote Judge Chen.

Several advocacy groups petitioned to establish a case that fluoride posed an unreasonable risk of harm sufficient to require a response by the EPA under the amended Toxic Substances Control Act, which allows citizens to petition the EPA to consider whether a chemical presents an unreasonable risk of injury to health.

This ruling comes after the Department of Health and Human Service’s National Toxicology Program released “Monograph on the State of Science Concerning Fluoride Exposure and Neurodevelopment and Cognition.” The August [report](#) found that drinking water at more than twice the recommended limit is “consistently associated” with lower IQ in children. The report notes that the findings are limited to fluoride exposures that are more than double ( $\geq 1.5$  mg/L) what the Centers for Disease Control and Prevention currently recommends for the optimal level of community water fluoridation (0.7 mg/L).

An ADA expert committee examined the report, stating the monograph does not provide any new conclusive evidence that warrants changes in current community water fluoridation practices for public health policy consideration.

The ADA continues to endorse fluoridation of community water as a necessary way to prevent tooth decay and promote oral health. The Association notes that the CDC named it one of the

10 great public health achievements of the 20th century and that for more than 75 years scientific evidence has pointed to fluoridation as safe and effective.

Judge Chen said the Toxic Substances Control Act requires the EPA to engage with a response since the court found an unreasonable risk of injury. He did not state what exactly the response must be.

“Amended [Toxic Substances Control Act] leaves that decision in the first instance to the EPA. One thing the EPA cannot do, however, in the face of this Court’s finding, is to ignore that risk,” he wrote.

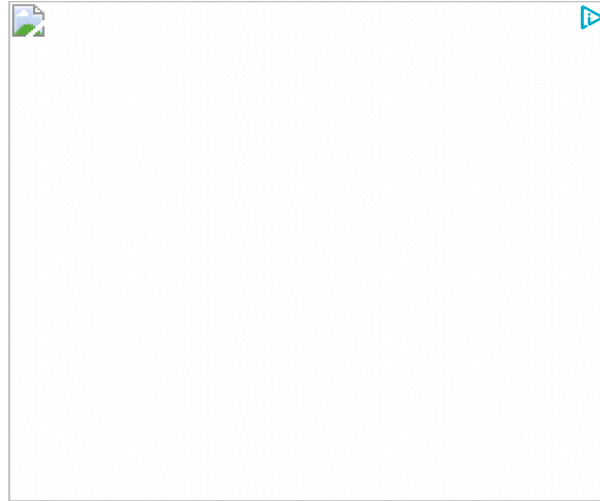
ADA President Linda J. Edgar, D.D.S., said in a statement that oral health is essential and that community water fluoridation has been proven to prevent at least 25% of tooth decay in children and adults.

“The scientific weight of sound evidence around the benefit of community water fluoridation is clear and compelling,” Dr. Edgar said.

Because of the widespread misinformation circulating online and in social media around community water fluoridation, the ADA urged its members to be cautious of “pseudo-scientific information.”

“This information is not always based on research conducted according to impartial and evidence-based scientific methodology; and the conclusions drawn from research are not always scientifically justifiable or without bias,” the release concludes.

For more information on community water fluoridation and ADA advocacy, visit [ADA.org/fluoride](https://ada.org/fluoride).



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# Research review contends fluoride in water is less effective than in 1970s

ADA notes limitations, exclusions in review, reaffirms support for fluoridation

by **Kelly Ganski**

October 04, 2024



A [new review](#) published Oct. 4 by the Cochrane Library contends community water fluoridation is less effective now than it was in the 1970s, but an expert committee of the ADA points out limitations and exclusions in the report.

Researchers from the Universities of Manchester, Dundee and Aberdeen in the United Kingdom examined 157 studies— 135 on fluorosis and 22 on decay prevention — that compared communities in high-income countries that had fluoride added to their water with those that had no additional fluoride in the

water. They conclude that the benefit of fluoridation has declined since the 1970s, when fluoride toothpaste became more widely available. However, they state “the impact of community water fluoridation in low- and middle-income countries is less clear, due to the absence of recent research.”

“Optimally fluoridated water is accessible to communities regardless of socioeconomic status, education or other social variables,” said ADA President Linda J. Edgar, D.D.S. “Even in an era with widespread availability of fluoride from various sources, other studies show that community water fluoridation prevents at least 25% of tooth decay in children and adults throughout their life span. The scientific weight of sound evidence around the benefit of community water fluoridation is clear and compelling.”

Following the review’s release, the ADA issued a statement saying it “believes the review does not present any new or significant findings on the subject” and the Association continues to endorse fluoridation as beneficial to oral health. The American Academy of Pediatric Dentistry, American Academy of Pediatrics and Centers for Disease Control and Prevention continue to endorse the practice.

The ADA’s media statement cited information on the U.S. Centers for Disease Control and Prevention’s website which states, “Water fluoridation and fluoride toothpaste work together to help prevent tooth decay and offer more protection against decay than using either one alone. Fluoridated water keeps a low level of fluoride in the mouth throughout the day, while fluoride toothpaste delivers higher concentrations at important times of the day, such as bedtime.”

The National Fluoridation Advisory Committee, an expert committee of the ADA, examined the review and noted



limitations in the criteria the investigators used for the inclusion of studies and omission of significant findings.

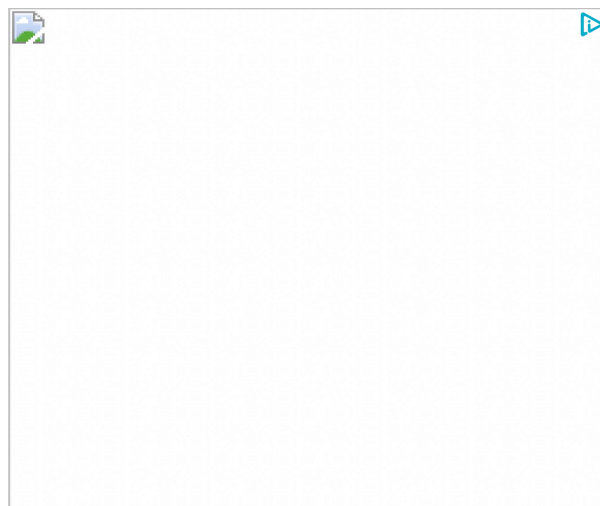
The ADA and National Fluoridation Advisory Committee said there are many other recent studies excluded from the Cochrane review that show negative impacts on public health once fluoride is removed from the water supply.

“The study’s exclusion criteria means that highly relevant research from over the past decade that show significant increases in tooth decay in communities like Juneau, Alaska, Calgary, Canada and other countries after their decision to remove fluoride from water supplies were not included” says Catherine Hayes, D.M.D., member of the National Fluoridation Advisory Committee.

The NFAC also notes that the review did not rely on enough high-quality studies. NFAC suggested the authors must emphasize caution in interpreting results based on the very small number of recent studies.

“Normally, meta-analyses and systematic reviews are only conducted with substantial numbers of relevant high-quality studies,” Dr. Hayes said. “However, there were only a small number of recent studies on which the conclusions are based  $\frac{3}{4}$  only two for primary caries [cavities in baby teeth] outcomes and maybe a few more for permanent caries [cavities in adult teeth]. The analysts at Cochrane also excluded reliable studies because of the year of data collection rather than the quality and reliability of the data. This is an important oversight that cannot be ignored. In addition, Cochrane researchers noted a significant cost-savings due to fluoridation, and this was also not included in the summary.”

The review advises, “the implementation or cessation of CWF [community water fluoridation] requires careful consideration of this current evidence, in the broader context of a population’s oral health, diet and consumption of tap water, movement or migration and the availability and uptake of other caries (cavity) prevention strategies.”



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# Fluoridation Facts



## Dedication

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This 2018 edition of *Fluoridation Facts* is dedicated to Dr. Ernest Newbrun, respected researcher, esteemed educator, inspiring mentor and tireless advocate for community water fluoridation.

## About Fluoridation Facts

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*Fluoridation Facts* contains answers to frequently asked questions regarding community water fluoridation. A number of these questions are responses to myths and misconceptions advanced by a small faction opposed to water fluoridation. The answers to the questions that appear in *Fluoridation Facts* are based on generally accepted, peer-reviewed, scientific evidence. They are offered to assist policy makers and the general public in making informed decisions. The answers are supported by over 400 credible scientific articles, as referenced within the document. It is hoped that decision makers will make sound choices based on this body of generally accepted, peer-reviewed science.

## Acknowledgments

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This publication was developed by the National Fluoridation Advisory Committee (NFAC) of the American Dental Association (ADA) Council on Advocacy for Access and Prevention (CAAP). NFAC members participating in the development of the publication included Valerie Peckosh, DMD, chair; Robert Crawford, DDS; Jay Kumar, DDS, MPH; Steven Levy, DDS, MPH; E. Angeles Martinez Mier, DDS, MSD, PhD; Howard Pollick, BDS, MPH; Brittany Seymour, DDS, MPH and Leon Stanislav, DDS.

Principal CAAP staff contributions to this edition of *Fluoridation Facts* were made by: Jane S. McGinley, RDH, MBA, Manager, Fluoridation and Preventive Health Activities; Sharon (Sharee) R. Clough, RDH, MS Ed Manager, Preventive Health Activities and Carlos Jones, Coordinator, Action for Dental Health. Other significant staff contributors included Paul O'Connor, Senior Legislative Liaison, Department of State Government Affairs. In addition to her legal review, Wendy J. Wils, Esq., Deputy General Counsel, Division of Legal Affairs provided greatly to the vision of this publication.

### **Disclaimer**

This publication is designed to answer frequently asked questions about community water fluoridation, based on a summary of relevant published articles. It is not intended to be a comprehensive review of the extensive literature on fluoridation and fluorides or to promote professional advice. Readers must also rely on their own review of the literature, including the sources cited herein and any subsequently published, for a complete understanding of these issues.

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# Executive Summary

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- Fluoridation of community water supplies is the single most effective public health measure to prevent tooth decay.
  - Throughout more than 70 years of research and practical experience, the overwhelming weight of credible scientific evidence has consistently indicated that fluoridation of community water supplies is safe.
  - Studies prove water fluoridation continues to be effective in reducing tooth decay by more than 25% in children and adults, even in an era with widespread availability of fluoride from other sources, such as fluoride toothpaste.
  - Because of the important role it has played in the reduction of tooth decay, the Centers for Disease Control and Prevention has proclaimed community water fluoridation (along with vaccinations and infectious disease control) one of ten great public health achievements of the 20th century.
  - Community water fluoridation is the controlled adjustment of fluoride that occurs naturally in all water to optimal levels to prevent tooth decay.
  - Community water fluoridation benefits everyone, especially those without access to regular dental care. Fluoridation is a powerful tool in the fight for social justice and health equity.
  - Simply by drinking water, people can benefit from fluoridation's cavity protection whether they are at home, work or school.
  - Water that has been fortified with fluoride is similar to fortifying salt with iodine, milk with vitamin D and orange juice with vitamin C — none of which are medications.
- When compared to the cost of other prevention programs, water fluoridation is the most cost-effective means of preventing tooth decay for both children and adults in the United States. The cost of a lifetime of water fluoridation for one person is less than the cost of one filling.
  - For community water systems that serve more than 1,000 people, the economic benefit of fluoridation exceeds the cost. And the benefit-cost ratio increases as the size of the population served increases (largely due to economies of scale). Fluoridation is a cost-saving method to prevent tooth decay.
  - According to data from 2014, nearly 75% of the population (3 out of 4 people) in the United States are served by public water systems that are optimally fluoridated.
  - Fluoridation has been thoroughly tested in the United States' court system, and found to be a proper means of furthering public health and welfare. No court of last resort has ever determined fluoridation to be unlawful.
  - The ADA supports community water fluoridation as a safe, effective, cost-saving and socially equitable way to prevent tooth decay.
  - One of the most widely respected sources for information regarding fluoridation and fluorides is the American Dental Association. The ADA maintains Fluoride and Fluoridation web pages at <http://www.ADA.org/fluoride>.

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# Introduction

*Fluoridation Facts* has been published by the American Dental Association (ADA) since 1956. Revised periodically, *Fluoridation Facts* answers frequently asked questions about community water fluoridation. In this 2018 edition, the ADA Council on Advocacy for Access and Prevention provides updated information for individuals and groups interested in the facts about fluoridation. The United States now has more than 70 years of extensive experience with community water fluoridation. Its remarkable longevity and success is testimony to fluoridation's significance as a public health measure. In recognition of the impact that water fluoridation has had on the oral and general health of the public, in 1999, the Centers for Disease Control and Prevention (CDC) named fluoridation of drinking water as one of ten great public health achievements of the 20th century.<sup>1,2</sup>

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*Many organizations in the United States and around the world recognize the benefits of community water fluoridation.*

---

## Support for Water Fluoridation

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Since 1950, the American Dental Association (ADA) has continuously and unreservedly endorsed the optimal fluoridation of community water supplies as a safe and effective public health measure for the prevention of tooth decay. The ADA's policy is based on the best available scientific evidence on the safety and effectiveness of fluoridation. Since the ADA first adopted policy recommending community water fluoridation in 1950, the ADA has continued to reaffirm its position of support for water fluoridation and has strongly urged that its benefits be extended to communities served by public water systems.<sup>3</sup>

Over the years, additional support has come from numerous U.S. Surgeons General who are the leading spokespersons on matters of public health in the federal government. In 2016, Surgeon General Dr. Vivek H. Murthy in his "Statement on Community Water Fluoridation,"<sup>4</sup> noted:

Water fluoridation is the best method for delivering fluoride to all members of the community, regardless of age, education, income level or access to routine dental care. Fluoride's effectiveness in preventing tooth decay extends throughout one's life, resulting in fewer — and less severe — cavities. In fact, each generation born over the past 70 years has enjoyed better dental health than the one before it. That's the very essence of the American promise.<sup>4</sup>

In addition to the American Dental Association, the American Medical Association,<sup>5</sup> the American Academy of Pediatrics<sup>6</sup> and the World Health Organization<sup>7</sup> also support community water fluoridation.

Many organizations in the United States and around the world recognize the benefits of community water fluoridation. The ADA has developed a list of "National and International Organizations that Recognize the Public Health Benefits of Community Water Fluoridation for Preventing Dental Decay." Please see the ADA website at [www.ADA.org/fluoride](http://www.ADA.org/fluoride) for the most current listing as well as information on reproduction and distribution of the list.



## Scientific Information on Fluoridation

The ADA's policies regarding community water fluoridation are based on the best available scientific knowledge. This body of knowledge results from the efforts of nationally recognized scientists who have conducted research using the scientific method, have drawn appropriate balanced conclusions based on their research findings and published their results in refereed (peer-reviewed) professional journals that are widely held or circulated. Studies showing the safety and effectiveness of water fluoridation have been confirmed by independent scientific studies conducted by a number of nationally and internationally recognized scientific investigators. While opponents of fluoridation have questioned its safety and effectiveness, none of their charges has ever been substantiated by scientific evidence.

With the advent of the Information Age, a new type of "pseudo-scientific literature" has developed. The public often sees scientific and technical information quoted in the press, printed in a letter to the editor or distributed via an internet web page. Often the public accepts such information as true simply because it is in print. Yet the information is not always based on research conducted according to the scientific method and the conclusions drawn from research are not always scientifically justifiable. In the case of water fluoridation, an abundance of misinformation has been circulated. Therefore, scientific information from all print and electronic sources must be critically reviewed before conclusions can be drawn. (See Figure 1.) Everyone is entitled to his or her own opinion but not his or her own facts. Pseudo-scientific literature can pique a reader's interest but when read as science, it can be misleading. The scientific validity and relevance of claims made by opponents of fluoridation might be

**Figure 1. A Guide to Identifying and Using Trustworthy Information**

### Question The Author

Actively search for study authors' intellectual and financial conflicts of interest that may have affected the conduct of the study or results interpretation.

### Correlation Does Not Imply Causation

The fact that two things happen together does not mean that one necessarily causes the other.

### Mice vs. Humans

Wait for studies with human subjects to confirm animal studies' results before considering applying the research findings in practice.

### Consider The Big Picture

Identify systematic reviews that comprehensively summarize the evidence instead of using single studies that present only a small part of the big picture.

### High Impact Journals

Impact factor and reputation of a journal do not necessarily relate to the quality of the published study in question, so always remain skeptical.

### The Right Study Design

Some clinical questions cannot be studied using the classic randomized control (RCT) study design and non-RCT designs may be a suitable alternative

best viewed when measured against criteria set forth by the U.S. Supreme Court.<sup>8</sup>

➦ *Additional information about this topic can be found in the Public Policy Section, Question 61.*

## History of Water Fluoridation

Research into the effects of fluoride began in the early 1900s. Dr. Frederick McKay, a young dentist, opened a dental practice in Colorado Springs, Colorado, and was surprised to discover that many local residents exhibited brown stains on their permanent teeth. Dr. McKay could find no documentation of the condition in the dental literature and eventually convinced Dr. G.V. Black, dean of the Northwestern University Dental School in Chicago, to join him in studying the condition. Through their research, Drs. Black and McKay determined that mottled enamel, as Dr. Black termed the condition, resulted from developmental imperfections in teeth. Drs. Black and McKay wrote detailed descriptions of mottled enamel.<sup>9,10</sup> (Mottled enamel is a historical term. Today, this condition is called dental or enamel fluorosis.)

In the 1920s, Dr. McKay, along with others, suspected that something either in or missing from the drinking water was causing the mottled enamel. Dr. McKay wrote to the Surgeon General in 1926 indicating that he had identified a number of regions in Colorado, New Mexico, Arizona, California, Idaho, South Dakota, Texas and Virginia where mottled enamel existed. Also in the late 1920s, Dr. McKay made another significant discovery — these stained teeth were surprisingly resistant to decay.<sup>10</sup>

Following additional studies completed in the early 1930s in St. David, Arizona<sup>11</sup> and Bauxite, Arkansas,<sup>12</sup> it was determined that high levels of naturally occurring fluoride in the drinking water were causing the mottled enamel. In Arizona, researchers studied in great detail 250 residents in 39 local families and were able to rule out hereditary factors and environmental factors, except for one — fluoride in the water which occurred naturally at levels of 3.8 mg/L to 7.15 mg/L.<sup>11</sup> In Bauxite, H. V. Churchill, chief chemist with the Aluminum Company of America (later changed to ALCOA), was using a new method of spectrographic analysis in his laboratory to look at the possibility that the water from an abandoned deep well in the area might have high levels of aluminum-containing bauxite that was causing mottled teeth. What he found was that the water contained a high level of

naturally occurring fluoride (13.7 mg/L). When McKay learned of this new form of analysis and Churchill's findings, he forwarded samples of water from areas where mottled enamel was commonplace to Churchill. All of the samples were found to have high levels of fluoride when compared to waters tested from areas with no mottled enamel.<sup>10</sup>

During the 1930s, Dr. H. Trendley Dean, a dental officer of the U.S. Public Health Service, and his associates conducted classic epidemiological studies on the geographic distribution and severity of fluorosis in the United States.<sup>13</sup> These early studies quantified the severity of tooth decay and dental fluorosis, called mottled enamel at that time, according to fluoride levels in the water. In so doing, it was observed that "at Aurora, IL where the domestic water contained 1.2 ppm of fluoride (F) and where a relatively low tooth decay prevalence was recorded, mottled enamel as an esthetic problem was not encountered."<sup>14</sup> Dean and his staff had made a critical discovery. Namely, fluoride levels of up to 1.0 ppm in drinking water did not cause enamel fluorosis in most people and only mild dental fluorosis in a small percentage of people.<sup>14-16</sup>

In 1939, Dr. Gerald J. Cox and his associates at the Mellon Institute evaluated the epidemiological evidence and conducted independent laboratory studies. While the issue was being discussed in the dental research community at the time, they were the first to publish a paper that proposed adding fluoride to drinking water to prevent tooth decay.<sup>17</sup> In the 1940s, four classic, community-wide studies were carried out to evaluate the controlled addition of sodium fluoride to fluoride-deficient water supplies. The first community water fluoridation program, under the direction of Dr. Dean, began in Grand Rapids, Michigan, in January 1945 with Muskegon, Michigan as the nonfluoridated control community. The other three studies were conducted in the following three pairs of cities with the fluoridated city listed first: Newburgh and Kingston, New York (May 1945); Brantford and Sarnia, Ontario, Canada (June 1945) and Evanston and Oak Park, Illinois (February 1947).<sup>18-20</sup>

*In the 1940s, four classic, community-wide studies were carried out to evaluate the controlled addition of sodium fluoride to fluoride-deficient water supplies.*

The astounding success of these comparison studies firmly established the practice of water fluoridation as a practical, safe and effective public health measure to prevent tooth decay that would quickly be embraced by other communities.

The history of water fluoridation is a classic example of a curious professional making exacting clinical observations which led to epidemiologic investigation and eventually to a safe and effective community-based public health intervention which even today remains the cornerstone of communities' efforts to prevent tooth decay.

In addition to the studies noted above, a number of reviews on fluoride in drinking water have been issued over the years. For example, in 1951 the National Research Council (NRC), of the National Academies, issued its first report stating fluoridation was safe and effective. The NRC has continued to issue reports on fluoride in drinking water (1977<sup>21</sup> and 1993<sup>22</sup>) with the most recent review published in 2006.<sup>23</sup> Additional reviews completed over the ten year period from 2007–2017 include:

- 2017 Australian Government. National Health and Medical Research Council (NHMRC). *Information Paper — Water Fluoridation: Dental and Other Human Health Outcomes*.<sup>24</sup>
- 2016 O'Mullane DM, Baez RJ, Jones S, Lennon MA, Petersen PE, Rugg-Gunn AJ, Whelton H, Whitford GM. *Fluoride and Oral Health*.<sup>25</sup>
- 2016 American Water Works Association. *Water Fluoridation Principles and Practices*. AWWA Manual M4. Sixth edition.<sup>26</sup>
- 2015 Water Research Foundation. *State of the Science: Community Water Fluoridation*.<sup>27</sup>
- 2015 The Network for Public Health Law. *Issue Brief: Community Water Fluoridation*.<sup>28</sup>
- 2015 Ireland Health Research Board. *Health Effects of Water Fluoridation: An Evidence Review*.<sup>29</sup>
- 2015 U.S. Department of Health and Human Services Federal Panel on Community Water Fluoridation. *U.S. Public Health Service Recommendation for Fluoride Concentration in Drinking Water for the Prevention of Dental Caries*.<sup>30</sup>

- 2014 Public Health England. *Water Fluoridation: Health Monitoring Report for England*.<sup>31</sup>
- 2014 Royal Society of New Zealand and the Office of the Prime Minister's Chief Science Advisor. *Health Effects of Water Fluoridation: a Review of the Scientific Evidence*.<sup>32</sup>
- 2013 U.S. Community Preventive Services Task Force. The Guide to Community Preventive Services. *Preventing Dental Caries: Community Water Fluoridation*.<sup>33</sup>
- 2011 European Commission of the European Union Scientific Committee on Health and Environmental Risks (SCHER). *Fluoridation*.<sup>34</sup>
- 2008 Health Canada. *Findings and Recommendations of the Fluoride Expert Panel*.<sup>35</sup>
- 2007 Australian Government. National Health and Medical Research Council *A Systematic Review of the Efficacy and Safety of Fluoridation; Part A: Review Methodology and Results*.<sup>36</sup>

## Water Fluoridation as a Public Health Measure

Throughout decades of research and more than 70 years of practical experience, fluoridation of public water supplies has been responsible for dramatically improving the public's oral health. In 1994, the U.S. Department of Health and Human Services (HHS) issued a report which reviewed public health achievements.<sup>37</sup> Along with other successful public health measures such as the virtual eradication of polio and reductions in childhood blood lead levels, fluoridation was lauded as one of the most economical preventive interventions in the nation.<sup>37</sup>

Because of the important role fluoridation has played in the reduction of tooth decay, the Centers for Disease Control and Prevention proclaimed community water fluoridation one of ten great public health achievements of the 20th century.<sup>1, 2</sup> Other public health achievements included in the 1999 announcement were vaccinations (which have been responsible for the elimination of polio in the Americas), recognition of tobacco use as a health hazard and the decline in deaths from coronary heart disease and stroke. In 2000, U.S. Surgeon General Dr. David Satcher issued the first ever Surgeon General

report on oral health, *Oral Health in America: a Report of the Surgeon General*.<sup>38</sup> In the report, Dr. Satcher stated that community water fluoridation continues to be the most cost-effective, practical and safe means for reducing and controlling the occurrence of tooth decay in a community. Additionally, Dr. Satcher noted that water fluoridation is a powerful strategy in efforts to eliminate health disparities among populations. Studies have shown that fluoridation is the most significant strategy employed to reduce disparities in tooth decay.<sup>38-42</sup>

➤ *Additional information about this topic can be found in the Public Policy Section, Question 59.*

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In the 2003 *National Call to Action to Promote Oral Health*,<sup>43</sup> U.S. Surgeon General Dr. Richard Carmona called on policymakers, community leaders, private industry, health professionals, the media and the public to affirm that oral health is essential to general health and well-being. Additionally, Dr. Carmona urged these groups to apply strategies to enhance the adoption and maintenance of proven community-based interventions such as community water fluoridation.

Writing in *Public Health Reports* in 2010, Surgeon General Dr. Rebecca Benjamin noted that, "Community water fluoridation continues to be a vital, cost-effective method of preventing dental caries."<sup>44</sup>

In a 2015 Surgeon's General Perspective<sup>45</sup> issued to coincide with the release of the updated USPHS recommendation on fluoride levels in drinking water to prevent tooth decay, Surgeon General Dr. Vivek H. Murthy stated, "As Surgeon General, I encourage all Americans to make choices that enable them to prevent illness and promote well-being. Community water fluoridation is one of the most practical, cost-effective, equitable, and safe measures communities can take to prevent tooth decay and improve oral health."<sup>45</sup>

Established by the U.S. Department of Health and Human Services (DHHS), Healthy People 2020<sup>46</sup> provides a science-based, comprehensive set of ambitious, yet achievable, ten-year national objectives for improving the health of the public. Included under oral health is an objective to expand the fluoridation of public water supplies. Objective 13 states that at least 79.6% of the U.S. population served by community water systems should be receiving the benefits of optimally fluoridated water by the year 2020.<sup>47</sup> In 2014, the CDC indicated that 74.4% of the U.S. population on public water systems, or a total of 211.4 million people, had access to fluoridated water.<sup>48</sup>

After more than four years of additional research and review following the initial notice of intent, in 2015 the DHHS announced that the U.S. Public Health Service had made a final recommendation on the fluoride level in drinking water<sup>30</sup> that updated and replaced the 1962 Drinking Water Standards related to community water fluoridation. In this guidance, the optimal concentration of fluoride in drinking water of 0.7 mg/L (milligrams per liter) was defined as "the concentration that provides the best balance of protection from dental caries while limiting the risk of dental fluorosis."<sup>30</sup>

➤ *Additional information about this topic can be found in the Safety Section, Question 19.*

## Water Fluoridation's Role in Reducing Tooth Decay

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Water fluoridation has played a significant role in improving oral health. Numerous studies and reviews have been published making fluoridation one of the most widely studied public health measures in history. Fluoridation of community water supplies is the single most effective public health measure to prevent tooth decay. Studies show that community water fluoridation prevents at least 25 percent of tooth decay in children<sup>49</sup> and adults,<sup>50</sup> even in an era with widespread availability of fluoride from other sources, such as fluoride toothpaste. Fluoridation helps to prevent, and in some cases, reverse tooth decay across the life span. Increasing numbers of adults are retaining their teeth throughout their lifetimes due in part to the benefits they receive from water fluoridation. Dental costs for these individuals are likely to have been reduced and many

hours of needless pain and suffering due to untreated tooth decay have been avoided. By preventing tooth decay, community water fluoridation has been shown to save money, both for families and the health care system. The return on investment for community water fluoridation varies with size of the community, and in general, increases as the community size increases. Community water fluoridation is cost-saving, even for small communities.

➤ *Additional information about this topic can be found in the Cost Section, Question 68.*

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*Fluoridation of community water supplies is the single most effective public health measure to prevent tooth decay. Studies show that community water fluoridation prevents at least 25 percent of tooth decay in children and adults, even in an era with widespread availability of fluoride from other sources, such as fluoride toothpaste.*

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Community water fluoridation is a most valuable public health measure because:

- Optimally fluoridated water is accessible to the entire community regardless of socioeconomic status, educational attainment or other social variables.<sup>51</sup>
- Individuals do not need to change their behavior to obtain the benefits of fluoridation.
- Frequent exposure to small amounts of fluoride over time makes fluoridation effective through the life span in helping to prevent tooth decay.<sup>52</sup>
- Community water fluoridation is more cost-effective and cost-saving than other forms of fluoride treatments or applications.<sup>53,54</sup>

Tooth decay is caused by sugars in snacks, food and beverages being converted into acid by the bacteria in dental plaque, a thin, sticky, colorless deposit on teeth. The acid attacks the tooth enamel (the hard surface of the tooth) or root surface. After repeated attacks, the enamel or root surface loses minerals (demineralization) and the acids and bacteria penetrate the dentin and finally the pulp. The soft

tissue of the pulp contains nerves and blood vessels. Once the decay enters the pulp, it becomes infected and without treatment, the infection progresses and travels into the surrounding tissues. It can enter the bloodstream and potentially spread the infection to other parts of the body which can be life-threatening.

➤ *Additional information about this topic can be found in the Benefits Section, Question 2.*

There are a number of factors that increase an individual's risk for tooth decay:<sup>54-59</sup>

- Recent history of tooth decay
- Elevated oral bacteria count
- Inadequate exposures to fluorides
- Exposed roots
- Frequent intake of sugar/sugary foods and sugar-sweetened beverages
- Poor or inadequate oral hygiene
- Decreased flow of saliva
- Deep pits and fissures on the chewing surfaces of teeth

Exposure to fluoride is a key component in any recommended decay prevention strategy; however, the use of fluoride alone will not prevent all tooth decay. In formulating a decay prevention program, in addition to consuming fluoridated tap water, a number of intervention strategies may be considered such as improved daily home care, reducing sugar in the diet, placement of dental sealants and prescription strength fluoride toothpaste for home use and professionally applied topical treatments.

## Ongoing Need for Water Fluoridation

Because of the risk factors for tooth decay noted previously, many individuals and communities still experience high levels of tooth decay. Although water fluoridation demonstrates an impressive record of effectiveness and safety, only 74.4% of the United States population on public water supplies in 2014 received fluoridated water containing protective levels of fluoride.<sup>48</sup> Unfortunately, some people continue to be confused about this effective public health measure. If the number of individuals drinking fluoridated water is to increase, the public must be accurately informed about its benefits and safety.



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## 1. What is fluoride?

### Answer.

Fluoride is a naturally occurring mineral that can help prevent tooth decay.

### Fact.

The element fluorine is abundant in the earth's crust as a naturally occurring fluoride compound found in rocks and soil.<sup>1</sup> As ground water moves through the earth, it passes over rock formations and dissolves the fluoride minerals that are present, releasing fluoride ions that are naturally occurring fluoride in the rocks. This increases the fluoride content of the water. The concentration of fluoride in ground water (e.g., wells, springs) varies according to such factors as the depth at which the water is found and the quantity of fluoride-bearing minerals in the area.

Fluoride is present at varied concentrations in all water sources including rainwater and the oceans. For example, the oceans' fluoride levels range from 1.2 to 1.4 mg/L.<sup>2</sup> In the United States, the natural level of fluoride in ground water varies from very low levels to over 4 mg/L.<sup>3</sup> In comparison, the fluoride concentrations in surface water sources such as lakes and rivers is very low. For example, the water analysis completed by the city of Chicago for the year 2016 lists the range for Lake Michigan's natural fluoride level as 0.11 to 0.13 mg/L.<sup>4</sup>

## 2. How does fluoride help prevent tooth decay?

### Answer.

Tooth decay begins when the outer layer of a tooth loses some of its minerals due to acid produced by bacteria in dental plaque breaking down the sugars that we eat. Fluoride protects teeth by helping to prevent the loss of these minerals and by restoring them with a fluoride-containing mineral that is more resistant to acid attacks. In other words, fluoride protects teeth by reducing demineralization and enhancing remineralization. Fluoride also works to hinder bacterial activity necessary for the formation of tooth decay.

### Fact.

One of fluoride's main mechanism of action is its ability to prevent or delay the loss of minerals from teeth.<sup>5,6</sup> Cavities start to form when minerals are lost due to acid attacks from bacteria in dental plaque (a soft, sticky film that is constantly forming on teeth). Bacteria grow rapidly by feeding on the sugars and refined carbohydrates that we consume. This process of losing minerals is called demineralization.

Fluoride's second mechanism of action is called remineralization, which is the reversal of this demineralization process.<sup>6,7</sup> Teeth gain back the minerals lost during acid attacks through remineralization but with an important difference. Some of the hydroxyapatite crystal lost is replaced with fluorapatite. This fluoride-rich replacement mineral is even more resistant to acid attacks than the original tooth surface.<sup>6</sup>



Studies indicate fluoride has a third mechanism of action that hinders the ability of bacteria to metabolize carbohydrates and produce acids.<sup>5</sup> It can also hinder the ability of the bacteria to stick to the tooth surface.<sup>8</sup>

Fluoride and minerals, including calcium and phosphate, are present in saliva<sup>6,8</sup> and are stored in dental plaque. To halt the formation of tooth decay or rebuild tooth surfaces, fluoride must be constantly present in low concentrations in saliva and plaque.<sup>6</sup> Frequent exposure to small amounts of fluoride, such as that which occurs when drinking fluoridated water, helps to maintain the reservoir of available fluoride in saliva and plaque to resist demineralization and enhance remineralization.<sup>6,9</sup> In other words, drinking fluoridated water provides the right amount of fluoride at the right place at the right time. Fluoride in water and water-based beverages is consumed many times during the day, providing frequent contact with tooth structures and making fluoride available to fluoride reservoirs in the mouth. This helps explain why fluoride at the low levels found in fluoridated water helps to prevent tooth decay.<sup>6</sup>

Additionally, studies have concluded that fluoride ingested during tooth formation becomes incorporated into the tooth structure making the teeth more resistant to acid attacks and demineralization.<sup>10-14</sup> In particular, this pre-eruptive exposure to fluoride, before the teeth come into the mouth during childhood, can play a significant role in preventing tooth decay in the pits and fissures of the chewing surfaces, particularly of molars.<sup>6,15,16</sup> Sources of fluorides in the United States that provide this pre-eruptive effect include fluoridated water and dietary fluoride supplements as well as fluoride present in foods and beverages. Additionally, young children often swallow substantial percentages of the fluoride toothpaste and other fluoride-containing dental products which adds to their intake of fluoride. Originally, it was believed that fluoride's action was exclusively pre-eruptive, meaning the benefit occurred only during tooth formation, but by the mid-1950s there was growing evidence of the importance of fluoride's important roles in demineralization and remineralization.<sup>11</sup>

Pre-eruptive effects are sometimes called systemic, while post-eruptive effects are called topical. These terms refer to different things. Pre- and post-eruptive refer to the timing of fluoride benefits while systemic

and topical refer to the mode of administration or source of fluoride. Defining the effects of fluoride from a specific source as solely systemic or topical is not entirely accurate. For example, water fluoridation provides both a systemic (during tooth development) and topical effect (at the time of ingestion strengthening the outside of the tooth).

Today it is understood that the maximum reduction in tooth decay occurs when both effects are combined, that is when fluoride has been incorporated into the tooth during formation and when it is available at the tooth surface during demineralization and remineralization. Water fluoridation works in both ways to prevent tooth decay.<sup>8,11,13,15,16</sup>

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### 3. What is water fluoridation?

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#### **Answer.**

Water fluoridation is the controlled adjustment of the natural fluoride concentration in community water supplies to the concentration recommended for optimal dental health. Fluoridation helps prevent tooth decay in children and adults.

#### **Fact.**

In 2015, the U.S. Department of Health and Human Services (HHS), using the best available science, established the recommended concentration for fluoride in the water in the United States at 0.7 mg/L.<sup>17</sup> This level effectively reduces tooth decay while minimizing dental fluorosis.


The level of fluoride in water is measured in milligrams per liter (mg/L) or parts per million (ppm). When referring to water, a concentration in milligrams per liter is identical to parts per million and the notations can be used interchangeably. Thus, 0.7 mg/L of fluoride in water is identical to 0.7 ppm. The preferred notation is milligrams per liter.

At 0.7 mg/L, there are seven-tenths of one part of fluoride mixed with 999,999.3 parts of water. While not exact, the following comparisons can be of assistance in comprehending 0.7 mg/L:

- 1 inch in approximately 23 miles
- 1 minute in approximately 1000 days
- 1 cent in approximately \$14,000.00
- 1 seat in more than 34 Wrigley Field baseball parks (seating capacity 41,268)

The following terms and definitions are used in this publication:

- **Community water fluoridation** is the controlled adjustment of the natural fluoride concentration in water up to 0.7 mg/L, the level recommended for optimal dental health. Other terms used interchangeably are water fluoridation, fluoridation and optimally fluoridated water. Optimal levels of fluoride can be present in the water naturally or by adjusted means.
- **Sub-optimally fluoridated water** is water that naturally contains less than the optimal level (below 0.7 mg/L) of fluoride. Other terms used are nonfluoridated water and fluoride-deficient water.

 Additional information on this topic can be found in this Section, Question 6.

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## 4. How much fluoride is in your water?

### Answer.

If your water comes from a public/community water supply, the options to learn the fluoride level of the water include contacting the local water supplier or the local/county/state health department, reviewing the Consumer Confidence Report (CCR) issued by your local water supplier, and using the Centers for Disease Control and Prevention's internet based "My Water's Fluoride." If your water source is a private well, it will need to be tested and the results obtained from a certified laboratory.

### Fact.

The fluoride content of the local public or community water system can be obtained by contacting the local water supplier or the local/county/state health department. The name of your water system might not be the same as the name of your community.

In 1999, the U.S. Environmental Protection Agency (EPA) began requiring water suppliers to make annual drinking water quality reports accessible to their customers. Available prior to July 1 each year for the preceding calendar year, these Consumer Confidence Reports (CCRs), or Water Quality Reports,<sup>18</sup> can be mailed to customers, placed in the local newspaper or made available through the internet. To obtain a copy of the report, contact the local water supplier. If the name of the community water system is unknown, contact the local health department.

There are two sites on the internet that supply information on water quality of community water systems. The online source for Water Quality Reports or CCRs is the EPA website<sup>19</sup> at: <https://ofmpub.epa.gov/apex/safewater/f?p=136:102>. Additionally, the Centers for Disease Control and Prevention's (CDC) fluoridation website, "My Water's Fluoride,"<sup>20</sup> is available at: [https://nccd.cdc.gov/DOH\\_MWF/Default/Default.aspx](https://nccd.cdc.gov/DOH_MWF/Default/Default.aspx). The website allows consumers in currently participating states to learn the fluoridation status of their water system. It also provides information on the number of people served by the water system, the water source, and if the water system is naturally fluoridated or adjusts the fluoride level in the water supply.<sup>20</sup>

The EPA does not have the authority to regulate private drinking water wells. However, the EPA recommends that private well water be tested once a year.<sup>21</sup> For

the most accurate results, a state certified laboratory that conducts drinking water tests should be used for fluoride testing. For a list of state certified laboratories, contact the local, county or state water/health department.

The EPA does not specifically recommend testing private wells for the level of fluoride. However, if a household with a private well has children under 16 years of age, their health professionals will need to know the fluoride level of the well water prior to consideration of prescription of dietary fluoride supplements<sup>8</sup> or to counsel patients about alternative water sources to reduce the risk of fluorosis if the natural fluoride levels are above 2 mg/L.

Dietary fluoride supplements (tablets, drops or lozenges) are available only by prescription and are intended for use by children ages six months to 16 years living in nonfluoridated areas and at high risk of developing tooth decay. Your dentist or physician can prescribe the correct dosage.<sup>8</sup>

**+** *Additional information on this topic can be found in this Section, Question 12 and in the Safety Section, Questions 21, 27, 28 and 29.*

## 5. What additives are used to fluoridate water supplies in the United States?

### **Answer.**

Sodium fluoride, sodium fluorosilicate and fluorosilicic acid are the three additives approved for use in community water fluoridation in the United States. Sodium fluorosilicate and fluorosilicic acid are sometimes referred to as silicofluoride additives.

### **Fact.**

The three basic additives used to fluoridate water in the United States are: 1) sodium fluoride which is a white, odorless material available either as a powder or crystals; 2) sodium fluorosilicate which is a white or yellow-white, odorless crystalline material and 3) fluorosilicic acid which is a white to straw-colored liquid.<sup>22</sup>

Water fluoridation began in the U.S. in 1945 with the use of sodium fluoride; the use of silicofluorides began in 1946 and by 1951, they were the most commonly used additives.<sup>23</sup> First used in the late

1940s, fluorosilicic acid is currently the most commonly used additive to fluoridate communities in the United States.<sup>24</sup> To ensure the public's safety, regardless of where the additives are manufactured, they should meet safety standards for water treatment in the U.S.<sup>22</sup> Specifically, additives used in water fluoridation should meet standards of the American Water Works Association (AWWA). With respect to NSF/ANSI certification, fluoride additives are considered no different than other water additives. Fluoride additives, like any other water additive should also meet NSF/ANSI Standards.<sup>22</sup> In the United States, the authority to regulate products for use in drinking water, including additives used to fluoridate community water systems, rests with individual states. In 2013, AWWA reported that 47 states had adopted the NSF/ANSI Standard 60 which specifies the product quality with validation supplied by independent certification entities.<sup>22</sup>

*To ensure the public's safety, regardless of where the additives are manufactured, they should meet safety standards for water treatment in the U.S.*

Additional information on the topic of fluoride additives can be found in the Fluoridation Practice section of this publication and at the CDC's fluoridation website, "Water Operators and Engineers" at <https://www.cdc.gov/fluoridation/engineering/index.htm>.

## 6. Is there a difference in the effectiveness between naturally occurring fluoridated water (at optimal fluoride levels) and water that has fluoride added to reach the optimal level?

### **Answer.**

No. The dental benefits of optimally fluoridated water occur regardless of the fluoride's source.

### **Fact.**

Fluoride is present in water as "ions" or electrically-charged atoms.<sup>25</sup> These ions are the same whether acquired by water as it seeps through rocks and sand or added to the water supply under carefully controlled conditions.

It has been observed that the major features of human fluoride metabolism are not affected by the three fluoride additives used in community water fluoridation nor are they affected by whether the fluoride is present naturally or added to drinking water.<sup>26</sup> In more simple terms, there is no difference chemically between natural and adjusted fluoridation.

When fluoride is added under controlled conditions to fluoride-deficient water, the dental benefits are the same as those obtained from naturally fluoridated water. Fluoridation is merely an increase of the level of the naturally occurring fluoride present in all drinking water sources to the level recommended for optimal dental health.

*Fluoridation is merely an increase of the level of the naturally occurring fluoride present in all drinking water sources to the level recommended for optimal dental health.*

For example, a fluoridation study conducted in the Ontario, Canada, communities of Brantford (optimally fluoridated by adjustment), Stratford (optimally fluoridated naturally) and Sarnia (fluoride-deficient), revealed much lower decay rates in both Brantford and Stratford as compared to nonfluoridated Sarnia. There was no observable difference in the decay-reducing effect between the naturally occurring fluoride and adjusted fluoride concentration water supplies, proving that dental benefits were similar regardless of the source of fluoride.<sup>27</sup>

Some individuals use the term “artificial fluoridation” to imply that the process of water fluoridation is unnatural and that it delivers a foreign substance into a water supply when, in fact, all water sources contain some fluoride. The fluoride ion released in water is the same regardless of the source<sup>25</sup> and is metabolized (processed) by the body in the same way no matter what the source.<sup>26</sup> Community water fluoridation is a natural way to improve oral health.

## 7. Is water fluoridation effective in helping to prevent tooth decay?

### Answer.

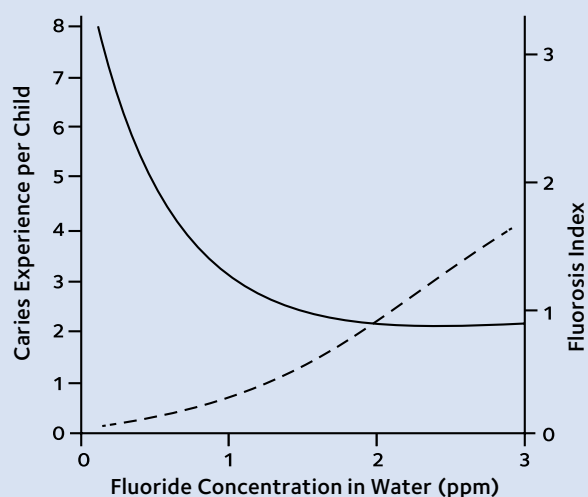
Yes. According to the best available scientific evidence, community water fluoridation is an effective public health measure for preventing, and in some cases, reversing tooth decay, in children, adolescents and adults. With hundreds of studies published in peer-reviewed, scientific journals, fluoridation is one of the most studied public health measures in history and it continues to be studied today.

### Fact.

The effectiveness of fluoride in drinking water to prevent tooth decay has been documented in the scientific literature for over 70 years. Before the first community fluoridation program began in 1945, epidemiologic data from the 1930s and 1940s were collected and analyzed.<sup>28-30</sup> What began as research to learn what caused “Colorado Brown Stain” (dental fluorosis) led to the discovery of strikingly low tooth decay rates associated with fluoride in drinking water at approximately 1 ppm (mg/L). Figure 2 shows the results of early research by Dr. H. Trendley Dean noting the relationship between children’s experience with tooth decay (solid line), dental fluorosis (dotted line) and the fluoride concentration in drinking water.<sup>28,29</sup>

[+](#) Additional information on this topic can be found in the Introduction Section.

**Figure 2. Dean’s Graph**  
Relationships of tooth decay experience (solid line), dental fluorosis index (dashed line) and the fluoride concentration of drinking water.<sup>28,29</sup>



Since that time, hundreds of studies have been done, including a number of systematic reviews which continue to show fluoride's effectiveness in helping to prevent tooth decay. A systematic review is an analysis of studies that identifies and evaluates all of the evidence with which to answer a specific, narrowly focused question. It entails a systematic and unbiased review process that locates, assesses and combines high quality evidence from a collection of scientific studies to obtain a comprehensive, valid and reliable review on a specific topic. Systematic reviews provide the highest level of scientific evidence about a specific research question. Below is a discussion of major reviews of community water fluoridation, beginning with two systematic reviews published in 2017 and 2013, respectively, demonstrating that water fluoridation is effective in reducing tooth decay.

On November 9, 2017, the Australian Government's National Health and Medical Research Council (NHMRC) released the *NHMRC Public Statement 2017 — Water Fluoridation and Human Health in Australia*<sup>31</sup> recommending community water fluoridation as a safe, effective and ethical way to help reduce tooth decay. Based on a comprehensive review of the evidence, published in 2016, and the translation of that evidence into the *NHMRC Information Paper — Water Fluoridation: Dental and Other Human Health Outcomes*,<sup>32</sup> published in 2017, the Public Statement notes that the NHMRC found that water fluoridation reduces tooth decay by 26% to 44% in children and adolescents, and by 27% in adults. Additionally, it notes that recent Australian research found that access to fluoridated water from an early age is associated with less tooth decay in adults. The Statement notes that NHMRC supports Australian states and territories fluoridating their drinking water supplies within the range of 0.6 to 1.1 mg/L.<sup>31</sup>

Established by the U.S. Department of Health and Human Services in 1996, the Community Preventive Services Task Force develops and disseminates guidance on which community-based health promotion and disease prevention intervention approaches work, and which do not work, based on available scientific evidence. The Task Force issues findings based on systematic reviews of effectiveness and economic evidence. The Guide to Community Preventive Services ("The Community Guide") is a collection of evidence-based findings of the Community Preventive Services Task Force and is designed to assist decision makers in selecting

interventions to improve health and prevent disease.<sup>33</sup>

The Community Guide reviews are designed to answer three questions:

1. What has worked for others and how well?
2. What might this intervention approach cost, and what am I likely to achieve through my investment?
3. What are the evidence gaps?<sup>33</sup>

In a 2013 update of the evidence, the Community Preventive Services Task Force continued to recommend community water fluoridation to reduce tooth decay, noting that cavities decreased when fluoridation was implemented and that cavities increased when fluoridation was stopped, as compared to communities that continued fluoridation.<sup>33</sup>

A summary of systematic reviews by the Oral Health Services Research Centre at the University Dental School in Cork, Ireland, published in 2009, reviewed results from three systematic reviews, all of which were published between 2000 and 2007. The summary of results concluded that the best available scientific evidence demonstrated that water fluoridation was an effective community-based method to prevent tooth decay, especially for the disadvantaged who bear the greatest burden of disease.<sup>35</sup>

A meta-analysis (a type of systematic review that seeks to determine a statistical estimate of an overall benefit based on the results of the collection of studies included in the review), which was published in 2007 in the *Journal of Dental Research*, demonstrated the effectiveness of water fluoridation for preventing tooth decay in adults. Twenty studies representing over 13,500 participants were included in the analysis. Of the 20 studies, nine examined the effectiveness of water fluoridation. The review of these studies found that fluoridation prevents approximately 27% of tooth decay in adults.<sup>36</sup>

Besides systematic reviews, significant additional studies conducted since the initiation of water fluoridation in 1945, also have demonstrated the effectiveness of water fluoridation in reducing the occurrence of tooth decay.



- In Grand Rapids, Michigan, the first city in the world to fluoridate its water supply, a 15-year landmark study showed that children who consumed fluoridated water from birth had 50–63% less tooth decay than children who had been examined during the original baseline survey completed in nonfluoridated Muskegon, Michigan.<sup>37</sup>
- In 1985, the National Preventive Dentistry Demonstration Program<sup>38</sup> analyzed various types and combinations of school-based preventive dental services to determine the cost and effectiveness of these types of prevention programs. Ten sites from across the nation were selected. Five of the sites had fluoridated water and five did not. Over 20,000 second and fifth graders participated in the study over a period of four years. Students were examined and assigned by site to one or a combination of the following groups:
  - biweekly in class brushing and flossing plus a home supply of fluoride toothpaste and dental health lessons (ten per year);
  - in-class daily fluoride tablets (in nonfluoridated areas);
  - in-school weekly fluoride mouthrinsing;
  - in-school professionally applied topical fluoride;
  - in-school professionally applied dental sealants, and
  - a control.<sup>38</sup>

After four years, approximately 50% of the original students were examined again. The study affirmed the value and effectiveness of community water fluoridation. At the sites where the community water was fluoridated, students had substantially fewer cavities, as compared to those sites without fluoridated water where the same preventive measures were implemented. In addition, while sealants were determined to be an effective prevention method, the cost of a sealant program was substantially more than the cost of fluoridating the community water, confirming fluoridation as the most cost-effective preventive option.<sup>38</sup>

- In another review of studies conducted from 1976 through 1987 and published in 1989,<sup>39</sup> data for different age groups were separated into categories by the types of teeth present in the mouth. The results demonstrated a 30–60% reduction in tooth decay in primary teeth, a 20–40% reduction in the mixed dentition (having both

baby and adult teeth) and a 15%–35% reduction in the permanent dentition (adults and seniors) for those living in fluoridated communities.<sup>39</sup>

- In the United States, an epidemiological survey of nearly 40,000 schoolchildren was completed in 1987.<sup>40</sup> Nearly 50% of the children aged 5 to 17 years who participated in the study were decay free in their permanent teeth, which was a major change from a similar survey conducted in 1980 in which approximately 37% were decay free. This dramatic decline in decay rates was attributed primarily to the widespread use of fluoride in community water supplies, toothpastes, dietary fluoride supplements and mouthrinses. Although decay rates had declined overall, data also revealed that the decay rate was 25% lower in children with continuous residence in fluoridated communities when the data were adjusted to control for exposure to dietary fluoride supplements and topical fluoride treatments.<sup>40</sup>
- In 1993, the results of 113 studies in 23 countries (over half of the studies were from the U.S.) were compiled and analyzed.<sup>41</sup> This review provided effectiveness data for 66 studies of primary teeth and 86 studies of permanent teeth. The analysis of the studies demonstrated a 40–49% decay reduction for primary (baby) teeth and a 50–59% decay reduction for permanent (adult) teeth for those living in fluoridated communities.<sup>41</sup>
- A comprehensive analysis of the first 50 years of community water fluoridation in the United States concluded that “Community water fluoridation is one of the most successful public health disease prevention programs ever initiated.”<sup>42</sup> While noting that the difference in tooth decay between optimally fluoridated communities and fluoride-deficient communities was smaller than in the early days of fluoridation, largely due to additional sources of fluoride, the difference was still significant and the benefits for adults should be emphasized. The report ended by noting that water fluoridation is a near-ideal public health measure whose benefits can transcend racial, ethnic, socioeconomic and regional differences.<sup>42</sup>

The systematic reviews and studies noted above provide science-based evidence that, for more than 70 years, fluoridation has been effective in helping to prevent tooth decay.

## 8. With other sources of fluoride now available, is water fluoridation still an effective method for preventing tooth decay?

### **Answer.**

Yes. Even in an era with widespread availability of fluoride from other sources, studies show that community water fluoridation prevents at least 25% of tooth decay in children and adults throughout the life span.

### **Fact.**

During the 1940s, studies demonstrated that children in communities with optimally fluoridated drinking water had reductions in tooth decay rates of approximately 40% to 60% as compared to those living in nonfluoridated communities.<sup>37,44</sup> At that time, drinking water was the only source of fluoride other than fluoride that occurred naturally in foods.

### **Increase in the Number of Sources of Fluoride**

Fluoride is available today from a number of sources including water, beverages, food, dental products (toothpaste, rinses, professionally applied fluoride foams, gels and varnish and dietary supplements.)<sup>17</sup> As a result of the widespread availability of these various sources of fluoride, the difference between decay rates in fluoridated areas and nonfluoridated areas is somewhat less than several decades ago, yet it is still significant.<sup>17</sup> Studies show that community water fluoridation prevents at least 25% of tooth decay in children and adults throughout the life span.<sup>36,45</sup> The benefits of fluoridation are extended to everyone in a community where they live, work, attend school or play — and it does not require a change of behavior or access to dental care.

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*The benefits of fluoridation are extended to everyone in a community where they live, work, attend school or play — and it does not require a change of behavior or access to dental care.*

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### **The Diffusion or Halo Effect**

The diffusion or “halo” effect occurs because foods and beverages processed in optimally fluoridated cities generally contain higher levels of fluoride than those processed in nonfluoridated communities. This exposure to fluoride in nonfluoridated areas through the diffusion effect lessens the differences in the amount of tooth decay between communities.<sup>39,42,43</sup> The best available national data demonstrate that the failure to account for the diffusion effect results in an underestimation of the total benefit of water fluoridation especially in areas where large quantities of fluoridated beverage and food products are brought into nonfluoridated communities.<sup>46</sup>

### **Exposure to Fluoridation over the Life Span**

Another factor in the difference between decay rates in fluoridated areas and nonfluoridated areas is the high geographic mobility of our society. On a day-to-day basis, many individuals may reside in a nonfluoridated community but spend a significant part of their day in a fluoridated community at work, school or daycare. Additionally, over their lifetime, people tend to move and reside in a number of communities, some with optimally fluoridated water and some without. This mobility makes it increasingly difficult to study large numbers of people who have spent their entire lives in one (fluoridated or nonfluoridated) community.<sup>39</sup> It also means that many individuals receive the benefit of fluoridation for at least some part of their lives. For children who have resided in fluoridated communities their entire lives, studies demonstrated they had less tooth decay than children who never lived in fluoridated communities.<sup>40</sup>

Despite fluoride from a number of other sources, the “halo effect” and the mobility of today’s society, studies show that community water fluoridation prevents at least 25% of tooth decay in children and adults throughout the life span.<sup>36,45</sup>

## 9. What happens if water fluoridation is discontinued?

### Answer.

Tooth decay can be expected to increase if water fluoridation in a community is discontinued even if topical products such as fluoride toothpaste and fluoride mouthrinses are widely used.

### Fact.

In 2013, using an updated systematic review, the Community Preventive Services Task Force, established by the U.S. Department of Health and Human Services, continued to recommend community water fluoridation to reduce tooth decay, noting that cavities decreased when fluoridation was implemented and that cavities increased when fluoridation was stopped, as compared to communities that continued fluoridation.<sup>34</sup> This confirmed the Task Force's earlier systematic review published in 2002<sup>45</sup> which also noted an increase in tooth decay when fluoridation was halted (a median 17.9% increase in tooth decay during 6 to 10 years of follow-up).

### Historical Studies Noting an Increase in Tooth Decay after Discontinuation of Fluoridation

Antigo, Wisconsin, began water fluoridation in June 1949 and ceased adding fluoride to its water in November 1960. After five and one-half years without optimal levels of fluoride, second grade children had a 200% increase in tooth decay experience, fourth graders a 70% increase and sixth graders a 91% increase in decay experience compared with the levels of those of the same ages in 1960. Residents of Antigo re-instituted water fluoridation in October 1965 on the basis of the severe deterioration of their children's oral health.<sup>47</sup>

A study that reported the relationship between fluoridated water and tooth decay prevalence focused on the city of Galesburg, Illinois, a community whose public water supply contained naturally occurring fluoride at 2.2 mg/L. In 1959, Galesburg switched its community water source to the Mississippi River. This alternative water source provided the citizens of Galesburg a sub-optimal level of fluoride at approximately 0.1 mg/L. In the period of time between a baseline survey conducted in 1958 and a new survey conducted in 1961, data revealed a 10% decrease in the percentage of decay free 14-year-olds (oldest group observed), and a 38% increase in mean tooth decay experience. Two years later, in

1961, the water was fluoridated at the recommended level of 1.0 mg/L.<sup>48</sup>

Because of a government decision in 1979, fluoridation in the northern Scotland town of Wick was discontinued after eight years. The water was returned to its sub-optimal, naturally occurring fluoride level of 0.02 mg/L. Data collected to monitor the oral health of Wick children clearly demonstrated a negative health effect from the discontinuation of water fluoridation. Five years after the cessation of water fluoridation, decay in primary (baby teeth) had increased 27%. This increase in decay occurred during a period when there had been a reported overall reduction in decay nationally and when fluoride toothpaste had been widely adopted. These data suggest that decay levels in children can be expected to rise where water fluoridation is interrupted or terminated, even when topical fluoride products are widely used.<sup>49</sup>

In a similar evaluation, the prevalence of tooth decay in 5- and 10-year-old children in Stranraer, Scotland, increased after the discontinuation of water fluoridation. This increase in tooth decay was estimated to result in a 115% increase in the mean cost of restorative dental treatment for decay. These data support the important role water fluoridation plays in the reduction of tooth decay.<sup>50</sup>

### Historical Studies and Factors Noting No Increase In Tooth Decay after Discontinuation of Fluoridation

There have been several studies from outside the United States that have not reported an increase in tooth decay following the discontinuation of fluoridation. In all of these, the discontinuation of fluoridation coincided with the implementation of other measures to prevent tooth decay.

In La Salud, Cuba, a study on tooth decay in children indicated that the rate of tooth decay did not increase after fluoridation was stopped in 1990. However, at the time fluoridation was discontinued a new preventive fluoride program was initiated where all children received fluoride mouthrinses on a regular basis and children two to five years of age received fluoride varnish once or twice a year.<sup>51</sup>

In Finland, a longitudinal study in Kuopio (fluoridated from 1959 to 1992) and Jyväskylä (with low levels of natural fluoride) showed little difference in



decay rates between the two communities that are extremely similar in terms of ethnic background and social structure.<sup>52</sup> This was attributed to a number of factors. The dental programs exposed the Finnish children to intense topical fluoride regimes and dental sealant programs. Virtually all children and adolescents used the government-sponsored, comprehensive, free dental care. As a result, the effect of water fluoridation appeared minimal. Because of this unique set of factors, it was concluded that these results could not be replicated in countries with less intensive preventive dental care programs.<sup>52</sup>

No significant decrease in tooth decay was seen after fluoridation was discontinued in 1990 in Chemnitz and Plauen, located in what was formerly East Germany.<sup>53</sup> The intervening factors in these communities include improvements in attitudes toward oral health behaviors, and broader availability and increased use of other preventive measures including fluoridated salt, fluoride toothpaste and dental sealants.<sup>53</sup>

A similar situation was reported from the Netherlands. A study was conducted of 15-year-old children in Tiel (fluoridated 1953 to 1973) and Culemborg (nonfluoridated) comparing tooth decay rates from a baseline in 1968 through 1988. The lower tooth decay rate in Tiel after the cessation of fluoridation was attributed in part to the initiation of a dental health education program, free dietary fluoride supplements and a greater use of professionally applied topical fluorides.<sup>54</sup>

In the preceding examples, communities that discontinued fluoridation either found higher tooth decay rates in their children or a lack of an increase that could be attributed to the availability and use of free dental services for all children or the implementation of wide-spread decay prevention programs that require significant professional and administrative support and are less cost-effective than fluoridation.

## 10. Is tooth decay still a serious problem in the United States?


### Answer.

Yes. Tooth decay is an infectious disease that continues to be a significant oral health problem.

### Fact.

Good oral health is often taken for granted by many people in the U.S. Yet, while largely preventable, tooth decay, cavities or dental caries (a term used by health professionals) remains a common, debilitating, chronic condition for many children and adults.

Tooth decay begins with a weakening and/or breakdown (loss of minerals) of the enamel (the hard outer layer of teeth) caused by acids produced by bacteria that live in plaque. Dental plaque is a soft, sticky film that is constantly forming on teeth. Eating foods or drinking beverages that contain sugars or other refined carbohydrates allow the bacteria in the plaque to produce acids that attack the enamel. The plaque helps to keep these acids in contact with the tooth surface and demineralization (loss of mineral) occurs. After repeated acid attacks, the enamel can breakdown creating a cavity. Left unchecked, bacteria and acid can penetrate the dentin (the next, inner layer of teeth) and then finally the pulp, which contains nerves and blood vessels. Once the bacteria enter the pulp, the tooth becomes infected (abscessed) and, without treatment, the infection can progress and travel into the surrounding tissues. The infection can enter the bloodstream and potentially spread the infection to other parts of the body which, in rare cases, becomes life-threatening.

 *Additional information on this topic can be found in this Section, Question 2.*

Tooth decay can negatively affect an individual's quality of life and ability to succeed. Tooth decay can cause pain — pain that can affect how we eat, speak, smile, learn at school or succeed at work. Children with cavities often miss more school and receive lower grades than children who are cavity-free.<sup>55</sup> More than \$6 billion of productivity is lost each year in the U.S, because people miss work to get dental care.<sup>56</sup>

While cavities are often thought of as a problem for children, adults in the U.S. are keeping their teeth longer (partially due exposure to fluoridation) and this increased retention of teeth means more adults are at risk for cavities — especially decay of exposed root surfaces.<sup>57,58</sup> Tooth root surfaces are covered with cementum (a softer surface than the enamel) and so are susceptible to decay. As Baby Boomers age, root decay experience is expected to increase in future years possibly to the point where older adults experience similar or higher levels of new cavities than do school children.<sup>57</sup>

*+ Additional information on this topic can be found in this Section, Question 11.*

Additionally, once an individual has a cavity repaired with a filling (restoration), that filling can break down over time especially around the edges. These rough edges (or margins) can harbor bacteria that start the cavity process over again or leak which allows the bacteria to enter the tooth below the existing filling. These fillings often need to be replaced — sometimes multiple times over decades — each time growing larger to the point where the best restoration for the tooth is a crown that covers the entire tooth surface. Preventing cavities and remineralizing teeth at the earliest stages of decay is very important not only in saving tooth structure but also in reducing the cost for dental care. Community water fluoridation is an effective public health measure that is a cost-saving and cost-effective approach to preventing tooth decay.

*+ Additional information on this topic can be found in the Cost Section, Question 68.*

Oral health disparities exist in the United States and have been documented through extensive studies and reviews.<sup>59-61</sup> Despite the fact that millions of people in the U.S. enjoy good dental health, disparities exist for many racial and ethnic groups, as well as by socioeconomic status, sex, age and geographic location.<sup>62</sup> Water fluoridation helps to reduce the disparities in oral health at the community level as it benefits all residents served by community water supplies. In his 2001 Statement on Community Water Fluoridation,<sup>63</sup> former Surgeon General Dr. David Satcher noted:

...community water fluoridation continues to be the most cost-effective, practical and safe means for reducing and controlling the occurrence of

dental decay in a community...water fluoridation is a powerful strategy in efforts to eliminate health disparities among populations.<sup>63</sup>

*+ Additional information on this topic can be found in the Public Policy Section, Question 59.*

Today, the major focus for achieving and maintaining oral health is on prevention. Established by the U.S. Department of Health and Human Services, Healthy People 2020<sup>64</sup> provides a science-based, comprehensive set of ambitious, yet achievable, ten-year national objectives for improving the health of the public. Included under oral health is an objective to expand the fluoridation of public water supplies. Objective 13 states that at least 79.6% of the U.S. population served by community water systems should be receiving the benefits of optimally fluoridated water by the year 2020.<sup>65</sup> Data from the CDC indicate that, in 2014, 74.4% of the U.S. population on public water systems, or a total of 211.4 million people, had access to fluoridated water.<sup>66</sup> Conversely, approximately 25% or more than 72.7 million people on public water systems do not receive the decay preventing benefits of fluoridation.

*While cavities are often thought of as a problem for children, adults in the U.S. are keeping their teeth longer (partially due exposure to fluoridation) and this increased retention of teeth means more adults are at risk for cavities — especially decay of exposed root surfaces.*

## 11. Do adults benefit from fluoridation?


### Answer.

Yes. Fluoridation plays a protective role against tooth decay throughout life, benefiting both children and adults.

### Fact.

While the early fluoridation trials were not designed to study the possible benefits fluoridation might have for adults, by the mid-1950s, it became evident from the results of the first fluoridation trial in Grand Rapids, Michigan, that the beneficial effects of fluoridation were not confined to children drinking the fluoridated water from birth. The fact that a reduction in tooth decay was observed for teeth which had already been calcified or were erupted when fluoridation was started indicated that a beneficial effect could be gained by older age groups.<sup>67, 68</sup> Today it is understood that the maximum reduction in tooth decay occurs when fluoride has been incorporated into the tooth during formation and when it also is available at the tooth surface during demineralization and remineralization. Fluoridation works in both ways to prevent tooth decay.<sup>9,12,14,16,17</sup>

Fluoride and minerals, including calcium and phosphate, are present in saliva<sup>7,9</sup> and are stored in dental plaque (a soft, sticky film that is constantly forming on teeth). To halt the formation of tooth decay or rebuild tooth surfaces, fluoride must be constantly present in low concentrations in saliva and plaque.<sup>7</sup> Frequent exposure to small amounts of fluoride, such as occurs when drinking fluoridated water, helps to maintain the reservoir of available fluoride in saliva and plaque to resist demineralization and enhance remineralization.<sup>7,10</sup> In other words, drinking fluoridated water provides the right amount of fluoride at the right place at the right time. Fluoride in water and water-based beverages is consumed many times during the day, providing frequent contact with tooth structures and making fluoride available to fluoride reservoirs in the mouth. This helps explain why fluoride at the low levels found in fluoridated water helps to prevent tooth decay in teeth after they have erupted.<sup>7</sup>

 *Additional information on this topic can be found in this Section, Question 2.*

While teeth already present in the mouth when exposure to water fluoridation begins receive the benefit of decay protection, studies have indicated

that adults who have consumed fluoridated water continuously from birth receive the maximum protection against tooth decay.<sup>10-14</sup>

An Australian study published in 2008 investigating decay experience among Australian Defense Force personnel showed that a longer period of exposure to water fluoridation was associated with lower decay rates in adults between the ages of 17 and 44. Adults who lived at least 90% of their lifetime in communities with fluoridated water had 24% less decay than adults who lived in fluoridated areas for less than 10% of their lifetimes.<sup>69</sup>

A meta-analysis published in 2007 examining the effectiveness of fluoridation for adults found that fluoridation prevents approximately 27% of tooth decay in adults. It included only studies that were published after 1979. The studies were limited to participants who were lifelong residents of communities with fluoridated water and a control group of lifelong residents of communities without fluoridated water.<sup>57</sup>

A study published in 2002 examined the differences in tooth decay patterns between two cohorts of young adults: the first grew up before fluoridation was widely available and the second after fluoridation became more widespread. Comparing data from two different U.S. National Health and Nutrition Examination Surveys (NHANES), NHANES I (1971-1974) and NHANES III (1988-84), results indicated that total tooth decay declined among people aged 45 years and younger. No decline was observed in people aged 46 to 65, a cohort that grew up during the late 40s and early 50s before fluoridation was widely available. This was identified as the major reason this older cohort did not show a decline in tooth decay.<sup>70</sup>

In 1989, a study conducted in the state of Washington found that adults (20-34 years of age) who had a continuous lifetime exposure to fluoridation water had 31% less tooth decay experience compared to similar aged adults with no exposure to fluoridated water. It also concluded that exposure to fluoridation only during childhood has lifetime benefits since adults exposed to fluoridated water only during childhood had decay experience similar to those adults exposed to fluoridated water only after age 14.<sup>71</sup>

An important issue for adults is the prevention of root decay.<sup>57,58</sup> People in the United States are living longer and retaining more of their natural teeth than ever

before — in part due to water fluoridation. Adults with gum recession are at risk for root decay because the root surface, a much softer tooth surface than enamel, becomes exposed to decay-causing bacteria in the mouth as gums recede. Data from the ongoing NHANES survey indicate that root decay experience has declined in recent years among older adults with teeth (ages 65-years and older), decreasing from 46% (NHANES 1988-1994) to 36% (NHANES 1999-2004). However, the prevalence of root decay increases markedly as adults age and escalates more rapidly after age 65. Specifically, the 75-years and older group had 23% greater prevalence of root surface decay than did the 65- to 74-years-old age group.<sup>72</sup> While most studies related to the prevention of root decay focus on professional fluoride treatments such as fluoride varnish, there is evidence that demonstrates fluoridation may have an impact on root decay.<sup>73-75</sup> For example, in Ontario, Canada, lifelong residents of the nonfluoridated community of Woodstock had a 21% higher root surface decay experience than those living in the naturally fluoridated (1.6 ppm) matched community of Stratford.<sup>74</sup> Similarly, Iowa residents more than 40 years of age living long-term in fluoridated communities had significantly less root decay than lifelong residents of nonfluoridated communities (0.56 versus 1.11 surfaces).<sup>75</sup>

Adults in the U.S. are keeping their natural teeth longer — partially due to exposure to water fluoridation. But as adults age with their teeth, it means more teeth will be at risk for tooth decay. It has been suggested in the literature that decay experience for adults could increase to the point where older adults experience similar or higher levels of new cavities than do school children.<sup>35,76,77</sup> It continues to be important to document and acknowledge the effectiveness of fluoridation in preventing tooth decay in adults because virtually all primary preventive dental programs target children and adolescents — with one exception — community water fluoridation. Fluoridation is unique in that it remains the one dental public health measure that reaches all members of a community including young, middle-aged and older adults.<sup>56</sup>

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*Fluoridation is unique in that it remains the one dental public health measure that reaches all members of a community including young, middle-aged and older adults.*

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## 12. Are dietary fluoride supplements effective in helping to prevent tooth decay?

### Answer.

Yes. Dietary fluoride supplements can be effective in preventing tooth decay.

### Fact.

Dietary fluoride supplements are available only by prescription in the United States and are intended for use by children who are at high risk for developing tooth decay and living in areas where the primary source of water is deficient in fluoride.<sup>8</sup>

Recommendations for health professionals seeking to prescribe dietary fluoride supplements are found in *The Evidence-Based Clinical Recommendations on the Prescription of Dietary Fluoride: A Report of the American Dental Association Council on Scientific Affairs published in 2010*.<sup>8</sup> The report and a *Chairside Guide: Dietary Fluoride Supplements: Evidence-based Clinical Recommendations* can be accessed at <http://ebd.ADA.org/en/evidence/guidelines/fluoride-supplements>. The current dietary fluoride supplement schedule appears in this section as Table 1.

➤ *Additional information on this topic can be found in this Section, Question 13.*


As noted in Table 3 of the report, “Clinical recommendations for the use of dietary fluoride supplements:”

The expert panel convened by the American Dental Association Council on Scientific Affairs developed the following recommendations. They are intended as a resource for dentists and other health care providers. The recommendations must be balanced with the practitioner’s professional judgment and the individual patient’s needs and preferences.

Children are exposed to multiple sources of fluoride. The expert panel encourages health care providers to evaluate all potential fluoride sources and to conduct a caries risk assessment before prescribing fluoride supplements.

As noted in the recommendations, prior to prescribing dietary fluoride supplements, accurate assessment of the fluoride content of the patient’s primary drinking water source(s) should be conducted.<sup>8</sup> The identification of the “primary” sources is sometimes

difficult due to the fact that some patients have multiple sources of drinking water during a typical day. For example, while a patient may have access to drinking water in the home, they often also spend a large part of their day accessing drinking water at day care or school, which could be a different water system. It might be necessary to contact the local, county or state health departments for information on the fluoride content of public water sources or to be referred to a certified laboratory that can provide a fluoride test for private wells.

 *Additional information on this topic can be found in this Section, Question 4.*

The ADA offers information on caries risk assessment<sup>7B</sup> on the web at <http://www.ADA.org/en/member-center/oral-health-topics/caries-risk-assessment-and-management>. It should be noted that dietary fluoride supplements are recommended only for children at high risk for tooth decay.<sup>8</sup> Caries risk assessments should be completed for patients on a regular basis to determine their risk for tooth decay which can change over time.

Dietary fluoride supplements can be effective in helping to prevent tooth decay. To receive the optimal benefit from fluoride supplements, the use of supplements should begin at six months of age and continue daily until the child is 16 years old.<sup>8</sup> However, individual patterns of compliance can vary greatly.

For that reason, the report suggests that providers carefully monitor the adherence to the schedule to maximize the therapeutic benefit of supplements in caries prevention. If the health care provider has concerns regarding a lack of compliance to the schedule, it might be best to consider other sources of fluoride exposure for the patient, such as bottled water with fluoride.<sup>8</sup>

While dietary fluoride supplements can be effective in reducing tooth decay, there are a number of factors that can impede their use and resulting therapeutic value:

- Patients/parents/caregivers must have access to a professional health care provider who can provide the necessary assessments and provide prescriptions for the supplements — often repeatedly over time.
- The supplements must be obtained through a pharmacy/pharmaceutical service and refilled as necessary.
- The cost of supplements can be a financial hardship for some individuals.
- The compliance required (a child should take the supplement every day until 16 years of age) to obtain the optimal therapeutic affect often is difficult to achieve.

**Table 1. Dietary Fluoride Supplement Schedule for Children at High Caries Risk<sup>8</sup>**

Age	Fluoride ion level in drinking water (ppm)*		
	<0.3 ppm	0.3-0.6 ppm	>0.6 ppm
<b>Birth - 6 months</b>	None	None	None
<b>6 months - 3 years</b>	0.25 mg/day**	None	None
<b>3-6 years</b>	0.50 mg/day	0.25 mg/day	None
<b>6-16 years</b>	1.0 mg/day	0.50 mg/day	None

\* 1.0 part per million (ppm) = 1 milligram/liter (mg/L) \*\*2.2 mg sodium fluoride contains 1 mg fluoride ion.

Noting the potential obstacles listed above, where feasible, community water fluoridation offers proven decay prevention benefits without the need for access to a health care professional or a change in behavior on the part of the individual. Simply by drinking water at home, school, work or play everyone in the community benefits regardless of socioeconomic status, educational attainment or other social variables.<sup>79</sup> While dietary fluoride supplements can reduce a child's risk of tooth decay, fluoridation extends that benefit to adults in the community. Additionally, the cost of dietary fluoride supplements over an extended period of time can be an economic concern to a family. In looking at overall costs, consideration should be given to the cost per person and the number of people who can benefit from a dietary fluoride supplement or community fluoridation program.<sup>77</sup>


### 13. The ADA Dietary Fluoride Supplements Schedule 2010 contains the word “none” in specific boxes. Does this mean the ADA does not recommend fluoride for children?

#### **Answer.**

No, that would be a misinterpretation of the purpose of the schedule. The schedule reflects the recommended dosage of fluoride supplements based on age and the fluoride level of the child's primary source of drinking water, in addition to what would be consumed from other sources.


#### **Fact.**

The dietary fluoride supplement schedule<sup>8</sup> (Table 1.) is just that — a supplement schedule. Children residing in areas where the drinking water is not fluoridated will receive some fluoride from other sources such as foods and beverages. Dietary fluoride supplements are designed for children over six months of age who do not receive a sufficient amount of fluoride from those sources. The dosage amounts in the table reflect the additional amount of supplemental fluoride intake necessary to achieve an optimal anti-cavity effect. To reduce the risk of dental fluorosis, children under six months of age should not take dietary fluoride supplements.

 *Additional information on this topic can be found in the Safety Section, Question 29.*

The dietary fluoride supplement schedule should not be viewed as a recommendation of the absolute upper limits of the amount of fluoride that should be ingested each day. In 2011, the Food and Nutrition Board of the Institute of Medicine developed Dietary Reference Intakes, a comprehensive set of reference values for dietary nutrient values. The values present nutrient requirements to optimize health and, for the first time, set maximum-level guidelines to reduce the risk of adverse effects from excessive consumption of a nutrient. In the case of fluoride, levels were established to reduce tooth decay without causing moderate dental fluorosis.<sup>80</sup>

For example, the dietary fluoride supplement schedule recommends that a two-year-old child at high risk for tooth decay living in a nonfluoridated area (where the primary water source contains less than 0.3 ppm fluoride) should receive 0.25 mg of supplemental fluoride per day. This does not mean that this child should ingest exactly 0.25 mg of fluoride per day total. Instead, a two-year-old child could receive important anti-cavity benefits by taking 0.25 mg of supplemental fluoride a day without causing any adverse effects on health. This child would most probably be receiving fluoride from other sources (foods and beverages) even in a nonfluoridated area and the recommendation of 0.25 mg of fluoride per day takes this into account. In the unlikely event the child did not receive any additional fluoride from food and beverages, the 0.25 mg per day could be inadequate fluoride supplementation to achieve an optimal anti-cavity effect.

 *Additional information on this topic can be found in the Safety Section, Question 23.*


The following statement is correct. “Fluoride supplement dosage levels have been lowered in the past as exposure to fluoride from other sources has increased.” Rather than being a problem, as those opposed to the use of fluoride might imply, this is evidence that ADA policy is based on the best available science. The ADA periodically reviews the dosage schedule and issues updated recommendations based on the best available science.

In 1994, a Dietary Fluoride Supplement Workshop, co-sponsored by the ADA, the American Academy of Pediatric Dentistry and the American Academy of Pediatrics, was held in Chicago. Based on a review of scientific evidence, a consensus was reached on a



new dosage schedule developed acknowledging that numerous sources of topical and systemic fluoride are available today that were not available many years ago.<sup>81</sup>

The supplement schedule was reviewed and reissued in December 2010. At that time, the American Dental Association Council on Scientific Affairs (CSA) published evidence-based clinical recommendations for the schedule of dietary fluoride supplements.<sup>8</sup> The evidence-based review recommended that the age stratification established in the ADA's 1994 supplement schedule remain unchanged. The review also recommended that prior to prescribing fluoride supplements, the prescribing provider should assess the patient's risk for cavities and only those at high risk should receive supplements.<sup>8</sup> If at high risk, then the fluoride level of the patient's primary drinking water source should be assessed.<sup>8</sup> It should be noted that an accurate assessment of the patient's primary drinking water source can be difficult due to the various sources of fluoridated water. For example, the patient might not have access to fluoridated water in the home, but may drink fluoridated water while at day care or school. The current dietary fluoride supplement schedule appears as Table 1.<sup>8</sup>

 *Additional information on this topic can be found in this Section, Question 12.*

## 14. What are salt and milk fluoridation and where are they used?

### **Answer.**

**Salt and milk fluoridation are fluoridation methods used to provide community-based fluoridation in countries outside of the United States where various political, geographical, financial or technical reasons prevent the use of water fluoridation.**

### **Fact.**

The practice of salt fluoridation began in the 1950s, approximately 10 years after water fluoridation was initiated in the United States.<sup>82</sup> Based on the success several decades earlier of the use of iodized salt for the prevention of goiter, fluoridated salt was first introduced in Switzerland in 1956.<sup>83</sup>

According to a review published in 2013, salt fluoridation is available in a number of countries in Europe but its coverage varies greatly.<sup>82</sup> Germany

and Switzerland have attained a coverage exceeding two-thirds of their populations (67% and 85% respectively). In other European countries including Austria, the Czech Republic, France, Slovakia and Spain, salt fluoridation is reportedly used on a very limited scale.<sup>82</sup> Additional countries, such as Hungary, Romania, Slovenia, Croatia and Poland, have considered salt fluoridation but have failed to take action.<sup>84</sup>

European regulations (current as of 2017) permit the addition of fluoride to salt and water.<sup>82</sup> However, it appears that the majority of European countries favor the twice daily use of fluoride toothpaste as the most important measure for improving the public's dental health.<sup>84</sup> In Europe, toothpaste sold over the counter typically contains 1,500 ppm fluoride,<sup>85</sup> while toothpaste in the United States typically contains 1,000 to 1,100 ppm fluoride.<sup>86</sup>

On a historical note, prior to the political changes that occurred in the late 1980s and early 1990s in Europe, water fluoridation was widely available in the German Democratic Republic and the Czechoslovak Republic and to a lesser extent in Poland. With the end of the Communist regimes, efforts related to public health dentistry were largely discontinued. While fluoridation continued in several small towns until 1993, in general, it was abandoned.<sup>84</sup>

In North and South America, salt fluoridation is available in Belize, Bolivia, Colombia, Costa Rica, Dominican Republic, Ecuador, Mexico, Peru, Uruguay and Venezuela. Like in Europe, the extent of salt fluoridation varies between countries. Columbia, Costa Rica, Jamaica, Mexico and Uruguay provide fluoridated salt to nearly their entire populations while there is less coverage in other countries.<sup>82</sup>

In 2013, it was estimated that approximately 60 million people in Europe and 160 million in the Americas had access to fluoridated salt.<sup>82</sup>

The Pan American Health Organization (PAHO), a regional division of the World Health Association (WHO) with responsibilities for health matters in North, South and Central America and the Caribbean, has been active in developing strategies to implement decay prevention programs in the regions of the Americas using water and salt fluoridation.<sup>87</sup> In order to achieve the greatest reduction in tooth decay while minimizing the risk of dental fluorosis, it is advisable that a country implement only one of these two

public health measures — either community water fluoridation or salt fluoridation. The United States has implemented water fluoridation. The U.S. Food and Drug Administration has not approved fluoridated salt for use in the U.S.

Early studies evaluating the effectiveness of salt fluoridation conducted in Columbia, Hungary and Switzerland indicated that fluoride delivered via salt might produce a reduction in tooth decay similar to that seen with optimally fluoridated water.<sup>88,89</sup> When all salt destined for human consumption (both domestic salt and bulk salt that is used by commercial bakeries, restaurants, institutions, and industrial food production) is fluoridated, the decay-reducing effect could be comparable to that of water fluoridation over an extended period of time.<sup>88,89</sup> When only domestic salt is fluoridated, the decay-reducing effect is diminished.<sup>88</sup> Studies conducted in Costa Rica, Jamaica and Mexico in the 1980s and 1990s also showed significant reductions in tooth decay. However, it was noted that these studies did not include other variables that could have contributed to the reductions.<sup>88</sup>

The fact that salt fluoridation does not require a centralized piped water system is of particular value in countries that do not have such water systems. Fluoridated salt is also a very cost-effective public health measure. For example, in Jamaica, where all salt destined for human consumption is fluoridated, the use of fluoridated salt was reported to reduce tooth decay by as much as 84% at a cost of 6 cents per person per year.<sup>87</sup> In some cases, the cost to produce fluoridated salt is so low that for consumers, the cost of fluoridated salt is the same as for nonfluoridated salt.<sup>90</sup>

The implementation of salt fluoridation has unique challenges not incurred with water fluoridation. Sources of salt, the willingness of local manufacturers to produce fluoridated salt or the need to import fluoridated salt would need to be studied. Because fluoridated salt should only be consumed by the public in areas with a naturally low level of fluoride, it would be necessary to completely map the naturally occurring levels of fluoride and devise a plan to keep fluoridated salt out of the areas with moderate to high naturally occurring fluoride (to aid in reducing the risk of dental fluorosis). Additionally, a plan would need to be developed to monitor the fluoride level in urine of those consuming fluoridated salt starting with a baseline before implementation

and including follow-up testing on a regular basis. While salt fluoridation typically is not implemented through a public vote, it would be necessary to gain the cooperation of salt manufacturers and institutions of all kinds that would use salt in their food preparation.<sup>89</sup> Additionally, educational efforts would need to be directed at health professionals and health authorities to avoid referendum approaches and identify enabling regulations.<sup>83</sup>

In a number of European countries, consumers have a choice of purchasing either fluoridated or nonfluoridated salt for use in the home. While it has been argued that, unlike water fluoridation, this option to purchase fluoridated or nonfluoridated salt allows for personal choice, studies indicate that fluoridated salt is not as effective a public health measure when only a small portion of the population opts to purchase and use the product.<sup>88</sup> For example, in France, fluoridated salt for home use became available to the consumer by decree in 1986, while nonfluoridated salt remained available for purchase. By 1991, with an aggressive public health campaign, the market share of fluoridated salt was 50% and it reached a high of 60% in 1993. Then the public health campaign ended. By 2003, the market share had decreased to 27%.<sup>82,91</sup> It has been suggested that, in order to be a successful public health measure that effectively reaches those who are disadvantaged, approximately 70% of the population needs to use fluoridated salt. Conversely, usage rates less than 50% should be considered as having minimal effect on public health.<sup>82</sup> While the situation described in Europe allows for personal choice, salt programs in the Americas where all salt destined for human consumption is fluoridated would seem at odds with the issue of personal choice, yet the program is apparently working well with fluoridated salt well accepted by the public.<sup>92</sup>

A number of studies have shown an increase in the occurrence of dental fluorosis in areas where salt fluoridation programs have been implemented. For example, a 2006 cohort study examined the prevalence and severity of dental fluorosis in children before and after the implementation of salt fluoridation in Campeche, Mexico, in 1991.<sup>93</sup> The study showed, that while 85% of the dental fluorosis identified was categorized as very mild, children born in 1990-1992 were more likely to have dental fluorosis than those born in the period 1986-1989<sup>93</sup> A study published in 2009 of children in Jamaica



showed similar results.<sup>94</sup> Jamaica began a fluoridated salt program in 1987. In 1999, an area around St. Elizabeth was found to have a high prevalence of dental fluorosis. Examiners returned in 2006 to re-evaluate students in the area. While their results indicated a slightly reduced tooth decay experience for 6-year-olds in 2006 compared to 6-year-olds in 1999, they also found that 6-year-olds also had a higher prevalence of dental fluorosis in 2006 than the 6-year-olds examined in 1999. In addition to the implementation of salt fluoridation, other factors including the use of increased use of fluoridated toothpaste and mouthrinses could have played a role.<sup>94</sup> However, both of these studies point out the need to carefully monitor fluorides from multiple sources especially when implementing fluoridated salt programs.

Fluoridated milk has been suggested as another alternative to community water fluoridation in countries outside the United States. Studies on the effectiveness of milk fluoridation have been carried out in numerous countries, including but not limited to, Brazil, Bulgaria, China, Israel, Japan, Russia and the United Kingdom.<sup>95</sup> Many of these studies have found milk fluoridation programs to be an efficient and cost-effective method to prevent cavities.<sup>95</sup> For example, a 2001 study of Chilean preschoolers using fluoridated powdered milk and milk derivatives resulted in a 41% reduction in the number of primary decayed missing and filled tooth surfaces as compared to the control group that did not receive fluoridated milk.<sup>96</sup> Additionally, in the same study, the proportion of decay free children increased from 22% to 48% in the study group after four years of implementing the program.<sup>96</sup>

In 2004, the dental health of school children from the northwest of England, who were enrolled in the school milk fluoridation program, was compared to children with similar characteristics who were not consuming fluoridated milk.<sup>97</sup> The average age of the children in the study was 11 years old. In order to participate in the study, participants chosen for the test group were required to have been receiving fluoridated milk for a minimum of 6 years. First permanent molars were examined for tooth decay experience. Results from the study indicated that children consuming fluoridated milk had less tooth decay experience (1.01 DMFT) than the children who did not receive fluoridated milk (1.46 DMFT).<sup>97</sup>

A study of community milk programs in Bulgaria examined children at age 3 and again at age 8.<sup>98</sup> The study indicated that tooth decay experience was substantially lower in the cohort of children who had received fluoridated milk in school for five years compared with the cohorts of children who had received milk in school without fluoride added. At the end of the five-year trial in 2009, tooth decay experience was lower in children who received fluoridated milk (5.61 dmfs and 0.48 DMFS) than in the control community children who received milk with no fluoride (9.41 dmfs and 1.24 DMFS).<sup>98</sup>

In these two examples “dmfs” is the mean number of decayed, missing or filled tooth surfaces on primary (or baby) teeth while “DMFS” is the mean number of decayed missing or filled tooth surfaces on permanent teeth.

Studies completed on milk fluoridation to date largely target children. There has been only a very small number that have looked at the role fluoridated milk might play for adults. These studies have largely examined fluoridated milk and its possible effect on root decay. For example, a study published in 2011 and conducted in Sweden indicated that fluoridated milk could be of value in remineralizing early tooth decay in root surfaces.<sup>99</sup>

It was estimated that as of 2013, more than one million children worldwide were receiving fluoridated milk.<sup>94</sup> The majority of studies conducted have indicated that fluoridated milk is effective in preventing tooth decay under certain conditions. It is most effective if the consumption of fluoridated milk starts before 4 years of age and continues until the permanent teeth are present in the mouth. Most successful programs are conducted through schools where the natural fluoride levels in water are low and children are able to consume fluoridated milk for a minimum of 200 days a year.<sup>95</sup> While these conditions prevent fluoridated milk from being recommended as a public health measure for an entire community, fluoridated milk might be the most appropriate and effective means of fluoride exposure for children in some circumstances.

## 15. Can the consistent use of bottled water result in individuals missing the benefits of optimally fluoridated water?

### Answer.

Yes. The majority of bottled waters on the market do not contain optimal levels (0.7 mg/L) of fluoride.

### Fact.

There is not a large body of research regarding the risk for tooth decay associated with the consumption of bottled water. However, a lack of exposure to fluoride could increase an individual's risk for tooth decay. The vast majority of bottled waters do not contain significant amounts of fluoride.<sup>100</sup> Individuals who drink bottled water as their primary source of water could be missing the decay preventive effects of optimally fluoridated water available from their community water supplies. These consumers should seek advice from their dentists about their risk for tooth decay and specific fluoride needs.


While drinking water from the tap is regulated by the U.S. Environmental Protection Agency (EPA), bottled water is regulated by the U.S. Food and Drug Administration (FDA).<sup>101</sup> The FDA has established maximum allowable levels for physical, chemical, microbiological, and radiological contaminants in bottled water.<sup>102</sup>

*Individuals who drink bottled water as their primary source of water could be missing the decay preventive effects of optimally fluoridated water available from their community water supplies.*

Noting that fluoride can occur naturally in source waters used for bottled water or can be added by a bottled water manufacturer, the FDA has approved standards for the fluoride content of bottled water.<sup>102</sup> However, the FDA regulations require the fluoride content of bottled water to be listed on the label only if fluoride is added during processing.<sup>103</sup> If the fluoride level is not shown on the label of the bottled water, the company can be contacted, or the water can be tested to obtain this information. Most consumers are unaware that the vast majority of bottled waters, especially those treated by distillation or reverse

osmosis, are largely fluoride-free. Unknowingly, individuals who drink bottled water as their primary source of water could be missing the decay preventive effects of optimally fluoridated water available from their community water supplies. The American Dental Association supports the labeling of bottled water with the fluoride content to aid consumers in making informed decisions about choices of drinking water.<sup>104</sup>

Recognizing the benefit of fluoride in drinking water, in 2006 the FDA issued the "FDA Health Claim Notification for Fluoridated Water and Reduced Risk of Dental Caries"<sup>105</sup> which states that bottled water meeting the specific standards of identity and quality set forth by FDA, and containing greater than 0.6 mg/L up to 1.0 mg/L total fluoride, can be labeled with the following health claim: "Drinking fluoridated water may reduce the risk of [dental caries or tooth decay]." This health claim is not intended for use on bottled water products specifically marketed for use by infants.<sup>105</sup>

 *Additional information on this topic can be found in the Safety Section, Question 28.*

According to a 2017 press release from the Beverage Marketing Corporation,<sup>106</sup> bottled water surpassed carbonated soft drinks in 2016 to become the largest beverage category by volume in the United States. Per capita consumption of bottled water was approximately 39.3 gallons in 2016, while the average consumption of carbonated soft drinks was approximately 38.5 gallons per person per year. The majority (67.3%) of U.S. bottled water is sold in single-serving PET (polyethylene terephthalate or plastic resin<sup>107</sup>) bottles. Bottled water is also sold via bulk deliveries to homes and offices (approximately 11%) and by retail sales in different sizes of gallon containers (approximately 9%).<sup>106</sup>

Individuals choose to drink bottled water for various reasons. Some find it a calorie-free substitute for carbonated soft drinks or other sugary beverages. Others dislike the taste of their tap water or have concerns about the possible contaminants in their local water supply.

In a small study published in 2012, a convenience sample of caretakers and adolescents at an urban clinic found that 17% drank tap water exclusively, 38% drank bottled water exclusively and 42% drank both. Bottled water was ranked significantly higher

in taste, clarity, purity and safety than tap water. Only 24% of caretakers of children and adolescents knew whether or not fluoride was in their drinking water. The authors concluded that perception of the qualities of water were responsible for choices of drinking water.<sup>108</sup> Similar findings have been echoed in earlier studies.<sup>109-111</sup> Additionally, cultural influences can affect drinking water preferences. In some Latino communities, parents were less likely to give tap water to their children because they believed tap water would make them sick based in part on the fact that many have come to the U.S. from places with poor water quality where water-borne illness was common.<sup>111</sup> Besides missing the decay preventive effects of fluoridated tap water, it has been determined that families spend hundreds of dollars more each year on purchasing water than if they were to consume tap water.<sup>109,111</sup>

## 16. Can home water treatment systems such as water filters, reverse osmosis and water softeners remove fluoride from drinking water?

### Answer.

Some types of home water treatment systems can reduce the fluoride levels in water supplies. Individuals who drink water processed by home water treatment systems as their primary source of water could be losing the decay preventive effects of optimally fluoridated water available from their community water supply.


### Fact.

There are many kinds of home water treatment systems including reverse osmosis systems, distillation units, water softeners and water filters such as carafe filters, faucet filters, under the sink filters and whole house filters. There has not been a large body of research regarding the extent to which these treatment systems affect the fluoride content of optimally fluoridated water.

However, it has been consistently documented that reverse osmosis systems and distillation units remove significant amounts of fluoride from the water supply.<sup>112,113</sup> Studies regarding water softeners show clearly that the water softening process does not significantly change fluoride levels.<sup>114,115</sup>

With water filters, the fluoride concentration remaining in the water depends on the type and quality of the filter being used, the status of the filter and the filter's age. Most carbon filters do not remove fluoride. However, some filters containing activated alumina can remove significant amounts of the fluoride. Additionally, some filters containing bone char also can remove significant amounts of fluoride.<sup>113,116</sup> Accordingly, each type of filter should be assessed individually.

Individuals who drink water processed by home water treatment systems as their primary source of water could be losing the decay preventive effects of optimally fluoridated water available from their community water supply. Therefore, it might be necessary to contact the installer, distributor or manufacturer of the water treatment system or water filter in question to determine whether the item removes fluoride. Information regarding the existing level of fluoride in a community's public water system can be obtained by asking a local dentist or contacting the local or state health department or the local water supplier. If the consumer is using a private well, it is suggested that it be tested yearly for fluoride levels.

 Additional information on this topic can be found in this Section, Question 4.

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## 17. Does fluoride in the water supply, at the levels recommended for the prevention of tooth decay, adversely affect human health?

### Answer.

The overwhelming weight of scientific evidence supports the safety of community water fluoridation.

### Fact.

For generations, millions of people have lived in areas where fluoride is found naturally in drinking water in concentrations as high or higher than the optimal level recommended to prevent tooth decay. Research conducted among these persons confirms the safety of fluoride in the water supply.<sup>1-5</sup>

As with other nutrients, fluoride is safe and effective when used and consumed as recommended. No charge against the benefits and safety of fluoridation has ever been substantiated by generally accepted scientific knowledge. A number of reviews on fluoride in drinking water have been issued over the years. For example, in 1951<sup>6</sup> the National Research Council (NRC), of the National Academies,

issued its first report stating fluoridation was safe and effective. Additional reviews by the NRC followed in 1977<sup>7</sup> and 1993<sup>8</sup> with the most recent NRC review completed in 2006.<sup>9</sup> Additional reviews completed over the ten year period from 2007-2017 include:

- 2017 Australian Government. National Health and Medical Research Council (NHMRC). *Information Paper — Water Fluoridation: Dental and Other Human Health Outcomes.*<sup>10</sup>
- 2016 O’Mullane DM, Baez RJ, Jones S, Lennon MA, Petersen PE, Rugg-Gunn AJ, Whelton H, Whitford GM. *Fluoride and Oral Health.*<sup>11</sup>
- 2016 American Water Works Association. *Water Fluoridation Principles and Practices.* AWWA Manual M4. Sixth edition.<sup>12</sup>
- 2015 Water Research Foundation. *State of the Science: Community Water Fluoridation.*<sup>13</sup>
- 2015 The Network for Public Health Law. *Issue Brief: Community Water Fluoridation.*<sup>14</sup>



- 2015 Ireland Health Research Board. *Health Effects of Water Fluoridation: An Evidence Review*.<sup>15</sup>
- 2015 U.S. Department of Health and Human Services Federal Panel on Community Water Fluoridation. *U.S. Public Health Service Recommendation for Fluoride Concentration in Drinking Water for the Prevention of Dental Caries*.<sup>16</sup>
- 2014 Public Health England. *Water Fluoridation: Health Monitoring Report for England*.<sup>17</sup>
- 2014 Royal Society of New Zealand and the Office of the Prime Minister's Chief Science Advisor. *Health Effects of Water Fluoridation: a Review of the Scientific Evidence*.<sup>18</sup>
- 2013 U.S. Community Preventive Services Task Force. *The Guide to Community Preventive Services. Preventing Dental Caries: Community Water Fluoridation*.<sup>19</sup>
- 2011 European Commission of the European Union Scientific Committee on Health and Environmental Risks (SCHER). *Fluoridation*.<sup>20</sup>
- 2008 Health Canada. *Findings and Recommendations of the Fluoride Expert Panel*.<sup>21</sup>
- 2007 Australian Government National Health and Medical Research Council *A Systematic Review of the Efficacy and Safety of Fluoridation; Part A: Review Methodology and Results*.<sup>22</sup>

*The overwhelming weight of scientific evidence supports the safety of community water fluoridation.*

## 18. Are additional studies being conducted to determine the effects of fluorides in humans?

### **Answer.**

Yes. Since its inception, fluoridation has undergone a nearly continuous process of re-evaluation. As with other areas of science, additional studies on the effects of fluorides in humans can provide insight as to how to make effective choices for the use of fluoride. The American Dental Association and the U.S. Public Health Service support this on-going research.

### **Fact.**

For more than 70 years, detailed reports have been published on multiple aspects of fluoridation. The accumulated dental, medical and public health evidence concerning fluoridation has been reviewed and evaluated numerous times by academicians, committees of experts, special councils of governments and most of the world's major national and international health organizations. The consensus of the scientific community is that water fluoridation, at the level recommended to prevent tooth decay, safely provides oral health benefits which in turn supports improved general health. The question of possible secondary health effects caused by fluorides consumed in optimal concentrations throughout life has been the object of thorough medical investigations which have failed to show any impairment of general health throughout life.<sup>10-22</sup>

*The consensus of the scientific community is that water fluoridation, at the level recommended to prevent tooth decay, safely provides oral health benefits which in turn supports improved general health.*

In scientific research, there is no such thing as "final knowledge." New information is continuously emerging and being disseminated. Government agencies, such as the U.S. National Institutes of Health, National Institute of Dental and Craniofacial Research, and others continue to fund fluoride research. One example is the National Toxicology Program's systematic review using animal studies to evaluate potential neurobehavioral effects from exposure to fluoride during development which began in 2015 and continues in 2017.<sup>23</sup>

In 2011, the U.S. Department of Health and Human Services and the U.S. Environmental Protection Agency (EPA) issued a joint press release<sup>24</sup> outlining important steps the respective agencies were taking to ensure that standards and guidelines on fluoride in drinking water continue to ensure the safety of the public while supporting good dental health, especially in children. Those actions resulted in the 2015 report issued by the U.S. Public Health Service<sup>16</sup> regarding the recommended level of fluoride in drinking water and the EPA activity was informational to the 2016 EPA Six-Year Review<sup>325</sup> in which the Agency completed a detailed review of drinking water regulations including the regulation for naturally occurring fluoride in water.

### 19. Why did the U.S. Public Health Service issue a report in 2015 recommending 0.7 milligrams per liter (mg/L) as the optimal level for fluoride in drinking water for all temperature zones in the U.S.?

#### Answer.

The U.S. Public Health Service (USPHS) updated and replaced its 1962 Drinking Water Standards related to community water fluoridation to establish a single value of 0.7 mg/L as the optimal concentration of fluoride in drinking water. This concentration provides the best balance of protection from tooth decay while limiting the risk of dental fluorosis.<sup>16</sup>

#### Fact.

The previous U.S. Public Health Service recommendations for optimal fluoride concentrations were based on average ambient air temperatures of geographic areas and ranged from 0.7–1.2 mg/L. In 2011, the U.S. Department of Health and Human Services (HHS) issued a notice of intent in the *Federal Register*<sup>26</sup> proposing that community water systems adjust the amount of fluoride to 0.7 mg/L to achieve an optimal fluoride level.

The new guidance was based on several considerations that included:

- Scientific evidence related to effectiveness of water fluoridation on caries prevention and control across all age groups.
- Fluoride in drinking water as one of several available fluoride sources.

- Trends in the prevalence and severity of dental fluorosis.
- Current evidence on fluid intake in children across various ambient air temperatures.

As part of the process leading to the notice of intent, the U.S. Department of Health and Human Services (HHS) convened a federal interdepartmental, interagency panel of scientists to review the scientific evidence relevant to the 1962 USPHS Drinking Water Standards for fluoride concentrations in drinking water in the United States and to update these recommendations based on current science. Panelists included representatives from the Centers for Disease Control and Prevention, the National Institutes of Health, the U.S. Food and Drug Administration, the Agency for Healthcare Research and Quality, the Office of the Assistant Secretary for Health, U.S. Environmental Protection Agency, and the U.S. Department of Agriculture.<sup>16</sup>

A public comment period followed the publication of the notice of intent during which time more than 19,000 comments were received. The vast majority (more than 18,000) were variations on a letter submitted by an organization opposing community water fluoridation. Comments received were summarized and reported to the full federal panel. The panel then spent several years reviewing each comment in light of the best available science. After completing their extensive review, the panel did not alter the recommendation based on the following:

- Community water fluoridation remains an effective public health strategy for delivering fluoride to prevent tooth decay and is the most feasible and cost-effective strategy for reaching entire communities.
- In addition to drinking water, other sources of fluoride exposure have contributed to the prevention of dental caries and an increase in dental fluorosis prevalence.
- Caries preventive benefits can be achieved and the risk of dental fluorosis reduced at 0.7 mg/L.
- Recent data do not show a convincing relationship between water intake and outdoor air temperature. Thus, recommendations for water fluoride concentrations that differ based on outdoor temperature are unnecessary.<sup>16</sup>

In 2015 the USPHS published a final report establishing guidance for water systems that are actively fluoridating or those that may initiate fluoridation in the future.<sup>16</sup> For community water systems that add fluoride to their water, the USPHS recommends a uniform fluoride concentration of 0.7 mg/L (parts per million [ppm]) for the entire United States to maintain caries (tooth decay) prevention benefits and reduce the risk of dental fluorosis.

The USPHS further noted that surveillance of dental caries (tooth decay), dental fluorosis, and fluoride intake through the National Health and Nutritional Examination Survey will be done to monitor changes that might occur following implementation of the recommendation.<sup>16</sup>

## 20. What is the recommendation for the maximum level of naturally occurring fluoride in drinking water contained in the 2016 EPA Six-Year Review 3?

### Answer.

As established by the U.S. EPA, the maximum allowable level of naturally occurring fluoride in drinking water is 4 milligrams/liter (mg/L or ppm). Under the Maximum Contaminant Level (MCL) standard, if the naturally occurring level of fluoride in a public water supply exceeds the MCL, the water supplier is required to lower the level of fluoride below the MCL — a process called defluoridation. The MCL is a federally enforceable standard.<sup>27</sup> (Additional details regarding the EPA maximum contaminant standards can be found in the Figure 3.)

### Fact.

Under the Safe Drinking Water Act (SDWA),<sup>27</sup> the EPA is required to periodically review the existing National Primary Drinking Water Regulations (NPDWRs) “not less often than every 6 years.” This review is a routine part of the EPA’s operations as dictated by the SDWA.

In April 2002, the EPA announced the results of its preliminary revise/not revise decisions for 68 chemical NPDWRs as part of its first Six-Year Review of drinking water standards.<sup>28</sup> Fluoride was one of the 68 items reviewed. While the EPA determined that it fell under the “Not Appropriate for Revision at this Time” category, the agency asked the National Academies (NA) to update the risk assessment for fluoride. Prior to this time, the National Academies’ National Research Council (NRC) completed a review

of fluoride for the EPA which was published as “Health Effects of Ingested Fluoride” in 1993.<sup>8</sup>

The National Research Council’s Committee on Toxicology created the Subcommittee on Fluoride in Drinking Water<sup>9</sup> which reviewed toxicologic, epidemiologic, and clinical data published since 1993, and exposure data on orally ingested fluoride from drinking water and other sources (e.g., food, toothpaste, dental rinses). Based on these reviews, the Subcommittee evaluated independently the scientific and technical basis of the U.S. Environmental Protection Agency’s (EPA) maximum contaminant level goal (MCLG) of 4 milligram per liter (mg/L or ppm) and secondary maximum contaminant level (SMCL) of 2 mg/L in drinking water.

On March 22, 2006, almost three years after work began, the NRC issued a 500-page report titled *Fluoride in Drinking Water — A Scientific Review of the EPA’s Standards*<sup>9</sup> to advise the EPA on the adequacy of its fluoride MCLG (maximum contaminant level goal) and SMCL (secondary maximum contaminant level) to protect children and others from adverse effects. (For additional information on the EPA maximum contaminant standards, please refer to Figure 3.) The report contained two major recommendations related to the MCLG:

In light of the collective evidence on various health end points and total exposure to fluoride, the committee concludes that EPA’s MCLG of 4 mg/L should be lowered. Lowering the MCLG will prevent children from developing severe enamel fluorosis and will reduce the lifetime accumulation of fluoride into bone that the majority of the committee concludes is likely to put individuals at increased risk of bone fracture and possibly skeletal fluorosis, which are particular concerns for subpopulations that are prone to accumulating fluoride in their bones.<sup>9</sup>

To develop an MCLG that is protective against severe enamel fluorosis, clinical stage II skeletal fluorosis, and bone fractures, EPA should update the risk assessment of fluoride to include new data on health risks and better estimates of total exposure (relative source contribution) for individuals. EPA should use current approaches for quantifying risk, considering susceptible subpopulations, and characterizing uncertainties and variability.<sup>9</sup>

The 2006 NRC report<sup>9</sup> contained one major recommendation related to the Secondary Maximum Contaminant Level (SMCL):

The prevalence of severe enamel fluorosis is very low (near zero) at fluoride concentrations below 2 mg/L. From a cosmetic standpoint, the SMCL does not completely prevent the occurrence of moderate enamel fluorosis. EPA has indicated that the SMCL was intended to reduce the severity and occurrence of the condition to 15% or less of the exposed population. The available data indicate that fewer than 15% of children will experience moderate enamel fluorosis of aesthetic concern (discoloration of the front teeth) at that concentration. However, the degree to which moderate enamel fluorosis might go beyond a cosmetic effect to create an adverse psychological effect or an adverse effect on social functioning is not known.<sup>9</sup>

Additionally, the Subcommittee identified data gaps and made recommendations for future research relevant to future revisions of the MCLG and SMCL for fluoride.<sup>9</sup>

It should be emphasized that the 2006 NRC report was not a review of fluoride as used in community water fluoridation. In fact, the 2006 NRC Report in Brief<sup>29</sup> states: “The committee did not evaluate the risks or benefits of the lower fluoride concentrations (0.7 to 1.2 mg/L) used in water fluoridation. Therefore, the committee’s conclusions regarding the potential for adverse effects from fluoride at 2 to 4 mg/L in drinking water do not apply at the lower water fluoride levels commonly experienced by most U.S. citizens.”<sup>29</sup>

In response to the recommendations noted above from the NRC report, in 2011, the EPA completed and peer-reviewed a quantitative dose-response assessment based on the available data for severe dental fluorosis as recommended by the NRC.<sup>30</sup> Additionally, the EPA completed and peer-reviewed a document on the environmental exposure of children and adults to fluoride and the relative source contribution for water which is needed in order to derive the MCLG from the dose-response assessment.<sup>30</sup> These efforts were being undertaken during Six-Year Review 2 and so no action on fluoride was taken during Six-Year Review 2.

In December 2016, the EPA announced the review results for the Agency’s third Six-Year Review (called Six-Year Review 3),<sup>25</sup> in which the Agency completed a detailed review of 76 national primary drinking water regulations. The regulation for naturally occurring fluoride in water was examined as part of this review and is included among the list of regulated contaminants considered to be “Low priority and/or

no meaningful opportunity” under “Not Appropriate for Revision at this Time.”<sup>25</sup>

The announcement of the results of the EPA’s Six-Year Review 3 in the *Federal Register*<sup>31</sup> indicates that, with the reviews of fluoride conducted since the first Six-Year Review (including but not limited to the 2006 NRC report and the EPA Fluoride Risk Assessment and Relative Source Contribution) and noting that other contaminants are of much greater concern, the EPA is recommending that no further action be taken at this time to change the current MCL/MCLG of 4 mg/L (the maximum level of naturally occurring fluoride allowed in drinking water).<sup>31</sup>

## 21. What is the Secondary Maximum Contaminant Level (SMCL) for naturally occurring fluoride in drinking water established by the EPA?

### Answer.

The Secondary Maximum Contaminant Level (SMCL) for naturally occurring fluoride in water is 2 mg/L (or ppm). This is a non-enforceable federal standard.

### Fact.

In addition to the MCL, the EPA has established a Secondary Maximum Contaminant Level (SMCL) of 2.0 mg/L and requires consumer notification by the water supplier if the naturally occurring fluoride level exceeds 2.0 mg/L. The SMCL, while not federally enforceable, is intended to alert families that regular consumption of water with natural levels of fluoride greater than 2.0 mg/L by young children could cause moderate to severe dental fluorosis in the developing permanent teeth.<sup>32</sup> The notice to be used by water systems that exceed the SMCL must contain the following points:

1. The notice is intended to alert families that children under nine years of age who are exposed to levels of fluoride greater than 2.0 mg/liter may develop dental fluorosis.
2. Adults are not affected because dental fluorosis occurs only when developing teeth are exposed to elevated fluoride levels.
3. The water supplier can be contacted for information on alternative sources or treatments that will insure the drinking water would meet all standards (including the SMCL).<sup>32</sup>

## Figure 3. USEPA Standards and USPHS Recommendation for Fluoride in Drinking Water

### U.S. Environmental Protection Agency (EPA) Standards for Fluoride in Drinking Water

The EPA standards for fluoride in drinking water apply to the *naturally occurring* fluoride in water. They are the:

- Maximum Contaminant Level Goal (**MCLG**) – 4 mg/L
- Maximum Contaminant Level (**MCL**) – 4 mg/L
- Secondary Maximum Contaminant Level (**SMCL**) – 2 mg/L

**MCLG** — The MCLG is the level of contaminants in drinking water at which no adverse health effects are likely to occur. This health goal is based solely on possible health risks and exposure over a lifetime with an adequate margin of safety. The current MCLG for fluoride is 4 mg/L and is set at this level to provide protection against the increased risk of crippling skeletal fluorosis.

**MCL** — The MCL is an enforceable standard which is set as close to the health goal as possible, considering the benefit to the public, the ability of public water systems to detect and remove contaminants using suitable treatment technologies and cost. In the case of fluoride, the MCL is set at the MCLG.

Under the MCL standard, if the naturally occurring level of fluoride in a public water supply exceeds 4 mg/L, the water supplier is required to lower the level of fluoride or defluoridate. Community water systems that exceed the fluoride MCL of 4 mg/L must notify persons served by that system as soon as practical, but no later than 30 days after the system learns of the violation.

**SMCL** — Secondary standards are non-enforceable guidelines regulating contaminants that may cause cosmetic effects (such as tooth discoloration). The EPA recommends secondary standards to water systems but does not require systems to comply. However, states may choose to adopt them as enforceable standards. Tooth discoloration and/or pitting is caused by excess fluoride exposures during the formative period prior to eruption of the teeth in children. The level of the SMCL was set based upon a balancing of the beneficial effects of protection from tooth decay and the undesirable effects of excessive exposures leading to discoloration.

Under the SMCL, if water exceeds 2 mg/L, the water system is to notify consumers that regular consumption of water with fluoride above 2 mg/L, may increase the risk for fluorosis in young (under 9 years of age) children. Community water systems that exceed the fluoride secondary standard of 2 mg/L must notify persons served by that system as soon as practical but no later than 12 months from the day the water system learns of the exceedance.


### U.S. Public Health Service (USPHS) Recommendation for Fluoride in Drinking Water

In 2015, the USPHS published a final report establishing guidance for water systems that are actively fluoridating or those that may initiate fluoridation in the future. For community water systems that add fluoride to their water, the USPHS recommends a uniform fluoride concentration of 0.7 mg/L for the entire United States to maintain caries (tooth decay) prevention benefits and reduce the risk of dental fluorosis.

### Why is the EPA MCL of 4 mg/L different from the USPHS recommendation of 0.7 mg/L?

The two benchmarks have different purposes and are set under different authorities. The EPA MCL of 4 mg/L is set to protect against risks from exposure to too much fluoride. The USPHS recommended level of fluoride on 0.7 mg/L is set to promote the benefit of fluoride in preventing tooth decay while minimizing the chance for dental fluorosis.

Information Source: EPA Fact Sheet: Questions and Answers on Fluoride. 2011. Available at <https://www.epa.gov/dwsixyearreview/fact-sheet-questions-and-answers-fluoride>

 Additional information on these topics can be found in this Section, Questions 19, 20 and 21.



## 22. Does the total intake of fluoride from air, water and foods in a community in the United States with drinking water fluoridated at the recommended level pose significant health risks?

### Answer.

The total intake of fluoride from air, water and foods in a community in the United States with drinking water fluoridated at the recommended level does not pose significant health risks.

### Fact.

#### Fluoride from the Air

The atmosphere normally contains negligible concentrations of airborne fluorides. Studies reporting the levels of fluoride in air in the United States suggest that ambient fluoride contributes very little to a person's overall fluoride intake.<sup>9,30</sup>

#### Fluoride from Water

For generations, millions of people have lived in areas where fluoride is found naturally in drinking water in concentrations as high as or higher than those recommended to prevent tooth decay. Research conducted among these people confirms the safety of fluoride in the water supply.<sup>1-5</sup>

A ten-year comparison study of long-time residents of Bartlett and Cameron, Texas, where the water supplies contained 8.0 and 0.4mg/L of fluoride, respectively, included examinations of organs, bones and tissues. Other than a higher prevalence of dental fluorosis in the Bartlett residents (8.0 mg/L fluoride), the study indicated that long-term consumption of fluoride from water and food sources (resident average length of fluoride exposure was 36.7 years), even at these levels more than 10 times higher than recommended for tooth decay prevention, resulted in no clinically significant physiological or functional effects.<sup>5</sup>

In the United States, the natural level of fluoride in ground water varies from very low levels to over 4 mg/L. Public water systems in the U.S. are monitored by the Environmental Protection Agency (EPA), which requires that public water systems not exceed a naturally occurring fluoride level of 4 mg/L.<sup>31</sup> The recommended level for fluoride in drinking water in the United States has been established at 0.7 mg/L by the U.S. Public Health Service.<sup>16</sup> This level has been

established to reduce tooth decay while minimizing the occurrence of dental fluorosis.

Individuals living in a community with water fluoridation get a portion of their daily fluoride intake from fluoridated water and a portion from dietary sources which would include foods and other beverages. Water and water-based beverages are the chief source of dietary fluoride intake. Conventional estimates are that approximately 75% of dietary fluoride comes from water and water-based beverages.<sup>33,34</sup> When considering water fluoridation, an individual consuming one liter of water fluoridated at 0.7 mg/L receives 0.7 milligram of fluoride.

#### Fluoride in Foods

In looking at the fluoride content of foods and beverages over time, it appears that fluoride intake from dietary sources has remained relatively constant.<sup>35</sup> Except for products prepared (commercially or by the individual) or cooked with fluoridated water, the fluoride content of most foods and beverages is not significantly different between fluoridated and nonfluoridated communities. When fluoridated water is used to prepare or cook the samples, the fluoride content of foods and beverages is higher. This difference has remained relatively constant over time.<sup>33,35</sup>

Launched in 2004 and updated in 2005, the National Fluoride Database is a comprehensive, nationally representative database of the fluoride concentration in 427 foods across 27 food groups and beverages consumed in the United States.<sup>34</sup> This database for fluoride was designed for use by epidemiologists and health researchers to estimate fluoride intake and to assist in the investigation of the relationships between fluoride intake and human health. The database contains fluoride values for beverages, water, and some lower priority foods.<sup>34</sup>

The fluoride content of fresh solid foods in the United States generally ranges from 0.01 to 1.0 part per million.<sup>35</sup> The foods highest in fluoride are fish and shellfish, reflective of the fluoride found in ocean water, and the presence or absence of bone fragments such as those in sardines.<sup>35</sup> (Fluoride has an affinity for calcified tissues such as bones.) Cereals, baked goods, breads, and other grain products were estimated to have fluoride concentrations between 0.06 and 0.72 ppm. The majority of vegetables (leafy, root, legumes, green or yellow) have a relatively low fluoride concentration (ranging from 0.01 to 0.5 ppm)

with fruits generally having lower concentrations (ranging from 0.01 to 0.2 ppm) than in vegetables. Raisins are one exception in the fruit category with a higher fluoride concentration due to the use of certain pesticides and concentration through drying.<sup>35</sup>

Brewed teas can contain fluoride concentrations of 1 ppm to 6 ppm depending on the amount of dry tea used, the water fluoride concentration and the brewing time.<sup>36</sup> The fluoride value for unsweetened instant tea powder appears very high when reported as a dry powder because this product is extremely concentrated. However, when one teaspoon of the unsweetened tea powder is added to an eight ounce cup of tap water, the value for prepared instant tea is similar to the values reported for regular brewed tea.<sup>34</sup>

Foods and beverages commercially processed (cooked or reconstituted) in cities fluoridated to the recommended level generally contain higher levels of fluoride than those processed in nonfluoridated communities. These foods and beverages are consumed not only in the city where processed, but also are often distributed to and consumed in nonfluoridated areas.<sup>37</sup> This “halo” or “diffusion” effect results in increased fluoride intake by people in nonfluoridated communities, providing them increased protection against tooth decay.<sup>38,39</sup> As a result of the widespread availability of these various sources of fluoride, the difference between tooth decay rates in fluoridated areas and nonfluoridated areas is somewhat less than several decades ago but this difference is still significant. Failure to account for the diffusion effect results in an underestimation of the total benefit of water fluoridation especially in areas where large amounts of fluoridated products are brought into nonfluoridated communities.<sup>38</sup>

The average daily dietary intake of fluoride (expressed on a body weight basis) by children residing in communities with water fluoridated at 1.0 mg/L is 0.05 mg/kg/day (milligram per kilogram of body weight per day).<sup>40</sup> In communities without optimally fluoridated water, average intakes for children are about 50% lower.<sup>40</sup> Dietary fluoride intake by adults in communities where water is fluoridated at 1.0 mg/L averages 1.4 to 3.4 mg/day, and in nonfluoridated areas averages 0.3 to 1.0 mg/day.<sup>40</sup> With the 2015 recommendation that drinking water be fluoridated at 0.7 mg/L, average intakes would be 30% lower in fluoridated communities than when they were fluoridated at 1.0 mg/L.

## 23. How much fluoride is recommended to maximize the tooth decay prevention benefits of fluoride?

### Answer.

As with all nutrients, the appropriate amount of daily fluoride intake varies with age and body weight. Fluoride is safe and effective when used and consumed properly.

### Fact.

In 1997, the Food and Nutrition Board of the Institute of Medicine developed a comprehensive set of reference values for dietary nutrient intakes.<sup>40</sup> These new reference values, the Dietary Reference Intakes (DRI), replace the Recommended Dietary Allowances (RDA) which had been set by the National Academy of Sciences since 1941. The new values present nutrient requirements to optimize health and, for the first time, set maximum-level guidelines to reduce the risk of adverse effects from excessive consumption of a nutrient. Along with calcium, phosphorous, magnesium and vitamin D, DRIs for fluoride were established because of its proven preventive effect on tooth decay. (See Table 2 in this Question.)

The Adequate Intake (AI) establishes a goal for intake to sustain a desired indicator of health without causing side effects. In the case of fluoride, the AI is the daily intake level required to reduce tooth decay without causing moderate dental fluorosis. The AI for fluoride intake from all sources (fluoridated water, foods, beverages, fluoride dental products and dietary fluoride supplements) is set at 0.05 mg/kg/day. Using the established AI of 0.05 mg/kg, the amount of fluoride for optimal health to be consumed each day has been calculated by sex and age group (expressed as average weight).<sup>40</sup>

The Tolerable Upper Intake Level (UL) establishes a maximum guideline. The UL is higher than the AI and is not the recommended level of intake. The UL is the estimated maximum intake level that should not produce unwanted effects on health. The UL for fluoride intake from all sources (fluoridated water, foods, beverages, fluoride dental products and dietary fluoride supplements) is set at 0.10 mg/kg/day (milligram per kilogram of body weight per day) for infants, toddlers, and children through eight years of age. For older children and adults, who are no longer at risk for dental fluorosis, the UL for fluoride is set at

**Table 2. Reference Intakes for Fluoride****Food and Nutrition Board of the Institute of Medicine 1997<sup>40</sup>**

Age Group	Reference Weights kg (lbs)*	Adequate Intake (mg/day)	Tolerable Upper Intake (mg/day)
<b>Infants 0-6 months</b>	7 (16)	0.01	0.7
<b>Infants 7-12 months</b>	9 (20)	0.5	0.9
<b>Children 1-3 years</b>	13 (29)	0.7	1.3
<b>Children 4-8 years</b>	22 (48)	1.0	2.2
<b>Children 9-13 years</b>	40 (88)	2.0	10.0
<b>Boys 14-18 years</b>	64 (142)	3.0	10.0
<b>Girls 14-18 years</b>	57 (125)	3.0	10.0
<b>Males 19 years and over</b>	76 (166)	4.0	10.0
<b>Females 19 years and over</b>	61 (133)	3.0	10.0

\* Value based on data collected during 1988-94 as part of the Third National Health and Nutrition Examination Survey (NHANES III) in the United States.<sup>40</sup>

10 mg/day regardless of weight. Using the established ULs for fluoride, the amount of fluoride that can be consumed each day to reduce the risk of moderate enamel fluorosis for children through age eight, has been calculated by sex and age group (expressed as average weight).<sup>40</sup> (See Table 2.)

As a practical example, daily intake of 2 mg of fluoride is adequate for a 9- to 13-year-old child weighing 88 pounds (40 kg). This was calculated by multiplying 0.05 mg/kg/day (AI) times 40 kg (weight) to equal 2 mg. At the same time, that 88 pound (40kg) child could consume 10 mg of fluoride a day as a tolerable upper intake level.

Children living in a community with water fluoridation get a portion of their daily fluoride intake from fluoridated water and a portion from dietary sources which would include foods and other beverages. When considering water fluoridation, an individual must consume one liter of water fluoridated at 0.7 mg/L to receive 0.7 milligrams (0.7 mg) of fluoride. Children under six years of age, on average, consume less than one-half liter of drinking water a day.<sup>35</sup> Therefore, children under six years of age would consume, on average, less than 0.35 mg of fluoride a day from drinking optimally fluoridated water (at 0.7 mg/L).

If a child lives in a nonfluoridated area and is determined to be at high risk for tooth decay, the dentist or physician may prescribe dietary fluoride supplements.<sup>41</sup> As shown in Table 1 “Dietary Fluoride Supplement Schedule” (See Benefits Section, Question 12.), the current dosage schedule recommends supplemental fluoride amounts that are below the AI for each age group.<sup>41</sup> The dosage schedule was designed to offer the benefit of decay reduction with a margin of safety to prevent mild to moderate enamel fluorosis. For example, the AI for a child 3 years of age is 0.7 mg/day. The recommended dietary fluoride supplement dosage for a child 3 years of age in a nonfluoridated community is 0.5 mg/day. This provides leeway for some fluoride intake from processed foods and beverages, and other sources.

Tooth decay rates are declining in many population groups because children today are being exposed to fluoride from a wider variety of sources than decades ago.<sup>16</sup> Many of these sources are intended for topical use only; however, some fluoride is ingested inadvertently by children.<sup>42,43</sup> By reducing the inappropriate ingestion of fluoride from toothpaste, the risk of dental fluorosis can be reduced without jeopardizing the benefits to oral health.



For example, it has been reported in a number of studies that young children inadvertently swallow an average of 0.30 mg of fluoride from fluoride toothpaste at each brushing.<sup>44-48</sup> If a child brushes twice a day, 0.60 mg of fluoride could be ingested inappropriately. This could slightly exceed the Adequate Intake (AI) values from Table 2. The 0.60 mg consumption is 0.10 mg higher than the AI value for children 6 to 12 months and is 0.10 mg lower than the AI for children from 1-3 years of age.<sup>40</sup> Although toothpaste is not meant to be swallowed, children could consume the daily recommended Adequate Intake amount of fluoride from toothpaste alone. In order to decrease the risk of dental fluorosis, the American Dental Association (ADA) recommends:<sup>49</sup>

- For children younger than 3 years, caregivers should begin brushing children's teeth as soon as they begin to come into the mouth by using fluoride toothpaste in an amount no more than a smear or the size of a grain of rice (Figure 4). Brush teeth thoroughly twice per day (morning and night) or as directed by a dentist or physician. Supervise children's brushing to ensure that they use the appropriate amount of toothpaste.
- For children 3 to 6 years of age, caregivers should dispense no more than a pea-sized amount (Figure 4) of fluoride toothpaste. Brush teeth thoroughly twice per day (morning and night) or as directed by a dentist or physician. Supervise children's brushing to minimize swallowing of toothpaste.<sup>49</sup>

➤ *Additional information on this topic can be found in this Section, Question 29.*

**Figure 4. Examples of Toothpaste Amounts for Children<sup>49</sup>**



For children under three years old, use no more than a smear or grain-of-rice-sized amount of fluoride toothpaste.



For children three to six years old, use only a pea-sized amount of fluoride toothpaste.

It should be noted that the amounts of fluoride discussed here are intake, or ingested, amounts. When fluoride is ingested, a portion is retained in the body and a portion is excreted.

➤ *Addition information on this topic can be found in this Section, Question 25.*

## 24. Is there a need for prenatal dietary fluoride supplementation?

### Answer.

**There is no scientific basis to suggest any need to increase a woman's daily fluoride intake during pregnancy or breastfeeding to protect her health. At this time, scientific evidence is insufficient to support the recommendation for prenatal fluoride supplementation for decay prevention for infants.**

### Fact.

The Institute of Medicine determined that, "No data from human studies document the metabolism of fluoride during lactation. Because fluoride concentrations in human milk are very low (0.007 to 0.011 ppm) and relatively insensitive to differences in the fluoride concentrations of the mother's drinking water, fluoride supplementation during lactation would not be expected to significantly affect fluoride intake by the nursing infant or the fluoride requirement of the mother."<sup>40</sup>

A 2005 a randomized, double blind study<sup>50</sup> compared the amount of fluoride incorporated into primary teeth exposed to prenatal and post natal fluoride supplements to primary teeth that were exposed to only postnatal fluoride. The study concluded that teeth exposed to prenatal and postnatal fluoride supplements had no additional measurable fluoride other than that attributable to postnatal fluoride alone.<sup>50</sup> This study confirmed the findings of a 1997 randomized, double blind study that evaluated the effectiveness of prenatal dietary supplementation which concluded that the data did not support the hypothesis that prenatal fluoride had a strong decay preventive effect on primary teeth.<sup>51</sup>

## 25. When fluoride is ingested, where does it go?


### Answer.

Much of the ingested fluoride is excreted. Of the fluoride retained, almost all is found in calcified (hard) tissues, such as bones and teeth.

### Fact.

After ingestion of fluoride, such as drinking a glass of fluoridated water, the majority of the fluoride is absorbed from the stomach and small intestine into the blood stream. This causes a short-term increase in fluoride levels in the blood. Fluoride is distributed through the body by plasma (a component of blood) to hard and soft tissues. Following ingestion, the fluoride plasma levels increase quickly and reach a peak concentration within 20–60 minutes. The concentration declines rapidly, usually approximating the baseline levels within three to six hours, due to the uptake of fluoride by calcified tissues and excretion in urine. In adults, approximately 50% of the fluoride absorbed each day becomes associated with calcified tissues within 24 hours while the remainder is excreted in the urine. Approximately 99% of the fluoride present in the body is in calcified tissues (mainly bone).<sup>52</sup>

Ingested or systemic fluoride becomes incorporated into forming tooth structures. Fluoride ingested regularly during the time when teeth are developing is deposited throughout the tooth structure and contributes to long lasting protection against tooth decay.<sup>53–57</sup>

 *Additional information on this topic can be found in the Benefits Section, Question 2.*

An individual's age and stage of skeletal development will affect the rate of fluoride retention. The amount of fluoride taken up by bone and retained in the body is inversely related to age. A greater percentage of fluoride is absorbed in young bones than in the bones of older adults.<sup>52</sup> However, once fluoride is absorbed into bones, it is released back into plasma (a component of blood) when fluoride levels in plasma fall. This absorption and release cycle continues throughout the life span.<sup>52</sup>

## 26. Will drinking water that is fluoridated at the recommended level adversely affect bone health?

### Answer.

According to the best available science, drinking water that has been fluoridated at the recommended level does not have an adverse effect on bone health.

### Fact.

Several systematic reviews have concluded that fluoride at the level used in community water fluoridation has no adverse effect on bone health. A systematic review published in 2000 concluded that there was no clear association between water fluoridation and hip fracture.<sup>59</sup> Twenty-nine studies that looked at the association between bone fracture/ bone development and water fluoridation were included in the review. The evidence regarding other types of bone fractures was similar.<sup>59</sup> A systematic review published in 2017<sup>10</sup> concurred with the earlier review concluding that there is evidence that fluoridated water at recommended levels is not associated with bone fracture.<sup>10</sup>

In addition to the systematic reviews, a number of individual studies have investigated the bone health of individuals residing in communities with fluoride in drinking water at the recommended levels and higher than recommended levels. Most of these studies have focused on whether there exists a possible link between fluoride and bone fractures. Additionally, the possible association between fluoride and bone cancer has been studied. None of the studies provide a legitimate reason for altering public health policy regarding fluoridation and bone health concerns.

The following studies, listed in chronological order, add to the body of evidence indicating that there is no association between consumption of optimally fluoridated water and bone fracture.

The Iowa Fluoride Study/Iowa Bone Development Study<sup>60</sup> looked at the association of fluoride intake with bone measures (bone mineral content and bone mineral density) in a cohort of Iowa children. Assessment of the participants' dietary fluoride intake had been ongoing since birth with parents completing detailed fluoride questionnaires at numerous time periods through 15 years of age. These children had combined fluoride intake estimated from a number of sources including water, other beverages, selected

foods, dietary fluoride supplements and fluoride toothpaste. Estimated fluoride intake was noted during different time periods and cumulatively from birth to 15 years of age. The findings indicate that fluoride exposures at typical levels for most U.S. adolescents in fluoridated areas do not have significant effects on bone mineral measures. These findings are generally comparable with those from the analyses of this cohort at age 11 years.<sup>61</sup> During the intervening 4 years, cohort members generally experienced a substantial increase in bone mass accrual. For example, mean whole-body bone mineral content showed mean increases of approximately 61% in females and 96% in males. Despite the acceleration of bone growth near puberty, the associations between fluoride intake and bone outcome measures remained weak and none was significant after adjustment for other variables.<sup>60</sup>

In one of the largest studies of its kind with nearly half a million subjects, Swedish researchers looked at residents' chronic consumption of various levels of fluoride and the risk of hip fracture. All individuals born in Sweden between January 1, 1900 and December 31, 1919, alive and living in their municipality of birth at the time of the start of follow-up, were eligible for the study. Information on the study population was linked to the Swedish health registers. Estimated individual drinking water fluoride exposure was stratified into 4 categories: very low, < 0.3 mg/L; low, 0.3 to 0.69 mg/L; medium, 0.7 to 1.49 mg/L; and high, ≥ 1.5 mg/L. Published in 2013, the researchers found Swedish residents chronically exposed to various levels of fluoride in drinking water did not show any differences in rates of either hip fracture or low-trauma osteoporotic hip fracture due to fluoride exposure.<sup>62</sup>

A study published in 2005 evaluated the bone mineral density levels and rate of bone fracture of 1,300 women living in three separate communities. To be included in the study, the women had to be ambulatory. The ages of the women ranged from 20 years to 92 years. The size and demographics of the three communities were similar. One part of the study looked at whether fluoride was associated with adverse bone-related outcomes. The study measured fluoride serum levels, fluoride exposure, and bone metabolism as related to fluoride exposure and fluoride's interaction with other important bone factors including age, menopause status and medications. The study concluded that long-term exposure to fluoride was not associated with adverse effects on bone health.<sup>63</sup>

A study published in 2001<sup>64</sup> examined the risk of bone fractures, including hip fractures associated with long-term exposure to fluoridated water in six Chinese populations. The water fluoride concentrations ranged from 0.25 to 7.97 mg/L. A total of 8,266 male and female subjects, all of whom were 50 years old or older participated in the study. The results showed an interesting and potentially important finding regarding overall bone fractures. Whereas there appeared to be a trend for higher fracture rates from 1.00 to 4.00 mg/L, the fracture rate in the 1.00 to 1.06 mg/L category was lower than the rate in the category with the lowest fluoride intake (0.25 to 0.34 mg/L). The study concluded that long-term fluoride exposure from drinking water containing 4.32 mg/L or more increases the risk of overall bone fracture, as well as hip fracture, while water fluoride levels of 1.0 to 1.06 mg/L decreased the risk of overall fractures relative to negligible fluoride in water.<sup>64</sup> (Note that 4.32 mg/L is more than six times the fluoride level currently recommended for community water fluoridation in the United States).

While a number of studies reported findings at a population level, both the Hillier and Phipps studies published in 2000, examined risk on an individual, rather than a community basis, taking into account other risk factors such as medications, age of menopause, alcohol consumption, smoking, dietary calcium intake and physical activity. Using these more rigorous study designs, these two studies reported no effect of the risk of hip fracture<sup>65</sup> and no increase in the risk of hip fracture in those drinking fluoridated water,<sup>66</sup> respectively.

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*According to the best available science, drinking water that has been fluoridated at the recommended level does not have an adverse effect on bone health.*

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## 27. What is dental fluorosis or enamel fluorosis?

### Answer.

Dental fluorosis is a change in the appearance of the tooth enamel that only occurs when younger children consume too much fluoride, from all sources, over long periods when teeth are developing under the gums.<sup>36</sup> In the United States, most commonly these changes are not readily apparent to the affected individual or casual observer and require a trained specialist to detect. This type of dental fluorosis found in the United States has no effect on tooth function and can make the teeth more resistant to decay.<sup>67</sup> Photographs of mild dental fluorosis can be viewed at <https://www.ADA.org/en/member-center/oral-health-topics/fluoride-topical-and-systemic-supplements>. (Note that mild dental fluorosis is generally less evident than on these photographs. This is because the teeth were dried very well to improve the photography and this makes the mild dental fluorosis stand out, but if the tooth had saliva on it as it usually does, then it would be less noticeable.)

### Fact.

The crown of the tooth (the part covered in enamel) is formed under the gums before the teeth erupt. Enamel formation of permanent teeth, other than third molars (wisdom teeth), occurs from about the time of birth until approximately eight years of age.<sup>68</sup> Because dental fluorosis occurs only while teeth are forming under the gums, teeth that have erupted are not at risk for dental fluorosis; therefore, older children and adults are not at risk for the development of dental fluorosis.<sup>69</sup> It should be noted that there are many other developmental changes that affect the appearance of tooth enamel which are not related to fluoride intake. In other words, not all opaque or white blemishes on teeth are caused by fluoride. Furthermore, dental fluorosis occurs among some people in all communities, even in communities that do not have community water fluoridation, or that have a low natural concentration of fluoride in their drinking water.<sup>70-72</sup>

### Classification of Dental Fluorosis

Dental fluorosis has been classified in a number of ways. One of the most widely used classifications was developed by Dean in 1942.<sup>73</sup> (See Table 3.)


In using Dean's Fluorosis Index, each tooth in an individual's mouth is rated according to the fluorosis

index in Table 3. The individual's dental fluorosis score is based upon the most severe form of fluorosis recorded for two or more teeth. Dean's Fluorosis Index, which has been used since 1942, remains popular for prevalence studies in large part due to its simplicity and the ability to make comparisons with findings from a number of earlier studies.<sup>74</sup>

In 2010, a report by the U.S. National Center for Health Statistics described the prevalence and changes in prevalence and severity of dental fluorosis in the United States and among adolescents between 1986–1987 and 1999–2004.<sup>75</sup> According to the report, in 1999 to 2004, 40.7% of adolescents had dental fluorosis. It should be noted that dental fluorosis can occur not only from fluoride intake from water but also from fluoride products, such as toothpaste, mouthrinses and excessive use of fluoride supplements during the ages when teeth are forming. A 1994 analysis of five studies showed that the amount of dental fluorosis attributable to water fluoridation at 1.0 mg/L was approximately 13%.<sup>76</sup> In other words, at that time the amount of dental fluorosis would have been reduced by only 13% if water was not fluoridated. Now it would be less of a reduction, since fluoridation uses the lower level of 0.7 mg/L. The majority of dental fluorosis in the U.S. is caused by the inappropriate ingestion of fluoride products.<sup>76</sup>

The vast majority of dental fluorosis in the United States is the very mild or mild type. This type of dental fluorosis is not readily apparent to the affected individual or casual observer and often requires a trained specialist to detect. In contrast, the moderate and severe forms of dental fluorosis, characterized by esthetically (cosmetically) objectionable changes in tooth color and surface irregularities, respectively, are not common in the United States. Most investigators regard even the more advanced forms of dental fluorosis as a cosmetic effect rather than a functional adverse effect.<sup>40</sup> In 1993, the U.S. Environmental Protection Agency, in a decision supported by the U.S. Surgeon General, determined that objectionable dental fluorosis is a cosmetic effect with no known health effects.<sup>77</sup> However, in 2003, the EPA requested that the National Research Council (NRC) evaluate the adequacy of its MCLG for fluoride to protect public health. A committee was convened to review recent evidence and eventually developed the 2006 report titled, *Fluoride in Drinking Water — A Scientific Review of the EPA's Standards*.<sup>9</sup> As part of that report, a majority of the committee members found severe dental fluorosis to be an adverse health

effect based on suggestive but inconclusive evidence that severe dental fluorosis (characterized by pitting of the enamel) increased the risk of tooth decay. All members of the committee agreed that the condition damages the tooth and that the EPA standard should prevent the occurrence of this unwanted condition. The prevalence of severe enamel fluorosis is very low below 2 mg/L of fluoride in drinking water in the U.S.<sup>9</sup>

 *Additional information on this topic can be found in this Section, Questions 20 and 21.*

*The vast majority of dental fluorosis in the United States is the very mild or mild type. This type of dental fluorosis is not readily apparent to the affected individual or casual observer and often requires a trained specialist to detect.*

Limited research on the psychological effects of dental fluorosis on children and adults has been conducted. However, a 2009 literature review that assessed the relationships between perceptions of dental appearance/oral health related quality of life (OHRQoL) and dental fluorosis concluded that very mild to mild dental fluorosis has little impact and in some cases evidence suggested enhanced quality of life with mild dental fluorosis.<sup>78</sup> When evaluating the oral health related quality of life of children by tooth decay (cavities) and dental fluorosis experience, a 2007 study concluded that cavities were associated with a negative impact while mild dental fluorosis had a positive impact on children's and parents' quality of life.<sup>79</sup>

Very mild to mild dental fluorosis has no effect on tooth function and can make the tooth enamel more resistant to decay. A study published in 2009<sup>67</sup> investigated the relationship between dental fluorosis and tooth decay in U.S. schoolchildren. The study concluded that teeth with dental fluorosis were more resistant to tooth decay than were teeth without dental fluorosis. Not only should the cavity preventive benefits of fluoridation be considered when evaluating policy to introduce or retain water fluoridation, but the cavity preventive benefits of mild dental fluorosis should also be considered.<sup>67</sup>

*Very mild to mild dental fluorosis has no effect on tooth function and can make the tooth enamel more resistant to decay.*

A report published in 2010<sup>75</sup> described the prevalence (total percentage of cases in a population) of dental fluorosis in the United States and discussed the changes in the prevalence and severity of dental fluorosis among adolescents between 1986-1987 and 1999-2004. The report used data from the National Health and Nutrition Examination Survey (NHANES) 1999-2004 and the 1986-1987 National Survey of Oral Health in U.S. School Children. The data represented persons from 6 to 49-years of age and varied races and ethnicities including non-Hispanic black and Mexican-American persons. The oral exams for both surveys were conducted by trained dental examiners and included a dental fluorosis assessment of permanent teeth. The Dean's Fluorosis Index was used to determine the prevalence and severity of dental fluorosis.

The data published in 2010<sup>75</sup> showed that less than one-quarter of persons aged 6-49 in the United States had some form of dental fluorosis. For the remaining three-quarters of persons in this age group, 60.6% were unaffected by dental fluorosis and 16.5% were classified as having questionable dental fluorosis. The percent distribution of the types of dental fluorosis in persons aged 6-49 years observed was:

Very mild fluorosis	16.0%
Mild fluorosis	4.8%
Moderate fluorosis	2.0%
Severe fluorosis	less than 1%

While moderate and severe dental fluorosis comprise less than 3% of dental fluorosis in all persons aged 6-49, the prevalence of moderate or severe dental fluorosis in this age group comprised a very small portion (less than 10%) of the total number of all cases of dental fluorosis. In other words, approximately 90% of all dental fluorosis observed was very mild to mild form.<sup>75</sup>

In regards to dental fluorosis in adolescents, children aged 12-15 years in 1999-2004 had higher prevalence of dental fluorosis compared with the same aged children in 1986-1987.<sup>75</sup>

In reviewing this report,<sup>75</sup> it should be noted that dental fluorosis was not assessed in NHANES 1988–1994 and so it was not possible to compare the NHANES 1999–2002 to the earlier NHANES report. The only other previously collected national data on dental fluorosis were the 1986–1987 National Institute of Dental Research (NIDR) National Survey of Oral Health in U.S. School Children. Differences in study design between NIDR 1986–1987 and NHANES 1999–2002 should be considered when drawing inferences about changes in prevalence and severity of enamel fluorosis.<sup>75</sup> Examples of differences in these two surveys include but are not limited to:

- NIDR survey is a school-based survey while the NHANES is a household survey.
- NHANES did not collect residential histories; NIDR did gather residential histories but it is unknown if NIDR reported dental fluorosis data only for those with a single residence history.
- NIDR collected water samples from schools for fluoride analysis; NHANES did not collect water samples for analysis until the 2013–14 survey cycle.

As defined in Table 3, very mild dental fluorosis is characterized by small opaque, paper-white areas covering less than 25% of the tooth surface. The risk of teeth forming with the very mildest form of dental fluorosis must be weighed against the benefit that the individual will have fewer cavities thus saving dental treatment costs, avoiding patient discomfort and reducing tooth loss.<sup>81,82</sup> In addition, the risk of dental fluorosis can be viewed as an alternative to having tooth decay,<sup>83</sup> which is a disease that causes cosmetic problems, pain, missed school and work, and can lead to infection and, in advanced cases, life-threatening health effects. This is in contrast to dental fluorosis which is not a disease and is not life-threatening.

*The risk of teeth forming with the very mildest form of dental fluorosis must be weighed against the benefit that the individual will have fewer cavities thus saving dental treatment costs, avoiding patient discomfort and reducing tooth loss.*

**Table 3. Dental Fluorosis Classification by H.T. Dean – 1942<sup>75</sup>**

Classification	Criteria-Description of Enamel
<b>Normal</b>	Smooth, glossy, pale creamy-white translucent surface
<b>Questionable</b>	A few white flecks or white spots
<b>Very Mild</b>	Small opaque, paper-white areas covering less than 25% of the tooth surface
<b>Mild</b>	Opaque white areas covering less than 50% of the tooth surface
<b>Moderate</b>	All tooth surfaces affected; marked wear on biting surfaces; brown stain may be present
<b>Severe</b>	All tooth surfaces affected; discrete or confluent pitting; brown stain present



## 28. Is it safe to use fluoridated water to reconstitute infant formula?

### Answer.

It is safe to use fluoridated water to reconstitute infant formula.

### Fact.

Fluoridated water can be used to prepare infant formula. However, if the child is exclusively consuming infant formula reconstituted with fluoridated water, there could be an increased chance of mild dental fluorosis.<sup>86</sup> To lessen this chance, parents can use low-fluoride bottled water some of the time to mix infant formula. These bottled waters are labeled as de-ionized, purified, demineralized, or distilled. However, parents should be aware that using these types of waters exclusively means an infant does not receive the amount of fluoride the Institute of Medicine indicated is required to prevent tooth decay.<sup>40</sup> On the other hand, the exclusive use of nonfluoridated water to reconstitute infant formula will not guarantee that an infant will not develop dental fluorosis. The chance of development of dental fluorosis exists through approximate eight years of age when the permanent teeth are still forming under the gums. Fluoride intake from other sources during this time such as toothpaste, mouthrinse and dietary fluoride supplements also contributes to the chance of dental fluorosis for children living in nonfluoridated and fluoridated communities.<sup>84</sup>

In response to the report of the National Research Council (NRC) *Fluoride in Drinking Water: A Scientific Review of EPA's Standards*<sup>9</sup> in November 2006, and with an abundance of caution, the ADA issued the *Interim Guidance on Fluoride Intake for Infants and Young Children* (Interim Guidance). **The Interim Guidance is no longer current and has been replaced.** Unfortunately, those opposed to fluoridation continue to publicize and use the Interim Guidance in efforts to halt fluoridation.

The *Interim Guidance* was replaced in January 2011 by the ADA *Evidence-Based Clinical Recommendations Regarding Fluoride Intake From Reconstituted Infant Formula and Enamel Fluorosis A Report of the American Dental Association Council on Scientific Affairs*.<sup>84</sup> The report encourages clinicians to follow the American Academy of Pediatrics guidelines for infant nutrition which advocates exclusive breastfeeding until the child is aged 6 months and continued breastfeeding until the

child is at least 12 months of age, unless specifically contraindicated. Additionally, the ADA report, designed for use by clinical practitioners, offers the following suggestions to practitioners to use in advising parents and caregivers of infants who consume powdered or liquid concentrate infant formula as the main source of nutrition:<sup>84</sup>

- Suggest the continued use of powdered or liquid concentrate infant formulas reconstituted with optimally fluoridated drinking water while being cognizant of the potential risk of enamel fluorosis development.<sup>89</sup>
- When the potential risk of enamel fluorosis development is a concern, suggest ready-to-feed formula or powdered or liquid concentrate formula reconstituted with water that either is fluoride free or has low concentrations of fluoride.<sup>84</sup>

It should be noted that the Centers for Disease Control and Prevention,<sup>85</sup> as well as other agencies, such as the U.S. Department of Health and Human Services,<sup>86</sup> American Public Health Association,<sup>87</sup> and health departments such as the New York State Health Department<sup>88</sup> provide similar information regarding the use of fluoridated water to reconstitute infant formula.

## 29. What can be done to reduce the occurrence of dental fluorosis in the U.S.?

### Answer.

The vast majority of enamel fluorosis in the United States can be prevented by limiting the ingestion of topical fluoride products (such as toothpaste) and recommending the appropriate use of dietary fluoride supplements — without denying young children the decay prevention benefits of community water fluoridation.

### Fact.

Tooth decay has decreased substantially in the United States because more children today are benefitting from access to fluoride which is available from a wider variety of sources than decades ago. Many of these sources are intended for topical use only; however, when they are used, some fluoride is inadvertently swallowed by children.<sup>42,43,89</sup> Inappropriate ingestion of topical fluoride can be minimized, thus reducing the risk for dental fluorosis without reducing decay prevention benefits.

## Fluoride Toothpaste

Fluoride toothpastes are effective in helping to prevent tooth decay but have been identified as a major risk factor for enamel fluorosis when used inappropriately.<sup>42,43,89</sup>

In order to decrease the risk of dental fluorosis, the American Dental Association (ADA) recommends:<sup>49</sup>

- For children younger than 3 years, caregivers should begin brushing children's teeth as soon as they begin to come into the mouth by using fluoride toothpaste in an amount no more than a smear or the size of a grain of rice. (See Figure 4 in Question 23.) Brush teeth thoroughly twice per day (morning and night) or as directed by a dentist or physician. Supervise children's brushing to ensure that they use the appropriate amount of toothpaste.
- For children 3 to 6 years of age, caregivers should dispense no more than a pea-sized amount (Figure 4) of fluoride toothpaste. Brush teeth thoroughly twice per day (morning and night) or as directed by a dentist or physician. Supervise children's brushing to minimize swallowing of toothpaste.

The reason for including age information on directions for use for fluoride toothpaste is because it takes into account the ages during which teeth are most susceptible to dental fluorosis (during the time when the teeth are forming under the gums). Additionally, until approximately six years of age, children have not developed the full ability to spit and not swallow toothpaste. Inadvertently swallowing toothpaste during brushing can increase the risk of dental fluorosis. After age eight, the enamel formation of permanent teeth (with the exception of the third molars) is basically complete;<sup>68</sup> therefore, the risk of developing dental fluorosis is over. Because dental fluorosis occurs while teeth are forming under the gums, individuals whose teeth have erupted are not at risk for enamel fluorosis.

➦ *Additional information on this topic can be found in this Section, Question 27.*

Numerous studies have established a direct relationship between young children brushing with more than a pea-sized amount of fluoride toothpaste and the risk of very mild or mild dental fluorosis in both fluoridated and nonfluoridated communities.<sup>42,43,48,71,89</sup> It was noted that 34% of the dental fluorosis cases in a nonfluoridated community were explained by children having brushed with fluoride toothpaste more than

once per day during the first two years of life.<sup>90</sup> In the optimally fluoridated community, 68% of the fluorosis cases were explained by the children using more than a pea-sized amount of toothpaste during the first year of life.<sup>90</sup> However, recognizing that the risk tooth decay can start before a child's first birthday, it is considered important to begin using a fluoride toothpaste when the child's first tooth appears in the mouth.<sup>49</sup>

## Dietary Fluoride Supplements

A systematic review published in 2006 concluded that the use of supplements during the first six years of life, and especially during the first three years, is associated with a significant increase in dental fluorosis.<sup>91</sup>

### **Dietary fluoride supplements should only be prescribed for children at high risk for tooth decay who live in nonfluoridated areas.**<sup>41</sup>

Dietary fluoride supplements should be prescribed according to the dosage schedule found in the *Evidence-based Clinical Recommendations on the Prescription of Dietary Fluoride Supplements for Caries Prevention: A Report of the American Dental Association Council on Scientific Affairs published in 2010*.<sup>41</sup> The current dietary fluoride supplement schedule<sup>41</sup> is shown in the Benefits Section, Question 12, Table 1.

Determination of the level of risk for tooth decay is accomplished through the use of a professional caries risk assessment that assists the health provider identify and assess factors that could contribute to the development of cavities.<sup>41</sup> A child's caries (cavity) risk should be assessed on a routine basis because risk status can be affected by changes in the child's development, home conditions, dietary regimen and oral hygiene practices. Additional information on caries risk assessments can be found on the ADA website.<sup>92</sup> Because of the many sources of fluoride in the diet, proper prescribing of fluoride supplements can be complex. It is suggested that all sources of fluoride be evaluated with a thorough fluoride history before supplements are prescribed for a child.<sup>41</sup> This evaluation should include testing of the home water supply if the fluoride concentration is unknown. Families on community water systems should contact their water supplier to ask about the fluoride level. Consumers with private wells should have the water tested yearly to accurately determine the fluoride content.

➦ *Additional information on this topic can be found in the Benefits Section, Question 4.*



Dietary fluoride supplements can be considered for infants and children aged 6 months to 16 years. Compliance with the daily administration of the supplement will enhance the cavity prevention benefits. Providers should consider and monitor the ability of the caregiver and child to adhere to the schedule. If compliance is an issue, another mode of fluoride delivery should be considered.<sup>41</sup>

### Use of Over the Counter Fluoride-Containing Dental Products in the Home

**Parents, caretakers and health care professionals should judiciously monitor use of all fluoride-containing dental products by children under age six.** As is the case with any therapeutic product, more is not always better. The same is true for most products found in the medicine cabinet; care should be taken to adhere to label directions on fluoride prescriptions and over-the-counter products (e.g., fluoride toothpastes and rinses).

**The ADA recommends the use of fluoride mouthrinses, but not for children less than six years of age because they may swallow the rinse.**<sup>93</sup> These products should be stored out of the reach of children. Additional information regarding the use of mouthrinses can be found on the ADA website.<sup>93</sup>

### Drinking Water That Has Been Fluoridated at the Recommended Levels

In 2015, the U.S. Public Health Service made a recommendation on the level of fluoride to be used in water fluoridation (0.7mg/L) to provide the best balance of protection from tooth decay while limiting the risk of dental fluorosis.<sup>16</sup>

➤ *Additional information on this topic can be found in this Section, Question 19.*

### Drinking Water With High Levels of Naturally Occurring Fluoride

**In areas where naturally occurring fluoride levels in ground water are higher than 2 mg/L, the U.S. EPA has recommended that consumers should consider action to lower the risk of dental fluorosis for young children such as providing drinking water from an alternative source.**<sup>32</sup>

Families with young children on community water systems should contact their water suppliers to ask about the fluoride level in their drinking water. Consumers with private wells should have the water tested yearly to accurately determine the fluoride content. Consumers should consult with their dentist regarding water-testing results and discuss appropriate dental health care measures.

In homes where young children (with developing permanent teeth) are faced with consuming water with a fluoride level greater than 2 mg/L, families should use an alternative primary water source that contains the recommended level of fluoride for drinking and cooking.<sup>32</sup>

➤ *Additional information on this topic can be found in this Section, Question 21.*

## 30. Why is there a warning label on a tube of fluoride toothpaste?

### Answer.

The U.S. Food and Drug Administration (FDA) has established regulations for warning labels for a number of over-the-counter items it considers safe and effective including fluoride toothpaste.

### Fact.

The FDA has published regulations regarding warning labels for over-the-counter (OTC) drugs in the Code of Federal Regulations (CFR).<sup>94</sup> All the non-prescription drugs covered by these regulations must display the general warning “Keep out of the reach of children” in bold type. The regulations outline three additional warning statements (based on the most likely route of exposure) to be listed on the label in the event the drug is misused. While they vary slightly, they all include the following language: “...get medical help or contact a Poison Control Center right away.”<sup>94</sup>

In the CFR, the FDA has outlined the drug categories to be covered by these warning labels.<sup>95</sup> Some of the 26 categories include antacids, allergy treatment products, antiperspirants, cold remedies, ophthalmic products and dentifrices and dental products such as analgesics, antiseptics, etc.<sup>95</sup>

A specific FDA regulation<sup>96</sup> applies to “Anticaries Drug Products for Over-The-Counter Human Use” which provides the exact language for the warning label to be used on “fluoride dentifrice (gel, paste, and powder) products.” The regulation requires the following language appear on these products under the heading “Warning”:

“Keep out of reach of children under 6 years of age. [highlighted in bold type] If more than used for brushing is accidentally swallowed, get medical help or contact a Poison Control Center right away.”<sup>96</sup>

The over-the-counter (OTC) drugs listed in these regulations are generally recognized as safe and effective by the FDA.<sup>94</sup> Fluoride toothpaste is just one of a long list of OTC products that carries a warning label.

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*The over-the-counter (OTC) drugs listed in these regulations are generally recognized as safe and effective by the FDA. Fluoride toothpaste is just one of a long list of OTC products that carries a warning label.*

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While the FDA has required such label language since 1997, the ADA has required manufacturers seeking the ADA Seal of Acceptance to place a label on fluoride toothpaste since 1991 to help ensure proper use and thereby reduce the risk of dental fluorosis. At that time, the ADA required the label to include: “Do not swallow. Use only a pea-sized amount for children under six. To prevent swallowing, children under six years of age should be supervised in the use of toothpaste.”

Additionally, to ensure children’s safety, the ADA limits the total amount of fluoride allowed in any one tube of ADA-Accepted toothpaste. If a child were to ingest an entire tube of fluoride toothpaste at one time, the total fluoride content of a single tube is not enough to cause a fatal event. In fact, because of some of the (non-fluoride) additives in toothpaste, a child attempting to ingest a tube of toothpaste would most likely vomit before they could eat enough to become seriously ill.

## 31. Is fluoride, as provided by community water fluoridation, a toxic substance?

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### **Answer.**

**No. Fluoride in water at the recommended level is not toxic according to the best available scientific evidence.**

### **Fact.**

Toxicity is related to dose. While large doses of fluoride could be toxic, it is important to recognize the difference between the effect of a massive dose of an extremely high level of fluoride versus the fluoride level currently recommended for public water systems. Like many common substances essential to life and good health — salt, iron, vitamins A and D, chlorine, oxygen and even water itself — fluoride can be toxic in massive quantities. Fluoride at the much lower recommended concentrations (0.7 mg/L) used in community water fluoridation is not harmful or toxic.<sup>16</sup>


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*Fluoride at the much lower recommended concentrations (0.7 mg/L) used in community water fluoridation is not harmful or toxic.*

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The single dose (consumed all at one time) of fluoride that could cause acute fluoride toxicity is 5 mg/kg of body weight (11mg/kg of body weight of sodium fluoride).<sup>97</sup> This dose is considered the probably toxic dose (PTD) which “is defined as the minimum dose that could cause serious or life-threatening systemic signs and symptoms and that should trigger immediate therapeutic intervention and hospitalization.”<sup>97</sup> Acute fluoride toxicity occurring from the ingestion of optimally fluoridated water is impossible.<sup>97</sup> With water fluoridated at 1 mg/L, an individual would need to drink five (5) liters of water for every kilogram of body weight. For example, for an adult male (155 pound/70.3 kilogram man), it would require that he consume more than 350 liters (nearly 93 gallons) of water at one time to reach an acute fluoride dose. With optimally fluoridated water now set at 0.7 mg/L, it would take almost 30% more, or nearly 120 gallons (more than 1,900 eight ounce glasses) of water at one time to reach the acute dose.

Chronic fluoride toxicity can develop after 10 or more years of exposure to very high levels of fluoride, levels much higher than what is associated with drinking water fluoridated at recommended levels. The primary functional adverse effect associated with long-term excess fluoride intake is skeletal fluorosis.<sup>40,58</sup> The development of skeletal fluorosis and its severity is directly related to the level and duration of fluoride intake. For example, the ingestion of water naturally fluoridated at approximately 5 mg/L or greater for 10 years or more is needed to produce clinical signs of osteosclerosis (a mild form of skeletal fluorosis that can be seen as a change in bone density on x-rays) in the general population. In areas naturally fluoridated at 5 mg/L, daily fluoride intake of 10 mg/day would not be uncommon.<sup>40</sup> A survey of X-rays from 170,000 people in Texas and Oklahoma whose drinking water had naturally occurring fluoride levels of 4 to 8 ppm revealed only 23 cases of osteosclerosis and no cases of crippling skeletal fluorosis.<sup>98</sup> Evidence of advanced skeletal fluorosis, or crippling skeletal fluorosis, was not seen in communities in the United States where water supplies contained up to 20 mg/L of naturally occurring fluoride.<sup>40,99</sup> In these communities, “daily fluoride intake of 20 mg/day would not be uncommon.”<sup>40</sup> Crippling skeletal fluorosis is extremely rare in the United States and is not associated with water fluoridated at the recommended level.<sup>40,58</sup>

 *Additional information on this topic can be found in this Section, Question 26.*

The Environmental Protection Agency (EPA) identifies the most serious hazardous waste sites in the nation. These sites make up the Superfund: National Priorities List (NPL) and are the sites targeted for long-term federal cleanup activities.<sup>100</sup> The Agency for Toxic Substances and Disease Registry (ATSDR) prepares toxicological profiles for hazardous substances that describe the effects of exposure from chemicals found at these sites and acute releases of these hazardous substances.<sup>101</sup> The ATSDR provides answers to the most frequently asked questions about exposure to hazardous substances found around hazardous waste sites and the effects of exposure on human health. The Toxicological Profile for Fluorides, Hydrogen Fluoride and Fluorine indicates that subsets of the population could be unusually susceptible to the toxic effects of fluoride and its compounds at high doses, such as what might be encountered in the cleanup of a chemical spill. However, there are no data to suggest that exposure to the low levels of fluoride associated with community

water fluoridation would result in adverse effects in these potentially susceptible populations.<sup>101</sup> The ATSDR’s Public Health Statement on Fluorides states that “when used appropriately, fluoride is effective in preventing and controlling dental caries.”<sup>102</sup>

While large doses of fluoride could be toxic, it is important to recognize the difference in the effect of a massive dose of an extremely high level of fluoride versus the recommended amount of fluoride found in optimally fluoridated water. The implication that fluoride in large doses and fluoride in trace amounts have the same effect is completely unfounded. Many substances in widespread use are very beneficial in small amounts while toxic in large quantities.

The possibility of adverse health effects from continuous low level consumption of fluoride over long periods has been studied extensively. As with other nutrients, fluoride is safe and effective when used and consumed properly. No charge against the safety of fluoridation has ever been substantiated by generally accepted scientific knowledge. After more than 70 years of research and practical experience, the best available scientific evidence indicates that fluoridation of community water supplies is safe.

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*After more than 70 years of research and practical experience, the best available scientific evidence indicates that fluoridation of community water supplies is safe.*

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## 32. Does drinking water fluoridated at the recommended levels cause or accelerate the growth of cancer?

### **Answer.**

**According to the best available scientific evidence, there is no association between cancer rates in humans and drinking water that is fluoridated at the recommended levels.**

### **Fact.**

Since community water fluoridation was introduced in 1945, more than 50 epidemiologic studies in different populations and at different times have failed to demonstrate an association between fluoridation and the risk of cancer.<sup>1</sup> Studies have been conducted

in the United States,<sup>103-108</sup> Japan,<sup>109</sup> the United Kingdom,<sup>110-112</sup> Canada<sup>113</sup> and Australia.<sup>114</sup> In addition, over the years, a number of independent bodies from around the world have conducted extensive reviews of the scientific literature and concluded that there is no relationship between fluoridation and cancer.<sup>1,2,4,59,115</sup> At the beginning of the Safety Section in Question 17, a number of recent reviews are listed that have also concluded there is no relationship between fluoridation and cancer.<sup>10,11,13,15-18,20,21</sup> Clearly, the best available science indicates there is no association between fluoridation and cancer.

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*Clearly, the best available science indicates there is no association between fluoridation and cancer.*

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Many of the questions about a possible association between fluoride and cancer center around a form of bone cancer called osteosarcoma. This topic is covered in the next question.

In October 2011, the California Office of Environmental Health Hazard Assessment (OEHHA) through its Carcinogen Identification Committee (CIC) determined that fluoride does not cause cancer. The review was part of California's Proposition 65 listing process.<sup>116</sup> Proposition 65 was enacted in 1986 with the intent to protect California citizens and the State's drinking water sources from chemicals known to cause cancer, birth defects or other reproductive harm and to inform citizens about exposure to such chemicals. It requires the Governor to publish, at least annually, a list of chemicals known to the state to cause cancer or reproductive toxicity. The OEHHA administers meetings of the CIC and the list of items to be reviewed through the Proposition 65 process. On May 29, 2009, fluoride was selected by OEHHA for review by the CIC. Due to widespread exposure to fluoride, it was identified as one of five high priority chemicals to be evaluated. A public comment period followed. On July 8, 2011, as the next step in the Proposition 65 process, the CIC released a hazard identification document, "Evidence on the Carcinogenicity of Fluoride and its Salts". It was used by the CIC in its deliberations on whether fluoride should be listed as a carcinogen under Proposition 65. A second public comment period followed. At a public meeting on October 12, 2011, the CIC

heard additional testimony and then voted on the question, "Do you believe that it has been clearly shown, through scientifically valid testing according to generally accepted principles, that fluoride causes cancer?" The CIC's vote was unanimous (6-0) that fluoride had not been clearly shown to cause cancer.<sup>117</sup>

On its website, the American Cancer Society (ACS) provides a page titled, "Water Fluoridation and Cancer Risk."<sup>118</sup> In question and answer format, the ACS provides basic information regarding fluoridation as well as information on a number of studies that examined the possible association between fluoridation and cancer — many of which are referenced in the opening paragraph of this Safety Section. Near the bottom of the ACS web page, under the header "Assessments by Expert Groups" is this paragraph:

The general consensus among the reviews done to date is that there is no strong evidence of a link between water fluoridation and cancer. However, several of the reviews noted that further studies are needed to clarify the possible link.<sup>118</sup>

### 33. Does fluoridated water cause osteosarcoma?

**Answer.**

**No. The best available scientific evidence shows that fluoridated water does not cause osteosarcoma.**

**Fact.**

In 2016, the American Society of Clinical Oncology estimated that a total of 1,000 people, including 450 children and teens younger than 20, would be diagnosed with osteosarcoma (a form of bone cancer) in the United States during the year. About 2% of all childhood cancers are osteosarcoma which most often affects those between the ages of 10 and 30. Osteosarcoma is about 50% more common in boys than girls. The 5-year survival rate for children and teens with osteosarcoma that is only in one place at the time of diagnosis is 70%.<sup>119</sup>

In 2014, researchers from England published the largest study ever conducted examining the possible association between fluoride in drinking water and risk of osteosarcoma or Ewing sarcoma. Analyzing 2,566 osteosarcoma cases and 1,650 Ewing's sarcoma cases from 1980 to 2005, the study found that higher

levels of natural or adjusted fluoride in drinking water in Great Britain (England, Scotland and Wales) had no impact on the incidence of either osteosarcoma or Ewing's sarcoma in people aged 0–49. Water fluoride levels ranged from near zero to a maximum of approximately 1.26 ppm.<sup>120</sup>

A case-control study<sup>121</sup> published in 2011 found no significant association between the fluoride levels in bone and osteosarcoma risk. Led by a Harvard researcher, the study analyzed fluoride levels in bone samples from 137 patients with primary osteosarcoma and bone samples from 51 patients with other newly-diagnosed malignant bone tumors who served as a control group. Conducted in nine U.S. hospitals over an eight-year period (1993 and 2000), the study was considered the most extensive to date on the issue. The vast majority of fluoride in the body is located in calcified tissue such as bone. The study hypothesized that if chronic exposure to fluoride was a risk factor for osteosarcoma, then those cases would have a significantly higher level of fluoride in bone than the controls. This was not the case. The major advantage of this study was the ability to use actual bone fluoride levels as a measure of fluoride intake rather than estimating fluoride exposure. Focusing on fluoride intake from water as a primary source of fluoride, in earlier studies<sup>122,123</sup> members of the research team noted the difficulty in obtaining accurate information on fluoride levels of drinking water at the subjects' homes. Even when accurate information could be obtained, that information did not reflect actual consumption of water by the study subjects. Funding for the study came from three agencies of the National Institutes of Health — the National Cancer Institute, the National Institute of Environmental Health Sciences and the National Institute of Dental and Craniofacial Research.<sup>121</sup>

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*The best available scientific evidence shows that fluoridated water does not cause osteosarcoma (a form of bone cancer).*

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### 34. Does fluoride, as provided by community water fluoridation, inhibit the activity of enzymes in humans?

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#### **Answer.**

The best available scientific evidence demonstrates that the recommended levels of fluoride in drinking water, has no effect on human enzyme activity.

#### **Fact.**

Enzymes are organic compounds that promote chemical change in the body. The best available scientific evidence has not indicated that water fluoridated at the recommended levels has any influence on human enzyme activity. There are no available data to indicate that, in humans drinking water fluoridated at the recommended levels, the fluoride affects enzyme activities with toxic consequences.<sup>124</sup> The World Health Organization report, *Fluorides and Human Health* states, "No evidence has yet been provided that fluoride ingested at 1 ppm in the drinking water affects intermediary metabolism of food stuffs, vitamin utilization or either hormonal or enzymatic activity."<sup>125</sup>

In 2006, the National Research Council Report stated that the available data were not sufficient to draw any conclusions about potential effects or risks to liver enzymes from low-level long-term fluoride exposures such as those seen with community water fluoridation.<sup>9</sup>

The concentrations of fluoride used in laboratory studies to produce significant inhibition of enzymes are hundreds of times greater than the concentration present in body fluids or tissues.<sup>126</sup> While fluoride could affect enzymes in an artificial environment outside of a living organism in the laboratory, it is unlikely that adequate cellular levels of fluoride to adversely alter enzyme activities would be attainable in a living organism. The two primary physiological mechanisms that maintain a low concentration of fluoride ion in body fluids are the rapid excretion of fluoride by the kidneys and the uptake of fluoride by calcified tissues.<sup>52</sup>



### 35. Does the ingestion of optimally fluoridated water adversely affect the thyroid gland or its function?

#### Answer.

The best available scientific evidence indicates optimally fluoridated water does not have an adverse effect on the thyroid gland or its function.

#### Fact.

A number of systematic reviews completed in the last ten years have looked at a possible association between exposure to fluoride and thyroid function.

In 2017, the Australian National Health and Medical Research Council's systematic review *Information Paper — Water Fluoridation: Dental and Other Human Health Outcomes*<sup>10</sup> concluded, "There is no reliable evidence of an association between water fluoridation and current Australian levels and thyroid function." (Current recommendations for fluoride levels in drinking water in Australia are a range of 0.6 to 1.1 mg/L depending on climate.)<sup>10</sup>

A scientific evaluation of fluoridating agents of drinking water was done by the Scientific Committee on Health and Environmental Risks (SCHER) as requested by the European Commission (EC). The EC is the European Union's (EU) executive body with responsibility to manage EU policy. The final report, *Critical review of any new evidence on the hazard profile, health effects, and human exposure to fluoride and the fluoridating agents of drinking water*, was released in 2011. It stated that "A systematic evaluation of the human studies does not suggest a potential thyroid effect at realistic exposures to fluoride."<sup>20</sup>

In 2015, the *U.S. Public Health Service Recommendation for Fluoride Concentration in Drinking Water for the Prevention of Dental Caries*<sup>16</sup> was released. It referred to the 2006 National Research Council's report, *Fluoride in Drinking Water — A Scientific Review of the EPA's Standards*,<sup>9</sup> stating:

The 2006 NRC review considered a potential association between fluoride exposure (2–4 mg/L) and changes in the thyroid, parathyroid, and pineal glands in experimental animals and humans. The report noted that available studies of the effects of fluoride exposure on endocrine function have limitations. For example, many studies did not measure actual hormone concentrations, and several

studies did not report nutritional status or other factors likely to confound findings. The NRC called for better measurement of exposure to fluoride in epidemiological studies and for further research "to characterize the direct and indirect mechanisms of fluoride's action on the endocrine system and factors that determine the response, if any, in a given individual."<sup>9</sup>

On March 22, 2006, during the press webcast<sup>127</sup> for the release of the 2006 National Research Council (NRC) Report,<sup>9</sup> John Doull, M.D., Ph.D., Professor Emeritus of Pharmacology and Toxicology, University of Kansas Medical Center, Kansas City and Chair of the NRC Committee was asked about the conclusions reached on fluoride and the endocrine system (which includes the thyroid). Dr. Doull replied:

The Endocrine Chapter (of the NRC Report) is a relatively new chapter. It has not been extensively reviewed previously and our feeling was that we needed to provide a baseline of all the adverse effects and a lot of the systems that hadn't really been looked at very closely. We have a chapter for example on the central nervous system which has not been reviewed in detail previously. We went through all those effects in the endocrine chapter, the thyroid effect, the parathyroid effect, calcitonin to see whether there were sufficient evidence for us to include any of those effects as specific adverse effects at 4 mg/L and the conclusion of our Committee was that those were all things we needed to worry about. Those were all things that we made recommendations for additional research. **But, none of them reached the level where we considered them to be signs of adverse effects at the 4 mg/L level.** (Emphasis added.)<sup>127</sup>

A population-based Canadian study<sup>128</sup> was released in 2017 that examined the association between fluoride exposure and thyroid conditions. Data for the analysis came from Cycles 2 (2009–2011) and 3 (2012–2013) of Statistics Canada's Canadian Health Measures Survey (CHMS). The CHMS' target population is all Canadian residents between the ages of 3 and 79 living in all ten Canadian provinces. It collects health information by an individual in-home interview followed by a clinical exam conducted in a mobile clinic. The researchers' reported findings suggest that, at the population level in Canada, fluoride exposure does not contribute to impaired thyroid functioning during a time when multiple sources of fluoride exposure, including community water

fluoridation, exist. It was additionally noted that the findings could be broadly relevant to other countries with similar populations and water fluoridation.<sup>128</sup>

In 2015, a study was published in which the authors claimed to have found a positive association between fluoride levels in drinking water and hypothyroidism. Drawing immediate criticism, the published critiques noted that a major weakness of this study was the failure to consider a number of potential confounding factors. The only confounders taken into consideration were age, sex and socioeconomic status. While acknowledging that iodine intake is associated with thyroid health, the authors failed to consider iodine as a factor along with the impacts of smoking and medications. The strong conclusion of the paper was not supported by the work of the authors or other published literature.<sup>130-133</sup>

In addition, two studies have explored the association between fluoridated water and cancer of the thyroid gland. Both studies found no association between optimal levels of fluoride in drinking water and thyroid cancer.<sup>106,110</sup>

### 36. Does water fluoridation affect the pineal gland causing the early onset of puberty?

#### **Answer.**

The best available scientific evidence indicates that water fluoridation does not cause the early onset of puberty.

#### **Fact.**

The pineal gland is an endocrine gland located in the brain which produces melatonin.<sup>133</sup> Endocrine glands secrete their products into the bloodstream and body tissues and help regulate many kinds of body functions. The hormone, melatonin, plays a role in sleep, aging and reproduction.<sup>134</sup>

A single researcher has published one study in a peer-reviewed scientific journal regarding fluoride accumulation in the pineal gland. The purpose of the study was to discover whether fluoride accumulates in the pineal gland of older adults. This limited study, conducted on only 11 cadavers whose average age at death was 82 years, indicated that fluoride deposited in the pineal gland was significantly linked to the amount of calcium in the pineal gland.<sup>135</sup> It would not be unexpected to see higher levels of calcium in the pineal gland of

older individuals as this would be considered part of a normal aging process. As discussed in Question 25, approximately 99% of the fluoride present in the body is associated with hard or calcified tissues.<sup>52</sup> The study concluded fluoride levels in the pineal gland were not indicators of long-term fluoride exposure.<sup>135</sup>

The same researcher had theorized in her 1997 dissertation, portions of which are posted on numerous internet sites opposed to fluoridation, that the accumulation of fluoride in children's pineal glands leads to an earlier onset of puberty. However, the researcher notes in the dissertation that there is no verification that fluoride accumulates in children's pineal glands. Moreover, a study conducted in Newburgh (fluoridated) and Kingston (nonfluoridated), New York found no statistically significant difference between the onset of menstruation for girls living in a fluoridated versus nonfluoridated area.<sup>136</sup> The National Research Council's 2006 report, *Fluoride in Drinking Water: A Scientific Review of EPA's Standards*, stated that a connection between fluoride pineal function in humans remains to be demonstrated.<sup>9</sup>

### 37. Can fluoride, at the levels found in drinking water that is fluoridated to the recommended levels, alter immune function or produce an allergic reaction (hypersensitivity)?

#### **Answer.**

There is no scientific evidence of any adverse effect from fluoridation on any specific immunity, nor have there been any medically confirmed reports of allergic reaction from drinking or being in contact with optimally fluoridated water.

#### **Fact.**

There is no scientific evidence linking health conditions related to immune function such as HIV or AIDS (acquired immune deficiency syndrome) with community water fluoridation.<sup>137</sup>

There are no confirmed cases of allergy to fluoride, or of any positive skin testing in human or animal models.<sup>138</sup> A committee of the National Academy of Sciences evaluated clinical reports of possible allergic responses to fluoride in 1977 and stated, "The reservation in accepting (claims of allergic reaction) at face value is the lack of similar reports in much larger numbers of people who have been exposed to considerably more fluoride than was involved in the

original observations.”<sup>7</sup> The World Health Organization also judged these cases to represent “a variety of unrelated conditions” and found no evidence of allergic reactions to fluoride.<sup>139,140</sup>

### 38. Is fluoride, as provided by community water fluoridation, a genetic hazard?

#### **Answer.**

The best available scientific evidence indicates that drinking water fluoridated at the recommended levels is not a genetic hazard.

#### **Fact.**

Chromosomes are the DNA-containing bodies of cells that are responsible for the determination and transmission of hereditary characteristics. A single chromosome contains many genes which are the functional hereditary units that occupy a fixed location on a chromosome. Many studies have examined the possible effects of fluoride on chromosome damage.

In 1993, the National Research Council (NRC) of the National Academies issued a report<sup>8</sup> that supported the conclusion that drinking optimally fluoridated water is not a genetic hazard. In a statement summarizing its research<sup>8</sup>, the NRC stated, “in vitro data indicate that:

1. the genotoxicity of fluoride is limited primarily to doses much higher than those to which humans are exposed,
2. even at high doses, genotoxic effects are not always observed, and
3. the preponderance of the genotoxic effects that have been reported are of the types that probably are of no or negligible genetic significance.”<sup>8</sup>

The lowest dose of fluoride reported to cause chromosomal changes in mammalian cells was approximately 170 times that normally found in human cells in areas where drinking water was fluoridated at 1.0 mg/L, which indicates a large margin of safety.<sup>8</sup> (Note that this would be 242 times greater with fluoridation now set at 0.7 mg/L.)

In its subsequent 2006 report,<sup>9</sup> the NRC stated after reviewing the evidence available since its 1993 report, that the weight of evidence from studies on rodents indicated a very low probability that fluoride presents a risk of genetic mutation for humans.<sup>9</sup>

In addition, the 2006 NRC report<sup>9</sup> indicated that the results of human studies related to fluoride and its effect on genotoxicity since its 1993 report are inconsistent and do not strongly indicate the presence or absence of genotoxic potential for fluoride. Continued research and evaluation are recommended.<sup>9</sup>

### 39. Does fluoride at the levels found in water fluoridation affect human reproduction, fertility or birth rates?

#### **Answer.**

According to the best available scientific evidence, water fluoridation does not have an adverse effect on human reproduction, fertility or birth rates.

#### **Fact.**

In 2011, the European Commission requested the European Scientific Committee on Health and Environmental Risks (SCHER) perform a critical review of fluoridating agents of drinking water. A portion of that report looked at reproductive issues. The report concluded that there is no new evidence from human studies indicating that fluoride in drinking water influences male and female reproductive capacity.<sup>20</sup>

In its 2006 report,<sup>9</sup> the National Research Council (NRC) indicated that since 1990, the quality and number of reproductive and developmental studies using laboratory animals have improved significantly. These high-quality studies indicate adverse reproductive and developmental effects occur only at levels of fluoride much higher than 4 mg/L.<sup>9</sup> The NRC also indicated that a few studies conducted with human populations have suggested that fluoride might be associated with alterations in reproductive hormones and fertility. However, the report continued on to explain that limitations in study design, such as the lack of control of reproductive variables, make these studies of little value for risk evaluation.<sup>9</sup>

A study examining the relative risk of stillbirths and congenital abnormalities (facial clefts, Down syndrome and neural tube defects) found no evidence that fluoridation had any influence on the rates of congenital abnormalities or stillbirths.<sup>141</sup> The study, conducted in 2003, analyzed data from two population based registries to identify all stillbirths and congenital abnormalities occurring in northeastern England between 1989 and 1998 and compared the rates of stillbirths and



specific congenital abnormalities in fluoridated and nonfluoridated communities. The study found no significant association between the occurrence of stillbirths or specific congenital abnormalities and fluoride levels in drinking water.<sup>141</sup>

#### 40. For women, does drinking water fluoridated at the recommended levels create a risk for their children to be born with Down syndrome?

##### **Answer.**

There is no known association between the consumption of drinking water fluoridated at the recommended levels and Down syndrome.

##### **Fact.**

All people with Down syndrome have an extra, critical portion of chromosome 21 present in all or some of their cells. This additional genetic material alters the course of development and causes the characteristics associated with Down syndrome. The cause of the extra full or partial chromosome is still unknown. Maternal age is the major factor that has been linked to an increased chance of having a baby with Down syndrome. There is no definitive scientific research that indicates that Down syndrome is caused by environmental factors or the parents' activities before or during pregnancy.<sup>142</sup>

However, those opposed to fluoridation sometimes still assert that consuming fluoridated tap water can cause Down syndrome.

In 2014, the systematic review published by Public Health England reviewed the literature and concluded that there was no evidence of a difference in the rate of Down syndrome in fluoridated and nonfluoridated areas.<sup>17</sup>

A number of studies have looked at this issue in the past. Several are summarized below.

A detailed study of approximately 2,500 children born with Down syndrome was conducted in Massachusetts. A rate of 1.5 cases per 1,000 births was found in both fluoridated and nonfluoridated communities, providing strong evidence that fluoridation does not increase the risk of Down syndrome.<sup>143</sup>

Another large population-based study with U.S. national data relating to nearly 1.4 million births showed no association between water fluoridation and the incidence of congenital malformations including Down syndrome.<sup>144</sup>

A comprehensive study of Down syndrome births was conducted in 44 U.S. cities over a two-year period. Rates of Down syndrome were comparable in both fluoridated and nonfluoridated cities.<sup>145</sup>

#### 41. Does ingestion of water fluoridated at recommended levels have any effect on intelligence (IQ) in children or neurological impact?

##### **Answer.**

The best available science-based evidence does not establish a causal relationship between consumption of water fluoridated at recommended levels and lowered intelligence (IQ) or behavioral disorders in children.

##### **Fact.**

A number of systematic reviews and individual studies provide evidence that consumption of optimally fluoridated water at levels recommended in the U.S. (0.7 mg/L) does not lower IQ or cause behavior problems in children. The following conclusions from a number of systematic reviews and individual studies support the safety of community water fluoridation.

*A number of systematic reviews and individual studies provide evidence that consumption of optimally fluoridated water at levels recommended in the U.S. (0.7 mg/L) does not lower IQ or cause behavior problems in children.*

In 2017, the Australian National Health and Medical Research Council's systematic review *Information paper — Water Fluoridation: Dental and Other Human Health Outcomes*<sup>10</sup> concluded, "The evidence from a single study of acceptable quality shows that there is no association between water fluoridation at current Australian levels and the cognitive function of children or adults." (Current recommendations for fluoride levels in drinking water in Australia are a range of 0.6 to 1.1 mg/L depending on climate.)<sup>10</sup>

The report, *Health Effects of Water Fluoridation: An Evidence Review*, issued in 2015 by the Ireland Health Research Board noted,<sup>15</sup> “There was only one study carried out in a non-endemic or CWF area (like Ireland) that examined fluoride and IQ. This was a prospective cohort study (whose design is appropriate to infer causality) in New Zealand. The study concluded that there was no evidence of a detrimental effect on IQ as a result of exposure to CWF (community water fluoridation).”<sup>15</sup>

In 2014, a scientific review, *Health effects of water fluoridation: A review of the scientific evidence*,<sup>18</sup> commissioned by the New Zealand Prime Minister’s Chief Science Advisor and the President of the Royal Society of New Zealand concluded: “There is no convincing evidence of neurological effects at fluoride concentrations achieved by CWF.”<sup>18</sup>

At the request of the European Commission, the Scientific Committee on Health and Environmental Risks (SCHER) conducted a critical review<sup>20</sup> of any new evidence on the hazard profile, health effects, and human exposure to fluoride and the fluoridating agents of drinking water. Their report of May 2011 reviewed animal and human studies concluding that “there is not enough evidence to conclude that fluoride in drinking water at concentrations permitted in the EU may impair the IQ of children. SCHER also agreed that a biological plausibility for the link between fluoridated water and IQ has not been established.”<sup>20</sup>

As noted in the preceding paragraphs, at least three systematic reviews<sup>10,15,18</sup> indicated that there was only one high-quality prospective cohort study that addressed the issue of IQ. Published in 2014, a study<sup>146</sup> conducted in New Zealand followed a group of more than 1,000 people born in the early 1970s and measured childhood IQ at the ages of 7, 9, 11 and 13 years and adult IQ at the age of 38 years. Early life exposure to fluoride from a variety of sources was recorded and adjustments were made for factors potentially influencing IQ. Childhood factors associated with IQ variation included socio-economic status of parents, birth weight and breastfeeding, as well as secondary and tertiary educational achievement, which is associated with adult IQ. This detailed study revealed no evidence that exposure to water fluoridation in New Zealand affects neurological development or IQ. (Recommended levels of fluoride used in New Zealand’s fluoridation program range from 0.7 mg/L to 1.0 mg/L.)<sup>146</sup>

Those opposed to water fluoridation have promoted studies that reportedly show fluoridation causes lower intelligence (IQ) in children. The studies cited are often from China, Mexico, India or Iran where social, nutritional and environmental conditions are significantly different from those in the United States. The vast majority of these studies have not been published in peer-reviewed English language journals. The consensus of those who have reviewed these studies is that the quality of these studies does not stand up to scientific scrutiny. The studies are of low quality, have a high risk of bias and use a study design unsuited to prove or disprove theories. They take no or little account of other factors that are known to cause a lowering of IQ (also called confounders) such as nutritional status, socioeconomic status, iodine deficiency and consumption of other harmful elements in ground water (arsenic or lead).

At the request of the U.S. EPA, a report on fluoride in drinking water issued in 2006 by the National Research Council<sup>9</sup> noted that the significance of the Chinese studies reviewed was “uncertain.” “Most of the papers were brief reports and omitted important procedural details...Most of the studies did not indicate whether the IQ tests were administered in a blinded manner. Some of the effects noted in the studies could have been due to stress induced by the testing conditions. Without detailed information about the testing conditions and the tests themselves, the committee was unable to assess the strength of the studies.”<sup>9</sup>

In England in 2009, the South Central Strategic Health Authority requested an independent critical appraisal of 19 papers and one abstract that reported an association between fluoride in drinking water and IQ in countries outside England. The appraisal<sup>147</sup> noted that the study design and methods used by many of the researchers in these studies had serious limitations. The researchers also exhibited a lack of a thorough consideration of confounding factors as a source of bias in the results. From these studies alone, it was “uncertain how fluoride was responsible for any impairment in intellectual development.” Significant differences were noted in conditions between the communities studied and conditions in England. For example, some studies noted high levels of naturally occurring fluoride in drinking water and exposure to fluoride from other sources including the practice of burning high fluoride coal to heat poorly ventilated homes in China. Additionally, in many cases, there were stark differences in other environmental conditions and socioeconomic characteristics.<sup>147</sup>

In November 2016, those opposed to fluoridation filed a legal petition<sup>148</sup> with the U.S. Environmental Protection Agency (EPA) in Washington, D.C. calling for the EPA to ban the addition of fluoridating chemicals to public drinking water on the grounds that a large body of animal, cellular, and human research showed that fluoride is neurotoxic at doses within the range now seen in fluoridated communities in the U.S. (0.7 mg/L). The EPA responded to the petition in February 2017 noting, "After careful consideration, EPA denied the TSCA section 21 petition, primarily because EPA concluded that the petition has not set forth a scientifically defensible basis to conclude that any persons have suffered neurotoxic harm as a result of exposure to fluoride in the U.S. through the purposeful addition of fluoridation chemicals to drinking water or otherwise from fluoride exposure in the U.S."<sup>148</sup> As allowed under the TSCA process, the petitioners filed a lawsuit challenging the EPA ruling in April 2017 in the U.S. District Court for the Northern District of California at San Francisco. In late 2017, a federal judge denied an EPA motion to dismiss the lawsuit.

In 2017 a study from Mexico City<sup>149</sup> received some coverage in the popular press. The authors concluded higher urinary fluoride levels of pregnant women were associated with lower scores on tests of cognitive function in their children. This was an observational study that by definition could only show a possible association between fluoride exposure and IQ — not cause and effect. This small study did not adequately address a number of potential confounders that might explain the possible association such as breast feeding, maternal age, gestational age, birth weight and education as well as exposures to lead, mercury, arsenic and iodine that affect IQ and other measures of cognitive ability. Unlike conditions in the U.S., the pregnant women participating in the study were exposed to varied fluoride levels from naturally occurring fluoride in the water supply (in some cases at levels almost twice as high as the level recommended for community water fluoridation in the U.S.) and fluoridated salt.<sup>149</sup>

Additional research on this topic is underway through the National Toxicology Program's systematic review using animal studies to evaluate potential neurobehavioral effects from exposure to fluoride during development. Initiated in 2015, work continued in 2017.<sup>23</sup>

## 42. Does drinking fluoridated water increase the level of lead in the blood or cause lead poisoning in children?

### Answer.

The best available scientific evidence has not shown any association between water fluoridation and blood lead levels.

### Fact.

A number of reviews and data analyses indicate no association between water fluoridation and blood lead levels.

In 2011, the European Commission requested that the European Scientific Committee on Health and Environmental Risks (SCHER) perform a critical review of fluoridating agents of drinking water. The committee concluded that "it is highly unlikely that there would be an increased release of lead from pipes due to hexafluorosilicic acid."<sup>20</sup> Hexafluorosilicic acid is another name for fluorosilicic acid which is one of the additives used to fluoridate water in the U.S.

➦ *Additional information on this topic can be found in the Fluoridation Practice Section, Question 49.*

A 2006 study analyzed data from the Third National Health and Nutrition Examination Survey (1988–1994) and the 1992 Fluoridation Census to evaluate the relationship between water fluoridation and lead concentrations in children. The study concluded that the results did not support that the silicofluorides used in community water systems caused higher lead concentrations in children.<sup>150</sup>

According to the Centers for Disease Control and Prevention,<sup>151</sup> the average blood lead levels of young children in the U.S. have continued to decline since the 1970s primarily due to lead poisoning prevention laws such as the phase-out of leaded paint and leaded gasoline. The primary remaining sources of childhood lead exposure are deteriorated leaded paint, house dust contaminated by leaded paint and soil contaminated by leaded paint and/or decades of industrial and motor vehicle emissions. Besides exposure to lead paint in older homes, lead water pipes and fixtures also can be found in homes built before 1978. In some areas of the county, folk remedies and pottery also add to lead exposure.<sup>151</sup> Findings from the National Health and Nutrition

Examination Surveys (NHANES) from 1976–1980 to 2003–2008 show that the percentage of children aged 1- to 5-years-old having high lead blood levels ( $\geq 10$   $\mu\text{g}/\text{dL}$ ) declined dramatically from 88.2% to 0.9%.<sup>152</sup> During that same time period (1976 to 2008), the percentage of the U.S. population receiving fluoridated water rose from approximately 48.8% to 64.3%.<sup>153</sup> Moreover, in the 1991–1994 NHANES, the overall (all age groups) prevalence of high lead blood levels ( $\geq 10$   $\mu\text{g}/\text{dL}$ ) was 2.2% but decreased to 0.7% by the 1999–2002 survey.<sup>151</sup> While antifluoridationists claim that fluoridated water increases lead blood levels in children, the fact is that since 1976 while the use of water fluoridation has increased, the percentage of children in the U.S. with high lead blood levels actually has continued to decrease substantially. This demonstrates that the claim made by those opposed to water fluoridation that fluoride in water increases lead concentrations in children is unfounded. It should be noted that approximately 95% of the primary sources of adult lead exposure are occupational.<sup>154</sup> In general, adult blood lead levels have continued to decline over recent decades due largely to improved prevention measures in the workplace and changes in employment patterns.<sup>154</sup>

Those opposed to water fluoridation sometimes claim that there is an increase in acidity when fluoride is added to water and that the acidic water in the system leaches lead from pipes and fixtures. The process of adding fluoride to water has minimal impact on the acidity or pH of drinking water. Under some water quality conditions, a small increase in the acidity of drinking water that is already slightly acidic can be observed after treatment with alum, chlorine, fluorosilicic acid or sodium fluorosilicate. In such cases, additional water treatment to adjust the pH to neutralize the acid in water distribution systems is standard practice in water plants.<sup>155</sup> Water facilities typically maintain a pH of between 7.0 and 8.0 as standard practice indicating that the water leaving the plant is slightly alkaline and non-acidic.<sup>156</sup>

Despite this information, antifluoridationists continue to exploit their unfounded claims that fluoridation can lead to an increased uptake of lead by children. A 1999 study<sup>157</sup> charged that fluorosilicic acid and sodium silicofluoride did not disassociate completely when added to water systems and could be responsible for lower pH (more acidic) levels of drinking water, leaching lead from plumbing systems

and increasing lead uptake by children. In response to the study, scientists from the EPA reviewed the basic science that was the foundation for the claim that silicofluorides leach lead from water pipes and found that many of the chemical assumptions made in the original ecological study were scientifically unjustified.<sup>158</sup> Fluoride additives do disassociate very quickly and completely release fluoride ions into the water. The research from the 1999 study was inconsistent with accepted scientific knowledge and the authors of that study failed to identify or account for those inconsistencies. The EPA scientists discounted the 1999 study and said there were no credible data to suggest any link between fluoridation and lead. Overall, the EPA scientists concluded that "...no credible evidence exists to show that water fluoridation has any quantifiable effects on the solubility, bioavailability, bioaccumulation, or reactivity of lead compounds."<sup>158</sup>

### 43. Does drinking water fluoridated at recommended levels cause Alzheimer's disease?

#### Answer.

The best available scientific evidence has not indicated an association between drinking optimally fluoridated water and Alzheimer's disease.

#### Fact.

Scientists believe the causes of late-onset Alzheimer's, the most common form of the disease, include a combination of age-related brain changes, genetic, lifestyle, and environmental factors. The importance of any one of these factors in increasing or decreasing the risk of developing Alzheimer's could differ from person to person. Early-onset Alzheimer's is less common (fewer than 10% of Alzheimer's cases) with the first signs of the disease typically appearing between an individual's 30s and mid-60s. It is believed to be caused primarily by gene changes passed down from parent to child.<sup>159</sup>

A study published in 1998<sup>160</sup> raised concerns about the potential relationship between fluoride, aluminum and Alzheimer's disease. However, several flaws in the study's experimental design precluded any definitive conclusions from being drawn.<sup>161</sup> Concerns were noted about a number of aspects of the protocol including, but not limited to, the high percentage of the test rodents dying during the study and that

the researchers failing to account for the high levels of aluminum and fluoride in the chow fed to all test rodents.<sup>161</sup> For decades, a small number of researchers have implicated aluminum in the development of late-onset Alzheimer's disease. However, the "Aluminum Hypothesis" has been abandoned by the majority of mainstream scientists.<sup>162</sup>

In 2000, a study<sup>163</sup> investigated the relationships between trace elements in drinking water and the thought processes of 1,016 subjects over the age of 65 living in two rural areas of China. In today's U.S. society, people are very mobile and tend to live in multiple places during their lifetimes. In contrast, the rural residents of China rarely move and so in this study the researchers were able to assume that this elderly population had used the same water and food sources throughout their lifetimes. The researchers evaluated the effects on thought processes of seven elements (cadmium, calcium, fluoride, iron, lead, selenium and zinc) found in the water sources at the two study sites. The study assessed thought processes in three areas (memory, language and attention) using a Chinese translation of the Community Screening Interview for Dementia. Taking into account the effects of the seven trace elements, the authors concluded that fluoride is not significantly related to impairment of thought processes such as is seen in Alzheimer's disease.<sup>163</sup>

#### 44. Does drinking water fluoridated at recommended levels cause or contribute to heart disease?

##### **Answer.**

**Drinking water fluoridated at recommended levels is not a risk factor for heart disease.**

##### **Fact.**

The American Heart Association identifies aging, male gender, heredity, cigarette and tobacco smoke, high blood cholesterol levels, high blood pressure, physical inactivity, obesity and diabetes mellitus as major risk factors for cardiovascular disease.<sup>164</sup>

The American Heart Association's website notes: "No evidence exists that adjusting the fluoride content of public water supplies to a level of about one part per million has any harmful effect on the cardiovascular system."<sup>165</sup>

A number of historical studies have evaluated urban mortality in relation to fluoridation status. Researchers from the National Heart, Lung and Blood Institute of the National Institutes of Health examined a wide range of data from communities that had naturally high levels, optimal levels and low levels of fluoride in water. The results of their analysis published in 1972<sup>166</sup> concluded, "Thus, the evidence from comparison of the health of fluoridating and nonfluoridating cities, from medical and pathological examination of persons exposed to a lifetime of naturally occurring fluorides or persons with high industrial exposures, and from broad national experience with fluoridation all consistently indicate no adverse effect on cardiovascular health."<sup>166</sup> Two additional studies were published in 1978. In the first study,<sup>104</sup> the mortality trends from 1950-70 were studied for 473 cities in the United States with populations of 25,000 or more. Findings showed no relationship between fluoridation and heart disease death rates over the 20-year period.<sup>104</sup> In the second study,<sup>105</sup> the mortality rates for approximately 30 million people in 24 fluoridated cities were compared with those of 22 nonfluoridated cities for two years. No evidence was found of any harmful health effects, including heart disease, attributable to fluoridation.<sup>105</sup>

The misinterpretation of the results of a study by those opposed to fluoridation<sup>167</sup> led the opposition to claim that "research highlights the fact that mass fluoride exposure may be to blame for the cardiovascular disease epidemic that takes more lives each year than cancer."<sup>167</sup> In fact, the study published in Nuclear Medicine Communications in January 2012<sup>168</sup> examines the possible benefits of using a sodium fluoride isotope marker in testing to determine the presence of atherosclerosis and risk for coronary disease. In this case, fluoride's affinity for calcified tissue aided in the location of calcium deposited in arterial walls which could be associated with an increased risk of coronary artery disease. The study made no reference to any relationship between the consumption of fluoridated water and heart disease.<sup>168</sup>



## 45. Is the consumption of water fluoridated at recommended levels harmful to kidneys?

### Answer.

Consuming water fluoridated at recommended levels has not been shown to cause or worsen kidney disease.

### Fact.

Approximately 60% of the fluoride absorbed daily by adults (45% for children) is removed from the body by the kidneys.<sup>52</sup> Because the kidneys are constantly exposed to various fluoride concentrations, any health effects caused by fluoride would likely manifest themselves in kidney cells. However, several large community-based studies of people with long-term exposure to drinking water with fluoride concentrations up to 8 ppm have failed to show an increase in kidney disease.<sup>5,136,169</sup>

In a report issued in 1993 by the National Research Council (NRC), the Subcommittee on Health Effects of Ingested Fluoride stated that the threshold dose of fluoride in drinking water which causes kidney effects in animals is approximately 50 ppm — more than 12 times the maximum level allowed in drinking water by the Environmental Protection Agency. Therefore, they concluded that “ingestion of fluoride at currently recommended concentrations is not likely to produce kidney toxicity in humans.”<sup>8</sup> Furthermore, the NRC report on fluoride in drinking water issued in 2006 concluded that there were no published studies that demonstrate that drinking water fluoridated at recommended levels can damage kidneys. The report further concluded that fluoride concentrations need to be higher than 4 ppm to affect kidney tissues and function.<sup>9</sup>

A review of scientific studies completed in 2007 for Kidney Health Australia (KHA),<sup>170</sup> summarized findings from the recent literature related to the health effects of fluoridated water for people with chronic kidney disease (CKD). The purpose of the review was to provide an up to date summary of studies on the topic so that KHA, the leading organization in Australia that promotes kidney and urinary tract health, could develop a fluoride position paper. The review concluded that while studies on the topic are limited, “there is no evidence that consumption of optimally fluoridated drinking water increases the risk of developing CKD.” For those people who have CKD, the report stated that “there is no evidence that

consumption of optimally fluoridated drinking water poses any health risks for people with CKD, although only limited studies addressing this issue are available.” There is limited evidence that people with advanced CKD (stages 4 or 5) “who ingest substances with a high concentration of fluoride may be at risk of fluorosis.” Accordingly, the report recommended that it would be “prudent” for patients with advanced CKD to monitor fluoride intake and avoid fluoride-rich substances. These conclusions are the basis for KHA’s position statement on fluoride which was released in 2007.<sup>170</sup> The position statement was updated in 2011 and concluded that “there has been no new published evidence to contradict the 2007 KHA Position Statement.”<sup>171</sup>

According to information on their website, the National Kidney Foundation is the leading organization in the U.S. dedicated to the awareness, prevention and treatment of kidney disease. A paper titled *Fluoride Intake in Chronic Kidney Disease* dated April 15, 2008,<sup>172</sup> developed by the National Kidney Foundation (NKF) and posted on the NKF website includes the following points under the header “Analysis and Recommendations”:

- Dietary advice for patients with CKD should primarily focus on established recommendations for sodium, potassium, calcium, phosphorus, energy/calorie, protein, fat, and carbohydrate intake. Fluoride intake is a secondary concern.
- Individuals with CKD should be notified of the potential risk of fluoride exposure by providing information on the NKF website including a link to the Report in Brief of the National Research Council and the Kidney Health Australia position paper. The risk is likely greatest in areas with naturally high water fluoride levels.
- The NKF has no position on the optimal fluoridation of water. The oral health of people with CKD is certainly of interest to the NKF, but balancing the overall benefits and risks of fluoride exposure is the primary concern.<sup>172</sup>

Many people with kidney failure depend on hemodialysis (treatment with an artificial kidney machine) for their survival. During hemodialysis, the patient’s blood is exposed to large amounts of water each week (280–560 quarts). Therefore, procedures have been designed to ensure that the water utilized in the process contain a minimum of dissolved substances that could diffuse indiscriminately into

the patient's bloodstream.<sup>173</sup> Both KHA and the NKF recommend careful monitoring of hemodialysis systems to ensure proper mechanical function.<sup>170,172</sup> Since the composition of water varies in different geographic locations in the United States, the U.S. Public Health Service recommends dialysis units use techniques such as reverse osmosis and de-ionization to remove excess iron, magnesium, aluminum, calcium, and other minerals, as well as fluoride, from tap water before the water is used for dialysis.<sup>173</sup>

#### 46. What are some of the erroneous health claims made against water fluoridation?

##### **Answer.**

From sources such as the internet, newsletters, social media and personal anecdotes in emails, it is frequently claimed that community water fluoridation causes the following adverse health effects:

- AIDS
- Allergic Reactions (e.g., loss of hair, skin that burns and peels after contact with fluoridated water)
- Accelerated Aging
- Alzheimer's disease
- Arthritis
- Asthma
- Autism
- Behavioral Problems (e.g., attention deficit disorders)
- Bone Disease (e.g., osteoporosis – increased bone/hip fractures)
- Cancer (all types including osteosarcoma or bone cancer)
- Chronic Bronchitis
- Colic (acute abdominal pain)
- Cystic Fibrosis
- Down Syndrome
- Emphysema
- Enzyme Effects (gene-alterations)
- Flatulence (gas)
- Gastrointestinal Problems (irritable bowel syndrome)
- Harmful Interactions with Medications
- Heart Disease
- Increased Infant Mortality
- Low Birth Weight for Infants
- Kidney Disease
- Lead Poisonings
- Lethargy (lack of energy)
- Lower IQ scores

- Malpositioned Teeth
- Parkinson's Disease
- Calcification of the Pineal Gland (causing early puberty) (chronic insomnia);
- Reproductive issues (damaged sperm) (reduced fertility)
- Skin Conditions (redness, rash/welts, itching)
- Sudden Infant Death Syndrome (SIDS)
- Thyroid Problems (goiter and obesity due to hypothyroidism)

##### AND

- Tooth Decay

##### **Fact.**

As discussed throughout this document, the best available scientific evidence consistently has indicated that fluoridation of community water supplies is safe and effective. The possibility of any adverse health effects from continuous low-level consumption of fluoride has been and continues to be studied extensively. Of the thousands of credible scientific studies on fluoridation, none has shown health problems associated with the consumption of optimally fluoridated water.

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*Of the thousands of credible scientific studies on fluoridation, none has shown health problems associated with the consumption of optimally fluoridated water.*

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# Fluoridation Practice

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## 47. Who regulates drinking water additives in United States?

### Answer.

The United States Environmental Protection Agency (EPA) regulates drinking water additives.

### Fact.

In 1974, Congress passed the Safe Drinking Water Act (SDWA) which protects the public's health by regulating the nation's public drinking water supply.<sup>1</sup> The SDWA, as amended in 1986 and 1996,<sup>1</sup> requires the Environmental Protection Agency (EPA) to ensure the public is provided with safe drinking water.<sup>1</sup> On June 22, 1979, the Food and Drug Administration (FDA) and the EPA entered into a Memorandum of Understanding (MOU) to clarify their roles and responsibilities in water quality assurance.<sup>2</sup> The stated purpose of the MOU is to "avoid the possibility of overlapping jurisdiction between the USEPA and FDA with respect to control of drinking water additives." The two agencies agreed that the Safe Drinking Water Act's passage in 1974 implicitly repealed FDA's jurisdiction over drinking water as a 'food' under the Federal Food, Drug and Cosmetic Act (FFDCA). Under the MOU, EPA enjoys exclusive regulatory authority over drinking water provided by public water systems, including any additives in such water. FDA retains jurisdiction over bottled drinking water under Section 410 of the FFDCA and "over water (and substances in water) used in food or food processing once it enters the food processing establishment."<sup>2</sup>

While drinking water from the tap is regulated by the EPA, bottled water is regulated by the FDA which has established standards for its quality.<sup>2</sup> The FDA has noted that fluoride can occur naturally in source waters used for bottled water or may be added by a

bottled water manufacturer. Recognizing the benefit of fluoride in water, the FDA has stated that bottled water that meets specific standards of identity and quality set forth by FDA, and the provisions of the authorized health claim related to fluoride, may be labeled with the following health claim: "Drinking fluoridated water may reduce the risk of [dental caries or tooth decay]."<sup>3</sup>

*While drinking water from the tap is regulated by the EPA, bottled water is regulated by the FDA which has established standards for its quality. The FDA has noted that fluoride can occur naturally in source waters used for bottled water or may be added by a bottled water manufacturer. Recognizing the benefit of fluoride in water, the FDA has stated that bottled water that meets specific standards of identity and quality set forth by FDA, and the provisions of the authorized health claim related to fluoride, may be labeled with the following health claim: "Drinking fluoridated water may reduce the risk of [dental caries or tooth decay]."*

From time to time, states and communities have had to deal with legislation or ballot initiatives aimed at requiring the approval of the FDA before any agent can be added to community water systems. Often referred to as the Fluoride Product Quality Control Act, Water Product Quality Ordinance or Pure Water Ordinance, the legislation is specifically used by those opposed to water fluoridation as a tool to prevent water systems from providing community water fluoridation. Often this legislation does not specifically

mention fluoride or fluoridation. Those supporting this type of legislation may claim that they are not against water fluoridation but are proponents of pure water and do not want anything added to water that has not been approved by the FDA. On the surface, this may appear to be a “common sense” approach. However, its only real purpose is to defeat efforts to provide water fluoridation. That is because this proposed legislation would require the FDA — which does NOT regulate public water systems — to approve any water additive. By mistakenly (and perhaps craftily) naming the wrong federal agency, the probable outcome is to stop or prevent water fluoridation.

#### 48. What standards have been established to ensure the safety of fluoride additives used in community water fluoridation in the United States?

##### **Answer.**

The three fluoride additives used in the U.S. to fluoridate community water systems (sodium fluoride, sodium fluorosilicate, and fluorosilicic acid) meet safety standards established by the American Water Works Association (AWWA) and NSF International (NSF).<sup>4</sup>

*The three fluoride additives used in the U.S. to fluoridate community water systems (sodium fluoride, sodium fluorosilicate, and fluorosilicic acid) meet safety standards established by the American Water Works Association (AWWA) and NSF International (NSF).*

##### **Fact.**

Additives used in water treatment meet safety standards prepared in response to a request by the Environmental Protection Agency to establish minimum requirements to ensure the safety of products added to water for its treatment, thereby ensuring the public’s health.<sup>4</sup> Specifically, fluoride additives used in water fluoridation meet standards established by the American Water Works Association (AWWA) and NSF International (NSF).<sup>4</sup> Additionally, the American National Standards Institute (ANSI) endorses both AWWA and NSF standards for fluoridation additives and includes its name on these standards.<sup>4</sup>

The American Water Works Association<sup>5</sup> is an international nonprofit scientific and educational society dedicated to providing total water solutions to assure the effective management of water. Founded in 1881, the AWWA is the largest organization of water supply professionals in the world. The membership represents the full spectrum of the water community: public water and wastewater systems, environmental advocates, scientists, academicians, and others who hold a genuine interest in water. AWWA unites the diverse water community to advance public health, safety, the economy, and the environment.<sup>5</sup>

NSF International,<sup>6</sup> an independent, accredited organization, is dedicated to being the leading global provider of public health and safety-based risk management solutions. Manufacturers, regulators and consumers look to NSF to develop public health standards and certifications that help protect food, water, consumer products and the environment. Its professional staff includes microbiologists, toxicologists, chemists, engineers, and environmental and public health professionals. Founded in 1944 as the National Sanitation Foundation, NSF’s mission is to protect and improve global human health.<sup>6</sup>

The American National Standards Institute (ANSI)<sup>7</sup> is a private, non-profit organization that administers and coordinates the U.S. voluntary standardization and conformity assessment system. The Institute’s mission is to enhance both the global competitiveness of U.S. business and the U.S. quality of life by promoting and facilitating voluntary consensus standards and conformity assessment systems, and safeguarding their integrity.<sup>7</sup>

The AWWA documents provide manufacturers, suppliers and purchasers with standards for the manufacturing, quality and verification for each of the three fluoride additives listed below. The AWWA standards set the physical, chemical and impurities standards including information on verification of the standard requirements and requirements for delivery.<sup>4</sup>

- ANSI/AWWA B701 Sodium Fluoride
- ANSI/AWWA B702 Sodium Fluorosilicate
- ANSI/AWWA B703 Fluorosilicic Acid<sup>4</sup>

NSF/ANSI Standard 60<sup>4,6</sup> provides for purity of drinking water additives as it limits an additive's contribution of harmful contaminants to drinking water. The Standard also provides for safety assurances from production through distribution to ensure product quality is maintained. Additionally, the Standard requires documentation of the purity of the additives including specific criteria for products imported from other countries. NSF/ANSI Standard 61<sup>4,6</sup> is a related standard that provides guidance for equipment/products used in water treatment plants that come in contact with drinking water. Both NSF/ANSI standards were developed by a consortium of associations including NSF, AWWA, the Association of State Drinking Water Administrators and the Conference of State Health and Environmental Managers with support from the U.S. Environmental Protection Agency.<sup>4</sup>

Fluoride additives, like all of the more than 40 additives typically used in water treatment, are "water grade" additives. All additives used at the water plant are classified as water grade additives meeting NSF Standard 60 requirements. Examples of other "water grade" additives which are commonly used in water plant operations are chlorine (gas), ferrous sulfate, hydrochloric acid, sulfur dioxide and sulfuric acid.<sup>8</sup>

Sometimes antifluoridationists express the view that they are not really opposed to fluoridation, but are opposed to the use of "industrial grade" fluoride additives. They may even go so far as to state that they would support fluoridation if the process was implemented with pharmaceutical grade fluoride additives that were approved by the U.S. Food and Drug Administration (FDA). On the surface, this may appear to be a "common sense" approach. In fact, this is usually a ploy whose only real purpose is to stop fluoridation. First, the EPA, not the FDA, has regulatory authority for additives used in public water systems. Second, and perhaps most importantly, the U.S. Pharmacopeia (USP) monograph on sodium fluoride does not provide for certification of quality by an independent credentialing body.<sup>4,9</sup> Third, the USP and The National Formulary (USP-NF) standards used to formulate prescription drugs are not appropriate for water fluoridation additives as they could actually allow higher levels of contaminants to be introduced into drinking water than is allowed by the current EPA standards.<sup>4,9</sup> According to the CDC:<sup>9</sup>

The USP does not provide specific protection levels for individual contaminants, but establishes a relative maximum exposure level for a group of related contaminants. Some potential impurities have no restrictions by the USP, including arsenic, some heavy metals regulated by the U.S. EPA, and radionuclides. Given the volumes of chemicals used in water fluoridation, a pharmaceutical grade of sodium fluoride for fluoridation could potentially contain much higher levels of arsenic, radionuclides, and regulated heavy metals than an NSF/ANSI Standard 60-certified product.

➤ *Additional information about this topic can be found in this Section, Question 49.*

Lastly, USP-grade sodium fluoride product is more likely to result in water plant personnel being exposed to fluoride dust as it is more powder-like than the preferred AWWA-grade sodium fluoride which is crystalline and so minimizes dusting when handled.<sup>4</sup>

➤ *Additional information about this topic can be found in this Section, Question 52.*

## 49. Does fluoridating the community water supply raise concerns about lead, arsenic and other toxic contaminants to the water supply?

### Answer.

**No. The concentrations of contaminants in drinking water as a result of fluoridation do not exceed, but are in fact, well below regulatory standards set to ensure the public's safety.**

### Fact.

Fluorosilicic acid is used to fluoridate the majority of community water systems in the United States.<sup>10</sup> Because the additive is derived from ore mined from the earth, fluorosilicic acid may contain minute amounts of contaminants such as lead and arsenic. However, existing regulations and standards require that these contaminants, and others, be at levels considered acceptable by the U.S. Environmental Protection Agency when the fluorosilicic acid or other fluoridation additives are diluted to produce optimally fluoridated water.<sup>6</sup> NSF International and the American National Standards Institute (NSF/ANSI) Standard 60 as well as AWWA standards are applicable to all fluoride additives.<sup>4,6</sup>



Testing of fluoride additives provides evidence that the levels of these contaminants do not exceed, but are in fact, well below regulatory standards set to ensure the public's safety. NSF has prepared a detailed fact sheet, *NSF Fact Sheet on Fluoridation Products (2013)*<sup>11</sup> that provides the documented quality of fluoride additives based on product samples analyzed. The NSF reports that the majority of fluoridation products as a class, based on NSF test results, do not add measurable amounts of arsenic, lead, or other heavy metals, or radionuclides to drinking water.<sup>9,11</sup>

## 50. Have fluoride additives been tested for safety?

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### **Answer.**

The claim is sometimes made that no studies on safety exist on the additives used in water fluoridation. This statement is a ruse because the scientific community does not study the health effects of the concentrated additives; studies are done on the health effects of the treated water.

### **Fact.**

A 1999 study<sup>12</sup> charged that fluorosilicic acid and sodium silicofluoride did not disassociate (break down) completely when added to water systems and may be responsible for lower pH (acid) levels of drinking water, leaching lead from plumbing systems and increasing lead uptake by children. Scientists from the U.S. Environmental Protection Agency (EPA) evaluated the disassociation of fluoride additives<sup>13</sup> and concluded that at the typical pH level of drinking water (which is normally slightly alkaline) and the fluoride levels used in drinking water, the fluoride additives quickly and completely broke down to fluoride ions and silica.

Published in 2006,<sup>14</sup> researchers at the University of Michigan verified for the EPA that theoretical predictions that hexafluorosilicate completely hydrolyzed (broke down) when added to water separating into free fluoride ions and silica ions were confirmed. The research demonstrated that there was no hexafluorosilicate that could be measured in the finished water.<sup>14</sup>

While sodium fluoride was the first additive used in water fluoridation, the use of silicofluoride additives (sodium fluorosilicate and fluorosilicic acid) began in the late 1940s. By 1951, silicofluorides had become

the most commonly used fluoride additives in water fluoridation.<sup>15</sup> Many of the early studies on the health effects of fluoridation were completed in communities that were using the silicofluoride additives, most generally fluorosilicic acid.<sup>16-21</sup> However, at that time, the additives used to fluoridate were not always identified in research reports. As the body of research on fluoridation grew, it became evident that there were no adverse health effects associated with water fluoridation regardless of which fluoride additive was used. Additionally, over time, a number of comprehensive reviews of the health effects of fluoridation were published. These reviews which support the safety of water fluoridation include many studies conducted in large fluoridated communities which used the silicofluoride additives.<sup>22-29</sup>

There is now more than 70 years of practical experience that lends additional credence to the best available science that concludes that fluoridation is safe.

## 51. What is the source of the additives used to fluoridate water supplies in the United States?

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### **Answer.**

The majority of fluoridation additives used in the United States are derived from the mineral apatite (a component of calcium phosphate).

### **Fact.**

About 95% of the fluoridation additives used in water fluoridation are by-products which come from the processing of calcium phosphate into phosphate fertilizer. About 4% are derived from the processing of calcium fluoride and the remaining 1% derived from the production of high-purity silica.\*

In the production of phosphate fertilizer, calcium phosphate ore (which contains apatite) is mixed with sulfuric acid resulting in a calcium sulfate (gypsum) slurry. The gaseous phosphoric acid released from this process is collected by vacuum extraction, condensed and then desiccated (dried) and formed into phosphate fertilizer pellets. Fluoride is a trace constituent (3-7%) of the mineral apatite found in calcium phosphate ore. Silica tetrafluoride is also released as a gas in the creation of the calcium sulfate slurry and is collected by vacuum extraction along with the gaseous phosphoric acid. In about half the phosphate fertilizer plants in the U.S., the silica tetrafluoride gas is condensed and

processed along with the phosphoric acid and becomes a trace component of the phosphate fertilizer. In the other plants, the silica tetrafluoride gas is separated from the phosphoric acid. Roughly 60% of the fluoride recovered from processing calcium phosphate ore is sold for use as fluoridation additives. The fluoridation additive produced by this process is fluorosilicic acid. While most of the product is sold as fluorosilicic acid, some of the product is partially neutralized to sodium fluorosilicate salt and some is fully neutralized to sodium fluoride salt. In the U.S., 77% of the fluoridation additives used are fluorosilicic acid, 15% are sodium fluorosilicate and 8% are sodium fluoride.\*

About 4% of the fluoridation additives used are derived from the processing of calcium fluoride into hydrogen fluoride using a gas separation technique to recover the fluorosilicic acid from the hydrogen fluoride.\*

About 1% of the fluoridation additives used are derived from the production of high-purity silica. Fluorosilicic acid is produced as part of the purification of the silica.\*

*\*The preceding paragraphs were developed using references 4, 30 through 35 and personal communication from Mr. Kip Duchon, P.E., national fluoridation engineer, CDC.*

From time to time, opponents of fluoridation allege that fluoridation additives are by-products of the phosphate fertilizer industry in an effort to suggest the additives are not safe. By definition, by-products are materials produced as a result of producing something else. In the chemical industry, a byproduct (secondary product) is anything other than the principal product produced. The fact that a product is a secondary product of a manufacturing process should not suggest the item is bad, harmful or a waste product. On the contrary, by-products may have certain characteristics which make them valuable resources. In the production of phosphate fertilizer, the fluoridation additive, fluorosilicic acid, is a by-product along with gypsum.<sup>36</sup> Gypsum is commonly used in manufacturing wall board used in construction. The production of orange juice provides another example of valuable by-products. In addition to orange juice, various by-products are obtained from oranges during juice production that are used in cleaners, fragrances and flavorings.<sup>37</sup>

Fluoridation additives are valuable by-products produced as a result of producing phosphate fertilizer. To ensure the public's safety, additives used in water fluoridation meet standards of the American Water Works Association (AWWA) and NSF International (NSF).<sup>4</sup>

## 52. Does the process of water fluoridation present unusual safety concerns for water systems and water facility operators?

### **Answer.**

**No. With proper monitoring, maintenance, water facility operator training and systems planning, water fluoridation is a safe and reliable process.**

### **Fact.**

Water facilities and water facility operators perform a valuable public service by carefully adjusting the level of fluoride in water to improve the oral health of the community. Facilities and personnel are subject to a number of regulations designed to ensure safety.

Employers must conform to Occupational Safety and Health Administration (OSHA) requirements.<sup>38</sup> OSHA's mission is to assure safe and healthful workplaces by setting and enforcing standards, and by providing training, outreach, education and assistance. Under the OSH Act, employers are responsible for providing a safe and healthful workplace. Employers must comply with all applicable OSHA standards.<sup>38</sup>

Additionally, in order to assist in protecting the professionals who produce sustainable supplies of high-quality drinking water, the American Water Works Association publishes detailed guidance on safety and safe working conditions for water plant personnel.<sup>39</sup>

Furthermore, OSHA requires that Safety Data Sheets (SDS), previously known as Material Safety Data Sheets (MSDS), be readily available to all employees for potentially harmful substances handled in the workplace under the Hazard Communication regulation.<sup>40</sup> A SDS may include instructions for the safe use and potential hazards associated with a particular material and are typically made available in the area where the material is stored or used. Information contained in a SDS focuses on the potential hazards of working with the material in an occupational setting. Adherence to the SDS guidelines for handling fluoride additives helps to ensure the

recommended level of fluoride in drinking water flows through the water system while maintaining water operator safety. In the case of fluoride, the potential hazards faced by a water facility employee in dealing with concentrated fluoride additives before they enter the water system are not related to the level of fluoride in water as used by consumers. The information found in the SDS for fluoride additives is not applicable to water with fluoride at the recommended level. Therefore, SDS sheets should not be used by consumers to gauge potential hazards of community water fluoridation.

As part of safety procedures, water facility personnel receive training on the management of the additives in water plants. While the recommended fluoride level found in drinking water has been proven safe, water facility operators and engineers may be exposed to much higher fluoride levels when handling fluoride additives at the water treatment facility.<sup>4</sup> Fluoride additives present risks comparable to other water additives in common use at water facilities, such as hypochlorite, quicklime, aluminum sulfate, sodium hydroxide and ferrous sulfate. In some cases, the fluoride additives are much less dangerous than many other additives, including chlorine gas commonly used in many water plants.<sup>39</sup>

Today's equipment allows water facility personnel to easily monitor and maintain the desired fluoride concentration. Automatic monitoring technology is also available that can help to ensure that the fluoride concentration of the water remains within the recommended range.<sup>4</sup>

It is important that the water facility personnel responsible for monitoring the addition of fluoride to the water supply are appropriately trained and that the equipment used for this process is adequately maintained.<sup>4</sup> With over 70 years of experience and thousands of water systems adding fluoride every day, water facility personnel have an excellent safety record related not only to their personal safety but in providing safe drinking water to their customers.

### 53. Does fluoridation present difficult engineering problems?

#### Answer.

No. Adding fluoride products to water is no different than adding other commonly used water treatment additive products using the same equipment and techniques.

#### Fact.

Fluoride additives used to adjust the fluoride level in drinking water are compatible with other water treatment processes often using the same type of equipment and other standard materials designed for the safe handling of other water treatment additive products in drinking water treatment facilities. Fluoride additives are introduced to the water supply as liquids. There are many control devices, some in use for decades and some newer equipment, that allow water facility personnel to easily monitor and maintain the desired fluoride level as well as levels of other water treatment additives and naturally occurring substances that may be in the water. Automatic monitoring technology is available that can help to ensure that the fluoride concentration of the water remains within the recommended range.<sup>4</sup>

When added to community water supplies, the concentrated fluoride additives become greatly diluted. For example, typically fluorosilicic acid is diluted approximately 315,000 times to reach the recommended target concentration of 0.7 mg/L. The exact dilution factor depends on the concentration of the fluoride additive and the amount of additive being used to reach the concentration of 0.7mg/L. At 0.7mg/L (or 0.7 parts per million), seven-tenths of one part of fluoride is diluted in is diluted in 999,999.3 parts of water. To place this concentration in perspective, the following comparisons can be of assistance.

- 1 inch in approximately 23 miles
- 1 minute in approximately 1,000 days
- 1 cent in approximately \$14,000
- 1 seat in more than 34 Wrigley Field baseball parks (seating capacity 41,268)

With more than 70 years of experience with water fluoridation, there is considerable guidance on sound engineering practices to design, construct, operate and maintain water fluoridation systems. By design, and with proper maintenance and testing, water

systems can provide the recommended level of fluoride within a narrow control range of the target of 0.7mg/L.<sup>41,42</sup> Additional design features such as the use of a day tank (that holds only one day's supply of fluoride) can limit the amount of fluoride that can be added to a water system in a 24-hour period and is the most reliable method to ensure overfeed protection.<sup>4</sup> The State Office of Drinking Water, or similar state agency, will normally establish engineering requirements for safety. Additional standards and references on best engineering practice are available from the American Water Works Association and the Centers for Disease Control and Prevention.<sup>4,43</sup>

#### 54. Does fluoride at levels used in fluoridation corrode water pipes?

**Answer.**

No. Allegations that fluoridation causes corrosion of water pipes are not supported by the best available scientific evidence.

**Fact.**

The process of adding fluoride to water has minimal impact on the acidity or pH of drinking water and therefore will not corrode water pipes. Corrosion of drinking water pipes is related primarily to induced electrical current between dissimilar metals. Other contributing factors include the dissolved oxygen concentration, water temperature, acidity/alkalinity (pH), hardness, salt concentration, hydrogen sulfide content and the presence of certain bacteria. Under some water quality conditions, a small increase in the acidity of drinking water that is already slightly acidic may be observed after treatment with alum, chlorine, fluorosilicic acid or sodium fluorosilicate. In such cases, further water treatment to adjust the pH to neutralize the acid for corrosion control in water distribution systems is standard procedure in water plants.<sup>44</sup>

*The process of adding fluoride to water has minimal impact on the acidity or pH of drinking water and therefore will not corrode water pipes.*

Note that the Water Quality Report or Consumer Confidence Report that all water systems must make available to customers on a yearly basis, may list the pH of the system's finished water.<sup>45</sup> Control of neutral pH (7.0) is essential as part of corrosion control requirements. Water facilities typically maintain a pH of between 7.0 and 8.0 as good practice indicating that the water leaving the plant is slightly alkaline and non-acidic.<sup>46</sup>

#### 55. Does fluoride at levels used in water fluoridation corrode glass, concrete or other surfaces in water plants?

**Answer.**

No. A correctly engineered and maintained system will not result in damage to the water plant.

**Fact.**

Fluorosilicic acid in a concentrated form can be corrosive if not correctly handled. The concentrated fluorosilicic acid is 75% water, and 25% fluorosilicic acid. Up to 1% of the fluorosilicic acid can be other acids including hydrogen fluoride. Hydrogen fluoride is volatile near room temperature so it will evaporate from the solution if the system is not properly engineered and maintained. The evaporation process occurs at an extremely slow rate. Less than 1% of fluorosilicic acid will be lost over a month from the evaporation of hydrogen fluoride. However, only a small release of hydrogen fluoride may be very corrosive to concrete, glass, and electrical components.<sup>30</sup>

If a water system is reporting problems with corrosion from evaporating hydrogen fluoride in the storage room or fluoride handling room (i.e. the glass in the facility has become "frosted"), the system is being inadequately maintained. The storage tank and other locations in the fluorosilicic acid feed system may not be sealed or correctly vented and hydrogen fluoride gas can be released (leaked) at those points. All fluoride products storage, handling, and feed systems should be vented to the outside of the building and the system and piping should be pressure tested (low pressure is sufficient) to identify possible locations of leaks. Leaks should be promptly corrected.<sup>30</sup>

With no system leaks and proper venting to outside the building, there will be no corrosion problems.<sup>30</sup>

## 56. Does fluoridated water harm the environment?

### **Answer.**

No. Scientific evidence supports the fluoridation of public water supplies as safe for the environment and beneficial for people.

### **Fact.**

Fluoride is naturally occurring in the environment and is the 13th most abundant element in the earth's crust. It is found in naturally in all water sources as noted below.<sup>47</sup>

Rain — between 0.1 to 0.2 mg/L

Streams and lakes — between 0.1 to 0.3 mg/L

Groundwaters — between 0.1 to 10 mg/L

Oceans and seawater — between 1.2 to 1.4 mg/L

A comprehensive literature review published in 2004 revealed no negative environmental impacts as a result of water fluoridation.<sup>48</sup> A 1990 study concluded that fluoridation has little or no impact on surrounding aquatic environment or soil.<sup>49</sup> Historically, issues surrounding problems with fluoride and the environment have involved incidents related to serious industrial pollution or accidents.<sup>49</sup>

Under the Washington's State Environmental Protection Act (SEPA), a study was conducted in Tacoma-Pierce County to investigate the environmental consequences of adding optimal levels of fluoride to drinking water. Noting that the amount of fluoride in the water does not reach levels that are harmful to plants or animals, the SEPA study concluded that there are "no probable significant adverse environmental impacts."<sup>50</sup>

There is no evidence that the recommended level of fluoride in drinking water has any adverse effect on gardens, lawns or plants.<sup>50</sup>

*Additional information regarding water fluoridation additives and engineering issues can be found on the CDC's fluoridation website, "Water Operators and Engineers" at <https://www.cdc.gov/fluoridation/engineering/index.htm>.*

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# Public Policy

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## 57. What is public health?

### Answer.

Public health promotes and protects the health of people and the communities where they live, learn, work and play. Public health measures improve the quality of life for members of the community.

### Fact.

Public health has numerous definitions and dimensions. It can encompass issues of research, education, regulation, policy and more. It focuses on the health of entire populations that can vary in size from as small as a local neighborhood to a small-sized community and a large-sized city. It also can focus on populations with a state, national or even global perspective. But how does public health affect our everyday lives? Individuals are touched by public health measures every day without giving them a second thought. For example, garbage pick-up and disposal prevent the spread of disease. The stoplight at a busy intersection protects motorists and pedestrians from injury. Building sidewalks in communities provides the option for people to walk to help control their weight and improve their heart health. Smoke-free laws help prevent lung cancer. All of these are public health in action.

Community water fluoridation is another example of a public health measure.

- Optimally fluoridated water is accessible to the entire community regardless of socioeconomic status, educational attainment or other social variables.<sup>1</sup>
- Individuals do not need to take special action or otherwise change their behavior to obtain the benefits of fluoridation.

- Frequent exposure to small amounts of fluoride over time makes fluoridation effective through the life span in helping to prevent tooth decay.<sup>2</sup>
- Community water fluoridation is more cost-effective and cost-saving than other forms of fluoride treatments or applications.<sup>3, 4</sup>

During the 20th century, the health and life expectancy of persons residing in the United States improved dramatically. Since 1900, the average life span of persons in the United States lengthened by greater than 30 years; 25 years of this gain are attributable to advances in public health. Many notable public health achievements occurred during the 1900s. In a series of reports during 1999, the *Morbidity and Mortality Weekly Report (MMWR)* profiled 10 public health achievements chosen to highlight the contributions of public health and to describe the impact of these contributions on the health and well being of persons in the United States.<sup>5</sup>

### Ten Great Public Health Achievements — United States, 1900-1999<sup>5</sup>

- Vaccination
- Motor-vehicle safety
- Safer workplaces
- Control of infectious diseases
- Decline in deaths from coronary heart disease and stroke
- Safer and healthier foods
- Healthier mothers and babies
- Family planning
- Fluoridation of drinking water
- Recognition of tobacco use as a health hazard



In discussing the contribution of fluoridation, the October 22, 1999 MMWR<sup>6</sup> noted fluoridation of community drinking water was a major factor responsible for the decline in tooth decay during the second half of the 20th century. Although other fluoride-containing products are available, water fluoridation remains the most equitable and cost-effective method of delivering fluoride to all members of communities, regardless of age, educational attainment, or income level.<sup>6</sup>

## 58. Is water fluoridation a valuable public health measure?

### Answer.

Yes. Community water fluoridation is a public health measure that benefits people of all ages and is a public health program that saves money for families and the health care system. Because fluoridation reaches large numbers of people where they live, learn, work and play, it is more effective than other forms of fluoride delivery. Water fluoridation reaches everyone in the community regardless of age, race, education, income level or access to routine dental care. Because of the important role it has played in the reduction of tooth decay, the Centers for Disease Control and Prevention (CDC) has proclaimed community water fluoridation one of 10 great public health achievements of the 20th century.<sup>5,6</sup>

*Community water fluoridation is a public health measure that benefits people of all ages and is a public health program that saves money for families and the health care system.*

### Fact.

Throughout decades of research and more than 70 years of practical experience, fluoridation of public water supplies has been responsible for dramatically improving the public's oral health status.

It has been said that those who cannot remember the past are condemned to repeat it. As generations pass, details from life in the 1930s and 1940s fade.

The oral health of Americans suffered greatly during the time of the Great Depression and into the era of World War II. There were no public health programs in place that addressed tooth decay and the loss of teeth was viewed as an eventuality. In fact, as World War II approached, those joining the U.S. Army were required to have six back teeth (three on the top and three on the bottom) that opposed each other to serve the function of chewing food and six front teeth (three on the top and three on the bottom) that opposed each other for the purpose of biting into food. The number of men disqualified for dental reasons far exceeded all expectations as "dental disease" became the most common reason for military deferment. One out of eleven registrants examined was disqualified for military service due to dental issues.<sup>7</sup> After Pearl Harbor it was apparent that the manpower needed to fight a global war could be obtained only if dental standards for induction were drastically relaxed. By March 1942, the standards had been revised so that a man who was "well nourished, of good musculature, and free from gross dental infections" but who was completely edentulous (without any teeth) could be inducted if his condition was corrected or could be corrected with dentures.<sup>7</sup>

*Because fluoridation reaches large numbers of people where they live, learn, work and play, it is more effective than other forms of fluoride delivery.*

In January 1945, a community water fluoridation trial began in Grand Rapids, Michigan followed within months by trials in Newburgh, NY (May 1945), Brantford, Ontario (June 1945) and Evanston, IL (February 1947). Reductions in tooth decay were dramatic leading to the rapid adoption of fluoridation in cities across the U.S. As a result, tooth decay declined sharply during the second half of the 20th century. Tooth loss was no longer considered inevitable.

Former U.S. Surgeon General, Dr. Luther Terry, called fluoridation as vital a public health measure as immunization against disease, pasteurization of milk and purification of water.<sup>8</sup>

Another former U.S. Surgeon General, Dr. C. Everett Koop, wrote:

...this preventive measure (fluoridation) is the single most important commitment that a community can make to the oral health of its children and to future generations. I urge all health officials and concerned citizens to join me in supporting this commitment and in the task of achieving water fluoridation for all community drinking water supplies which lack the fluoride content needed for the prevention of dental caries.<sup>9</sup>

In 1999, because of the dramatic role it played in the reduction of tooth decay, the Centers for Disease Control and Prevention (CDC) proclaimed community water fluoridation one of 10 great public health achievements of the 20th century.<sup>5,6</sup>

In May 2000, U.S. Surgeon General Dr. David Satcher issued the first ever Surgeon General's report on oral health titled, *Oral Health in America: A Report of the Surgeon General*.<sup>10</sup> In 2001, Dr. Satcher issued a statement on fluoridation in which he noted:

...community water fluoridation continues to be the most cost-effective, practical and safe means for reducing and controlling the occurrence of dental decay in a community...water fluoridation is a powerful strategy in efforts to eliminate health disparities among populations.<sup>11</sup>

In the 2003 *National Call to Action to Promote Oral Health*,<sup>12</sup> U.S. Surgeon General Dr. Richard Carmona called on individuals and groups who are most concerned and in a position to act to apply strategies to enhance the adoption and maintenance of proven community-based interventions such as community water fluoridation.<sup>12</sup> In his 2004 *Statement on Community Water Fluoridation*,<sup>13</sup> Dr. Carmona wrote:

While we can be pleased with what has already been accomplished, it is clear that there is much yet to be done. Policymakers, community leaders, private industry, health professionals, the media, and the public should affirm that oral health is essential to general health and well-being and take action to make ourselves, our families, and our communities healthier. I join previous Surgeons General in acknowledging the continuing public health role for community water fluoridation in enhancing the oral health of all Americans.<sup>13</sup>

In 2013, U.S. Surgeon General Dr. Regina M. Benjamin wrote:<sup>14</sup>

...As Surgeon General I have been working hard to encourage individuals and communities to make healthy choices because I believe it is better to prevent illness and disease rather than treat it after it occurs. Community water fluoridation is one of the most effective choices communities can make to prevent health problems while actually improving the oral health of their citizens... Fluoridation's effectiveness in preventing tooth decay is not limited to children, but extends throughout life, resulting in fewer and less severe cavities. In fact, each generation born since the implementation of water fluoridation has enjoyed better dental health than the generation that preceded it...<sup>14</sup>

U.S. Surgeon General Dr. Vivek H. Murthy issued a video statement supporting community water fluoridation in December 2015.<sup>15</sup> In his video and written statement on fluoridation issued in 2016,<sup>15,16</sup> Surgeon General Murthy emphasized:

Our progress on this issue over the past 70 years has been undeniable. But we still have work to do. Because we know that so much of our health is determined by zip code rather than genetic code. That's why creating a culture of disease prevention through community efforts — and ensuring health equity for all — is one of my highest priorities. Community water fluoridation helps us meet these goals; as it is one of the most cost-effective, equitable, and safe measures communities can take to prevent tooth decay and improve oral health.<sup>15,16</sup>

Today, the focus in achieving and maintaining health is on prevention. Established by the U.S. Department of Health and Human Services, Healthy People 2020<sup>17</sup> provides a science-based, comprehensive set of ambitious, yet achievable, ten-year national objectives for improving the health of the public. Included under oral health is an objective to expand the fluoridation of public water supplies. Objective 13 states that at least 79.6% of the U.S. population served by community water systems should be receiving the benefits of optimally fluoridated water by the year 2020.<sup>18</sup> Data from the CDC indicate that in 2014, 74.4% of the U.S. population on public water systems, or a total of 211.4 million people, had access to fluoridated water.<sup>19</sup>

Established by the U.S. Department of Health and Human Services in 1996, the Community Preventive Services Task Force develops and disseminates guidance on which community-based health promotion and disease prevention intervention approaches work, and which do not work, based on available scientific evidence. The Task Force issues findings based on systematic reviews of effectiveness and economic evidence. The Guide to Community Preventive Services (“The Community Guide”) is a collection of evidence-based findings of the Community Preventive Services Task Force and is designed to assist decision makers in selecting interventions to improve health and prevent disease.<sup>20</sup>

The Community Guide reviews are designed to answer three questions:

1. What has worked for others and how well?
2. What might this intervention approach cost, and what am I likely to achieve through my investment?
3. What are the evidence gaps?<sup>20</sup>

The Community Preventive Services Task Force recommends community water fluoridation to reduce tooth decay.<sup>21</sup>

Reports have been released by the U.S. Department of Health and Human Services that encourage the use of preventive interventions to improve the overall and oral health of the nation.<sup>22,23</sup> Specific to oral health, two reports issued in 2011 by the Institute of Medicine acknowledge water fluoridation is an effective intervention for the prevention of tooth decay. *Advancing Oral Health in America*<sup>24</sup> referred to water fluoridation as an effective prevention intervention, while *Improving Access to Oral Health Care for Vulnerable and Underserved Populations*<sup>25</sup> acknowledged that evidence regarding community water fluoridation programs continues to validate its effectiveness, safety and cost-saving benefits.

## 59. Does water fluoridation reduce disparities in dental health?

### Answer.

Yes, evidence indicates water fluoridation helps to reduce the disparities in dental health at the community level. Populations with lower socioeconomic status (SES) who live in fluoridated communities have less tooth decay than their peers in nonfluoridated communities.

### Fact.

In the first ever Surgeon’s General Report on Oral Health issued in May 2000, U.S. Surgeon General David Satcher noted that community water fluoridation is safe and effective in preventing dental caries in both children and adults. Fluoridation benefits all residents served by community water supplies regardless of their social or economic status.<sup>10</sup> In 2001, Dr. Satcher issued a statement on fluoridation in which he noted:

...community water fluoridation continues to be the most cost-effective, practical and safe means for reducing and controlling the occurrence of dental decay in a community...water fluoridation is a powerful strategy in efforts to eliminate health disparities among populations.<sup>11</sup>

*“...water fluoridation is a powerful strategy in efforts to eliminate health disparities among populations.”*

Established by the U.S. Department of Health and Human Services, Healthy People 2020 provides a science-based, comprehensive set of ambitious, yet achievable, ten-year national objectives for improving the health of the public and reducing health disparities.<sup>17</sup> Starting with Healthy People 2000, one of the overarching goals of Healthy People has focused on disparities. With Healthy People 2020, that goal was expanded to achieve health equity, eliminate disparities, and improve the health of all groups.<sup>25</sup> Healthy People 2020 provides the following definitions.

*Health disparity* — a particular type of health difference that is closely linked with social, economic, and/or environmental disadvantage. Health disparities adversely affect groups of people who have systematically experienced greater obstacles to health based on their racial or ethnic

group; religion; socioeconomic status; gender; age; mental health; cognitive, sensory, or physical disability; sexual orientation or gender identity; geographic location; or other characteristics historically linked to discrimination or exclusion.<sup>25</sup>

*Health equity* — the attainment of the highest level of health for all people. Achieving health equity requires valuing everyone equally with focused and ongoing societal efforts to address avoidable inequalities, historical and contemporary injustices, and the elimination of health and health care disparities.<sup>25</sup>

The association between social class and disparities in dental health has been established through extensive studies and reviews.<sup>26-28</sup> Studies in communities both with and without fluoridated water consistently have shown higher levels of tooth decay in lower socioeconomic groups. Additional studies have evaluated the differences in children's tooth decay experience among socioeconomic groups and the effect that community water fluoridation has had on that experience.<sup>29-35</sup> In areas with water fluoridation, children with low socioeconomic status (SES) had greater cavity experience than those with high SES. However, the tooth decay rates were higher for children with low SES who had no exposure to fluoridation compared to children with low SES who had exposure to fluoridated water.<sup>29-35</sup> These studies demonstrate the positive effects that fluoridation has in reducing oral health disparities.

In 2011, a report by the Institute of Medicine, *Improving Access to Oral Health Care for Vulnerable and Underserved Populations*,<sup>36</sup> acknowledged that evidence regarding community water fluoridation programs continues to validate its effectiveness, safety and cost-saving benefits.

Under the topic "Oral Health," Healthy People 2020 includes an objective to expand the fluoridation of public water supplies. Objective 13 states that at least 79.6% of the U.S. population served by community water systems should be receiving the benefits of optimally fluoridated water by the year 2020.<sup>18</sup> Data from the CDC indicate that in 2014, 74.4% of the U.S. population on public water systems, or a total of 211.4 million people, had access to fluoridated water.<sup>19</sup> Conversely, approximately 25% or more than 72.7 million people on public water systems do not receive the decay preventing benefits of fluoridation — a powerful strategy communities can implement in efforts to eliminate health disparities.

## 60. Along with the American Dental Association, who supports community water fluoridation?

### Answer.

Many organizations, such as the National Dental Association, Hispanic Dental Association, American Academy of Pediatrics, American Medical Association, American Public Health Association and the World Health Organization also have policies that support community water fluoridation.

*Many organizations, such as the National Dental Association, Hispanic Dental Association, American Academy of Pediatrics, American Medical Association, American Public Health Association and the World Health Organization also have policies that support community water fluoridation.*

### Fact.

The American Dental Association (ADA) adopted its original resolution in support of fluoridation in 1950<sup>37</sup> and has repeatedly reaffirmed its position publicly and in its House of Delegates based on its continuing evaluation of the safety and effectiveness of fluoridation.<sup>27</sup>

The National Dental Association (NDA) is the largest and oldest organization of minority oral health professionals in the world.<sup>39</sup> Representing more than 7,000 minority dentists, nationally and abroad,<sup>39</sup> the NDA seeks to provide continued advancement of the highest quality of oral health care and safety for the public.<sup>40</sup> In 2012, the NDA adopted the following position:<sup>40</sup>

It is therefore, the position of the National Dental Association that Community Water Fluoridation is safe, beneficial and cost-effective and should be encouraged and supported under the following conditions:

- Community water supplies should contain the optimal fluoride levels as recommended by the U.S. Public Health Service (a range from 0.7 – 1.2 parts per million)
- Local communities and dental societies should be in agreement with and support the fluoridation project in their communities.

- Appropriate resources monitoring capabilities should be available to ensure that the appropriate water fluoride monitoring infrastructures are in place at all times in the impacted communities.<sup>40</sup>

In a policy position released in 2012,<sup>41</sup> the Hispanic Dental Association (HDA) noted that the HDA mission works toward the elimination of oral health disparities in the Hispanic community and that the benefits of fluoridation are critical to HDA's endorsement. The HDA position statement<sup>41</sup> includes the following item:

Therefore, it is the position of the Hispanic Dental Association to:

1. Endorse community water fluoridation in all communities — especially the Hispanic and underserved communities — as a safe, beneficial and cost-effective public health measure based on science for preventing dental caries and to aid in the reduction of oral health disparities.<sup>41</sup>

As part of its core values<sup>42</sup> the American Academy of Pediatrics (AAP) is dedicated to promoting optimal health and wellbeing for every child. With a strong emphasis on policy, advocacy and education,<sup>42</sup> the AAP is a strong advocate for community water fluoridation. In support of water fluoridation<sup>43</sup> the AAP states:

Water fluoridation is a community-based intervention that optimizes the level of fluoride in drinking water, resulting in preeruptive and posteruptive protection of the teeth. Water fluoridation is a cost-effective means of preventing dental caries, with the lifetime cost per person equaling less than the cost of 1 dental restoration.<sup>43</sup>

The American Medical Association's (AMA) mission is to promote the art and science of medicine and the betterment of public health.<sup>44</sup> Its House of Delegates first endorsed fluoridation in 1951<sup>45</sup> and the AMA reaffirmed its support for water fluoridation in 2011.<sup>46</sup>

The American Public Health Association (APHA) champions the health of all people and all communities and speaks out for public health issues and policies backed by science.<sup>47</sup> It has supported community water fluoridation as a safe and effective public health measure for the prevention of tooth decay since 1950.<sup>48</sup> The APHA reaffirmed its support in 2008 by stating that it strongly endorses and recommends

“the fluoridation of all community water systems as a safe and effective public health measure for the prevention of tooth decay.”<sup>49</sup>

The goal<sup>50</sup> at the World Health Organization (WHO) is to build a better, healthier future for people all over the world. The WHO, which initially adopted policy recommending the practice of water fluoridation in 1969,<sup>51</sup> reaffirmed its support for fluoridation in 1994<sup>52</sup> stating:

Providing that a community has a piped water supply, water fluoridation is the most effective method of reaching the whole population, so that all social classes benefit without the need for active participation on the part of individuals.<sup>52</sup>

In 2004, the WHO once again affirmed its support stating that “Water fluoridation, where technically feasible and culturally acceptable, has substantial public health benefits.”<sup>53</sup> In 2007, the Sixtieth World Health Assembly adopted *WHA60.17-Oral health action plan for promotion and integrated disease prevention*<sup>54</sup> which urges member states to:

(4) for those countries without access to optimal levels of fluoride, and which have not yet established systematic fluoridation programmes, to consider the development and implementation of fluoridation programmes, giving priority to equitable strategies such as the automatic administration of fluoride, for example, in drinking-water, salt or milk, and to the provision of affordable fluoride toothpaste;<sup>54</sup>

In 2016, WHO officials wrote:

The use of fluoride is a major breakthrough in public health. Controlled addition of fluoride to drinking water supplies in communities where fluoride concentration is below optimal levels to have a cariostatic effect began in the 1940s and since then extensive research has confirmed the successful reduction in dental caries in many countries.<sup>55</sup>

Additionally a list of more than 35 organizations with positions/policies supporting community water fluoridation can be viewed on ADA's website at [www.ADA.org/fluoride](http://www.ADA.org/fluoride) in the section marked “Fluoridation Links.” Each organization is listed with a link to their specific fluoridation position/policy. Below are just a few of the organizations listed on the website.



- American Association of Dental Research
- American Association of Public Health Dentistry
- American Water Works Association
- Association of State and Territorial Dental Directors
- Centers for Disease Control and Prevention
- International Association of Dental Research
- National Institute of Dental and Craniofacial Research

Many organizations in the United States and around the world recognize the benefits of community water fluoridation. The ADA has developed a list of “National and International Organizations that Recognize the Public Health Benefits of Community Water Fluoridation for Preventing Dental Decay.” Please see the ADA website at [www.ADA.org/fluoride](http://www.ADA.org/fluoride) for the most current listing as well as information on reproduction and distribution of the list.

However, support for fluoridation doesn’t end with a list of organizations. In many cases, local newspaper editorial boards support fluoridation. Perhaps the most notable of these efforts occurred when the 2013 Pulitzer Prize for Journalism — Editorial Writing<sup>56</sup> was awarded to Tim Nickens and Daniel Ruth of the *Tampa Bay Times*, St. Petersburg, Florida, for their diligent campaign that helped reverse a decision to end fluoridation of the water supply for the 700,000 residents of the newspaper’s home (Pinellas) county. Copies of their 10 editorials from 2012 can be viewed at <http://www.pulitzer.org/winners/tim-nickens-and-daniel-ruth>.

## 61. Has the legality of water fluoridation been upheld by the courts?

### Answer.

Yes. Fluoridation has been thoroughly tested in the United States’ court system, and found to be a proper means of furthering public health and welfare. No court of last resort has ever determined fluoridation to be unlawful. Moreover, fluoridation clearly has been held not to be an unconstitutional invasion of religious freedom or other individual rights guaranteed by the First, Fifth or Fourteenth Amendments to the U.S. Constitution. And while cases decided primarily on procedural grounds have been won and lost by both pro- and anti-fluoridation interests, to ADA’s knowledge, no final ruling in any of those cases has found fluoridation to be anything but safe and effective.

### Fact.

The legality of fluoridation in the United States has been thoroughly tested in our court systems. Fluoridation is viewed by the courts as a proper means of furthering public health and welfare.<sup>57</sup> No court of last resort has ever determined fluoridation to be unlawful. The highest courts of more than a dozen states have confirmed the constitutionality of fluoridation.<sup>58</sup> In 1984, the Illinois Supreme Court upheld the constitutionality of the state’s mandatory fluoridation law, resolving 16 years of court action at a variety of judicial levels.<sup>59</sup> Moreover, the U.S. Supreme Court has denied review of fluoridation cases thirteen times, citing that no substantial federal or constitutional questions were involved.<sup>58</sup>

*Fluoridation is viewed by the courts as a proper means of furthering public health and welfare. No court of last resort has ever determined fluoridation to be unlawful.*

It has been the position of the American courts that a significant government interest in the health and welfare of the public generally overrides individual objections to public health regulation.<sup>58</sup> Consequently, the courts have rejected the contention that fluoridation ordinances are a deprivation of religious or individual freedoms guaranteed under the Constitution.<sup>58,60</sup> In reviewing the legal aspects of fluoridation, the courts have dealt with this concern by ruling that: (1) fluoride is a nutrient, not a medication, and is present naturally in the environment; (2) no one is forced to drink fluoridated water as alternative sources are available; and (3) in cases where a person believes that fluoridation interferes with religious beliefs, there is a difference between the freedom to believe, which is absolute, and the freedom to practice beliefs, which may be restricted in the public’s interest.<sup>61,62</sup>

Fluoridation is the adjustment of the level of a naturally occurring mineral found in water in order to prevent tooth decay. Courts have consistently ruled that water fluoridation is not a form of compulsory mass medication or socialized medicine.<sup>58,61,63</sup> In fact, water that has been fortified with fluoride is similar to fortifying salt with iodine, milk with vitamin D and orange juice with calcium — none of which are medications.

In recent years, challenges to fluoridation have been dismissed for a variety of reasons, including that plaintiffs admitted they could not establish injury by virtue of fluoridation and that state law supporting fluoridation prevailed over local attempts to oppose fluoridation.

Interestingly, pro- and anti- fluoridation interests have each won and lost legal challenges regarding which state or local agency has regulatory authority over fluoridation, which of course varies by state and locality.

State law variances have also led to different rulings on other issues, such as whether downstream end-users of fluoridation must be given an opportunity to vote on whether to fluoridate. While cases decided primarily on procedural grounds have been won and lost by both pro- and anti- fluoridation interests, to the ADA's knowledge no final ruling in any of those cases has found fluoridation to be anything but safe and effective.

For additional information regarding the legal status of community water fluoridation in the United States, refer to *The Fluoride Legislative User Information Database* (FLUID) which is a comprehensive database containing historical information on legal cases decided by U.S. courts. The database also contains current information on federal and state policies regarding community water fluoridation. The website can be accessed at: <http://fluidlaw.org>.

## 62. Why does opposition to community water fluoridation continue?

### **Answer.**

Public health controversies sometimes exist regarding public health interventions. In public health there can be tension between “public good” and “individual freedoms.” Because public health deals with populations it is all but impossible to resolve issues to achieve approval from 100 percent of the individuals within the population. When looking at fluoridation, some individuals opposed to fluoridation are sincere in their beliefs. Others ignore what constitutes reputable scientific evidence as defined by the vast majority of the scientific community and choose instead to base their beliefs on personal opinions and studies with flawed methodologies.

### **Fact.**

Fluoridation is considered beneficial by the overwhelming majority of the health and scientific communities as well as the general public. A vast body of scientific literature endorses water fluoridation as a safe means of reducing the incidence of tooth decay. Support for fluoridation among scientists and health professionals, including physicians and dentists, is nearly universal. Recognition of the benefits of fluoridation by the American Dental Association, the American Medical Association, the American Academy of Pediatrics, governmental agencies and other national health and civic organizations continues as a result of published, peer-reviewed research.

Fluoridation has a long history of being a political issue, as well as a scientific one, with opposition including activists from both the right and the left of the political spectrum. In the late 40s, opposition to fluoridation began to appear nationwide. Reportedly, one of the first public votes on fluoridation occurred in 1950 in Stevens Point, Wisconsin,<sup>64</sup> when a local activist initiated a campaign to stop the introduction of what he called “poison” into the water system. The campaign quickly moved from being a discussion of the science to a political campaign that included the involvement of a large number of civic groups, unofficial public petitions, calls for a debate, campaign rallies and numerous letters to the editor that “kept typesetters busy preparing for print the thousands of words that poured into the editor’s desk.” After 1950 when the U.S. Public Health Service and ADA endorsed fluoridation, proponents became more organized in their efforts to promote fluoridation while the opposition capitalized on the political nature of the struggle and used lessons learned in Stevens Point.

Of the small faction that opposes water fluoridation for philosophical reasons, freedom of choice probably is one of the most frequently cited issues. People take the stance that society should not “force” individuals to act in ways that are beneficial to their own health or the health of others. They are opposed to “government interference” in their lives.<sup>65</sup> Some individuals are opposed to community action on any health issue, others are opposed due to environmental or economic concerns and some are opposed because they are simply misinformed.

Opposition to fluoridation has existed since the initiation of the first programs in 1945 and continues today despite over 70 years of practical experience

showing fluoridation to be safe and effective. An article<sup>55</sup> that appeared in the local newspaper shortly after the first fluoridation program was implemented in Grand Rapids, Michigan, noted that the fluoridation program was slated to commence January 1, but did not actually begin until January 25. Interestingly, health officials in Grand Rapids began receiving complaints of physical ailments, including “teeth falling out and enamel peeling off their teeth,” attributed to fluoridation from citizens weeks before fluoride was actually added to the water.<sup>66</sup> In 1992 a community in Finland opted to stop their fluoridation program at the end of the year in December. However, it was discontinued at the end of November without the public being told. Public surveys conducted in November and December and again in March the following year revealed the occurrence and mean number of symptoms (the most common being itching and dryness of skin) were fairly similar during the periods of actual and supposed fluoridation indicating the symptoms were not caused by fluoride in the water. Interestingly, those who claimed to be able to taste the fluoride in the water made this claim equally often during actual and supposed fluoridation. A significant reduction in the symptoms occurred after those responding to the surveys became aware that fluoridation had stopped. The authors concluded that the prevalence rates of the symptoms were connected to the psychological rather than the physical effects of exposure to fluoride in water.<sup>67</sup>

Over time, antifluoridation leaders and organizations have come and gone, but their basic beliefs have remained the same. These include: fluoride is toxic and causes numerous harmful health effects; fluoride does not prevent tooth decay; fluoridation is costly; and fluoridation interferes with freedom of choice and infringes on individual rights.

Opinions are seldom unanimous on any scientific subject. In fact, there really is no such thing as “final knowledge,” since new information is continuously emerging and being disseminated. As such, the benefit evidence must be continually weighed against risk evidence. Health professionals, decision makers and the public should be cooperating partners in the quest for accountability where decisions are based on proven benefits measured against verified risks.<sup>68</sup> Dentists are a valuable source of accurate information regarding water fluoridation for both their patients and their communities.

### 63. What are the tactics fluoridation opponents use to provoke opposition to water fluoridation?

#### **Answer.**

Fluoridation opponents use numerous tactics to disseminate misinformation and raise the fears of the public about the safety of water fluoridation. Routinely, they use scare techniques,<sup>69</sup> present half-truths, downplay the significance of science-based evidence and use selective reporting of results and studies to support their false allegations.<sup>59</sup>

#### **Fact.**

While many of the arguments against fluoridation have remained relatively constant over the years, antifluoridationists have used different approaches that play upon the popular concerns of the public at the time.<sup>65</sup> For example, in the 1950s fluoridation was said to be a Communist plot. With America’s growing concern for environmental issues in the 1960s, fluoridation was called pollution. After the Vietnam War in the 1970s, the antifluoridationists capitalized on the popularity of conspiracy theories by portraying fluoridation as a conspiracy between the U.S. government, the dental-medical establishment and industry. As the population became more concerned about their health in the 1980s, antifluoridationists claimed fluoridation caused AIDS and Alzheimer’s disease. In the 1990s, claims of hip fractures and cancer were designed to resonate with aging baby boomers. With the new millennium, overexposure and toxicity, in association with lead poisoning, surfaced as common themes. Since the economic crisis of 2008, discussions about the cost of fluoridation are more commonplace. In the 2010s, neurotoxicity became a constant theme with charges of lower IQ and autism. Over the years, none of these approaches have ever really disappeared, but instead are often recycled as antifluoridationists choose which approach will have the greatest effect on the intended audience.<sup>65</sup>

The internet has breathed new life into the antifluoridation effort bringing the antifluoridation message into voters’ homes.<sup>71,72</sup> With just a click of the mouse, search engines can locate a large number of websites denouncing fluoridation, which can give the impression that this is a one-sided argument. Individuals who look to the internet as a source of valid and reliable information often fail to recognize that these sites frequently contain personal opinion rather than scientific fact. Newspaper stories,



press releases and letters to the editor are often posted as documentation of the “science” behind antifluoridationists’ claims. All too often, the public accepts this type of information as true simply because it is in print. Opposition videos are available from national antifluoridation organizations and are shared at no cost via vehicles such as YouTube making it possible for every campaign to bring an antifluoridationist to the community. Social media such as Facebook and Twitter are used to spread antifluoridation messaging to the public and to assist in organizing local efforts. These venues have allowed the small faction of antifluoridationists to be linked across the country and around the world and promote their message quickly, repeatedly and economically.

Spreading misinformation impacts public policy and costs society in immeasurable ways. The opponents’ claims and opinions can escalate to emotional arguments that, in the end, can delay, or prevent the introduction of a water fluoridation program or stop an existing program.<sup>70</sup> More people, especially those involved in policy decisions, need to be better informed about these tactics. In making decisions that affect the health of the community, it is important to distinguish between someone’s personal opinion disguised as science and information based on the best available scientific evidence. It is perfectly acceptable to have your own opinion but it is unacceptable to have your own “facts” derived from something less than reputable science.

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*In making decisions that affect the health of the community, it is important to distinguish between someone’s personal opinion disguised as science and information based on the best available scientific evidence.*

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In 1993 the U.S. Supreme Court issued a landmark decision that many view as likely to restrict the use of information inferred as science in the federal courts and in those state courts which adopt this reasoning. The Court determined that while “general acceptance” is not needed for scientific evidence to be admissible, federal trial judges have the task of ensuring that an expert’s testimony rests on a reasonable foundation and is relevant to the issue in question.<sup>73</sup> According to the Supreme Court, many considerations will bear on whether the expert’s underlying reasoning or methodology is scientifically valid and applicable in a given case. The Court set out four criteria that judges could use when evaluating scientific testimony:

1. whether the expert’s theory or technique can be (and has been) tested, using the scientific method,
2. whether it has been subject to peer review and publication (although failing this criteria alone is not necessarily grounds for disallowing the testimony),
3. its known or potential error rate and the existence and maintenance of standards in controlling its operation and
4. whether it has attracted widespread acceptance within a relevant scientific community, since a known technique that has been able to attract only minimal support may properly be viewed with skepticism.<sup>73</sup>

The scientific validity and relevance of claims made by opponents of fluoridation might be best viewed when measured against these criteria.<sup>73</sup> The techniques used by antifluoridationists are well known and have been discussed at length in a number of published articles that review the tactics used by antifluoridationists.<sup>58,65,68-70,74-77</sup> Examples of a few of the techniques can be viewed in Figure 5.

## Figure 5. Opposition Tactics

**Targeting Politicians and Community Leaders:** Antifluoridation websites contain draft letters to be sent to newspaper publishers, water departments, and community public officials warning them of their “liability” should they support or endorse water fluoridation. Leaders are urged to remain “neutral” and allow fluoridation decisions to be put to a public vote, therefore, relieving the leaders of any and all responsibility in the matter. Antifluoridationists use the time gained to conduct a public referendum to bombard the public with misinformation designed to turn public opinion against fluoridation.

**Unproven Claims:** Antifluoridationists have repeatedly claimed fluoridation causes an entire laundry list of human illnesses, including AIDS, Alzheimer’s disease, cancer, Down Syndrome, genetic damage, heart disease, lower intelligence, kidney disease, osteoporosis and hip fractures. None of these claims has a basis in fact. These allegations are often repeated so frequently during campaigns that the public assumes they must be true. Their appearance in print, even if only in letters to the editor of the local newspaper, reinforces the allegation’s credibility. With just a small amount of doubt established, the opposition slogan, “If in doubt, vote it out,” often rings true with voters.

**Innuendo:** The statement, “Fifty years ago physicians and dentists posed for cigarette ads,” is an example of innuendo or, more specifically, guilt by association. Even though fluoridation is not mentioned, individuals are expected to make the connection that the medical community changed its position on smoking so it is possible health professionals are wrong about fluoridation, too.

**Outdated Studies and Statements from “Experts”:** Antifluoridation websites often offer a list of “respected medical professionals and scientists” who have spoken out against fluoridation. One of those often quoted is Dr. Charles Gordon Heyd who is noted to be a Past President of the American Medical Association (AMA). What is not disclosed is the source of the quote or that Dr. Heyd was President of the AMA in 1936 – almost ten years before water fluoridation trials began. His decades-old quote certainly does not represent the current AMA position of support for water fluoridation and is characteristic of antifluoridationists’ use of items that are out of date. Additionally, antifluoridationists have claimed that fourteen Nobel Prize winners have “opposed or expressed reservations about fluoridation.” It should be noted that the vast majority of these individuals were awarded their prizes from 1929 through 1958.

**Statements Out of Context:** One of the most repeated antifluoridation statements is, “Fluoride is a toxic chemical. Don’t let them put it in our water.” This statement ignores the scientific principle that toxicity is related to dosage and not just to exposure to a substance. Examples of other substances that can be harmful in the wrong amounts, but beneficial in the correct amounts, are salt, vitamins A and D, iron, iodine, aspirin and even water itself.

**Conspiracy Theories:** Hardly a fluoridation campaign goes by without those opposed to fluoridation bringing up any number of conspiracy theories about fluoridation. Whether it is the claim that scientists from the original atomic bomb program secretly shaped and guided the early Newburgh, NY, fluoridation trial or that chemtrails are a government plot to spread fluoride, these claims have no basis in fact. Even the belief that fluoridation was a communist plot to destroy America was famously parodied in the 1964 movie *Dr. Strangelove*. Over the decades, those opposed to fluoridation have used propaganda schemes and conspiracy theories that reflected the social and political environment of the times. Today, “follow the money” is a common theme as the opposition claims that the beverage industry, the companies supplying fluoride additives and others are financially backing researchers, as well as dental and medical groups, who are promoting fluoridation. None of these claims has a basis in fact.

**Treating Correlation as Causation:** Many people have heard the phrase that “correlation does not imply causation.” In other words, just because two events seem to fluctuate in tandem does not prove that they are meaningfully related to one another. For example, statistics show that sales of ice cream increase in warm summer months. Statistics also show that crime goes up in large cities in the summer. However, it would be ludicrous to draw the conclusion that ice cream causes an increase in crime. Yet this is exactly the type of logic exercised in some arguments and studies promoted by those opposed to fluoridation. For example, the opposition often points to Kentucky as having a large portion of the population on public water supplies receiving fluoridated water. And that’s correct. In 2014, Kentucky was ranked the number one state in the U.S. as 99.9% of its public water systems were fluoridated. But the opposition also points to the fact that Kentucky suffers from a large number of people who have lost their teeth. They draw the conclusion that this proves fluoridation does not work — without looking at other factors that influence this outcome. For example, while there is a large number of public water systems that are fluoridated, Kentucky has a large rural population that does not have access to public water supplies. Additionally, and perhaps most importantly, Kentucky’s population has a high rate of tobacco use which is known to be a risk factor for periodontal (gum) disease which can lead to the loss of teeth.

## 64. Where can valid, evidence-based information about water fluoridation be found on the internet?

### Answer.

There are many reputable sites on the internet that provide information on fluorides and fluoridation including the American Dental Association as well as other reputable health and science organizations and government agencies. These sites provide information that is consistent with the best available scientific evidence.

### Fact.

One of the most widely respected sources for information regarding fluoridation and fluorides is the American Dental Association’s (ADA) Fluoride and Fluoridation website at [www.ADA.org/fluoride](http://www.ADA.org/fluoride). (See Figure 6.) From the ADA website individuals can link to other fluoridation websites such as:

- Centers for Disease Control and Prevention at [www.cdc.gov/fluoridation](http://www.cdc.gov/fluoridation)
- The Community Guide at <https://www.thecommunityguide.org>
- Fluoride Science at <http://fluoridescience.org>

The internet contains numerous sources of information on fluoridation. However, not all

“science” posted on the internet is based on scientific fact. Searching the internet for “fluoride” or “water fluoridation” directs individuals to numerous websites. Some of the content found in the sites is scientifically sound. Other less scientific sites look highly technical, but contain information based on science that is unconfirmed or has not gained widespread acceptance. In many cases, the information is largely opinion. While everyone is entitled to their opinion, they are not entitled to make that opinion appear as scientific fact. Commercial interests, such as the sale of water filters, are often promoted.

Today’s technology can put the world at your fingertips but search engine technology can influence what is returned in searches. The first time the search for “fluoridation” is made, it is likely that the returns will include both pro- and anti- fluoridation websites. When you click to view a website, the search engine takes note and on subsequent searches for the same term, the search engine will return items similar to what you chose initially. For example, if you choose a pro-fluoridation website initially, the next time you search for “fluoridation,” the search engine will likely return a selection of other pro-fluoridation websites for your review. Of course the converse is also true. Clicking on anti-fluoridation websites will allow you to see a search laden with similar anti-fluoridation sites.

Figure 6. ADA Fluoride and Fluoridation Web Page



## FLUORIDATION AT YOUR FINGERTIPS!

<http://www.ADA.org/fluoride>

- ADA Fluoridation Resources
- ADA Fluoridation Videos
- ADA Fluoridation News Stories
- ADA Policy and Statements
- Links to Additional Fluoridation Websites

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65. Why does community water fluoridation sometimes lose when it is put to a public vote?

**Answer.**

Voter apathy or low voter turnout due to the vote being held as a special election or in an “off” year, confusing ballot language (a “no” vote translates to support for fluoridation), blurring of scientific issues, the use of scare tactics by those opposed to fluoridation, long campaigns that lead to “fluoridation fatigue,” lack of leadership by elected officials and a lack of political campaign skills among health professionals are some of the reasons fluoridation votes are sometimes unsuccessful.

**Fact.**

The fact is that fluoridation votes in the U.S. are more often successful than not. In 2016, it was common to see those opposed to fluoridation make statements such as “450 communities had rejected fluoridation since 2000” or similar statements using different numbers. What is not made clear is that the number of communities in these statements is a global number. Many of these communities are outside the United States.<sup>78</sup> In fact from 2000 through 2016, more than 515 U.S. communities in 42 states voted to adopt or retain successful fluoridation programs.<sup>79</sup> In the five years from 2012 to 2016, U.S. communities voted in favor of fluoridation programs by a two to one margin.<sup>78,79</sup>

*The fact is that fluoridation votes in the U.S. are more often successful than not...In the five years from 2012 to 2016, U.S. communities voted in favor of fluoridation programs by a two to one margin.*

Since 2000, nearly 50 million people have been added to the population on public water systems in the United States that enjoys the benefit of optimally fluoridated water.<sup>80</sup> In 2000, 65% of the public on public water systems received fluoridated water.<sup>81</sup> In 2014, the percentage had increased nearly 10% to 74.4% of the population.<sup>19</sup> But despite the continuing growth of fluoridation in this country over the past several decades, millions of people in the U.S. do not yet receive the protective benefit of fluoride in their drinking

**Figure 7. Largest Fluoridated Cities**

**Two cities (Jacksonville, Florida and El Paso, Texas) are naturally fluoridated.\***



\* Data compiled by the American Dental Association and Centers for Disease Control and Prevention/Division of Oral Health. Information current as of October 2017.

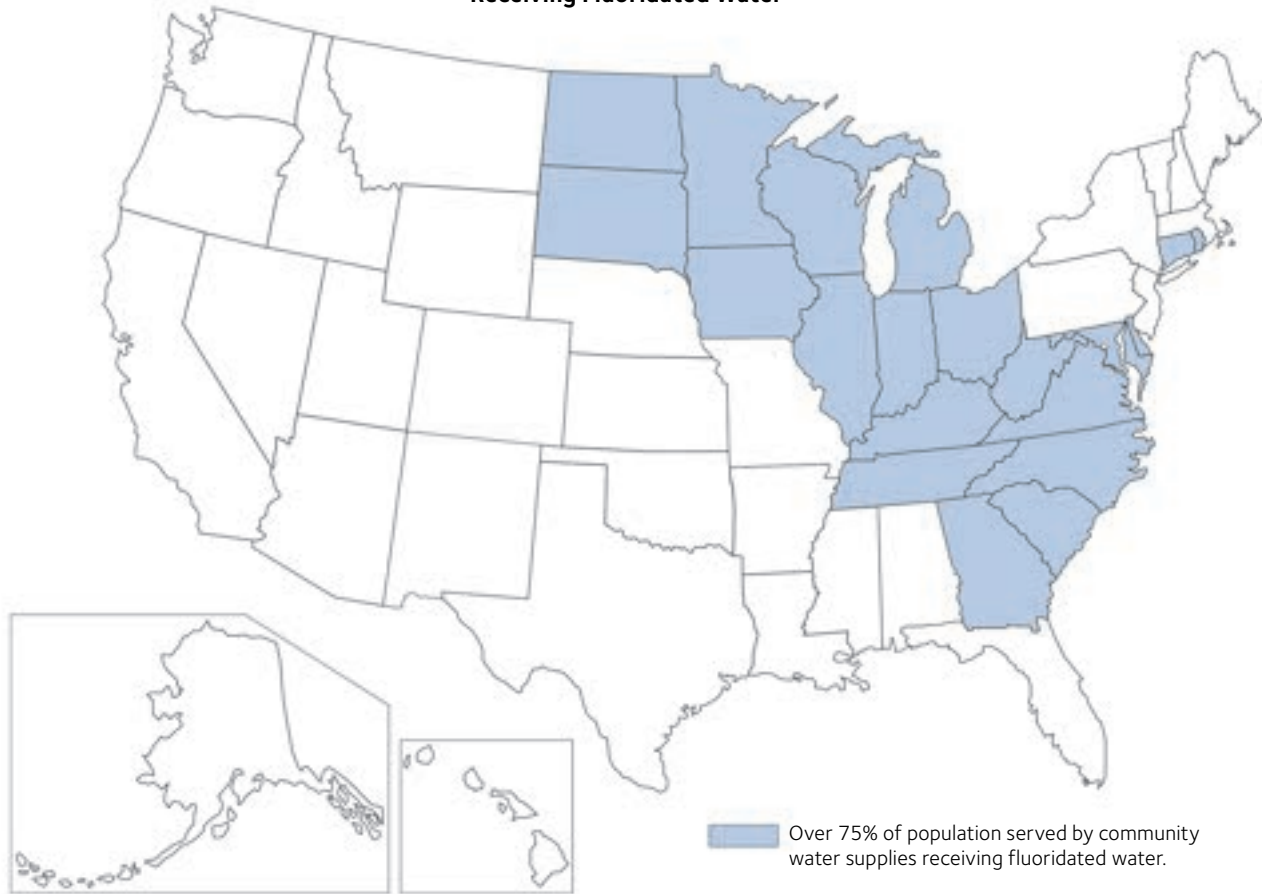
water. Centers for Disease Control and Prevention (CDC) data from 2014 indicated more than 25% of the population served by public water systems did not have access to fluoridated water.<sup>19</sup> In 2017, 44 of the 50 largest cities were fluoridated.<sup>82</sup> Of the 44 cities, 42 were fluoridated by adjustment and two had naturally occurring fluoride at the recommended levels (Figure 7). The remaining six largest nonfluoridated cities (in order of population largest to smallest) were: Portland, Oregon; Albuquerque, New Mexico; Tucson, Arizona; Fresno, California; Colorado Springs, Colorado; and Wichita, Kansas. In October 2017, the Albuquerque Bernalillo County Water Utility Authority authorized budget monies to restore fluoridation to their customers. It is estimated that fluoridated water will be available in six to eight months.

In 2010, recognizing the ongoing need to improve health and well-being, the U.S. Department of Health and Human Services revised national health objectives to be achieved by the year 2020.<sup>17</sup> Included under oral health was an objective to significantly expand the fluoridation of public water supplies. Specifically, Objective 13 of Healthy People 2020 states that at least 79.6% of the U.S. population served by community water systems should be receiving the benefits of optimally fluoridated water by the year 2020.<sup>18</sup> This replaced the Healthy People 2010 objective of 75%.<sup>83</sup> As of 2014, twenty states met or exceeded the 2020 objective.<sup>19</sup> (See Figure 8.) Although water fluoridation reaches some residents in every state the coverage is uneven. Data from 2014 indicated that 26 states provided fluoridation benefits to 75% or more of their residents on community water systems while eight states were at or below 50%.<sup>19</sup> (See Figure 9.)



**Figure 8. States Meeting National Goal**

**States Meeting the Healthy People 2020 Goal Of 79.6% of the Population Served by Community Water Supplies Receiving Fluoridated Water\***



\* Data Source: Centers for Disease Control and Prevention/Division of Oral Health. "National Fluoridation Statistics" 2014. Available at <https://www.cdc.gov/fluoridation/statistics/2014stats.htm>

Fluoridation campaigns can vary greatly from community to community. To paraphrase an old saying, "If you've seen one fluoridation campaign, you've seen one fluoridation campaign." A number of factors commonly come into play when fluoridation is put to a public vote and does not succeed. Among those factors are a lack of funding, public and professional apathy, the failure of many legislators and community leaders to take a stand because of perceived controversy, low voter turnout and the difficulty faced by an electorate in evaluating scientific information in the midst of emotional charges by opponents. Voters are often unaware of the fluoride content of their water. Unfortunately, citizens sometimes mistakenly believe their water contains the recommended level of fluoride when, in fact, it does not. On the other hand, people sometimes say they have great teeth and don't need fluoridation

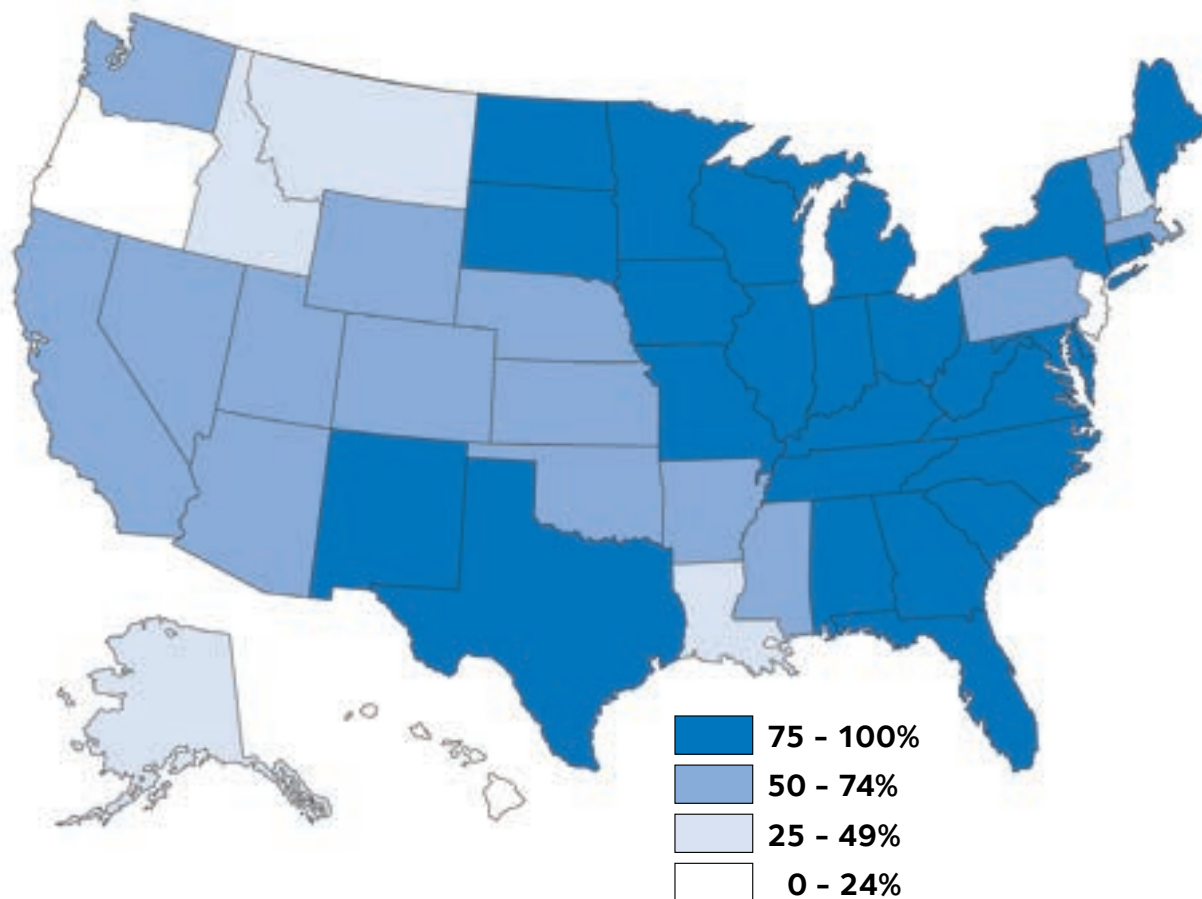
when in fact, the major reason they have such good teeth is because they've had the benefit of fluoride in the water their entire lives. And, in some cases, because fluoridation campaigns often become political campaigns, there are political factors that can sway a vote that have nothing at all to do with fluoridation.

Clever use of emotionally charged "scare" propaganda by fluoride opponents creates fear, confusion and doubt within a community when voters consider the use of fluoridation.<sup>84,85</sup>

Defeats of referenda or the discontinuance of fluoridation have occurred most often when a small, vocal and well organized group has used a barrage of fear-inspiring allegations designed to confuse the electorate. In addition to attempts to influence voters, opponents have threatened community leaders with

Figure 9. State Fluoridation Status

Percentage of population on community water systems receiving fluoridated water.\*



\* Data Source: Centers for Disease Control and Prevention/Division of Oral Health. "National Fluoridation Statistics" 2014. Available at <https://www.cdc.gov/fluoridation/statistics/2014stats.htm>

personal litigation.<sup>86</sup> While no court of last resort has ever ruled against fluoridation, community leaders can be swayed by the threat of litigation due to the cost and time involved in defending even a groundless suit, not to mention threats of political fallout. The American Dental Association (ADA) knows of no cases in which community leaders have been found liable for their pro-fluoridation efforts. In no instance has fluoridation been discontinued because it was proven harmful in any way.<sup>85-87</sup>

*Defeats of referenda or the discontinuance of fluoridation have occurred most often when a small, vocal and well organized group has used a barrage of fear-inspiring allegations designed to confuse the electorate.*

Adoption of fluoridation is ultimately a decision of state or local decision makers, whether determined by elected officials, health officers or the voting public. Fluoridation can be enacted through state legislation, administrative regulation, ordinance or a public referendum. While fluoridation is not legislated at the federal level, it is legislated at the state and local level. As with any public health measure, a community has the right and obligation to protect the health and welfare of its citizens, even if it means overriding individual objections to implement fluoridation.

Those opposed to fluoridation sometimes comment that "the government is forcing fluoridation" on the community. But who is "the government?" The fact is that since fluoridation is implemented by state or local votes (by city councils or public vote), the people are "the government." Voters elect officials at the

state and local level to act on their behalf. Voters participate directly in public votes on fluoridation.

Each spring as part of the yearly ADA/ASTDD/CDC Community Water Fluoridation Awards program, the ADA, Association of State and Territorial Dental Directors and the CDC Division of Oral Health compile a list of water systems/communities in the United States that have adopted or retained community water fluoridation in the previous year.<sup>88</sup> This list is posted on the ADA website at <http://www.ADA.org/fluoride>. The ADA has also compiled a master list of U.S. communities voting to adopt or retain fluoridation programs dating from 1998 which is also available on the ADA website.<sup>79</sup> From 2000 through 2016, more than 515 U.S. communities in 42 states have voted to adopt or retain fluoridation. The size of these water systems/communities varies greatly — from those with a few thousand residents to the Metropolitan Water District of Southern California which provides fluoridated water to more than 18 million people.<sup>79</sup>

The primary source for technical assistance with fluoridation efforts is the ADA's Council on Advocacy for Access and Prevention (CAAP) at the ADA. Additional support for fluoridation is available from the ADA's Division of Legal Affairs, Division of Communications and Department of State Government Affairs. Dental and health professionals seeking technical assistance can reach CAAP at 312.440.2500.

## 66. Is community water fluoridation accepted by other countries?

### Answer.

According to the British Fluoridation Society,<sup>89</sup> as of November 2012, approximately 377.7 million people in 25 countries worldwide were supplied with water fluoridated by adjustment. Additionally, the number of people receiving naturally fluoridated water at the optimum level is approximately 57.4 million. Worldwide, the estimated number of people with access to optimally fluoridated water is 435.1 million and it continues to grow each year.<sup>89</sup> A second study estimates the number at 437.2 million.<sup>90</sup>

*According to the British Fluoridation Society, as of November 2012, approximately 377.7 million people in 25 countries worldwide were supplied with water fluoridated by adjustment.*

### Fact.

The value of water fluoridation is recognized internationally. Countries and geographic regions with water fluoridated by adjustment include the U.S., Argentina, Australia, Brazil, Brunei, Canada, Chile, China (Special Administrative Region of Hong Kong), Fiji, Guatemala, Guyana, the Irish Republic, Israel, Malaysia, New Zealand, Panama, Papua New Guinea, Peru, Republic of Korea (South Korea), Serbia, Singapore, Spain, the United Kingdom and Vietnam.<sup>89</sup> Major cities (outside the U.S.) with fluoridated water include Adelaide, Auckland, Bilbao, Birmingham, Brisbane, Buenos Aires, Cork, Dublin, Edmonton, Ho Chi Minh City (Saigon), Kuala Lumpur, Melbourne, Newcastle upon Tyne, Perth, Rio de Janeiro, San Paolo, Santiago, Seville, Sydney, Toronto, Wellington and Winnipeg.<sup>89</sup>

Thorough investigations of fluoridation, conducted in a number of countries in addition to the U.S. including Australia, England, Ireland, New Zealand as well as by the European Commission and the World Health Organization, support the safety and effectiveness of water fluoridation.<sup>90-95</sup>

Considering the extent to which fluoridation has already been implemented throughout the world, the lack of documentation of adverse health effects is remarkable testimony to its safety.<sup>91-94, 96</sup> The World Health Organization (WHO) has endorsed the practice of water fluoridation since 1969.<sup>51</sup> In 1994, an expert committee of the WHO published a report which reaffirmed its support of fluoridation as being safe and effective in the prevention of tooth decay, and stated that “provided a community has a piped water supply, water fluoridation is the most effective method of reaching the whole population, so that all social classes benefit without the need for active participation on the part of individuals.”<sup>52</sup> In 2004, the WHO once again affirmed its support.<sup>53</sup> In 2007, the Sixtieth World Health Assembly recommended that countries without access to optimal levels of fluoride or systemic fluoridation programs should consider initiating fluoridation programs.<sup>54</sup>

A scientific evaluation of fluoride was conducted by the Scientific Committee on Health and Environmental Risks (SCHER) upon request by the European Commission (EC).<sup>85</sup> The EC is the European Union's (EU) executive body with responsibility to manage EU policy. The Committee was asked to critically evaluate any new evidence on the hazard profile, health effects and human exposure to fluoride. The final report,



*Critical review of any new evidence on the hazard profile, health effects, and human exposure to fluoride and the fluoridating agents of drinking water* was released in 2011.<sup>95</sup> It stated that exposure to levels of fluoride used for fluoridation of drinking water is not expected to lead to unacceptable risks to the environment. Additionally, the report concluded there was insufficient evidence or no evidence that fluoridation was linked to endemic skeletal fluorosis, osteosarcoma, lower IQs in children, thyroid or reproductive problems.<sup>95</sup>

There are parts of the world where water fluoridation is not common. In some of these instances water fluoridation is not feasible due to the lack of a central water supply, the existence of other more life-threatening health needs, the lack of trained technical personnel or sufficient funds for start-up and maintenance costs. In some cases where water fluoridation has not been implemented, countries have chosen to institute salt fluoridation programs.

## 67. Is community water fluoridation banned in Europe?

### **Answer.**

**No country in Europe bans community water fluoridation.**

### **Fact.**

Under European Union (EU) law and regulations, the individual Member States can decide whether to or not to fluoridate water. Members of the European Union (EU) construct their own water quality regulations within the framework of the Drinking Water Directive<sup>97</sup> adopted in 1998 which outlines the quality of water intended for human consumption. They can also decide whether to or not to add fluoride to milk or salt products. There is no EU-wide obligation to add fluoride to any product consumed by humans including water nor is there an EU-wide obligation not to add fluoride to any product including water.<sup>87</sup>

The Directive provides maximum admissible concentrations for many substances, one of which is fluoride. The Directive does not require or prohibit fluoridation; it merely requires that the fluoride concentration in water does not exceed the maximum permissible concentration of 1.5 mg/L.<sup>97</sup>

Many fluoridation systems that used to operate in Eastern and Central Europe did not function

properly and when the Iron Curtain fell in 1989–90, fluoridation stopped because of obsolete technical equipment and lack of knowledge as to the benefits of fluoridated water.<sup>88</sup>

Water fluoridation is not practical in some European countries because of complex water systems with numerous water sources. As an alternative to water fluoridation, many European countries have opted for the use of dietary fluoride supplements or salt fluoridation.

Basel, Switzerland is one such example.<sup>98</sup> Those opposed to water fluoridation claimed a large victory when Basel voted to cease water fluoridation in 2003. The facts are that Basel was the lone city with fluoridated water surrounded by communities that used fluoridated salt. In the mid-1990s, trade barriers that had prevented fluoridated salt from being sold to those living in Basel fell and soon it was evident that residents were receiving fluoride from salt as well as through drinking water. The government voted to cease water fluoridation in 2003 in light of availability and use of fluoridated salt in the community. Basel, Switzerland did not stop providing fluoride. Officials simply chose another type of fluoridation — salt fluoridation.<sup>98</sup>

Again, no European country bans fluoridation. It has simply not been implemented for a variety of technical, legal, financial or political reasons.

Those opposed to fluoridation sometimes comment that “97% of western Europe has rejected water fluoridation,” although frequently the line becomes “most of Europe has rejected water fluoridation.” But what is not mentioned is that there are a number of countries in Europe that have opted to use fluoridated salt or milk fluoridation. (Additional information on this topic can be found in Benefits Section, Question 14.) Letters have appeared on the internet reportedly from officials in foreign countries who comment negatively regarding their country’s position on fluoridation. However, from the letters it is apparent the writers are responding to a question that is not publically available and that was designed to illicit a negative response. Additionally the credentials of the respondents do not provide any insight as to what relationship, if any, they have with the governmental bodies who have jurisdiction over fluoridation practices in their respective countries. These letters should not be construed as any country’s official position on fluoridation.

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# Cost

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## 68. Is water fluoridation a cost-effective and cost-saving method of preventing tooth decay?

### Answer.

Yes. When compared to the cost of other prevention programs, water fluoridation is the most cost-effective means of preventing tooth decay for both children and adults in the United States. A number of studies over the past 15 years have attempted to place a specific dollar value on the benefit of fluoridation. These studies, conducted in different years (and therefore using different dollar values), encompassing different communities/populations and different methodologies have two conclusions in common: 1) for systems that serve more than 1,000 people, the economic benefit of fluoridation exceeds the cost and 2) the benefit-cost ratios increased as the size of the populations increase largely due to economies of scale.

### Fact.

The cost of community water fluoridation varies for each community depending on the following factors.<sup>1</sup>

1. Size of the community (population and water usage);
2. Number of fluoride injection points where fluoride additives will be added to the water system;
3. Amount and type of equipment used to add and monitor fluoride additives;
4. Amount and type of fluoride additive needed to reach the target fluoride level of 0.7 mg/L; its price, cost of transportation and storage; and
5. Expertise and preferences of personnel at the water plant.

In 2016, a study<sup>2</sup> led by researchers from the Colorado School of Public Health created a model of fluoridation program costs, savings, net savings and return on investment for the 2013 U.S. population with access to optimally fluoridated water systems that served 1,000 or more people. The researchers found that savings associated with individuals avoiding tooth decay in 2013 as a result of fluoridation were estimated at \$6.8 billion, or \$32.19 per person, for the more than 211 million people who had access to fluoridated water through community water systems serving more than 1,000 people that year. Based on the estimated cost of the systems to fluoridate (\$324 million), the net savings from fluoridation was estimated at \$6.5 billion and the estimated return on investment (ROI) averaged 20 to 1 across water systems of all sizes (from 1,000 to over 100,000 people with a ROI range of 15.5 to 26.2). However, it was noted that the cost per person to fluoridate can vary significantly among different sizes of communities based on a number of the factors outlined in the previous paragraph. Because of those variables, the researchers urged communities to inform their policy decisions by identifying their specific water system's annual cost and comparing that cost to the annual estimated per person savings (\$32.19) in averted treatment costs. The researchers noted that in 2013, while 211 million people had access to fluoridated water, more than 78 million people had access to a public water system that served 1,000 or more people that was not fluoridated. The study findings suggest that if those water systems had been fluoridated, an additional \$2.5 billion could have been saved as a result of reductions in tooth decay.<sup>2</sup>

The economic benefits of fluoridation were also reconfirmed in a systematic review<sup>3</sup> conducted in 2013 by the Community Preventive Services Task Force which sought to update their prior review conducted in 2002<sup>4</sup> which also found that fluoridation saved money. The 2013 review concluded that recent

evidence continues to indicate the economic benefit of fluoridation programs exceeds their cost. The review also noted that benefit-cost ratio increases with the population of the community.

Because of the decay reducing effects of fluoride, the need for restorative dental care is typically lower in fluoridated communities. Therefore, an individual residing in a fluoridated community will typically pay for fewer dental restorative services (such as fillings) during a lifetime. A study<sup>5</sup> published in 2005, estimated the cost and treatment savings resulting from community water fluoridation programs in Colorado. The study also estimated the added savings if communities without water fluoridation initiated a fluoridation program. The study estimated a community fluoridation program generated treatment savings through prevented tooth decay of \$61 for every \$1 spent to fluoridate the community's water. On a state level, results indicated an annual savings of nearly \$150 million associated with the water fluoridation programs and projected a nearly \$50 million annual savings if the remaining 52 nonfluoridated water systems in Colorado were to implement water fluoridation programs.<sup>5</sup>

There are various types of dental restorations (fillings) commonly used for the initial treatment of tooth decay (cavities) including amalgam (silver) and composite resins (tooth-colored). In the 2016 study noted earlier<sup>2</sup>, the most commonly used treatment was a two-surface composite resin restoration in posterior (back) permanent teeth. Considering the fact that in the United States the fee<sup>6</sup> for a two-surface composite resin restoration in a permanent tooth placed by a general dentist typically ranges from \$165-\$305\*, fluoridation clearly demonstrates significant cost savings. An individual can enjoy a lifetime of fluoridated water for less than the cost of one dental filling.

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*An individual can enjoy a lifetime of fluoridated water for less than the cost of one dental filling.*

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\*The Survey data should not be interpreted as constituting a fee schedule in any way, and should not be used for that purpose. Dentists must establish their own fees based on their individual practice and market considerations. The American Dental Association discourages dentists from engaging in any unlawful concerted activity regarding fees or otherwise.

When it comes to the cost of treating dental disease, everyone pays. Not just those who need treatment, but the entire community — through higher health insurance premiums and higher taxes. Cutting dental care costs by reducing tooth decay is something a community can do to improve oral health and save money for everyone. With the escalating cost of health care, fluoridation remains a community public health measure that saves money and so benefits all members of the community.

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The economic importance of fluoridation is underscored by the fact that the cost of treating dental disease frequently is paid not only by the affected individual, but also by the general public through services provided by health departments, community health clinics, health insurance premiums, the military and other publicly supported medical programs.<sup>7</sup> For example, results from a New York State study published in 2010<sup>8</sup> that compared the number of Medicaid claims in 2006 for cavity-related procedures in fluoridated and nonfluoridated counties showed a 33.4% higher level of claims for fillings, root canals and extractions in nonfluoridated counties as compared to such claims in fluoridated counties.<sup>8</sup>

Fluoridation contributes much more to overall health than simply reducing tooth decay. It prevents needless infection, pain, suffering and loss of teeth and saves vast sums of money in dental treatment cost — particularly in cases where dental care is received through surgical intervention in a hospital or through hospital emergency services.

In a study<sup>9</sup> conducted in Louisiana, Medicaid-eligible children (ages 1-5) residing in communities without fluoridated water were three times more likely than Medicaid-eligible children residing in communities with fluoridated water to receive dental treatment in a hospital and the cost of dental treatment per eligible child was approximately twice as high. In addition

to community water fluoridation status, the study took into account per capita income, population and number of dentists per county.<sup>9</sup>

By preventing tooth decay, fluoridation also plays a role in reducing visits to hospital emergency rooms (ERs) for toothaches and other related dental problems where treatment costs are high. Most hospitals do not have the facilities or staff to provide comprehensive or even emergency dental care. Many patients receive only antibiotics or pain medication but the underlying dental problem is not addressed. In too many cases, the patient returns to the ER in a few days with the same problem or worse.

School-based dental disease prevention activities such as fluoride mouthrinse or tablet programs, professionally applied topical fluorides, dental health education and placement of dental sealants are beneficial but have not been found to be as cost-effective in preventing tooth decay as community water fluoridation.<sup>10</sup> In 1985, the National Preventive Dentistry Demonstration Program<sup>10</sup> analyzed various types and combinations of school-based preventive dental services to determine the cost and effectiveness of these types of prevention programs. Ten sites from across the nation were selected. Five of the sites had fluoridated water and five did not. Over 20,000 second and fifth graders participated in the study over a period of four years. Students were examined and assigned by site to one or a combination of the following groups:

- biweekly in class brushing and flossing plus a home supply of fluoride toothpaste and dental health lessons (ten per year);
- in-class daily fluoride tablets (in nonfluoridated areas);
- in-school weekly fluoride mouthrinsing;
- in-school professionally applied topical fluoride;
- in-school professionally applied dental sealants, and
- a control.<sup>10</sup>

After four years, approximately 50% of the original students were examined again. The study affirmed the value and effectiveness of community water fluoridation. At the sites where the community

water was fluoridated, students had fewer cavities, as compared to those sites without fluoridated water where the same preventive measures were implemented. In addition, while sealants were determined to be an effective prevention method, the cost of a sealant program was substantially more than the cost of fluoridating the community water demonstrating fluoridation as the most cost-effective preventive option.<sup>10</sup>

In an effort to balance budgets, decision makers sometimes make economic choices that amount to being “penny wise and pound foolish.” In other words, they cut an expense today that appears to be a sure money saver. But they fail to take a long-term view (or see the big picture) on the consequences of that action. They fail to see how money spent now can provide greater savings in the future. A decision to eliminate funding for a successful community water fluoridation program would be an example of that kind of action. Often decision makers are swayed by the promise of an alternative fluoride delivery system without considering who it will cover (and who it will not cover), how it will be administered and what it will cost. Examples of these alternative fluoride delivery programs include school-based fluoride mouthrinse programs, fluoride supplements, fluoride varnish and other professionally applied topical fluorides. Often dental health education programs including dispensing “free” toothbrushes and fluoridated toothpaste are mentioned as an alternative to fluoridation. All of these programs can be beneficial but are not as cost-effective as fluoridation programs because they typically require additional personnel to facilitate the programs, action on the part of the recipient and have much higher administrative and supply costs. Additionally, these programs typically target only children and so do not provide decay preventing benefits to adults. Fluoridation benefits all members of the community — children and adults — and is more cost-effective.

The CDC’s “Health Impact in 5 Years” (HI-5) initiative<sup>11</sup> launched in 2016 highlights community-wide approaches that have evidence reporting 1) positive health impacts, 2) results in five years and 3) cost-effectiveness or cost savings over the lifetime of the population or earlier. Fluoridation is one of the community approaches included in the HI-5 Initiative as it has great potential to help keep people healthy as it reaches all members of a community where they live, learn, work, and play. Documenting the impact

of fluoridation can be challenging partially because the beneficial effect is not immediately apparent.<sup>12</sup> Cost savings from fluoridation would be expected to increase over several years' time. The most notable decrease in tooth decay would be anticipated in young children who received the benefits of fluoridation over their lifetime in both their primary teeth and as their adult teeth begin to appear when the children are approximately six years old. More immediate savings could be realized in recently fluoridated communities as children who had once received fluoride supplements would no longer require these prescriptions which are typically recommended for children from six months to 16 years of age, whose primary drinking water source is not fluoridated and have been determined to be at high risk for tooth decay.

Benefits from the prevention of tooth decay can include:

- freedom from dental pain
- a more positive self-image
- fewer missing teeth
- fewer cases of poorly aligned tooth aggravated by tooth loss
- fewer teeth requiring root canal treatment
- reduced need for crown, bridges, dentures and implants
- less time lost from school or work because of dental pain or visits to the dentist

While some of these types of benefits are difficult to measure economically, they are extremely important.<sup>13,14</sup>

Fluoridation remains the most cost-effective and practical form of preventing tooth decay in the United States and other countries with established municipal water systems. It is one of the very few public health measures that actually saves more money than it costs.<sup>13,15-17</sup>

## 69. Why fluoridate an entire water system when the vast majority of the water is not used for drinking?

### **Answer.**

**It is more practical and less costly to fluoridate an entire water supply than to attempt to treat only the water that will be consumed.**

### **Fact.**

Water systems treat all the water supplied to communities to the same high standards, for disinfection, clarity or fluoridation, whether the water is to be used for washing dishes, washing a car, watering lawns, preparing food or drinking. Although not all that water needs to be disinfected, clarified or fluoridated, it is more practical and cost efficient to treat all the water delivered to the customer to the same standard.

Fluoride is only one of more than 40 different chemicals/additives that can be used to treat water in the United States. Many are added for aesthetic or convenience purposes such as to improve the odor or taste, prevent natural cloudiness or prevent staining of clothes or porcelain.<sup>18</sup> The cost of additives for fluoridating a community's water supply is very low on a per capita basis; therefore, it is practical to fluoridate the entire water supply. It would be prohibitively expensive and impractical for a community to have two water systems — one that provided drinking water and another for all other water use (watering lawns, laundry, flushing toilets).

Many organizations that are concerned about water use, conservation and quality support the practice of water fluoridation. For example, the American Water Works Association, an international nonprofit scientific and educational association dedicated to the improvement of drinking water quality and supply, supports the practice of fluoridation of public water supplies.<sup>19</sup>



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*Fluoridation Facts* print copy,  
please visit [ADAcatalog.org](http://ADAcatalog.org).

## Fluoridation Facts

Fluoridation Facts contains answers to frequently asked questions regarding community water fluoridation. As ADA's premier resource on fluoridation, the booklet contains information regarding the latest scientific research in an easy to use question and answer format to assist policy makers and the general public in making informed decisions about fluoridation. Over 400 references are used to answer questions related to fluoridation's effectiveness, safety, practice and cost-effectiveness.

**J120**

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**RESOLUTION NO. 2025-XX**

**A RESOLUTION OF THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA, ORDERING AN END TO FLUORIDATION OF THE CITY OF NORTH MIAMI BEACH'S WATER; AUTHORIZING THE CITY MANAGER OR DESIGNEE TO DO ALL THINGS NECESSARY TO EFFECTUATE THIS RESOLUTION; PROVIDING FOR CONFLICTS; PROVIDING FOR SCRIVENER ERRORS, PROVIDING FOR SEVERABILITY; AND PROVIDING FOR AN EFFECTIVE DATE.**

**WHEREAS**, the City of North Miami Beach has long been adding fluoride to its municipal water, as have many other jurisdictions; and

**WHEREAS**, there is some controversy as to the safety of fluoridation of water; and

**WHEREAS**, the City Commission believes it is in the best interests of its citizens to order an end to fluoridation of the City of North Miami Beach's water.

**NOW, THEREFORE, BE IT RESOLVED BY THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA, THAT:**

**Section 1.** The foregoing whereas clauses are true and correct and adopted as the legislative and administrative findings of the City Commission and made a specific part of this Resolution; all exhibits attached hereto are made a specific part of this Resolution.

**Section 2.** The City Commission determines that the process of fluoridating the City of North Miami Beach's water should be discontinued immediately.

**Section 3.** The City Manager or designee is authorized to do all things necessary to effectuate this Resolution.

**Section 4.** All Resolutions or parts of Resolutions in conflict with this Resolution are repealed to the extent of such conflict.

**Section 5.** Any scrivener or typographical errors that do not affect intent may be corrected with notice to, and the authorization of the City Attorney and City Manager without further process.

**Section 6.** If any provision of this Resolution or the application thereof to any person or circumstance is held invalid, such invalidity shall not affect other provisions or applications of this Resolution that can be given effect without the invalid provision or application, and to this end the provisions of this Resolution are declared to be severable.

**RESOLUTION NO. 2025-XX**

**Section 7.** This Resolution shall take effect immediately upon adoption.

**APPROVED AND ADOPTED** by the City of North Miami Beach City Commission at the regular meeting assembled this \_\_\_ **day of January 2025**.

ATTEST:

\_\_\_\_\_  
ANDRISE BERNARD, MMC  
CITY CLERK

\_\_\_\_\_  
MICHAEL JOSEPH  
MAYOR

(CITY SEAL)

APPROVED AS TO FORM AND LEGAL SUFFICIENCY FOR THE USE  
AND RELIANCE OF THE CITY OF NORTH MIAMI BEACH ONLY:

GREENSPOON MARDER LLP

By: \_\_\_\_\_  
JOSEPH S. GELLER  
CITY ATTORNEYS

**RESOLUTION NO. 2025-XX**



**Legislation  
11.3.**

City of North Miami Beach  
17011 NE 19 Avenue  
North Miami Beach, FL 33162  
305-947-7581  
www.citynmb.com

**MEMORANDUM**

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<b>TO:</b>	Mayor and City Commission
<b>FROM:</b>	Samuel Zamacona, Public Works Director
<b>VIA:</b>	
<b>DATE:</b>	January 21, 2025

---

**RE:** Resolution No. R2025-18 Approving Task Order for Chen Moore and Associates for Engineering Services for Design of Traffic Calming Projects (Samuel Zamacona, Public Works Director)

---

**Description**

**BACKGROUND**

**ANALYSIS:**

**RECOMMENDATION:**

**FISCAL/ BUDGETARY**

**IMPACT:**

---

**ATTACHMENTS:**

**Description**

- Agenda Memo
- Chen Moore\_Resolution
- Chen Moore\_Exhibit A



**City of North Miami Beach**  
**17011 NE 19<sup>th</sup> Avenue**  
**North Miami Beach, FL 33162**  
**305-947-7581**  
**www.citynmb.com**

**MEMORANDUM**

**TO:** The Honorable Mayor and Commission  
**FROM:** Samuel Zamacona E.I., Public Works Director  
**VIA:** Mario Diaz, City Manager  
Shereece George, Chief Procurement Officer  
**DATE:** November 25, 2024  
**RE:** Resolution to Approve a Task Order for Engineering Services for Design of Traffic Calming Projects

---

On September 2024, the City Commission approved the FY25 Budget which included approximately \$3,250,315 Citywide Traffic Calming projects. Staff requests approval of task orders to Chen Moore & Associates for \$470,455 for the Design of five traffic calming projects.

The traffic calming projects support the city’s strategic plan for safe streets by reducing speeding and accidents. These projects were identified through various means: resident complaints, Police Department observations and traffic studies.

Please reference project details below:

**Requisition # 517: (\$67,540.00 for Design) – Pan Uleta – 651 NE 168th Streets**

- **Project Name:** Traffic Calming – Pan Uleta 651<sup>st</sup> NE 168th Streets
- **CIP Project No.:** NMB-F24-013
- **Scope of Work:** Design of Mini Roundabout
- **Budget (Design):** \$220,000 (LOGT, Approved in FY25 CIP Budget)
- **Benefit:** Reduce Speeding + Accident Occurrence
- **Background:** Study completed in FY24; Design approved FY25 CIP Budget. Construction FY26
- **Schedule:** Planning & Design 08/01/24 – 5/28/25, Bidding 06/03/25-09/03/25 and Construction 10/01/25-05/01/26 (pending approval of FY26 Budget).





## Requisition # 412: (\$69,675 for Design) - NE 163<sup>rd</sup>-165th St & 26th Ave

- **Project Name:** Traffic Calming - NE 165 ST and NE 26 AVE
- **CIP Project No.:** NMB-FY24-015
- **Scope of Work:**
  - Installation of a high visibility- raised mid-block crosswalk near the NE 26th Ave. and NE 165th Street intersection
  - Electronic speed feedback signs (ESFS) north of NE 165th St and north of NE 163rd Streets. Install 25 MPH Speed Signs.
  - Sidewalk along the west side of the section of 26th Ave from 165th Street to 163rd Street.
- **Budget (Design + Construction):** \$179,675 (CITT + LOGT, Approved in FY25 CIP Budget)
- **Benefit:** Reduce Speeding + Accident Occurrence + Pedestrian Safety
- **Background:** Study completed in FY24, Design and Construction approved FY25 CIP Budget.
- **Schedule:** Planning & Design 08/01/24 – 2/28/25, Bidding 03/03/25-07/03/25 and Construction 07/09/25-12/30/25. Electronic speed feedbacks signs pending FY26 approved budget.



## Requisition # 409: (\$61,600 for Design) - NE 180th St & 12th Ave

- **Project Name:** Traffic Calming - NE 180 ST and NE 12 AVE
- **CIP Project No.:** NMB-FY24-NMB-008-TRAFFIC
- **Scope of Work:** Installation of speed humps on 180th Street and signage
- **Budget (Design + Construction):** \$111,600 (CITT, Approved in FY25 CIP Budget)
- **Benefit:** Reduce Speeding + Accident Occurrence
- **Background:** Study completed in FY24, Design and Construction approved FY25 CIP Budget.
- **Schedule:** Planning & Design 08/01/24 – 2/28/25, Bidding 03/03/25-07/03/25 and Construction 07/09/25-12/30/25.





### Requisition # 635: (\$51,620 for Design) – NE 160-163 St & NE 9 Ct

- **Project Name:** Traffic Calming - NE 9 CT between 160 Ter-163 ST
- **CIP Project No.:** NMB-FY24-NMB-009-TRAFFIC
- **Scope of Work:** Installation of speed hump between NE 160th terrace and NE 163rd st. A crosswalk at the intersection of NE 160th Terrace with NE 9th Court.
- **Budget (Design):** \$74,040 (CITT, Approved in FY25 CIP Budget)
- **Benefit:** Reduce Speeding + Accident Occurrence
- **Background:** Study completed in FY24, Design approved FY25 CIP Budget.
- **Schedule:** Planning & Design 08/01/24 – 4/28/25, Bidding 05/01/25-08/01/25 and Construction 10/01/25-02/28/26 (pending FY26 approved budget).



### Requisition # 636: (\$150,165 for Design) - NE 13<sup>th</sup> Avenue Raised Intersections

- **Project Name:** Traffic Calming - NE 13<sup>th</sup> Avenue Raised Intersections
- **CIP Project No.:** NMB-FY24-NMB-005-TRAFFIC
- **Scope of Work:** Raised intersections at NE 153 St, NE 155 St & 157 St. Install 25 MPH Speed Signs
- **Budget (Design + Construction):** \$900,000 (CITT, Approved in FY25 CIP Budget)
- **Benefit:** Reduce Speeding + Accident Occurrence
- **Background:** Study completed in FY24, Design and Construction approved FY25 CIP Budget.
- **Schedule:** Planning & Design 08/01/24 – 4/1/25, Bidding 04/30/25-07/01/25 and Construction 08/01/25- 03/01/26.



## Requisition # 711: (\$69,855 for Design) - NE 2<sup>nd</sup> Avenue

- **Project Name:** Traffic Calming - NE 2<sup>nd</sup> Ave (2024)
- **CIP Project No.:** NMB-FY24-NMB-004-TRAFFIC
- **Scope of Work:** Raised intersections at NE 171<sup>st</sup> and 2<sup>nd</sup> Ave with crosswalk
- **Budget (Design):** \$70,000 (CITT, Approved in FY25 CIP Budget)
- **Benefit:** Reduce Speeding + Accident Occurrence
- **Background:** Design approved FY25 CIP Budget.
- **Schedule:** Planning & Design 08/01/24 – 8/1/25, Bidding 09/30/25-11/01/25 and Construction 01/10/26- 06/01/26.



**RESOLUTION NO. R2025--**

**A RESOLUTION OF THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA, APPROVING MULTIPLE TASK ORDERS FOR PROFESSIONAL ENGINEERING SERVICES FOR THE STUDY & DESIGN OF TRAFFIC CALMING PROJECTS IN AN ESTIMATED AMOUNT OF \$470,455.00, WITH CHEN MOORE AND ASSOCIATES UNDER THE “CONTINUING SERVICES AGREEMENT” FOR PROFESSIONAL CONSULTING SERVICES; AND AUTHORIZING THE CITY MANAGER OR DESIGNEE TO DO ALL THINGS NECESSARY TO EFFECTUATE THIS RESOLUTION; PROVIDING FOR CONFLICTS; AND SUBJECT TO THE BUDGET APPROPRIATION AND AVAILABILITY OF FUNDS; AND PROVIDING FOR AN EFFECTIVE DATE.**

**WHEREAS**, pursuant to Chapter 166, Florida Statutes and Section 1.4 of the Charter of the City of North Miami Beach (“City”), the City shall have all available governmental, corporate, and proprietary powers and may exercise them except when prohibited by law; and

**WHEREAS**, on July 21, 2020, the City Commission approved Resolution R2020-62 for RFQ 19-082-MC “Continuing Services Agreement for Architectural/Engineering, Landscape Architect and Surveying Services.” Subsequently, the City executed agreements with the ranked firms that met the qualifications and provided firm pricing under the solicitation specifications – including an agreement with Chen Moore and Associates (“Chen Moore”) on December 21, 2020, for a term of three (3) years, with two, one (1) year options to renew (“Continuing Services Agreement”). The second renewal year has been executed through December 21, 2025; and

**WHEREAS**, the Public Works Department is requesting professional engineering services for study and design of Traffic Calming project via multiple Task Orders with Chen Moore in an estimated amount of \$470,455.00, utilizing CITT and CIP approved budgeted expenditure; and

**WHEREAS**, Section 3-3.14 of the Code of Ordinances City of North Miami Beach, Florida, 2008 (“Code”) provides that contracts more than fifty thousand dollars (\$50,000.00) shall be awarded by the City Commission; and

**WHEREAS**, the City Manager and the Chief Procurement Officer recommend that the City Commission approve and authorize the City Manager or designee to approve multiple Task Orders with Chen Moore in the amount of \$470,455.00 for Traffic Calming projects; and

**WHEREAS**, the Mayor and City Commission believe it is in the best interests of the City to authorize the City Manager or designee to approve multiple Task Orders with Chen Moore and Associates and execute purchase orders in the budgeted amount of \$470,455.00 for Traffic Calming projects.

**NOW, THEREFORE, BE IT RESOLVED BY THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA:**

**Section 1.** The foregoing whereas clauses are true and correct and adopted as the legislative and administrative findings of the City Commission and made a specific part of this Resolution; all exhibits attached hereto are made a specific part of this Resolution.

**Section 2.** The Task Orders with Chen Moore and Associates in the amount of \$470,455.00 for the Traffic Calming projects, in substantially the form attached as Exhibit “A,” is approved and the City Manager or designee is authorized to issue purchase orders and execute the Task Order on behalf of the City.

**Section 3.** The City Manager or designee is authorized to do all things necessary to effectuate this Resolution.

**Section 4.** All Resolutions or parts of Resolutions in conflict with this Resolution are repealed to the extent of such conflict.

**Section 5.** Any scrivener or typographical errors that do not affect intent may be corrected with notice to, and the authorization of the City Attorney and City Manager without further process.

**Section 6.** If any provision of this Resolution or the application thereof to any person or circumstance is held invalid, such invalidity shall not affect other provisions or applications of this Resolution that can be given effect without the invalid provision or application, and to this end the provisions of this Resolution are declared to be severable.

**Section 7.** This Resolution shall take effect immediately upon adoption.

**APPROVED AND ADOPTED** by the City of North Miami Beach City Commission at the regular meeting assembled this **21<sup>st</sup> day of January 2025.**

ATTEST:

\_\_\_\_\_  
ANDRISE BERNARD, MMC  
CITY CLERK

\_\_\_\_\_  
MICHAEL JOSEPH  
MAYOR

(CITY SEAL)

APPROVED AS TO FORM AND LEGAL SUFFICIENCY FOR THE USE  
AND RELIANCE OF THE CITY OF NORTH MIAMI BEACH ONLY:

GREENSPOON MARDER, LLP.

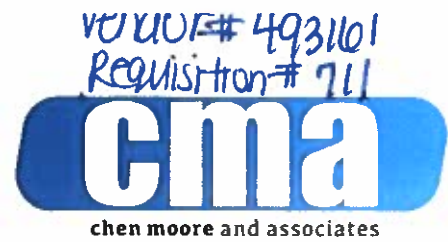
By: \_\_\_\_\_

CITY ATTORNEYS

Sponsored by: Mayor & Commission

# EXHIBIT A

3150 SW 38<sup>th</sup> Avenue, Suite 950  
Miami, FL 33146  
Office: +1 (786) 497-1500



November 3, 2022 (Revised 11/22/2024)

SENT VIA E-MAIL (samuel.zamacona@citynmb.com)

Mr. Samuel Zamacona  
City of North Miami Beach – Public Works  
17050 NE 19th Avenue  
North Miami Beach, FL 33162

**Subject: City of North Miami Beach – NE 2<sup>nd</sup> Ave & 171<sup>st</sup> St Raised Intersection  
Agreement No.19-082-MC  
CMA Proposal No. 22-0083.P0001-014**

Dear Mr. Zamacona:

Chen Moore and Associates (CMA) is pleased to submit the attached Agreement for Professional Services and Scope of Services to assist your team with the civil engineering services for the above-referenced project.

## PROJECT INTRODUCTION

It is CMA's understanding that the City of North Miami Beach (NMB) has received complaints of speeding motorists along NE 2<sup>nd</sup> Avenue between NE 167<sup>th</sup> Street and NE 171<sup>st</sup> Street from area residents. A subsequent traffic study was performed by CALTRAN Engineering Group, Inc (CALTRAN) for this area which resulted in the recommendation to install a raised intersection at NE 171<sup>st</sup> Street as a means of traffic calming along the corridor. Given this, NMB now wants to proceed with the recommended installation of the raised intersection and speed hump to improve pedestrian safety in this area and address residents' concerns.

CMA shall provide the civil engineering, geotechnical engineering, and topographic surveying to design, permit, and periodically observe the construction of these improvements per the request of NMB. Note that this work is anticipated to conform with the allowable traffic calming measures listed in the Intergovernmental Agency Agreement to Perform Traffic Engineering Functions between NMB and Miami-Dade County Department of Transportation and Public Works (DTPW).

## PROJECT STAFFING

Our staff and team are ready and prepared to work on this project. Chen Moore staff project roles shall be as follows:

Principal – Peter Moore, P.E. – President and CEO  
Project Director – Gregory Mendez, P.E.  
Project Manager – G. Ben Lehr, P.E.  
Project Engineer – Madeline Batey, P.E.  
Designer – Joseph Hall  
Construction Specialist – Robert Guttman

Subconsultants:

- Longitude Surveyors – Topographic Survey
- PanGeo Consultants – Geotechnical Exploration

**SCOPE OF SERVICES**

The scope of services our firm shall provide as per our recent discussions is as follows:

**Task 1 – Site Reconnaissance and Data Gathering**

- Consultant shall obtain a Sunshine One Call of Florida design ticket to identify existing utilities within the project area.
- Consultant shall coordinate with utilities identified in the design ticket to obtain as-built plans, GIS maps, and/or other available information for existing utilities in the project area.
- Consultant shall perform a site visit to observe existing conditions of the project area.
- Through our subconsultant, we shall perform geotechnical exploration including:
  - One boring to a depth of 15-ft with Standard Penetration Tests (SPTs).
  - One percolation test conforming to the standards of the South Florida Water Management District (SFWMD).
  - Generation of a report summarizing findings and providing recommendations for pavement sections.
- Through our subconsultant, we shall complete a topographic survey of the project area with the following scope:
  - Limits including the ROWs in and adjacent to NE 2nd Ave at the intersection with NE 171<sup>st</sup> Street and extending approximately 200-LF in each direction away from the intersection.
  - Identification of boundary information (ROW lines, centerlines, easements, etc.).
  - Topographic information shall include:
    - Identification of all above ground features including but not limited to curbs, roads, driveways (including material), manholes, inlets, pullboxes, striping, poles, sidewalks, lights, signs, valves, building walls, trees, vegetation, and above ground utilities.
    - Labeling of all house numbers/folios/easements/dedications.
    - Spot elevations in NGVD 29 datum at a maximum 25-foot grid with additional elevations to identify all grade changes and features of interest. Spot elevations along roads shall identify inverted crown of road, edge of pavement, back of curb, driveway at ROW line, toe of slope, top of bank, etc.
    - Rim elevations, invert elevation, invert direction, invert material, invert diameter, and bottom of structure elevations for all sanitary sewer and stormwater manholes and inlets.
    - Existing roadway striping and street signs type labels.
    - Area extending 10-ft beyond the ROW where feasible.
- Consultant shall review survey, as-builts from local utilities and field verify locations as site accessibility permits.



## **Task 2 – Construction Documents**

### *50% Design*

- Consultant shall attend up to two (2) meetings with the Client; additional meetings beyond this number shall be performed on an hourly basis at the written direction of the Client.
- Consultant shall develop roadway and sidewalk layouts for the proposed raised intersection following local practices and requirements.
- Consultant shall analyze impacts of the improvements to the existing drainage system and propose modifications/improvements as required.
- Consultant shall prepare 50% Construction Document level plans which are anticipated to include existing conditions and demolition, paving and grading, drainage, and signage and marking plans with associated cross-sections for the purpose of Client review.
- Consultant shall generate an Engineer's Opinion of Probable Construction Cost for the proposed improvements upon request.

### *100% Design*

- Consultant shall attend up to two (2) meetings with the Client; additional meetings beyond this number shall be performed on an hourly basis at the written direction of the Client.
- Consultant shall review and implement comments received on 50% Construction Documents design submittal.
- Consultant shall develop stormwater management calculations (water quality, water quantity, and attenuation) and reports as required.
- Consultant shall prepare 100% Construction Document level plans which are anticipated to include existing conditions and demolition, paving and grading, drainage, signage and marking, and stormwater pollution prevention plans with associated notes and details for the purpose of project permitting and construction.
- Consultant shall finalize the Engineer's Opinion of Probable Construction Cost for the proposed improvements based on the final design upon request.

## **Task 3 – Government Permitting Assistance**

- Upon Client authorization, Consultant shall attend permit pre-application meetings with the following agencies:
  - Miami-Dade County Regulatory and Economic Resources Department of Environmental Resources Management (RER-DERM)
- Consultant shall prepare and submit permit applications related to civil engineering. The agencies having jurisdiction (AHJ) of requiring government permitting are anticipated to be:
  - City of North Miami Beach Public Works
  - RER-DERM Water Control Section
  - Miami-Dade County Department of Transportation and Public Works (DTPW)
- Consultant shall review and respond AHJ comments and revise plans, as applicable.
- Additional AHJ submittals are not anticipated for civil engineering. If required, they may be performed via an additional service agreement.
- The approved plans are considered to be the final construction documents. Preparation of additional plan sets or Client-requested changes following approval of the permits listed above may be performed via an additional service agreement.



**Task 4 – Bid & Award Support**

- Consultant shall prepare responses to questions from bidders for the scope of work in this proposal.
- Consultant shall review bids and respond to contractor questions on the work.
- This task includes up to two (2) meetings with the Client and/or Bidder.

**Task 5 – Limited Construction Administration**

- Preconstruction:
  - Consultant shall attend a pre-construction conference as arranged by the contractor.
  - Consultant shall review shop drawing submittals (a total of five submittal package reviews are included).
- Construction Observation:
  - Consultant shall review and respond to Contractor RFIs.
  - Consultant shall perform up to two (2) field visits for the purpose of observing the installation of the project, including the preparation of a daily report of construction.
  - Additional visits beyond this number shall be performed on an hourly basis at the written direction of the Client.
- Certification and Closeout
  - Consultant shall attend up to one (1) substantial completion walkthrough for the purpose of generating a closeout punch list.
  - Consultant shall review Contractor-provided signed and sealed as-builts.
  - Consultant shall attend up to one (1) final walkthrough for the purpose of verifying closeout punch list items have been addressed.
  - Consultant shall sign and submit certifications of completion of civil engineering components, as required.

**The basis for the above scope of services and associated fee(s) are based on the following:**

- Project shall be completed in one phase.
- Consultant assumes that previously prepared traffic study for this project (by Caltran) shall be sufficient to permit the impact of this project to area traffic operations per the executed Intergovernmental Agency Agreement to Perform Traffic Engineering Functions between the City of North Miami Beach and Miami-Dade County Department of Transportation and Public Works.
- If any utilities (potable water, sanitary sewer, stormwater, etc.) or roadway improvements not explicitly included in this agreement are required, they shall be rendered as an Additional Service.
- Drainage analysis shall only be for work within the project limits. Should additional drainage analysis work be required for other portions of the onsite or offsite systems, this work shall be rendered as an Additional Service.
- Franchise utility (such as FPL, telecom, and natural gas) relocation and/or service design shall be by others.
- All notes and specifications needed to construct project shall be provided in the plans.
- Site and street lighting, landscape architecture, irrigation, and environmental engineering services are not included in this proposal.
- It is assumed that there are no environmental concerns within the subject project area.
- Contractor to obtain any necessary NPDES NOI permits.
- Contractor to prepare Maintenance of Traffic (MOT) plans and submit for MOT permits from the necessary regulatory agencies.

3150 SW 38<sup>th</sup> Avenue, Suite 950  
 Miami, FL 33146  
 Office: +1 (786) 497-1500



- Contractor to prepare any dewatering plans and obtain dewatering permits as necessary to construct the project.
- Contractor to obtain right-of-way permits for the necessary regulatory agencies for construction.
- Contractor shall submit "rock" as-builts prior to installing pavement surface.
- Contractor shall provide as-builts signed and sealed by a Florida licensed professional surveyor and mapper for consultant review prior to construction close-out.
- Proposal assumes attendance to limited field meetings and inspections. Attendance to regular owner/contractor meetings during construction shall be rendered as an additional service.
- Plan revisions required by permitting authorities after issuance of permit/during construction are not included. If required, such revisions shall be performed on an hourly basis.

**Information to be provided by the Client:**

- Filing and permit application fees, review fees, impact fees or any other associated assessments by other governments/agencies.
- Copies of all relevant data, including correspondence, traffic reports, plans or information in Client's possession which may be beneficial to the work effort performed by Consultant.
- An official City Purchase Order for this work.

**SCHEDULE AND FEES**

Consultant shall schedule work upon receipt of purchase order and official notice to proceed (NTP) for this project. Per discussions with your team, the goal is to start immediately upon official authorization from the City. The anticipated durations of each task are shown in the table below.

<b>TASK</b>	<b>DESCRIPTION</b>	<b>DURATION</b>
Task 1	Site Reconnaissance & Data Gathering	6 Weeks
Task 2	Construction Documents	
	50% Design	8 Weeks
	<i>Client/Owner Review</i>	2 Weeks
	100% Design	6 Weeks
	<i>Client/Owner Review</i>	2 Weeks
	Final Plans	1 Week
Task 3	Government Permitting Assistance	12 Weeks*
		(Concurrent with 100% Design)
Task 4	Bid and Award Support	12 Weeks
Task 5	Limited Construction Administration	12 Weeks*
		<b>Total: 43 Weeks</b>

\* Permitting and construction durations shown above are estimated and may vary due to factors beyond CMA's control.

The total lump sum fee for this project will be divided as follows:

<b>Task(s)</b>	<b>Task Description</b>	<b>Lump Sum Fees</b>
Task 1	Site Reconnaissance & Data Gathering	\$2,480.00
Task 2	Construction Documents	\$34,500.00
Task 3	Government Permitting Assistance	\$5,330.00

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Miami, FL 33146  
Office: +1 (786) 497-1500



Task 4	Bid and Award Support	\$3,420.00
Task 5	Limited Construction Administration	\$11,020.00
<b>SUBTOTAL</b>		<b>\$56,750.00</b>
	Reimbursables Allowance	\$1,000.00
	Topographic Survey – Longitude Surveyors	\$7,045.00
	Geotechnical Exploration – PanGeo Consultants	\$5,060.00
<b>PROJECT TOTAL</b>		<b>\$69,855.00</b>

Reimbursable expenses for mileage and report preparation have been included in the lump sum fees noted above. Additional reimbursable expenses requested by the Client outside of the items for the tasks above, including delivery of additional copies of items shall be invoiced as defined in our Professional Services Agreement for General Engineering Services.

This proposal is based on our understanding of the requirements for civil engineering and surveying services as itemized under the anticipated tasks listed above. Accordingly, we reserve the right to modify this proposal due to any changes in scope.

Should you have any questions, please do not hesitate to contact me at my office at (813) 896-0286 or my cell phone at (904) 707-7724 or send me an electronic message at [blehr@chenmoore.com](mailto:blehr@chenmoore.com).

Respectfully submitted,

CHEN MOORE AND ASSOCIATES  
G. Benjamin Lehr, P.E.  
Project Manager

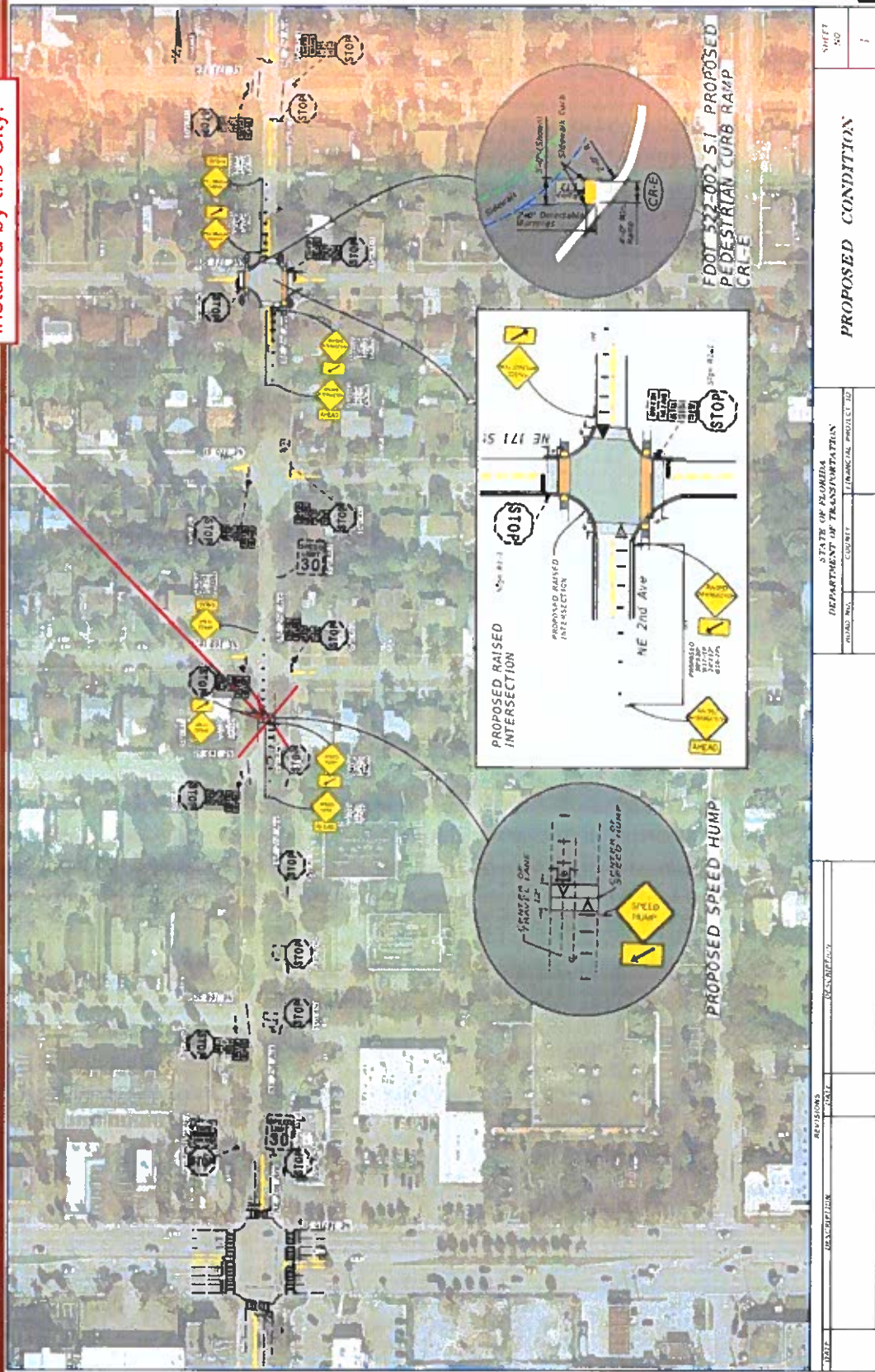
GBL/GAM

Cc: Gregory A. Mendez, P.E., Chen Moore and Associates  
Jose L. Acosta, P.E., F. ASCE, Chen Moore and Associates



**North Miami Beach – Traffic Calming**

Not included in this scope of work, Speed hump previously installed by the City.



**Figure 4. Proposed Recommendation**

November 2, 2022

Mr. Nicholas S. Karpathy, P.E., ENV SP, Senior Engineer  
CHEN MOORE AND ASSOCIATES  
3150 SW 38<sup>th</sup> Ave, Suite 950  
Miami, FL 33146  
O: +1 (786) 497-1500, Ext. 1157  
Email: [nkarpathy@chenmoore.com](mailto:nkarpathy@chenmoore.com)

Re: Proposal/Agreement for Additional Geotechnical Exploration Services  
Proposed Raised Intersection  
Intersection of NE 2<sup>nd</sup> Ave & NE 171<sup>st</sup> St.  
North Miami Beach, FL

Dear Mr. Karpathy:

Pan Geo Consultants (PGC) is pleased to present this proposal/agreement for performing geotechnical engineering services at the referenced project.

Based on our communication with you, we understand the city is looking to install a raised intersection and crosswalk as a means of traffic calming in the neighborhood.

Based on your request for proposal and our understanding of the project, we propose the following scope of work and fee schedule.

#### **SCOPE OF WORK**

We propose to perform one (1) Standard Penetration Test (SPT) boring in general accordance with ASTM D-1586 specifications to a depth of 15 ft and one (1) exfiltration test in general accordance with SFWMD specifications to 15 ft. At the completion of the on-site work, the soil samples will be returned to our laboratory. We will provide an engineering report including a description of our findings and general site preparation and design recommendations for support of the proposed construction. In order to provide information concerning the engineering properties of the soils encountered, it is anticipated that tests may be performed to determine natural water content, organic content, and sieve analysis on representative soil samples collected from the field. The engineering report will include graphic logs of the test borings and a test boring location plan. We assume the site is accessible to truck mounted

drilling equipment and that underground utilities will be cleared by others prior to our performing the on-site work.

## FEE SCHEDULE

The above-indicated scope of work will be performed for an estimated cost of \$2,507.50 – \$4,207.50 based on the following rates and quantities:

<u>Description</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Subtotal</u>
Project Engineer	6 hours	\$110.00/ hour	\$660.00
Registered Professional Engineer	2 hours	\$130.00/ hour	\$260.00
Drafting/ Clerical Services	2 hours	\$55.00/ hour	\$110.00
Senior Technician	4 hours	\$75.00/ hour	\$300.00
Mobilization (Equipment/ Crew)	1 each	\$350.00	\$350.00
Soil Test Borings (ASTM D-1586)*	15 linear feet	\$14.50/ l.f.	\$210.00
Setting 3-inch Casing	15 linear feet	\$4.50/l.f.	\$67.50
SFWMD Exfiltration Testing	1 test	\$450.00	\$450.00
Laboratory Testing	Lump		\$150.00
<i>Permit (if needed)</i>	<i>Lump</i>		<i>\$1000.00</i>
<i>MOT (if needed)</i>	<i>Lump</i>		<i>\$700.00</i>

\*If loose or deleterious soil is encountered it may be necessary to extend the soil boring(s).

We currently anticipate starting this work within approximately four business days of receiving written authorization to proceed and 50% deposit. The on-site work should take approximately 2 days to complete. The geotechnical report, including 2 days for laboratory testing, should be available within approximately 10 business days after the on-site work is completed.

The cost estimated provided is based on our understanding of the expected project requirements PGC will only charge for the work performed and will not exceed the estimated cost without prior written approval from you.

# PANGEO

CONSULTANTS

GEOTECHNICAL ENGINEERING AND INSPECTIONS

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We appreciate the opportunity to be selected for performing geotechnical engineering on this project. Should you have any questions, please contact the undersigned at your convenience.

Respectfully submitted,  
**Pan Geo Consultants**

Paul C. Catledge, P.E.  
Principal

Reports and invoices will be addressed to the client as listed below unless other instructions are provided in writing with this executed proposal. The undersigned, as an authorized representative of the entity listed below, approves this proposal and agrees to be bound by the terms and conditions contained in this proposal. We note that our terms are net thirty days. Any invoices over thirty days will be assessed a 1 1/2 percent service charge. If you are a first time client, we request that the fee for these services be paid at the time of report completion. Once your account is established, we will bill you on an invoice basis.

SIGNATURE: \_\_\_\_\_ DATE: \_\_\_\_\_

PRINT NAME: \_\_\_\_\_ TITLE: \_\_\_\_\_

COMPANY NAME: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

\_\_\_\_\_

PHONE: \_\_\_\_\_ FAX: \_\_\_\_\_

EMAIL: \_\_\_\_\_

#### General Terms and Conditions

For the purpose of this project, the addressee of this proposal will be known as the Client. The client is expected to furnish PAN GEO CONSULTANTS,LLC (PGC), with accurate information including sketch of survey and/or site plan, construction drawings/specifications as appropriate, details of proposed construction including the proposed structural system and loads or existing construction problem information and site accessibility information as appropriate. Other information requirements may be detailed in the enclosed proposal. IF ANY CONDITIONS CHANGE such as building layout, loading, project specifications/design, or unusual site conditions are observed, PGC should be notified immediately in writing about the changed condition for possible review and comment. Should the Client wish to impose other conditions and requirements beyond those contained in this proposal such as in a separate contract, we reserve the option to modify contract language, fee amounts, to remove our proposal from consideration or other measures as may be indicated.

---

**PANGEO CONSULTANTS**  
8258 West SR 84, Davie, FL  
Phone: 954 200 4019  
Email: info@pangeoconsult.com





Thursday, December 12, 2024

Mr. G. Benjamin Lehr, PE, DBIA, LEED AP  
Director - Transportation  
[blehr@chenmoore.com](mailto:blehr@chenmoore.com)



450 Carillon Parkway, Suite 210  
St. Petersburg, FL 33716  
904.707.7724

**RE:** Surveying and Mapping services for the 'Raised Intersection Project' located at the intersection of Northeast 2 Avenue and Northeast 171 Street within North Miami Beach, FL 33162.

Dear Mr. Lehr,

According to your request regarding a fee estimate for Surveying and Mapping services for the above-referenced project, LONGITUDE SURVEYORS, LLC (LS) is pleased to submit the following proposal for your consideration.

**A. SCOPE OF WORK – TOPOGRAPHIC SURVEY:**

- LS will show rights-of-way computing field evidence, plats, deeds, and other documentation relative to the project. Lot lines and ownership lines, including locations, bearings, and dimensions, within the survey limits will be shown graphically.
- LS will show any easements, covenants, restrictions, etc., found on plats, deeds, and other public records relative to the project. However, without a Title Commitment or Title Search, there is no guarantee that easements, covenants, restrictions, etc., will be shown on the survey.
- LS will establish horizontal and vertical control within the limits of the survey.
- The survey will be geo-referenced to the Florida State Plane Coordinate System based on the North American Datum of 1983/2011 (NAD83/11).
- Elevations will be referenced to the National Geodetic Vertical Datum of 1929 (NGVD29).
- LS will collect significant aboveground improvements, including, but not limited to, pavement, edge of pavement lines, pavement markings, curb and gutters, sidewalks, driveways (including material), fences and gates, walls, buildings, concrete slabs, ramps, signs, manholes, catch basins, fire hydrants, bollards, utility boxes, utility poles, and any other significant aboveground improvements and utilities within the survey limits.
- LS will locate trees and palms that have a three (3) inch diameter or greater at breast height (DBH) or are twelve (12) feet in height or more significant. Tree identification and/or a tree table will not be provided.
- Elevations equivalent to a twenty-five (25) foot grid will be collected throughout the survey limits. Additional elevations will be collected to identify grade changes and features of interest within the survey limits.
- LS will collect existing drainage and sanitary structures and show rim elevation, structure bottom elevation, pipe size, pipe material, pipe direction, direction of water flow, and inverts. *Please Note: LS requests that the Client contact the corresponding city/department where the survey will be performed to ensure the structures are cleaned correctly. Alternatively, the Client may provide a contact for the city/department so that LS can reach out directly to have them cleaned before the commencement of any work.*
- A Digital Terrain Model (DTM) of the resulting survey will not be provided.

**B. SURVEY LIMITS:**

The 'Raised Intersection Project' located at the intersection of Northeast 2 Avenue and Northeast 171 Street within North Miami Beach, FL 33162, FL 33162. Limits to extend approximately ten (10) feet past the public right-of-way and approximately one hundred (100) feet past the point of curvature/point of tangency of intersecting roadways, as per the attached Exhibit.





**C. DELIVERABLES:**

LS will provide a digitally signed and sealed PDF and a Civil 3D CAD file of the resulting survey. Signed and sealed hard copies can be provided upon request.

**D. TIME & COST:**

The total professional fee to complete the **Scope of Work** described herein shall be a lump sum of **\$7,045.00**. LS has an estimated twelve (12) business days from the date of the Notice to Proceed (NTP) to complete these tasks. Notice to Proceed (NTP) is considered adequate twenty-four (24) hours after this proposal agreement has been executed and returned to the undersigned.

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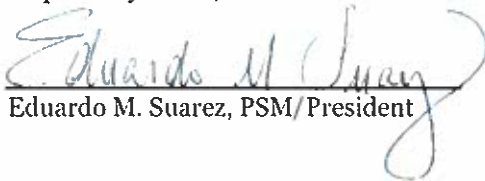
I agree that by signing below, "I APPROVE AND ACCEPT," this proposal is a legally binding contract.

By: \_\_\_\_\_ Date: \_\_\_\_\_  
(Authorized Signature)

\_\_\_\_\_  
(Typed or printed name) Title: \_\_\_\_\_

On behalf of the firm, I thank you for the opportunity to present this proposal. We look forward to utilizing our best professional efforts on your behalf on this very important project.

Respectfully Yours,

  
Eduardo M. Suarez, PSM/President



NE 2nd Ave & 171st St

Legend

NE 2nd Ct

NE 171 ST

NE 2 AVE

NE 173 ST

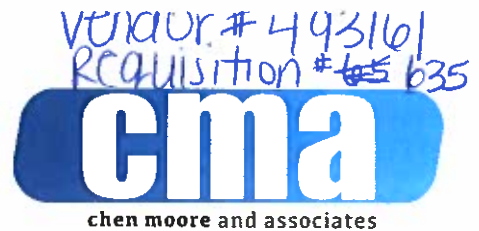
200 ft

Google Earth





3150 SW 38<sup>th</sup> Avenue, Suite 950  
Miami, FL 33146  
Office: +1 (786) 497-1500



November 22, 2024

SENT VIA E-MAIL (samuel.zamacona@citynmb.com)

Mr. Samuel Zamacona  
City of North Miami Beach – Public Works  
17050 NE 19th Avenue  
North Miami Beach, FL 33162

**Subject: City of North Miami Beach – NE 9<sup>th</sup> Court, NE 160<sup>th</sup> Street to NE 163<sup>rd</sup> Street Traffic Calming Agreement No.19-082-MC CMA Proposal No. 24-0083.P0001-003**

Dear Mr. Zamacona:

Chen Moore and Associates (CMA) is pleased to submit the attached Agreement for Professional Services and Scope of Services to assist your team with the civil engineering services for the above-referenced project.

#### **PROJECT INTRODUCTION**

It is CMA's understanding that the City of North Miami Beach (NMB) has received complaints of speeding motorists along NE 9<sup>th</sup> Court between NE 160<sup>th</sup> Street and NE 163<sup>rd</sup> Street from area residents. A subsequent traffic study was performed by CALTRAN Engineering Group, Inc (CALTRAN) for this area which resulted in the recommendation to install a speed hump between NE 160<sup>th</sup> Terrace and NE 163<sup>rd</sup> Street as a means of traffic calming along the corridor. Additionally, it was recommended to improve the curb ramps at NE 160<sup>th</sup> Terrace and add crosswalk pavement markings and signage at this intersection. Given this, NMB now wants to proceed with these recommendations to reduce speeding and improve pedestrian safety in this area and address residents' concerns.

CMA shall provide the civil engineering, geotechnical engineering, and topographic surveying to design, permit, and periodically observe the construction of these improvements per the request of NMB. Note that this work is anticipated to conform with the allowable traffic calming measures listed in the Intergovernmental Agency Agreement to Perform Traffic Engineering Functions between NMB and Miami-Dade County Department of Transportation and Public Works (DTPW).

#### **PROJECT STAFFING**

Our staff and team are ready and prepared to work on this project. Chen Moore staff project roles shall be as follows:

Principal – Peter Moore, P.E. – President and CEO  
Project Director – Gregory Mendez, P.E.  
Project Manager – G. Ben Lehr, P.E.  
Project Engineer – Madeline Batey, P.E.  
Designer – Joseph Hall  
Construction Specialist – Robert Guttman

[www.chenmoore.com](http://www.chenmoore.com)

GITT2412

Subconsultants:

Longitude Surveyors – Topographic Survey

### **SCOPE OF SERVICES**

The scope of services our firm shall provide as per our recent discussions is as follows:

#### **Task 1 – Site Reconnaissance and Data Gathering**

- Consultant shall obtain a Sunshine One Call of Florida design ticket to identify existing utilities within the project area.
- Consultant shall coordinate with utilities identified in the design ticket to obtain as-built plans, GIS maps, and/or other available information for existing utilities in the project area.
- Consultant shall perform a site visit to observe existing conditions of the project area.
- Through our subconsultant, we shall complete a topographic survey of the project area with the following scope:
  - Limits including the ROWs in and adjacent to NE 9<sup>th</sup> Court between NE 160<sup>th</sup> Street and NE 163<sup>rd</sup> Street extending approximately 200-LF west of the center of the intersection with NE 160<sup>th</sup> Terrace.
  - Identification of boundary information (ROW lines, centerlines, easements, etc.).
  - Topographic information shall include:
    - Identification of all above ground features including but not limited to curbs, roads, driveways (including material), manholes, inlets, pullboxes, striping, poles, sidewalks, lights, signs, valves, building walls, trees, vegetation, and above ground utilities.
    - Labeling of all house numbers/folios/easements/dedications.
    - Spot elevations in NGVD 29 datum at a maximum 25-foot grid with additional elevations to identify all grade changes and features of interest. Spot elevations along roads shall identify inverted crown of road, edge of pavement, back of curb, driveway at ROW line, toe of slope, top of bank, etc.
    - Rim elevations, invert elevation, invert direction, invert material, invert diameter, and bottom of structure elevations for all sanitary sewer and stormwater manholes and inlets.
    - Existing roadway striping and street signs type labels.
    - Area extending 10-ft beyond the ROW where feasible.
- Consultant shall review survey, as-builts from local utilities and field verify locations as site accessibility permits.

#### **Task 2 – Construction Documents**

##### *50% Design*

- Consultant shall attend up to two (2) meetings with the Client; additional meetings beyond this number shall be performed on an hourly basis at the written direction of the Client.
- Consultant shall develop roadway and sidewalk layouts for the proposed curb ramps and sidewalk extensions needed at NE 160<sup>th</sup> Terrace.
- No impacts to the existing drainage system are anticipated.

- Consultant shall prepare 50% Construction Document level plans which are anticipated to include existing conditions and demolition, paving and grading, , and signage and marking plans for the purpose of Client review.
- Consultant shall generate an Engineer's Opinion of Probable Construction Cost for the proposed improvements upon request.

*100% Design*

- Consultant shall attend up to two (2) meetings with the Client; additional meetings beyond this number shall be performed on an hourly basis at the written direction of the Client.
- Consultant shall review and implement comments received on 50% Construction Documents design submittal.
- Consultant shall develop stormwater management calculations (water quality, water quantity, and attenuation) and reports as required.
- Consultant shall prepare 100% Construction Document level plans which are anticipated to include existing conditions and demolition, paving and grading, signage and marking, and stormwater pollution prevention plans with associated notes and details for the purpose of project permitting and construction.
- Consultant shall finalize the Engineer's Opinion of Probable Construction Cost for the proposed improvements based on the final design upon request.

**Task 3 – Government Permitting Assistance**

- Upon Client authorization, Consultant shall attend permit pre-application meetings with the following agencies:
  - Miami-Dade County Regulatory and Economic Resources Department of Environmental Resources Management (RER-DERM)
- Consultant shall prepare and submit permit applications related to civil engineering. The agencies having jurisdiction (AHJ) of requiring government permitting are anticipated to be:
  - City of North Miami Beach Public Works
  - RER-DERM Water Control Section
  - Miami-Dade County Department of Transportation and Public Works (DTPW)
- Consultant shall review and respond AHJ comments and revise plans, as applicable.
- Additional AHJ submittals are not anticipated for civil engineering. If required, they may be performed via an additional service agreement.
- The approved plans are considered to be the final construction documents. Preparation of additional plan sets or Client-requested changes following approval of the permits listed above may be performed via an additional service agreement.

**Task 4 – Bid & Award Support**

- Consultant shall prepare responses to questions from bidders for the scope of work in this proposal.
- Consultant shall review bids and respond to contractor questions on the work.
- This task includes up to two (2) meetings with the Client and/or Bidder.

**Task 5 – Limited Construction Administration**

- Preconstruction:
  - Consultant shall attend a pre-construction conference as arranged by the contractor.

- Consultant shall review shop drawing submittals (a total of five submittal package reviews are included).
- Construction Observation:
  - Consultant shall review and respond to Contractor RFIs.
  - Consultant shall perform up to one (1) field visit for the purpose of observing the installation of the project, including the preparation of a daily report of construction.
  - Additional visits beyond this number shall be performed on an hourly basis at the written direction of the Client.
- Certification and Closeout
  - Consultant shall attend up to one (1) substantial completion walkthrough for the purpose of generating a closeout punch list.
  - Consultant shall review Contractor-provided signed and sealed as-builts.
  - Consultant shall attend up to one (1) final walkthrough for the purpose of verifying closeout punch list items have been addressed.
  - Consultant shall sign and submit certifications of completion of civil engineering components, as required.

**The basis for the above scope of services and associated fee(s) are based on the following:**

- Project shall be completed in one phase.
- Consultant assumes that previously prepared traffic study for this project (by CALTRAN) shall be sufficient to permit the impact of this project to area traffic operations per the executed Intergovernmental Agency Agreement to Perform Traffic Engineering Functions between the City of North Miami Beach and Miami-Dade County Department of Transportation and Public Works.
- If any utilities (potable water, sanitary sewer, stormwater, etc.) or roadway improvements not explicitly included in this agreement are required, they shall be rendered as an Additional Service.
- Drainage analysis shall only be for work within the project limits. Should additional drainage analysis work be required for other portions of the onsite or offsite systems, this work shall be rendered as an Additional Service.
- Franchise utility (such as FPL, telecom, and natural gas) relocation and/or service design shall be by others.
- All notes and specifications needed to construct project shall be provided in the plans.
- Site and street lighting, landscape architecture, irrigation, and environmental engineering services are not included in this proposal.
- It is assumed that there are no environmental concerns within the subject project area.
- Contractor to obtain any necessary NPDES NOI permits.
- Contractor to prepare Maintenance of Traffic (MOT) plans and submit for MOT permits from the necessary regulatory agencies.
- Contractor to prepare any dewatering plans and obtain dewatering permits as necessary to construct the project.
- Contractor to obtain right-of-way permits for the necessary regulatory agencies for construction.
- Contractor shall submit "rock" as-builts prior to installing pavement surface.
- Contractor shall provide as-builts signed and sealed by a Florida licensed professional surveyor and mapper for consultant review prior to construction close-out.
- Proposal assumes attendance to limited field meetings and inspections. Attendance to regular owner/contractor meetings during construction shall be rendered as an additional service.
- Plan revisions required by permitting authorities after issuance of permit/during construction are

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 Miami, FL 33146  
 Office: +1 (786) 497-1500



not included. If required, such revisions shall be performed on an hourly basis.

**Information to be provided by the Client:**

- Filing and permit application fees, review fees, impact fees or any other associated assessments by other governments/agencies.
- Copies of all relevant data, including correspondence, traffic reports, plans or information in Client’s possession which may be beneficial to the work effort performed by Consultant.
- An official City Purchase Order for this work.

**SCHEDULE AND FEES**

Consultant shall schedule work upon receipt of purchase order and official notice to proceed (NTP) for this project. Per discussions with your team, the goal is to start immediately upon official authorization from the City. The anticipated durations of each task are shown in the table below.

<b>TASK</b>	<b>DESCRIPTION</b>	<b>DURATION</b>
Task 1	Site Reconnaissance & Data Gathering	4 Weeks
Task 2	Construction Documents	
	50% Design	4 Weeks
	<i>Client/Owner Review</i>	2 Weeks
	100% Design	4 Weeks
	<i>Client/Owner Review</i>	2 Weeks
	Final Plans	1 Week
Task 3	Government Permitting Assistance	12 Weeks*
		(Concurrent with 100% Design)
Task 4	Bid and Award Support	12 Weeks
Task 5	Limited Construction Administration	8 Weeks*
		Total: 42 Weeks

\* *Permitting and construction durations shown above are estimated and may vary due to factors beyond CMA’s control.*

The total lump sum fee for this project will be divided as follows:

<b>Task(s)</b>	<b>Task Description</b>	<b>Lump Sum Fees</b>
Task 1	Site Reconnaissance & Data Gathering	\$2,480.00
Task 2	Construction Documents	\$15,960.00
Task 3	Government Permitting Assistance	\$4,730.00
Task 4	Bid and Award Support	\$3,420.00
Task 5	Limited Construction Administration	\$9,230.00
<b>SUBTOTAL</b>		<b>\$35,820.00</b>
	Reimbursables Allowance	\$2,000.00
	Topographic Survey – Longitude Surveyors	\$13,800.00
<b>PROJECT TOTAL</b>		<b>\$51,620.00</b>

Reimbursable expenses for mileage and report preparation have been included in the lump sum fees noted above. Additional reimbursable expenses requested by the Client outside of the items for the tasks

3150 SW 38<sup>th</sup> Avenue, Suite 950  
Miami, FL 33146  
Office: +1 (786) 497-1500



above, including delivery of additional copies of items shall be invoiced as defined in our Professional Services Agreement for General Engineering Services.

This proposal is based on our understanding of the requirements for civil engineering and surveying services as itemized under the anticipated tasks listed above. Accordingly, we reserve the right to modify this proposal due to any changes in scope.

Should you have any questions, please do not hesitate to contact me at my office at (813) 896-0286 or my cell phone at (904) 707-7724 or send me an electronic message at [blehr@chenmoore.com](mailto:blehr@chenmoore.com).

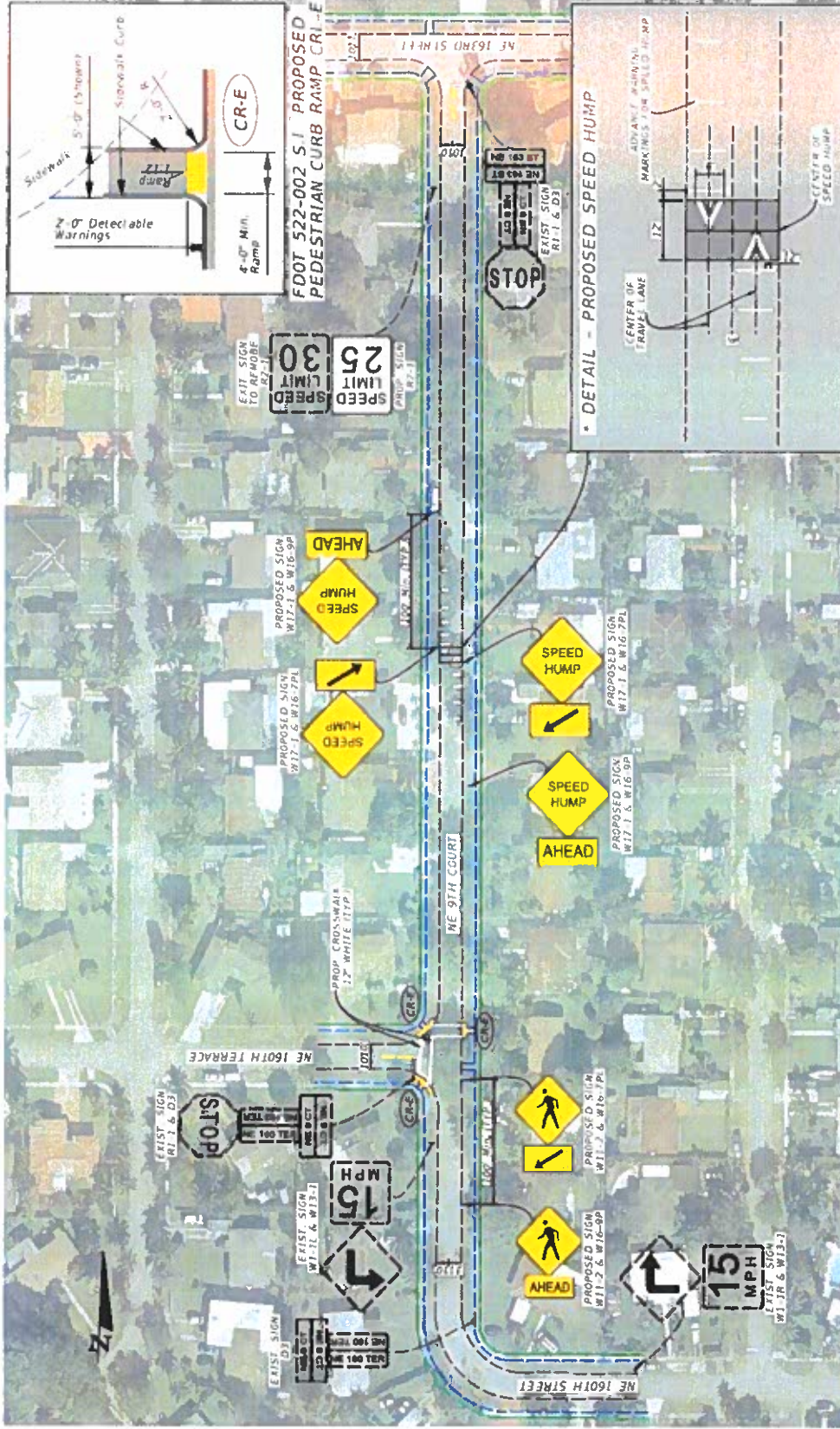
Respectfully submitted,

CHEN MOORE AND ASSOCIATES  
G. Benjamin Lehr, P.E.  
Project Manager

GBL/GAM

Cc: Gregory A. Mendez, P.E., Chen Moore and Associates  
Jose L. Acosta, P.E., F. ASCE, Chen Moore and Associates





**EXHIBIT - NOT FOR CONSTRUCTION**

PROJECT NUMBER	22-083.042
DATE OF ISSUE	01/12/2024
DRAWING NUMBER	<b>C2.01</b>

**PROJECT INFORMATION**

**NE 9TH CT TRAFFIC CALMING STUDY**

NORTH MIAMI BEACH, FLORIDA 33162

**DRAWING TITLE**

**CONCEPTUAL LAYOUT**



**CLIENT**

3150 SW 38th Avenue  
 Suite 950  
 Miami, FL, 33146  
 786.497.1500  
 www.chenmoore.com





Tuesday, February 27, 2024

Ms. Yulet Miguel, PE  
Senior Engineer - Civil  
[ymiguel@chenmoore.com](mailto:ymiguel@chenmoore.com)



500 West Cypress Creek Road, Suite 600  
Fort Lauderdale, FL 33309  
786.218.4858

**RE:** Surveying and Mapping services for the 'City of North Miami Beach – Traffic Calming Project' of Northeast 9 Court located in North Miami Beach, FL 33162.

Dear Ms. Miguel,

Pursuant to your request regarding a fee estimate for Surveying and Mapping services for the above-referenced project, LONGITUDE SURVEYORS, LLC (LS) is pleased to submit the following proposal for your consideration.

**A. SCOPE OF WORK – TOPOGRAPHIC SURVEY:**

- LS will show rights-of-way computing field evidence, plats, deeds, and other documentation relative to the project. Lot lines and ownership lines, inclusive of locations, bearings, and dimensions, within the survey limits will be shown graphically.
- LS will show any easements, covenants, restrictions, etc. that can be found on plats, deeds, and other public records relative to the project. However, without a Title Commitment or Title Search there is no guarantee that easements, covenants, restrictions, etc. will be shown on the survey.
- LS will establish horizontal and vertical control within the limits of the survey.
- The survey will be geo-referenced to the Florida State Plane Coordinate System based on the North American Datum of 1983/2011 (NAD83/11).
- Elevations will be referenced to the National Geodetic Vertical Datum of 1929 (NGVD29).
- LS will collect significant aboveground improvements including but not limited to; pavement, edge of pavement lines, pavement markings, sidewalks, driveways (including material), fences and gates, light poles, hedges, catch basins, manholes, utility poles, utility boxes, fire hydrants, signs, and any other significant above-ground improvements and utilities within the survey limits.
- LS will locate trees and palms having a three (3) inch diameter or greater at breast height (DBH) or being six (6) feet in height or greater. Identification of trees and/or a tree table will not be provided.
- Elevations will be collected equivalent to a twenty-five (25) foot grid throughout the survey limits. Additional elevations will be collected sufficient to identify grade changes and features of interest within the survey limits.
- A Digital Terrain Model (DTM) of the resulting survey will NOT be provided.

**B. SURVEY LIMITS:**

The roadway of Northeast 9 Court from the centerline of Northeast 163 Street South up to where Northeast 9 Court turns East into Northeast 160 Street, located in North Miami Beach, FL 33162. Limits include the full width of the public right-of-way, extending approximately fifty (50) feet past the curb return of each intersecting roadway, as per the attached Exhibit.

**C. DELIVERABLES:**

LS will provide a digitally signed and sealed PDF and CAD of the resulting survey. Signed and sealed hardcopies can be provided upon request.

**D. TIME & COST:**

The total professional fee to complete the **Scope of Work** described herein shall be a lump sum of **\$13,800.00**. LS has estimated eighteen (18) business days from the date of Notice to Proceed (NTP) to complete these tasks. Notice to Proceed (NTP) is considered effective twenty-four (24) hours after this proposal agreement has been executed and returned to the undersigned.



I agree that by signing below "I APPROVE AND ACCEPT" this proposal as a legal binding contract.

By: \_\_\_\_\_  
(Authorized Signature)

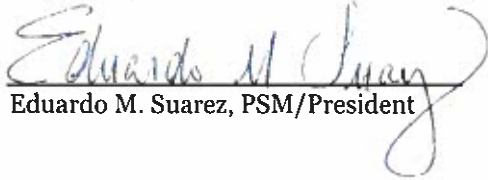
Date: \_\_\_\_\_

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(Typed or printed name)

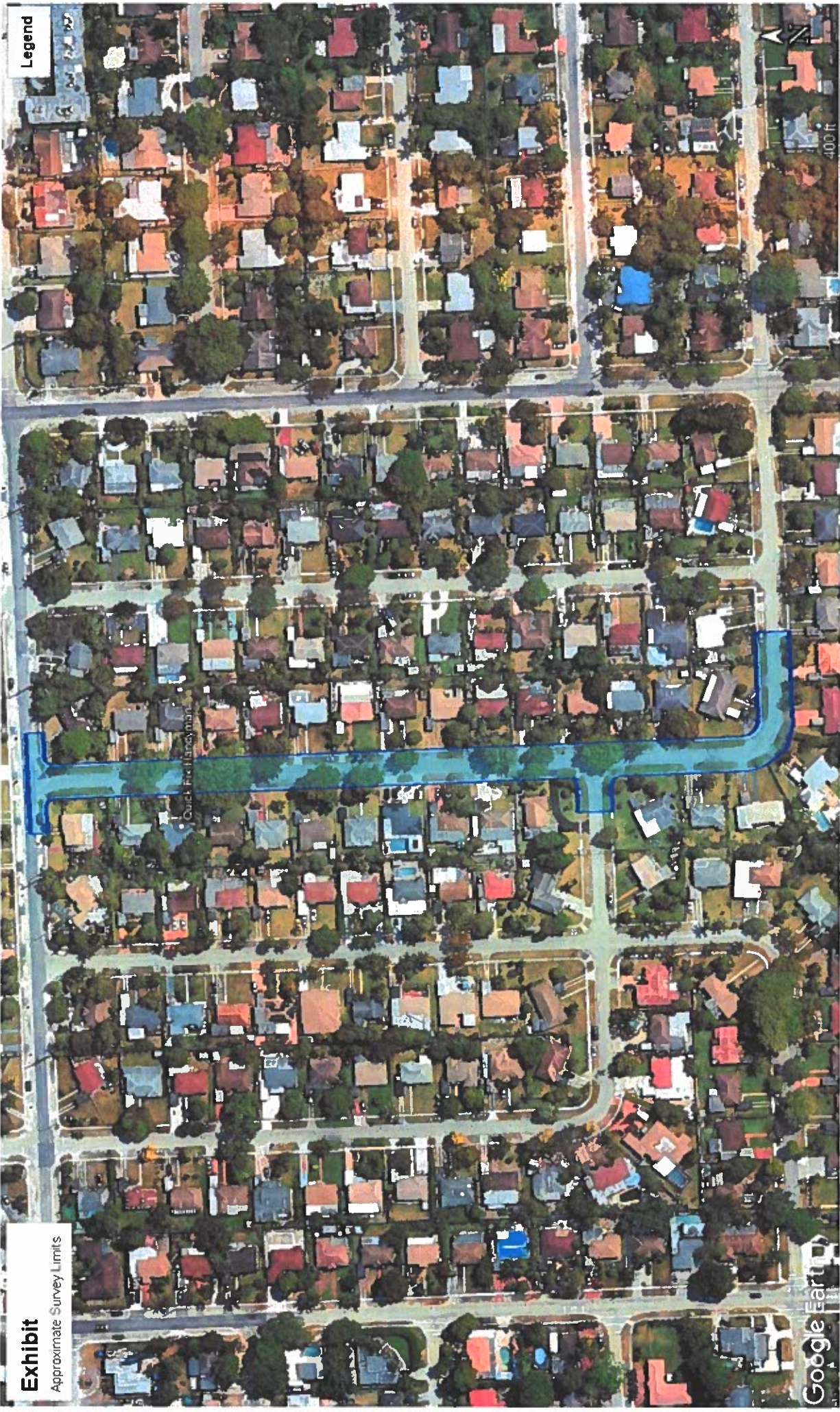
Title: \_\_\_\_\_

On behalf of the firm, I thank you for the opportunity to present this proposal. We look forward to utilizing our best professional efforts on your behalf on this very important project.

Respectfully Yours,

  
Eduardo M. Suarez, PSM/President





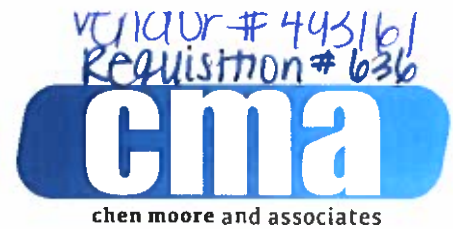
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**Exhibit**  
Approximate Survey Limits

Google Earth



3150 SW 38<sup>th</sup> Avenue, Suite 950  
Miami, FL 33146  
Office: +1 (786) 497-1500



November 3, 2022 (Revised 11/22/2024)

SENT VIA E-MAIL (samuel.zamacona@citynmb.com)

Mr. Samuel Zamacona  
City of North Miami Beach – Public Works  
17050 NE 19th Avenue  
North Miami Beach, FL 33162

**Subject: City of North Miami Beach – NE 13<sup>th</sup> Ave Raised Intersections  
Agreement No.19-082-MC  
CMA Proposal No. 22-0083.P0001-013**

Dear Mr. Zamacona:

Chen Moore and Associates (CMA) is pleased to submit the attached Agreement for Professional Services and Scope of Services to assist your team with the civil engineering services for the above-referenced project.

#### **PROJECT INTRODUCTION**

It is CMA's understanding that the City of North Miami Beach (NMB) has received complaints of speeding motorists along NE 13<sup>th</sup> Avenue between NE 151<sup>st</sup> Street and NE 159<sup>th</sup> Street from area residents. A subsequent traffic study was performed by CALTRAN Engineering Group, Inc (CALTRAN) for this area which resulted in the recommendation to install raised intersections at NE 153<sup>rd</sup> Street, NE 155<sup>th</sup> Street, and NE 157<sup>th</sup> Street as a means of traffic calming along the corridor. Given this, NMB now wants to proceed with the recommended installation to improve pedestrian safety in this area and address residents' concerns.

CMA shall provide the civil engineering, geotechnical engineering, and topographic surveying to design, permit, and periodically observe the construction of these improvements per the request of NMB. Note that this work is anticipated to conform with the allowable traffic calming measures listed in the Intergovernmental Agency Agreement to Perform Traffic Engineering Functions between NMB and Miami-Dade County Department of Transportation and Public Works (DTPW).

#### **PROJECT STAFFING**

Our staff and team are ready and prepared to work on this project. Chen Moore staff project roles shall be as follows:

Principal – Peter Moore, P.E. – President and CEO  
Project Director – Gregory Mendez P.E.  
Project Manager – G. Benjamin Lehr, P.E.  
Project Engineer – Madeline Batey, P.E.  
Designer – Joseph Hall  
Construction Specialist – Robert Guttman

Subconsultants:

- Longitude Surveyors – Topographic Survey
- PanGeo Consultants – Geotechnical Exploration

**SCOPE OF SERVICES**

The scope of services our firm shall provide as per our recent discussions is as follows:

**Task 1 – Site Reconnaissance and Data Gathering**

- Consultant shall obtain a Sunshine One Call of Florida design ticket to identify existing utilities within the project area.
- Consultant shall coordinate with utilities identified in the design ticket to obtain as-built plans, GIS maps, and/or other available information for existing utilities in the project area.
- Consultant shall perform a site visit to observe existing conditions of the project area.
- Through our subconsultant, we shall perform geotechnical exploration including:
  - Three (3) borings to a depth of 15-ft with Standard Penetration Tests (SPTs).
  - Three (3) percolation tests conforming to the standard of the South Florida Water Management District (SFWMD).
  - Generation of a report summarizing findings and providing recommendations for pavement sections and pipe bedding.
- Through our subconsultant, we shall complete a topographic survey of the project area with the following scope:
  - Limits including the ROWs in and adjacent to the intersections of NE 13<sup>th</sup> Ave with NE 153<sup>rd</sup>, 155<sup>th</sup>, and 157<sup>th</sup> Streets extending approximately 200-LF north and south and approximately 100-LF east and west of the center of the northern and southern intersections. Continuous survey between the subject intersections along NE 13<sup>th</sup> Street will be collected to understand drainage patterns and for plans development.
  - Identification of boundary information (ROW lines, centerlines, easements, etc.).
  - Topographic information shall include:
    - Identification of all above ground features including but not limited to curbs, roads, driveways (including material), manholes, inlets, pullboxes, striping, poles, sidewalks, lights, signs, valves, building walls, trees, vegetation, and above ground utilities.
    - Labeling of all house numbers/folios/easements/dedications.
    - Spot elevations in NGVD 29 datum at a maximum 25-foot grid with additional elevations to identify all grade changes and features of interest. Spot elevations along roads shall identify inverted crown of road, edge of pavement, back of curb, driveway at ROW line, toe of slope, top of bank, etc.
    - Rim elevations, invert elevation, invert direction, invert material, invert diameter, and bottom of structure elevations for all sanitary sewer and stormwater manholes and inlets.
    - Existing roadway striping and street signs type labels.
    - Area extending 10-ft beyond the ROW where feasible.
- Consultant shall review survey, as-builts from local utilities and field verify locations as site accessibility permits.

## **Task 2 – Construction Documents**

### *50% Design*

- Consultant shall attend up to two (2) meetings with the Client; additional meetings beyond this number shall be performed on an hourly basis at the written direction of the Client.
- Consultant shall develop roadway, ADA compliant curb ramps, and sidewalk layouts for the proposed raised intersections following local practices and requirements.
- Consultant shall analyze impacts of the improvements to the existing drainage system and propose modifications/improvements as required. To minimize impacts to existing infrastructure, it is anticipated that the grading of the raised intersections will be such that the existing drainage patterns will be maintained and that edge of pavement elevations within the raised intersection areas will be as close as practical to existing grades.
- Consultant shall prepare 50% Construction Document level plans which are anticipated to include existing conditions and demolition, paving and grading, drainage, and signage and marking plans with associated cross-sections for the purpose of Client review.
- Consultant shall generate an Engineer's Opinion of Probable Construction Cost for the proposed improvements upon request.

### *100% Design*

- Consultant shall attend up to two (2) meetings with the Client; additional meetings beyond this number shall be performed on an hourly basis at the written direction of the Client.
- Consultant shall review and implement comments received on 50% Construction Documents design submittal.
- Consultant shall develop stormwater management calculations (water quality, water quantity, and attenuation) and reports as required.
- Consultant shall prepare 100% Construction Document level plans which are anticipated to include existing conditions and demolition, paving and grading, drainage, signage and marking, and stormwater pollution prevention plans with associated notes and details for the purpose of project permitting and construction.
- Consultant shall finalize the Engineer's Opinion of Probable Construction Cost for the proposed improvements based on the final design upon request.

## **Task 3 – Government Permitting Assistance**

- Upon Client authorization, Consultant shall attend permit pre-application meetings with the following agencies:
  - Miami-Dade County Regulatory and Economic Resources Department of Environmental Resources Management (RER-DERM)
- Consultant shall prepare and submit permit applications/notifications of construction related to civil engineering. The agencies having jurisdiction (AHJ) of requiring government permitting are anticipated to be:
  - City of North Miami Beach Public Works
  - RER-DERM Water Control Section
  - Miami-Dade County Department of Transportation and Public Works (DTPW)
- Consultant shall review and respond AHJ comments and revise plans, as applicable.
- Additional AHJ submittals are not anticipated for civil engineering. If required, they may be performed via an additional service agreement.

- The approved plans are considered to be the final construction documents. Preparation of additional plan sets or Client-requested changes following approval of the permits listed above may be performed via an additional service agreement.

#### **Task 4 – Bid & Award Support**

- Consultant shall prepare responses to questions from bidders for the scope of work in this proposal.
- Consultant shall review bids and respond to contractor questions on the work.
- This task includes up to two (2) meetings with the Client and/or Bidder.

#### **Task 5 – Limited Construction Administration**

- Preconstruction:
  - Consultant shall attend a pre-construction conference as arranged by the contractor.
  - Consultant shall review shop drawing submittals (a total of six submittal package reviews are included).
- Construction Observation:
  - Consultant shall review and respond to Contractor RFIs.
  - Consultant shall perform up to six (6) field visits for the purpose of observing the installation of the project, including the preparation of a daily report of construction.
  - Additional visits beyond this number shall be performed on an hourly basis at the written direction of the Client.
- Certification and Closeout
  - Consultant shall attend up to one (1) substantial completion walkthrough for the purpose of generating a closeout punch list.
  - Consultant shall review Contractor-provided signed and sealed as-builts.
  - Consultant shall attend up to one (1) final walkthrough for the purpose of verifying closeout punch list items have been addressed.
  - Consultant shall sign and submit certifications of completion of civil engineering components, as required.

#### **The basis for the above scope of services and associated fee(s) are based on the following:**

- Project shall be completed in one phase.
- Consultant assumes that previously prepared traffic study for this project (by CALTRAN) shall be sufficient to permit the impact of this project to area traffic operations per the executed Intergovernmental Agency Agreement to Perform Traffic Engineering Functions between the City of North Miami Beach and Miami-Dade County Department of Transportation and Public Works.
- If any utilities (potable water, sanitary sewer, stormwater, etc.) or roadway improvements not explicitly included in this agreement are required, they shall be rendered as an Additional Service.
- Drainage analysis shall only be for work within the project limits. Should additional drainage analysis work be required for other portions of the onsite or offsite systems, this work shall be rendered as an Additional Service.
- Franchise utility (such as FPL, telecom, and natural gas) relocation and/or service design shall be by others.
- All notes and specifications needed to construct project shall be provided in the plans.
- Site and street lighting, landscape architecture, irrigation, and environmental engineering services are not included in this proposal.





- It is assumed that there are no environmental concerns within the subject project area.
- Contractor to obtain any necessary NPDES NOI permits.
- Contractor to prepare Maintenance of Traffic (MOT) plans and submit for MOT permits from the necessary regulatory agencies.
- Contractor to prepare any dewatering plans and obtain dewatering permits as necessary to construct the project.
- Contractor to obtain right-of-way permits for the necessary regulatory agencies for construction.
- Contractor shall submit "rock" as-builts prior to installing pavement surface.
- Contractor shall provide as-builts signed and sealed by a Florida licensed professional surveyor and mapper for consultant review prior to construction close-out.
- Proposal assumes attendance to limited field meetings and inspections. Attendance to regular owner/contractor meetings during construction shall be rendered as an additional service.
- Plan revisions required by permitting authorities after issuance of permit/during construction are not included. If required, such revisions shall be performed on an hourly basis.

**Information to be provided by the Client:**

- Filing and permit application fees, review fees, impact fees or any other associated assessments by other governments/agencies.
- Copies of all relevant data, including correspondence, traffic reports, plans or information in Client's possession which may be beneficial to the work effort performed by Consultant.
- An official City Purchase Order for this work.

**SCHEDULE AND FEES**

Consultant shall schedule work upon receipt of purchase order and official notice to proceed (NTP) for this project. Per discussions with your team, the goal is to start immediately upon official authorization from the City. The anticipated durations of each task are shown in the table below.

<b>TASK</b>	<b>DESCRIPTION</b>	<b>DURATION</b>
Task 1	Site Reconnaissance & Data Gathering	6 Weeks
Task 2	Construction Documents	
	50% Design	10 Weeks
	<i>Client/Owner Review</i>	2 Weeks
	100% Design	6 Weeks
	<i>Client/Owner Review</i>	2 Weeks
	Final Plans	2 Weeks
Task 3	Government Permitting Assistance	12 Weeks*
		(Concurrent with 100% Design)
Task 4	Bid and Award Support	12 Weeks
Task 5	Limited Construction Administration	16 Weeks*
		Total: 58 Weeks

\* Permitting and construction durations shown above are estimated and may vary due to factors beyond CMA's control.

3150 SW 38<sup>th</sup> Avenue, Suite 950  
Miami, FL 33146  
Office: +1 (786) 497-1500



The total lump sum fee for this project will be divided as follows:

<u>Task(s)</u>	<u>Task Description</u>	<u>Lump Sum Fees</u>
Task 1	Site Reconnaissance & Data Gathering	\$8,120.00
Task 2	Construction Documents	\$58,280.00
Task 3	Government Permitting Assistance	\$8,220.00
Task 4	Bid and Award Support	\$9,330.00
Task 5	Limited Construction Administration	\$32,840.00
<b><i>SUBTOTAL</i></b>		<b><i>\$116,790.00</i></b>
	Reimbursables Allowance	\$2,000.00
	Topographic Survey – Longitude Surveyors	\$24,425.00
	Geotechnical Exploration – PanGeo Consultants	\$6,950.00
<b>PROJECT TOTAL</b>		<b>\$150,165.00</b>

Reimbursable expenses for mileage and report preparation have been included in the lump sum fees noted above. Additional reimbursable expenses requested by the Client outside of the items for the tasks above, including delivery of additional copies of items shall be invoiced as defined in our Professional Services Agreement for General Engineering Services.

This proposal is based on our understanding of the requirements for civil engineering and surveying services as itemized under the anticipated tasks listed above. Accordingly, we reserve the right to modify this proposal due to any changes in scope.

Should you have any questions, please do not hesitate to contact me at my office at (813) 896-0286 or my cell phone at (904) 707-7724 or send me an electronic message at [blehr@chenmoore.com](mailto:blehr@chenmoore.com).

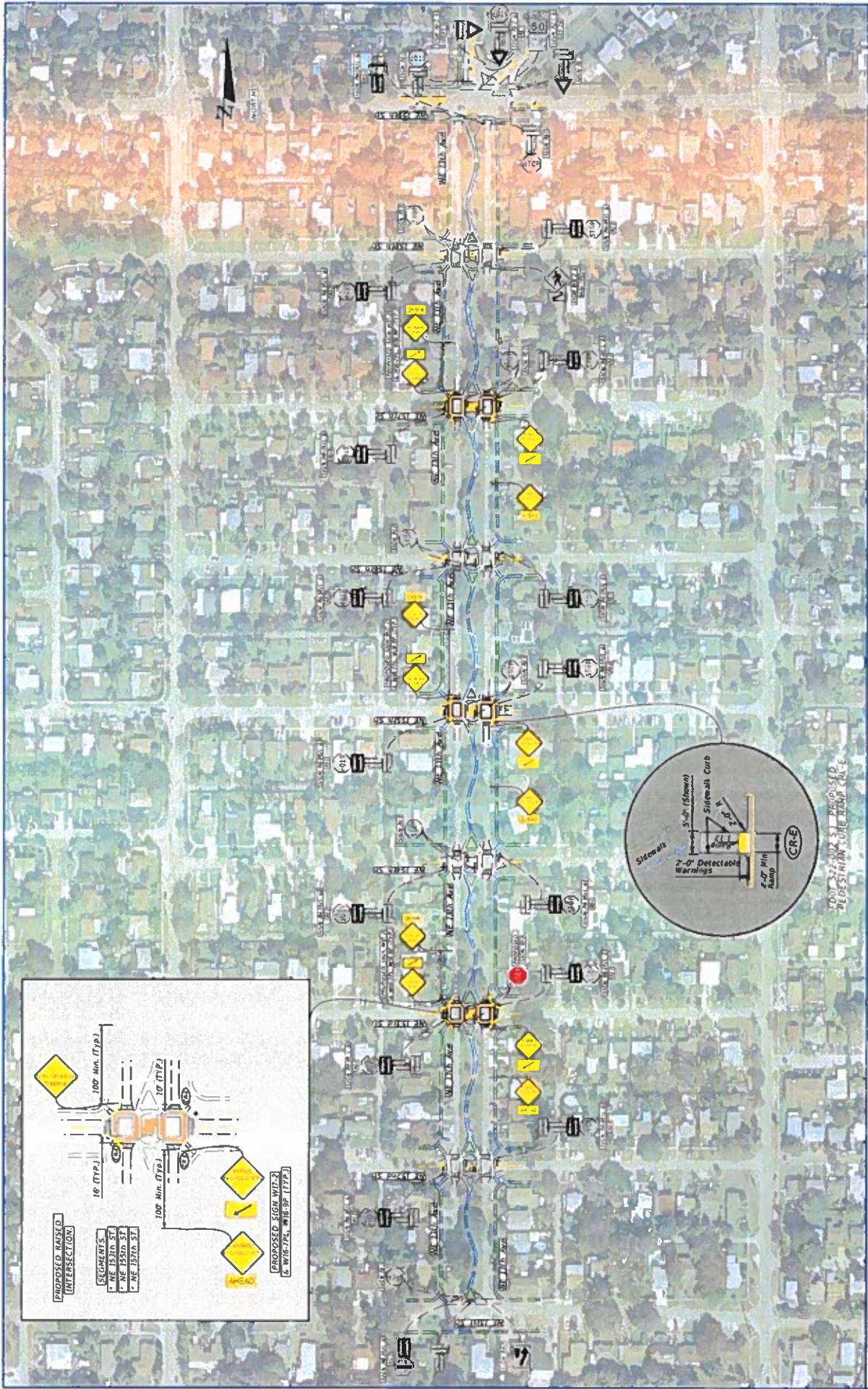
Respectfully submitted,

CHEN MOORE AND ASSOCIATES  
G. Benjamin Lehr, P.E.  
Project Manager

GBL/GAM

Cc: Gregory A. Mendez, P.E., Chen Moore and Associates  
Jose L. Acosta, P.E., F. ASCE, Chen Moore and Associates





STATE OF FLORIDA			SHEET NO.	
DEPARTMENT OF TRANSPORTATION			1	
ROAD NO.		FINANCIAL PROJECT ID		
COUNTY		PROJECT ID		
<b>Figure 4</b> <b>Proposed Recommendations</b>				
DATE:	BY:	DATE:	BY:	DATE:

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 03/24/2022 9:25:39 PM D:\p1000



November 2, 2022

Mr. Nicholas S. Karpathy, P.E., ENV SP, Senior Engineer  
CHEN MOORE AND ASSOCIATES  
3150 SW 38<sup>th</sup> Ave, Suite 950  
Miami, FL 33146  
O: +1 (786) 497-1500, Ext. 1157  
Email: [nkarpathy@chenmoore.com](mailto:nkarpathy@chenmoore.com)

Re: Proposal/Agreement for Additional Geotechnical Exploration Services  
NE 13th Ave. Raised Intersections  
Intersections of NE 13th Ave and NE 153rd, NE 155th, and NE 157th Streets.  
North Miami Beach, FL

Dear Mr. Karpathy:

Pan Geo Consultants (PGC) is pleased to present this proposal/agreement for performing geotechnical engineering services at the referenced project.

Based on our communication with you, we understand the city is looking to install three (3) raised intersections and crosswalks as a means of traffic calming in the neighborhood.

Based on your request for proposal and our understanding of the project, we propose the following scope of work and fee schedule.

#### **SCOPE OF WORK**

We propose to perform three (3) Standard Penetration Test (SPT) borings in general accordance with ASTM D-1586 specifications to a depth of 15 ft and three (3) exfiltration tests in general accordance with SFWMD specifications to 15 ft. At the completion of the on-site work, the soil samples will be returned to our laboratory. We will provide an engineering report including a description of our findings and general site preparation and design recommendations for support of the proposed construction. In order to provide information concerning the engineering properties of the soils encountered, it is anticipated that tests may be performed to determine natural water content, organic content, and sieve analysis on representative soil samples collected from the field. The engineering report will include graphic logs of the test borings and a test boring location plan. We assume the site is accessible to truck mounted

drilling equipment and that underground utilities will be cleared by others prior to our performing the on-site work.

**FEE SCHEDULE**

The above-indicated scope of work will be performed for an estimated cost of \$3,962.50 – \$5,662.50 based on the following rates and quantities:

<b>Description</b>	<b>Quantity</b>	<b>Unit Cost</b>	<b>Subtotal</b>
Project Engineer	6 hours	\$110.00/ hour	\$660.00
Registered Professional Engineer	2 hours	\$130.00/ hour	\$260.00
Drafting/ Clerical Services	2 hours	\$55.00/ hour	\$110.00
Senior Technician	4 hours	\$75.00/ hour	\$300.00
Mobilization (Equipment/ Crew)	1 each	\$350.00	\$350.00
Soil Test Borings (ASTM D-1586)*	45 linear feet	\$14.50/ l.f.	\$630.00
Setting 3-inch Casing	45 linear feet	\$4.50/l.f.	\$202.50
SFWM D Exfiltration Testing	3 tests	\$450.00	\$1350.00
Laboratory Testing	Lump		\$100.00
<i>Permit (if needed)</i>	<i>Lump</i>		<i>\$1000.00</i>
<i>MOT (if needed)</i>	<i>Lump</i>		<i>\$700.00</i>

\*If loose or deleterious soil is encountered it may be necessary to extend the soil boring(s).

We currently anticipate starting this work within approximately four business days of receiving written authorization to proceed and 50% deposit. The on-site work should take approximately 2 days to complete. The geotechnical report, including 2 days for laboratory testing, should be available within approximately 10 business days after the on-site work is completed.

The cost estimated provided is based on our understanding of the expected project requirements PGC will only charge for the work performed and will not exceed the estimated cost without prior written approval from you.

We appreciate the opportunity to be selected for performing geotechnical engineering on this project. Should you have any questions, please contact the undersigned at your convenience.

Respectfully submitted,  
**Pan Geo Consultants**

Paul C. Catledge, P.E.  
Principal

Reports and invoices will be addressed to the client as listed below unless other instructions are provided in writing with this executed proposal. The undersigned, as an authorized representative of the entity listed below, approves this proposal and agrees to be bound by the terms and conditions contained in this proposal. We note that our terms are net thirty days. Any invoices over thirty days will be assessed a 1 1/2 percent service charge. If you are a first time client, we request that the fee for these services be paid at the time of report completion. Once your account is established, we will bill you on an invoice basis.

SIGNATURE: \_\_\_\_\_ DATE: \_\_\_\_\_

PRINT NAME: \_\_\_\_\_ TITLE: \_\_\_\_\_

COMPANY NAME: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

PHONE: \_\_\_\_\_ FAX: \_\_\_\_\_

EMAIL: \_\_\_\_\_

**General Terms and Conditions**

For the purpose of this project, the addressee of this proposal will be known as the Client. The client is expected to furnish PAN GEO CONSULTANTS, LLC (PGC), with accurate information including sketch of survey and/or site plan, construction drawings/specifications as appropriate, details of proposed construction including the proposed structural system and loads or existing construction problem information and site accessibility information as appropriate. Other information requirements may be detailed in the enclosed proposal. IF ANY CONDITIONS CHANGE such as building layout, loading, project specifications/design, or unusual site conditions are observed, PGC should be notified immediately in writing about the changed condition for possible review and comment. Should the Client wish to impose other conditions and requirements beyond those contained in this proposal such as in a separate contract, we reserve the option to modify contract language, fee amounts, to remove our proposal from consideration or other measures as may be indicated.

**Delivery** – Scheduled upon receipt of written authorization to proceed and deposit unless other arrangements are agreed to in writing. Additional report copies can be provided for a nominal fee to the Client. PGC will exercise appropriate measures to ensure project completion within a reasonable time frame subject to existing workloads. However, PGC will not be held responsible for unavailability of necessary project data and site access within the time frame agreed upon for the investigation. Project delivery may be delayed if the ENTIRE signed proposal and deposit are not received in a timely manner. The ENTIRE signed quotation should be returned along with the requested project information. This unsigned proposal is valid for 60 days.

**Payment** – 50% deposit required with signed agreement. Directing PGC to proceed with the work shall constitute acceptance of the terms of PGC's proposal and these General Terms and Conditions. Balance due upon delivery of report. Interest at the rate of 18% per annum or the highest rate allowable by law whichever is less, will be added to all amounts not paid within 30 days after date of invoice. All attorney fees and expenses associated with collection of past due invoices will be paid by Client.

**Insurance** – PGC maintains Workers' Compensation and Employer's Liability Insurance in conformance with state law. In addition, we maintain Comprehensive General Liability Insurance and Automobile Liability Insurance. A certificate of insurance can be supplied evidencing such coverage which contains a clause providing that fifteen days written notice be given prior to cancellation.

**Right-of-Entry** - Unless otherwise agreed, Client will furnish right-of-entry on the property for PGC to make the planned borings, surveys, and/or explorations. PGC will not be responsible for removing fences, earth berms, vegetation or other obstructions for purposes of our investigation. PGC will take reasonable precautions to minimize damage to the property caused by its equipment and sampling procedures, but the cost of restoration or damage which may result from the planned operations is not included in the contracted amount. If Client desires to restore the property to its former condition, PGC will accomplish this and add the cost to its fee. Client agrees to waive all claims arising from or related to the failure to provide PGC with proper access to conduct its work.

**Damage to Existing Man-made Objects** - It shall be the responsibility of the Owner or his duly authorized representative to disclose the presence and accurate location of all hidden or obscure man-made objects relative to routes of access, field tests, sampling, or boring locations. When cautioned, advised or given data in writing that reveal the presence or potential presence of underground or over-ground obstructions, such as utilities, septic tanks, etc., PGC will give special instructions to its field personnel. In addition, Client waives any claim against PGC arising from damage to existing man-made objects.

**Warranty and Limitation of Liability** - PGC shall perform services for Client in a professional manner, using that degree of care and skill ordinarily exercised by and consistent with the standards of competent consultants practicing in the same or a similar locality as the project. In the event any portion of the services fails to comply with this warranty obligation and PGC is promptly notified in writing prior to one year after completion of such portion of the services, PGC will re-perform such portion of the services, or if re-performance is impracticable, PGC will refund the amount of compensation paid to PGC for such portion of the services. This warranty is in lieu of all other warranties. No other warranty, expressed or implied, including warranties of merchantability and fitness for a particular purpose is made or intended by the proposal for consulting services, by furnishing an oral response of the findings made or by any representations made regarding the services included in this agreement. In no event shall PGC or any of its professional employees be liable for any special, indirect, incidental or consequential loss or damages, including but not limited to impact and delay claims. The remedies set forth herein are exclusive and the total liability of consultant whether in contract, tort (including negligence whether sole or concurrent), or otherwise arising out of, connected with or resulting from the services provided pursuant to this Agreement shall not exceed the total fees paid by Client or \$50,000.00, whichever is greater. At additional cost, Client may obtain a higher limit prior to commencement of services.

**PURSUANT TO §558.0035, FLORIDA STATUTES, PGC'S INDIVIDUAL EMPLOYEES AND/OR AGENTS MAY NOT BE HELD INDIVIDUALLY LIABLE FOR NEGLIGENCE ARISING OUT OF, CONNECTED WITH, OR RESULTING FROM THEIR SERVICES PROVIDED PURSUANT TO THIS AGREEMENT.**

**Indemnification** – Client agrees to defend, indemnify and save harmless PGC from all claims, including negligence claims, suits, losses, personal injuries, death and property liability resulting from PGC's performance of the proposed work, whether such claims or damages are caused in part by PGC, and agrees to reimburse PGC for expenses in connection with any such claims or suits, including reasonable attorney's fees. Client's obligation to indemnify is limited to \$2 million per occurrence, which Client agrees bears a reasonable commercial relationship to the Work undertaken by PGC. Client further agrees that these general conditions are a part of the Work's specifications or bid documents, if any.

**Sampling or Testing Location** - Unless specifically stated to the contrary, the unit fees included in this proposal do not include costs associated with professional land surveying of the site or the accurate horizontal and vertical locations of tests. Field tests or boring locations described in our report or shown on our sketches are based on specific information furnished to us by others and/or estimates made in the field by our technicians. Such dimensions, depths or elevations should be considered as approximations unless otherwise stated in the report. It is understood that all drilling locations are accessible to conventional truck mounted drilling equipment unless otherwise specified by the client. If unscheduled remobilizations or use of portable or all terrain equipment is required additional charges will apply. PGC will attempt to clear utilities at our excavation/test locations by manual drilling to 3' below land surface (BLS). Any utilities/obstructions present at client specified test locations or below 3' BLS will be the responsibility of the client.

**Sample Handling and Retention** – Generally soil test samples are retained for approximately three months after which time they will be discarded unless written instructions to the contrary are received from the client.

**Legal Jurisdiction** - The parties agree that any actions brought to enforce any provision of this Agreement shall only be brought in a court of competent jurisdiction located in Broward County, Florida. Any and all causes of action arising out of PGC's performance of the Work, including but not limited to claims for indemnity, contribution and equitable subrogation, shall be deemed to have accrued and the applicable statutes of limitations shall commence to run not later than the date of PGC's last invoice for the Work performed hereunder.

# PANGEO

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## CONSULTANTS

GEOTECHNICAL ENGINEERING AND INSPECTIONS

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**Force Majeure** - PGC shall not be held responsible for any delay or failure in performance of any part of this Agreement to the extent such delay or failure is caused by fire, flood, explosion, war, strike, embargo, government requirement, civil or military authority, acts of God, act or omission of subcontractors, carriers, client or other similar causes beyond its control.

**Documents** - PGC shall be entitled to rely upon the accuracy and completeness of all surveys, reports and information furnished by the client. If conditions different from those described in our report are found at the site, PGC should be notified in writing immediately upon discovery. PGC reserves the right to revise conclusions and recommendations presented in the final report should additional information regarding the project become available. All permits will be obtained by others unless otherwise specified in this proposal or in writing to PGC. PGC has no liability for consequences of information not provided or unavailable or otherwise not reviewed or known from the normal sources customarily examined by PGC in such investigations within the time frame allowed for this investigation under this agreement. The client, entities identified in writing on the address portion of our report, design team professionals engaged by our client and building official staff are entitled to use and rely upon PGC'S reports for purposes of the current project. Other parties are not authorized to use or rely upon PGC'S reports unless PGC so states in writing.

General Contract Terms and Conditions 2022

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**PANGEO CONSULTANTS**

8258 West SR 84, Davie, FL

Phone: 954 200 4019

Email: [info@pangeoconsult.com](mailto:info@pangeoconsult.com)





Friday, November 22, 2024

Ms. Yulet Miguel, PE  
Senior Engineer - Civil  
[ymiguel@chenmoore.com](mailto:ymiguel@chenmoore.com)



500 West Cypress Creek Road, Suite 600  
Fort Lauderdale, FL 33309  
786.218.4858

**RE:** Surveying and Mapping services for the 'Raised Intersection Project' along the roadway of Northeast 13 Avenue located in North Miami Beach, FL 33162.

Dear Ms. Miguel,

According to your request regarding a fee estimate for Surveying and Mapping services for the above-referenced project, LONGITUDE SURVEYORS, LLC (LS) is pleased to submit the following proposal for your consideration.

**A. SCOPE OF WORK – TOPOGRAPHIC SURVEY:**

- LS will show rights-of-way computing field evidence, plats, deeds, and other documentation relative to the project. Lot lines and ownership lines, including locations, bearings, and dimensions, within the survey limits will be shown graphically.
- LS will show any easements, covenants, restrictions, etc., found on plats, deeds, and other public records relative to the project. However, without a Title Commitment or Title Search, there is no guarantee that easements, covenants, restrictions, etc., will be shown on the survey.
- LS will establish horizontal and vertical control within the limits of the survey.
- The survey will be geo-referenced to the Florida State Plane Coordinate System based on the North American Datum of 1983/2011 (NAD83/11).
- Elevations will be referenced to the National Geodetic Vertical Datum of 1929 (NGVD29).
- LS will collect significant aboveground improvements, including, but not limited to, pavement, edge of pavement lines, pavement markings, curb and gutters, sidewalks, medians, driveways (including material), fences and gates, walls, buildings, concrete slabs, ramps, signs, manholes, catch basins, fire hydrants, bollards, utility boxes, utility poles, and any other significant aboveground improvements and utilities within the survey limits.
- LS will locate trees and palms that have a three (3) inch diameter or greater at breast height (DBH) or are twelve (12) feet in height or more significant. Tree identification and/or a tree table will not be provided.
- Elevations equivalent to a twenty-five (25) foot grid will be collected throughout the survey limits. Additional elevations will be collected to identify grade changes and features of interest within the survey limits.
- Invert information for existing drainage and sanitary structures within the survey limits will not be collected or shown on our final survey deliverable.
- A Digital Terrain Model (DTM) of the resulting survey will not be provided.

**B. SURVEY LIMITS:**

The 'Raised Intersection Project' along the roadway of Northeast 13 Avenue located in North Miami Beach, FL 33162. Limits to span from approximately one hundred fifty (150) feet South from the intersection of Northeast 153 Street due North to approximately one hundred fifty (150) feet North from the intersection of Northeast 157 Street, extending ten (10) feet beyond the route right-of-way wherever possible and fifty (50) feet past the point of curvature/point of tangency of any intersecting roadways, as per the attached Exhibit.

**C. DELIVERABLES:**

LS will provide a digitally signed and sealed PDF and a Civil 3D CAD file of the resulting survey. Signed and sealed hard copies can be provided upon request.



**D. TIME & COST:**

The total professional fee to complete the **Scope of Work** described herein shall be a lump sum of **\$24,425.00**. LS has an estimated twenty-three (23) business days from the date of the Notice to Proceed (NTP) to complete these tasks. Notice to Proceed (NTP) is considered adequate twenty-four (24) hours after this proposal agreement has been executed and returned to the undersigned.

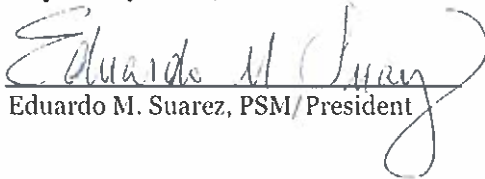
I agree that by signing below, "I APPROVE AND ACCEPT," this proposal is a legally binding contract.

By: \_\_\_\_\_ Date: \_\_\_\_\_  
(Authorized Signature)

\_\_\_\_\_  
(Typed or printed name) Title: \_\_\_\_\_

On behalf of the firm, I thank you for the opportunity to present this proposal. We look forward to utilizing our best professional efforts on your behalf on this very important project.

Respectfully Yours,

  
Eduardo M. Suarez, PSM/President



Legend



400 ft



**Exhibit**  
Approximate Survey Limits

Google Earth



3150 SW 38<sup>th</sup> Ave., Suite 950  
Miami, FL 33146  
Office: +1 (786) 497-1500

Requisition #412



October 30, 2024

SENT VIA E-MAIL (samuel.zamacona@citynmb.com)

Sam Zamacona E.I.  
Public Works Director  
City of North Miami Beach  
Public Works Department  
17011 NE 19th Avenue,  
North Miami Beach, FL 33162

A handwritten signature in blue ink, appearing to read "Sam Zamacona", is written over a horizontal line.

11/14/20:

**Subject: City of North Miami Beach – NE 26<sup>th</sup> Avenue Traffic Calming Design  
Agreement No.19-082-MC Task Order #17  
CMA Proposal No. 24-0083.P0001.004**

Dear Mr. Zamacona,

Chen Moore and Associates, Inc. (CMA) has prepared and submitted a Traffic study and recommendation of traffic calming measure(s) in this corridor, in accordance with the Interagency Agreement between MDC and the City. The City has also asked CMA to provide a conceptual design of a recommended traffic calming option for this corridor and an associated Engineer's Opinion of Probable Construction Cost (EOPCC). This proposal shall serve as the basis for the requested items herein.

As a result of the study, CMA will prepare Construction Documents to implement the recommended traffic calming devices. We are pleased to submit this Agreement for Professional Services and Scope of Services to provide all remaining civil engineering services for the above referenced project located in the neighborhood along NE 26<sup>th</sup> Avenue, in North Miami Beach, Florida.

**PROJECT STAFFING**

Our staff and team are ready and prepared to work on this project. Chen Moore staff project roles shall be as follows:

Principal – Peter Moore, P.E., President  
Project Director - Jose L. Acosta, P.E., Vice President  
Senior Project Manager – Gregory Mendez, P.E.

Engineering Staff includes the following:

- G. Benjamin Lehr, PE, Principal Engineer
- Andres Aristazabal, Senior Designer
- Eric Harrison, RLA, Senior Landscape Architect
- Stefan Bortak, RLA, CID, Certified irrigation Designer
- Jose McCray, Sr. Construction Specialist

Sub-consultants for this Project

- Land Surveying – Longitude Surveyors, LLC

chenmoore.com

CITT2413

### **SCOPE OF SERVICES**

The scope of services is as follows:

#### **Task 1 – Site data collection and utility coordination**

- Obtain Topographical survey via subconsultant, Longitude Surveyors.
- Obtain Sunshine 611 utility design ticket.
- Consultant shall review survey and/or as-built drawings from local utilities and field verify locations as per available accessibility.

#### **Task 2 – Construction Documents**

- Consultant shall review survey and/or as-built drawings from local utilities and field verify locations as per available accessibility.
- Consultant shall visit the site as necessary to become familiar with and/or document current site conditions.
- Consultant shall arrange and attend meetings with governmental permitting agencies or other authorities having jurisdiction as required regarding any pertinent regulatory requirements and limitations.
- Consultant shall examine and verify all existing site conditions as to their accuracy as depicted on the boundary survey.
- Attendance at up to two meetings with the Client.
- Design and plan preparation including the demolition, earthwork, paving, grading, drainage, water, signing and marking, landscaping, irrigation (if applicable), details, specifications and storm water pollution prevention plans.
- Pre-submittal meetings with related permitting agencies as necessary.
- Complete conflict data table with available information, if applicable.
- Update of the latest Opinion of Probable Cost for this stage of the design.
- Consultant shall prepare technical specifications for the civil engineering design components for use during bidding, aside from what will be included in the design documents (as needed)
- Consultant shall include all general notes, recommending any minimum requirements for a site contractor.

#### **Task 3 – Permitting & Approvals**

- Consultant shall prepare submittal packages and submit for government agency permits with the appropriate calculations and back-up to the following agencies:
- Miami-Dade County – Regulatory and Environmental Resources (RER) – Storm water
- Miami-Dade County Public Works – Traffic Engineering Division
- Miami-Dade County Fire Department
- City of North Miami Beach Public Works
- City of North Miami Beach Utilities
- Tree Removal permit (only if required) with Miami-Dade County RER Tree Section
- Consultant shall revise plans and coordinate permit resubmittals.

#### **Task 4 – Bidding Assistance**

- Attendance at a pre-bid meeting
- Prepare responses to questions from bidders for the scope of work in this proposal.
- Review bids to assist in selecting a qualified contractor.

**Task 5 – Limited Construction Administration Support Services** – Consultant shall perform the following:

- Consultant shall attend one pre-construction meeting, as arranged by the client.
- Consultant shall perform all required shop drawing reviews as they relate to the improvements designed and permitted under this scope of services.
- Consultant shall respond to requests for information (RFIs) during both the bid and construction phases.
- Provide general weekly observation of the work and verification of system testing for the civil engineering. Field reports will be issued to Client on a weekly basis on the week of the field visit. Consultant shall attend scheduled inspections. Contractor shall notify the consultant at least 48 hours in advance of any scheduled inspections.
- Coordination of certification/site close out packages for the following agencies: Miami-Dade County Public Works – Traffic Engineering Division, Miami-Dade County RER, and the City of North Miami Beach.

**BASIS OF SCOPE**

- The basis for the above scope of services and associated fee(s) are based on the following:
- Project shall be completed in one phase.
- Investigation and design of offsite facilities and improvements are only included as directly related to the base scope of services of this project.
- The Project is in the city of North Miami Beach, Florida.
- Off-site improvements including turn lanes, water/sewer main extensions or replacements, building or structural improvements, electrical, lighting, traffic signalization, telecommunications or other utility improvements of any kind beyond the project limits, or as depicted herein, shall be deemed as an Additional Service item and is not included in this proposal.
- An ERP from SFWMD is not included in this proposal.
- No environmental exploration, engineering or permitting of any kind is included in this proposal.
- Landscaping shall be limited to small, hearty, drought-resistant ground cover in southern end of the extended park area as well as any required street trees.
- Specifications shall be included on the design plans
- No modifications or alterations to any traffic signal is proposed under this proposal
- It is assumed that no traffic impact study of any kind shall be required for this project, since it has been properly vetted through the Miami-Dade County Public Works Department Traffic Division.

**INFORMATION TO BE PROVIDED BY CLIENT**

- Information to be provided by City includes the following:
- A letter from the property owner granting access to the site and giving approval for Consultant to perform the services listed above.
- Copies of all relevant data, including correspondence, plans or information in the City's possession which may be beneficial to the work effort performed by Consultant.
- An official CMB Purchase Order (P.O.) to commence with this work.

3150 SW 38<sup>th</sup> Ave., Suite 950  
Miami, FL 33146  
Office: +1 (786) 497-1500



**SCHEDULE AND FEES**

Consultant shall schedule work upon receipt of signed approval and shall provide construction documents, bidding assistance and construction inspection and administrative services in accordance with Agreement No.19-082-MC Professional Services Agreement for General Engineering Services.

The total lump sum fees for this project will be divided as follows:

<u>Task(s)</u>	<u>Task Description</u>	<u>Lump Sum Fees</u>	<u>Total Fees</u>
1	Topographical Survey - Longitude Surveyors	\$22,175.00	
	Site data collection and utility coordination	\$5,000.00	\$27,175.00
2	Construction Documents	\$21,500.00	\$21,500.00
3	Permitting & Approvals	\$7,500.00	\$7,500.00
4	Bidding Assistance	\$3,500.00	\$3,500.00
5	Limited Construction Administration Support Services	\$10,000.00	\$10,000.00
	<b>GRAND TOTAL</b>		<b>\$69,675.00</b>

Reimbursable expenses for mileage and report preparation have been included in the lump sum fees noted above. Additional reimbursable expenses requested by the Client outside of the items for the tasks above, including delivery of additional copies of items shall be invoiced as defined in our Professional Services Agreement for General Engineering Services

This proposal is based on our understanding of the requirements for engineering services as itemized under the anticipated tasks listed above. Accordingly, we reserve the right to modify this proposal due to any changes in scope.

Should you have any questions, please do not hesitate to contact me by e-mail at [ymiguel@chenmoore.com](mailto:ymiguel@chenmoore.com).

Respectfully submitted,

CHEN MOORE AND ASSOCIATES  
G. Benjamin Lehr, P.E.  
Project Manager

Cc: Greg Mendez, P.E., Chen Moore and Associates  
Jose L. Acosta, P.E., Chen Moore and Associates

**ACCEPTED BY**

Mario A. Diaz  
City Manager

11/14/2024

Date



3150 SW 38<sup>th</sup> Ave., Suite 950  
Miami, FL 33146  
Office: +1 (786) 497-1500



**SCHEDULE AND FEES**

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	<b>GRAND TOTAL</b>		<b>\$69,675.00</b>

Reimbursable expenses for mileage and report preparation have been included in the lump sum fees noted above. Additional reimbursable expenses requested by the Client outside of the items for the tasks above, including delivery of additional copies of items shall be invoiced as defined in our Professional Services Agreement for General Engineering Services

This proposal is based on our understanding of the requirements for engineering services as itemized under the anticipated tasks listed above. Accordingly, we reserve the right to modify this proposal due to any changes in scope.

Should you have any questions, please do not hesitate to contact me by e-mail at [blehr@chenmoore.com](mailto:blehr@chenmoore.com).

Respectfully submitted,

CHEN MOORE AND ASSOCIATES  
G. Benjamin Lehr, P.E.  
Project Manager

Cc: Greg Mendez, P.E., Chen Moore and Associates  
Jose L. Acosta, P.E., Chen Moore and Associates

**ACCEPTED BY**

\_\_\_\_\_  
Mario A. Diaz  
City Manager

\_\_\_\_\_  
Date

3150 SW 38<sup>th</sup> Ave., Suite 950  
Miami, FL 33146  
Office: +1 (786) 497-1500



Exhibit A

Tuesday, February 27, 2024

Ms. Yulet Miguel, PE  
Senior Engineer - Civil  
[ymiguel@chenmoore.com](mailto:ymiguel@chenmoore.com)



500 West Cypress Creek Road, Suite 600  
Fort Lauderdale, FL 33309  
786.218.4858

**RE:** Surveying and Mapping services for the 'City of North Miami Beach – Traffic Calming Project' of Northeast 26 Avenue located in North Miami Beach, FL 33160.

Dear Ms. Miguel,

Pursuant to your request regarding a fee estimate for Surveying and Mapping services for the above-referenced project, LONGITUDE SURVEYORS, LLC (LS) is pleased to submit the following proposal for your consideration.

**A. SCOPE OF WORK – TOPOGRAPHIC SURVEY:**

- LS will show rights-of-way computing field evidence, plats, deeds, and other documentation relative to the project. Lot lines and ownership lines, inclusive of locations, bearings, and dimensions, within the survey limits will be shown graphically.
- LS will show any easements, covenants, restrictions, etc. that can be found on plats, deeds, and other public records relative to the project. However, without a Title Commitment or Title Search there is no guarantee that easements, covenants, restrictions, etc. will be shown on the survey.
- LS will establish horizontal and vertical control within the limits of the survey.
- The survey will be geo-referenced to the Florida State Plane Coordinate System based on the North American Datum of 1983/2011 (NAD83/11).
- Elevations will be referenced to the National Geodetic Vertical Datum of 1929 (NGVD29).
- LS will collect significant aboveground improvements including but not limited to; pavement, edge of pavement lines, pavement markings, curb and gutters, sidewalks, driveways (including material), fences and gates, hedges, catch basins, manholes, utility poles, utility boxes, fire hydrants, signs, and any other significant above-ground improvements and utilities within the survey limits.
- LS will locate trees and palms having a three (3) inch diameter or greater at breast height (DBH) or being six (6) feet in height or greater. Identification of trees and/or a tree table will not be provided.
- Elevations will be collected equivalent to a twenty-five (25) foot grid throughout the survey limits. Additional elevations will be collected sufficient to identify grade changes and features of interest within the survey limits.
- A Digital Terrain Model (DTM) of the resulting survey will NOT be provided.

**B. SURVEY LIMITS:**

The roadway of Northeast 26 Avenue from the centerline of Northeast 163 Street North to the curb return pf where Northeast 26 Avenue begins to turn to the East, located in North Miami Beach, FL 33160. Limits include the full width of the public right-of-way, extending approximately fifty (50) feet past the curb return of each intersecting roadway, as per the attached Exhibit.

**C. DELIVERABLES:**

LS will provide a digitally signed and sealed PDF and CAD of the resulting survey. Signed and sealed hardcopies can be provided upon request.

**D. TIME & COST:**

The total professional fee to complete the **Scope of Work** described herein shall be a lump sum of **\$22,175.00**. LS has estimated twenty-four (24) business days from the date of Notice to Proceed (NTP) to complete these tasks. Notice to Proceed (NTP) is considered effective twenty-four (24) hours after this proposal agreement has been executed and returned to the undersigned.



I agree that by signing below "I APPROVE AND ACCEPT" this proposal as a legal binding contract.

By: \_\_\_\_\_  
(Authorized Signature)

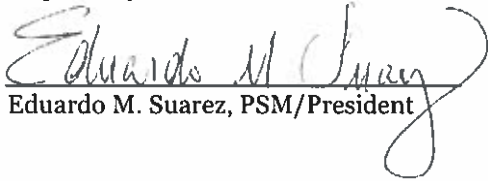
Date: \_\_\_\_\_

\_\_\_\_\_  
(Typed or printed name)

Title: \_\_\_\_\_

On behalf of the firm, I thank you for the opportunity to present this proposal. We look forward to utilizing our best professional efforts on your behalf on this very important project.

Respectfully Yours,

  
Eduardo M. Suarez, PSM/President





Legend

**Exhibit**  
Approximate Survey Limits

Google Earth

500 ft

3150 SW 38<sup>th</sup> Ave., Suite 950  
Miami, FL 33146  
Office: +1 (786) 497-1500



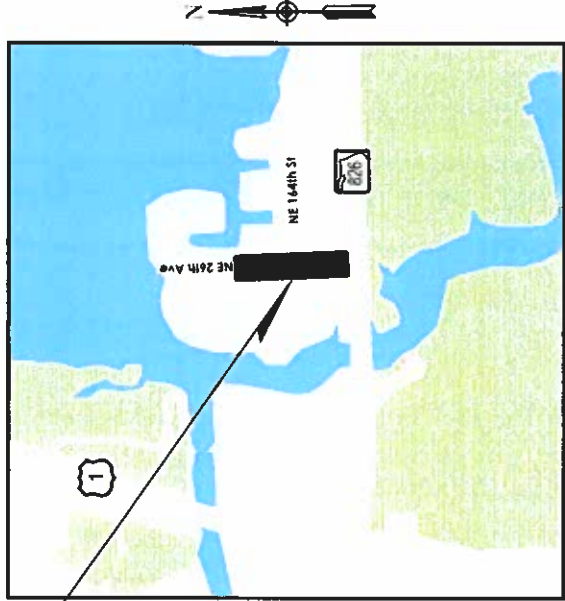
Exhibit B

# NE 26TH AVE TRAFFIC CALMING STUDY

NORTH MIAMI BEACH, FLORIDA 33162

## EXHIBIT - NOT FOR CONSTRUCTION

DATE OF ISSUE: 01/12/2024



SHT #	DGW #	SHEET TITLE
1	C0.00	COVER SHEET
2	C1.01	QUANTITIES
3	C2.01	CONCEPTUAL LAYOUT



City of North Miami Beach  
17011 NE 19th Avenue  
North Miami Beach, FL 33162

AGENCY COMMISSION/COUNCIL


- |                     |                        |
|---------------------|------------------------|
| Evan S. Piper       | Mayor                  |
| Jay R. Chernoff     | Commissioner - Group 2 |
| Daniela Jean        | Commissioner - Group 3 |
| Farluna Smukler     | Commissioner - Group 4 |
| McKenzie Fleurimond | Commissioner - Group 5 |
| Phyllis Smith       | Commissioner - Group 6 |
| Michael Joseph      | Commissioner - Group 7 |

ADMINISTRATION/STAFF

- |                   |                       |
|-------------------|-----------------------|
| Mario A. Diaz     | City Manager          |
| Sam Zamacona E.I. | Public Works Director |



3150 SW 38th Avenue  
Suite 950  
Miami, FL, 33146  
786.497.1500  
www.chenmoore.com



Call 811 or visit sunshine811.com two full business days before digging to have buried facilities located and marked. Check positive response codes before you dig!

LOCATION MAP

PROJECT NUMBER	22-083.042
CLIENT PROJECT NUMBER	
DRAWING NUMBER	C0.00



TABLE OF QUANTITIES		
ITEM DESCRIPTION	QUANTITY	UNIT
W11-2 SIGN	10	EA
W16-9P SIGN	5	EA
W16-7PL SIGN	5	EA
SPEED FEED-BACK SIGN	2	EA
RZ-1 SIGN	2	EA
4' CONCRETE SIDEWALK	183	SY
DETECTABLE WARNING PAD	4	EA
RAISED CROSSWALK	4	EA

**EXHIBIT - NOT FOR CONSTRUCTION**

**PROJECT INFORMATION**

**NE 26TH AVE TRAFFIC CALMING STUDY**  
 NORTH MIAMI BEACH, FLORIDA 33162  
 DRAWING TITLE

PROJECT NUMBER  
22-083.040  
 DATE OF ISSUE  
01/12/2024  
 DRAWING NUMBER

**C1.01**  
2 OF 3

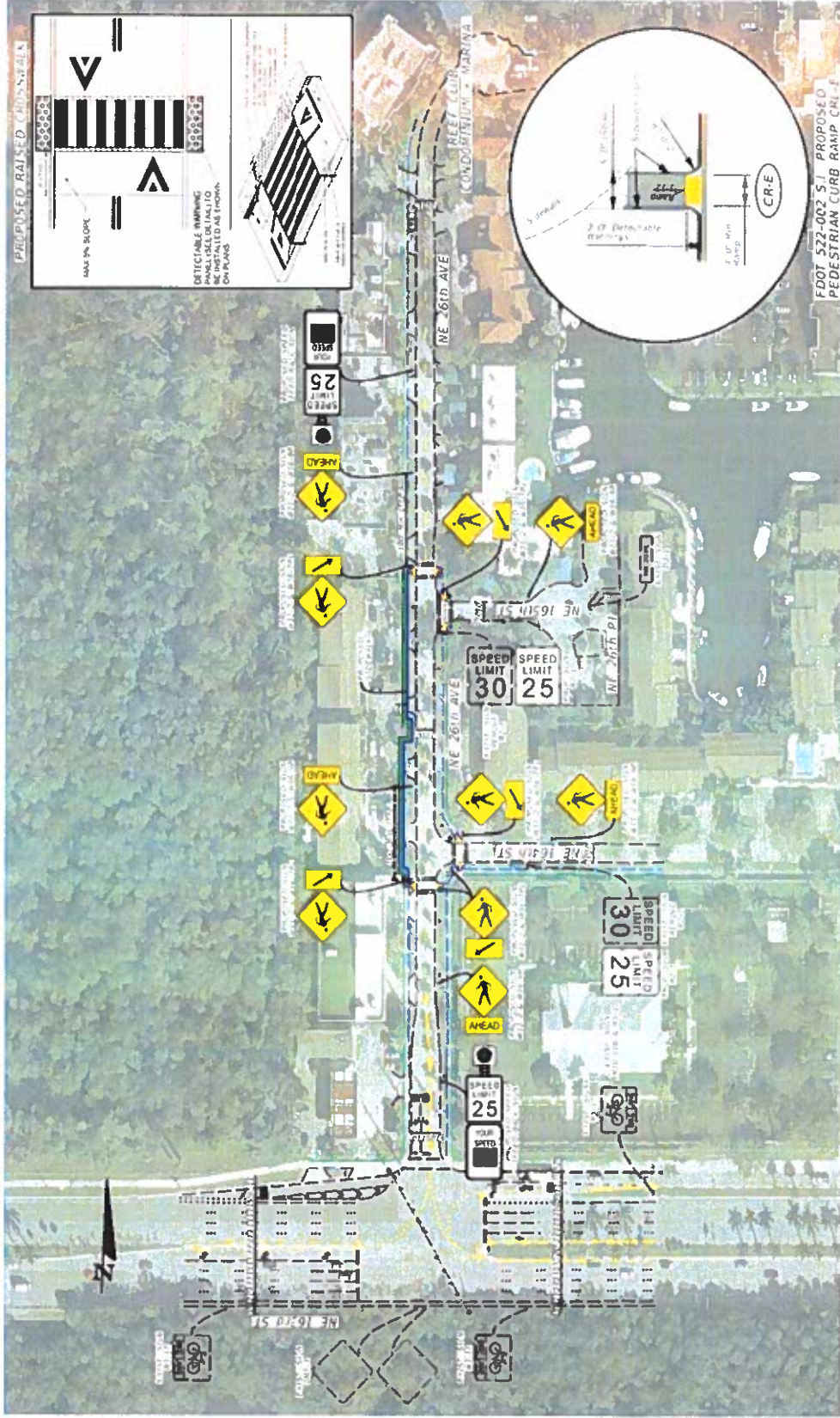
**CLIENT**

3150 SW 38th Avenue  
 Suite 950  
 Miami, FL, 33146  
 786.497.1500  
 www.chenmoore.com



**ema**  
 chen moore and associates

**QUANTITIES**



**EXHIBIT - NOT FOR CONSTRUCTION**

PROJECT NUMBER  
22-083.040  
 DATE OF ISSUE  
01/12/2024  
 DRAWING NUMBER  
**C2.01**  
 3 OF 3

PROJECT INFORMATION  
**NE 26TH AVE TRAFFIC CALMING STUDY**  
 NORTH MIAMI BEACH, FLORIDA 33162  
 DRAWING TITLE  
**CONCEPTUAL LAYOUT**



CLIENT  
 3150 SW 38th Avenue  
 Suite 950  
 Miami, FL, 33146  
 786.497.1500  
 www.chenmoore.com



**NE 26TH AVE TRAFFIC CALMING STUDY**  
**ENGINEER'S OPINION OF PROBABLE COST (EOPC)**



ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
<b>ITEM NO. 1 - GENERAL CONDITIONS</b>					
1- 1	PERFORMANCE AND PAYMENT GUARANTEE AND INSURANCE	1	LS	\$2,500.00	\$2,500.00
1- 2	MOBILIZATION	1	LS	\$7,500.00	\$7,500.00
1- 3	MAINTENANCE OF TRAFFIC	1	LS	\$3,000.00	\$3,000.00
1- 4	SURVEYING, STAKE-OUT, AND AS-BUILT DRAWINGS	1	LS	\$7,500.00	\$7,500.00
	<b>SUBTOTAL</b>				<b>\$20,500</b>

<b>ITEM NO. 2 - DEMOLITION</b>					
2- 1	REMOVE AND DISPOSE EXISTING SIGN	2	EA	\$250.00	\$500.00
	<b>SUBTOTAL</b>				<b>\$500</b>

<b>ITEM NO. 3 - TRAFFIC CALMING MEASURES</b>					
3- 1	FURNISH AND INSTALL SINGLE POST - 1 SIGN	2	EA	\$2,500.00	\$5,000.00
3- 1a	FURNISH AND INSTALL SINGLE POST - 2 SIGNS	10	EA	\$3,000.00	\$30,000.00
3- 2	FURNISH AND INSTALL SPEED FEED-BACK SIGN	2	EA	\$5,000.00	\$10,000.00
3- 3	FURNISH AND INSTALL 4" CONCRETE SIDEWALK	183	SY	\$70.00	\$12,810.00
3- 4	FURNISH AND INSTALL DETECTABLE WARNING PAD	4	EA	\$400.00	\$1,600.00
3- 5	FURNISH AND INSTALL RAISED CROSSWALK	3	EA	\$7,000.00	\$21,000.00
	<b>SUBTOTAL</b>				<b>\$80,410</b>

	TOTAL
<b>TOTAL ESTIMATED CONSTRUCTION COST</b>	
1 ITEM NO. 1 - GENERAL CONDITIONS	\$ 20,500.00
2 ITEM NO. 2 - DEMOLITION	\$ 500.00
3 ITEM NO. 3 - TRAFFIC CALMING MEASURES	\$ 80,410.00
<b>PROJECT SUBTOTAL</b>	<b>\$ 101,410.00</b>
CONTINGENCY (15%)	\$ 15,211.50
<b>PROJECT TOTAL</b>	<b>\$ 116,621.50</b>

*This EOPC provided by ENGINEER is made on the basis of information available to ENGINEER and on the basis of ENGINEER's experience and qualifications, and represents its judgment as an experienced and qualified professional engineer. However, since ENGINEER has no control over the cost of labor, materials, equipment or services furnished by others, or over the contractor's methods of determining prices, or over competitive bidding or market conditions, ENGINEER does not guarantee that proposals, bids or actual project or construction cost will not vary from amounts of probable cost ENGINEER prepares.*









# Chen Moore & Associates - Task Order

Final Audit Report

2024-11-14

Created:	2024-11-14
By:	Ahsan Saleem (ahsan.saleem@citynmb.com)
Status:	Signed
Transaction ID:	CBJCHBCAABAAvTxk0je8OY8ZonRCscH0J7cpmXjjXQ2

## "Chen Moore & Associates - Task Order" History

-  Document created by Ahsan Saleem (ahsan.saleem@citynmb.com)  
2024-11-14 - 6:17:54 PM GMT
-  Document emailed to Sam Zamacona (samuel.zamacona@citynmb.com) for signature  
2024-11-14 - 6:18:00 PM GMT
-  Email viewed by Sam Zamacona (samuel.zamacona@citynmb.com)  
2024-11-14 - 6:27:00 PM GMT
-  Document e-signed by Sam Zamacona (samuel.zamacona@citynmb.com)  
Signature Date: 2024-11-14 - 8:13:53 PM GMT - Time Source: server
-  Document emailed to Mario Diaz (mario.diaz@citynmb.com) for signature  
2024-11-14 - 8:13:54 PM GMT
-  Email viewed by Mario Diaz (mario.diaz@citynmb.com)  
2024-11-14 - 8:14:30 PM GMT
-  Document e-signed by Mario Diaz (mario.diaz@citynmb.com)  
Signature Date: 2024-11-14 - 8:14:42 PM GMT - Time Source: server
-  Agreement completed.  
2024-11-14 - 8:14:42 PM GMT



3150 SW 38<sup>th</sup> Ave., Suite 950  
Miami, FL 33146  
Office: +1 (786) 497-1500

Requisition #409



October 30, 2024

SENT VIA E-MAIL (samuel.zamacona@citynmb.com)

Sam Zamacona E.I.  
Public Works Director  
City of North Miami Beach  
Public Works Department  
17011 NE 19th Avenue,  
North Miami Beach, FL 33162

**Subject: City of North Miami Beach – NE 180<sup>th</sup> Street Traffic Calming Design  
Agreement No.19-082-MC Task Order #18  
CMA Proposal No. 24-0083.P0001.006**

Dear Mr. Zamacona,

Chen Moore and Associates, Inc. (CMA) has prepared and submitted a Traffic study and recommendation of traffic calming measure(s) in this corridor, in accordance with the Interagency Agreement between MDC and the City. The City has also asked CMA to provide a conceptual design of a recommended traffic calming option for this corridor and an associated Engineer's Opinion of Probable Construction Cost (EOPCC). This proposal shall serve as the basis for the requested items herein.

As a result of the study, CMA will prepare Construction Documents to implement the recommended traffic calming devices. We are pleased to submit this Agreement for Professional Services and Scope of Services to provide all remaining civil engineering services for the above referenced project located in the neighborhood along NE 180<sup>th</sup> Street, in North Miami Beach, Florida.

#### **PROJECT STAFFING**

Our staff and team are ready and prepared to work on this project. Chen Moore staff project roles shall be as follows:

Principal – Peter Moore, P.E., President  
Project Director - Jose L. Acosta, P.E., Vice President  
Senior Project Manager – Gregory Mendez, P.E.

Engineering Staff includes the following:

- G. Benjamin Lehr, PE, Principal Engineer
- Andres Aristazabal, Senior Designer
- Eric Harrison, RLA, Senior Landscape Architect
- Stefan Bortak, RLA, CID, Certified irrigation Designer
- Jose McCray, Sr. Construction Specialist

Sub-consultants for this Project

- Land Surveying – Longitude Surveyors, LLC

**chenmoore.com**

CITT 2415

### **SCOPE OF SERVICES**

The scope of services is as follows:

#### **Task 1 – Site data collection and utility coordination**

- Obtain Topographical survey via subconsultant, Longitude Surveyors.
- Obtain Sunshine 611 utility design ticket.
- Consultant shall review survey and/or as-built drawings from local utilities and field verify locations as per available accessibility.

#### **Task 2 – Construction Documents**

- Consultant shall review survey and/or as-built drawings from local utilities and field verify locations as per available accessibility.
- Consultant shall visit the site as necessary to become familiar with and/or document current site conditions.
- Consultant shall arrange and attend meetings with governmental permitting agencies or other authorities having jurisdiction as required regarding any pertinent regulatory requirements and limitations.
- Consultant shall examine and verify all existing site conditions as to their accuracy as depicted on the boundary survey.
- Attendance at up to two meetings with the Client.
- Design and plan preparation including the demolition, earthwork, paving, grading, drainage, water, signing and marking, landscaping, irrigation (if applicable), details, specifications and storm water pollution prevention plans.
- Pre-submittal meetings with related permitting agencies as necessary.
- Complete conflict data table with available information, if applicable.
- Update of the latest Opinion of Probable Cost for this stage of the design.
- Consultant shall prepare technical specifications for the civil engineering design components for use during bidding, aside from what will be included in the design documents (as needed)
- Consultant shall include all general notes, recommending any minimum requirements for a site contractor.

#### **Task 3 – Permitting & Approvals**

- Consultant shall prepare submittal packages and submit for government agency permits with the appropriate calculations and back-up to the following agencies:
- Miami-Dade County – Regulatory and Environmental Resources (RER) – Storm water
- Miami-Dade County Public Works – Traffic Engineering Division
- Miami-Dade County Fire Department
- City of North Miami Beach Public Works
- City of North Miami Beach Utilities
- Tree Removal permit (only if required) with Miami-Dade County RER Tree Section
- Consultant shall revise plans and coordinate permit resubmittals.

#### **Task 4 – Bidding Assistance**

- Attendance at a pre-bid meeting
- Prepare responses to questions from bidders for the scope of work in this proposal.
- Review bids to assist in selecting a qualified contractor.

**Task 5 – Limited Construction Administration Support Services – Consultant shall perform the following:**

- Consultant shall attend one pre-construction meeting, as arranged by the client.
- Consultant shall perform all required shop drawing reviews as they relate to the improvements designed and permitted under this scope of services.
- Consultant shall respond to requests for information (RFIs) during both the bid and construction phases.
- Provide general weekly observation of the work and verification of system testing for the civil engineering. Field reports will be issued to Client on a weekly basis on the week of the field visit. Consultant shall attend scheduled inspections. Contractor shall notify the consultant at least 48 hours in advance of any scheduled inspections.
- Coordination of certification/site close out packages for the following agencies: Miami-Dade County Public Works – Traffic Engineering Division, Miami-Dade County RER, and the City of North Miami Beach.

**BASIS OF SCOPE**

- The basis for the above scope of services and associated fee(s) are based on the following:
- Project shall be completed in one phase.
- Investigation and design of offsite facilities and improvements are only included as directly related to the base scope of services of this project.
- The Project is in the city of North Miami Beach, Florida.
- Off-site improvements including turn lanes, water/sewer main extensions or replacements, building or structural improvements, electrical, lighting, traffic signalization, telecommunications or other utility improvements of any kind beyond the project limits, or as depicted herein, shall be deemed as an Additional Service item and is not included in this proposal.
- An ERP from SFWMD is not included in this proposal.
- No environmental exploration, engineering or permitting of any kind is included in this proposal.
- Landscaping shall be limited to small, hearty, drought-resistant ground cover in southern end of the extended park area as well as any required street trees.
- Specifications shall be included on the design plans
- No modifications or alterations to any traffic signal is proposed under this proposal
- It is assumed that no traffic impact study of any kind shall be required for this project, since it has been properly vetted through the Miami-Dade County Public Works Department Traffic Division.

**INFORMATION TO BE PROVIDED BY CLIENT**

- Information to be provided by City includes the following:
- A letter from the property owner granting access to the site and giving approval for Consultant to perform the services listed above.
- Copies of all relevant data, including correspondence, plans or information in the City's possession which may be beneficial to the work effort performed by Consultant.
- An official CMB Purchase Order (P.O.) to commence with this work.



3150 SW 38<sup>th</sup> Ave., Suite 950  
Miami, FL 33146  
Office: +1 (786) 497-1500



**SCHEDULE AND FEES**

Consultant shall schedule work upon receipt of signed approval and shall provide construction documents, bidding assistance and construction inspection and administrative services in accordance with Agreement No.19-082-MC Professional Services Agreement for General Engineering Services.

The total lump sum fees for this project will be divided as follows:

<u>Task(s)</u>	<u>Task Description</u>	<u>Lump Sum Fees</u>	<u>Total Fees</u>
1	Topographical Survey - Longitude Surveyors	\$17,500.00	
	Site data collection and utility coordination	\$4,900.00	\$22,400.00
2	Construction Documents	\$18,200.00	\$18,200.00
3	Permitting & Approvals	\$7,500.00	\$7,500.00
4	Bidding Assistance	\$3,500.00	\$3,500.00
5	Limited Construction Administration Support Services	\$10,000.00	\$10,000.00
	<b>SUBTOTAL</b>	<b>\$61,600.00</b>	<b>\$61,600.00</b>

Reimbursable expenses for mileage and report preparation have been included in the lump sum fees noted above. Additional reimbursable expenses requested by the Client outside of the items for the tasks above, including delivery of additional copies of items shall be invoiced as defined in our Professional Services Agreement for General Engineering Services

This proposal is based on our understanding of the requirements for engineering services as itemized under the anticipated tasks listed above. Accordingly, we reserve the right to modify this proposal due to any changes in scope.

Should you have any questions, please do not hesitate to contact me by e-mail at [blehr@chenmoore.com](mailto:blehr@chenmoore.com).

Respectfully submitted,

CHEN MOORE AND ASSOCIATES  
G. Benjamin Lehr, P.E.  
Project Manager

Cc: Greg Mendez, P.E., Chen Moore and Associates  
Jose L. Acosta, P.E., Chen Moore and Associates

**ACCEPTED BY**

\_\_\_\_\_  
Mario A. Diaz  
City Manager

\_\_\_\_\_  
Date

3150 SW 38<sup>th</sup> Ave., Suite 950  
Miami, FL 33146  
Office: +1 (786) 497-1500



Exhibit A



Tuesday, February 27, 2024

Ms. Yulet Miguel, PE  
Senior Engineer - Civil  
[ymiguel@chenmoore.com](mailto:ymiguel@chenmoore.com)



500 West Cypress Creek Road, Suite 600  
Fort Lauderdale, FL 33309  
786.218.4858

**RE:** Surveying and Mapping services for the 'City of North Miami Beach – Traffic Calming Project' of Northeast 180 Street located in North Miami Beach, FL 33162.

Dear Ms. Miguel,

Pursuant to your request regarding a fee estimate for Surveying and Mapping services for the above-referenced project, LONGITUDE SURVEYORS, LLC (LS) is pleased to submit the following proposal for your consideration.

**A. SCOPE OF WORK – TOPOGRAPHIC SURVEY:**

- LS will show rights-of-way computing field evidence, plats, deeds, and other documentation relative to the project. Lot lines and ownership lines, inclusive of locations, bearings, and dimensions, within the survey limits will be shown graphically.
- LS will show any easements, covenants, restrictions, etc. that can be found on plats, deeds, and other public records relative to the project. However, without a Title Commitment or Title Search there is no guarantee that easements, covenants, restrictions, etc. will be shown on the survey.
- LS will establish horizontal and vertical control within the limits of the survey.
- The survey will be geo-referenced to the Florida State Plane Coordinate System based on the North American Datum of 1983/2011 (NAD83/11).
- Elevations will be referenced to the National Geodetic Vertical Datum of 1929 (NGVD29).
- LS will collect significant aboveground improvements including but not limited to; pavement, edge of pavement lines, pavement markings, sidewalks, driveways (including material), fences and gates, light poles, hedges, catch basins, manholes, utility poles, utility boxes, fire hydrants, utility poles, signs, and any other significant above-ground improvements and utilities within the survey limits.
- LS will locate trees and palms having a three (3) inch diameter or greater at breast height (DBH) or being six (6) feet in height or greater. Identification of trees and/or a tree table will not be provided.
- Elevations will be collected equivalent to a twenty-five (25) foot grid throughout the survey limits. Additional elevations will be collected sufficient to identify grade changes and features of interest within the survey limits.
- A Digital Terrain Model (DTM) of the resulting survey will NOT be provided.

**B. SURVEY LIMITS:**

The roadway of Northeast 180 Street from the intersection of Northeast 12 Avenue to the intersection of Northeast 14 Avenue, located in North Miami Beach, FL 33162. Limits include the full width of the public right-of-way, extending approximately fifty (50) feet past the curb return of each intersecting roadway, as per the attached Exhibit.

**C. DELIVERABLES:**

LS will provide a digitally signed and sealed PDF and CAD of the resulting survey. Signed and sealed hardcopies can be provided upon request.

**D. TIME & COST:**

The total professional fee to complete the **Scope of Work** described herein shall be a lump sum of **\$17,500.00**. LS has estimated **twenty (20) business days** from the date of Notice to Proceed (NTP) to complete these tasks. Notice to Proceed (NTP) is considered effective twenty-four (24) hours after this proposal agreement has been executed and returned to the undersigned.



I agree that by signing below "I APPROVE AND ACCEPT" this proposal as a legal binding contract.

By: \_\_\_\_\_  
(Authorized Signature)

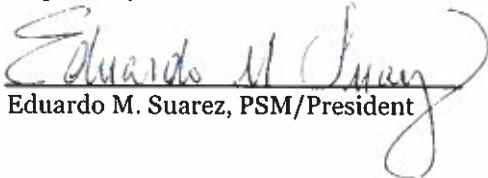
Date: \_\_\_\_\_

\_\_\_\_\_  
(Typed or printed name)

Title: \_\_\_\_\_

On behalf of the firm, I thank you for the opportunity to present this proposal. We look forward to utilizing our best professional efforts on your behalf on this very important project.

Respectfully Yours,

  
Eduardo M. Suarez, PSM/President





**Exhibit**  
Approximate Survey Limits

Legend

400 ft

Person Paul Yatin Retiring

Actual Misc

Celia Recording Studio

Mars B. N. La Sca

Astis wings



3150 SW 38<sup>th</sup> Ave., Suite 950  
Miami, FL 33146  
Office: +1 (786) 497-1500



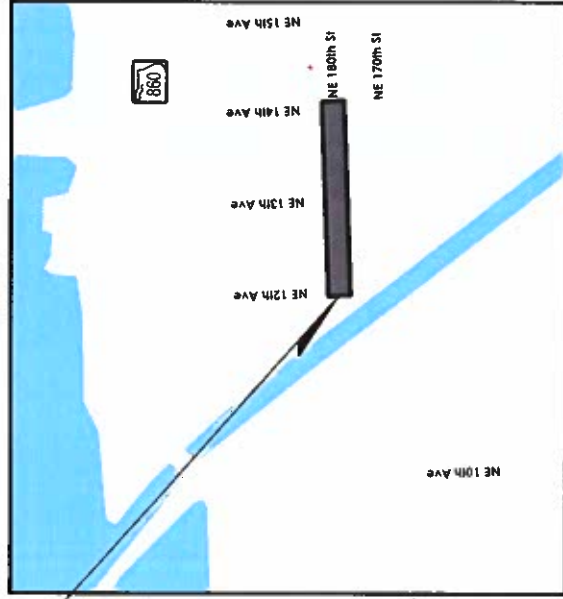
Exhibit B

# NE 180TH ST TRAFFIC CALMING STUDY

NORTH MIAMI BEACH, FLORIDA 33162

EXHIBIT - NOT FOR CONSTRUCTION

DATE OF ISSUE: 01/12/2024



SHT #	DGW #	SHEET TITLE
1	C0.00	COVER SHEET
2	C1.01	QUANTITIES
3	C2.01	CONCEPTUAL LAYOUT



City of North Miami Beach  
17011 NE 19th Avenue  
North Miami Beach, FL 33162

AGENCY COMMISSION/COUNCIL

- |                     |                        |
|---------------------|------------------------|
| Evan S. Piper       | Mayor                  |
| Jay R. Chernoff     | Commissioner - Group 2 |
| Daniela Jean        | Commissioner - Group 3 |
| Fortuna Smukler     | Commissioner - Group 4 |
| McKenzie Fleurimond | Commissioner - Group 5 |
| Phyllis Smith       | Commissioner - Group 6 |
| Michael Joseph      | Commissioner - Group 7 |

ADMINISTRATION/STAFF

- |                   |                       |
|-------------------|-----------------------|
| Mario A. Diaz     | City Manager          |
| Sam Zamacona E.I. | Public Works Director |



3150 SW 38th Avenue  
Suite 950  
Miami, FL, 33146  
786.497.1500  
www.chenmoore.com

**Sunshine 811**  
Call 811 or visit [sunshine811.com](http://sunshine811.com) two full business days before digging to have buried facilities located and marked. Check positive response codes before you dig!

LOCATION MAP

SECTION 17, TOWNSHIP 52S, RANGE 42E  
N.15

PROJECT NUMBER	22-083.042
CLIENT PROJECT NUMBER	
DRAWING NUMBER	C0.00



TABLE OF QUANTITIES		
ITEM DESCRIPTION	QUANTITY	UNIT
W16-9P SIGN	4	EA
W16-7PL SIGN	4	EA
W17-1 SIGN	8	EA
R2-1 SIGN	2	EA
SPEED HUMP (INCLUSIVE OF ADVANCE WARNING MARKING)	2	EA

**EXHIBIT - NOT FOR CONSTRUCTION**

**PROJECT INFORMATION**

**NE 180TH ST TRAFFIC CALMING STUDY**  
 NORTH MIAMI BEACH, FLORIDA 33162  
 DRAWING TITLE

PROJECT NUMBER  
 22-083.041  
 DATE OF ISSUE  
 01/12/2024  
 DRAWING NUMBER

**C1.01**  
 2 OF 3

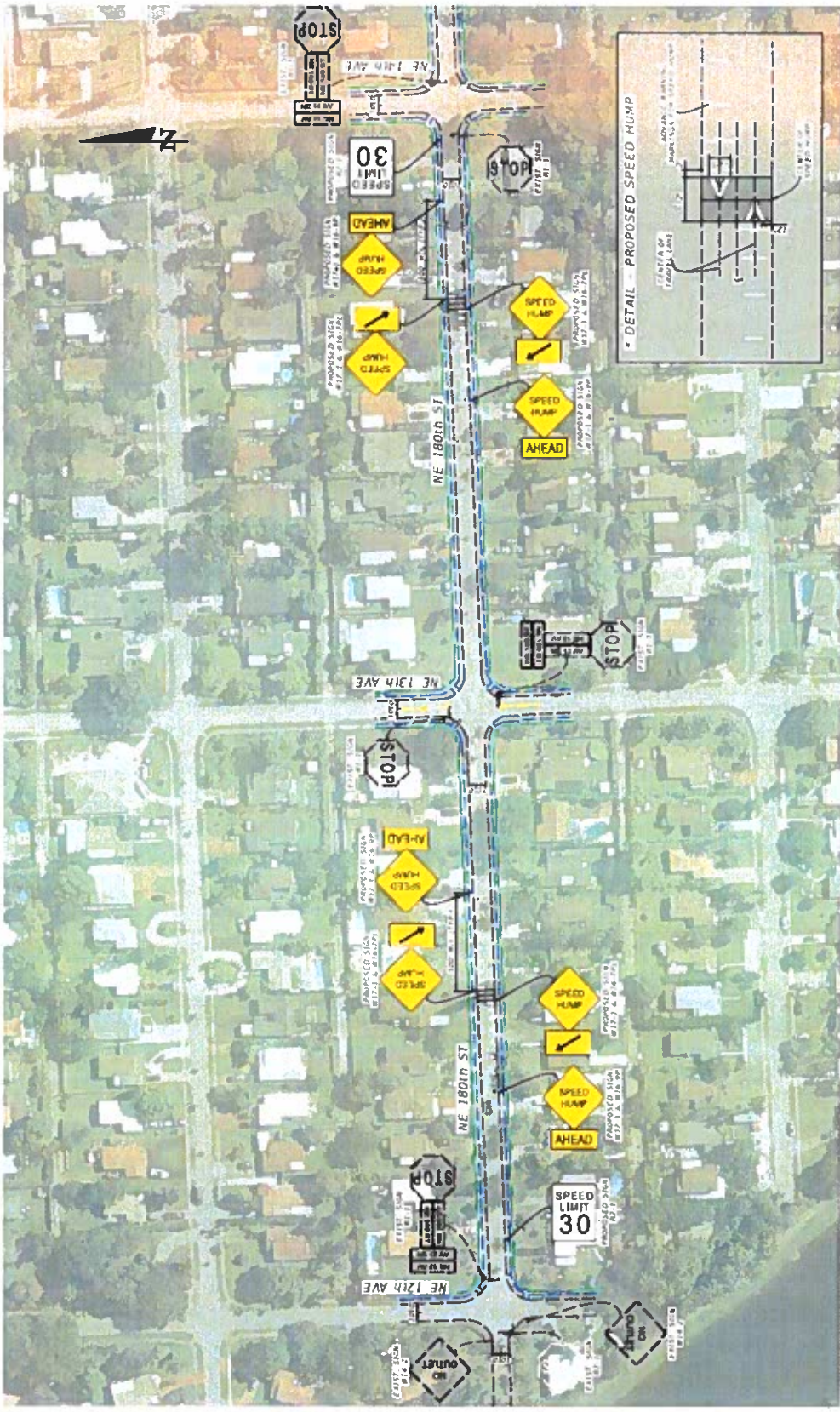
**CLIENT**



3150 SW 38th Avenue  
 Suite 950  
 Miami, FL 33146  
 786.497.1500  
 www.chenmoore.com

**ema**  
 chen moore and associates

**QUANTITIES**



**EXHIBIT - NOT FOR CONSTRUCTION**

**PROJECT NUMBER**  
22-083.041  
**DATE OF ISSUE**  
01/12/2024  
**DRAWING NUMBER**  
**C2.01**  
 3 OF 3

**PROJECT INFORMATION**  
**NE 180TH ST TRAFFIC CALMING STUDY**  
 NORTH MIAMI BEACH, FLORIDA 33162  
**DRAWING TITLE**  
**CONCEPTUAL LAYOUT**



**CLIENT**  
 3150 SW 38th Avenue  
 Suite 950  
 Miami, FL 33146  
 786.497.1500  
 www.chenmoore.com



**NE 180TH STREET TRAFFIC CALMING STUDY**  
**ENGINEER'S OPINION OF PROBABLE COST (EOPC)**



ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
<b>ITEM NO. 1 - GENERAL CONDITIONS</b>					
1- 1	PERFORMANCE AND PAYMENT GUARANTEE AND INSURANCE	1	LS	\$2,000.00	\$2,000.00
1- 2	MOBILIZATION	1	LS	\$5,000.00	\$5,000.00
1- 3	MAINTENANCE OF TRAFFIC	1	LS	\$2,000.00	\$2,000.00
1- 4	SURVEYING, STAKE-OUT, AND AS-BUILT DRAWINGS	1	LS	\$7,500.00	\$7,500.00
	<b>SUBTOTAL</b>			<b>\$16,500.00</b>	

<b>ITEM NO. 2 - TRAFFIC CALMING MEASURES</b>					
3- 1	FURNISH AND INSTALL SINGLE POST - 1 SIGN	2	EA	\$2,500.00	\$5,000.00
3- 1A	FURNISH AND INSTALL SINGLE POST - 2 SIGNS	8	EA	\$3,000.00	\$24,000.00
3- 2	FURNISH AND INSTALL SPEED HUMP (INCLUSIVE OF ADVANCED WARNING MARKINGS)	2	EA	\$1,500.00	\$3,000.00
	<b>SUBTOTAL</b>			<b>\$32,000.00</b>	

<b>TOTAL ESTIMATED CONSTRUCTION COST</b>		<b>TOTAL</b>
1	ITEM NO. 1 - GENERAL CONDITIONS	\$ 16,500.00
2	ITEM NO. 2 - TRAFFIC CALMING MEASURES	\$ 32,000.00
	<b>PROJECT SUBTOTAL</b>	<b>\$ 48,500.00</b>
	CONTINGENCY (15%)	\$ 7,275.00
	<b>PROJECT TOTAL</b>	<b>\$ 55,775.00</b>

*This EOPC provided by ENGINEER is made on the basis of information available to ENGINEER and on the basis of ENGINEER'S experience and qualifications, and represents its judgment as an experienced and qualified professional engineer. However, since ENGINEER has no control over the cost of labor, materials, equipment or services furnished by others, or over the contractor's methods of determining prices, or over competitive bidding or market conditions, ENGINEER does not guarantee that proposals, bids or actual project or construction cost will not vary from opinions of probable cost ENGINEER prepares.*



CIT 2404

Requisition # 517

Vendor # 493161

3150 SW 38<sup>th</sup> Ave., Suite 950  
Miami, FL 33146  
Office: +1 (786) 497-1500



November 12, 2024

SENT VIA E-MAIL (samuel.zamacona@citynmb.com)

Sam Zamacona E.I.  
Public Works Director  
City of North Miami Beach  
Public Works Department  
17011 NE 19th Avenue,  
North Miami Beach, FL 33162

**Subject: City of North Miami Beach – NE 168<sup>th</sup> St from NE 6<sup>th</sup> Ct to NE 8<sup>th</sup> Ave (Pan Uleta)  
Agreement No.19-082-MC Task Order #16  
CMA Proposal No. 24-0083.P0001.005**

Dear Mr. Zamacona,

Chen Moore and Associates, Inc. (CMA) has prepared and submitted a Traffic study and recommendation of traffic calming measure(s) in this corridor, in accordance with the Interagency Agreement between MDC and the City. The City has also asked CMA to provide a conceptual design of a recommended traffic calming option for this corridor and an associated Engineer's Opinion of Probable Construction Cost (EOPCC). This proposal shall serve as the basis for the requested items herein.

As a result of the study, CMA will prepare Construction Documents to implement the recommended traffic calming devices. We are pleased to submit this Agreement for Professional Services and Scope of Services to provide all remaining civil engineering services for the above referenced project located in the Pan Uleta neighborhood to the immediate north of NE 168<sup>th</sup> Street between NE 6<sup>th</sup> Ct and NE 8<sup>th</sup> Ave, in North Miami Beach, Florida.

#### **PROJECT STAFFING**

Our staff and team are ready and prepared to work on this project. Chen Moore staff project roles shall be as follows:

Principal – Peter Moore, P.E., President  
Project Director - Jose L. Acosta, P.E., Vice President  
Senior Project Manager – Gregory Mendez, P.E.

Engineering Staff includes the following:

- G. Benjamin Lehr, PE, Principal Engineer
- Andres Aristazabal, Senior Designer
- Eric Harrison, RLA, Senior Landscape Architect
- Stefan Bortak, RLA, CID, Certified irrigation Designer
- Jose McCray, Sr. Construction Specialist

**chenmoore.com**

3150 SW 38<sup>th</sup> Ave., Suite 950  
Miami, FL 33146  
Office: +1 (786) 497-1500



Sub-consultants for this Project

- Land Surveying – Longitude Surveyors, LLC
- 

### **SCOPE OF SERVICES**

The scope of services is as follows:

#### **Task 1 – Site data collection and utility coordination**

- Obtain Topographical survey via subconsultant, Longitude Surveyors.
- Obtain Sunshine 611 utility design ticket.
- Consultant shall review survey and/or as-built drawings from local utilities and field verify locations as per available accessibility.

#### **Task 2 – Construction Documents**

- Consultant shall review survey and/or as-built drawings from local utilities and field verify locations as per available accessibility.
- Consultant shall visit the site as necessary to become familiar with and/or document current site conditions.
- Consultant shall arrange and attend meetings with governmental permitting agencies or other authorities having jurisdiction as required regarding any pertinent regulatory requirements and limitations.
- Consultant shall examine and verify all existing site conditions as to their accuracy as depicted on the boundary survey.
- Attendance at up to two meetings with the Client.
- Design and plan preparation including the demolition, earthwork, paving, grading, drainage, water, signing and marking, landscaping, irrigation (if applicable), details, specifications and storm water pollution prevention plans.
- Pre-submittal meetings with related permitting agencies as necessary.
- Complete conflict data table with available information, if applicable.
- Update of the latest Opinion of Probable Cost for this stage of the design.
- Consultant shall prepare technical specifications for the civil engineering design components for use during bidding, aside from what will be included in the design documents (as needed)
- Consultant shall include all general notes, recommending any minimum requirements for a site contractor.

#### **Task 3 – Permitting & Approvals**

- Consultant shall prepare submittal packages and submit for government agency permits with the appropriate calculations and back-up to the following agencies:
- Miami-Dade County – Regulatory and Environmental Resources (RER) – Storm water
- Miami-Dade County Public Works – Traffic Engineering Division
- Miami-Dade County Fire Department
- City of North Miami Beach Public Works
- City of North Miami Beach Utilities
- Tree Removal permit (only if required) with Miami-Dade County RER Tree Section
- Consultant shall revise plans and coordinate permit resubmittals.

3150 SW 38<sup>th</sup> Ave., Suite 950  
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Office: +1 (786) 497-1500



#### **Task 4 – Bidding Assistance**

- Attendance at a pre-bid meeting
- Prepare responses to questions from bidders for the scope of work in this proposal.
- Review bids to assist in selecting a qualified contractor.

#### **Task 5 – Limited Construction Administration Support Services – Consultant shall perform the following:**

- Consultant shall attend one pre-construction meeting, as arranged by the client.
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- Consultant shall respond to requests for information (RFIs) during both the bid and construction phases.
- Provide general weekly observation of the work and verification of system testing for the civil engineering. Field reports will be issued to Client on a weekly basis on the week of the field visit. Consultant shall attend scheduled inspections. Contractor shall notify the consultant at least 48 hours in advance of any scheduled inspections.
- Coordination of certification/site close out packages for the following agencies: Miami-Dade County Public Works – Traffic Engineering Division, Miami-Dade County RER, and the City of North Miami Beach.

#### **BASIS OF SCOPE**

- The basis for the above scope of services and associated fee(s) are based on the following:
- Project shall be completed in one phase.
- Investigation and design of offsite facilities and improvements are only included as directly related to the base scope of services of this project.
- The Project is in the city of North Miami Beach, Florida.
- Off-site improvements including turn lanes, water/sewer main extensions or replacements, building or structural improvements, electrical, lighting, traffic signalization, telecommunications or other utility improvements of any kind beyond the project limits, or as depicted herein, shall be deemed as an Additional Service item and is not included in this proposal.
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- No environmental exploration, engineering or permitting of any kind is included in this proposal.
- Landscaping shall be limited to small, hearty, drought-resistant ground cover in southern end of the extended park area as well as any required street trees.
- Specifications shall be included on the design plans
- No modifications or alterations to any traffic signal is proposed under this proposal
- It is assumed that no traffic impact study of any kind shall be required for this project, since it has been properly vetted through the Miami-Dade County Public Works Department Traffic Division.

#### **INFORMATION TO BE PROVIDED BY CLIENT**

- Information to be provided by City includes the following:
- A letter from the property owner granting access to the site and giving approval for Consultant to perform the services listed above.
- Copies of all relevant data, including correspondence, plans or information in the City's possession which may be beneficial to the work effort performed by Consultant.
- An official CMB Purchase Order (P.O.) to commence with this work.

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**SCHEDULE AND FEES**

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The total lump sum fees for this project will be divided as follows:

<u>Task(s)</u>	<u>Task Description</u>	<u>Lump Sum Fees</u>	<u>Total Fees</u>
1	Topographical Survey - Longitude Surveyors	\$20,300.00	
	Site data collection and utility coordination	\$5,400.00	\$25,700.00
2	Construction Documents	\$20,840.00	\$20,840.00
3	Permitting & Approvals	\$7,500.00	\$7,500.00
4	Bidding Assistance	\$3,500.00	\$3,500.00
5	Limited Construction Administration Support Services	\$10,000.00	\$10,000.00
	<b>SUBTOTAL</b>	<b>\$67,540.00</b>	<b>\$67,540.00</b>

Reimbursable expenses for mileage and report preparation have been included in the lump sum fees noted above. Additional reimbursable expenses requested by the Client outside of the items for the tasks above, including delivery of additional copies of items shall be invoiced as defined in our Professional Services Agreement for General Engineering Services

This proposal is based on our understanding of the requirements for engineering services as itemized under the anticipated tasks listed above. Accordingly, we reserve the right to modify this proposal due to any changes in scope.

Should you have any questions, please do not hesitate to contact me by e-mail at [blehr@chenmoore.com](mailto:blehr@chenmoore.com).

Respectfully submitted,

CHEN MOORE AND ASSOCIATES  
G. Benjamin Lehr, P.E.  
Project Manager

Cc: Greg Mendez, P.E., Chen Moore and Associates  
Jose L. Acosta, P.E., Chen Moore and Associates

**ACCEPTED BY**

\_\_\_\_\_  
Mario A. Diaz  
City Manager

\_\_\_\_\_  
Date



---

**3150 SW 38<sup>th</sup> Ave., Suite 950**  
**Miami, FL 33146**  
Office: +1 (786) 497-1500



Exhibit A



Tuesday, February 27, 2024

Ms. Yulet Miguel, PE  
Senior Engineer - Civil  
[ymiguel@chenmoore.com](mailto:ymiguel@chenmoore.com)



500 West Cypress Creek Road, Suite 600  
Fort Lauderdale, FL 33309  
786.218.4858

**RE:** Surveying and Mapping services for the 'City of North Miami Beach – Traffic Calming Project' of Northeast 168 Street located in North Miami Beach, FL 33162.

Dear Ms. Miguel,

Pursuant to your request regarding a fee estimate for Surveying and Mapping services for the above-referenced project, LONGITUDE SURVEYORS, LLC (LS) is pleased to submit the following proposal for your consideration.

**A. SCOPE OF WORK – TOPOGRAPHIC SURVEY:**

- LS will show rights-of-way computing field evidence, plats, deeds, and other documentation relative to the project. Lot lines and ownership lines, inclusive of locations, bearings, and dimensions, within the survey limits will be shown graphically.
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- LS will locate trees and palms having a three (3) inch diameter or greater at breast height (DBH) or being six (6) feet in height or greater. Identification of trees and/or a tree table will not be provided.
- Elevations will be collected equivalent to a twenty-five (25) foot grid throughout the survey limits. Additional elevations will be collected sufficient to identify grade changes and features of interest within the survey limits.
- A Digital Terrain Model (DTM) of the resulting survey will NOT be provided.

**B. SURVEY LIMITS:**

The roadway of Northeast 169 Street from the intersection of Northeast 8 Avenue, West to Northeast 6 Court, then South on Northeast 6 Court which turns to the East and becomes Northeast 168 Street, located in North Miami Beach, FL 33162. Limits include the full width of the public right-of-way, extending approximately fifty (50) feet past the curb return of each intersecting roadway, as per the attached Exhibit.

**C. DELIVERABLES:**

LS will provide a digitally signed and sealed PDF and CAD of the resulting survey. Signed and sealed hardcopies can be provided upon request.

**D. TIME & COST:**

The total professional fee to complete the **Scope of Work** described herein shall be a lump sum of **\$20,300.00**. LS has estimated **twenty-two (22) business days** from the date of Notice to Proceed (NTP) to complete these tasks. Notice to Proceed (NTP) is considered effective twenty-four (24) hours after this proposal agreement has been executed and returned to the undersigned.



I agree that by signing below "I APPROVE AND ACCEPT" this proposal as a legal binding contract.

By: \_\_\_\_\_  
(Authorized Signature)

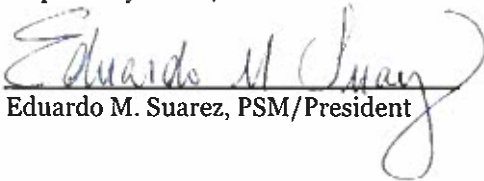
Date: \_\_\_\_\_

\_\_\_\_\_  
(Typed or printed name)

Title: \_\_\_\_\_

On behalf of the firm, I thank you for the opportunity to present this proposal. We look forward to utilizing our best professional efforts on your behalf on this very important project.

Respectfully Yours,

  
Eduardo M. Suarez, PSM/President



# Exhibit

Approximate Survey limits

# Legend





3150 SW 38<sup>th</sup> Ave., Suite 950  
Miami, FL 33146  
Office: +1 (786) 497-1500



Exhibit B

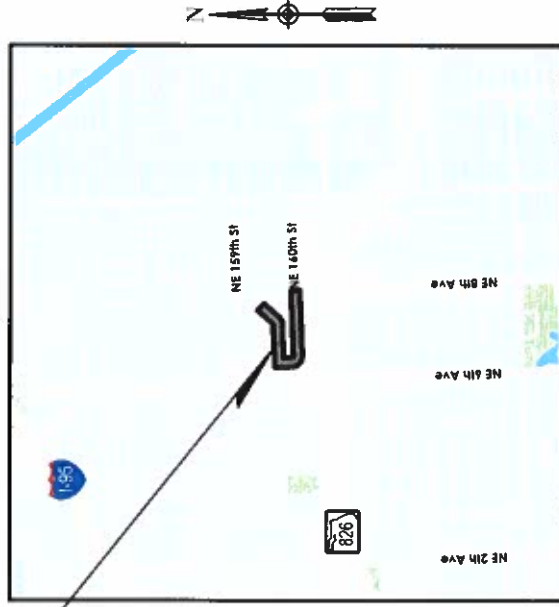
# NE 168TH ST TRAFFIC CALMING STUDY

NORTH MIAMI BEACH, FLORIDA 33162

EXHIBIT - NOT FOR CONSTRUCTION

DATE OF ISSUE: 01/12/2024

PROJECT LOCATION



SHT #	DGW #	SHEET TITLE
1	C0.00	COVER SHEET
2	C1.01	QUANTITIES
3	C2.01	CONCEPTUAL LAYOUT



City of North Miami Beach  
17011 NE 19th Avenue  
North Miami Beach, FL 33162

AGENCY COMMISSION/COUNCIL

- |                    |                        |
|--------------------|------------------------|
| Evan S. Piper      | Mayor                  |
| Jay R. Chernoff    | Commissioner - Group 2 |
| Daniela Jean       | Commissioner - Group 3 |
| Fortuna Smukler    | Commissioner - Group 4 |
| McKenzie Fleutmond | Commissioner - Group 5 |
| Phyllis Smith      | Commissioner - Group 6 |
| Michael Joseph     | Commissioner - Group 7 |

ADMINISTRATION/STAFF

- |                   |                       |
|-------------------|-----------------------|
| Mario A. Diaz     | City Manager          |
| Sam Zamacona E.I. | Public Works Director |



3150 SW 38th Avenue  
Suite 950  
Miami, FL, 33146  
786.497.1500  
www.chenmoore.com

PROJECT NUMBER	22-083-042
CLIENT PROJECT NUMBER	
DRAWING NUMBER	C0.00

**TABLE OF QUANTITIES**

ITEM DESCRIPTION	QUANTITY	UNIT
W11-2 SIGN	4	EA
W17-1 SIGN	8	EA
R6-4 SIGN	4	EA
R1-2 SIGN	4	EA
W16-9P SIGN	8	EA
W16-7PL SIGN	8	LF
W2-6 SIGN	4	EA
W1-6L SIGN	1	EA
OM1-1 SIGN	3	EA
12" WHITE PAVEMENT MARKING	225	LF
24" WHITE PAVEMENT MARKING	175	LF
6" YELLOW PAVEMENT MARKING	190	LF
4" CONCRETE SIDEWALK	48	SY
TYPE 'D' CURB	160	LF
DETECTABLE WARNING	8	EA
TRAFFIC CIRCLE (INCLUSIVE OF PAVERS, TYPE 'A' CURB, AND SOD)	1	EA
SPEED HUMPS (INCLUSIVE OF ADVANCE WARNING MARKING)	2	EA
CURVE PROTECTION (INCLUSIVE OF GUARD RAIL AND SCREENING)	60	LF

**LEGEND**

**(A)** PROP. R6-4 SIGN  
**(B)** PROP. R1-2 SIGN  
**(C)** PROP. W11-2 & W16-7PL SIGNS  
**(D)** PROP. W2-6 & W16-9P SIGNS  
**(E)** PROP. W17-1 & W16-7PL SIGNS  
**(F)** PROP. W17-1 & W16-9P SIGNS  
**(G)** PROP. (3) OM1-1 & W1-6L SIGNS

**EXHIBIT - NOT FOR CONSTRUCTION**

**PROJECT INFORMATION**

**NE 168TH ST TRAFFIC CALMING STUDY**  
 NORTH MIAMI BEACH, FLORIDA 33162  
 DRAWING TITLE

PROJECT NUMBER  
23-083.043  
 DATE OF ISSUE  
01/12/2024  
 DRAWING NUMBER

**C1.01**  
 2 OF 3

**CLIENT**

3150 SW 38th Avenue  
 Suite 950  
 Miami, FL, 33146  
 786.497.1500  
 www.chenmoore.com



**Chen Moore and Associates**

**QUANTITIES**





**EXHIBIT - NOT FOR CONSTRUCTION**

**PROJECT INFORMATION**

**NE 168TH ST TRAFFIC CALMING STUDY**  
 NORTH MIAMI BEACH, FLORIDA 33162  
 DRAWING TITLE

PROJECT NUMBER  
 23-083.043  
 DATE OF ISSUE  
 01/12/2024  
 DRAWING NUMBER

**C2.01**  
 3 OF 3

**CLIENT**



3150 SW 38th Avenue  
 Suite 950  
 Miami, FL 33146  
 786.497.1500  
 www.chenmoore.com

**ema**  
 chen moore and associates

**NE 168TH STREET TRAFFIC CALMING STUDY**  
**ENGINEER'S OPINION OF PROBABLE COST (EOPC)**



ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
<b>ITEM NO. 1 - GENERAL CONDITIONS</b>					
1-1	PERFORMANCE AND PAYMENT GUARANTEE AND INSURANCE	1	LS	\$5,000.00	\$5,000.00
1-2	MOBILIZATION	1	LS	\$15,000.00	\$15,000.00
1-3	MAINTENANCE OF TRAFFIC	1	LS	\$7,000.00	\$7,000.00
1-4	SURVEYING, STAKE-OUT, AND AS-BUILT DRAWINGS	1	LS	\$10,000.00	\$10,000.00
	<b>SUBTOTAL</b>				<b>\$37,000</b>

<b>ITEM NO. 2 - TRAFFIC CALMING MEASURES</b>					
2-1	FURNISH AND INSTALL SINGLE POST SIGN - 1 SIGN	12	EA	\$2,500.00	\$30,000.00
2-1A	FURNISH AND INSTALL SINGLE POST SIGN - 2 SIGN	16	EA	\$3,000.00	\$48,000.00
2-2	FURNISH AND PLACE 12-INCH SOLID WHITE THERMOPLASTIC	175	LF	\$3.00	\$525.00
2-3	FURNISH AND PLACE 24-INCH SOLID WHITE THERMOPLASTIC	225	LF	\$6.00	\$1,350.00
2-4	FURNISH AND PLACE 6-INCH SOLID YELLOW THERMOPLASTIC	190	LF	\$2.00	\$380.00
2-5	FURNISH AND INSTALL 4" CONCRETE SIDEWALK	48	SY	\$70.00	\$3,360.00
2-6	FURNISH AND INSTALL TYPE 'D' CURB	160	LF	\$32.50	\$5,200.00
2-7	FURNISH AND INSTALL DETECTABLE WARNING PAD	8	EA	\$400.00	\$3,200.00
2-8	FURNISH AND INSTALL TRAFFIC CIRCLE (INCLUSIVE OF PAVERS, TYPE 'A' CURB, AND SOD)	1	EA	\$13,000.00	\$13,000.00
2-9	FURNISH AND INSTALL SPEED HUMP (INCLUSIVE OF ADVANCED WARNING MARKINGS)	2	EA	\$1,500.00	\$3,000.00
2-10	FURNISH AND INSTALL CURVE PROTECTION (INCLUSIVE OF GUARD RAIL AND SCREENING)	60	LF	\$40.00	\$2,400.00
	<b>SUBTOTAL</b>				<b>\$110,415</b>

<b>TOTAL ESTIMATED CONSTRUCTION COST</b>		<b>TOTAL</b>
1	ITEM NO. 1 - GENERAL CONDITIONS	\$ 37,000.00
2	ITEM NO. 2 - TRAFFIC CALMING MEASURES	\$ 110,415.00
	<b>PROJECT SUBTOTAL</b>	<b>\$ 147,415.00</b>
	CONTINGENCY (15%)	\$ 22,112.25
	<b>PROJECT TOTAL</b>	<b>\$ 169,527.25</b>

*This EOPC provided by ENGINEER is made on the basis of information available to ENGINEER and on the basis of ENGINEER's experience and qualifications, and represents its judgment as an experienced and qualified professional engineer. However, since ENGINEER has no control over the cost of labor, materials, equipment or services furnished by others, or over the contractor's methods of determining prices, or over competitive bidding or market conditions, ENGINEER does not guarantee that proposals, bids or actual project or construction cost will not vary from opinions of probable cost ENGINEER prepares.*





City of North Miami Beach  
17011 NE 19<sup>th</sup> Avenue  
North Miami Beach, FL 33162  
305-947-7581  
www.citynmb.com

## MEMORANDUM

**TO:** The Honorable Mayor and Commission  
**FROM:** Samuel Zamacona E.I., Public Works Director  
**VIA:** Mario Diaz, City Manager  
Shereece George, Chief Procurement Officer  
**DATE:** November 25, 2024  
**RE:** Resolution No. R2025-xx to Approve a Task Order for Engineering Services for Design of Traffic Calming Projects

---

On September 2024, the City Commission approved the FY25 Budget which included approximately \$3,250,315 Citywide Traffic Calming projects. Staff requests approval of task orders to Chen Moore & Associates for \$470,455.00 for the Design of seven traffic calming projects.

The traffic calming projects support the city's strategic plan for safe streets by reducing speeding and accidents. These projects were identified through various means: resident complaints, Police Department observations and traffic studies.

Please reference project details below:

### **Requisition # 517: (\$470,455 for Design) – Pan Uleta – 651 NE 168th Streets**

- **Project Name:** Traffic Calming – Pan Uleta 651<sup>st</sup> NE 168th Streets
- **CIP Project No.:** NMB-F24-013
- **Scope of Work:** Design of Mini Roundabout
- **Budget (Design):** \$220,000 (LOGT, Approved in FY25 CIP Budget)
- **Benefit:** Reduce Speeding + Accident Occurrence
- **Background:** Study completed in FY24; Design approved FY25 CIP Budget. Construction FY26
- **Schedule:** Planning & Design 08/01/24 – 5/28/25, Bidding 06/03/25-09/03/25 and Construction 10/01/25-05/01/26 (pending approval of FY26 Budget).



## Requisition # 412: (\$69,675 for Design) - NE 163<sup>rd</sup>-165th St & 26th Ave

- **Project Name:** Traffic Calming - NE 165 ST and NE 26 AVE
- **CIP Project No.:** NMB-FY24-015
- **Scope of Work:**
  - Installation of a high visibility- raised mid-block crosswalk near the NE 26th Ave. and NE 165th Street intersection
  - Electronic speed feedback signs (ESFS) north of NE 165th St and north of NE 163rd Streets. Install 25 MPH Speed Signs.
  - Sidewalk along the west side of the section of 26th Ave from 165th Street to 163rd Street.
- **Budget (Design + Construction):** \$179,675 (CITT + LOGT, Approved in FY25 CIP Budget)
- **Benefit:** Reduce Speeding + Accident Occurrence + Pedestrian Safety
- **Background:** Study completed in FY24, Design and Construction approved FY25 CIP Budget.
- **Schedule:** Planning & Design 08/01/24 – 2/28/25, Bidding 03/03/25-07/03/25 and Construction 07/09/25-12/30/25. Electronic speed feedbacks signs pending FY26 approved budget.



## Requisition # 409: (\$61,600 for Design) - NE 180th St & 12th Ave

- **Project Name:** Traffic Calming - NE 180 ST and NE 12 AVE
- **CIP Project No.:** NMB-FY24-NMB-008-TRAFFIC
- **Scope of Work:** Installation of speed humps on 180th Street and signage
- **Budget (Design + Construction):** \$111,600 (CITT, Approved in FY25 CIP Budget)
- **Benefit:** Reduce Speeding + Accident Occurrence
- **Background:** Study completed in FY24, Design and Construction approved FY25 CIP Budget.
- **Schedule:** Planning & Design 08/01/24 – 2/28/25, Bidding 03/03/25-07/03/25 and Construction 07/09/25-12/30/25.



### Requisition # 635: (\$51,620 for Design) – NE 160-163 St & NE 9 Ct

- **Project Name:** Traffic Calming - NE 9 CT between 160 Ter-163 ST
- **CIP Project No.:** NMB-FY24-NMB-009-TRAFFIC
- **Scope of Work:** Installation of speed hump between NE 160th terrace and NE 163rd st. A crosswalk at the intersection of NE 160th Terrace with NE 9th Court.
- **Budget (Design):** \$74,040 (CITT, Approved in FY25 CIP Budget)
- **Benefit:** Reduce Speeding + Accident Occurrence
- **Background:** Study completed in FY24, Design approved FY25 CIP Budget.
- **Schedule:** Planning & Design 08/01/24 – 4/28/25, Bidding 05/01/25-08/01/25 and Construction 10/01/25-02/28/26 (pending FY26 approved budget).



### Requisition # 636: (\$150,165 for Design) - NE 13<sup>th</sup> Avenue Raised Intersections

- **Project Name:** Traffic Calming - NE 13<sup>th</sup> Avenue Raised Intersections
- **CIP Project No.:** NMB-FY24-NMB-005-TRAFFIC
- **Scope of Work:** Raised intersections at NE 153 St, NE 155 St & 157 St. Install 25 MPH Speed Signs
- **Budget (Design + Construction):** \$900,000 (CITT, Approved in FY25 CIP Budget)
- **Benefit:** Reduce Speeding + Accident Occurrence
- **Background:** Study completed in FY24, Design and Construction approved FY25 CIP Budget.
- **Schedule:** Planning & Design 08/01/24 – 4/1/25, Bidding 04/30/25-07/01/25 and Construction 08/01/25- 03/01/26.







**Legislation  
11.4.**

City of North Miami Beach  
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North Miami Beach, FL 33162  
305-947-7581  
www.citynmb.com

**MEMORANDUM**

---

<b>TO:</b>	Mayor and City Commission
<b>FROM:</b>	Sherece George Depusoir, Chief Procurement Officer
<b>VIA:</b>	Mario A. Diaz, City Manager
<b>DATE:</b>	January 21, 2025

---

Resolution No. R2025-19 Approving Firms Responding to Request for Qualifications RFQ-24-026-RE: SG Recreational Complex Redevelopment Project Phase One (Sherece George Depusoir, Chief Procurement Officer)

---

**Description**

Through collaborative efforts with the Parks & Recreation, Community Development, and Procurement Management, the City would seek interest from individuals or business owners for a redevelopment project of a Recreation Complex on the two parcels of City-owned land (collectively, the “Site”), located at 16851 W. Dixie Hwy, North Miami Beach, FL.

Aligned with Florida Statute 255.065, the City intends to use a 2-Step Procurement approach with the goal of securing viable complex recreational concepts, ideas, viewpoints, and suggestions for how the site can be optimally improved and redeveloped in the near future.

Phase 1 included the Request for Qualifications (RFQ), whereby the City initially requests Respondents to provide responses to highlight and affirm their experience, expertise/qualifications, past performance, technical capabilities, firm stability and other relevant criteria for evaluation to shortlist firms to move to Phase 2.

**BACKGROUND  
ANALYSIS:**

The solicitation was posted on the City’s website and BidSync, with electronic notification sent to over 51,000 suppliers. In addition, the solicitation was also advertised in the Miami Herald. On October 7, 2024, six (6) responses were received from ActivNation LLC, Liberty Base Investments, Macken Companies, North Miami Beach Academy, Related



### Group and Soccer Development Group.3

The Evaluation Committee conducted a public discussion, regarding the established evaluation criteria, including but not limited to: Previous Experience, Development Team & Key Personnel, Financial Capability and Public Private Partnership Experience.

The City recommends a shortlist of firms to move forward to the Phase 2: RFP; listed in order of score ranking:

**RECOMMENDATION:** 1<sup>st</sup> Liberty Base Investments  
2<sup>nd</sup> Related Group  
3<sup>rd</sup> ActivNation LLC  
4<sup>th</sup> Soccer Development Group  
5<sup>th</sup> Macken Companies  
6<sup>th</sup> North Miami Beach Academy

### **FISCAL/ BUDGETARY**

**IMPACT:** There is no fiscal impact at this phase of the project.

---

### ATTACHMENTS:

#### Description

- ☐ Agenda Memo
- ☐ Phase 1 Rec Complex\_Resolution
- ☐ Evaluation Committee Scoring Sheet
- ☐ RFQ Phase One Rec Complex

## Agenda Memo

### **RFQ-24-026-SG RECREATIONAL COMPLEX REDEVELOPMENT PROJECT PHASE ONE DEVELOPER PRE-QUALIFICATION**

#### **Background**

Through collaborative efforts with the Parks & Recreation, Community Development, and Procurement Management, the City would seek interest from individuals or business owners for a redevelopment project of a Recreation Complex on the two parcels of City-owned land (collectively, the "Site"), located at 16851 W. Dixie Hwy, North Miami Beach, FL.

Aligned with Florida Statute 255.065, the City intends to use a 2-Step Procurement approach with the goal of securing viable complex recreational concepts, ideas, viewpoints, and suggestions for how the site can be optimally improved and redeveloped in the near future.

Phase 1 included the Request for Qualifications (RFQ), whereby the City initially requests Respondents to provide responses to highlight and affirm their experience, expertise/qualifications, past performance, technical capabilities, firm stability and other relevant criteria for evaluation to shortlist firms to move to Phase 2.

The solicitation was posted on the City's website and BidSync, with electronic notification sent to over 51,000 suppliers. In addition, the solicitation was also advertised in the Miami Herald. On October 7, 2024, six (6) responses were received from ActivNation LLC, Liberty Base Investments, Macken Companies, North Miami Beach Academy, Related Group and Soccer Development Group.

The Evaluation Committee conducted a public discussion, regarding the established evaluation criteria, including but not limited to: Previous Experience, Development Team & Key Personnel, Financial Capability and Public Private Partnership Experience.

#### Recommendation

The City recommends a shortlist of firms to move forward to the Phase 2: RFP; listed in order of score ranking:

- 1<sup>st</sup> Liberty Base Investments
- 2<sup>nd</sup> Related Group
- 3<sup>rd</sup> ActivNation LLC
- 4<sup>th</sup> Soccer Development Group
- 5<sup>th</sup> Macken Companies
- 6<sup>th</sup> North Miami Beach Academy

**RESOLUTION NO. R2024-XX**

**A RESOLUTION OF THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA, APPROVING THE QUALIFIED SHORTLISTED FIRMS THAT RESPONDED TO REQUEST FOR QUALIFICATIONS RFQ-24-026-SG RECREATIONAL COMPLEX REDEVELOPMENT PROJECT PHASE ONE: DEVELOPER PRE-QUALIFICATION; AND APPROVING THEIR EXCLUSIVE PARTICIPATION IN PHASE TWO OF THE PROJECT.**

**WHEREAS**, pursuant to Section 3.3 of the City Charter of the City of North Miami Beach (“City”), there shall be a City Attorney or law firm who shall be head of the Office of the City Attorney and shall serve at the pleasure of the City Commission; and

**WHEREAS**, on July 29, 2024, the City issued Request for Qualifications (“RFQ”) RFP-24-026-SG Recreational Complex Redevelopment Project Phase One: Developer Pre-Qualification (“Developer Pre-Qualification”), seeking firms that have successfully completed a Recreational Complex Project (“Project”) and to highlight and affirm their experience, expertise/qualifications, past performance, technical capabilities, firm stability and other relevant criteria; and

**WHEREAS**, electronic notices were posted on the city’s website and Bidsync.com, sent to over 51,000 potential, local and national firms; and

**WHEREAS**, on October 7, 2024, six (6) responses were received from ActivNation LLC, Liberty Base Investments, Macken Companies, North Miami Beach Academy, Related Group and Soccer Development Group; and

**WHEREAS**, the City Manager established an Evaluation Committee comprised of the Assistant City Manager/Parks & Recreation Director, the Chief Financial Officer and the Assistant Community Development Director; and

**WHEREAS**, the Procurement Management Department conducted an administrative review of the submissions and deemed all submissions responsive. On January 8, 2025, at a publicly advertised meeting, the Evaluation Committee submitted initial scoring of the responses. The Evaluation Committee conducted a public discussion, regarding the established evaluation criteria, including but not limited to: Previous Experience, Development Team & Key Personnel, Financial Capability and Public Private Partnership Experience; and

**WHEREAS**, a recommendation of the shortlisted firms; listed in order of score ranking:

- 1<sup>st</sup> Liberty Base Investments
- 2<sup>nd</sup> Related Group
- 3<sup>rd</sup> ActivNation LLC
- 4<sup>th</sup> Soccer Development Group
- 5<sup>th</sup> Macken Companies
- 6<sup>th</sup> North Miami Beach Academy

**WHEREAS**, the City Manager conducted his own due diligence concurs with the recommendation of the Evaluation Committee, and the Procurement Management Department, wish to move the shortlisted firms to Phase Two of the Project; and

**WHEREAS**, the Mayor and City Commission find it to be in the best interests of the City to accept the shortlist of the respondents as specified herein and authorize the City Manager to extend an invitation

**RESOLUTION NO. R2025-XX**

to the shortlisted respondents to submit a response which showcases their creativity, innovation, resources, financial stability for development concepts and ideas for a Recreational Complex via a Request for Proposal.

**NOW, THEREFORE, BE IT RESOLVED** by the City Commission of the City of North Miami Beach, Florida.

**Section 1.** The foregoing whereas clauses are true and correct and adopted as the legislative and administrative findings of the City Commission and made a specific part of this Resolution; all exhibits attached hereto are made a specific part of this Resolution.

**Section 2.** The Mayor and City Commission hereby approve the following shortlisted firms for the RFQ Phase One of the Project as follows:

- 1<sup>st</sup> Liberty Base Investments
- 2<sup>nd</sup> Related Group
- 3<sup>rd</sup> ActivNation LLC
- 4<sup>th</sup> Soccer Development Group
- 5<sup>th</sup> Macken Companies
- 6<sup>th</sup> North Miami Beach Academy

**Section 3.** The City Manager or designee is authorized to do all things necessary to effectuate this Resolution, extend an invitation to the shortlisted respondents to submit a response which showcases their creativity, innovation, resources, financial stability for development concepts and ideas for a Recreational Complex via a Request for Proposal.

**Section 4.** All Resolutions or parts of Resolutions in conflict with this Resolution are repealed to the extent of such conflict.

**Section 5.** Any scrivener or typographical errors that do not affect intent may be corrected with notice to, and the authorization of the City Attorney and City Manager without further process.

**Section 6.** If any provision of this Resolution or the application thereof to any person or circumstance is held invalid, such invalidity shall not affect other provisions or applications of this Resolution that can be given affect without the invalid provision or application, and to this end the provisions of this Resolution are declared to be severable.

**Section 7.** This Resolution shall take effect immediately upon adoption.

**APPROVED AND ADOPTED** by the City of North Miami Beach City Commission at the regular meeting assembled this 21<sup>st</sup> day of **January 2025**.

**[THE REMAINDER OF THIS PAGE INTENTIONALLY LEFT BLANK]**

ATTEST:

\_\_\_\_\_  
ANDRISE BERNARD, MMC  
CITY CLERK

\_\_\_\_\_  
MICHAEL JOSEPH  
MAYOR

(CITY SEAL)

**RESOLUTION NO. R2025-XX**

APPROVED AS TO FORM AND LEGAL SUFFICIENCY FOR THE USE  
AND RELIANCE OF THE CITY OF NORTH MIAMI BEACH ONLY:

GREENSPOON MARDER, LLP.

By: \_\_\_\_\_  
CITY ATTORNEYS

Sponsored by: Mayor & Commission

**SOLICITATION NO. RFQ-24-026-SG RECREATIONAL COMPLEX REDEVELOPMENT PROJECT PHASE ONE: DEVELOPER PRE-QUALIFICATION**

*EVALUATION COMMITTEE ASSESSMENT SCORING*

<u>Evaluation Criteria Description</u>		<u>Points Possible</u>	<u>ActivNation LLC</u>	<u>Liberty Base Investments</u>	<u>Macken Companies</u>	<u>North Miami Beach Academy</u>	<u>Related Group</u>	<u>Soccer Development Group</u>
<b>Evaluator 1</b> <b>MAustin</b>	Previous Project Experience	<b>30</b>	18	27	15	17	17	28
	Development Team & Key Personnel	<b>25</b>	15	22	14	13	20	20
	Financial Capability	<b>25</b>	25	22	25	6	25	19
	Public Private Partnership Experience	<b>20</b>	15	18	10	15	15	18
<b>TOTAL</b>		<b>100</b>	<b>73</b>	<b>89</b>	<b>64</b>	<b>51</b>	<b>77</b>	<b>85</b>
<hr/>								
<u>Evaluation Criteria Description</u>		<u>Points Possible</u>	<u>ActivNation</u>	<u>Liberty Base Investments</u>	<u>Macken Companies</u>	<u>North Miami Beach Academy</u>	<u>Related Group</u>	<u>Soccer Development Group</u>
<b>Evaluator 2</b> <b>APlotkin</b>	Previous Project Experience	<b>30</b>	23	25	17	17	23	21
	Development Team & Key Personnel	<b>25</b>	20	19	22	12	23	13
	Financial Capability	<b>25</b>	20	19	20	12	23	19
	Public Private Partnership Experience	<b>20</b>	15	18	10	15	14	16
<b>TOTAL</b>		<b>100</b>	<b>78</b>	<b>81</b>	<b>69</b>	<b>56</b>	<b>83</b>	<b>69</b>
<hr/>								
<u>Evaluation Criteria Description</u>		<u>Points Possible</u>	<u>ActivNation</u>	<u>Liberty Base Investments</u>	<u>Macken Companies</u>	<u>North Miami Beach Academy</u>	<u>Related Group</u>	<u>Soccer Development Group</u>
<b>Evaluator 3</b> <b>TRahmani</b>	Previous Project Experience	<b>30</b>	24	24	12	10	18	18
	Development Team & Key Personnel	<b>25</b>	19	22	13	8	20	13
	Financial Capability	<b>25</b>	15	19	15	12	19	18
	Public Private Partnership Experience	<b>20</b>	18	16	10	14	15	13
<b>TOTAL</b>		<b>100</b>	<b>76</b>	<b>81</b>	<b>50</b>	<b>44</b>	<b>72</b>	<b>62</b>
<b>COMBINED TOTAL SCORE</b>		<b>300</b>	<b>227</b>	<b>251</b>	<b>183</b>	<b>151</b>	<b>232</b>	<b>216</b>

## **Solicitation RFQ-24-026-SG**

# **RECREATIONAL COMPLEX REDEVELOPMENT PROJECT PHASE ONE DEVELOPER PRE-QUALIFICATION**

**Bid Designation: Public**



**City of North Miami Beach**



## Bid RFQ-24-026-SG

# RECREATIONAL COMPLEX REDEVELOPMENT PROJECT PHASE ONE DEVELOPER PRE-QUALIFICATION

Bid Number	<b>RFQ-24-026-SG</b>
Bid Title	<b>RECREATIONAL COMPLEX REDEVELOPMENT PROJECT PHASE ONE DEVELOPER PRE-QUALIFICATION</b>
Bid Start Date	<b>Jul 29, 2024 5:39:40 PM EDT</b>
Bid End Date	<b>Oct 7, 2024 3:00:00 PM EDT</b>
Question & Answer End Date	<b>Sep 27, 2024 3:00:00 PM EDT</b>
Bid Contact	<b>Shereece George Depusoir</b> <b>Chief Procurement Officer</b> <b>305-948-2946</b> <b>Shereece.George@citynmb.com</b>
Bid Contact	<b>Kemesia Clarke</b> <b>Purchasing Specialist</b> <b>305-948-2946</b> <b>kemesia.clarke@citynmb.com</b>
Contract Duration	<b>2 years</b>
Contract Renewal	<b>Not Applicable</b>
Prices Good for	<b>Not Applicable</b>
Pre-Bid Conference	<b>Aug 13, 2024 11:00:00 AM EDT (Online)</b> <b>Attendance is optional</b>
Bid Comments	<p><b>The City of North Miami Beach (“City”), a political subdivision of the State of Florida, is seeking interest from individuals or business owners for a redevelopment project of a Recreation Complex on the two parcels of City-owned land (collectively, the “Site”), which is located at 16851 W. Dixie Highway (Harriet Tubman Highway) North Miami Beach, FL.</b></p> <p><b>Respondents shall respond BOTH virtually AND physically to be deemed responsive by the RFQ deadline of Monday, September 30, 2024. SEE SECTION 4.0</b></p> <p><b><u>*** TWO PRE-BID MEETINGS SHALL BE HELD VIRTUALLY***</u></b></p> <p><b>#1: Tuesday, August 13, 2024 @ 11AM VIA ZOOM -</b></p> <p><b><a href="https://citynmb.zoom.us/j/89414750231?pwd=cz60ugaVcvPbMiHqepcHpZ21UdX1h1.1">https://citynmb.zoom.us/j/89414750231?pwd=cz60ugaVcvPbMiHqepcHpZ21UdX1h1.1</a></b>  <b>Meeting ID: 894 1475 0231</b>  <b>Passcode: 931503</b></p> <p><b>#2: Thursday, September 12, 2024 @ 11AM VIA ZOOM -</b></p> <p><b><a href="https://citynmb.zoom.us/j/83004919742?pwd=eyCQFVvYxKwAU1FUUUQzst4jSDI7hM.1">https://citynmb.zoom.us/j/83004919742?pwd=eyCQFVvYxKwAU1FUUUQzst4jSDI7hM.1</a></b>  <b>Meeting ID: 830 0491 9742</b>  <b>Passcode: 838558</b></p> <p><b>Respondents’ submittals will be reviewed and evaluated in accordance with Section 4.0 and Section 5.0. A</b></p>

shortlist will be determined based on the criteria outlined in the RFQ. Shortlisted firms will be presented to the City Commission for discussion and approval. The shortlisted firms will move to Phase 2 to submit their proposals.

For information concerning technical specifications, please utilize the question/answer feature provided by BIDSYNC at www.bidsync.com . Questions of a material nature must be received prior to the cut-off date specified in the solicitation. Material changes, if any, to the scope of services or bidding procedures, will only be transmitted by written addendum. (See addendum section of BIDSYNC Site). Contractors please note: No part of your bid can be submitted via FAX. No variation in price or conditions shall be permitted based upon a claim of ignorance. Submission of a bid will be considered evidence that the Contractor has familiarized himself with the nature and extent of the work, equipment, materials, and labor required. The entire bid response must be submitted in accordance with all specifications contained in this solicitation.

Added on Aug 13, 2024:

\*\*ADDENDUM #1 - PRE-BID MEETING VIA ZOOM Tuesday, August 13, 2024 @ 11AM VIA ZOOM -

https://citynmb.zoom.us/j/89414750231?pwd=cz60ugaVcvPbMiHqepcHpZ21UdX1h1.1

Meeting ID: 894 1475 0231

Passcode: 931503

Added on Sep 11, 2024:

\*\*ADDENDUM #2 - PRE-BID MEETING VIA ZOOM, Thursday, September 12, 2024 @ 11AM\*\*

https://citynmb.zoom.us/j/83004919742?pwd=eyCQFVvYxKwAU1FUUUQzst4jSDI7hM.1

Meeting ID: 830 0491 9742

Passcode: 838558

Added on Sep 23, 2024:

\*\*ADDENDUM #3 Q & A END DATE EXTENDED TO: FRIDAY, SEPTEMBER 27, 2024 // BID CLOSE DATE HAS BEEN CHANGED: MONDAY, OCTOBER 7, 2024\*\*

Added on Oct 1, 2024:

\*\*ADDENDUM #4 - POSTED ZOOM PRE-BID MEETINGS #1 & #2\*\*

Addendum # 1

New Documents	Recreational Complex Redevelopment Project 3.pdf
Removed Documents	Recreational Complex Redevelopment Project 2.pdf

Item Response Form

Item RFQ-24-026-SG--01-01 - Provide Qualifications - Section 4.0

Quantity 1 each

Unit Price

Delivery Location **City of North Miami Beach**  
[City of North Miami Beach](#)  
 17011 NE 19th Avenue  
 North Miami Beach FL 33162  
 Qty 1

**Description**  
**SEE SECTION 4.0 RESPONDENT DELIVERABLES**

Respondents shall respond BOTH virtually AND physically to be deemed responsive by the RFQ deadline of: Monday, September 30, 2024

Virtual Response shall be via Bid Sync by completing Section 6.0 Required Documents.

Physical Response; Section 4.0 shall be delivered in person to: to City of North Miami Beach, City Hall, Third Floor Procurement Management Department, Suite 315 located at: 17011 NE 19<sup>th</sup> Avenue, North Miami Beach, FL 33162. The completion of Submittal Package in accordance with the format outlined herein. Five (5) complete submittal packages shall be included and delivered to the aforementioned location.





# Recreational Complex Redevelopment Project

## Phase One – Developer Pre-Qualification

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**CITY OF NORTH MIAMI BEACH**

*Mario A. Diaz, City Manager*

**PROCUREMENT MANAGEMENT DEPARTMENT**

**Sherece George Depusoir, Chief Procurement Officer**

**[bids@citynmb.com](mailto:bids@citynmb.com)**



# Executive Summary

The City of North Miami Beach, FL (“City”) is soliciting a Request for Qualifications (“RFQ”) from qualified real estate developers, business owners and individuals for a redevelopment opportunity for the construction of a Recreational Complex on the two parcels of City-owned land (collectively, the “Site”), located at 16851 W. Dixie Hwy, North Miami Beach, FL.

The City will engage in a two-phase formal solicitation process to identify and partner with a developer for a recreational complex.

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*Phase One - Request for Qualifications: The City is using the Request for Qualifications process to establish a pre-qualified list of developers who will be invited to submit a detailed development proposal under Phase Two of this process.*

*Phase Two - Limited Request for Proposals: Under Phase Two of the process, only the pre-qualified development firms approved by the City Commission as apart of Phase One will be invited to submit a detailed development proposal, conceptual designs, and a financial plan for the Redevelopment Project.*



# The Offering

Property Address: 16851 West Dixie Highway

North Miami Beach, FL 33160

Folio:07-2209-001-0681

Lot Size: 438,649 SF or 10 acres

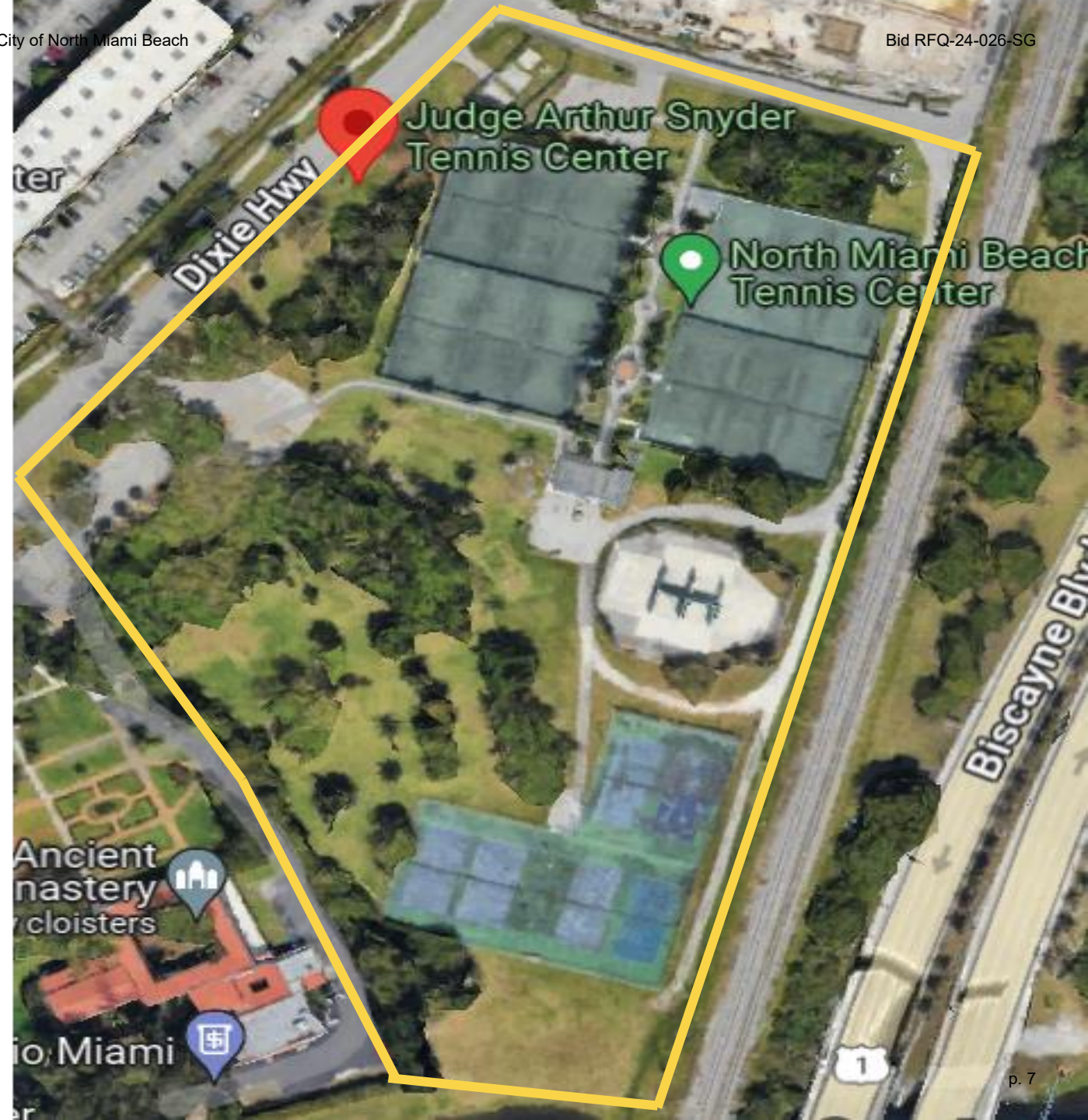
Municipal Zone: Community Facility (CF)

- The site is located with easy transit access to the West Dixie Highway Corridor, Biscayne Boulevard, residential areas, employment centers, and the City of North Miami
- To the north are some local flavors, with several popular restaurants, and a local grocery and popular fish market.
- To the south, this site is adjacent to the Spanish Monastery, a historic local attraction, and across the canal, the City has recently approved new mixed-use development in the form of May NMB (2024) and BH-164 (2023).
- To the west are residential areas with both single and multifamily with longstanding residents eager to see an enhanced community facility at Snyder Park.

12/5/2024 1:22 PM

City of North Miami Beach

Bid RFQ-24-026-SG





# The Vision



The City envisions and anticipates a signature recreation complex to include popular recreational and leisure activities that cater to various demographics. The Complex should include a state-of-the-art recreational facility, enhanced greenspace areas and walking paths, which could provide pedestrian connectivity along West Dixie Highway and across Biscayne Blvd. to East Greynolds Park and Snake Creek Canal.

This recreational complex will serve as a community hub for fitness, sports, wellness, and social activities. Additional recreation and leisure components should include but not limited to:

- Stadium Courts & Seating for Tennis, Pickleball, Padel
- Dog Park
- Art Displays
- Club House / Event Space
- Educational / Training Space / Meeting Rooms
- Café or Dining Hall
- Rooftop Lounge





# The Vision

This strategic and collaborative approach is intended to be open to innovative and commercial ideas, particularly those which are community-based and recreational activity-oriented. The project would provide a market-driven solution toward creating, as well as expanding visitation to the area.

We anticipate receiving the world-class ideas to best redevelop the Site in a manner that will be financially self-sustaining in the future.



12/5/2024 1:22 PM



# Project Priorities

## MUST HAVES

- Sport courts and seating
- Green spaces / walking paths
- Indoor / Outdoor dining & lounge
- Parking and alternative transportation options like EV stations and biking
- Innovative public gathering space
- High quality architectural and urban design
- Integration of local commuter options
- Incorporation of arts and culture

## STRONGLY ENCOURAGE

- Sustainable building practices that include design, construction and stewardship of products and environments that align human need and ecological resourcefulness. Water conservation, renewable energy and low embodied carbon are among the desired practices in this category.
- Job opportunities for local residents and creative small business opportunities which may include training space, innovation hubs, restaurants, art and culture.

# General Project Information

## ➤ Solicitation Details

- RFQ-24-026-SG Recreational Complex Redevelopment Project: PHASE ONE Developer Pre-Qualification
  - ✓ **RFQ Release Date:** July 29, 2024
  - ✓ **Pre-Bid Conference:** August 13, 2024 & September 12, 2024
  - ✓ **Proposal Submission Deadline:** September 30, 2024

## ➤ Bid Sync – Periscope: 800-990-9339

## ➤ Procurement Management – 305-948-4629 / [bids@citynmb.com](mailto:bids@citynmb.com)

- Vendor Services – [vendor@citynmb.com](mailto:vendor@citynmb.com)
- City Hall: 17011 NE 19<sup>th</sup> Ave, Suite #315, North Miami Beach, FL 33162



# **Recreational Complex Redevelopment Project**

## **Phase One – Developer Pre-Qualification**

**CITY OF NORTH MIAMI BEACH**  
*Mario A. Diaz, City Manager*

**PROCUREMENT MANAGEMENT DEPARTMENT**  
**Sherece George Depusoir, Chief Procurement Officer**  
[bids@citynmb.com](mailto:bids@citynmb.com)



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## SECTION 1.0 GENERAL TERMS AND CONDITIONS

### 1.1 DEFINITIONS

When used in Contract Documents (defined below) or in related documents, the following terms shall have the meanings given below:

**Addendum:** A modification of the Plans, Specifications or other Contract Documents distributed to prospective Bidders prior to the opening of Bids/Proposals.

**Allowance Account:** Amount established to cover the cost of prescribed items that are not specified in enough detail.

**Advertisement for Bids:** The public notice inviting the submission of bids for the work.

**Bid:** The written offer of a Bidder to perform the work or service.

**Bid Documents:** Bid Guarantee or Bid deposit. The Advertisement for Bid, Instructions to Bidders, Bid Form, Bidder Bond, Contract, Performance Bond, Payment Bond, General Conditions, Special Conditions, and Scope of Work, together with all Addenda.

**Bid Form:** The form on which Bids are submitted.

**Bidder:** Any individual, firm, partnership, or corporation submitting a Bid in accordance with the Instructions to Bidders.

**Bid/Proposal Bond:** A bond executed by a Bidder/Respondent and its Surety in the attached form guaranteeing that the Bidder/Respondent, if awarded the Contract will execute the same and will timely furnish the required Performance Bond, Payment Bond, and evidence of Insurance.

**Calendar Day:** Every day shown on the calendar.

**Change Order:** A written agreement executed by the City, the Contractor and the Contractor's Surety, covering modifications to the Contract recommended by the Project Manager and approved by the City Manager and/or City Commission.

**Construction Manager:** Individual that coordinates and supervises and/or oversees the implementation of this project.

**Contract:** The written agreement between the City and the Bidder for performance of the Work in accordance with the requirements of the Contract Documents and for the payment of the agreed consideration.



**Contract Documents:** The Instructions to Bidders, Bid Form, Bid Bond, Contract, Performance Bond, Payment Bond, General Conditions, Special Conditions, and Scope of Work, together with all Addenda.

**Contract Manager:** North Miami Beach's City Manager or designee or duly authorized representative designated to manage the Contract.

**Contractor:** The individual, firm, partnership, corporation, or joint venture whose bid is accepted and who enters into a Contract with the City of North Miami Beach and who is liable for the acceptable performance of the work and for the payment of all legal debts pertaining to the Work.

**Contract Date:** The date on which the Agreement is effective.

**Contract Time:** The number of days allowed for completion of the work. The Contract Time will be stipulated in the Bid Form, unless extended by a Change Order. All contract time shall be measured in calendar days.

**City:** A political subdivision, Incorporated City within Miami-Dade County of the State of Florida, whose governing body is a City Commission consisting of a Mayor, Vice Mayor and five City Commission members.

**City Manager:** The Manager of the City of North Miami Beach, Florida.

**Days:** Reference made to Days shall mean consecutive calendar days.

**Deliverables:** All documentation and any items of any nature submitted by the Contractor to the City's Contract Manager for review and approval in writing pursuant to the terms of the Agreement.

**Engineer:** Any individual, firm partnership, or corporation providing design services related to this Bid.

**Inspector:** Individual employed to ensure that official regulations are obeyed for this project.

**Lessee:** Any individual, partnership or corporation having a tenant relationship with the City of North Miami Beach.

**Owner:** The term Owner as used in this Contract shall mean the City of North Miami Beach.

**Performance Deposit:** Certified Bank Check executed by the Contractor, on the attached forms, assuring that the Contractor will, in good faith, perform and guarantee the work in full conformity with the terms of the Contract Documents and will promptly pay all person's sup- plying the Contractor with labor, materials, or supplies, used directly or indirectly by the Contractor in the prosecution of the Work.





**Project Manager:** The duly authorized representative designated to manage the Project.

**Scope of Service:** Document which details the work to be performed by the Bidder.

**Subcontractor or Sub consultant:** Any person, entity, firm, or corporation, other than the employees of the Contractor, who furnishes labor and/or materials, in connection with the Work, whether directly or indirectly, on behalf of and/or under the direction of the Contractor and whether or not in privity of Contract with the Contractor.

The words "Work", "Services", "Program", or "Project": All matters and things required to be done by the Bidder in accordance with the provisions of the Contract.

The words "Directed", "Required", "Permitted", "Ordered", "Designated", "Selected", "Prescribed", or words of like import to mean respectively, the direction, requirement, permission, order, designation, selection or prescription of the City's Contract Manager; and similarly the words "approved", "acceptable", "satisfactory", "equal", "necessary", or words of like import to mean respectively, approved by, or acceptable or satisfactory to, equal or necessary in the opinion of the City's Contract Manager. In resolving disputes and in all respects the City Manager's decision shall be final.

## **1.2 VENDOR REGISTRATION INSTRUCTIONS**

It is the policy of the City to encourage full and open competition among all available qualified vendors. All vendors regularly engaged in the type of work specified in the Solicitation are encouraged to submit Bids. At the time of contract award (including small purchase orders), Bidders must complete a Vendor Application. For information and to apply as a vendor, please visit our website at [www.citynmb.com](http://www.citynmb.com) to download an application and submit it to Procurement Management Division, 17011 NE 19 Avenue, Suite 315 North Miami Beach, Florida 33162. To get solicitation document, specifications and updates go to [www.citynmb.com](http://www.citynmb.com).

### **1.3 CONE OF SILENCE AND REQUEST FOR ADDITIONAL INFORMATION**

"Cone of Silence," as used herein, means a prohibition on any communication regarding a particular Request for Proposal ("RFP"), Request for Qualification ("RFQ") or Invitation to Bid ("ITB").

Pursuant to Section 2-11.1(t) of the County Code, all solicitations, once advertised and until an award recommendation has been forwarded to the appropriate authority are under the "Cone of Silence". Any communication or inquiries, except for clarification of process or procedure already contained in the solicitation, are to be made in writing to the attention of the Chief Procurement Officer or Procurement Supervisor. Such inquiries or request for information shall be submitted to the Chief Procurement Officer or Procurement Supervisor and shall contain the requester's name, address, and telephone number. The request may also be electronically mailed to [bids@citynmb.com](mailto:bids@citynmb.com) or mailed to Procurement



Management Division, 17011 NE 19 Avenue, Suite 315, North Miami Beach, Florida 33162.

During the Cone of Silence, the following is prohibited: Any communication regarding this solicitation between a potential vendor, service provider, Bidder, lobbyist, or consultant and the City's professional staff including, but not limited to City Commission, the City Manager and his or her staff. All communication regarding this solicitation should be sent in writing only to the Procurement Management Division at [bids@citynmb.com](mailto:bids@citynmb.com).

#### 1.4 BIDDERS RESPONSIBILITIES

Bidders are required to submit their bids upon the following express conditions:

- A. Bidders shall thoroughly examine the drawings, specifications, schedules, instructions, and all other contract documents.
- B. Bidders shall make all investigations necessary to thoroughly inform themselves regarding site(s) and facilities for delivery of material and equipment as required by the solicitation conditions. No plea of ignorance, by the Bidder, of conditions that exist or that may hereafter exist as a result of failure or omission on the part of the Bidder to make the necessary examinations and investigations, or failure to fulfill in every detail the requirements of the contract documents, will be accepted as a basis for varying the requirements of the City or the compensation due the Bidder.

- C. Bidders are advised that all City contracts are subject to all legal requirements provided for in the City of North Miami Beach Purchasing Code and applicable Miami-Dade County Ordinances, State Statutes and Federal Statutes.

#### 1.5 SUBMISSION OF BIDS

Bids and Addenda thereto shall be delivered via Bidsync.com by the due/time specified.

#### 1.6 ADDENDA

The Procurement Management Division may issue an addendum in response to any inquiry received, prior to the bid opening, which changes, adds to, or clarifies the terms, provisions, or requirements of the solicitation. The Bidder should not rely on any representation, statement, or explanation, whether written or verbal, other than those made in this solicitation document or in any addenda issued. Where there appears to be a conflict between this solicitation and any addenda, the last addendum issued shall prevail. It is the Bidder's responsibility to ensure receipt of all addenda and any accompanying documents. Bidder(s) shall acknowledge receipt of any formal Addenda via Bidsync.com. Failure to acknowledge Addenda shall deem the response non-responsive provided, however, that the City may waive this requirement in its best interest.

#### 1.7 REJECTION OF BID

**The City reserves the right to reject any or all bids prior to award.** Reasonable efforts



will be made to either award the contract or reject all bids within one hundred and twenty (120) calendar days after Bids opening date.

### 1.8 WITHDRAWAL OF BID

- A. Bids may not be withdrawn and shall be deemed enforceable for a period of 120 days after the time set for the Bid opening.
- B. Bids may be withdrawn prior to the time set for the Bid opening. Such request must be in writing.
- C. The City will permanently retain as liquidated damages the Bid deposit furnished by any Bidder who requests to withdraw a Bid after the Bid opening.

### 1.9 LATE BIDS OR MODIFICATIONS

Only Bids received as of opening date and time will be considered timely. Bids and modifications received after the time set for the Bid opening will be rejected as late.

### 1.10 CONFLICTS WITHIN THE SOLICITATION

Where there appears to be a conflict between the General Terms and Conditions, Special Conditions, Scope of Services, Bid Submittal Section, or any addendum issued, the order of precedence shall be as follows: The last addendum issued, the General Terms and Conditions, the Special Conditions, the Scope of Services, and the Bid Submittal Section.

### 1.11 CLARIFICATION OR OBJECTION TO BID SPECIFICATIONS

If any person contemplating submitting a bid for this contract is in doubt as to the true meaning of the specifications or other bid documents or any part thereof, he/she may submit to the Chief Procurement Officer on or before the date and time stated herein, a request for clarification. All such requests for clarification shall be made in writing and the person submitting the request will be responsible for its prompt delivery. Any interpretation of the bid, if made, will be made only by Addendum duly issued. The City will not be responsible for any other explanation or interpretation of the proposed made or given prior to the award of the contract. Any objection to the specifications and requirements as set forth in this bid must be filed in writing with the **Chief Procurement Officer by the deadline for Questions posted on Bidsync.com.**

### 1.12 INVOICING/PAYMENT

All invoices should be sent to:

Finance Department,  
17011 NE 19 Avenue, 3<sup>rd</sup> Floor,  
North Miami Beach, Florida 33162.

In accordance with Florida State Statutes, Chapter 218, payment will be made within 45 days after receipt of services and a proper invoice. The City cannot make advance payments, make deposits in advance of receipt of goods, or pay C.O.D. Bidders should state any payment discount in the space provided on the bid form.



### 1.13 COMPETENCY OF BIDDERS

- A. Pre-award inspection of the Bidder's facility may be made prior to the award of contract. Bids will be considered only from firms which are regularly engaged in the business of providing the goods and/or services as described in this solicitation(s); have a record of performance for a reasonable period of time; and have sufficient financial support, equipment and organization to ensure that they can satisfactorily deliver the material and/or services if awarded a Contract under the terms and conditions herein stated. The terms "equipment and organization" as used herein shall be construed to mean a fully equipped and well-established company in line with the best business practices in the industry and as determined by the proper authorities of the City.
- B. The City may consider any evidence available to it of the financial, technical, and other qualifications and abilities of a Bidder, including past performance (experience) in making the award in the best interest of the City. In all cases the City of North Miami Beach shall have no liability to any contractor for any costs or expense incurred in connection with this bid or otherwise.

### 1.14 NOTICE REQUIREMENTS UNDER THE AGREEMENT

All notices required or permitted under the Agreement shall be in writing and shall be deemed sufficiently served if delivered by Registered or Certified Mail, with return receipt requested; or delivered personally; or

delivered via e-mail (if provided below) and followed with delivery of hard copy; and in any case addressed as follows:

To the Chief Procurement Officer.  
Procurement Management Division  
17011 NE 19th Avenue, Suite 315  
North Miami Beach, FL 33162  
Phone: (305) 948-2946  
Email: [bids@citynmb.com](mailto:bids@citynmb.com)

and,

To the City Attorney  
City Attorney  
17011 NE 19th Avenue, 4<sup>th</sup> Floor  
North Miami Beach, FL 33162  
Phone: (305) 948-2939

#### To the Bidder

Notices will be sent to the Bidder at the e-mail address and to the person listed in the bid, as applicable.

Either party may at any time designate a different address and/or contact person by giving notice as provided above to the other party. Such notices shall be deemed given upon receipt by the addressee.



### 1.15 EMPLOYEES

All employees of the Bidder shall be at all times the sole employees of the Bidder under the Bidder's sole direction, and not employees or agents of the City of North Miami Beach. The Bidder shall supply competent and physically capable employees and the City is authorized to require the Bidder to remove any employee it deems careless, incompetent, insubordinate or otherwise objectionable and whose presence on City property is not in the best interest of the City.

Each employee at all times shall have and display in plain view proper identification. The names of the employee and the company shall be displayed on the front of the employee's shirt.

### 1.16 AWARD OF BID

The bid, or contract, shall be awarded to the lowest responsible and responsive bidder whose bid conforms with the terms and conditions of the Invitation to Bid.

### 1.17 PROTESTS

- A. Right to protest. Any Bidder or interested parties (hereinafter collectively referred to as the "Bidder") who has a substantial interest in and is aggrieved in connection with the solicitation or proposed award of the ITB may protest to the City Manager or designee. Protests arising from the decisions and votes of any evaluation or selection committee shall be limited to protests

based upon alleged deviation(s) from established purchasing procedures set forth in City Purchasing Code, any written guidelines of the procurement department, and the specifications, requirements and/or terms set forth in the ITB.

1. Any protest concerning the ITB specifications, requirements, and/or terms must be made within three business days (for the purposes of this section, "business day" means a day other than Saturday, Sunday, or a national holiday), from the time the facts become known and, in any case, at least seven business days prior to the opening of the responses. Such protest must be made in writing (as provided for herein *Notice Requirements*) to the Chief Procurement Officer with copy to the City Manager and City Attorney, and such protest shall state the particular grounds on which it is based and shall include all pertinent documents and evidence. No protest shall be accepted unless it complies with the requirements of this section. Failure to timely protest ITB specifications, requirements and/or terms is a waiver of the ability to protest the specifications, requirements and/or terms.
2. Any protest after the bid opening, including challenges to actions of any evaluation or selection committee as provided in subsection (1) above shall be submitted in writing to the Chief Procurement Officer with copy to the City Manager and City Attorney. The City will allow such bid protest to be submitted anytime until two business days





- following the release of the notice of the City Manager's written recommendation to the City Commission for award of the solicitation in question. Such protest shall state the particular grounds on which it is based and shall include all pertinent grounds on which it is based and shall include all pertinent documents and evidence. No protest shall be accepted unless it complies with the requirements of this section. All Bidders shall be notified in writing (which may be transmitted by electronic communication, such as e-mail), following the release of the City Manager's written recommendation to the City Commission.
- B. The City may request reasonable reimbursement for expenses incurred in processing any protest hereunder, which expenses shall include, but not be limited to, staff time, legal fees, and expenses (including expert witness fees), reproduction of documents and other out-of-pocket expenses.
- C. Authority to resolve protests. The City Manager or designee shall have the authority to settle and resolve a protest concerning the solicitation or award of the ITB.
- D. Responsiveness. Prior to any decision being rendered under this section with respect to a protest, the City Manager and the City Attorney, or their respective designees, shall certify whether the submission of the response to the ITB in question is responsive. The parties to the protest shall be bound by the determination of the City Manager and the City Attorney with regard to the issue of responsiveness.
- E. Decision and appeal procedures. If the protest is not resolved by mutual agreement, the City Manager and the City Attorney, or their respective designees, shall promptly issue a decision in writing. The decision shall specifically state the reasons for the action taken and inform the protestor of his or her right to challenge the decision. Any person aggrieved by any action or decision of the City Manager, the City Attorney, or their respective designees, with regard to any decision rendered under this section may appeal said decision by filing an original action in the Circuit Court of the Eleventh Judicial Circuit in and for Miami-Dade County, Florida, in accordance with the applicable court rules. Any action not brought in good faith shall be subject to sanctions including damages suffered by the City and attorney's fees incurred by the City in defense of such wrongful action.
- F. Distribution. A copy of each decision by the City Manager and the City Attorney shall be mailed or otherwise furnished immediately to the protestor.
- G. Stay of procurements during protests. In the event of a timely protest under this section, the City shall not proceed further with the solicitation or with the award pursuant to the ITB unless a written determination is made by the City Manager, that the award pursuant to the ITB must be made without delay in order to protect a substantial interest of the City.



- H. The institution and filing of a protest under this section is an administrative remedy that shall be employed prior to the institution and filing of any civil action against the City concerning the subject matter of the protest.
- I. Protests not timely made under this section shall be barred. Any basis or ground for a protest not set forth in the letter of protest required under this section shall be deemed waived.
- J. At the time, the City Manager's written recommendation for award of the ITB is presented at a meeting of the Mayor and City Commission, the City Attorney, or designee, shall present a report to inform the Mayor and City Commission of any legal issues relative to any protest filed in connection with the ITB in question.
- K. The determination of the City Manager and the City Attorney with regards to all procedural and technical matters shall be final.

**1.18 AGREEMENT**

An agreement shall be sent to the awarded Bidder to be signed, witnessed, and returned to the City for execution. The City will provide a copy of the fully executed agreement to the awarded Bidder.

**1.19 DISQUALIFICATION OF BIDDERS**

A Bidder may be disqualified temporarily or permanently, and his/her bid(s) rejected for:

- Poor performance or default, in the City's opinion, on previous contracts with the City.
- Poor performance or default, in the City's opinion, on previous contracts with other public entities.
- Insufficient financial or company size, in the City's opinion, to perform the requirements of the contract.

**1.20 SUBCONTRACTING**

The Bidder will not assign, transfer or sub-contract any work either in whole or in part, without prior written approval of the City. The Bidder shall furnish in writing to the City the names of the Subcontractors. The Bidder shall not contract with any Subcontractors to whom the City has made reasonable and timely objection. The final Subcontractors list shall be presented to the City.

**1.21 ASSIGNMENT**

The successful Bidder shall not assign, transfer, hypothecate, or otherwise dispose of this contract, including any rights, title, or interest therein, or its power to execute such contract to any person, company, or corporation without the prior written consent of the City and City's approval.

**1.22 FRAUD AND MISREPRESENTATION**

In accordance with City Purchasing Policy 3.6 and pursuant to Section 2-8-1.4 of the Miami-Dade County Code, any individual, corporation, or other entity that attempts to





meet its contractual obligations with the City through fraud, misrepresentation, or material misstatement, may be debarred from doing business with the City. The City as further sanction may terminate or cancel any other contracts with such individual, corporation, or entity. Such individual or entity shall be responsible for all direct or indirect costs associated with termination or cancellation, including attorney's fees.

### **1.23 COLLUSION**

The Bidder, by affixing his signature to this bid, agrees to the following: "Bidder certifies that his/her bid is made without previous understanding, agreement, or connection with any person, firm or corporation, making a bid for the same items, or the initiating City department, and is in all respects fair, without outside control, collusion, fraud, or otherwise illegal action."

### **1.24 PATENTS AND COPYRIGHTS**

It shall be understood and agreed that by the submission of a bid, the Bidder, if awarded a contract, shall save harmless and fully indemnify the City and any of its officers or agents from any and all damages that may, at any time, be imposed or claimed for infringement of any patent right, trademark, or copyright, of any person or persons, association, or corporation, as the result of the use of such articles by the City, or any of its officers, agents, or employees, and of which articles the contractor is not the patentee, assignee, licensee, or owner, or lawfully entitled to sell same.

### **1.25 PUBLIC RECORDS LAW**

Pursuant to Florida Statute 119.07, public records may be inspected and examined by anyone desiring to do so, at a reasonable time, under reasonable conditions, and under supervision by the custodian of the public record. Sealed Bids and Proposals become subject to this statute, notwithstanding Bidders' requests to the contrary, at the time the City provides notice of a decision or intended decision, or 30 days after bid or bid opening, whichever is earlier.

Financial statements submitted in response to a request by the City are confidential and exempt from disclosure. Data processing software obtained under a licensing agreement which prohibits its disclosure is also exempt.

Bidders are hereby notified and agree that all information submitted as part of, or in support of bid/proposal submittals will be available for public inspection after opening of bids/proposals in compliance with Chapter 119 of the Florida Statutes. The Bidder shall not submit any information in response to this invitation which the Bidder considers to be a trade secret, proprietary or confidential. The submission of any information to the City in connection with this ITB shall be deemed conclusively to be a waiver of any trade secret or other protection, which would otherwise be available to the Bidder. In the event that the Bidder submits information to the City in violation of this restriction, either inadvertently or intentionally and clearly identifies that information in the bid/proposal as protected or confidential, the City shall endeavor to redact and return that information to the Bidder as quickly as possible, and if appropriate, evaluate the balance of the bid/proposal. The redaction or return of information pursuant to



this clause may render a bid/response non-responsive.

**IF THE CONTRACTOR HAS QUESTIONS REGARDING THE APPLICATION OF CHAPTER 119, FLORIDA STATUTES, TO THE CONTRACTOR'S DUTY TO PROVIDE PUBLIC RECORDS RELATING TO THIS AGREEMENT, CONTACT THE CUSTODIAN OF PUBLIC RECORDS AT (TELEPHONE NUMBER: (305) 787-6001, E-MAIL ADDRESS: CITYCLERK@CITYNMB.COM, AND MAILING ADDRESS: CITY CLERK, NMB CITY HALL, 17011 N.E. 19 AVENUE, NORTH MIAMI BEACH, FLORIDA 33162-3100).**

#### **1.26 EXCEPTIONS TO BID**

The Bidder must clearly indicate any exceptions they wish to take to any of the terms in this Bid, and outline what, if any, alternative is being offered. All exceptions and alternatives shall be included and clearly delineated, in writing, in the Bid. The City, at its sole and absolute discretion, may accept or reject any or all exceptions and alternatives. In cases in which exceptions and alternatives are rejected, the City shall require the Bidder to comply with the particular term and/or condition of the ITB to which the Bidder took exception to (as said term and/or condition was originally set forth on the ITB.)

#### **1.27 INDEMNIFICATION AND HOLD HARMLESS AGREEMENT**

The Bidder shall indemnify and hold harmless the City of North Miami Beach and its officers, employees, agents, and instrumentalities from any and all liability, losses, or damages in an amount not less than \$1,000,000 per occurrence. In addition to \$1,000,000 per occurrence, the City shall be entitled to attorney's fees and costs of defense, which the City of North Miami Beach, or its officers, employees, agents, or instrumentalities may incur as a result of claims, demands, suits, causes of actions or proceedings of any kind or nature arising out of, relating to or resulting from the performance of this project by the awarded Bidder or its employees, agents, servants, partners, principals or subcontractors. Furthermore, the awarded Bidder shall pay all claims and losses in an amount not less than \$1,000,000 per occurrence in connection therewith and shall investigate and defend all claims, suits, or actions of any kind of nature in the name of the City of North Miami Beach, where applicable, including appellate proceedings, and shall pay all costs, judgments, and attorney's fees which may issue thereon. The awarded Bidder expressly understands and agrees that any insurance protection required by the resulting agreement or otherwise provided by the awarded Bidder shall cover the City of North Miami Beach, its officers, employees, agents and instrumentalities and shall include claims for damages resulting from and/or caused by the negligence, recklessness or intentional wrongful misconduct of the indemnifying party and persons employed or by utilized by the indemnifying party in the performance of the contract.

#### **1.28 COPELAND "ANTI-KICKBACK"**



Contractor and all subcontractors will comply with the Copeland Anti-Kickback Act (18 U.S.C. 874) as supplemented in Department of Labor regulations (29 CFR Part 3).

### **1.29 CHOICE OF LAW**

If and when this contract is disputed, and should it be necessary to litigate, the substantive and procedural laws of the State of Florida shall govern the outcome of such litigation. This shall apply notwithstanding such factors which include, but are not limited to, place where contract is entered into, place where accident arises and choice of law principles.

### **1.30 QUANTITIES**

The City specifically reserves the right to accept all or any part of the bid, to split the award, to increase or decrease the quantity to meet additional or reduced requirements of the City, without such change affecting the contract price set forth in the bid form by the Bidder.

### **1.31 CLAIMS**

Successful Bidder(s) will be responsible for making any and all claims against carriers for missing or damaged items.

### **1.32 MODIFICATION OF CONTRACT**

The contract may be modified by mutual consent, in writing through the issuance of a

modification to the contract, purchase order, change order or award sheet, as appropriate.

### **1.33 PUBLIC ENTITY CRIMES**

A person or affiliate who has been placed on the convicted vendor list following a conviction for a public entity crime may not submit a bid/proposal on a contract to provide any goods or services to a public entity, may not submit a bid/proposal on a contract with a public entity for the construction or repair of a public building or public work, may not submit bids/proposals on leases of real property to a public entity, may not be awarded or perform work as a contractor, supplier, subcontractor, or consultant under a contract with any public entity, and may not transact business with any public entity in excess of the threshold amount provided in Florida Statutes, Section 287.017, for CATEGORY TWO for a period of 36 months from the date of being placed on the convicted vendor list.

### **1.34 DISCRIMINATION**

Any entity or affiliate who has been placed on the discriminatory vendor list may not submit a bid/proposal on a contract to provide goods or services to a public entity, may not submit a bid/proposal on a contract with a public entity for construction or repair of a public building or public work, may not submit bids/proposals on leases of real property to a public entity, may not award or perform work as a contractor, supplier, subcontractor, or consultant under contract with any public entity, and may not transact business with any public entity.



### **1.35 DRUG-FREEWORKPLACE PROGRAM**

Bidders are required to maintain and enforce a Drug-Free Workplace Program for the duration of the agreement and any extensions thereof. Bidders shall complete and submit a copy of the attached form and a copy of the program with their bid.

### **1.36 SOLICITATION, GIVING, AND ACCEPTANCE OF GIFTS POLICY**

Bidders shall sign and submit this attached form indicating understanding and compliance with the City's and State's policies prohibiting solicitation and acceptance of gifts by public officers, employees, or candidates.

Failure to submit this signed form will result in your bid being declared non-responsive; provided, however, that the low Bidder may be given the opportunity to submit the form to the City within five calendar days after notification by the City, if this is determined to be in the best interest of the City.

### **1.37 ACCESS TO RECORDS**

The City reserves the right to require the Bidder to submit to an audit. The Bidder shall provide access to all of its records which relate directly or indirectly to the Agreement at its place of business during regular business hours. The selected Bidder shall retain all records pertaining to the Agreement and upon request make them available to the City for three years following expiration of the Agreement. The Bidder agrees to provide such assistance as may be necessary to

facilitate the review or audit by the City to ensure compliance with applicable accounting and financial standards at no cost to the City.

**IF THE CONTRACTOR HAS QUESTIONS REGARDING THE APPLICATION OF CHAPTER 119, FLORIDA STATUTES, TO THE CONTRACTOR'S DUTY TO PROVIDE PUBLIC RECORDS RELATING TO THIS AGREEMENT, CONTACT THE CUSTODIAN OF PUBLIC RECORDS AT (TELEPHONE NUMBER: (305) 787-6001, E-MAIL ADDRESS: CITYCLERK@CITYNMB.COM, AND MAILING ADDRESS: CITY CLERK, NMB CITY HALL, 17011 N.E. 19 AVENUE, NORTH MIAMI BEACH, FLORIDA 33162-3100).**

### **1.38 BEST INTEREST OF NORTH MIAMI BEACH**

The City of North Miami Beach reserves the right to reject any and all submissions, to waive any and all irregularities in any submission, and to make awards in the best interest of the City.

### **1.39 INSURANCE REQUIREMENTS**

The Bidder shall maintain and carry in full force during the Term the insurance required herein. Upon City's notification, the Bidder shall furnish to the Procurement Management Division, Certificates of Insurance that indicate that insurance coverage has been obtained which meets the requirements as outlined below:



- A. Worker's Compensation Insurance for all employees of the Bidder as required by Florida Statute 440. Should the Bidder be exempt from this Statute, the Bidder and each employee shall hold the City harmless from any injury incurred during performance of the Contract. The exempt Bidder shall also submit a written statement detailing the number of employees and that they are not required to carry Worker's Compensation insurance, and do not anticipate hiring any additional employees during the term of this contract or a copy of a Certificate of Exemption.
- B. General Liability Insurance on a comprehensive basis in an amount not less than \$1,000,000 per person, \$2,000,000 per occurrence for bodily injury and property damage. City of North Miami Beach must be shown as an additional insured with respect to this coverage. The mailing address of City of North Miami Beach 17011 NE 19 Avenue, Suite 315, North Miami Beach, Florida 33162, as the certificate holder, must appear on the certificate of insurance.
- C. Automobile Liability Insurance covering all owned, non-owned, and hired vehicles used in connection with the Services, in an amount not less than \$1,000,000 combined. City of North Miami Beach must be shown as an additional insured with respect to this coverage. The mailing address of City of North Miami Beach 17011 NE 19 Avenue, Suite 315, North Miami Beach, Florida 33162, as the certificate holder, must appear on the certificate of insurance. Add: Uninsured Motorist Coverage.

The insurance coverage required shall include those classifications, as listed in standard liability insurance manuals, which most nearly reflect the operation of the Bidder. All insurance policies required above shall be issued by companies authorized to do business under the laws of the State of Florida with the following qualifications:

The company must be rated no less than "B" as to management, and no less than "Class V" as to financial strength, according to the latest edition of Best's Insurance Guide published by A.M. Best Company, Oldwick, New Jersey, or its equivalent, subject to the approval of the City's Risk Management Division.

Certificates of Insurance must indicate that for any cancellation of coverage before the expiration date, the issuing insurance carrier will endeavor to mail thirty (30) day written advance notice to the certificate holder. In addition, the Bidder hereby agrees not to modify the insurance coverage without thirty (30) days written advance notice to the City.

**NOTE: CITY OF NORTH MIAMI BEACH CONTRACT NUMBER AND TITLE MUST APPEAR ON EACH CERTIFICATE OF INSURANCE.**

Compliance with the foregoing requirements shall not relieve the Bidder of this liability and obligation under this section or under any other section in the Agreement.

Award of this Contract is contingent upon the receipt of the insurance documents, as





required, within fifteen (15) calendar days after City notification to Bidder to comply before the award is made. If the insurance certificate is received within the specified time frame but not in the manner prescribed in the Agreement, the Bidder shall be verbally notified of such deficiency and shall have an additional five (5) calendar days to submit certificate to the City. If the Bidder fails to submit the required insurance documents in the manner prescribed in the Agreement within twenty (20) calendar days after City notification to comply, the Bidder shall be in default of the contractual terms and conditions and award of the Contract will be rescinded, unless such time frame for submission has been extended by the City.

The Bidder shall be responsible for assuring that the insurance certificates required in conjunction with this Section remain in force for the duration of the contractual period of the Contract, including any and all option years or extension periods that may be granted by the City. If insurance certificates are scheduled to expire during the contractual period, the Bidder shall be responsible for submitting new or renewed insurance certificates to the City at a minimum of thirty (30) calendar days in advance of such expiration. In the event that expired certificates are not replaced with new or renewed certificates which cover the contractual period, the City shall suspend the Contract until such time as the new or renewed certificates are received by the City in the manner prescribed herein; provided, however, that this suspended period does not exceed thirty (30) calendar days. Thereafter, the City may, at its sole discretion, terminate this contract.

#### **1.40 CITY WEBSITE**

The City utilizes the following procedures for notification of bid opportunities: [www.bidsync.com](http://www.bidsync.com) and on the City Website: <https://www.citynmb.com/214/Bid-Opportunities>. These are the only forms of notification by the City. The City shall not be responsible for receipt of notification and information from any source other than those listed. It shall be the bidder's responsibility to verify the validity of all bid information received by sources other than those listed.

#### **1.41 DISCLAIMER**

The City of North Miami Beach may, in its sole and absolute discretion without prejudice or liability, accept or reject, in whole or in part, for any reason whatsoever any or all bids; re-advertise this ITB; postpone or cancel at any time this ITB process; or waive any formalities of or irregularities in the process. Bids that are not submitted on time and/or do not conform to the City of North Miami Beach's requirements will not be considered. After all bids are analyzed, Bidder(s) submitting bids that appear, solely in the opinion of the City of North Miami Beach, to be the most qualified, shall be submitted to the City of North Miami Beach's City Commission, and the final selection will be made thereafter with a timetable set solely by the City of North Miami Beach. The selection by the City of North Miami Beach shall be based on the ITB, which is, in the sole opinion of the City Commission of the City of North Miami Beach, in the best interest of the City of North Miami Beach. The issuance of this ITB constitutes only an invitation to make presentations to the City of North Miami Beach. The City of North Miami Beach reserves the right to determine, at its sole discretion, whether any aspect of the



response satisfies the criteria established in this ITB. In all cases the City of North Miami Beach shall have no liability to any bid for any costs or expense incurred in connection with this ITB.

#### **1.42 CONFIDENTIALITY**

As a political subdivision, the City of North Miami Beach is subject to the Florida Government in the Sunshine Act and Public Records Law. By submitting a bid, Bidder acknowledges that the materials submitted with the bid and the results of the City of North Miami Beach's evaluation are open to public inspection upon proper request. Bidder should take special note of this as it relates to proprietary information that might be included in its bid.

#### **1.43 NATURE OF THE AGREEMENT**

The Agreement incorporates and includes all negotiations, correspondence, conversations, agreements, and understandings applicable to the matters contained in the Agreement. The parties agree that there are no commitments, agreements, or understandings concerning the subject matter of the Agreement that are not contained in the Agreement, and that the Agreement contains the entire agreement between the parties as to all matters contained herein. Accordingly, it is agreed that no deviation from the terms hereof shall be predicated upon any prior representations or agreements, whether oral or written. It is further agreed that any oral representations or modifications concerning the Agreement shall be of no force or effect, and that the Agreement may be modified, altered, or amended only by a written amendment duly

executed by both parties hereto and their authorized representatives.

The Bidder shall provide the services set forth in the Scope of Services and render full and prompt cooperation with the City in all aspects of the Services performed hereunder.

The Bidder acknowledges that the Agreement requires the performance of all things necessary for or incidental to the effective and complete performance of all Work and Services under this Contract. All things not expressly mentioned in the Agreement but necessary to carrying out its intent are required by the Agreement, and the Bidder shall perform the same as though they were specifically mentioned, described, and delineated.

The Bidder shall furnish all labor, materials, tools, supplies, and other items required to perform the Work and Services that are necessary for the completion of this Contract. All Work and Services shall be accomplished at the direction of and to the satisfaction of the City's Contract Manager.

The Bidder acknowledges that the City shall be responsible for making all policy decisions regarding the Scope of Services. The Bidder agrees to provide input on policy issues in the form of recommendations.

The Bidder agrees to implement any and all changes in providing Services hereunder as a result of a policy change implemented by the City. The Bidder agrees to act in an





expeditious and fiscally sound manner in providing the City with input regarding the time and cost to implement said changes and in executing the activities required to implement said changes.

#### **1.44 PAYMENT FOR SERVICES/AMOUNT OBLIGATED**

The Bidder warrants that it has reviewed the City's requirements and has asked such questions and conducted such other inquiries as the Bidder deemed necessary in order to determine the price the Bidder will charge to provide the Work and Services to be performed under this Contract. The compensation for all Work and Services performed under this Contract, including all costs associated with such Work and Services, shall be in the total amount submitted on the Bid Form. The City shall have no obligation to pay the Bidder any additional sum(s) in excess of this amount, except for a change and/or modification to the Contract which is approved and executed in writing by the City and the Bidder.

All Services undertaken by the Bidder before City's approval of this Contract shall be at the Bidder's risk and expense.

#### **1.45 PRICING**

Prices shall remain firm and fixed for the term of the Contract, including any option or extension periods; however, the Bidder may offer incentive discounts to the City at any time during the Contract term, including any renewal or extension thereof.

#### **1.46 MANNER OF PERFORMANCE**

- A. The Bidder shall provide the Services described herein in a competent and professional manner satisfactory to the City in accordance with the terms and conditions of the Agreement. The City shall be entitled to a satisfactory performance of all Services described herein and to full and prompt cooperation by the Bidder in all aspects of the Services. At the request of the City, the Bidder shall promptly remove from the project any Bidder's employee, subcontractor, or any other person performing Services hereunder. The Contractor agrees that such removal of any of its employees does not require the termination or demotion of any employee by the Bidder.
- B. The Bidder agrees to defend, hold harmless and indemnify the City and shall be liable and responsible for any and all claims, suits, actions, damages and costs (including attorney's fees and court costs) made against the City, occurring on account of, arising from or in connection with the removal and replacement of any Bidder's personnel performing services hereunder at the behest of the City. Removal and replacement of any Bidder's personnel as used in this Article shall not require the termination and or demotion of such Bidder's personnel.
- C. The Bidder agrees that at all times it will employ, maintain and assign to the performance of the Services a sufficient number of competent and qualified professionals and other personnel to meet the requirements to which reference is hereinafter



made. The Bidder agrees to adjust its personnel staffing levels or to replace any of its personnel upon reasonable request from the City, should the City make a determination, in its sole discretion that said personnel staffing is inappropriate or that any individual is not performing in a manner consistent with the requirements for such a position.

- D. The Bidder warrants and represents that its personnel have the proper skill, training, background, knowledge, experience, rights, authorizations, integrity, character, and licenses as necessary to perform the Services described herein, in a competent and professional manner.

- E. The Bidder shall at all times cooperate with the City and coordinate its respective work efforts to most effectively and efficiently maintain the progress in performing the Services.

- F. The Bidder shall comply with all provisions of all federal, state, and local laws, statutes, ordinances, and regulations that are applicable to the performance of the Agreement.

#### **1.47 INDEPENDENT CONTRACTOR RELATIONSHIP**

The Bidder is, and shall be, in the performance of all work services and activities under the Agreement, an independent contractor, and not an employee, agent of the City. All persons engaged in any of the work or services performed pursuant to the Agreement shall

at all times, and in all places, be subject to the Bidder's sole direction, supervision and control. The Bidder shall exercise control over the means and manner in which it and its employees perform the work, and in all respects the Bidder's relationship and the relationship of its employees to the City shall be that of an independent contractor and not as employees and agents of the City.

The Bidder does not have the power or authority to bind the City in any promise, agreement, or representation other than specifically provided for in the Agreement.

#### **1.48 AUTHORITY OF THE CITY'S CONTRACT MANAGER**

- A. The Bidder hereby acknowledges that the City's Contract Manager will determine in the first instance all questions of any nature whatsoever arising out of, under, or in connection with, or in any way related to or on account of, the Agreement including without limitations: questions as to the value, acceptability and fitness of the Services; questions as to either party's fulfillment of its obligations under the Contract; negligence, fraud or misrepresentation before or subsequent to acceptance of the Bid; questions as to the interpretation of the Scope of Services; and claims for damages, compensation and losses.

- B. The Bidder shall be bound by all determinations or orders and shall promptly obey and follow every order of the Contract Manager, including the withdrawal or modification of any previous order and regardless of whether the Bidder agrees with the



Contract Manager's determination or order. Where orders are given orally, they will be issued in writing by the Contract Manager as soon thereafter as is practicable.

- C. The Bidder must, in the final instance, seek to resolve every difference concerning the Agreement with the Contract Manager. In the event that the Bidder and the Contract Manager are unable to resolve their difference, the Bidder may initiate a dispute in accordance with the procedures set forth in the section below. Exhaustion of these procedures shall be a condition precedent to any lawsuit permitted hereunder.
- D. In the event of such dispute, the parties to the Agreement authorize the City Manager or designee, who may not be the Contract Manager or anyone associated with this Project, acting personally, to decide all questions arising out of, under, or in connection with, or in any way related to or on account of the Agreement (including but not limited to claims in the nature of breach of contract, fraud or misrepresentation arising either before or subsequent to execution hereof) and the decision of each with respect to matters within the City Manager's purview as set forth above shall be conclusive, final and binding on parties. Any such dispute shall be brought, if at all, before the City Manager within 10 days of the occurrence, event or act out of which the dispute arises.

The City Manager may base this decision on such assistance as may be desirable, including advice of experts, but in any event shall base

the decision on an independent and objective determination of whether Bidder's performance or any Deliverable meets the requirements of the Agreement and any specifications with respect thereto set forth herein. The effect of any decision shall not be impaired or waived by any negotiations or settlements or offers made in connection with the dispute, whether or not the City Manager participated therein, or by any prior decision of others, which prior decision shall be deemed subject to review, or by any termination or cancellation of the Agreement. All such disputes shall be submitted in writing by the Bidder to the City Manager for a decision, together with all evidence and other pertinent information in regard to such questions, in order that a fair and impartial decision may be made. The parties agree that whenever the City Manager is entitled to exercise discretion or judgment or to make a determination or form an opinion pursuant to the provisions of this Article, such action shall be deemed fair and impartial when exercised or taken. The City Manager shall render a decision in writing and deliver a copy of the same to the Bidder. Except as such remedies may be limited or waived elsewhere in the Agreement, Contractor reserves the right to pursue any remedies available under law after exhausting the provisions of this Article.

#### **1.49 MUTUAL OBLIGATIONS**

The Agreement, including attachments and appendices to the Agreement, shall constitute the entire Agreement between



the parties with respect hereto and supersedes all previous communications and representations or agreements, whether written or oral, with respect to the subject matter hereto unless acknowledged in writing by the duly authorized representatives of both parties.

Nothing in the Agreement shall be construed for the benefit, intended or otherwise, of any third party that is not a parent or subsidiary of a party or otherwise related (by virtue of ownership control or statutory control) to a party.

In those situations where the Agreement imposes an indemnity or defense obligation on the Contractor, the City may, at its expense, elect to participate in the defense if the City should so choose. Furthermore, the City may at its own expense defend or settle any such claims if the Contractor fails to diligently defend such claims, and thereafter seek indemnity for costs and attorney's fees from the Contractor.

#### **1.50 QUALITY ASSURANCE/QUALITY ASSURANCE RECORD KEEPING**

The Contractor shall maintain, and shall require that its subcontractors and suppliers maintain, complete and accurate records to substantiate compliance with the requirements set forth in the Scope of Services. The Contractor and its subcontractors and suppliers shall retain such records, and all other documents relevant to the Services furnished under the Agreement for a period of three (3) years from the expiration date of the Agreement and any extension thereof.

#### **1.51 SUBSTITUTION OF PERSONNEL**

In the event the Contractor wishes to substitute personnel for the key personnel identified by the Contractor's Bid, the Contractor must notify the City in writing and request written approval for the substitution at least ten (10) business days prior to effecting such substitution.

#### **1.52 ASSUMPTION, PARAMETERS, PROJECTIONS, ESTIMATES AND EXPLANATIONS**

The Contractor understands and agrees that any assumptions, parameters, projections, estimates, and explanations presented by the City were provided to the Contractor for evaluation purposes only. However, since these assumptions, parameters, projections, estimates, and explanations represent predictions of future events, the City makes no representations or guarantees, the City shall not be responsible for the accuracy of the assumptions presented, the City shall not be responsible for conclusions to be drawn there from, and any assumptions, parameters, projections, estimates and explanations shall not form the basis of any claim by the Contractor. The Contractor accepts all risks associated with using this information.

#### **1.53 SEVERABILITY**

If the Agreement contains any provision found to be unlawful, the same shall be deemed to be of no effect and shall be deemed stricken from the Agreement without affecting the binding force of the Agreement



as it shall remain after omitting such provision.

#### **1.54 TERMINATION FOR CONVENIENCE AND SUSPENSION OF WORK**

- A. The City may terminate the Agreement if an individual or corporation or other entity attempts to meet its contractual obligation with the City through fraud, misrepresentation, or material misstatement.
- B. The City may, as a further sanction, terminate or cancel any other contract(s) that such individual or corporation or other entity has with the City. Such individual, corporation or other entity shall be responsible for all direct and indirect costs associated with such termination or cancellation, including attorney's fees.
- C. Contractor acknowledges and agrees that ten dollars (\$10.00) of the compensation to be paid by the City, the receipt and adequacy of which is hereby acknowledged by Contractor is given specific consideration to Contractor for City's right to terminate this Agreement for convenience.
- D. The City, through its City Manager, and for its convenience and without cause, terminate the Contract at any time during the term by giving written notice to consultant of such termination, which shall become effective within fifteen (15) days following receipt by the Contractor of such notice. If the Contract is

terminated for convenience by the City, the Contractor shall be paid for any services satisfactorily performed up to the date of termination; following which the City shall be discharged from any and all liabilities, duties, and terms arising out, or by virtue of, this Contract.

- E. The foregoing notwithstanding, any individual, corporation or other entity which attempts to meet its contractual obligations with the City through fraud, misrepresentation or material misstatement may be debarred from City contracting in accordance with the City debarment procedures. The Contractor may be subject to debarment for failure to perform and all other reasons set forth in Chapter 3 of the City's Purchasing Policies and Procedures Manual.

In addition to cancellation or termination as otherwise provided in the Agreement, the City may at any time, in its sole discretion, with or without cause, terminate the Agreement by written notice to the Contractor and in such event:

- F. The Contractor shall, upon receipt of such notice, unless otherwise directed by the City:
  1. Stop work on the date specified in the notice ("the Effective Termination Date").
  2. Take such action as may be necessary for the protection and preservation of the City's materials and property.





- 3. Cancel orders.
- 4. Assign to the City and deliver to any location designated by the City any non-cancelable orders for Deliverables that are not capable of use except in the performance of the Agreement and which have been specifically developed for the sole purpose of the Agreement and not incorporated in the Services.
- 5. Take no action which will increase the amounts payable by the City under the Agreement.

G. In the event that the City exercises its right to terminate the Agreement pursuant to this Article the Contractor will be compensated as stated in the payment Articles, herein, for the:

- 1. Portion of the Services completed in accordance with the Agreement up to the Effective Termination Date; and
- 2. Non-cancelable Deliverables that are not capable of use except in the performance of the Agreement and which have been specifically developed for the sole purpose of the Agreement but not incorporated in the Services.

H. All compensation pursuant to this Article is subject to audit.

**1.55 EVENT OF DEFAULT**

A. An Event of Default shall mean a breach of the Agreement by the

Contractor. Without limiting the generality of the foregoing and in addition to those instances referred to herein as a breach, an Event of Default, shall include the following:

- 1. The Contractor has not delivered Deliverables on a timely basis.
- 2. The Contractor has refused or failed, except in any case for which an extension of time is provided, to supply enough properly skilled staff personnel.
- 3. The Contractor has failed to make prompt payment to subcontractors or suppliers for any Services.
- 4. The Contractor has become insolvent (other than as interdicted by the bankruptcy laws) or has assigned the proceeds received for the benefit of the Contractor's creditors, or the Contractor has taken advantage of any insolvency statute or debtor/creditor law or if the Contractor's affairs have been put in the hands of a receiver.
- 5. The Contractor has failed to obtain the approval of the City where required by the Agreement.
- 6. The Contractor has failed to provide "adequate assurances" as required under subsection "B" below; and
- 7. The Contractor has failed in the



representation of any warranties stated herein.

B. When, in the opinion of the City, reasonable grounds for uncertainty exist with respect to the Contractor's ability to perform the Services or any portion thereof, the City may request that the Contractor, within the time frame set forth in the City's request, provide adequate assurances to the City, in writing, of the Contractor's ability to perform in accordance with terms of the Agreement. Until the City receives such assurances the City may request an adjustment to the compensation received by the Contractor for portions of the Services which the Contractor has not performed. In the event that the Contractor fails to provide to the City the requested assurances within the prescribed time frame, the City may:

1. Treat such failure as a repudiation of the Agreement.
2. Resort to any remedy for breach provided herein or at law, including but not limited to, taking over the performance of the Services or any part thereof either by itself or through others.

C. In the event the City shall terminate the Agreement for default, the City or its designated representatives may immediately take possession of all applicable equipment, materials, products, documentation, reports and data.

#### **1.56 REMEDIES IN THE EVENT OF DEFAULT**

If an Event of Default occurs, the Contractor shall be liable for all damages resulting from the default, including but not limited to:

- A. Lost revenues.
- B. The difference between the cost associated with procuring Services hereunder and the amount actually expended by the City for procurement of Services, including procurement and administrative costs; and,
- C. Such other direct damages.

The Contractor shall also remain liable for any liabilities and claims related to the Contractor's default. The City may also bring any suit or proceeding for specific performance or for an injunction.

#### **1.57 PATENT AND COPYRIGHT INDEMNIFICATION**

- A. The Contractor warrants that all Deliverables furnished hereunder, including but not limited to services, equipment, programs, documentation, software, analyses, applications, methods, ways, processes, and the like, do not infringe upon or violate any patent, copyrights, service marks, trade secret, or any other third-party proprietary rights.
- B. The Contractor shall be liable and responsible for any and all claims made against the City for infringement of patents, copyrights, service marks, trade secrets or any





other third party proprietary rights, by the use or supplying of any programs, documentation, software, analyses, applications, methods, ways, processes, and the like, in the course of performance or completion of, or in any way connected with, the Work, or the City's continued use of the Deliverables furnished hereunder. Accordingly, the Contractor at its own expense, including the payment of attorney's fees, shall indemnify, and hold harmless the City and defend any action brought against the City with respect to any claim, demand, and cause of action, debt, or liability.

C. In the event any Deliverable or anything provided to the City hereunder, or a portion thereof is held to constitute an infringement and its use is or may be enjoined, the Contractor shall have the obligation, at the City's option, to (i) modify, or require that the applicable subcontractor or supplier modify, the alleged infringing item(s) at the Contractor's expense, without impairing in any respect the functionality or performance of the item(s), or (ii) procure for the City, at the Contractor's expense, the rights provided under the Agreement to use the item(s).

D. The Contractor shall be solely responsible for determining and informing the City whether a prospective supplier or subcontractor is a party to any litigation involving patent or copyright infringement, service mark, trademark, violation, or proprietary rights claims or is subject to any injunction which may prohibit it from providing any Deliverable hereunder. The Contractor shall enter into agreements with all

suppliers and subcontractors at the Contractor's own risk. The City may reject any Deliverable that it believes to be the subject of any such litigation or injunction, or if, in the City's judgment, use thereof would delay the Work or be unlawful.

E. The Contractor shall not infringe any copyright, trademark, service mark, trade secrets, patent rights, or other intellectual property rights in the performance of the Work.

### **1.58 PROPRIETARY RIGHTS**

A. The Bidder hereby acknowledges and agrees that the City retains all rights, title and interests in and to all materials, data, documentation and copies thereof furnished by the City to the Bidder hereunder or furnished by the Bidder to the City and/or created by the Bidder for delivery to the City, even if unfinished or in process, as a result of the Services the respondent performs in connection with this Agreement, including all copyright and other proprietary rights therein, which the Bidder as well as its employees, agents, subcontractors and suppliers may use only in connection with the performance of Services under this Agreement. The Bidder shall not, without the prior written consent of the City, use such documentation on any other project in which the Bidder or its employees, agents, subcontractors, or suppliers are or may become engaged. Submission or distribution by the Bidder to meet official regulatory requirements or for other purposes in connection with the performance of Services under this Agreement shall not be construed as



publication in derogation of the City's copyrights or other proprietary rights.

- B. All rights, title, and interest in and to certain inventions, ideas, designs and methods, specifications and other documentation related thereto developed by the Bidder and its subcontractors specifically for the City, hereinafter referred to as "Developed Works" shall become the property of the City.
- C. Accordingly, neither the Bidder nor its employees, agents, subcontractors, or suppliers shall have any proprietary interest in such Developed Works. The Developed Works may not be utilized, reproduced, or distributed by or on behalf of the Bidder, or any employee, agent, subcontractor, or supplier thereof, without the prior written consent of the City, except as required for the Bidder's performance hereunder.

### 1.59 ELECTRONIC BIDDING

The City maintains an automated vendor address list that has been generated for each specific commodity class item through our electronic bid issuing service, [www.bidsync.com](http://www.bidsync.com). Notices of Invitations to Bids (ITB) are sent by email to the selection of bidders who have fully registered with [www.bidsync.com](http://www.bidsync.com), and to every vendor on those lists, who may then view the bid documents online. Bidders who have been informed of a bid's availability in any other manner are responsible for registering with BidSync in order to view the bid documents. There is no fee for doing so. If you wish bid

notifications, be provided to another e-mail address contact [www.bidsync.com](http://www.bidsync.com).

### 1.60 LOCAL, STATE, AND FEDERAL COMPLIANCE REQUIREMENTS

Bidder agrees to comply, subject to applicable professional standards, with the provisions of any and all applicable Federal, State, County and City orders, statutes, ordinances, rules and regulations which may pertain to the Services required under the Agreement, including but not limited to:

- A. Equal Employment Opportunity (EEO), in compliance with Executive Order 11246 as amended and applicable to this Contract.
- B. Miami-Dade County Florida, Department of Small Business Development Participation Provisions, as applicable to this Contract.
- C. Occupational Safety and Health Act (OSHA) as applicable to this contract.
- D. Environmental Protection Agency (EPA), as applicable to this Contract.
- E. Miami-Dade County Code, Chapter 11A, Article 3. All contractors and subcontractors performing work in connection with this Contract shall provide equal opportunity for employment because of race, religion, color, age, sex, national origin, sexual preference, disability, or marital status. The aforesaid provision shall include, but not be



limited to, the following: employment, upgrading, demotion or transfer, recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in a conspicuous place available for employees and applicants for employment, such notices as may be required by the Dade County Fair Housing and Employment Commission, or other authority having jurisdiction over the Work setting forth the provisions of the nondiscrimination law.

- F. "Conflicts of Interest" Section 2-11 of the County Code, and Ordinance 01-199.
- G. North Miami Beach Purchasing Policies and Procedures Manual Policy 3.6 "Debarment and Suspension".
- H. Florida Building Code (FBC).
- I. Notwithstanding any other provision of the Agreement, Contractor shall not be required pursuant to the Agreement to take any action or abstain from taking any action if such action or abstention would, in the good faith determination of the Contractor, constitute a violation of any law or regulation to which Contractor is subject, including, but not limited to, laws and regulations requiring that Contractor conduct its operations in a safe and sound manner.

## 1.61 NONDISCRIMINATION

During the performance of this Contract, Bidder agrees to not discriminate against any employee or applicant for employment because of race, religion, color, sex, handicap, marital status, age, or national origin, and will take affirmative action to ensure that they are afforded equal employment opportunities without discrimination. Such action shall be taken with reference to, but not be limited to, recruitment, employment, termination, rates of pay or other forms of compensation, and selection for training or retraining, including apprenticeship and on-the-job training. By entering into this Contract with the City, the Bidder attests that it is not in violation of the Americans with Disabilities Act of 1990 (and related Acts). If the Bidder or any owner, subsidiary or other firm affiliated with or related to the Bidder is found by the responsible enforcement agency or the City to be in violation of the Act, such violation shall render this Contract void. This Contract shall be void if the Bidder submits a false affidavit or the Contractor violates the Act during the term of this Contract, even if the Bidder was not in violation at the time it submitted its affidavit.

## 1.62 CONFLICT OF INTEREST

The Bidder represents that:

- A. No officer, director, employee, agent, or other consultant of the City or a member of the immediate family or household of the aforesaid has directly or indirectly received or been promised any form of benefit, payment, or compensation, whether tangible or intangible, in connection with the grant of the Agreement.



B. There are no undisclosed persons or entities interested with the Bidder in the Agreement. The Agreement is entered into by the Bidder without any connection with any other entity or person making a bid for the same purpose, and without collusion, fraud, or conflict of interest. No elected or appointed officer or official, director, employee, agent, or other consultant of the City, or of the State of Florida (including elected and appointed members of the legislative and executive branches of government), or member of the immediate family or household of any of the aforesaid:

1. Is interested on behalf of or through the Bidder directly or indirectly in any manner whatsoever in the execution or the performance of the Agreement, or in the services, supplies or work, to which the Agreement relates or in any portion of the revenues; or
2. Is an employee, agent, advisor, or consultant to the Contractor or to the best of the Bidder's knowledge, any subcontractor or supplier to the Bidder.

C. Neither the Bidder nor any officer, director, employee, agent, parent, subsidiary, or affiliate of the Bidder shall have an interest which is in conflict with the Bidder's faithful performance of its obligations under the Agreement; provided that the City Attorney, in its sole discretion, may consent in writing to such a relationship, and provided the Bidder provides the City with a written notice, in advance, which identifies all the individuals and entities involved

and sets forth in detail the nature of the relationship and why it is in the City's best interest to consent to such relationship.

D. The provisions of this Article are supplemental to, not in lieu of, all applicable laws with respect to conflict of interest. In the event there is a difference between the standards applicable under the Agreement and those provided by statute, the stricter standard shall apply.

E. In the event Bidder has no prior knowledge of a conflict of interest as set forth above and acquires information which may indicate that there may be an actual or apparent violation of any of the above, Bidder shall promptly bring such information to the attention of the City's Attorney. Bidder shall thereafter cooperate with the City Attorney's review and investigation of such information and comply with the instructions Bidder receives from the Contract Manager in regard to remedying the situation.

### **1.63 PRESS RELEASE OR OTHER PUBLIC COMMUNICATION**

Under no circumstances shall the Bidder, its employees, agents, subcontractors, and suppliers, without the express written consent of the City:

A. Issue or permit to be issued any press release, advertisement or literature of any kind which refers to the City, or the Work being performed hereunder, unless the Bidder first obtains the written approval of the City. Such approval may be withheld



if for any reason the City believes that the publication of such information would be harmful to the public interest or is in any way undesirable; and

- B. Communicate in any way with any contractor, department, board, agency, Commission or other organization or any person whether governmental or private in connection with the Services to be performed hereunder except upon prior written approval and instruction of the City; and
- C. Represent, directly or indirectly, that any product or service provided by the Bidder, or such parties has been approved or endorsed by the City, except as may be required by law.

#### **1.64 BANKRUPTCY**

The City reserves the right to terminate this contract if, during the term of any contract the Bidder has with the City, the Bidder becomes involved as a debtor in a bankruptcy proceeding, or becomes involved in a reorganization, dissolution, or liquidation proceeding, or if a trustee or receiver is appointed over all or a substantial portion of the property of the Bidder under federal bankruptcy law or any state insolvency law.

#### **1.65 GOVERNING LAW/VENUE**

This Contract, including appendices, and all matters relating to this Contract (whether in contract, statute, tort (such as negligence), or otherwise) shall be governed by, and construed in accordance with, the laws of the

State of Florida. Venue shall be in Miami-Dade County.

#### **1.66 SURVIVAL**

The parties acknowledge that any of the obligations in the Agreement will survive the term, termination, and cancellation hereof. Accordingly, the respective obligations of the Bidder and the City under the Agreement, which by nature would continue beyond the termination, cancellation, or expiration thereof, shall survive termination, cancellation, or expiration hereof.

#### **1.67 VERBAL INSTRUCTIONS PROCEDURE**

No negotiations, decisions, or actions shall be initiated or executed by the Bidder as a result of any discussions with any City employee. Only those communications which are in writing from an authorized City representative may be considered. Only written communications from Bidder, which are assigned by a person designated as authorized to bind the Bidder, will be recognized by the City as duly authorized expressions on behalf of Bidder.

#### **1.68 PROHIBITION OF INTEREST**

No contract will be awarded to a proposing firm who has City elected officials, officers or employees affiliated with it, unless the proposing firm has fully complied with current Florida State Statutes and City Ordinances relating to this issue. Bidders must disclose any such affiliation. Failure to disclose any such affiliation will result in disqualification of





the Bidder or termination of the agreement, removal of the Bidder from the City's Bidder lists, and prohibition from engaging in any business with the City.

### **1.69 NO CONTINGENT FEES**

Vendor warrants that it has not employed or retained any company or person other than a bona fide employee working solely for the Vendor to solicit or secure the Agreement, and that it has not paid or agreed to pay any person, company, corporation, individual, or firm, other than a bona fide employee working solely for the Vendor any fee, commission, percentage, gift, or other consideration contingent upon or resulting from the award or making of the Agreement. For the breach or infraction of this provision, the City shall have the right to terminate the Agreement without liability at its discretion, to deduct from the contract price, or otherwise recover the full amount of such fee, commission, percentage, gift, or consideration.

### **1.70 E-VERIFY**

Bidder acknowledges that the City may be utilizing the Bidder's services for a project that is funded in whole or in part by State funds pursuant to a contract between the City and a State agency. Bidder shall be responsible for complying with the E-Verify requirements in the contract and using the U.S. Department of Homeland Security's E-Verify system to verify the employment of all new employees hired by Bidder during the Agreement term. The Bidder is also responsible for e-verifying its subcontractors, if any, pursuant to any agreement between the City and a State Agency, and reporting to

the City any required information. Bidder acknowledges that the terms of this paragraph are material terms, the breach of any of which shall constitute a default under the Agreement.

### **1.71 FORCE MAJEURE**

The Agreement which is awarded to the successful Bidder may provide that the performance of any act by the City or Bidder hereunder may be delayed or suspended at any time while, but only so long as, either party is hindered in or prevented from performance by acts of God, the elements, war, rebellion, strikes, lockouts or any cause beyond the reasonable control of such party, provided however, the City shall have the right to provide substitute service from third parties or City forces and in such event the City shall withhold payment due Bidder for such period of time. If the condition of force majeure exceeds a period of 14 days the City may, at its option and discretion, cancel or renegotiate the Agreement.

### **1.72 BUDGETARY CONSTRAINTS**

In the event the City is required to reduce contract costs due to budgetary constraints, all services specified in this document may be subject to a permanent or temporary reduction in budget. In such an event, the total cost for the affected service shall be reduced as required. The Bidder shall also be provided with a minimum 30-day notice prior to any such reduction in budget.

### **1.73 ANNEXATION**



Bidder agrees to extend all terms, conditions and pricing in the Agreement and any amendments thereto, to any areas annexed into the City.

#### **1.74 CONTRACT EXTENSION**

##### **A. City Manager Approved Contracts**

The City Manager is authorized to extend, for up to 180 days, any contract entered into by the City that did not require City Commission approval.

##### **B. City Commission Approved Contracts**

The City Manager may extend a City Commission approved contract for up to 180 days under the same terms and conditions. The extension of any City Commission approved contract for longer than 180 days shall be subject to prior approval by the City Commission. In the event of an emergency, the City Manager may extend a City Commission approved contract without City Commission approval, subject to later ratification by the City Commission

#### **1.75 SOVEREIGN IMMUNITY**

Nothing in the Agreement shall be interpreted or construed to mean that the City waives its common law sovereign immunity or the limits on liability set forth in Section 768.28, Florida Statute.

#### **1.76 SCRUTINIZED COMPANIES PURSUANT TO SECTION 287.135 AND 215.473**

Contractor must certify that the company is not participating in a boycott of Israel. Contractor must also certify that Contractor is not on the Scrutinized Companies that Boycott Israel list, not on the Scrutinized Companies with Activities in Sudan List, and not on the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List or has been engaged in business operations in Cuba or Syria. Subject to limited exceptions provided in state law, the City will not contract for the provision of goods or services with any scrutinized company referred to above. Contractor must submit the certification that is attached to this contract. Submitting a false certification shall be deemed a material breach of contract. The City shall provide notice, in writing, to the Contractor of the City's determination concerning the false certification. The Contractor shall have five (5) days from receipt of notice to refute the false certification allegation. If such false certification is discovered during the active contract term, the Contractor shall have ninety (90) days following receipt of the notice to respond in writing and demonstrate that the determination of false certification was made in error. If the Contractor does not demonstrate that the City's determination of false certification was made in error then the City shall have the right to terminate the contract and seek civil remedies pursuant to Section 287.135, Florida Statutes, as amended from time to time.

#### **1.77 LIVING WAGES**

If the total contract value exceeds \$50,000, unless specifically excluded by the provisions of Section 5-3 (Living Wage Requirements) of the City of North Miami





Beach Code as amended by Ordinance, federal or state law, will apply. A copy of this Code Section may be obtained online at [City of North Miami Beach Code of Ordinance Section 5-3](#) A copy of the living wages to be paid by the contractor may be obtained online at [City of North Miami Beach Code of Ordinance Section 5-3.2](#) or by contacting the [City of North Miami Beach Human Resource Department](#).

If the contract is for both goods and services, it shall apply only to the services portion of such contract. This requirement shall not apply to contracts which are primarily for the sale or leasing of goods.

### 1.77 LOCAL VENDOR PREFERENCE

Except where federal or state law mandates to the contrary, this preference shall apply to submittals received from Bidders that qualify, a preference of either ten (10) percent of the total evaluation points to be awarded, or within ten (10) percent of the total contract price, shall be given to a local business.

To satisfy this requirement, the business must submit Local Vendor Affidavit Form shall affirm in writing that it meets the following requirements:

1. Business must be located in the City of North Miami Beach (City) with a current city business tax receipt and certificate of use issued at least twelve (12) months prior to the City's issuance of the Solicitation AND;
2. Business must have a physical business location/address located within the City's limits, in an area zoned for the conduct of such business, from which the vendor operates or performs business on a day-

to-day basis, that is a substantial component of the goods or services being offered to the City AND;

3. Business must certify in writing and provide all required documentation supporting its compliance with the foregoing at the time of submitting its bid or proposal by signing and notarizing this form.

Alternatively, a business who subcontracts at least twenty (20) percent of the contractual amount of a City project with subcontractors who meet the above-listed criteria is deemed a Local Business for award of preference in accordance with Section 3-4.13 of the City of North Miami Beach Code of Ordinances. If the prime Bidder utilizes subcontractors to qualify for Local Business Preference, the prime Bidder must also submit Disclosure of Subcontractors Form with their submittal, along with this form.

Business location means a permanent office or other site where the local business conducts, engages in, or carries on all or a portion of its business. A post office box or location at a postal service center shall not constitute a business location.

***The Bidder seeking local business preference has the burden to show that it qualifies for the preference, to the satisfaction of the City, by submitting supporting documentation. Failure to do so may result in being considered ineligible for local business preference.***

### 1.78 COMMUNITY BENEFITS PLAN

If the total contract value exceeds \$250,000, unless specially excluded by federal or state law. The awarded Bidder may be asked to submit a Community Benefits Plan for



approval by the City. The Benefits Plan should identify the proposed benefits to the City submitted by the Bidder including, but not limited to, the creation of job opportunities for local vendors and residents, as described under Section 3-4.13 of the City Code of Ordinances. If requested by the City, the Benefits Plan shall be incorporated and become a part of the Agreement entered between the City and the awarded Bidder for this project.

Bidder/Respondent/Respondent is hereby notified that Section 287.05701, Florida Statutes, mandates that the City may not request documentation of or consider a Bidder/Respondent/Respondent's social, political, or ideological interests when determining if the Bidder/Respondent/Respondent is a responsible Bidder/Respondent/Respondent.

**1.79 RESPONSIBLE BIDDER/  
RESPONDENT/ RESPONDENT  
DETERMINATION**

**END OF SECTION**



## SECTION 2.0 SPECIAL TERMS AND CONDITIONS

### 2.1 **COMPETENCY OF RESPONDENTS**

Submittals shall be considered only from firms that have been continuously engaged in providing services similar to those specified herein for a reasonable period and that are presently engaged in the provision of these services.

The Respondent shall submit satisfactory evidence of his experience in like work and that he is fully prepared with the necessary organization, capital, and personnel to complete the Scope of Services. Respondents shall be insured, licensed and certified by all applicable local, county, and state agencies.

### 2.2 **PROCUREMENT PROCESS**

The Procurement process for this project will be two phases, open to the public to include all experienced developers, business owners, related firms and stakeholders.

#### **A. Phase 1 – Requests for Qualifications**

Phase 1 includes the Request for Qualifications (RFQ), whereby the City initially requests Respondents to provide responses to highlight and affirm their experience, expertise/qualifications, past performance, technical capabilities, firm stability and other relevant criteria for evaluation to shortlist firms to move to Phase 2.

*There are no obligations on either the City or the Respondents (or any other interested parties) to participate or even discuss ideas, potential projects, and/or any proposals.*

#### **B. Phase 2 – Requests for Proposals**

Phase 2 includes the Request for Proposals (RFP), whereby the City will extend an invitation to the shortlisted respondents to submit a response which showcases their creativity, innovation, resources, financial stability for development concepts and ideas for a Recreation Complex for the Site. The response should include and highlight the project objective, project goals and much more.

### 2.3 **METHOD OF AWARD**

Respondents' submittals will be reviewed and evaluated in accordance with Section 4.0 and Section 5.0. A shortlist will be determined based on the criteria outlined in the RFQ. Shortlisted firms will be presented to the City Commission for discussion and approval. The shortlisted firms



will move to Phase 2 to submit their proposals.

## **2.4 MINIMUM QUALIFICATIONS**

All responding firms shall meet the following minimum qualifications outlined herein, in addition to Section 4.0 Proposal Deliverables.

- a) Be an active registered corporation with the State of Florida Department of State, Division of Corporations (Sunbiz); and
- b) Provide a valid Local Business Tax Receipt from Miami-Dade, Broward or Palm Beach counties; and

## **2.5 CONTRACT AWARD TERMS OF AGREEMENT**

The Respondent understands that this RFQ does not constitute an offer or a contract with the City. The Respondent further understands that responses to this RFQ represents only the first phase in a two-phase process for the selection of a qualified firm to develop the Recreational Complex.

## **2.4 POSTPONEMENT OF DATE FOR SUBMITTING PROPOSALS**

The City reserves the right to extend the date for the receipt of proposals and will give ample notice of any such postponement to each prospective Respondent.

## **2.5 ACCEPTANCE, WAIVER OR REJECTION OF PROPOSALS**

The City, in its sole discretion, reserves the right to accept or reject any proposal, or portions thereof, in the best interests of the City. Proposals are subject to review, evaluation, and revision. Refinement of changes to layouts and elements of the proposal may be made by the City during the pre-proposal process any time until 72 hours preceding the date of opening. Addenda will be issued following such revisions.

The City reserves the right to waive any informalities or reject any and all proposals, in whole or part, to utilize any applicable state contracts in lieu of or in addition to this proposal and to accept the proposal that in its judgment will best serve the interest of the City.

## **2.6 DISQUALIFICATION OF RESPONDENTS**

Any of the following reasons may be considered as sufficient for the disqualification of a Respondent and the rejection of its proposal or proposals:

- a. More than one submittal for the same work from an individual, firm or corporation under the same or different name.
- b. Evidence that the Respondent has a financial interest in the firm of another Respondent for the same work.
- c. Evidence of collusion among Respondents. Participants in such collusion will be ineligible as Respondents for any future work of the City until such participant has been reinstated as a qualified Respondent.
- d. Uncompleted work which in the judgment of the City might hinder or prevent the



prompt completion of additional work if awarded.

- e. Failure to pay or satisfactorily settle all bills due for labor and material on former contracts in force at the time of advertisement for proposals.
- f. Default under previous contract.

## **2.7 REQUESTS FOR INFORMATION**

For information concerning specifications please utilize the question / answer feature provided by BidSync at [www.bidsync.com](http://www.bidsync.com). Questions of a material nature must be received prior to the cut-off date specified in the solicitation. Material changes, if any, to the scope of services or bidding procedures will only be transmitted by written addendum. (See addendum section of BidSync Site). Please note: No part of your bid can be submitted via FAX. No variation in price or conditions shall be permitted based upon a claim of ignorance. Submission of a bid will be considered evidence that the Contractor has familiarized themselves with the nature and extent of the work, and the equipment, materials, and labor required. The entire bid response must be submitted in accordance with all specifications contained in this solicitation. The questions and answers submitted in [www.bidsync.com](http://www.bidsync.com) shall become part of any contract that is created from this RFQ.

Any oral instructions given are not binding. All questions and interpretations will be clarified in writing to all Respondents by written addenda. Failure of a Respondent to receive and/or acknowledge any addendum shall not release the Respondent from any obligations under this solicitation.

## **2.8 VARIATIONS, CONTRADICTIONS AND SUBSTITUTIONS**

Any variations from RFQ specifications, no matter how slight, including substitutions of products or methods, must be noted and explained fully in a submittal with bid entitled "Exceptions to Specifications". If no exceptions are noted, it shall be understood that the plans and specifications will be adhered to exactly.

Where an "or equal" is specified, the City shall be the sole judge in determining equality. Any deviation from these specifications and/or changes during construction must be approved by the City in writing. If specifications are in contradiction, or if they contain any errors or omissions, bidders shall notify the Procurement Division in writing at least ten (10) working days before the Solicitation opening, or at the pre-proposal conference, to allow sufficient time to resolve all discrepancies.

**END OF SECTION**



## **SECTION 3.0 PROJECT SCOPE**

### **3.1 PURPOSE**

The City of North Miami Beach ("City"), a political subdivision of the State of Florida, is seeking interest from individuals or business owners for a redevelopment project of a Recreation Complex on the two parcels of City-owned land (collectively, the "Site"), which is located at 16851 W. Dixie Highway (Harriet Tubman Highway) North Miami Beach, FL (see Map 1).

The City intends to use a 2 Step Procurement approach with the goal of securing viable recreational / park related concepts, ideas, viewpoints, and suggestions for how the site can be optimally improved and redeveloped in the near future.

The City's efforts are designed to be more open to innovative and commercial ideas, particularly those which are community based and recreational activity oriented, and that are intended to offer market driven solutions toward creating, as well as expanding visitation to the area, without narrowly directing that individuals or businesses to follow any specific development pattern or site plan.

We anticipate receiving the finest ideas in the market, from the community and business owners, for how to best redevelop the Site in a manner that will be financially self-sustaining in the future.

### **3.2 DESCRIPTION OF THE PROPERTY**

The 10 1/2-acre of the Judge Arthur I. Snyder Tennis Center and adjacent Daniel D. Diefenbach Bicentennial Park is one of the larger continuous tracts of recreational open space in the City of North Miami Beach. Located at 16851 West Dixie Highway (Harriet Tubman Highway), the Tennis center features multiple lighted courts, a pro shop and shower facilities. Adjacent to the Tennis Center, is the Daniel D. Diefenbach Bicentennial Park. The park is an expanse of mature trees, turf and uniquely-shaped benches. Amenities of the combined Tennis Center and Bicentennial Park include, 12 lighted clay tennis courts, 6 lighted hard- surfaced courts, pro-shop, lounge and shower facilities, 4 racquetball courts, 2 paddleball courts, and picnic areas. The open space adjacent to Arthur Snyder Tennis Center along the Snake Creek Canal at Biscayne Boulevard presents an opportunity to create a pedestrian connection to the south end of East Greynolds Parks. The parcels north and south of the site are being proposed for high-rise residential and mixed used development. There is limited vertical clearance beneath the bridge, and overhead power lines above it. A water management control structure spans the canal to the east of the Biscayne Boulevard bridge.

The site is located with easy transit access to the West Dixie Highway Corridor, Biscayne Boulevard, residential areas, employment centers, and the City of North Miami Beach's busway. We are a vibrant community. Development of several key properties



along West Dixie and Biscayne Blvd. are scheduled and/or underway. The properties are situated just north of The Ancient Spanish Monastery. The Ancient Spanish Monastery is one of the area's most impressive and unique structures. The monastery was transplanted to the City of North Miami Beach brick by brick, from the original in Spain which dates to the 12th Century.

***See Map 1 Development Site (the "Site")***

### **3.3 PROJECT OBJECTIVE**

The City of North Miami Beach is offering an opportunity for individuals or businesses to propose a redevelopment project for a Recreation Complex to be placed on prime real estate owned by the City of North Miami Beach and which may result in a redevelopment deal to design, build, finance, operate and maintain public Recreational Complex.

The City envisions and anticipates a signature recreation complex to include popular recreational and leisure activities that cater to various demographics. The Complex should include a state-of-the-art recreational facility, enhanced greenspace areas and walking paths, which could provide pedestrian connectivity along West Dixie Highway and across Biscayne Blvd. to East Greynolds Park and Snake Creek Canal. Additional recreation and leisure components should be:

- Stadium Courts & Seating for Tennis, Pickleball, Padel
- Dog Park
- Greenspace
- Art Displays
- Club House / Event Space
- Educational Training Space / Meeting Rooms
- Café or Dining Hall
- Rooftop Lounge

### **3.4 PROJECT GOALS**

The City's goal is to redevelop Judge Arthur Snyder Tennis Center and Daniel Dieffenbach Park including any complementary improvements that increase and improve community, resident and tourist visitation to the area. Interested parties with the experience and expertise to design, build, finance, operate and maintain recreational public facility will be encouraged to accomplish the following goals;

#### **A. Improve and Unify**

Demonstrate the market demand for the proposed re-development/use of the park. This should include at a minimum economic study and/or market studies. To the greatest extent possible, provide an array of patron experiences that are both compatible with, and complementary in nature to, the current use of existing park site and which will ultimately broaden the appeal of the area as a recreational attraction, while simultaneously creating the overall impression of a unified destination.

#### **B. Create Flexible and Innovative Developments**





Expressions of interest for development and improvements to the Site can take any unified form of one or multiple businesses, that does not contradict with any deed(s) and/or violate and regulatory restrictions; and that recognizes certain shared needs between the City and the Respondent, including, but not limited to common entry, parking, security, and pedestrian and vehicular mobility.

**C. Include the Possibility of Incentives for Public-Private Partnerships (Development Partnerships)**

It is anticipated that the Respondent's development approaches will, by necessity, include some shared infrastructure in the form of entry, parking, security, and intra-site pedestrian and vehicular mobility. As a result, any anticipated contribution or participation by the City, or any other governmental entity or agency, should be specifically addressed in the Respondent's response, particularly any necessary financial incentives or contribution to the development or any required improvements. Responses should also suggest where such public incentives would increase the financial return to the City from the development plan.

**D. Address the Use or Utilization of the Parking**

The City would benefit from additional parking at the site and as a result, Respondents should consider incorporating improved parking for the benefit of the patrons to the site. However, if a Respondent's response includes the utilization of the current surface parking lot, as part of the proposed redevelopment plan, then that suggestion shall specifically describe, in a detailed plan, that how such collaboration with the City is expected to occur, including, but not limited to the times of such usage, the type of usage, and how such usage will benefit the City and/or the guest and patrons of the park. Further, any development on the existing surface parking lot must result, at minimum, in the same number of available parking stalls/spaces.

### **3.5 RESPONDENT SPECIFICATIONS**

The City of North Miami Beach, through its Procurement Management Department, is the entity both issuing and coordinating both the RFQ and RFP. In addition to the requirements stated elsewhere in this RFQ, this RFQ is subject to the following terms, conditions, and limitations stated below.

- A. The Site, and any portion thereof, will be conveyed or leased for re-development in its "as-is" "whereis" condition, so long as such lease and/or conveyance, if any, does not interfere with, or otherwise cause undue hardship upon the development of any other portion of the Site, a neighboring site and/or negatively impact the City of North Miami Beach.
- B. The City and its officers, employees, and agents, make no representation or warranty and assume no responsibility for the accuracy of the information set forth in this RFQ, the physical condition of the Site, the zoning, the status of the title thereto, the Site's suitability for any specific use, the presence or absence of any hazardous or toxic condition on the Site, or any other similar matter. The City and its officers, employees, and agents assume no responsibility for errors or omissions. All due diligence is the responsibility of the



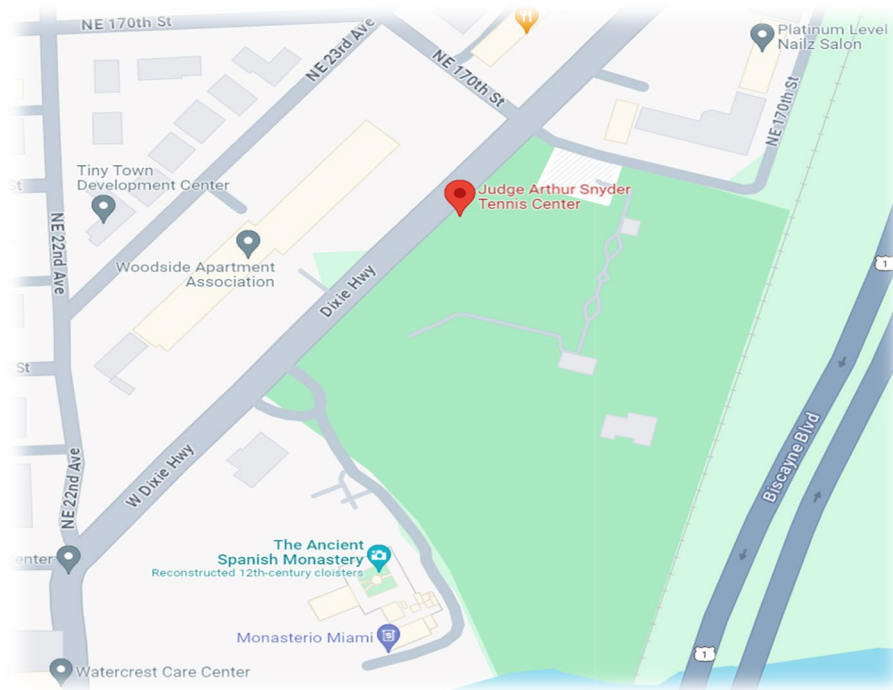
Respondents, and Respondents are urged to satisfy themselves with respect to the physical condition of the Site, information contained herein, and all laws, regulations, ordinances, restrictions, limitations, covenants, and/or other rules or obligations affecting the Site. The City will not be responsible for any injury arising out of or occurring during any visit to the Site.

- C. All submissions by Respondents, provided in response to this RFQ, shall conform to, and be subject to, the provisions of all applicable laws, regulations, ordinances and plans of all federal, state, and City authorities having jurisdiction over redevelopment and/or improvement, as may be amended from time to time. Notwithstanding the aforementioned restrictions and/or limitations, the City will cooperate with the selected Respondent(s) in obtaining necessary governmental approvals when and if necessary.
- D. The City is not obligated to pay and shall not pay any costs or expenses in connection with Respondents creating their responses to this RFQ, or for their costs or expenses associated with traveling to meet, or otherwise meeting with, City staff to discuss their responses to this RFQ, or for any other cost or expense incurred by any Respondent at any time, or for any reason, unless the City has expressly agreed to do so in advance and in writing.
- E. This RFQ contains provisions for Respondents to provide City staff with summary project or redevelopment information at early Phases for discussion only, prior to release of any formal solicitation. By submitting a response pursuant to this RFQ, you agree that all such materials will be public records pursuant to Florida Statutes Section 286.011 and Florida Statutes Chapter 119. The Respondent shall not submit any information in response to this RFQ which the Respondent considers to be a trade secret, proprietary or confidential.
- F. In the event that the response contains a claim that all or a portion of the response submitted contains confidential, proprietary or trade secret information, the Respondent, by submitting, knowingly and expressly waives all claims made that the response, or any part thereof no matter how indicated, is confidential, proprietary or a trade secret and authorizes the City to release such information to the public for any reason.
- G. RFQ submissions may be presented by any person or entity of a prospective development team to be considered. Individuals in representation, agency, or having a consultant status may submit under the direction of identified principals. However, collusion by two (2) or more persons and/or entities is expressly prohibited.
- H. In furtherance of the City's interest in the redevelopment potential of the Site, the Respondent(s) are asked to deliver documentary evidence, to the greatest extent possible, to the City, showing the specific economic benefit of any proposed project on the Site including, but not limited, to key economic indices and timeframes, such as a thirty (30) year pro forma.

**END OF SECTION**



### Map 1 Development Site (the "Site")









1301486 ①



NO.	DATE	DESCRIPTION



NOTICE: This plan is submitted to the City of North Miami Beach for review and approval. It is not to be used for any other purpose without the written consent of the City Engineer. The City Engineer's review is limited to the technical aspects of the plan and does not constitute a warranty of its accuracy or completeness. The City Engineer is not responsible for any errors or omissions in this plan.

**CITY OF NORTH MIAMI BEACH**  
 17051 NE 9TH AVENUE  
 N. MIAMI BEACH, FLORIDA 33162  
**PROJECT: ARTHUR I. SNYDER TENNIS CENTER**  
 18851 WEST DIXIE HIGHWAY  
 N. MIAMI BEACH, FLORIDA 33160  
**TITLE: SITE PLAN AND PHASING**

CLIENT: CITY OF NORTH MIAMI BEACH  
 PROJECT: ARTHUR I. SNYDER TENNIS CENTER  
 TITLE: SITE PLAN AND PHASING

JOB NO.: 100012419  
 DRAWN: KMS  
 DESIGN: TLJ  
 CHECKED: SLP  
 APPROVED: HLB  
 SHEET NO. G-100



**PHASING LEGEND**

SYMBOL	PHS.	PROJECT COMPLETE
[Yellow shading]	PHASE 1	APRIL 2010
[Hatched shading]	PHASE 2	SEPTEMBER 2011
[Cross-hatched shading]	PHASE 3A	SPRING 2012
[Diagonal hatching]	PHASE 3B	FALL 2012
[Dotted shading]	PHASE 4	FALL 2013

① SITE PLAN & PHASING

**PROPERTY DATA**  
 ADDRESS: 6851 W. DIXIE HIGHWAY  
 NORTH MIAMI BEACH, FL 33162  
 FOLIO NUMBER & LAND USE DESIGNATIONS  
 FOLIO NUMBER: 07-2209-001-0881  
 LAND USE: PARKS  
 (INCLUDING PRESERVES & CONSERVATIONS)

**LAND AREA DATA**  
 TOTAL PROPERTY AREA 10.38 AC.  
 PROJECT AREA (PHASE II) 2.62 AC.  
 EXISTING SURFACE  
 IMPERVIOUS 0.64 AC.  
 PERVIOUS 1.38 AC.  
 PROPOSED SURFACE  
 IMPERVIOUS 1.42 AC.  
 PERVIOUS 0.60 AC.

**PROPOSED SURFACE BREAKDOWN**  
 WALKWAYS 0.11 AC. 5%  
 ASPHALT/CURB 0.65 AC. 32%  
 BUILDING 0.66 AC. 33%  
 TOTAL IMPERVIOUS 1.42 AC. 70%  
 TOTAL PERVIOUS 0.60 AC. 30%

**BUILDING DATA**  
 MAXIMUM BUILDING ALLOWED: 35'-0"  
 MAXIMUM PROPOSED BUILDING HEIGHT: 29'-0"  
 AIR CONDITIONED AREA: 7,695 SF  
 AREA UNDER ROOF  
 (INCLUDING EXTERIOR COVERED DINING AREA): 9,625 SF  
 BUILDING FOOTPRINT  
 (INCLUDING EXTERIOR DECK W/ NO ROOF  
 ABOVE & EXTERIOR COVERED DINING AREA): 11,496 SF

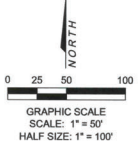
**RESTAURANT OCCUPANCY**  
 INDOOR DINING 91 OCCUPANTS  
 OUTDOOR COVERED DINING 128 OCCUPANTS  
 OUTDOOR UNCOVERED DINING 103 OCCUPANTS  
 TOTAL 322 OCCUPANTS

ITEM	REQUIRED	PROPOSED
PARKING SPACES (ALL SPACES TO HAVE 2' OVERHANG)		
STANDARD SPACES	143	88 (58 AT BUILDING)
HANDICAP SPACES	5	5 (3 AT BUILDING)

ITEM	MINIMUM	PROVIDED
SETBACKS		
FRONT	30 FT	120 FT
REAR	20 FT	270 FT
SIDE (INTERIOR)	15 FT	380 FT
SIDE (CORNER)	25 FT	120 FT
ADJACENT RESIDENTIAL DISTRICT	25 FT	OVER 110 FT

② SITE DATA TABLE





## **SECTION 4.0 RESPONDENT DELIVERABLES**

All documents and information must be fully completed and signed as required. To ensure a uniform review process and to obtain the maximum degree of comparability, it is required that the submittals be organized in the manner specified below.

### **4.1 RESPONDENT SUBMISSION INSTRUCTIONS**

***Respondents shall respond BOTH virtually AND physically to be deemed responsive by the RFQ deadline of: Monday, September 30, 2024.***

- A. Virtual Response shall be via Bid Sync by completing Section 6.0 Required Documents.
- B. Physical Response; Section 4.0 shall be delivered in person to: City of North Miami Beach, City Hall, Third Floor Procurement Management Department, Suite 315 located at: 17011 NE 19<sup>th</sup> Avenue, North Miami Beach, FL 33162. The completion of Submittal Package in accordance with the format outlined herein. Five (5) complete submittal packages shall be included and delivered to the aforementioned location.

### **4.2 SUBMISSION PACKAGE REQUIREMENTS**

- A. **Title Page, PAGE LIMIT: 1:** Show the name of respondent's agency/firm, address, telephone number, name of contact person, date, and the subject.
- B. **Table of Contents, PAGE LIMIT: 2:** Include a clear identification of the material by section and by page number.
- C. **Cover Letter and Executive Summary, PAGE LIMIT 4:** This letter should be signed by the person in your firm who is authorized to negotiate terms, render binding decisions, and commit the firm's resources. Summarize the Respondent's understanding of the work to be done and make a positive commitment to perform the work in accordance with the terms of the proposal being submitted.

In addition, you must include a statement that your firm understands that if selected; your firm is willing to respond to any questions, address concerns and/or provide an in person presentation to showcase your firms qualifications and experience outlined in your submittal package.

The Respondent shall be required to always warrant and represent that it shall maintain in good standing all required licenses, certifications and permits required under federal, state, and local laws necessary to perform the services. Give the name of the person(s) who will be authorized to make representations for the Respondent, their titles, addresses and telephone numbers.





**D. Submittal Package must include and address the following items:**

1. Proposer Information: Include firm(s) name, address, telephone; ownership/organizational structure; parent company (if applicable); and officers and principals. If the Responder intends to create a separate entity solely for the purpose of developing the Project, then include a detailed description of the entity and identify each partner, stockholder or member, and their respective interests in the separate entity.
2. Description of key personnel, including principal(s) in charge; project manager designated; and all other key personnel or development partners who will be participating in the Project. Provide an organizational chart identifying all key personnel who will be participating in the Project.
3. Description of experience of Proposer relevant to this proposal and of similar projects that have been completed by the primary firm. Describe the full development team that completed the projects and include the date, location and project budget.
4. Provide pictures and details on the projects. Projects must be completed and operating; do not submit projects which have only been designed or master planned, but not constructed. Please provide details as to development mix, operating structure, transportation elements (if applicable), sustainable building practices, and other public amenities such as parks, parking, or public art (if applicable). Respondents should place emphasis on experience with P3 structure.
5. Felony Indictments/Convictions: Provide a statement relative to whether any of the "Principals" referred to above have ever been indicted for, or convicted of, a felony.
6. Litigation History: List any litigation matter in the past five (5) years involving any projects or key personnel; please highlight any litigation specifically involving public entities.
7. References: Provide references for a minimum of three (3) similar completed development projects, two (2) Public Partner References preferred. Please provide name and contact information for each reference.

**E. FINANCIAL QUALIFICATIONS AND CAPABILITY**

1. Proposers/ Principals must submit three (3) years of audited financial statements.
2. Proposer must provide proof that they have secured funding for similar types of projects and indicate how the projects were financed.
3. Proposer must provide (2) Financial Institution References associated with the projects highlighted under Section D. Please provide name and contact information for each reference.

**END OF SECTION**



## **SECTION 5.0 EVALUATION CRITERIA**

### **5.1 REVIEW OF PROPOSALS FOR RESPONSIVENESS**

Each Submittal will be reviewed to determine if it is responsive to the submission requirements outlined in this Solicitation. A responsive Submittal is one that follows the requirements of this Solicitation, includes all documentation, is submitted in the format outlined in this Solicitation, is of timely submission, and has the appropriate signatures as required on each document. Failure to comply with these requirements may result in the Submittal being deemed non-responsive.

### **5.2 REVIEW OF PROPOSALS FOR RESPONSIBILITY**

Each Respondent will be reviewed to determine if the Respondent is a responsible Respondent. A responsible Respondent is a Respondent which the City affirmatively determines (prior to the award of a contract) has the ability, capability, and skill to perform under the terms of the contract; can provide the materials or service promptly within the time specified, without delay or interference; has a satisfactory record of integrity and business ethics; and meet the Minimum Qualification requirements in this RFP.

### **5.3 EVALUATION CRITERIA**

Proposals will be evaluated by an Evaluation Committee who will score and rank Responses on the criteria listed below. The Evaluation Committee will be comprised of appropriate City personnel, industry and/or technical professionals, as deemed necessary, with the appropriate experience and/or knowledge.

Upon request, informal staff meetings may occur with Respondents and others, to review former concepts, ideas, designs, and approaches to further affirm their experience and offer feedback to enhance each response without commitment or restriction.

The below criteria listed is provided to assist the Respondents in the allocation of their time and efforts during the submission process. The criterion also guides the Evaluation Committee during the shortlisting and final ranking of Respondents by establishing a general framework for those deliberations. During the evaluation process, City reserves the right, where it may serve the City of North Miami Beach's best interest, to request additional information or clarification from Respondents.

The Evaluation Committee will evaluate all responsive proposals based upon the information and references contained in the proposals as submitted. The criteria are itemized below with their maximum scores for a maximum total of one hundred (100) points per proposal.

#### **Evaluation Criteria - Maximum Points**

##### **A. Previous Project – 30 maximum points**

Has the firm constructed developments of similar size and scope.

Qualities considered (development quality, design, innovation, and operational success)

##### **B. Development Team & Key Personnel – 25 maximum points**



What is the experience and capacity of the development team to complete a project of this size, scale, and quality.

**C. Financial Capability – 25 maximum points**

What is the development team's ability to complete, build, operate, finance, maintain and sustain a development of this type. Has the team demonstrated strong financial capability in other projects.

**D. Public Private Partnership Experience - 20 maximum points**

Does the proposer have experience developing a public private partnership project. Was the scale, quality, and complexity comparable to this project.

**5.4 ORAL PRESENTATIONS**

Upon completion of the initial criteria evaluation ranking, the Committee may elect to shortlist all responsive proposals and may proceed with conducting oral presentation(s) with the Respondent(s) which the Evaluation Committee deems to warrant further consideration.

Should the City require such oral presentation(s), the Respondent will be notified seven (7) days in advance of appearing before the Evaluation Committee. The Respondent's Project Manager shall be the sole presenter. The City Commission may or may not re-rank the finalist's proposals. The City also reserves the right to request additional materials of Respondents, including, but not limited to, financial statements, etc. Upon completion of oral presentation(s) and/or facility site visits, the Committee will re-evaluate and re-rank the proposals remaining in consideration based upon the written documents combined with the oral presentation(s) and/or facility site visits.

**END OF SECTION**

**SECTION 6.0 REQUIRED FORMS**

The must be completed by an official having legal authorization to contractually bind the company or firm. Each signature represents a binding commitment upon the Bidder to provide the goods and/or services offered to the City if the Bidder is determined to be the most responsive and responsible Bidder.

- 6.1 Drug Free Workplace Program
- 6.2 Solicitation, Giving, and Acceptance of Gifts Policy
- 6.3 Indemnification Clause
- 6.4 Sworn Statement pursuant to section 287.133(3)(a) Florida Statutes on Public Entity Crimes
- 6.5 Anti-Kickback Affidavit
- 6.6 Non-Collusive Affidavit
- 6.7 Bidder Questionnaire
- 6.8 E-Verify Affirmation Statement
- 6.9 Living Wage
- 6.10 Local Preference Affidavit

**6.1 DRUG-FREE WORKPLACE PROGRAM**

In order to have a drug-free workplace program, a business shall:

1. Publish a statement notifying employees that the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance is prohibited in the workplace and specifying the actions that will be taken against employees for violations of such prohibition.
2. Inform employees about the dangers of drug abuse in the workplace, the business s policy of maintaining drug-free workplace, any available drug counseling, rehabilitation, and employee assistance programs, and the penalties that may be imposed upon employees for drug abuse violations.
3. Give each employee engaged in providing the commodities or contractual services that are under bid a copy of the statement specified in subsection (1).
4. In the statement specified in subsection (1), notify the employee that, as a condition of working on the commodities or contractual services that are under bid, the employee will abide by the terms of the statement and will notify the employer of any conviction of, or plea of guilty or nolo contendere to, any violation of chapter 893 or of any controlled substance law of the United States or any state, for a violation occurring in the workplace no later than five (5) days after such conviction.
5. Impose a sanction on, or require the satisfactory participation in a drug abuse assistance or rehabilitation program if such is available in the employee s community, by any employee who is so convicted.
6. Make a good faith effort to continue to maintain a drug-free workplace through implementation of this section.

As the person authorized to sign the statement, I certify that this firm complies fully with the above requirements.

Name:

Title:

Date:

**6.2 SOLICITATION, GIVING, AND ACCEPTANCE OF GIFTS POLICY**

Florida Statute 112.313 prohibits the solicitation or acceptance of Gifts. - No Public officer, employee of an agency, or candidate for nomination or election shall solicit or accept anything of value to the recipient, including a gift, loan, reward, promise of future employment, favor, or service, based upon any understanding that the vote, official action, or judgment of the public officer, employee, or candidate would be influenced thereby. ... The term public officer includes any person elected or appointed to hold office in any agency, including any person serving on an advisory body.

The City of North Miami Beach policy prohibits all public officers, elected or appointed, all employees, and their families from accepting any gifts of any value, either directly or indirectly, from any contractor, vendor, consultant, or business with whom the City does business. Only advertising office stationery or supplies of small value are exempt from this policy - e.g. calendars, note pads, pencils.

The State of Florida definition of gifts includes the following: Real

property or its use,

Tangible or intangible personal property, or its use,

A preferential rate of terms on a debt, loan, goods, or services,

Forgiveness of indebtedness,

Transportation, lodging, or parking, Membership

dues,

Entrance fees, admission fees, or tickets to events, performances, or facilities, Plants,

flowers or floral arrangements.

Services provided by persons pursuant to a professional license or certificate. Other personal services for which a fee is normally charged by the person providing the services.

Any other similar service or thing having an attributable value not already provided for in this section.

To this list, the City of North Miami Beach has added food, meals, beverages, and candy.

Any contractor, vendor, consultant, or business found to have given a gift to a public officer or employee, or his/her family, will be subject to dismissal or revocation of contract.

As the person authorized to sign the statement, I certify that this firm will comply fully with this policy.

Name:

Title:

Date:

**6.3 INDEMNIFICATION CLAUSE**

The Contractor shall indemnify, defend and hold harmless the City Commission, the City of North Miami Beach and their agents and employees from and against all claims, damages, losses and expenses (including attorney s fees) arising out of or resulting from the contractor s performance of the work, provided that any such claim, damage, loss or expense (1) is attributable to bodily injury, sickness, disease or death, or to injury to or damage to or destruction of property including the loss of use resulting there from, and (2) is caused in whole or in part by any breach or default by Contractor or negligent act or omission of the Contractor, any Subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, regardless of whether or not it is caused in part by a party indemnified hereunder.

As the person authorized to sign the statement, I certify that this firm complies fully with the above requirements.

Name:

Title:

Date:

**6.4 SWORN STATEMENT PURSUANT TO SECTION 287.133 (3) (a), FLORIDA STATUTES, ON PUBLIC ENTITY**

**CRIMES**

sworn statement is submitted to the **CITY OF NORTH MIAMI BEACH, FLORIDA**

By:

Name:

Title:

Date:

For: Legal business name:

Federal Employer I.D. no. (FEIN):

(If the entity has no FEIN, include the Social Security Number of the individual signing this sworn statement:Â \_\_\_\_\_ - \_\_\_\_\_ - \_\_\_\_\_).

Whose business address is:

2. I understand that a public entity crime as defined in Paragraph 287.133 (1)(g), Florida Statutes, means a violation of any state or federal law by a person with respect to and directly related to the transaction of business with any public entity or with an agency or political subdivision of any other state or of the United States, including but not limited to, any bid or contract for goods or services to be provided to any public entity or an agency or political subdivision of any other state or of the United States and involving antitrust, fraud, theft, bribery, collusion, racketeering, conspiracy, or material misrepresentations.
3. I understand that convicted or conviction as defined in Paragraph 287.133 (1) (b), Florida Statutes, means a finding of guilt or a conviction of a public entity crime, with or without an adjudication of guilt, in any federal or state trial court of record relating to charges brought by indictment or information after July 1, 1989, as a result of a jury verdict, non-jury trial, or entry of a plea of guilty or non contendere.
4. I understand that an affiliate as defined in Paragraph 287.133(1)(a), Florida Statutes, means:
  1. A predecessor or successor of a person convicted of a public entity crime; or
  2. An entity under the control of any natural person who is active in the management of the entity and who has been convicted of a public entity crime. The term affiliate includes those officers directors, executives, partners, shareholders, employees, members, and agents who are active in the management of an affiliate. The ownership by one person of shares constituting a controlling interest in another person, or a pooling of equipment or income among persons when not for fair market value under an arm s length agreement, shall be a prima facie case that one person controls another person. A person who knowingly enters into a joint venture with a person who has been convicted of a public entity crime in Florida during the preceding 36 months shall be considered an affiliate.
5. I understand that a person as defined in Paragraph 287.133(1) (e), Florida Statutes, means any natural person or entity organized under the laws of any state or of the United States with legal power to enter into a binding contract and which bids or applies to bid on contracts for the provision of goods or services let by a public entity, or which otherwise transacts or applies to transact business with a public entity. The term person includes those officers, directors, executives, and partners, shareholders, employees, members, and agents who are active in management of an entity.
6. Based on information and belief, the statement, which I have marked below, is true in relation to the entity submitting this sworn statement. (Indicate which statement applies).
  - Neither the entity submitting this sworn statement, nor any of its officers, directors, executives, partners, shareholders, employees, members, or agents who are active in the management of the entity, nor any affiliate of the entity has been charged with and convicted of a public entity crime subsequent to July 1, 1989.
  - The entity submitting this sworn statement, or one or more of its officers, directors, executives, partners, shareholders, employees, members, or agents who are active in the management of the entity, or an affiliate of the entity has been charged with and convicted of a public entity crime subsequent to July 1, 1989.
  - The entity submitting this sworn statement, or one or more of its officers, directors, executives, partners, shareholders, employees, members, or agents who are active in the management of the entity, or an affiliate of the entity has been charged with and convicted of a public entity crime subsequent to July 1, 1989.Â However, there has been a subsequent proceeding before a Hearing Officer of the State of Florida, Division of Administrative Hearings and the final Order entered by the Hearing Officer determined that it was not in the public interest to place the entity submitting this sworn statement on the convicted vendor list (attach a copy of the final order).

**I UNDERSTAND THAT THE SUBMISSION OF THIS TO THE CONTRACTING OFFICER FOR THE PUBLIC ENTITY IDENTIFIED IN PARAGRAPH 1 ABOVE IS FOR THAT PUBLIC ENTITY ONLY AND THAT THIS FORM IS VALID THROUGH DECEMBER 31 OF THE CALENDAR YEAR IN WHICH IT IS FILED. I ALSO UNDERSTAND THAT I AM REQUIRED TO INFORM THE PUBLIC ENTITY PRIOR TO ENTERING INTO A CONTRACT IN EXCESS OF THE THRESHOLD AMOUNT PROVIDED IN SECTION 287.017, FLORIDA STATUTES FOR CATEGORY TWO OF ANY CHANGE IN THE INFORMATION CONTAINED IN THIS FORM.**

As the person authorized to sign the statement, I certify that this firm complies fully with the above requirements.

Name:

Title:

Date:



6.5 ANTI-KICKBACK AFFIDAVIT

I, the undersigned, say that no portion of the sum herein bid will be paid to any employees of the City of North Miami Beach, as a commission, kickback, reward or gift, directly or indirectly by me or any member of my firm or by an officer of the corporation.

As the person authorized to sign the statement, I certify that this firm complies fully with the above requirements.

Name: [ ]
Title: [ ]
Date: [ ]

6.6 NON-COLLUSIVE AFFIDAVIT

a) He/she is the [ ], (Owner, Partner, Officer, Representative or Agent) of [ ] the Bidder that has submitted the attached Bid;

b) He/she is fully informed respecting the preparation and contents of the attached Bid and of all pertinent circumstances respecting such Bid;

c) Such Bid is genuine and is not collusive or a sham Bid;

d) Neither the said Bidder nor any of its officers, partners, owners, agents, representatives, employees or parties in interest, including this affiant, have in any way colluded, conspired, connived or agreed, directly or indirectly, with any other Bidder, firm, or person to submit a collusive or sham Bid in connection with the Work for which the attached Bid has been submitted; or to refrain from proposing in connection with such work; or have in any manner, directly or indirectly, sought by person to fix the price or prices in the attached Bid or of any other Bidder, or to fix any overhead, profit, or cost elements of the Bid price or the Bid price of any other Bidder, or to secure through any collusion, conspiracy, connivance, or unlawful agreement any advantage against (Recipient), or any person interested in the proposed work;

e) The price or prices quoted in the attached Bid are fair and proper and are not tainted by any collusion, conspiracy, connivance, or unlawful agreement on the part of the Bidder or any other of its agents, representatives, owners, employees or parties in interest, including this affiant.

As the person authorized to sign the statement, I certify that this firm complies fully with the above requirements.

Name: [ ]
Title: [ ]
Date: [ ]

6.7 BIDDER QUESTIONNAIRE

The completed Vendor Questionnaire should be submitted with the solicitation response.

If a response requires additional information, the Vendor should upload a written detailed response; each response should be numbered to match the question number. The completed questionnaire and attached responses will become part of the procurement record. It is imperative that the person completing the form be knowledgeable about the proposing Vendor's business and operations.

- 1. Legal business name: [ ]
2. Doing Business As/Fictitious Name (if applicable): [ ]
3. Federal Employer I.D. no. (FEIN): [ ]
4. Dun and Bradstreet No.: [ ]
5. Website address (if applicable): [ ]

6. Principal place of business address: ):

7. Office location responsible for this project:

8. Telephone no.:

Fax no.:

9. Type of business (check appropriate box):

Corporation (specify the state of incorporation):

Sole Proprietor

Limited Liability Company (LLC)

Limited Partnership

General Partnership (State and County filled in)

Other "Specify"

10. AUTHORIZED CONTACT(S) FOR YOUR FIRM:

Name:

Title:

E-mail:

Telephone No.:

Name:

Title:

E-mail:

Telephone No.:

11. List name and title of each principal, owner, officer, and major shareholder:

a)

b)

c)

d)

12. Affiliated Entities of the Principal(s): List the names and addresses of "affiliated entities" of the Vendor's principal(s) over the last five (5) years (from the solicitation opening deadline) that have acted as a prime Vendor with the City. Affiliated entities of the principal(s) are those entities related to the vendor by the sharing of stock or other means of control, including but not limited to a subsidiary, parent or sibling entity.

a)

b)

c)

d)

13. Has your firm, its principals, officers or predecessor organization(s) been debarred or suspended by any government entity within the last three years? If yes, specify details in an attached written response.  Yes  No

14. Has your firm, its principals, officers or predecessor organization(s) ever been debarred or suspended by any government entity? If yes, specify details in an attached written response, including the reinstatement date, if granted.  Yes  No

15. Specify the type of services or commodities your firm offers:

16. How many years has your firm been in business while providing the services and/or products offered within this solicitation?

17. Is your firm’s business regularly engaged in and routinely selling the product(s) or services offered within this solicitation?  Yes  No

18. Does your firm affirm that it is currently authorized by the manufacturer as a dealer/seller of the product(s) offered herein, and warranty offered is the manufacturer’s warranty with the City recorded as the original purchaser? The City reserves the right to verify prior to a recommendation of award.  Yes  No

19. Has your firm ever failed to complete any services and/or delivery of products during the last three (3) years? If yes, specify details in an attached written response.  Yes  No

20. Is your firm or any of its principals or officers currently principals or officers of another organization? If yes, specify details in an attached written response.  Yes  No

21. Have any voluntary or involuntary bankruptcy petitions been filed by or against your firm, its parent or subsidiaries or predecessor organizations during the last three years? If yes, specify details in an attached written response.  Yes  No

22. Has your firm’s surety ever intervened to assist in the completion of a contract or have Performance and/or Payment Bond claims been made to your firm or its predecessor’s sureties during the last three years? If yes, specify details in an attached a written response, including contact information for owner and surety company.  Yes  No

23. If requested, will your firm extend the same price, terms and conditions to other governmental entities during the period covered by this contract?  Yes  No

**Questions 24 - 27 are only applicable to service contracts or a construction contracts (repair, maintain or furnish and install) solicitations:**

24. What similar on-going contracts is your firm currently working on? If additional space is required, provide on separate sheet

25. Has your firm completely inspected the project site(s) prior to submitting response?  Yes  No

26. Will your firm need to rent or purchase any equipment for this contract? If yes, please specify details in an attached a written response.  Yes  No

27. What equipment does your firm own that is available for this contract?

28. Indicate registration, license numbers or certificate numbers for the businesses or professions, which are the subject of this ITB. Please attach certificate of competency and/or State registration.

29. Firm has attached a current Certificate of Liability Insurance?  Yes  No

30. If requested, will your firm extend the same price, terms and conditions to other governmental entities during the period covered by this contract? Check one:  Yes  No

31. Provide at least three (3) individuals, corporations, agencies, or institutions for which your firm has completed work of a similar nature or in which your firm sold similar commodities in the past three (3) years. Contact persons shall have personal knowledge of the referenced project/contract. If any of the following references are inaccessible or not relevant, additional references may be requested by the City.

**Reference 1:**

Scope of Work:

Contract/Project Title:

Agency:

Contact Name/Title:

Contact Telephone:

Email:

Contract/Project Dates (Month and Year):

Contract Amount:

**Reference 2:**

Scope of Work:

Contract/Project Title:

Agency:

Contact Name/Title:

Contact Telephone:

Email:

Contract/Project Dates (Month and Year):

Contract Amount:

**Reference 3:**

Scope of Work:

Contract/Project Title:

Agency:

Contact Name/Title:

Contact Telephone:

Email:

Contract/Project Dates (Month and Year):

Contract Amount:

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**32. Disclosure of Conflict of Interest**

VENDOR SHALL DISCLOSE BELOW, TO THE BEST OF HIS OR HER KNOWLEDGE, ANY CITY OF NORTH MIAMI BEACH OFFICER OR EMPLOYEE, OR ANY RELATIVE OF ANY SUCH OFFICER OR EMPLOYEE AS DEFINED IN SECTION 112.3135, *FLORIDA STATUTES*, WHO IS AN OFFICER, PARTNER, DIRECTOR OR PROPRIETOR OF, OR HAS A MATERIAL INTEREST IN THE VENDOR’S BUSINESS OR ITS PARENT COMPANY, ANY SUBSIDIARY, OR AFFILIATED COMPANY, WHETHER SUCH CITY OFFICIAL OR EMPLOYEE IS IN A POSITION TO INFLUENCE THIS PROCUREMENT OR NOT.

As the person authorized to sign the statement, I certify that this firm complies fully with the above requirements.

Name:

Title:

Date:

**6.8 E-VERIFY AFFIRMATION STATEMENT**

Contractor/Proposer/Bidder acknowledges and agrees to utilize the U.S. Department of Homeland Security s E-Verify System to verify the employment eligibility of,

- (a) all persons employed by Contractor/Proposer/Bidder to perform employment duties within Florida during the term of the Contract, and,
- (b) all persons (including subcontractors/vendors) assigned by Contractor/Proposer/Bidder to perform work pursuant to the Contract.

The Contractor/Proposer/Bidder acknowledges and agrees that use of the U.S. Department of Homeland Security s E- Verify System during the term of the Contract is a condition of the Contract.

As the person authorized to sign the statement, I certify that this firm complies fully with the above requirements.

Name:

Title:

Date:

**6.9 LIVING WAGE**

As applicable, Contractor/Proposer/Bidders acknowledges and agrees to provide Living Wage as set forth in Sec. 5-3.2 Living Wage in the City Code of Ordinances. A copy of this Code Section may be obtained online at [City of North Miami Beach Code of Ordinance Section 5-3](#) A copy of the living wages to be paid by the contractor may be obtained online at [City of North Miami Beach Code of Ordinance Section 5-3.2](#) or by contacting the [City of North Miami Beach Human Resource Department](#).

If the contract is for both goods and services, it shall apply only to the services portion of such contract. This requirement shall not apply to contracts which are primarily for the sale or leasing of goods.

As the person authorized to sign the statement, I certify that this firm complies fully with the above requirements.

Name:

Title:

Date:

**6.10 LOCAL BUSINESS PREFERENCE AFFIDAVIT**

**SECTION 1: GENERAL TERMS**

The evaluation of competitive bids is subject to Section 3-4.13 of the City of North Miami Beach Code of Ordinances which, except where contrary to federal and state law, or any other funding source requirements, provides that preference be given to local businesses.

This preference shall apply to submittals received from bidders in the purchase of supplies or services in which objective factors are used to evaluate the submittals received from offerors are assigned point totals, **a preference of ten (10) percent of the total evaluation points, or ten (10) percent of the total price**, shall be given to a local business.

To satisfy this requirement, the business shall affirm in writing that it meets the following requirements:

1. Business must be located in the City of North Miami Beach (City) with a current city business tax receipt **and** certificate of use issued at least twelve (12) months prior to the City s issuance of the Solicitation **AND**;

- 2. Business must have a physical business location/address located within the City's limits, in an area zoned for the conduct of such business, from which the vendor operates or performs business on a day-to-day basis, that is a substantial component of the goods or services being offered to the City **AND;**
- 3. Business must certify in writing and provide all required documentation supporting its compliance with the foregoing at the time of submitting its bid or proposal by signing and notarizing this form.

**Alternatively, a business who subcontracts at least twenty (20) percent of the contractual amount of a City project with subcontractors who meet the above listed criteria is deemed a Local Business for award of preference in accordance with Section 3-4.13 of the City of North Miami Beach Code of Ordinances.**

Business location means a permanent office or other site where the local business conducts, engages in, or carries on all or a portion of its business. A post office box or location at a postal service center shall not constitute a business location.

**The offeror, supplier, or contractor seeking the local business preference has the burden to show that it qualifies for the preference, to the satisfaction of the City.**

**Comparison of Qualifications:** The preferences established in no way prohibit the right of the City to compare quality of supplies or services for purchase and to compare qualifications, character, responsibility and fitness of all persons, firms or corporations submitting bids or proposals. Furthermore, the preference established in no way prohibits the right of the City to

give any other preference permitted by law instead of preferences granted, nor does it prohibit the City from selecting the bid or proposal which is the most responsible and in the best interests of the City.

**SECTION 2: AFFIRMATION**

**Failure to fully complete this affidavit and to submit the requisite supporting documents may render the Bidder/Proposer ineligible for Local Preference. The Bidder/Proposer must check the applicable box below.**

Place a check mark here if the **Bidder/Proposer** meets the requirements listed below:

**OR**

Place a check mark here if the **Bidder/Proposer** is applying for Local Business Preference by subcontracting 20% or more of the contract amount to local subcontractors which meet the requirements listed below:

- Has a business located in the City with a current City Business Tax Receipt and certificate of use issued at least twelve (12) months prior to the City's issuance of the Solicitation. ***(NOTE: A copy of applicable business tax receipt(s) and certificate(s) of use must be submitted along with this form)***
- Has a physical business location/address located within the City's limits, in an area zoned for the conduct of such business, from which the vendor operates or performs business on a day-to-day basis that is a substantial component of the goods and services being offered to the City.

**Bidder/Proposer Certification:**

I certify that the information and responses on this form or attached hereto are true, accurate, and complete. I understand that the submittal of this form to the City's Procurement Management Division is for this public entity only. I also understand that I am required to inform the City's Procurement Management Division of any change in the information contained in this form or any attachments hereto.

Name:

Title:

Date:

**Subcontractor Certification (if applicable):**

I certify that the information and responses on this form or attached hereto are true, accurate, and complete. I understand that the submittal of this form to the City's Procurement Management Division is for this public entity only. I also understand that I am required to inform the City's Procurement Management Division of any change in the information contained in this form or any attachments hereto.

Name:

Title:

Date:

**NOTE:** In the event that the Bidder/Proposer is using more than one subcontractor to qualify for Local Business Preference, then each eligible subcontractor must also complete and certify above of this to be submitted by the Bidder/Respondent as part of their proposal, along with the requisite supporting documents.





## Acknowledgement and Acceptance

This form is acknowledgment and acceptance to the terms and conditions outlined within this Request for Qualifications: RFQ-24-026-SG Recreational Complex Redevelopment Project Phase One: Developer Pre-Qualification.

***Please complete this form as part of the submittal package to be uploaded in Periscope Bid Sync.***

I, the undersigned, hereby acknowledge that I have received, read, and understood the solicitation documents provided by the City of North Miami Beach.

I agree to adhere to and comply with the solicitation process and procedures as outlined. I understand that my compliance with the guidelines and instructions provided herein may result in my submittal being deemed unresponsive.

I confirm that I have or will comply with the virtual and physical submission deadline of **September 30, 2024 at 3:00 PM (Eastern)**.

- ✓ I understand that all required documentation forms in Section 6.0 and the Acknowledgement and Acceptance form must be completed and submitted virtually via Periscope Bid Sync.
- ✓ I understand that the proposal documents as outlined in Section 4.0 must be submitted in person City of North Miami Beach, City Hall, Third Floor Procurement Management Department, Suite 315 located at: 17011 NE 19<sup>th</sup> Avenue, North Miami Beach, FL 33162. Five (5) complete submittal packages shall be included and delivered to the aforementioned location.

*By signing this form, I confirm that I have read and understood all the terms and conditions outlined in the documents provided. I agree to comply with all the requirements and stipulations therein.*

*As the person authorized to sign this affirmation, I certify that this firm fully complies with the above statement.*

\_\_\_\_\_  
Company Name

\_\_\_\_\_  
Date

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Signer Name, Title



## **ADDENDUM NO. 1**

August 13, 2024

**Solicitation No.** RFQ-24-026-SG

**Solicitation Title:** RECREATIONAL COMPLEX REDEVELOPMENT PROJECT PHASE ONE DEVELOPER PRE-QUALIFICATION

**Bid Opening Date:** September 30, 2024 @ 3:00PM (EST)

### **TO: ALL PROSPECTIVE BIDDERS:**

The following changes, additions, clarification and deletions amend the solicitation documents of the aforementioned Invitation to Bid (ITB) and shall become part of the solicitation documents. Words and/or figures stricken through shall be deleted. Underscored words and/or figures shall be added. The remaining provision are now in effect and remain unchanged.

### **A. UPDATE**

1. The PRE-BID Meeting has been scheduled:

**\*\*\* TWO PRE-BID MEETINGS SHALL BE HELD VIRTUALLY\*\*\***

**#1: Tuesday, August 13, 2024 @ 11AM VIA ZOOM -**

<https://citynmb.zoom.us/j/89414750231?pwd=cz60ugaVcvPbMiHqepcHpZ21UdX1h1.1>

Meeting ID: 894 1475 0231

Passcode: 931503

**#2: Thursday, September 12, 2024 @ 11AM VIA ZOOM -**

<https://citynmb.zoom.us/j/83004919742?pwd=eyCQFVvYxKwAU1FUUUQzst4jSDI7hM.1>

Meeting ID: 830 0491 9742

Passcode: 838558



## **ADDENDUM NO. 2**

September 4, 2024

**Solicitation No.** RFQ-24-026-SG

**Solicitation Title:** RECREATIONAL COMPLEX REDEVELOPMENT PROJECT PHASE ONE DEVELOPER PRE-QUALIFICATION

**Bid Opening Date:** September 30, 2024 @ 3:00PM (EST)

**TO: ALL PROSPECTIVE BIDDERS:**

The following changes, additions, clarification and deletions amend the solicitation documents of the aforementioned Invitation to Bid (ITB) and shall become part of the solicitation documents. Words and/or figures stricken through shall be deleted. Underscored words and/or figures shall be added. The remaining provision are now in effect and remain unchanged.

---

### **A. REMINDER**

1. The City encourages all interested and potential firms to participate in the live Zoom PRE-BID Meeting scheduled for:

***Thursday, September 12, 2024 @ 11AM VIA ZOOM -***

Link:

<https://citynmb.zoom.us/j/83004919742?pwd=eyCQFVvYxKwAU1FUUUQzst4jSDI7hM.1>

Meeting ID: 830 0491 9742 & Passcode: 838558



## **ADDENDUM NO. 3**

September 23, 2024

**Solicitation No.** RFQ-24-026-SG

**Solicitation Title:** RECREATIONAL COMPLEX REDEVELOPMENT PROJECT PHASE ONE DEVELOPER PRE-QUALIFICATION

**Bid Opening Date:** **September 30, 2024 @ 3:00PM (EST)**

### **TO: ALL PROSPECTIVE BIDDERS:**

The following changes, additions, clarification and deletions amend the solicitation documents of the aforementioned Invitation to Bid (ITB) and shall become part of the solicitation documents. Words and/or figures stricken through shall be deleted. Underscored words and/or figures shall be added. The remaining provision are now in effect and remain unchanged.

---

### **A. CHANGE**

1. The Bid Closing Date has been changed,

**Bid Close Date:** ~~Monday, September 30, 2024 @ 3:00 PM (EST)~~

***NEW Bid Close Date: Monday, October 7, 2024 @ 3:00 PM (EST)***

2. **Question & Answer End date has been extended: September 27, 2024**

## Question and Answers for Bid #RFQ-24-026-SG - RECREATIONAL COMPLEX REDEVELOPMENT PROJECT PHASE ONE DEVELOPER PRE-QUALIFICATION

### Overall Bid Questions

#### Question 1

There are 2 different times showing on Bid Sync for the pre-proposal meeting tomorrow. It is showing an 11 a.m. time and a 10 a.m. time. Which is correct? (Submitted: Aug 12, 2024 3:37:18 PM EDT)

#### Question 2

Can you please post the sign-in sheet from the 8-13-24 pre-bid meeting? (Submitted: Aug 14, 2024 10:12:29 AM EDT)

#### Question 3

1. What is the Magnitude for this project?
2. What percent is the Bid bond? (Submitted: Aug 15, 2024 1:40:52 PM EDT)

#### Question 4

Based on what the bid says in Items 2.2 a and b we would like to know if what requested in 3.4 c and d and 3.5 h is part of the deliverables of phase 1 on this RFQ, since in all Item 4 responder deliverables and Item 5 evaluation criteria there is not contemplated.

Thank you in advance for your help on this matter (Submitted: Sep 24, 2024 9:24:03 AM EDT)

#### Question 5

The pre bid conference zoom meeting is a public record? Is it possible to access it from somewhere in bidsynk? Thank you for your help on this matter (Submitted: Sep 24, 2024 9:27:26 AM EDT)



**Legislation  
11.5.**

City of North Miami Beach  
17011 NE 19 Avenue  
North Miami Beach, FL 33162  
305-947-7581  
www.citynmb.com

**MEMORANDUM**

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<b>TO:</b>	Mayor and City Commission
<b>FROM:</b>	Adam Old, CRA Executive Director
<b>VIA:</b>	
<b>DATE:</b>	January 21, 2025

---

**RE:** Resolution No. R2025-20 Approving the Transfer of the Singer Building to the North Miami Beach Community Redevelopment Agency (Adam Old, CRA Executive Director)

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**Description**

**BACKGROUND**

**ANALYSIS:**

**RECOMMENDATION:**

**FISCAL/ BUDGETARY**

**IMPACT:**

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**ATTACHMENTS:**

Description

- CRA Memo
- Resolution No R2025-xx Authorizing the Transfer of the Singer Building



North Miami Beach CRA

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**Community Redevelopment Agency**

TO: Mario Diaz, North Miami Beach City Manager  
FROM: Adam Old, CRA Executive Director  
CC: Steven Zelkowitz, CRA Attorney  
DATE: January 13, 2025

SUBJECT: **Purchase/Sale of Singer Building**

The City of North Miami Beach purchased property located at 16501 NE 15<sup>th</sup> Avenue, North Miami Beach, FL, for a purchase cost of \$1,950,000.00, and an assignment fee of \$300,000. The CRA contributed \$1,200,000 to this purchase, with the agreement that the City would build out the building as a Senior Center and allow the CRA to house its offices on the second floor.

Since the purchase the City has been unable to obtain funding to build out and operate the proposed Senior Center. In July 2024, the recommendations of the Miami-Dade County Audit Report on the North Miami Beach CRA looking at FY 2021 and FY 2022 state: *"If the CRA administrative office is not relocated to the purchased building in a reasonable time, the City should reimburse the CRA Fund."*

Instead of asking the City to reimburse the CRA from an already tight general fund, and because the CRA desires to complete the redevelopment activities outlined in its Redevelopment Plan—to restore the vacant and blighted building, and relocate its offices—in August 2024, and amended in December 2024, the CRA Board of Directors approved that the Executive Director negotiate with the City Manager a price by which to exchange the building as well as a price to exchange any necessary parking for the building within certain parameters. The CRA and City's negotiations settled on a transfer price of \$1,135,028, as well as an amount to obtain access to a perpetual shared parking easement, or similar instrument, giving access to 25 parking spaces, for \$23,000 per space, on the adjacent City-owned parking lot—or inside any future development on that site—to enable future redevelopment use of the entire property. **The total price of the purchase, to be paid from the CRA to the City at closing, or in a matter arranged in the legal documents, would be \$1,710,028.**

Since the City has considered a P3 using this property, the CRA would continue to participate, as it is able, in whichever project or program the City Commission and CRA Board ultimately wish to undertake. Until that time, the CRA will begin diligence in the rehabilitation of the envelope, mechanical, electrical, plumbing, and structural components as well as the cleanup and buildout of the offices upstairs, and the white-boxing of the downstairs space.

Thank you,

A handwritten signature in blue ink, appearing to read "Adam Old", is written over the typed name.

Adam Old  
Executive Director,  
North Miami Beach CRA



**RESOLUTION NO. 2025 -XX**

**A RESOLUTION OF THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA, AUTHORIZING THE CITY MANAGER AND CITY ATTORNEY TO NEGOTIATE AND FINALIZE AN INTERLOCAL AGREEMENT PURSUANT TO SECTION 163.01, FLORIDA STATUTES, WITH THE NORTH MIAMI BEACH CRA FOR THE TRANSFER OF THE PROPERTY LOCATED AT 16501 N.E. 15TH AVENUE, NORTH MIAMI BEACH KNOWN AS THE SINGER BUILDING FOR AN AMOUNT NOT TO EXCEED \$1,135,028 AND A PERPETUAL PARKING EASEMENT OR SIMILAR ACCESS TO 25 PARKING SPACES FOR AN AMOUNT NOT TO EXCEED \$23,000 PER PARKING SPACE ON THE ADJACENT CITY-OWNED PARKING LOT; AUTHORIZING THE CITY MANAGER TO EXECUTE THE INTERLOCAL AGREEMENT AND PERPETUAL PARKING EASEMENT WITH THE NMBCRA; AUTHORIZING THE CITY MANAGER TO TAKE ALL ACTION NECESSARY TO IMPLEMENT THE TERMS OF THE INTERLOCAL AGREEMENT AND PERPETUAL PARKING EASEMENT WITH THE NMBCRA; AUTHORIZING THE CITY MANAGER OR DESIGNEE TO DO ALL THINGS NECESSARY TO EFFECTUATE THIS RESOLUTION; PROVIDING FOR CONFLICTS; PROVIDING FOR SCRIVENER ERRORS, PROVIDING FOR SEVERABILITY; AND PROVIDING FOR AN EFFECTIVE DATE.**

**WHEREAS**, the City of North Miami Beach (the “City”) purchased the property located at 16501 N.E. 15<sup>th</sup> Avenue, North Miami Beach, Florida known as the Singer Building (the (“Property”) for a total acquisition expense of \$2,250,000.00, with the understanding that the North Miami Beach Community Redevelopment Agency (“NMBCRA”) would furnish \$1,200,000 to the City; and

**WHEREAS**, the NMBCRA has deemed the housing of its administrative offices as the best use of a portion of the Property; the rehabilitation of the Property as new NMBCRA offices will help with the removal of slum and blight, the defining mission of the NMBCRA; and

**WHEREAS**, the City Commission desires to authorize the negotiation, finalization and execution of an Interlocal Agreement pursuant to Section 163.01, Florida Statutes, with the NMBCRA for the transfer of the Property for an amount not to exceed \$1,135,028 and a Perpetual Parking Easement or similar access to 25 parking spaces for an amount not to exceed \$23,000 per parking space on the adjacent City-owned parking lot, such Interlocal Agreement and Perpetual Parking Easement shall be in a form and substance as negotiated and approved by the City Attorney.

**NOW, THEREFORE, BE IT RESOLVED BY THE MAYOR AND CITY COMMISSION OF THE CITY OF NORTH MIAMI BEACH, FLORIDA, THAT:**

**Section 1. Recitals.** The recitals in the whereas clauses are true and correct, and incorporated into this Resolution.

**Section 2. Negotiation and Finalization of the Interlocal Agreement and Perpetual Parking Easement.** The City Manager and City Attorney are hereby authorized to negotiate and finalize an Interlocal Agreement pursuant to Section 163.01, Florida Statutes, with the NMBCRA for the transfer of the Property for an amount not to exceed \$1,135,028 and a Perpetual Parking

Easement or similar access to 25 parking spaces for an amount not to exceed \$23,000 per parking space on the adjacent City-owned parking lot.

**Section 3. Execution of the Interlocal Agreement and Perpetual Parking Easement.** The City Manager is hereby authorized to execute the Interlocal Agreement and Perpetual Parking Easement with the NMBCRA.

**Section 4. Implementation of the Interlocal Agreement and Perpetual Parking Easement.** The City Manager is hereby authorized to take all action necessary to implement the terms of the Interlocal Agreement and Perpetual Parking Easement with the NMBCRA.

**Section 5.** The City Manager or designee is authorized to do all things necessary to effectuate this Resolution.

**Section 6.** All Resolutions or parts of Resolutions in conflict with this Resolution are repealed to the extent of such conflict.

**Section 7.** Any scrivener or typographical errors that do not affect intent may be corrected with notice to, and the authorization of the City Attorney and City Manager without further process.

**Section 8.** If any provision of this Resolution or the application thereof to any person or circumstance is held invalid, such invalidity shall not affect other provisions or applications of this Resolution that can be given affect without the invalid provision or application, and to this end the provisions of this Resolution are declared to be severable.

**Section 9. Effective Date.** This Resolution shall take effect immediately upon approval.

**APPROVED AND ADOPTED** by the City of North Miami Beach City Commission at the regular meeting assembled this \_\_\_ **day of January 2025.**

ATTEST:

\_\_\_\_\_  
ANDRISE BERNARD, MMC  
CITY CLERK

\_\_\_\_\_  
MICHAEL JOSEPH  
MAYOR

(CITY SEAL)

APPROVED AS TO FORM AND LEGAL SUFFICIENCY FOR THE USE  
AND RELIANCE OF THE CITY OF NORTH MIAMI BEACH ONLY:

GREENSPOON MARDER LLP

By: \_\_\_\_\_

JOSEPH S. GELLER  
CITY ATTORNEYS



**Appointments  
13.2.**

City of North Miami Beach  
17011 NE 19 Avenue  
North Miami Beach, FL 33162  
305-947-7581  
www.citynmb.com

**MEMORANDUM**

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<b>TO:</b>	Mayor and City Commission
<b>FROM:</b>	Andrise Bernard, MMC, City Clerk
<b>VIA:</b>	
<b>DATE:</b>	January 21, 2025

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**RE:** Appointing Whitney Padote to the Redevelopment Advisory Board (Andrise Bernard, MMC, City Clerk)

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**Description**

**BACKGROUND**                      None.  
**ANALYSIS:**

**RECOMMENDATION:** Approval.

**FISCAL/ BUDGETARY**              None.  
**IMPACT:**

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**ATTACHMENTS:**

Description

☐ Application



# City of North Miami Beach, Florida

## APPLICATION FOR MUNICIPAL APPOINTMENT TO A BOARD, COMMITTEE, COMMISSION

**CHAPTER 2, SECTION 2-32.1 OF THE CODE OF ORDINANCES OF THE CITY OF NORTH MIAMI BEACH PROVIDES "RESIDENCY REQUIREMENT: MEMBERS OF ALL BOARDS, COMMITTEES AND COMMISSIONS SHALL BE RESIDENTS OF THE CITY OF NORTH MIAMI BEACH, EXCEPT AS OTHERWISE SPECIFICALLY PROVIDED. SHOULD ANY BOARD, COMMITTEE OR COMMISSION MEMBER MOVE OUTSIDE THE CITY LIMITS DURING THE TERM OF HIS/HER APPOINTMENT, HE/SHE SHALL AUTOMATICALLY BE REMOVED FROM THE POSITION HE/SHE HOLDS." MEMBERS ARE ALSO SUBJECT TO CHAPTER 2, SECTION 2-32.4.**

I HEREBY FILE AN APPLICATION FOR APPOINTMENT TO THE FOLLOWING BOARD, COMMISSION OR COMMITTEE:

(PLEASE PRINT CLEARLY)

1. NAME: Whitney Padote
2. HOME ADDRESS: 2145 NE 164th Street APT 218  
CITY: North Miami Beach STATE: FL ZIP: 33162
3. BUSINESS NAME: \_\_\_\_\_  
BUSINESS ADDRESS: \_\_\_\_\_  
CITY: \_\_\_\_\_ STATE: \_\_\_\_\_ ZIP: \_\_\_\_\_
4. HOME PHONE: 786-202-6502 BUSINESS PHONE: \_\_\_\_\_  
CELL PHONE: \_\_\_\_\_ FAX: \_\_\_\_\_  
EMAIL ADDRESS: padotew@hotmail.com
5. DO YOU RESIDE IN NORTH MIAMI BEACH DURING ALL TWELVE MONTHS OF THE YEAR?  
YES:  NO:
6. HAVE YOU EVER BEEN CONVICTED OF A FELONY? YES:  NO:
7. HIGHEST LEVEL OF EDUCATION: (Youth Advisory Board Applicants: Please indicate current grade level as well as the name and telephone number of the school you are currently attending.)  
Master Degree, MBA, University of Miami

8. ARE YOU RELATED TO A CITY EMPLOYEE? YES  NO   
(If yes, please state the name of the employee and the department in which he/she works: \_\_\_\_\_)

9. EMPLOYMENT HISTORY (Please include employer, position, years served):

PRESENT STATUS: City of North Miami, Capital Project Manager, Current

20 22 to 20 24 Pricewaterhousecoopers, Consultant, 2 Years

20 17 to 20 22 Jacobs Engineering, Project Manager, 5 Years

20 16 to 20 17 City of North Miami Beach, GIS Coordinators, 1 Year

10. HAVE YOU EVER SERVED ON AN ADVISORY COMMITTEE IN THE PAST? (If yes, please describe: N/A)

N/A

11. IF NOT SELECTED FOR THE BOARD/COMMITTEE/COMMISSION INDICATED ABOVE, PLEASE LIST ANY ADDITIONAL BOARDS/COMMITTEE/COMMISSIONS FOR WHICH YOU WOULD LIKE YOUR APPLICATION SUBMITTED (Please rank in order of preference):

(1) Redevelopment Advisory Board

(2) \_\_\_\_\_

(3) \_\_\_\_\_

(4) \_\_\_\_\_

12. DESCRIBE YOUR PROFESSIONAL AND/OR VOLUNTEER EXPERIENCE OR BACKGROUND THAT WOULD BEST QUALIFY YOU FOR AN APPOINTMENT TO THE BOARD/COMMITTEE/COMMISSION YOU HAVE SELECTED: As a Capital Project Manager with an MBA and collaborations with the CRA on initiatives

on capital projects. I've led impactful redevelopment projects, combining strategic planning and community-focused expertise.

13. IF YOU ARE APPLYING FOR A BOARD/COMMITTEE/COMMISSION THAT HAS SPECIFIC REQUIREMENTS, PLEASE DETAIL HOW YOUR BACKGROUND AND/OR EXPERIENCE MEETS THE REQUIRED CRITERIA:

I have successfully managed large-scale projects, collaborated with stakeholders, and demonstrated expertise in strategic planning, financial analysis, and community engagement, aligning with the required criteria for this board.

**CERTIFICATION**

**I CERTIFY UNDER OATH, AND PENALTY OF PERJURY, THAT ALL INFORMATION SHOWN ABOVE IS TRUE AND CORRECT. I DO UNDERSTAND THAT ANY APPOINTMENT TO A BOARD, COMMITTEE, COMMISSION OBTAINED ON A MISREPRESENTATION OF A MATERIAL FACT SHALL BE NULL AND VOID.**

APPLICATION DATE: 1/14/2025 APPLICANT'S SIGNATURE: Willy Palte

LIAISON: \_\_\_\_\_ APPOINTMENT DATE: \_\_\_\_\_



**Appointments  
13.3.**

City of North Miami Beach  
17011 NE 19 Avenue  
North Miami Beach, FL 33162  
305-947-7581  
www.citynmb.com

**MEMORANDUM**

---

<b>TO:</b>	Mayor and City Commission
<b>FROM:</b>	Andrise Bernard, MMC, City Clerk
<b>VIA:</b>	
<b>DATE:</b>	January 21, 2025

---

**RE:** Appointing Patricia Miller to the Commission on Aging / Senior Citizens Advisory Board (Andrise Bernard, MMC, City Clerk)

---

**Description**

**BACKGROUND**                      None.  
**ANALYSIS:**

**RECOMMENDATION:** Approval.

**FISCAL/ BUDGETARY**                      None.  
**IMPACT:**

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**ATTACHMENTS:**

Description

▣ Application





# City of North Miami Beach, Florida

## APPLICATION FOR MUNICIPAL APPOINTMENT TO A BOARD, COMMITTEE, COMMISSION

CHAPTER 2, SECTION 2-32.1 OF THE CODE OF ORDINANCES OF THE CITY OF NORTH MIAMI BEACH PROVIDES "RESIDENCY REQUIREMENT: MEMBERS OF ALL BOARDS, COMMITTEES AND COMMISSIONS SHALL BE RESIDENTS OF THE CITY OF NORTH MIAMI BEACH, EXCEPT AS OTHERWISE SPECIFICALLY PROVIDED. SHOULD ANY BOARD, COMMITTEE OR COMMISSION MEMBER MOVE OUTSIDE THE CITY LIMITS DURING THE TERM OF HIS/HER APPOINTMENT, HE/SHE SHALL AUTOMATICALLY BE REMOVED FROM THE POSITION HE/SHE HOLDS." MEMBERS ARE ALSO SUBJECT TO CHAPTER 2, SECTION 2-32.4.

I HEREBY FILE AN APPLICATION FOR APPOINTMENT TO THE FOLLOWING BOARD, COMMISSION OR COMMITTEE:

(PLEASE PRINT CLEARLY)

1. **NAME:** Patricia N Miller
2. **HOME ADDRESS:** 1730 NE 171 Street  
**CITY:** NMB **STATE:** FL **ZIP:** 33162
3. **BUSINESS NAME:** \_\_\_\_\_  
**BUSINESS ADDRESS:** \_\_\_\_\_  
**CITY:** \_\_\_\_\_ **STATE:** \_\_\_\_\_ **ZIP:** \_\_\_\_\_
4. **HOME PHONE:** 305-903-1331 **BUSINESS PHONE:** \_\_\_\_\_  
**CELL PHONE:** \_\_\_\_\_ **FAX:** \_\_\_\_\_  
**EMAIL ADDRESS:** trishnmiller@gmail.com
5. **DO YOU RESIDE IN NORTH MIAMI BEACH DURING ALL TWELVE MONTHS OF THE YEAR?**  
YES:  NO:
6. **HAVE YOU EVER BEEN CONVICTED OF A FELONY?** YES:  NO:
7. **HIGHEST LEVEL OF EDUCATION:** (Youth Advisory Board Applicants: Please indicate current grade level as well as the name and telephone number of the school you are currently attending.)  
Master of Science

8. ARE YOU RELATED TO A CITY EMPLOYEE? YES  NO   
(If yes, please state the name of the employee and the department in which he/she works:  
\_\_\_\_\_ )

9. EMPLOYMENT HISTORY (Please include employer, position, years served):  
PRESENT STATUS: Retired  
20 01/15 to 20 01/15 Educator Miami Dade County Schools- 34 Years  
19 01/15 to 19 01/15 Educator Broward County Schools -12 Years  
19 01/15 to 19 01/15 \_\_\_\_\_

10. HAVE YOU EVER SERVED ON AN ADVISORY COMMITTEE IN THE PAST? (If yes, please describe: Current Chair of the City NMB Multicultural Committee  
Current Chair of the City NMB Multicultural Committee )

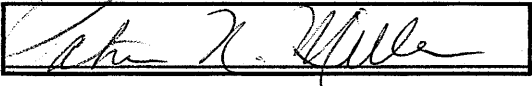
11. IF NOT SELECTED FOR THE BOARD/COMMITTEE/COMMISSION INDICATED ABOVE, PLEASE LIST ANY ADDITIONAL BOARDS/COMMITTEE/COMMISSIONS FOR WHICH YOU WOULD LIKE YOUR APPLICATION SUBMITTED (Please rank in order of preference):  
(1) \_\_\_\_\_ (2) \_\_\_\_\_  
(3) \_\_\_\_\_ (4) \_\_\_\_\_

12. DESCRIBE YOUR PROFESSIONAL AND/OR VOLUNTEER EXPERIENCE OR BACKGROUND THAT WOULD BEST QUALIFY YOU FOR AN APPOINTMENT TO THE BOARD/COMMITTEE/COMMISSION YOU HAVE SELECTED:  
Fulford United Methodist Church Council Chairperson, Trustee,  
United Women in Faith-President

13. IF YOU ARE APPLYING FOR A BOARD/COMMITTEE/COMMISSION THAT HAS SPECIFIC REQUIREMENTS, PLEASE DETAIL HOW YOUR BACKGROUND AND/OR EXPERIENCE MEETS THE REQUIRED CRITERIA:  
\_\_\_\_\_  
\_\_\_\_\_

**CERTIFICATION**

**I CERTIFY UNDER OATH, AND PENALTY OF PERJURY, THAT ALL INFORMATION SHOWN ABOVE IS TRUE AND CORRECT. I DO UNDERSTAND THAT ANY APPOINTMENT TO A BOARD, COMMITTEE, COMMISSION OBTAINED ON A MISREPRESENTATION OF A MATERIAL FACT SHALL BE NULL AND VOID.**

APPLICATION DATE: 01/15/2025 APPLICANT'S SIGNATURE: 

LIAISON: \_\_\_\_\_ APPOINTMENT DATE: \_\_\_\_\_



**Appointments  
13.4.**

City of North Miami Beach  
17011 NE 19 Avenue  
North Miami Beach, FL 33162  
305-947-7581  
www.citynmb.com

**MEMORANDUM**

---

<b>TO:</b>	Mayor and City Commission
<b>FROM:</b>	
<b>VIA:</b>	
<b>DATE:</b>	January 21, 2025

---

**RE:** Appointing Ketley Joachim to the Beautification Committee (Andrise Bernard, MMC, City Clerk)

---

**Description**

**BACKGROUND**

**ANALYSIS:**

**RECOMMENDATION:**

**FISCAL/ BUDGETARY**

**IMPACT:**

---

**ATTACHMENTS:**

Description

- ☐ Beautification Committee Application



# City of North Miami Beach, Florida

## APPLICATION FOR BEAUTIFICATION COMMITTEE

The Beautification Commission shall act in an advisory capacity in the City Commission in matters relating to City parks and City beautification.

The Beautification Commission duties include plan, develop, create, investigate and prepare studies, suggestions and recommendations to the City Commission in relation to parks and beautification to the end that a systematic program in relation thereto becomes effective both as to the present and future betterment of the City.

(PLEASE PRINT CLEARLY)

1. NAME: KETLEY JOACHIM
2. HOME ADDRESS: 210 NE 170 ST  
CITY: NMB STATE: FL ZIP: 33162
3. BUSINESS NAME: \_\_\_\_\_  
BUSINESS ADDRESS: \_\_\_\_\_  
CITY: \_\_\_\_\_ STATE: \_\_\_\_\_ ZIP: \_\_\_\_\_
4. CONTACT NO: (HOME) \_\_\_\_\_ (BUSINESS) \_\_\_\_\_  
CELL: 7862522479 EMAIL ADDRESS: \_\_\_\_\_  
FAX: \_\_\_\_\_
5. ARE YOU A RESIDENT OF THE CITY OF NORTH MIAMI BEACH OR DO YOU WORK IN THE CITY OF NORTH MIAMI BEACH?  
RESIDENT  WORK \_\_\_\_\_ (YES OR NO)
6. HAVE YOU EVER BEEN CONVICTED OF A FELONY? YES \_\_\_\_\_ NO
7. HIGHEST LEVEL OF EDUCATION AND OCCUPATION:  
HS AND online college courses

8. ARE YOU RELATED TO A CITY EMPLOYEE? YES \_\_\_\_\_ NO                       
(IF YES, PLEASE STATE THE NAME OF THE EMPLOYEE AND THE DEPARTMENT IN WHICH HE/SHE WORKS: \_\_\_\_\_)

9. EMPLOYMENT HISTORY (PLEASE INCLUDE EMPLOYER, POSITION, YEARS SERVED):

PRESENT STATUS: \_\_\_\_\_

83 to 2019 wells FARGO finance  
2019 to present Radio Host, small business director  
           to            CARIBBEAN SPEEDY

10. HAVE YOU EVER SERVED ON AN ADVISORY BOARD OR COMMITTEE DEALING WITH PARKS AND BEAUTIFICATION MATTERS (IF SO PLEASE LIST WHERE, WHEN, AND IN WHAT CAPACITY)

UNITE for Dignity Leadership Course  
IN MIAMI Dade County

11. PLEASE STATE YOUR REASON FOR INTEREST IN APPLYING FOR THE BEAUTIFICATION COMMITTEE:

I AM CURRENTLY SERVING ON THE LIBRARY  
CODE ENFORCEMENT BOARDS, COMMUNITY ACTIVIST  
LEADER. I AM ABLE TO BRING A LOT OF KNOWLEDGE  
AND EXPERIENCE AND I WAS PREVIOUSLY A  
MEMBER OF THIS BOARD

12. PLEASE LIST QUALIFICATIONS, TALENTS, OR EXPERTISE AS IT RELATES TO MEMBERSHIP FOR THIS BOARD:

I AM A PREVIOUS MEMBER OF THIS BOARD  
I HAVE WITH MY NEIGHBORS CLEANED OUT NEIGHBORHOOD  
COMMUNITY CLEANUP IN HIGHLAND VILLAGE, UTAH

CERTIFICATION

I CERTIFY UNDER OATH, AND PENALTY OF PERJURY, THAT ALL INFORMATION SHOWN ABOVE IS TRUE AND CORRECT. I DO UNDERSTAND THAT ANY APPOINTMENT TO A BOARD, COMMITTEE, COMMISSION OBTAINED ON A MISREPRESENTATION OF A MATERIAL FACT SHALL BE NULL AND VOID.

APPLICATION DATE: 4-30-21 APPLICANT'S SIGNATURE: Kelley Poachin

APPOINTMENT DATE: \_\_\_\_\_ BY \_\_\_\_\_



**Appointments  
13.5.**

City of North Miami Beach  
17011 NE 19 Avenue  
North Miami Beach, FL 33162  
305-947-7581  
www.citynmb.com

**MEMORANDUM**

---

<b>TO:</b>	Mayor and City Commission
<b>FROM:</b>	
<b>VIA:</b>	
<b>DATE:</b>	January 21, 2025

---

**RE:** Appointing Whitney Padote to the Public Utilities Commission (Andrise Bernard, MMC, City Clerk)

---

**Description**

**BACKGROUND**

**ANALYSIS:**

**RECOMMENDATION:**

**FISCAL/ BUDGETARY**

**IMPACT:**

---

**ATTACHMENTS:**

Description

▣ Application





# City of North Miami Beach, Florida

## APPLICATION FOR PUBLIC UTILITIES COMMISSION

The Public Utilities Commission shall at all times perform its duties with regard to the water and sewer systems consistent and in accordance with the ordinances adopted by the City Commissioners. The Public Utilities Commission shall also review and approve all monthly budget reports prepared by the Public Services Department and/or the City's Finance Department.

Members of the Public Utilities Commission shall have a professional degree or equivalent professional experience in the area(s) of public economics, public finance, public infrastructure, taxation, asset management, city planning, civil engineering, electrical engineering, architectural engineering, agricultural engineering, mechanical engineering, ocean engineering, energy engineering, any management position, any supervisory position, any board experience or any other related field associated with the above.

(PLEASE PRINT CLEARLY)

1. NAME: Whitney Padote
2. HOME ADDRESS: 2145 NE 164th Street APT 218  
CITY: North Miami Beach STATE: FL ZIP: 33162
3. BUSINESS NAME: \_\_\_\_\_  
BUSINESS ADDRESS: \_\_\_\_\_  
CITY: \_\_\_\_\_ STATE: \_\_\_\_\_ ZIP: \_\_\_\_\_
4. CONTACT NO: (HOME) \_\_\_\_\_ (BUSINESS) \_\_\_\_\_  
CELL: 786-202-6502 EMAIL ADDRESS: padotew@hotmail.com  
FAX: \_\_\_\_\_
5. ARE YOU A RESIDENT OF THE CITY OF NORTH MIAMI BEACH OR DO YOU WORK IN THE CITY OF NORTH MIAMI BEACH?  
RESIDENT Yes WORK No (YES OR NO)
6. HAVE YOU EVER BEEN CONVICTED OF A FELONY? YES \_\_\_\_\_ NO ✓



7. HIGHEST LEVEL OF EDUCATION AND OCCUPATION:

Master Degree & Captial Project Manager

8. ARE YOU RELATED TO A CITY EMPLOYEE? YES \_\_\_\_\_ NO  (IF YES, PLEASE STATE THE NAME OF THE EMPLOYEE AND THE DEPARTMENT IN WHICH HE/SHE WORKS: \_\_\_\_\_)

9. EMPLOYMENT HISTORY (PLEASE INCLUDE EMPLOYER, POSITION, YEARS SERVED):

PRESENT STATUS: City of North Miami, Captial Project Manager, Current

2022 to 2024 Pricewaterhousecoopers, Consultant, 2 Years

2017 to 2022 Jacobs Engineering, Project Manager, 5 Years

2016 to 2017 City of North Miami Beach, GIS Coordnator, 1 Year

10. HAVE YOU EVER SERVED ON AN ADVISORY BOARD OR COMMITTEE DEALING WITH PUBLIC UTILITITES COMMISSION MATTERS (IF SO PLEASE LIST WHERE, WHEN, AND IN WHAT CAPACITY)

N/A  
\_\_\_\_\_  
\_\_\_\_\_

11. PLEASE STATE YOUR REASON FOR INTEREST IN APPLYING FOR THE PUBLIC UTILITIES COMMISSION:

I am interested in applying for the Public Utilities Commission because it provides unique opportunity to apply my knowledge of utility infrastructure from job experience. I bring a practical, user-focused perspective to the commission, having worked hands-on to help develop and oversee the systems,which directly benefit our community.

12. PLEASE LIST QUALIFICATIONS, TALENTS, OR EXPERTISE AS IT RELATES TO MEMBERSHIP FOR THIS BOARD: Master Degree MBA- UM, Bachelor degree of Civil Engineering- FIU

Project Management, Stragetic Planning, Marketing, Finance Skills

CERTIFICATION

I CERTIFY UNDER OATH, AND PENALTY OF PERJURY, THAT ALL INFORMATION SHOWN ABOVE IS TRUE AND CORRECT. I DO UNDERSTAND THAT ANY APPOINTMENT TO A BOARD, COMMITTEE, COMMISSION OBTAINED ON A MISREPRESENTATION OF A MATERIAL FACT SHALL BE NULL AND VOID.

APPLICATION DATE: 1/9/2025 APPLICANT'S SIGNATURE: [Signature]

APPOINTMENT DATE: \_\_\_\_\_ BY \_\_\_\_\_



**Appointments  
13.6.**

City of North Miami Beach  
17011 NE 19 Avenue  
North Miami Beach, FL 33162  
305-947-7581  
www.citynmb.com

**MEMORANDUM**

---

<b>TO:</b>	Mayor and City Commission
<b>FROM:</b>	
<b>VIA:</b>	
<b>DATE:</b>	January 21, 2025

---

**RE:** Appointing Ruth Ogen to the Planning and Zoning Board (Andrise Bernard, MMC, City Clerk)

---

**Description**

**BACKGROUND**

**ANALYSIS:**

**RECOMMENDATION:**

**FISCAL/ BUDGETARY**

**IMPACT:**

---

**ATTACHMENTS:**

Description

▣ Application



# City of North Miami Beach, Florida

## APPLICATION FOR PLANNING AND ZONING BOARD

THE PLANNING AND ZONING BOARD SHALL ACT AS AN ADVISORY BODY, TO THE CITY MANAGER, THE MAYOR AND COMMISSIONERS.

Members of the Planning and Zoning Board shall have a license in engineering or contracting, or have equivalent professional experience in the area(s) of city planning, land use planning, transportation planning, urban planning, community development, real estate, mixed-use development, statistics, public economics, construction management, general contracting, architecture, or a law degree.

(PLEASE PRINT CLEARLY)

1. NAME: RUTH OGEN
2. HOME ADDRESS: 17451 NE 23 AVENUE  
CITY: NORTH MIAMI BEACH STATE: FL ZIP: 33160
3. BUSINESS NAME: UNIQUE ENTERPRISES OF MIAMI INC  
BUSINESS ADDRESS: 17451 NE 23 AVENUE  
CITY: NORTH MIAMI BEACH STATE: FL ZIP: 33160
4. CONTACT NO: (HOME) \_\_\_\_\_ (BUSINESS) \_\_\_\_\_  
CELL: 786-229-1250 EMAIL ADDRESS: KELIWOOL@YAHOO.COM  
FAX: \_\_\_\_\_
5. ARE YOU A RESIDENT OF THE CITY OF NORTH MIAMI BEACH OR DO YOU WORK IN THE CITY OF NORTH MIAMI BEACH?  
RESIDENT YES WORK \_\_\_\_\_ (YES OR NO)
6. HAVE YOU EVER BEEN CONVICTED OF A FELONY? YES \_\_\_\_\_ NO NO
7. HIGHEST LEVEL OF EDUCATION AND OCCUPATION:  
BACHELOR OF ARTS DEGREE - FLORIDA STATE LICENSED ROOFING, GENERAL AND REAL ESTATE AGENT

8. ARE YOU RELATED TO A CITY EMPLOYEE? YES \_\_\_\_\_ NO No  
(IF YES, PLEASE STATE THE NAME OF THE EMPLOYEE AND THE DEPARTMENT IN WHICH HE/SHE WORKS: \_\_\_\_\_)

9. EMPLOYMENT HISTORY (PLEASE INCLUDE EMPLOYER, POSITION, YEARS SERVED):

PRESENT STATUS: \_\_\_\_\_

2021 to PRESENT QUALIFIER FOR COLE ROOFING AS ROOFING CONTRACTOR

1976 to 2021 REALTOR - LATEST OFFICE BEING BEACHFRONT REALTY

1984 to 2004 OWNER AND QUALIFIER FOR UNIQUE ROOFING AND CONSTRUCTION INC

10. HAVE YOU EVER SERVED ON AN ADVISORY BOARD OR COMMITTEE DEALING WITH PLANNING AND ZONING MATTERS (IF SO PLEASE LIST WHERE, WHEN, AND IN WHAT CAPACITY)

NO  
\_\_\_\_\_  
\_\_\_\_\_

11. PLEASE STATE YOUR REASON FOR INTEREST IN APPLYING FOR THE PLANNING AND ZONING BOARD:

As a Florida-licensed General and Roofing Contractor and a Real Estate Agent with nearly 50 years of experience, I bring extensive expertise in construction, zoning, and property markets. Having lived in North Miami Beach for 45 years, I am deeply committed to its growth and sustainability. My unique perspective combines practical knowledge of building regulations with an understanding of market trends and community needs. I am passionate about preserving the city's character while fostering responsible development and would be honored to contribute my experience and dedication to the Planning and Zoning Board.

12. PLEASE LIST QUALIFICATIONS, TALENTS, OR EXPERTISE AS IT RELATES TO MEMBERSHIP FOR THIS BOARD: SEE ABOVE

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

CERTIFICATION

I CERTIFY UNDER OATH, AND PENALTY OF PERJURY, THAT ALL INFORMATION SHOWN ABOVE IS TRUE AND CORRECT. I DO UNDERSTAND THAT ANY APPOINTMENT TO A BOARD, COMMITTEE, COMMISSION OBTAINED ON A MISREPRESENTATION OF A MATERIAL FACT SHALL BE NULL AND VOID.

APPLICATION DATE: 01/12/2025 APPLICANT'S SIGNATURE: 

APPOINTMENT DATE: \_\_\_\_\_ BY \_\_\_\_\_



**Appointments  
13.7.**

City of North Miami Beach  
17011 NE 19 Avenue  
North Miami Beach, FL 33162  
305-947-7581  
www.citynmb.com

**MEMORANDUM**

---

<b>TO:</b>	Mayor and City Commission
<b>FROM:</b>	
<b>VIA:</b>	
<b>DATE:</b>	January 21, 2025

---

**RE:** Appointing Phyllis Poulos to the Code Enforcement Board (Andrise Bernard, MMC, City Clerk)

---

**Description**

**BACKGROUND**

**ANALYSIS:**

**RECOMMENDATION:**

**FISCAL/ BUDGETARY**

**IMPACT:**

---

**ATTACHMENTS:**

Description

- ▣ Application



# **City of North Miami Beach, Florida**

## **APPLICATION FOR CODE ENFORCEMENT BOARD**

The Code Enforcement Board promotes, protects, and improves the health, safety, and welfare of the citizens of the municipality by providing an equitable, expeditious, effective and inexpensive method of enforcing the various occupational license, building, zoning, sign and related codes in force within the municipality.

Members of the Code Enforcement Board shall, whenever possible, include an architect, a business person, an engineer, a general contractor, a subcontractor and a realtor.

(PLEASE PRINT CLEARLY)

1. NAME: \_\_\_\_\_
2. HOME ADDRESS: \_\_\_\_\_  
CITY: \_\_\_\_\_ STATE: \_\_\_\_\_ ZIP: \_\_\_\_\_
3. BUSINESS NAME: \_\_\_\_\_  
BUSINESS ADDRESS: \_\_\_\_\_  
CITY: \_\_\_\_\_ STATE: \_\_\_\_\_ ZIP: \_\_\_\_\_
4. CONTACT NO: (HOME) \_\_\_\_\_ (BUSINESS) \_\_\_\_\_  
CELL: \_\_\_\_\_ EMAIL ADDRESS: \_\_\_\_\_  
FAX: \_\_\_\_\_
5. ARE YOU A RESIDENT OF THE CITY OF NORTH MIAMI BEACH OR DO YOU WORK IN THE CITY OF NORTH MIAMI BEACH?  
RESIDENT \_\_\_\_\_ WORK \_\_\_\_\_ (YES OR NO)
6. HAVE YOU EVER BEEN CONVICTED OF A FELONY? YES \_\_\_\_\_ NO \_\_\_\_\_
7. HIGHEST LEVEL OF EDUCATION AND OCCUPATION:  
\_\_\_\_\_

8. ARE YOU RELATED TO A CITY EMPLOYEE? YES \_\_\_\_\_ NO \_\_\_\_\_  
(IF YES, PLEASE STATE THE NAME OF THE EMPLOYEE AND THE DEPARTMENT IN WHICH HE/SHE WORKS: \_\_\_\_\_)

9. EMPLOYMENT HISTORY (PLEASE INCLUDE EMPLOYER, POSITION, YEARS SERVED):

PRESENT STATUS: \_\_\_\_\_

\_\_\_\_\_ to \_\_\_\_\_

\_\_\_\_\_ to \_\_\_\_\_

\_\_\_\_\_ to \_\_\_\_\_

10. HAVE YOU EVER SERVED ON AN ADVISORY BOARD OR COMMITTEE DEALING WITH CODE ENFORCEMENT MATTERS (IF SO PLEASE LIST WHERE, WHEN, AND IN WHAT CAPACITY)

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

11. PLEASE STATE YOUR REASON FOR INTEREST IN APPLYING FOR THE CODE ENFORCEMENT BOARD:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

12. PLEASE LIST QUALIFICATIONS, TALENTS, OR EXPERTISE AS IT RELATES TO MEMBERSHIP FOR THIS BOARD: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

CERTIFICATION

I CERTIFY UNDER OATH, AND PENALTY OF PERJURY, THAT ALL INFORMATION SHOWN ABOVE IS TRUE AND CORRECT. I DO UNDERSTAND THAT ANY APPOINTMENT TO A BOARD, COMMITTEE, COMMISSION OBTAINED ON A MISREPRESENTATION OF A MATERIAL FACT SHALL BE NULL AND VOID.

APPLICATION DATE: \_\_\_\_\_ APPLICANT'S SIGNATURE: \_\_\_\_\_  
*P. H. Miller*

APPOINTMENT DATE: \_\_\_\_\_ BY \_\_\_\_\_





**Appointments  
13.8.**

City of North Miami Beach  
17011 NE 19 Avenue  
North Miami Beach, FL 33162  
305-947-7581  
www.citynmb.com

**MEMORANDUM**

---

<b>TO:</b>	Mayor and City Commission
<b>FROM:</b>	
<b>VIA:</b>	
<b>DATE:</b>	January 21, 2025

---

**RE:** Appointing Bruce Lamberto to the Eastern Shores Security Guard Special Taxing District (Andrise Bernard, MMC. City Clerk)

---

**Description**

**BACKGROUND**

**ANALYSIS:**

**RECOMMENDATION:**

**FISCAL/ BUDGETARY**

**IMPACT:**

---

**ATTACHMENTS:**

Description

▣ Application



**City of North Miami Beach, Florida**  
**APPLICATION FOR EASTERN SHORES SECURITY**  
**GUARD SPECIAL TAXING DISTRICT**  
**("ESSGSTD") BOARD**

THE EASTERN SHORES SECURITY GUARD SPECIAL TAXING DISTRICT BOARD WAS ESTABLISHED FOR THE PURPOSE OF COUNSELING THE CITY COMMISSION AS TO THE NEEDS, PLANNING REQUIREMENTS, DEVELOPMENT AND MANAGEMENT OF THE SAFETY AND SECURITY PROGRAMS WITHIN ESSGSTD.

THE ESSGSTD ADVISORY BOARD SHALL BE COMPOSED OF FIVE (5) MEMBERS, WHO SHALL BE OWNERS OF REAL PROPERTY WITHIN THE ESSGSTD.

(PLEASE PRINT CLEARLY)

1. NAME: Bruce Lamberto
2. HOME ADDRESS: 3420 NE 165 ST  
CITY: North Miami Beach STATE: FL. ZIP: 33160
3. BUSINESS NAME: N/A  
BUSINESS ADDRESS: \_\_\_\_\_  
CITY: \_\_\_\_\_ STATE: \_\_\_\_\_ ZIP: \_\_\_\_\_
4. CONTACT NO: (HOME) 305.945.5459 (BUSINESS) \_\_\_\_\_  
CELL: 786.367.7072 EMAIL ADDRESS: blamberto@aol.com  
FAX: \_\_\_\_\_
5. ARE YOU A RESIDENT OF THE CITY OF NORTH MIAMI BEACH OR DO YOU WORK IN THE CITY OF NORTH MIAMI BEACH?  
RESIDENT Yes WORK \_\_\_\_\_ (YES OR NO)
6. HAVE YOU EVER BEEN CONVICTED OF A FELONY? YES \_\_\_\_\_ NO X
7. HIGHEST LEVEL OF EDUCATION AND OCCUPATION:  
2 yrs college

8. ARE YOU RELATED TO A CITY EMPLOYEE? YES \_\_\_\_\_ NO  X  
(IF YES, PLEASE STATE THE NAME OF THE EMPLOYEE AND THE DEPARTMENT IN WHICH HE/SHE WORKS: \_\_\_\_\_)

9. EMPLOYMENT HISTORY (PLEASE INCLUDE EMPLOYER, POSITION, YEARS SERVED):

PRESENT STATUS: Retired

3/1992 to 09/2020 City of Miami Beach

\_\_\_\_\_ to \_\_\_\_\_

\_\_\_\_\_ to \_\_\_\_\_

10. HAVE YOU EVER SERVED ON AN ADVISORY BOARD OR COMMITTEE DEALING WITH SECURITY GUARD SPECIAL TAXING DISTRICT MATTERS (IF SO PLEASE LIST WHERE, WHEN, AND IN WHAT CAPACITY)

Yes. NMB 2020?  
\_\_\_\_\_  
\_\_\_\_\_

11. PLEASE STATE YOUR REASON FOR INTEREST IN APPLYING FOR THE ESSGSTD ADVISORY BOARD:

CommunityService  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

12. PLEASE LIST QUALIFICATIONS, TALENTS, OR EXPERTISE AS IT RELATES TO MEMBERSHIP FOR THIS BOARD:

0 years experience in water and sewer infrastructure and property management. I was the Administrator at the Normandy Shores Security District in Miami Beach  
\_\_\_\_\_  
\_\_\_\_\_

CERTIFICATION

I CERTIFY UNDER OATH, AND PENALTY OF PERJURY, THAT ALL INFORMATION SHOWN ABOVE IS TRUE AND CORRECT. I DO UNDERSTAND THAT ANY APPOINTMENT TO A BOARD, COMMITTEE, COMMISSION OBTAINED ON A MISREPRESENTATION OF A MATERIAL FACT SHALL BE NULL AND VOID.

APPLICATION DATE: Jan. 10, 2025 APPLICANT'S SIGNATURE:   
Bruce Lamberto

APPOINTMENT DATE: \_\_\_\_\_ BY \_\_\_\_\_



**City Manager's Report  
16.1.**

City of North Miami Beach  
17011 NE 19 Avenue  
North Miami Beach, FL 33162  
305-947-7581  
www.citynmb.com

**MEMORANDUM**

---

<b>TO:</b>	Mayor and City Commission
<b>FROM:</b>	
<b>VIA:</b>	
<b>DATE:</b>	January 21, 2025

---

**RE:** Miami Gardens v. North Miami Beach - Weekly Settlement Claims Administration Progress Update  
(December 2024)

---

**Description**

**BACKGROUND**

**ANALYSIS:**

**RECOMMENDATION:**

**FISCAL/ BUDGETARY**

**IMPACT:**

---

**ATTACHMENTS:**

Description

📎 MGv NMB Settlement



**City of North Miami Beach**  
**17011 NE 19<sup>th</sup> Avenue**  
**North Miami Beach, FL 33162**  
**305-947-7581**  
**[www.citynmb.com](http://www.citynmb.com)**

## **MEMORANDUM**

**TO:** Honorable Mayor, Vice Mayor, and Commissioners

**FROM:** Mario Diaz, City Manager

**DATE:** January 8, 2025

**RE:** Miami Gardens v. North Miami Beach Settlement Weekly Settlement Claims  
Administration Progress Update

---

### **Purpose:**

This memo provides a week-over-week comparison of the City of Miami Gardens v. City of North Miami Beach claims statistics, highlighting progress in notice distribution, claims submissions, and related activities.

---

### **Key Observations:**

1. **The total number of Settlement Notice Packets Mailed is 16,439**
2. **Notice of Settlement Delivery Challenges:**
  - The volume of undeliverable original notice packets has risen to 106, up from 90 in the previous month.
  - Traced notices sent to new addresses has increased, with 49 sent as of December 27.
  - The number of unsuccessful traces has increased to 55, indicating difficulties in locating recipients.
3. **Settlement Claims Submissions:**
  - The number of claims received increased significantly over the past month, rising from 534 to 1,894.
4. **Stability in Objections:**
  - No objections have been received to date, reflecting continued public alignment with the process.

### **Important Dates:**

- **Notice Packet Mailing Date:** November 1, 2024
- **Claim Form Submission Deadline:** January 12, 2026

**Support for Claimants:**

- **Toll-Free Hotline:** (855) 783-6819
- **Settlement Website:** [miamigardenswaterbillsettlement.com](http://miamigardenswaterbillsettlement.com)

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Category	As of 12/04/2024	As of 12/11/2024	As of 12/18/2024	As of 12/27/2024
Original Notice Packets Undeliverable	96	100	104	106
Traced, New Address Notice Sent	43	45	49	49
Notices to Trace Address Undeliverable	0	0	0	0
Trace Unsuccessful	53	55	55	55
Trace Pending	0	0	0	2
Notice Packets Remailed on Request	13	15	18	18
Remailed Packets Undeliverable	0	0	0	0
Packets Remailed to PO Forward	0	0	0	0
Objections Received	0	0	0	0
Claim Forms Received	914	1,406	1,828	1,894

- Total Notice Packets Mailed out 16,439

---

Cc:

Joseph Geller, City Attorney  
Andrise Benard, City Clerk  
Marline Monestime, Chief of Staff



**City Manager's Report  
16.2.**

City of North Miami Beach  
17011 NE 19 Avenue  
North Miami Beach, FL 33162  
305-947-7581  
www.citynmb.com

**MEMORANDUM**

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<b>TO:</b>	Mayor and City Commission
<b>FROM:</b>	
<b>VIA:</b>	
<b>DATE:</b>	January 21, 2025

---

**RE:** NMBPD Monthly Report (December 2024)

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**Description**

**BACKGROUND**

**ANALYSIS:**

**RECOMMENDATION:**

**FISCAL/ BUDGETARY**

**IMPACT:**

---

**ATTACHMENTS:**

Description

- ▣ NMBPD Monthly Report - December 2024





HIGHLIGHTS & SIGNIFICANT INCIDENTS

**NORTH MIAMI BEACH POLICE**

**DEPARTMENT**

**MONTHLY REPORT**

**December 2024**





# HIGHLIGHTS & SIGNIFICANT INCIDENTS

## ADMINISTRATIVE DIVISION

- **Recruiting, Academy and Training**  
Recruited at MDC BLE academy for 80 hours
- **Training Attended**
  - Police Basic Bicycle School
  - Basic Fraud Familiarization Patrol Gang Activity
  - “Communications” Crisis Intervention Team Training
  - Advanced SWAT School
  - Driver Improvement Program (DIP)
  - CMS Vehicle Operations Instructor
  - Volcanic Bikes Mechanic Class
  - Speed Measurement
  - PAL’s South Florida Annual Conference and Training
  - Advanced Traffic Homicide Investigation
  - G-300 Post 5/10/2019 Intermediate ICS
  - Stress Management Techniques
  - Introduction to General Investigations
- **Personnel**
  - Processing: 7 police officers being sworn-in on Thursday, January 16, 2025.
  - Personnel and training scheduling in-service training schedule and instructors for new hires in January 2025.
  - Conducted Police Cadet interviews
- **Communications**
  - Answered approximately 3,927 incoming calls for police service.

## OPERATIONS DIVISION

- **Road Patrol**
  - Calls for Service: 9951; Including: Watch Orders: 3196; Night Eyes: 811; Community Contacts: 1034
  - 82 arrests (36 felonies) this month. 866 traffic stops. 968 citations. 445 Field Contacts.  
Notable actions:
    - On December 15, 2024, Officers working the Deans Gold detail were approached by the complainant who advised his son, the victim, was intoxicated got out of his vehicle and jumped into the canal with the intent of committing suicide. The complainant advised that his son had been depressed due to a bad break up with his long-term girlfriend. Officers were able to quickly locate the victim struggling in the water.



## HIGHLIGHTS & SIGNIFICANT INCIDENTS

Officers Osorio and Estevez took immediate action and jumped into the water to conduct a successful rescue. The victim was then transported to Aventura Hospital to obtain mental health assistance.

- On Wednesday, December 25, 2024 at 11:13 PM, midnight shift officers responded to 2385 NE 173 Street in regard to a check on the welfare. The victim's nephew advised that the victim was battling cancer and had a tendency of falling. He stated that he had not heard of the victim in four days. Midnight shift officers responded and observed several mail items and packages stacked in the front door. Officers determined that they had an exigent circumstance due to fear of medical emergency and made forced entry. Upon entering the residence, they observed the victim on the ground, in unsanitary conditions. The victim was transported to the hospital to receive medical care. The immediate actions of the midnight shift officers saved the victims life.
- On Sunday, December 29, 2024, Officers received a License Plate Reader (LPR) notification of a vehicle stolen from the City of North Miami Beach in the area of US-1 and Biscayne BLVD. Officers immediately saturated the area and located the vehicle. Officers conducted a felony stop of the vehicle and immediately took the subject into custody. The K9 Unit responded and searched the vehicle, at which time, a stolen firearm was located.

### OPERATIONS DIVISION (Continued)

- Officers Hernandez and Conde completed Phase 2 of FTO Training.

### COMMUNITY PARTNERSHIP DIVISION

- **Events Attended**
  - On Wednesday, December 4, 2024, Community Policing (CP) assisted with the Senior Walk. The Polaris ATV escorted the walkers for an enjoyable event. They went from City Hall down NE 171 Street to South Glades Drive and back.
  - On Thursday, December 12, 2024, CP hosted the Club Law and Order holiday dinner. The event was successful in promoting positive communication between members of the community and the NMBPD.
  - On Saturday, December 14, 2024, CP assisted in managing the Toyland event at Snow Fest Winter Parade and Tree Lighting. During the Toyland



## HIGHLIGHTS & SIGNIFICANT INCIDENTS

Event, nearly 1000 toys were distributed to the children of North Miami Beach. The event was successful and fulfilled the dreams of many children.

- On Wednesday, December 18, 2024, CP assisted with the PAL Christmas Party at Allen Park. The event was very successful and all the children attending left with multiple toys.
- On Thursday, December 19, 2024, CP assisted with organizing traffic control for the Farm Share Food giveaway at Uleta Park. Over 500 boxes of food were distributed.

## COMMUNITY PARTNERSHIP DIVISION (Continued)

- On Thursday, December 19, 2024, CP assisted with the Mystic Force Christmas Tree lighting ceremony at the NMBPD.
- On Friday, December 20, 2024, CP participated in the annual Shop-with-a-Cop event at Walmart. The event went well and over 40 children participated.
- On Saturday, December 21, 2024, CP hosted the Helping Heros at Target, where 20 children were taken shopping for Christmas presents.
- On Thursday, December 26, 2024, provided security for the annual Menorah Lighting event. Approximately 1000 patrons participated in the celebration.

## INVESTIGATIVE DIVISION

- TIU was investigating a narcotics complaint within the City of North Miami Beach. A narcotics-related search warrant was obtained. On Tuesday, December 10, 2024, TIU in conjunction with NMBPD SRT, Aventura SWAT, DEA, and the US Secret Service served a warrant at 2350 NE 173<sup>rd</sup> Street. Upon completion of this investigation and narcotics search warrant, pink cocaine, known as Tusi was seized. This operation resulted in two arrests. Arrest charges relating to possession with intent to sell were made. Tusi, is a recreational drug that contains a mixture of different psychoactive substances, most commonly found in a pink-dyed powder form known as pink cocaine. Tusi, is believed to have originated in Latin America & sample tests have shown this specific drug contains narcotic substances such as Ketamine, MDMA, Methamphetamines, cocaine, Oxycodone & psychedelics.
- On December 17, 2024 at approximately 1613 hours, North Miami Beach



## HIGHLIGHTS & SIGNIFICANT INCIDENTS

Police Officers responded to the area of NE 168 Street / NE 22 Avenue in reference to a stabbing that occurred. Investigators were able to obtain surveillance footage from a nearby daycare which depicted an adult male victim and suspect involved in a verbal dispute. During the dispute a physical altercation ensued which led to the victim receiving a stab wound to the right side of the chest cavity and several other lacerations. Both parties separated and the suspect fled the scene prior to officer's arrival. TIU was able to locate the subject of the stabbing at 1290 NE 143 Street. A narcotics related search warrant was obtained for the residence. On Friday, December 20, 2024, TIU served a narcotics-related search warrant at 1290 NE 143 ST. This warrant operation was conducted with NMBPD SRT, North Miami PD and Aventura SWAT, DEA, the Secret Service and the Detective Bureau (DB). Upon completion of this investigation and narcotics search warrant, a stolen AR-15, Crack Cocaine, and trafficking amounts of powder Fentanyl were recovered. This operation resulted in the arrest of three individuals. Arrest charges relating to possession of a stolen firearm by a convicted felon, and Armed Fentanyl Trafficking were made. Within the warrant residence, a stolen electric motorized vehicle was also recovered.

- On December 18, 2024 officers responded to the Aqua Vista apartment complex in reference to 5 vehicle burglaries. While on scene, detective reviewed CCTV footage of the subject entering 3 vehicles belonging to 2 different victims. While reviewing the footage, detectives were able to identify the subject, who was a known to detectives. TIU saturated the area and were able to locate the subject near NE 19 Avenue and NE 167 Street.

### **INVESTIGATIVE DIVISION (Continued)**

- The Investigations Division made 13 arrests. TIU made 5 felony arrests, and 1 warrant arrest. DB made 6 felony arrests and 1 misdemeanor.



**City Manager's Report  
16.3.**

City of North Miami Beach  
17011 NE 19 Avenue  
North Miami Beach, FL 33162  
305-947-7581  
www.citynmb.com

**MEMORANDUM**

---

<b>TO:</b>	Mayor and City Commission
<b>FROM:</b>	
<b>VIA:</b>	
<b>DATE:</b>	January 21, 2025

---

**RE:** NMB Water Updates & Highlights (December 2024)

---

**Description**

**BACKGROUND**

**ANALYSIS:**

**RECOMMENDATION:**

**FISCAL/ BUDGETARY**

**IMPACT:**

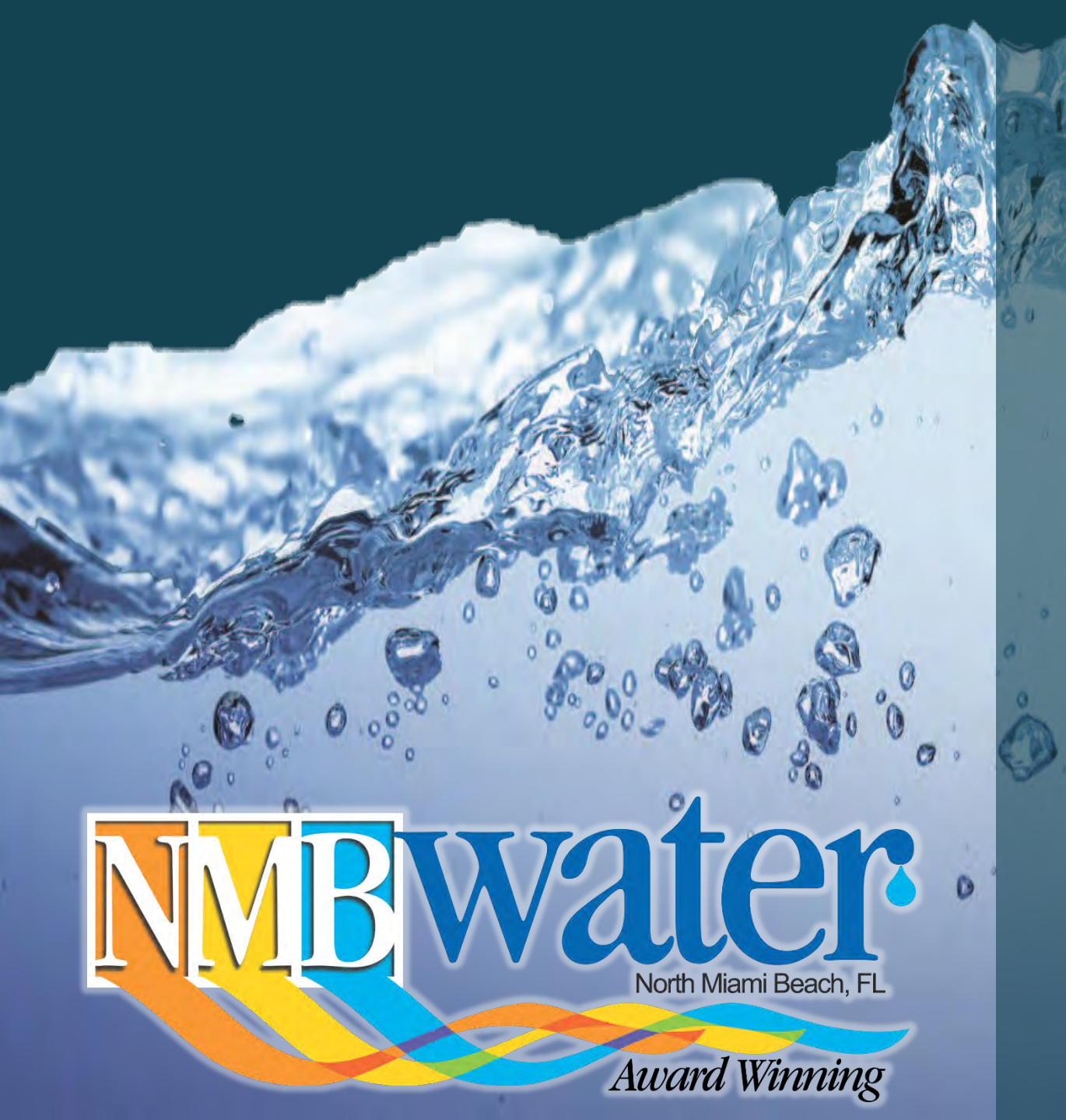
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**ATTACHMENTS:**

Description

- ▣ NMB Water Updates & Highlights





# Public Utilities Commission Meeting

# NMB Water Updates & Highlights

January 8, 2025



A vertical graphic on the left side of the slide showing a splash of water against a light blue background, with the water droplets and spray extending downwards.

# AGENDA

1. Capital Improvement Program Updates
2. Customer Service Update
3. Community Outreach Update

# Capital Improvement Program

UPDATES



A vertical graphic on the left side of the slide showing a splash of water against a light blue background.

# CIP Construction Updates

- **Eastern Shores Watermain System Rehabilitation (Phase 2)**
  - All Water Mains have been installed, and contractor is making connections as we get Department of Health (DOH) approval.
  - The CIP Team is waiting for DOH approval for NE 169<sup>th</sup> Street East and West and NE 168<sup>th</sup> Street West.
- **Operations Center Pump Station Improvements**
  - The mechanical and electrical installations are underway.
- **Norwood Water Treatment Plant Improvements (5-Million-Gallon Water Storage Tank)**
  - The final piping tie-in is complete, and the CIP Team is waiting for the final certification to commission the tank.

A vertical graphic on the left side of the slide showing a splash of water against a light blue background.

# CIP Construction Updates

- **Corona del Mar Collection System (Private Laterals)**
  - The contractor has connected 9 private properties to the new sewer system and has commenced installing the next 31 connections.
  - 30 additional permits are currently being submitted for approval.
- **Bunche Park Watermain Rehabilitation**
  - The CIP Team is working on obtaining the Right-of-Way permits from the City of Miami Gardens.
- **Master Pump Station #4 Force Main Re-routing**
- **Bell Gardens Force Main Replacement**
  - The CIP Team is submitting permits for the systems to the City of Miami Gardens.



A vertical graphic on the left side of the slide showing a splash of water against a light blue background, with the water droplets and spray extending downwards.

# CIP Procurement Updates

- **Norwood Water Treatment Plant (Phase 2) – Raw Water Transmission Main**
  - The NMB Procurement Department advertised the project for bidding on December 12, 2024.
- **Pinetree Park North, Pinetree Park South, and Norland**
  - The projects are in the Design phase.

# Customer Service

UPDATE



# Customer Service Update

## ➤ Comparison of debt from previous months

Month	Active	Inactive	Total
January	\$6,358,186.25	\$6,113,483.35	\$12,471,669
February	\$7,568,349.41	\$6,111,574.68	\$13,679,924
March	\$6,491,461.37	\$6,286,216.43	\$12,777,677
April	\$6,193,286.92	\$6,568,244.70	\$12,761,531
May	\$6,774,523.57	N/A	N/A
June	\$6,993,594.44	\$6,404,458.78	\$13,398,053
July	\$6,197,582.59	\$6,411,607.23	\$12,609,189
August	\$7,335,447.26	\$6,464,149.05	\$13,799,596
September	\$6,784,498.21	\$6,499,172.36	\$13,283,670
October	\$6,906,520.92	\$6,512,694.53	\$13,511,144
November	\$6,906,520.92	\$6,647,328.18	\$13,553,849
December	\$7,385,541.14	\$6,529,537.16	\$13,915,078



# Customer Service Update

## ➤ Comparison of debt from previous months

Month	Open	Closed	Total
May 2024	116	201	N/A
June 2024	99	186	34,169
July 2024	215	231	34,130
August 2024	201	183	34,146
September 2024	164	145	34,136
October 2024	177	178	34,169
November 2024	181	163	34,167
December 2024	200	164	34,214

# Customer Service Update

## ➤ Open Delinquent Accounts

Month	NMB	Outside NMB
May 2024	\$1,994,571.33	\$4,779,952.24
June 2024	\$2,062,701.07	\$4,930,893.37
July 2024	\$1,872,648.19	\$4,324,934.40
August 2024	\$2,221,145.82	\$5,114,301.44
September 2024	\$1,986,503.50	\$4,797,994.71
November 2024	\$2,279,012.96	\$4,627,507.96
December 2024	\$2,471,432.81	\$4,914,018.33

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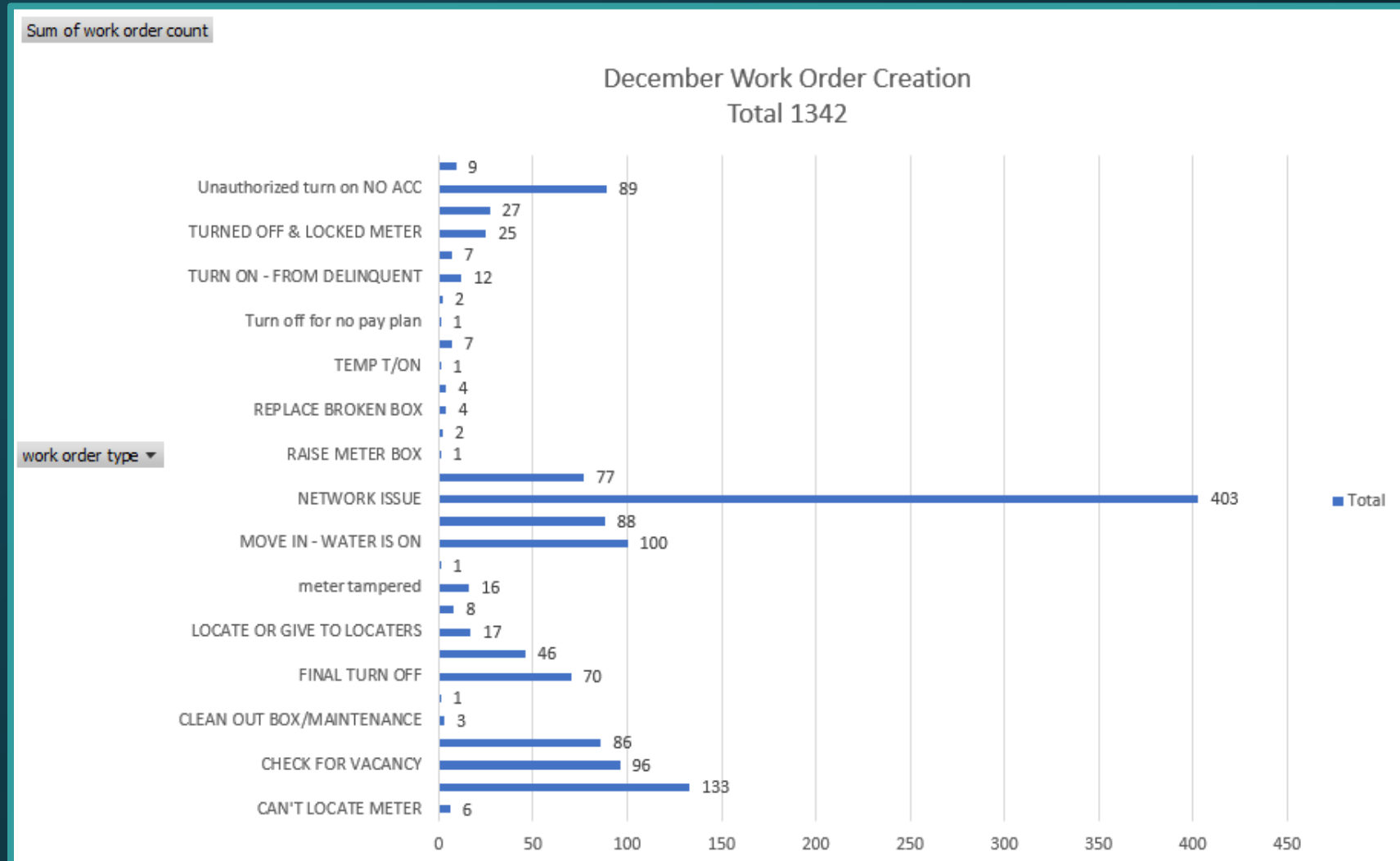
# Customer Service Update

## ➤ Total Open Accounts

- 454 accounts are delinquent with a balance of \$25 or greater (Represents 1%)
- 7,101 accounts have a balance ranging from \$0.01 to \$24.99 (Represents 20%)
- 26,657 accounts are good standing (Represent 77%)

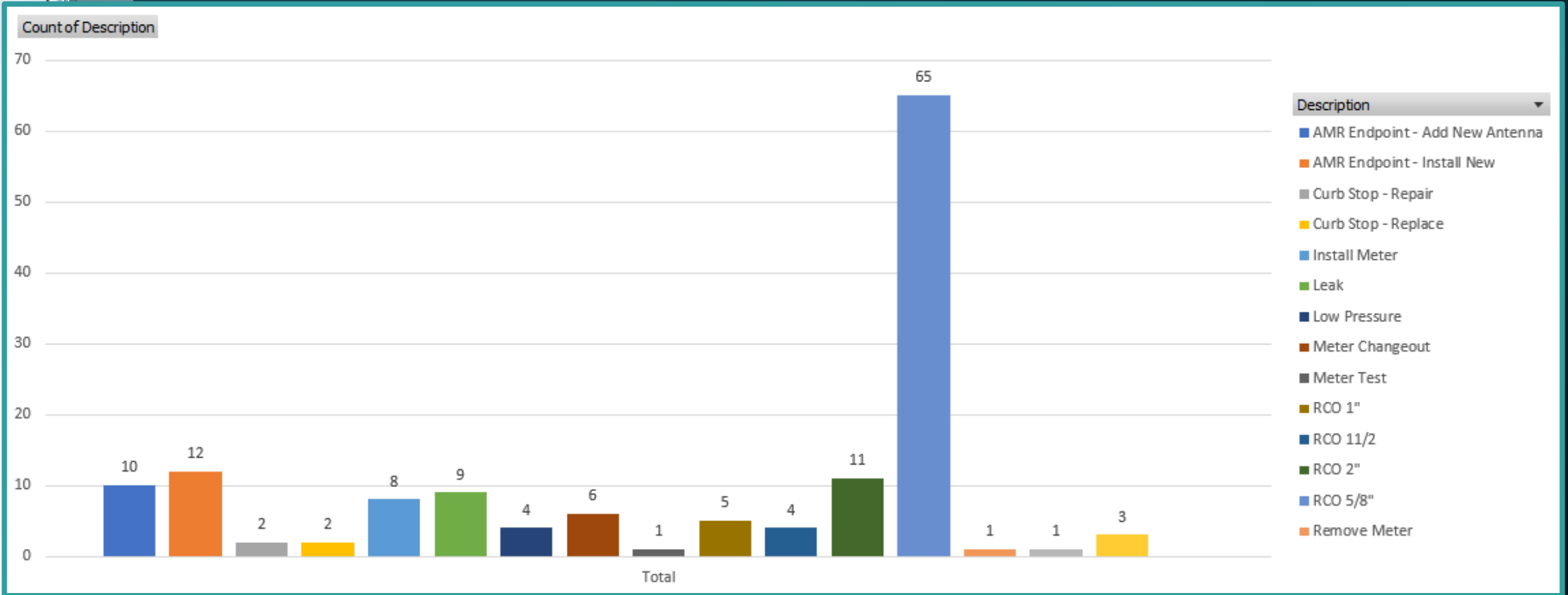
# Customer Service Update

## ➤ December Work Orders



# Customer Service Update

## ➤ December Work Order Breakdown



# Customer Service Update

- **We Care to Share Bill Payment Assistance Program**
  - Total Awarded: \$67,854.72
    - 110 Accounts – since 2022
  - Pending Applications: 63
    - Total Amount Pending Award: \$36,185.52





# Community Outreach

UPDATE





# Community Outreach Update

## ➤ John F. Kennedy Middle School Open House

- NMB Water participated at the JFK Middle School Open House December 7<sup>th</sup>.
- Our table-top display featured water conservation materials, shower-head giveaways, as well as leak detection tablets.



# Community Outreach Update

## ➤ Drop Saver Water Conservation Poster Contest

- NMB Water just kicked-off our annual Drop Saver Water Conservation Poster Contest.
- The contest is held annually for local students and will conclude on March 3<sup>rd</sup>.
- The winners of each division will compete at the State level at the the American Water Works Association (AWWA).





# Upcoming Community Outreach

## ➤ Career & Truck Day at the Madie Ives Preparatory Academy

- NMB Water staff will be presenting at this event at the Academy on January 16<sup>th</sup>.



**Madie Ives K-8 Preparatory Academy**

### CAREER AND TRUCK DAY

# VOLUNTEERS NEEDED

MIK8 IS LOOKING FOR CAREER DAY PRESENTERS FOR THURSDAY, JANUARY 16TH, 2025  
9:00 A.M. - 12:00 P.M.

DO YOU HAVE AN AMAZING CAREER THAT YOU WOULD LIKE TO SHARE?

- PRESENTATIONS ARE IN PERSON (ON OUR CAMPUS)
- ZOOM IS AN OPTION
- WE ARE HAPPY TO WORK WITH YOUR SCHEDULE!

IF YOU ARE INTERESTED IN PRESENTING, PLEASE EMAIL MS. LOCKHART AT [319027@DADESCHOOLS.NET](mailto:319027@DADESCHOOLS.NET)



# Upcoming Community Outreach

## ➤ 3<sup>rd</sup> Annual Charity Golf Classic

- NMB Water will be hosting our annual golf tournament to benefit the “We Care to Share” Bill Payment Assistance Program on March 28<sup>th</sup> at the Miami Shores Country Club.



**SAVE THE DATE**  
Friday, March 28, 2025

**3rd Annual  
NMB Water  
Charity  
Golf Classic**

**MIAMI SHORES COUNTRY CLUB**  
All Proceeds to Benefit the “We Care To Share”  
Bill Payment Assistance Program

**NMBwater**  
North Miami Beach, FL  
*Award Winning*

Tournament Information:  
[Elisabeth.Pierre@citynmb.com](mailto:Elisabeth.Pierre@citynmb.com)

The poster features a blue water drop character with a smiling face and a golf ball on a green field. It includes the event title, date, location, and contact information for tournament details.

# Thank You

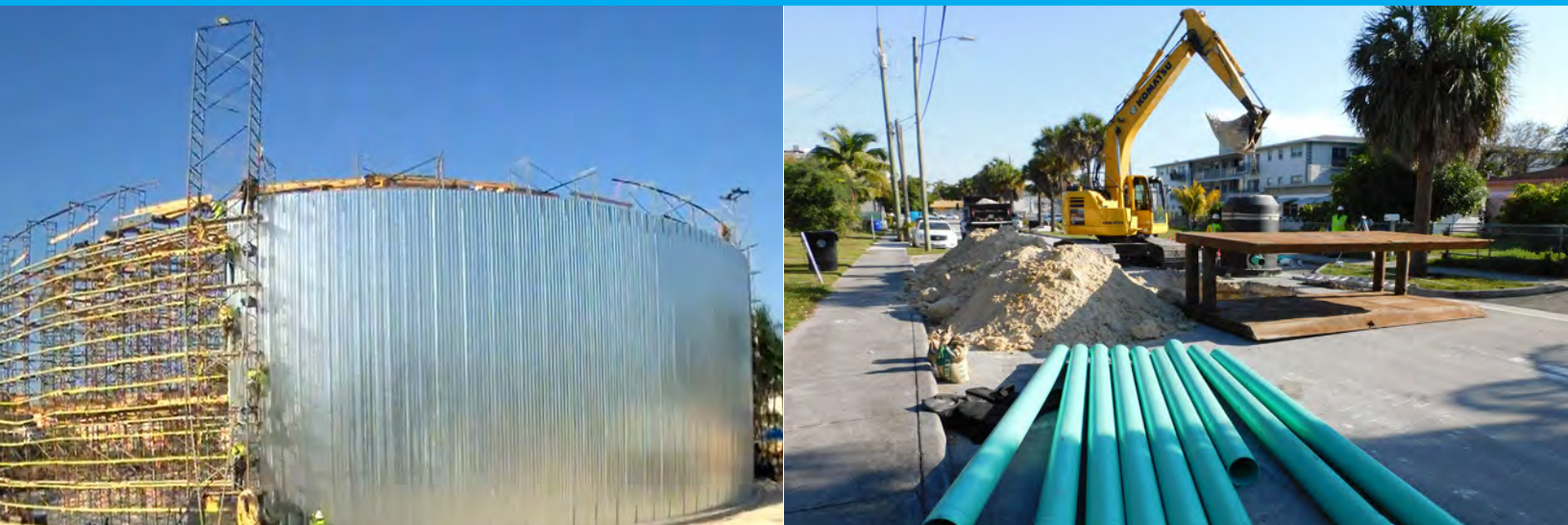




# Capital Improvement Program Management Support Monthly Progress Report

November 22, 2024, through December 20, 2024

**NORTH MIAMI BEACH, FLORIDA**





# CIP Management Support Monthly Progress Report

November 22, 2024, through December 20, 2024

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City of NMB – Water / Sewer

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Program Management

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## Pre-Construction

### Aqeel Abdool-Ghany, PE – CIP Program Manager

#### Highlights & Milestones

- The NMB Water CIP Team is waiting for the 60% Design from the Design Consultant for the Pinetree Park North, Pinetree Park South,
- The NMB Water CIP Team has reviewed and supplied the Design Consultant with the 60% Design comments awaiting their response.
- The NMB Procurement department issued the ITB for the W2002A- Raw Water Transmission Main on December 12, 2024.

#### Challenges & Issues

- The NMB Water CIP Team is currently reviewing the high construction bid costs and is evaluating the future of several projects.
- The NMB Water CIP Team are seeing long lead times for equipment delivery which is affecting various project schedules.
- The NMB Water CIP Team is currently waiting for the roll-over of FY 25 budgets into their respective accounts this is impeding the pending P.O. increase for W2002B, W2002C and payments for W2005B.

#### Project & Task Updates

- **Norwood Water Treatment Plant Improvement – Phase 2 (Raw Water Transmission Main)**
  - The NMB Procurement Department has advertised the project for bidding on December 12, 2024.
- **Pinetree Park – North Watermain Replacement**
  - The City of Miami Gardens has approved and issued the right-of-way permit. The Design Consultant is progressing toward the 60% Design milestone.
- **Pinetree Park – South Watermain Replacement**
  - The Design Consultant is progressing toward the 60% submittal.
  - All fire flow requirements were discussed during the monthly progress call.
- **Norland – Southeast Watermain Replacement**
  - The CIP team has completed its review of the 60% Design plan, incorporating feedback from relevant departments as part of this stage gate milestone.
  - The consolidated comments have been submitted to the Engineer of Record for resolution and inclusion in the forthcoming 90% Design submittal.
- **I-95/Turnpike Watermain Improvements**
  - The project remains on hold until further notice.
- **Sunny Isles Watermain Replacement**
  - The project remains on hold until further notice.
- **Highland Village Watermain Replacement**
  - The project remains on hold until further notice.
- **Master Pump Station #4 Force Main Re-routing**
  - On November 19, 2024, the NMB Water CIP Team conducted a kick-off meeting and subsequently released a Notice to Proceed (NTP) for Construction and Purchase Order (PO).
- **Bell Gardens Force Main Replacement**
  - On November 19, 2024, the NMB Water CIP Team conducted a kick-off meeting and subsequently released a Notice to Proceed (NTP) for Construction and Purchase Order (PO).
- **NE 19<sup>th</sup> Avenue Sewer**
  - The project remains on hold until further notice.

## Upcoming Initiatives & Deliverables

- **Norwood Water Treatment Plant Improvement – Phase 2 (Raw Water Transmission Main)**
  - NMB procurement issued bid on December 12, 2024, with the signed and sealed 100% Design.
- **Pinetree Park – North Watermain Replacement**
  - The Design Consultant will submit the 60% Design package for review.
- **Pinetree Park – South Watermain Replacement**
  - The Design Consultant will submit the 60% Design package for review.
- **Norland – Southeast Watermain Replacement**
  - The NMB Water CIP Team will conduct the 60% Design package review with the consultant.
- **Master Pump Station #4 Force Main Re-routing**
  - The Preconstruction NMB Water CIP Team has handed over the project to the NMB Water CIP Construction team.
- **Bell Gardens Force Main Replacement**
  - The Preconstruction NMB Water CIP Team has handed over the project to the NMB Water CIP Construction team.

## Construction

### Tom Raihl, PE, CCM – Construction Manager

#### Highlights & Milestones

- **Eastern Shores Watermain System Rehabilitation – Phase 2**
  - The contractor is continuing construction on NE 168<sup>th</sup> Street and NE 164<sup>th</sup> Street.
  - Temporary paving is complete to NE 32<sup>nd</sup> Avenue.
  - Service connections have been made for NE 171<sup>st</sup> Street west and are starting on NE 171<sup>st</sup> Street East and NE 170<sup>th</sup> Street East and West.
  - The CIP Team is waiting for Department of Health (DOH) approval for NE 169<sup>th</sup> Street East and West and NE 168<sup>th</sup> Street West.
- **Norwood Water Treatment Plant Improvements (5-Million-Gallon Water Storage Tank)**
  - The final piping tie-in is complete, and the CIP Team is waiting for the final certification.
- **Corona del Mar Collection System – (Private Laterals)**
  - The contractor has connected nine (9) properties to the new sewer system and has commenced installing the next thirty-one (31) connections. Thirty (30) additional permits are currently being submitted for approval.
- **Operations Center Rehabilitation**
  - The mechanical installation is currently taking place.
- **Norwood Water Treatment Plant Production Wells Installation**
  - The project has been re-started after an interruption due to well subsidence, but a new subsidence has occurred.
- **Bunche Park Water Main Rehabilitation**
  - The CIP Team is working on obtaining the permits.

#### Challenges & Issues

- Material supply chain issues continue to increase costs and cause delays for all project contracts most notably Variable Frequency Drives for WATR 2002C the Norwood Water Treatment Plant and WATR 2012 Operations Center Rehabilitation.
- Permitting continues to be a challenge especially for SEWR 2006 Corona Del Mar (Private Laterals), WATR 2002c Norwood Water Treatment Plant, and SEWR 2001 and WATR 2007o Bunche Park.
- A new subsidence has occurred at the wells.
- Corona Del Mar is currently six months late due to permitting issues with the Building Department, Plumbing Department, DERM, and the DOH.

#### Project & Task Updates

- **NE 153<sup>rd</sup> Street Watermain**
  - The CIP Team is waiting for the resolution of the contractor's claim prior to closing out.
- **Norwood Water Treatment Plant Improvements**
  - The new piping tie-ins are complete, but they have necessitated raising the road by two feet impacting the existing truck scale. The CIP Team is waiting for the certification of the 5-Million-Gallon Water Storage Tank.
- **Corona del Mar Collection System – Phase 3**
  - Proceeding with the permitting and installation for the private lateral connections.
- **Norwood Water Treatment Plant Production Wells Installation**
  - Well development for the Floridan is complete.
  - Repair of the Biscayne Aquifer well has begun.

- **Corona del Mar Collection System – Phase 2**
  - The CIP Team is waiting for the resolution of the contractor’s claim prior to closing out.

**Upcoming Initiatives & Deliverables**

- **Eastern Shores Watermain System Rehabilitation – Phase 2**
  - Testing, Flushing and Disinfection of NE 164<sup>th</sup> through NE 166<sup>th</sup> Streets.
  - Transfer of the services from the existing watermain to the new watermain.
- **Norwood Water Treatment Plant Progressive Design-Build at a Budget**
  - Commissioning of the 5-million-gallon water storage tank.
  - Paving of the roadway near the truck scale.
- **Master Pump Station #4 Force Main Re-Routing**
  - Submitting permits for the system to Miami Gardens.
- **Bell Gardens Force Main Replacement**
  - Submitting permits for the system to Miami Gardens.
- **Operations Center Rehabilitation**
  - Installing mechanical and electrical systems.



Norwood Water Treatment Plant – 5-Million-Gallon Water Storage Tank



NMB Water Operations Center Rehabilitation

## City of NMB – Water / Sewer Projects

### Guilherme Neukamp – Water / Sewer Design Manager

#### Highlights & Milestones

- Steady progress achieved across multiple projects, with teams working on updates, addressing feedback, and aligning next steps to ensure everything is set for a strong start in 2025.

#### Challenges & Issues

- Projects are experiencing delays due to contractors taking longer than expected to provide cost estimates.
- Increased material costs are resulting in higher bids, leading to delays or cancellations for some projects.

#### Project & Task Updates

- **SCADA Rehabilitation**
  - Significant progress has been made across various task orders, including ongoing updates to designs, drawings, and project plans to ensure timely execution.
- **Wellfield Protection and Palm Land**
  - The NMB City crew is actively working to address some of the repairs.
  - A purchase order has been issued to a specialized contractor.
- **Cravero Force Main Replacement**
  - The contractor is working through material delays that have temporarily impacted the project timeline.
  - The City has proactively advised incorporating the upcoming holiday season into the construction schedule to minimize disruptions.

#### Upcoming Initiatives & Deliverables

- **SCADA Rehabilitation**
  - The Team is waiting on the remaining Task Orders to be submitted for approval.
- **Wellfield Protection and Palm Land**
  - The completed report will be submitted to DERM on time, showcasing the progress made and our commitment to meeting regulatory requirements.
- **Cravero Force Main Replacement**
  - The contractor will provide updated timelines soon, ensuring the project progresses smoothly with clear communication and minimal impact on the community.

## Program Management

### Aqeel Abdool-Ghany, PE – CIP Program Manager

#### Schedule Update

The CIP Team conducted the monthly schedule update, where all project dates and milestones were reviewed through Friday, December 20, 2024. The below commentary denotes what changes were made and their impacts.

The schedule modifications described below do not have an impact to the overall WIFIA Project Milestone dates. The WIFIA Substantial Completion Phase IIA, IIB and IIC date is now forecast to be January 22, 2027, 31 days later than planned. The WIFIA substantial completion (WIFIA Development Default Deadline) is February 23, 2027.

#### Project Specific Updates – WATER

- **WATR2002 – Construction of Norwood WTP Improvements Phase 2 (Raw Water Transmission Main)** – “Procurement Prepare & Approval Package & Bid Notice,” finished December 12, 2024, versus November 30, 2024, as reported last month. Project completion is forecast to be September 6, 2026, versus last month’s forecast of March 25, 2026.
- **WATR2002 – Construction of Norwood WTP Improvements Phase 2 (Wells)** – “Well Development & Testing” restarted on November 4, 2024, as reported last month. Then the CIP Team will need 3 months to remobilize, repair the well and complete development. A new sinkhole has developed so the completion date is not forecast as of the date of this report.
- **WATR2002 – Construction of Norwood WTP Improvements Phase 2 (Plant Improvements)** – Substantial completion is holding as previously forecast for April 15, 2026, as reported last month.
- **WATR2005 – Eastern Shores Watermain System Rehabilitation Phase 1** – Construction was completed April 30, 2023.
- **WATR2005 – Eastern Shores Watermain System Rehabilitation Phase 2** – The anticipated substantial completion date is April 30, 2025. Final completion was moved up to May 30, 2025, versus last month’s forecast of July 29, 2025, because the CIP Team is anticipating finishing paving in May 2025.
- **WATR2007 – Oleta River Crossing** – Construction began July 17, 2024. Project substantial completion was September 24, 2024. Project completion is forecast to be December 31, 2024.
- **WATR2007 – 165<sup>th</sup> & W. Dixie Highway (Snake Creek)** – “Construction Procurement” is currently under the control of Miami-Dade County Public Works. The tentative completion date is December 31, 2025, as reported last month. Project completion is February 4, 2026.
- **WATR2007 – Sunny Isles Watermain Replacement** – This project is currently on hold until further notice.
- **WATR2007 – Highland Village Watermain Replacement** – This project is currently on hold until further notice.
- **WATR2007 – West Dixie Highway Industrial, 153<sup>rd</sup> Street Watermain** – The project is complete.
- **WATR2007 – I-95 & Turnpike Watermain Improvements** – This project is currently on hold until further notice.
- **WATR2007 – Bunche Park Watermain Improvements** – Construction Procurement and Construction has been split up into two separate sections. The CIP Team will be tracking 27<sup>th</sup> Avenue separate from the rest of the project. Construction of 27<sup>th</sup> Avenue finished January 31, 2024. The CIP Team received the NTP for the remaining portion of the project on September 16, 2024. “Construction Administration and Permitting” was forecast to finish on December 31, 2024, pushing Construction completion until September 12, 2025 versus last month’s forecast of August 11, 2025.



- **WATR2007 – Pinetree Park / Pinetree North** – The CIP Team have incorporated an updated schedule from the Designer. “Prepare 60% Design Package,” to be completed on December 27, 2024, versus last month’s forecast of January 1, 2025. Construction is currently forecast to complete on January 22, 2027.
- **WATR2007 – Pinetree Park / Pinetree South** – The CIP Team have incorporated an updated schedule from the Designer. “Prepare 60% Design Package will finish on January 16, 2025. Construction activities have been updated to complete January 8, 2027, versus last month’s update of December 14, 2026.
- **WATR2007 – Norland Southeast Phase 4** – This schedule has been updated to reflect the Designer’s schedule. “Prepare 60% Design Package,” finished November 11, 2024. “Prepare 90% Design Package,” is ongoing and forecast to finish on March 3, 2025. Project completion is forecast to finish July 28, 2026.
- **WATR2007 – Aerial Crossing Replacement** – This project is currently on hold until further notice.
- **WATR2009 – Design and Construct SCADA & Radio Telemetry System Upgrades** – The project is being managed by the City of NMB. “Construction Administration & Permitting,” finished on February 2, 2024. The anticipated substantial completion is January 31, 2025, which pushes project completion to May 1, 2025, as reported last month.
- **WATR2010 – Design and Construct Honey Hill Watermain System Rehabilitation** – Construction completion was November 30, 2022.
- **WATR2012 – Design and Construct Operations Center Pump Station Improvements** – No Construction work was performed. Based on the VFD Vendor Delivery, Construction substantial completion is being pushed out to October 2025, which pushes Final completion out to January 2026, as reported last month.

#### Project Specific Updates – SEWER

- **SEWR2001 – Wastewater Collection Repairs and Replacements Program** – The City has taken over management of this project. The CIP program will no longer track this project.
- **SEWR2002 – Construct Master PS #4 Force Main Re-Routing** – NTP was given on November 19, 2024. “Construction Administration & Permitting,” will finish on January 17, 2025. Construction completion is forecast to be December 13, 2025.
- **SEWR2003 – Implement Wastewater Collection System Plan of Compliance** – Inspection Report tasks to be completed by June 1, 2024, as reported last month.
  - Inspections – The Inspections have been split into two separate sections – Well Field, and Palm Land.
    - Well Field Inspection was completed November 17, 2023. “Recommended Repairs Completion,” is forecast to finish on December 26, 2024.
    - Palm Land is forecast to be completed July 1, 2025.
- **SEWR2004 – Construct Cravero Force Main Replacement** – This project is being managed by the City of NMB. “Construction Administration and Permitting,” began November 1, 2024, and is anticipated to finish on December 20, 2024. The project is projected to finish on January 31, 2025, versus last month’s forecast of December 30, 2024.
- **SEWR2005 – Construct Velda Farm Force Main Replacement** – This project is being managed by the City of NMB. Substantial completion finished September 20, 2024. The final completion of the project was December 20, 2024, versus last month’s forecast of December 30, 2024.
- **SEWR2006 – Construct Corona del Mar Phase II (Main Line Sewer)** – Construction completion was November 30, 2023.
- **SEWR2006 – Construct Corona del Mar Phase II (Private Property Laterals)** – “Construction Administration & Permitting,” runs in parallel with Construction thru Substantial completion as permits will be pulled throughout the Construction to Substantial phase. Construction thru Substantial completion started June 12, 2024, and is forecast to finish July 31, 2025. Construction completion is forecast to finish August 30, 2025, as reported last month.

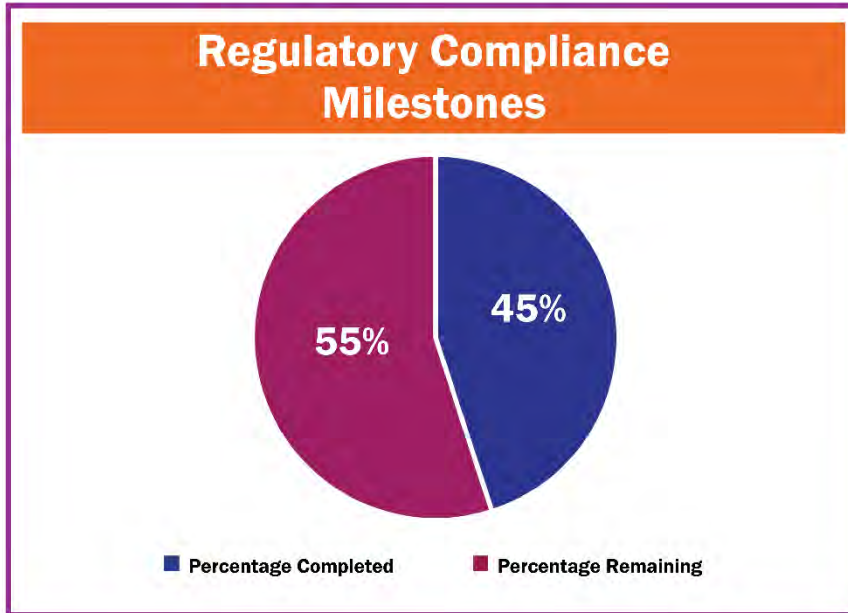


- **SEWR2007 – Construct Bell Gardens Force Main Replacement** – NTP was given on November 19, 2024. “Construction Administration & Permitting,” will finish on January 17, 2025. Construction completion is forecast to be January 12, 2026, as reported last month.
- **PARK1912 – Washington Park Sewer Connection** – This project was removed from the CIP project list by the City of NMB.
- **SEWR2201 – NE 19<sup>th</sup> Avenue Business District Sanitary Sewer System** – This project was removed from the CIP project list by the City of NMB.

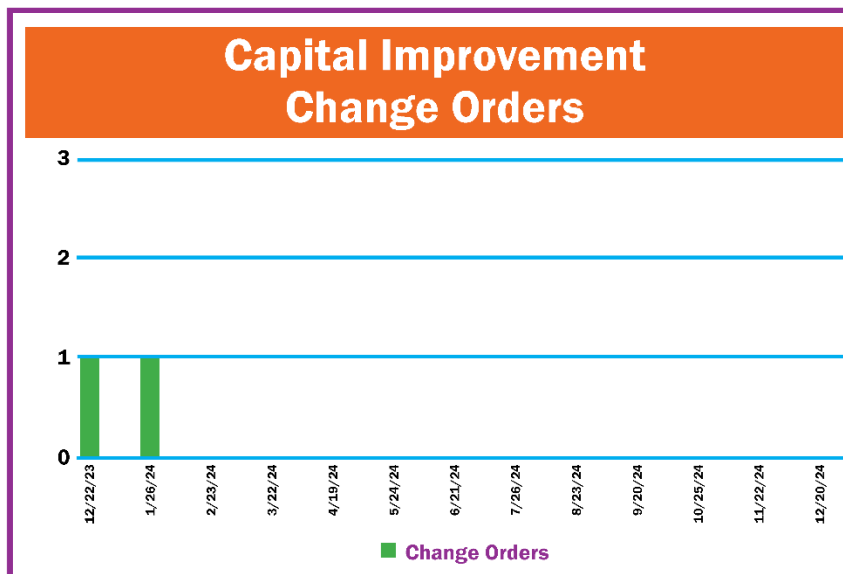
## Key Performance Indicators (KPI)

The CIP Team has defined the process for tracking KPI's within the CIP Program and updated the PMP accordingly. Below you will find the information for each of the current measured metrics.

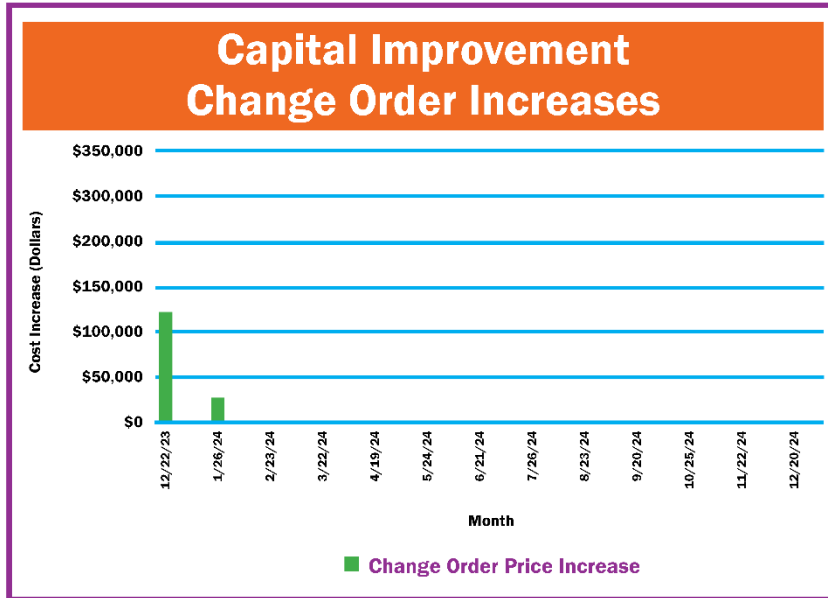
- Regulatory Compliance Milestones** – A total of 53 WIFIA milestones have been identified. A total of twenty-four (24) WIFIA milestones have been completed representing 45% overall completion. There were two milestones completed in this reporting period.



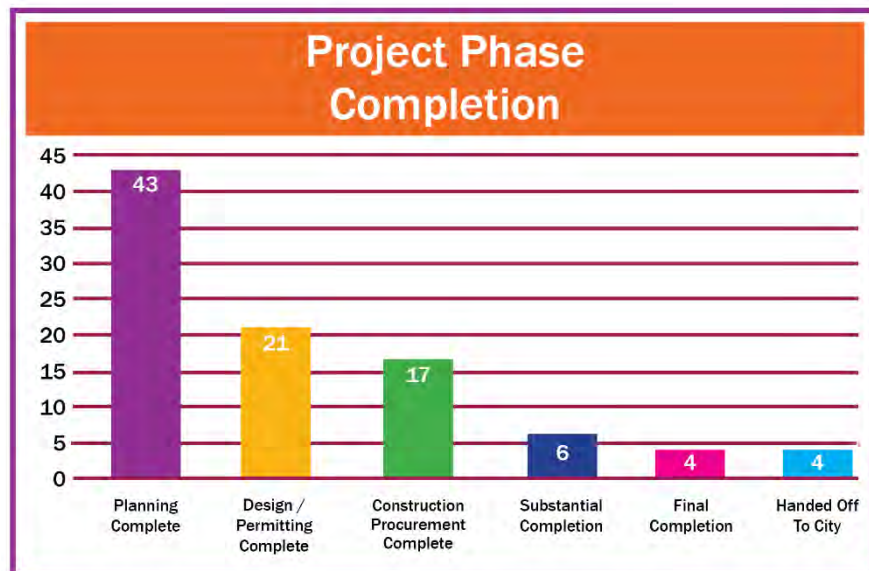
- Change Order Quantity** – Twenty-five (25) Change Orders have been approved, representing a total program increase cost of \$1,083,805.65. No Change Orders were approved during this reporting period.



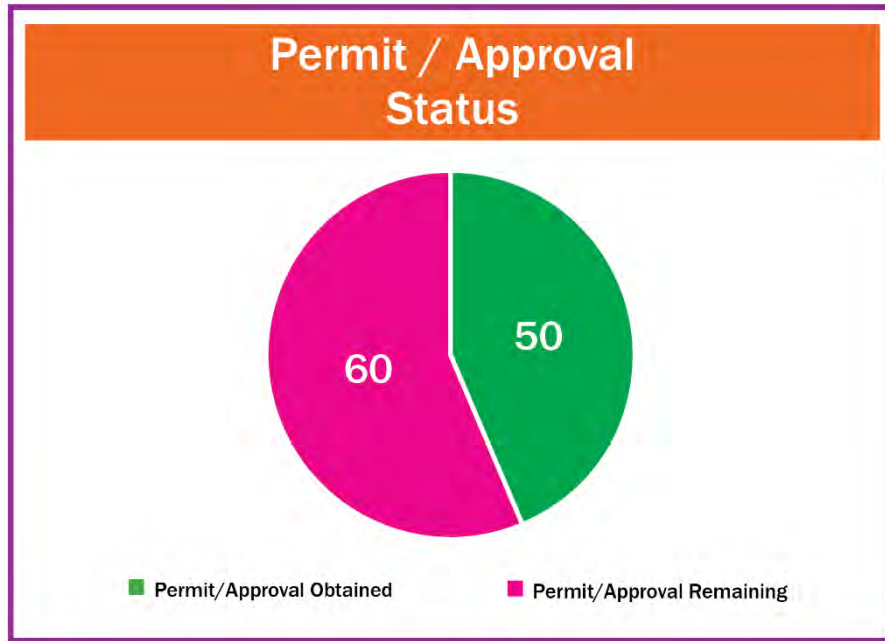
- 3. **Change Order % of Change** – The Change Orders approved for \$1,083,805.65 represents a 1.188% overall program cost increase. No additional costs were added during this reporting period.



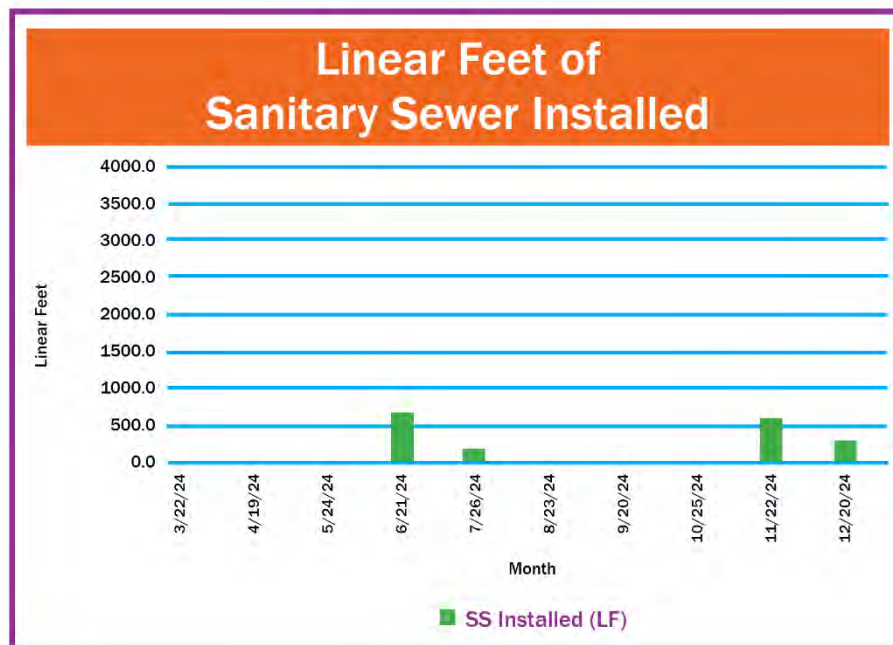
- 4. **Health & Safety** – There are a total of 5 safety incidents. None occurred in this reporting period.
- 5. **Project Phase Completion** – There are 43 identified potential projects in the CIP. The graph below shows how many projects have completed each of the milestones. Four projects have been handed off to the City including Washington Park, Velda Farms, Cravero and NE 19<sup>th</sup> Avenue.

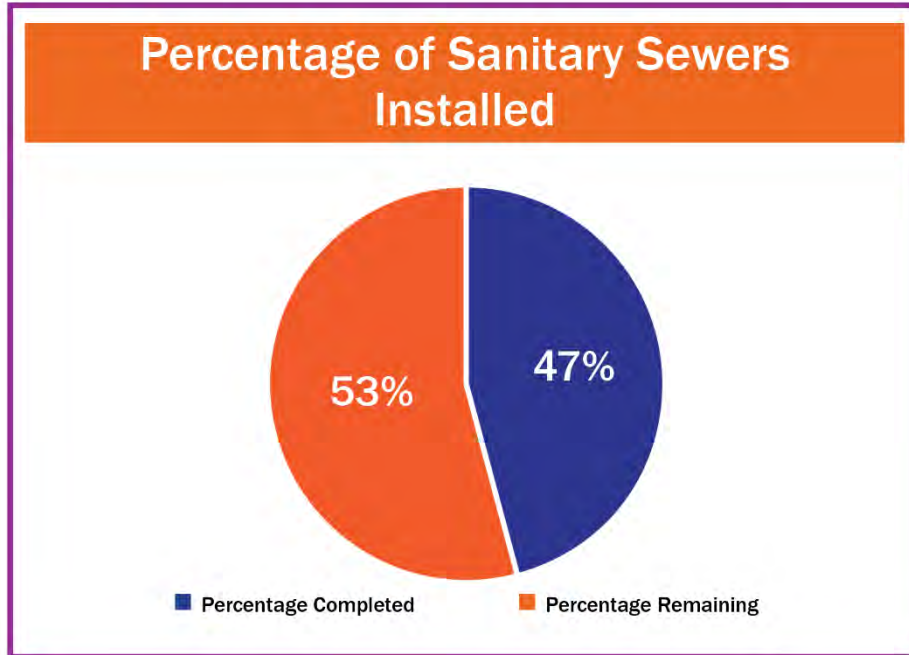


- 6. **Permit/Approval Status** – There are currently 60 permit / approvals identified still needed to be secured under this program from various agencies including Miami-Dade County Public Works, South Florida Water Management District, the Florida Department of Transportation. One permit was obtained during this reporting period.

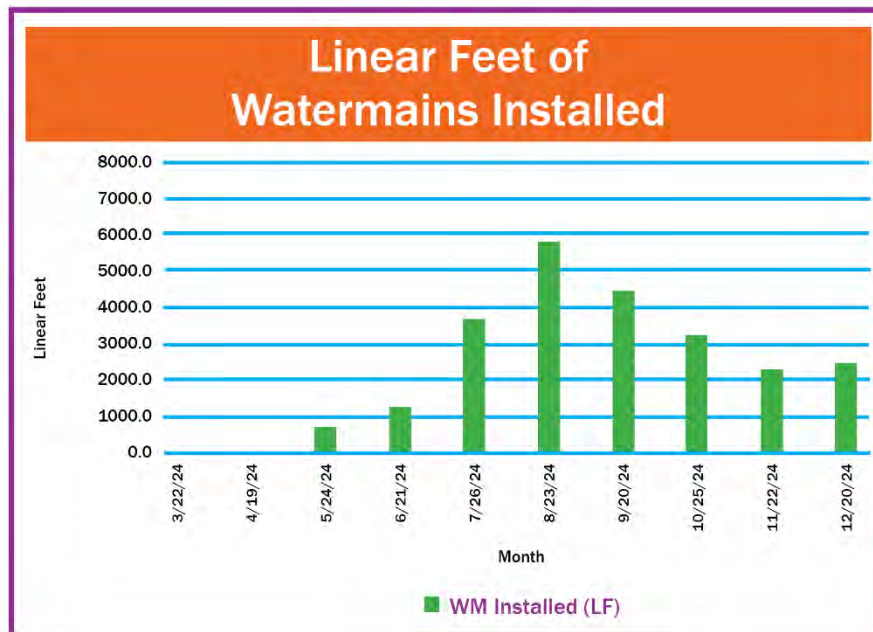


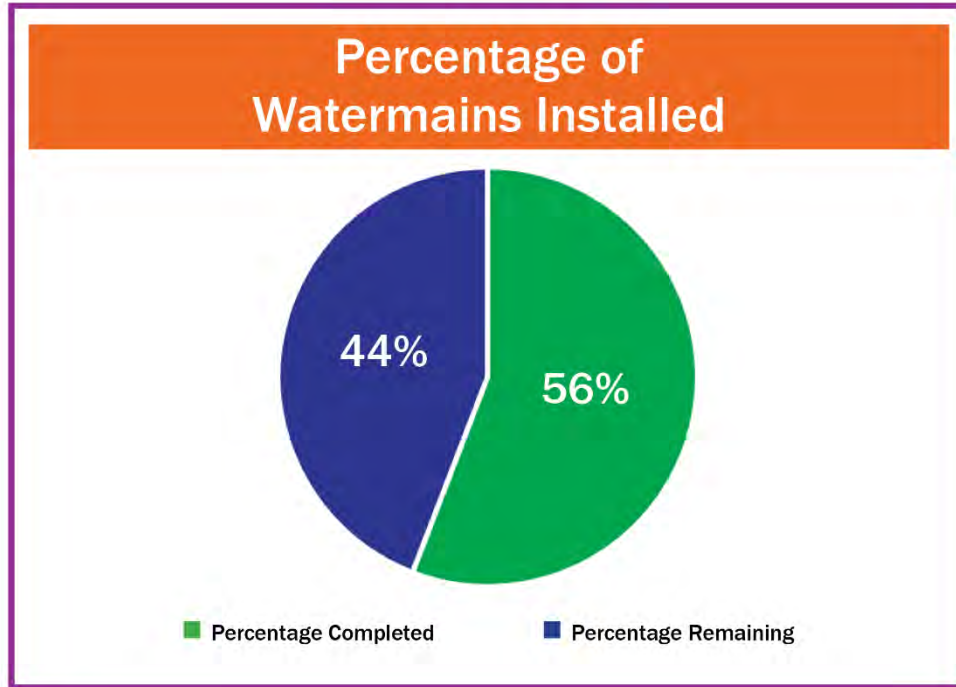
- 7. **Linear Feet of Sanitary Sewer Installed** – 286 linear feet of sanitary sewers were installed during the reporting period. There is a total of 20,394 linear feet of sewer currently planned to be installed. To date, 9,675 linear feet have been installed.





8. **Linear Feet of Watermains Installed** – 2,408 linear feet of watermains were installed during the reporting period. There is a total of 85,016 linear feet of watermains identified in the planning documents to be installed. To date 47,483 linear feet have been installed.









# Monthly Progress Report

November 2024  
Operations and Maintenance







# Monthly Progress Report

## Summary – November 2024

NMB Water is responsible for providing nearly 700 million gallons of water per month to approximately 175,000 customers in the service area, which include Miami Gardens, Aventura, Sunny Isles Beach, Golden Beach, and portions of unincorporated Miami-Dade County. This is achieved through nine (9) divisions, which are responsible for ensuring water production facilities supply clean and safe water in a reliable manner.

In addition, the divisions include wastewater collection, engineering, plan review and inspection services to developers that construct within the NMB Water service area, customer services, utility billing and collections for system and City-wide services (i.e., stormwater, sanitation).

The purpose of this Monthly Progress Report is to summarize the achievements and status of NMB Water as of November 2024.

In November 2024, NMB Water completed the following significant milestones and essential tasks:

- Norwood Water Plant produced approximately 735 million gallons of water.
- Water Maintenance completed a total of 331 work orders.
- Continued to manage the Florida Commerce Grants for Capital Improvement Projects, which includes addressing additional environmental review comments.
- Continued to manage the Florida Department of Environmental Protection (DEP) Grants and the WIFIA Loan for Capital Improvement Projects, which included hosting a successful on-site visit from the Environmental Protection Agency (EPA).

## NMB Water Division Responsibilities

1. NMB Water Administration (900) – is responsible for facilitating and administering the resources needed by all the divisions, which include:
  - a. Capital Improvement Program (Additional information provided under separate cover)
  - b. Finance & Repair and Replacement
  - c. Community Outreach
  - d. Safety & Claims
2. Quality Control (901) – is responsible for ensuring compliance with all local, state, and federal regulations. This includes sampling for WTP compliance at Norwood, laboratory services for water distribution, and water quality compliance.
3. Water Production (904) – is responsible for producing and treating an average of 700 million gallons of water per month.
4. Water Distribution and Construction (908) – is responsible for ensuring continuous reliable potable water distribution service to customers.
5. Water Utility Control and Maintenance (909) – Responsible for system monitoring software, as well as perform planned, preventive, and corrective maintenance of equipment used for water production and wastewater collection.
6. Wastewater Collection (910) – is responsible for the management and operation of the utility's wastewater collection infrastructure. This includes planned, corrective, and preventive maintenance of grinder and lift stations.
7. Engineering and Infrastructure (912) – provides services for GIS management, main water locations, road restoration, leakage detection monitoring/planning, hydrant flushing planning, backflow inspections, and provides technical services in project inspections, donations, and impact reviews.
8. Materials Control & Equipment (Ops Center/Warehouse) (915) - Responsible of acquiring, storing, and performing inventory control for all the parts, supplies, and equipment utilized by NMB Water.
9. Customer Services and Billing (916) – provides services for meter reading, Itron and Invoice Cloud management, billing, money-collection, and call center for NMB Water customers.

## Implementation of Key Performance Indicators (KPIs)

It is the goal of NMB Water to measure its performance and begin to measure execution and evaluate the success. Therefore, starting November 1, 2022, NMB Water is implementing individual Key Performance Indicators (KPIs) to provide a measurement in time of how an activity or initiative is performing toward agreed targets. NMB Water KPI targets and performance are compared to America Water Works Association (AWWA) industry benchmarking to improve operational efficiency and managerial effectiveness when appropriate. Accordingly, this month's report and future reports will reflect these KPIs to provide a deeper insight into each division's performance. The following are the current KPIs being implemented by division, when applicable:

### 1. NMB Water Administration (900)

#### Finance

##### Debt-Service Coverage Ratio

The debt service ratio is the ratio of net operating income to total debt service. Debt-service coverage ratios of less than one indicates a negative cash flow, meaning a utility is not generating enough income to pay its debt obligations strictly through operations. Debt service payments are made quarterly, and the next scheduled payment is in January 2026.

##### Operating Ratio

A utility's operating ratio is its operating expenses divided by operating revenue. The operating ratio shows how efficient an organization is at keeping costs low while generating revenue. Based on the reported revenues for the utility, the operating ratio is 51%, as of 11/30/2024.

**Bond Rating**

A utility’s bond rating is a grade that indicates its creditworthiness. Under the Fitch rating system, NMB Water investment grade is currently an A+. Based on AWWA table below, it is considered an Upper Medium Grade.

	Moody's	S&P	Fitch	Meaning
Investment Grade	Aaa	AAA	AAA	Prime
	Aa1	AA+	AA+	High Grade
	Aa2	AA	AA	
	Aa3	AA-	AA-	
	A1	A+	A+	Upper Medium Grade
	A2	A	A	
	A3	A-	A-	
	Baa1	BBB+	BBB+	Lower Medium Grade
	Baa2	BBB	BBB	
	Baa3	BBB-	BBB-	

**Repair and Replacement (R&R)**

The Repair and Replacement (R&R) allocated \$4,095,000.00 in funds for Fiscal Year 25. The table below summarizes the R&R allocated vs. invested dollars. 0% of Repair and Replacement funds have been encumbered so far in fiscal year 2025.

Divisions	Allocated	Invested
Water Production	\$1,183,000.000	-
Customer Service	\$0.00	-
Wastewater	\$1,750,000.00	-
Quality Control	\$0.00	-
Water Distribution	\$1,000,000.00	-
Warehouse	\$60,000.00	-
Administration	\$38,000.00	-
Utility Control Systems Management	\$64,000.00	-
<b>TOTAL</b>	<b>\$4,095,000.00</b>	<b>\$0.00</b>

## Community Outreach

Each month, the program communication staff develops a schedule of upcoming events. Activities involve internal planning and coordination, outreach to the community, and engaging with industry associations.

**There were no Community Outreach events held in November.**

## Safety and Claims

### Employee Training

Training employees is expressed as "the monthly number of training hours per employee as full-time equivalents (FTE)". This metric gives an indication of how much training was given to employees. The aim goal was reduced from 10 to 5 hours to make it more achievable given the lower number of training hours. There were no training courses offered for the month of November.

### Health and Safety Severity Rate

The Health and Safety Severity Rate provides a rate of FTE employee days lost from work due to occupational injury. Conversely, it is a measure of the safety performance or how safe work conditions are. As per the Occupational Safety and Health Administration (OSHA), an injury is defined as work-related death, injury, or illness, that involves the loss of consciousness, restricted work activity or job transfer, days away from work, or medical treatment beyond first aid. There is nothing to report for November 2024.

### Claims

Utility-related incidents include claims from service line leaks, damaged lines, and property damage, etc. The claim manager also serves as a liaison between the residents and the city. Claims processing procedures include visiting the site of the incident, verifying information with related parties, reviewing claim submission, and associating the cost of repair. There were five incidents reported in November, totaling \$17,933.13 in repairs.



## 2. Quality Control (901)

Water samples are collected to ensure quality standards continue to be met. In addition, bacteriological samples continue to be performed in-house since the Laboratory team achieved certification to the National Environmental Laboratory Accreditation Conference (NELAC) in July 2018. The laboratory technicians continue regular compliance sampling as required by local and state regulations.

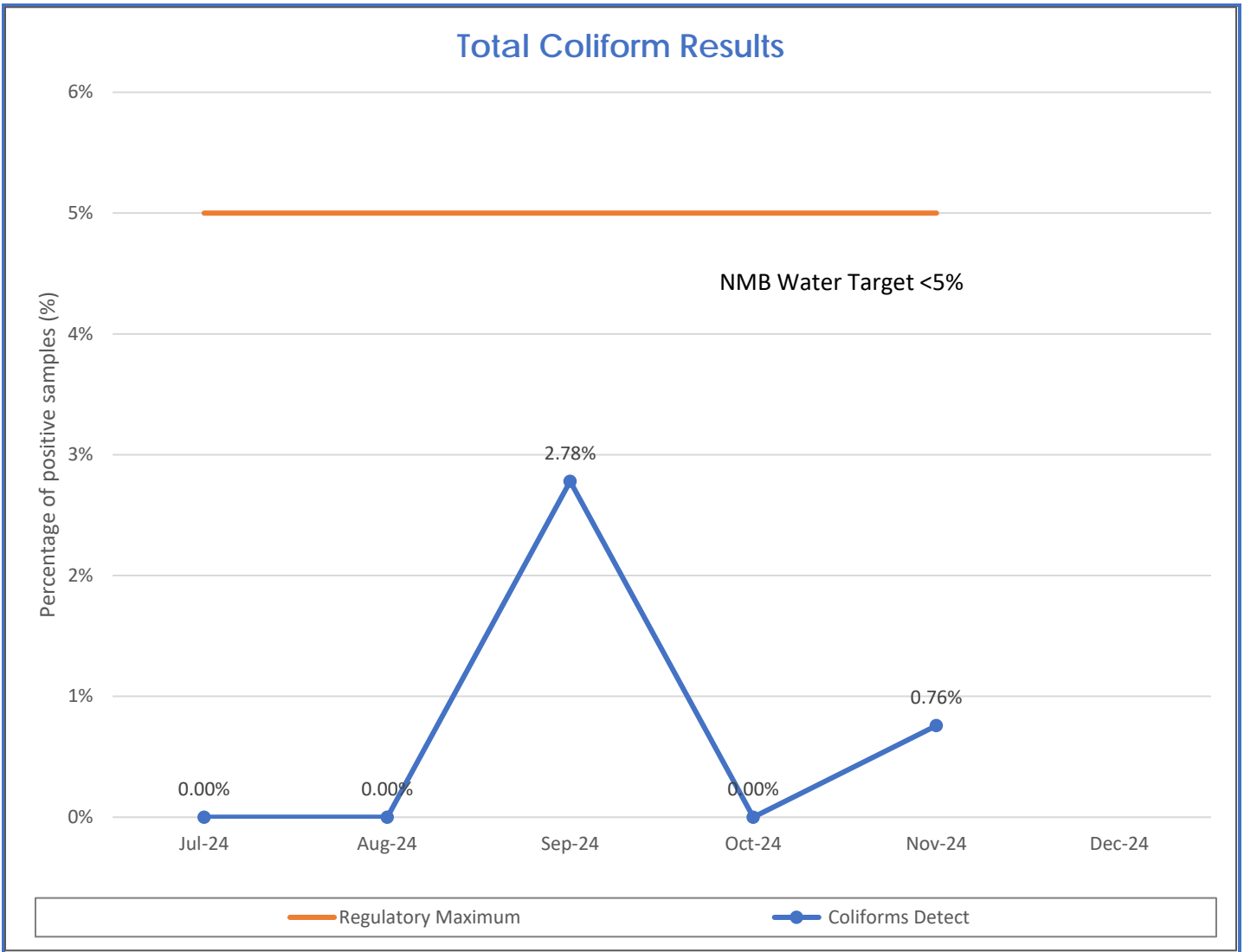
### Water Quality Metrics

The water quality parameters provided in the table below indicate the WTP continues to meet all water quality standards.

Parameter	Limits	Average	Compliance
pH	8.75-9.2	9	✓
Turbidity	<1 NTU	0.22	✓
Color	<15 NTU	8	✓
Fluoride	0.6-4.0 mg/l	0.63	✓
Alkalinity	45-70 mg/l	50	✓
Hardness	55-90 mg/l as CaCO <sub>3</sub>	61	✓
Cl <sub>2</sub> Residual – Norwood	3.8-4.0 mg/l	3.8	✓
Cl <sub>2</sub> Residual – Golden Beach	min 0.6 – 4.0 mg/l	2.9	✓

### Coliform and Chlorine Residual Results

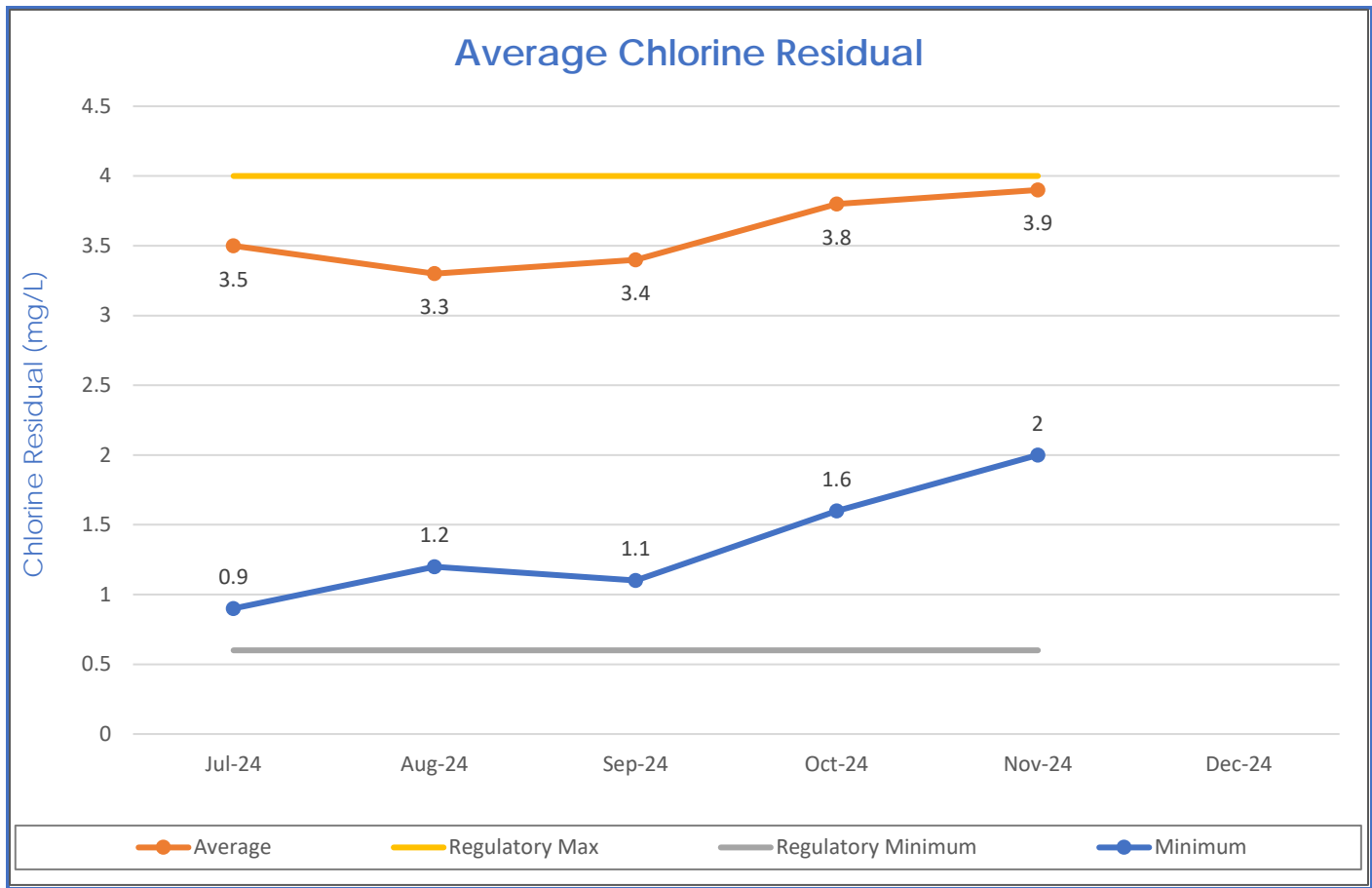
The results of the measurements show NMB Water continues to provide safe and potable water for the customers. Data is captured monthly from the revised total coliform rule report and chlorine residual submitted to the regulatory agency. The regulatory agency has determined the target.



### Chlorine Residual Results

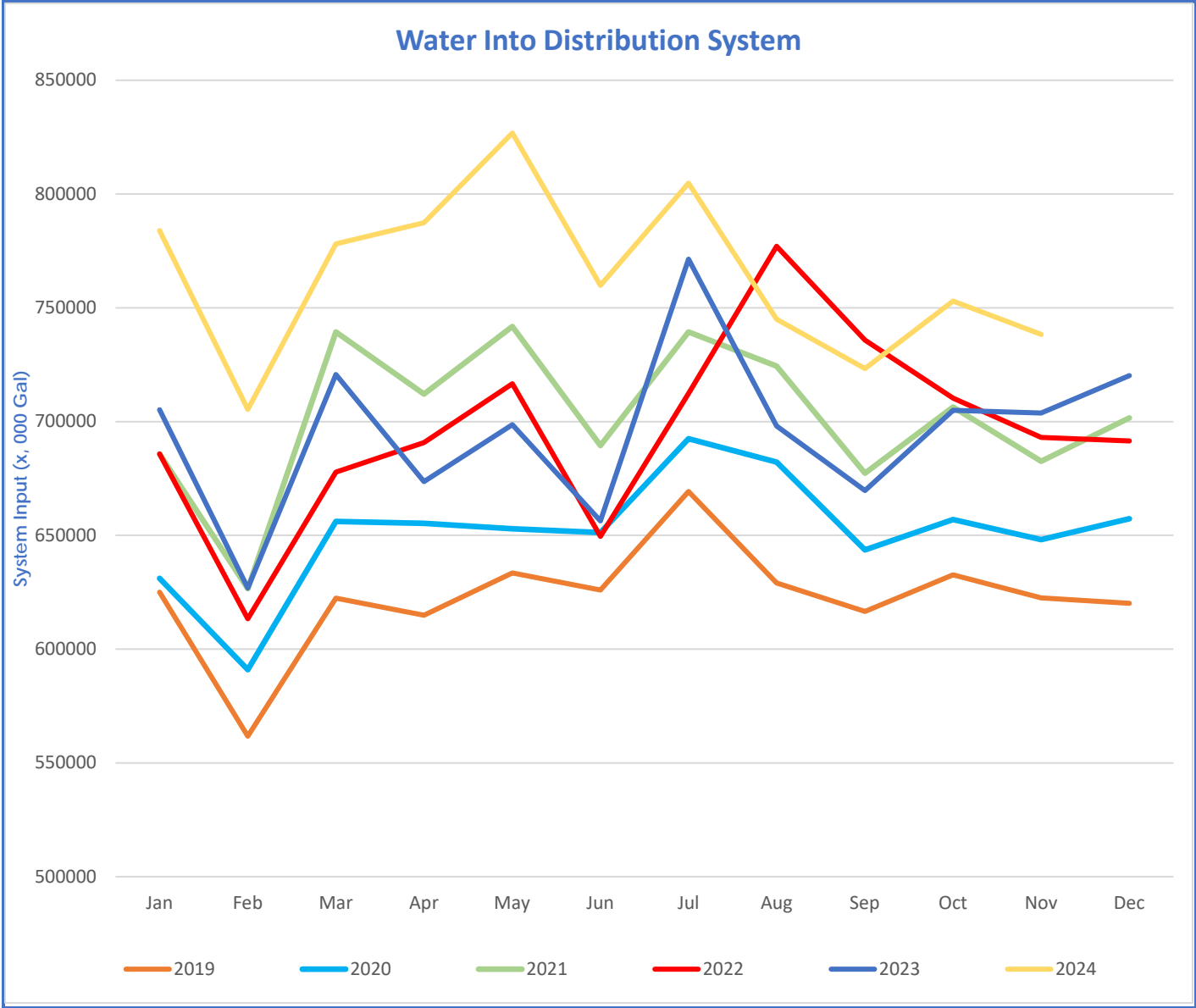
NMB Water collects a minimum of 134 water samples from within the water service area each month. While collecting samples to test for the indicator bacteria total coliforms, the lab technician checks and records the residual chlorine and pH at each location. The water sample collection locations are either at the hose bibs or sample stations.

This chart shows the average residual chlorine and the minimum residual chlorine data for the month. The regulatory maximum for residual chlorine in the water is 4.0 mg/L or 4.0 ppm (parts per million). The chart also shows the minimum residual chlorine level detected in water during the month. This data can be utilized to identify the areas that require consideration over time. Public water systems (PWS) are required to maintain a minimum of 0.6 mg/L of residual chlorine in the distribution system.



### 3. Norwood Water Treatment Plant Flows (904)

The chart below illustrates the amount of water produced since 2020. The Water Treatment Plant produced over 735 million gallons in November 2024.



## Pending Challenges & Issues

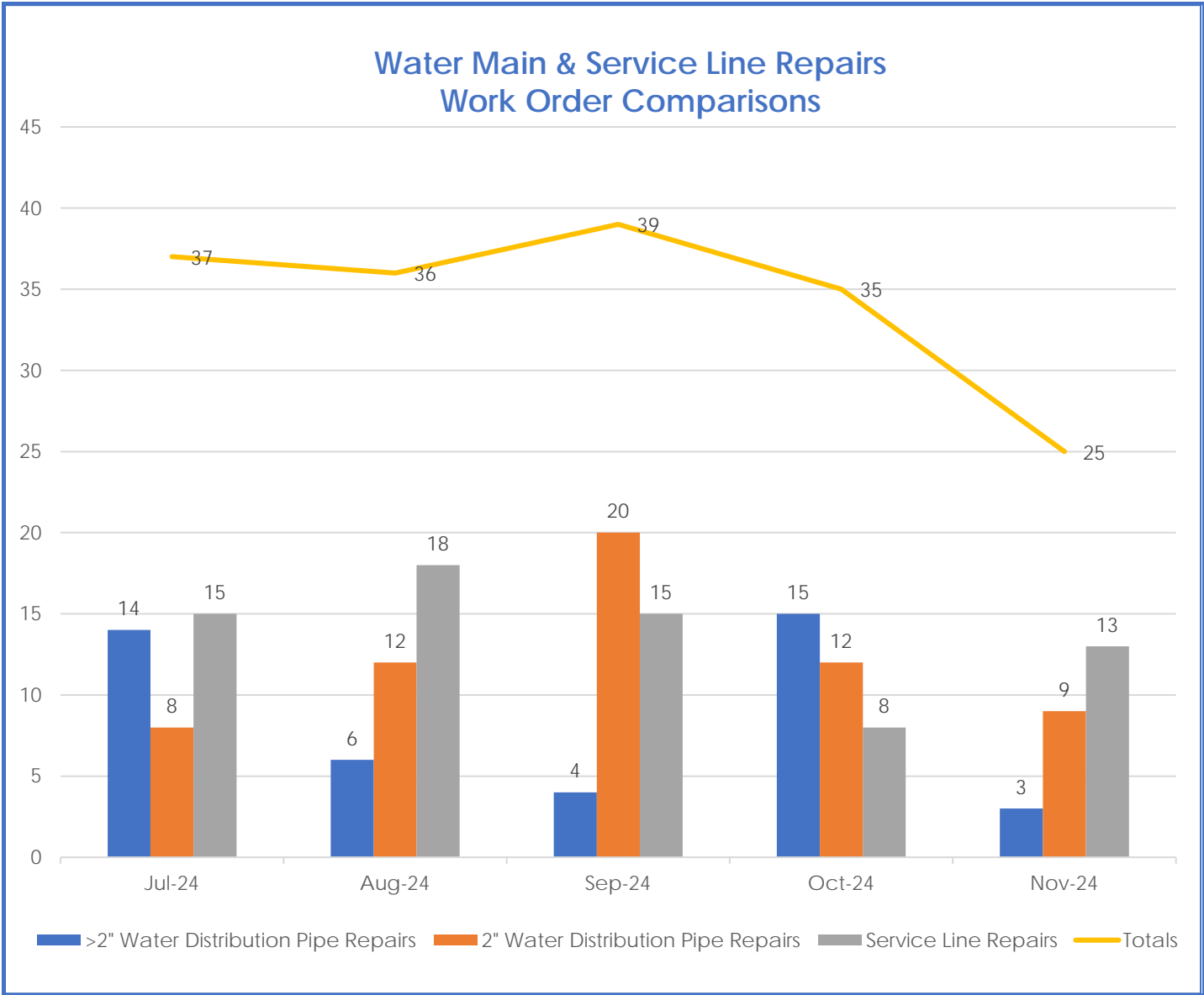
- Well #s 1, 10, 20, 21, and 3F are temporarily out of service.
- Well #1- The motor needs to be replaced.
- Well #10 – The motor has been replaced but well will need to be cleaned with acid.
- Well #20 – The motor has been replaced. However, they are currently not working. The well needs maintenance.
- Well #3F – The motor and pump have been replaced. Staff is waiting for the cable to be connected to disinfect and obtain a sample.
- Slaker #2 is temporarily out of service.
- VOC Tower #1440 is leaking. Needed parts have been ordered for repair.
- Backwash tank #7134 is temporarily out of service. Purchase Order issued and waiting on completion of repair work.
- HSP 5312 – Motor was repaired. However, the pump is leaking from the bearings. Installation of new parts in progress.
- HPP 2235 – Mechanical noise needs to be investigated. HPP 2235 is on the schedule to have motor and pump removed and repaired.
- Transfer pump 1511 – Motor needs to be replaced by contractor.
- Transfer pump 4511 – Pump is leaking by the mechanical seal.
- Transfer pump 4516 – Bearing noise at the motor, needs to be removed by contractor.
- Concentrate pump 7033 – VFD is failing. Parts from contractor need to be installed.
- Interstate Pumps for Nano Skid #1, #2, #3 and #4 will be temporarily out of service due to broken A/C units.
- Switchgear 1 lost communication with SCADA.
- Ro Sulfuric acid pump 8451 needs to be replaced.
- Lime side coagulant pump #2 needs to be replaced.
- Carbon Dioxide system is in manual.
- PH meter in the Odor Control Tower #2 is not working.

## Upcoming initiatives, Deliverables & Safety

- Remove the extra sludge from the Water Treatment Plant.
- There are no safety incidents to report.

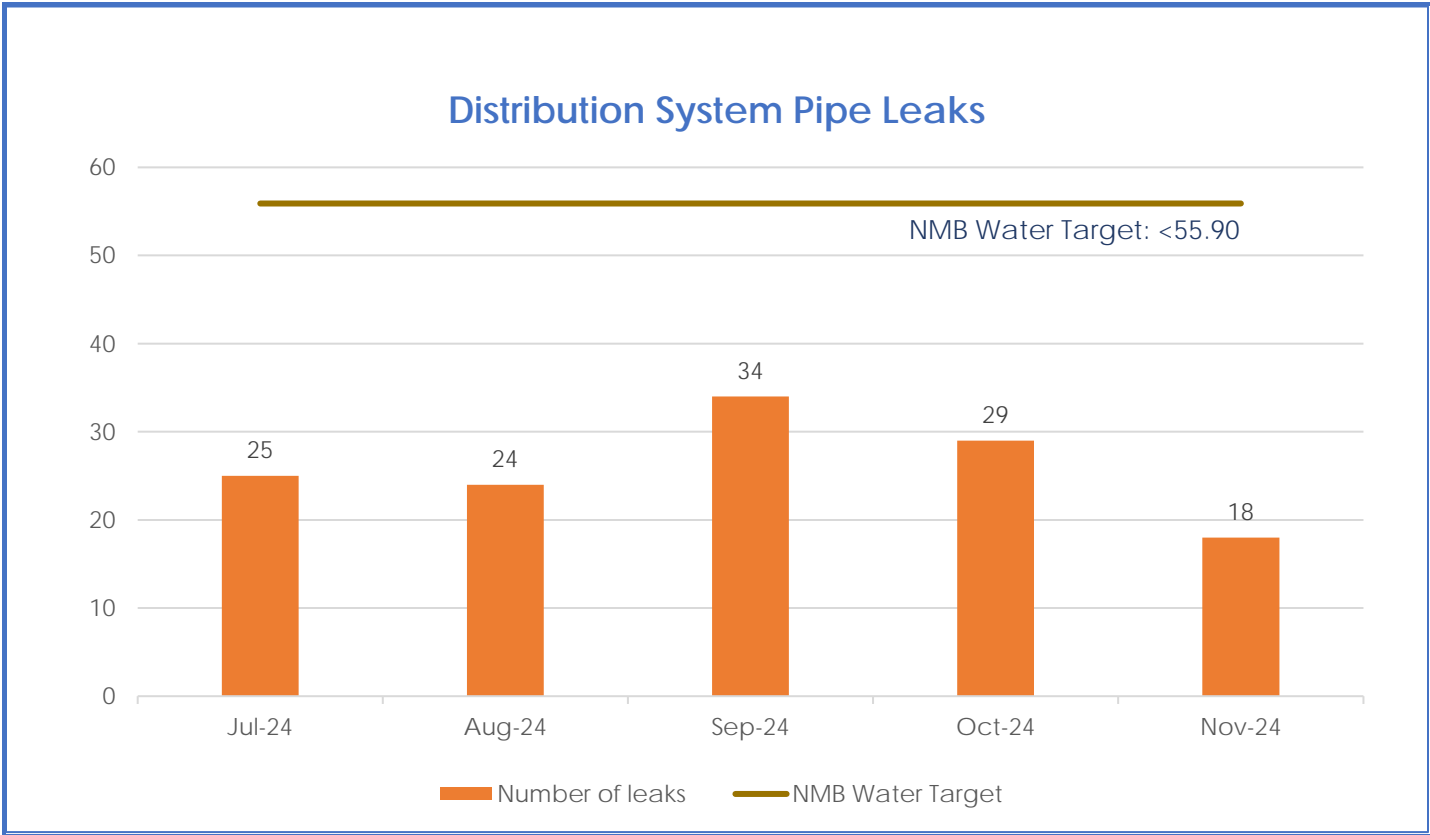
### 4. Water Distribution & Wastewater System Integrity (908)

NMB Water continues to assist with the F.D.O.T. relocation project by removing fire hydrants and installing and relocating water mains throughout the project area.



### Pipe Leaks

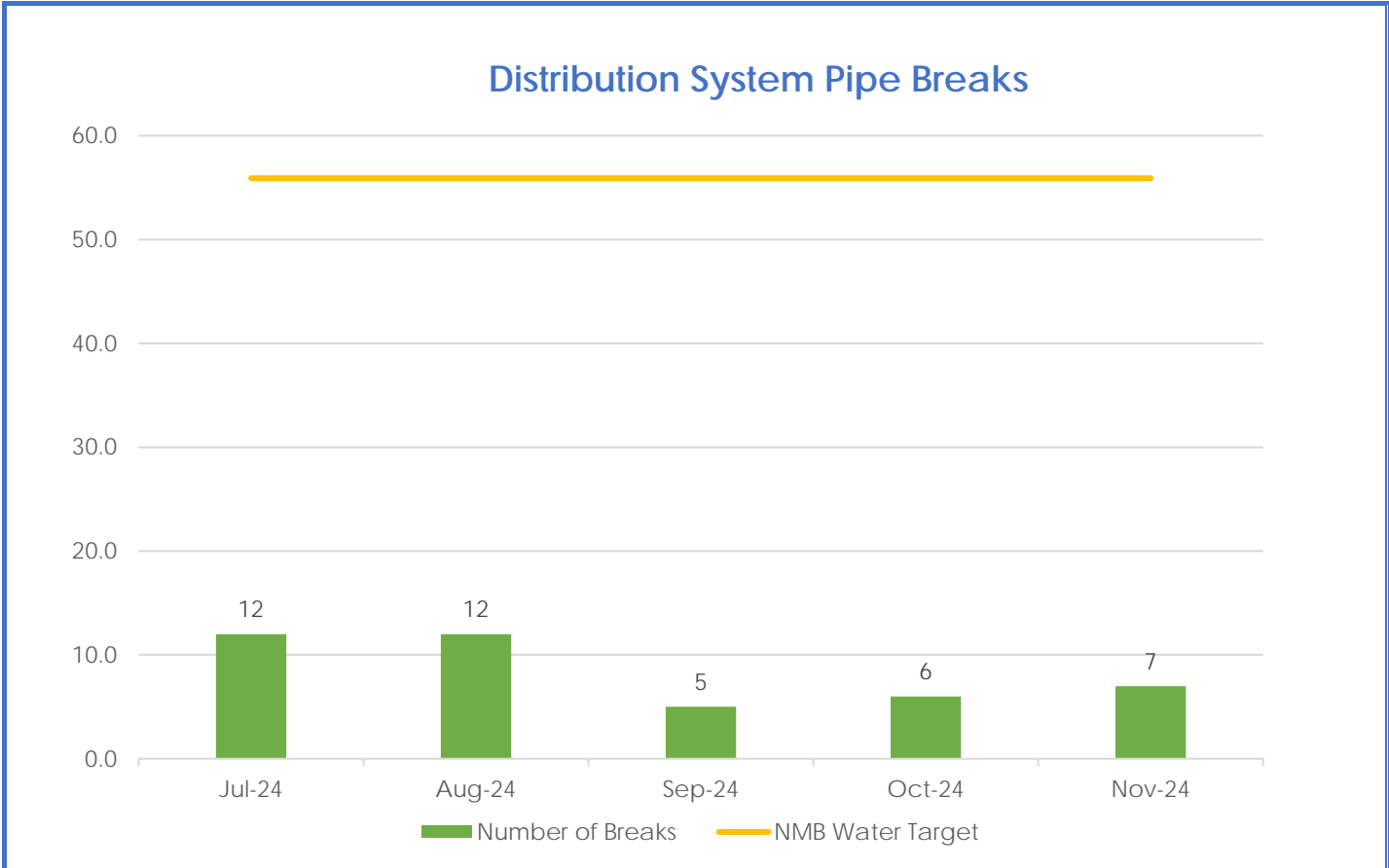
This KPI quantifies the condition of a water distribution system, expressed as the monthly number of leaks per 100 miles of distribution piping. A leak refers to an opening in a distribution pipeline, valve, hydrant, appurtenance, or service connection that is continuously losing water. Our target goal is 55.90 leaks per 100 miles. Most leaks were on older galvanized service pipe which are 50 years plus old.





### Pipe Breaks

A break means physical damage to a pipe, valve, hydrant, or other appurtenance that results in an abrupt loss of water. Our target goal is 55.90 leaks per 100 miles. Reported breaks were due to various contractors working throughout the distribution system.



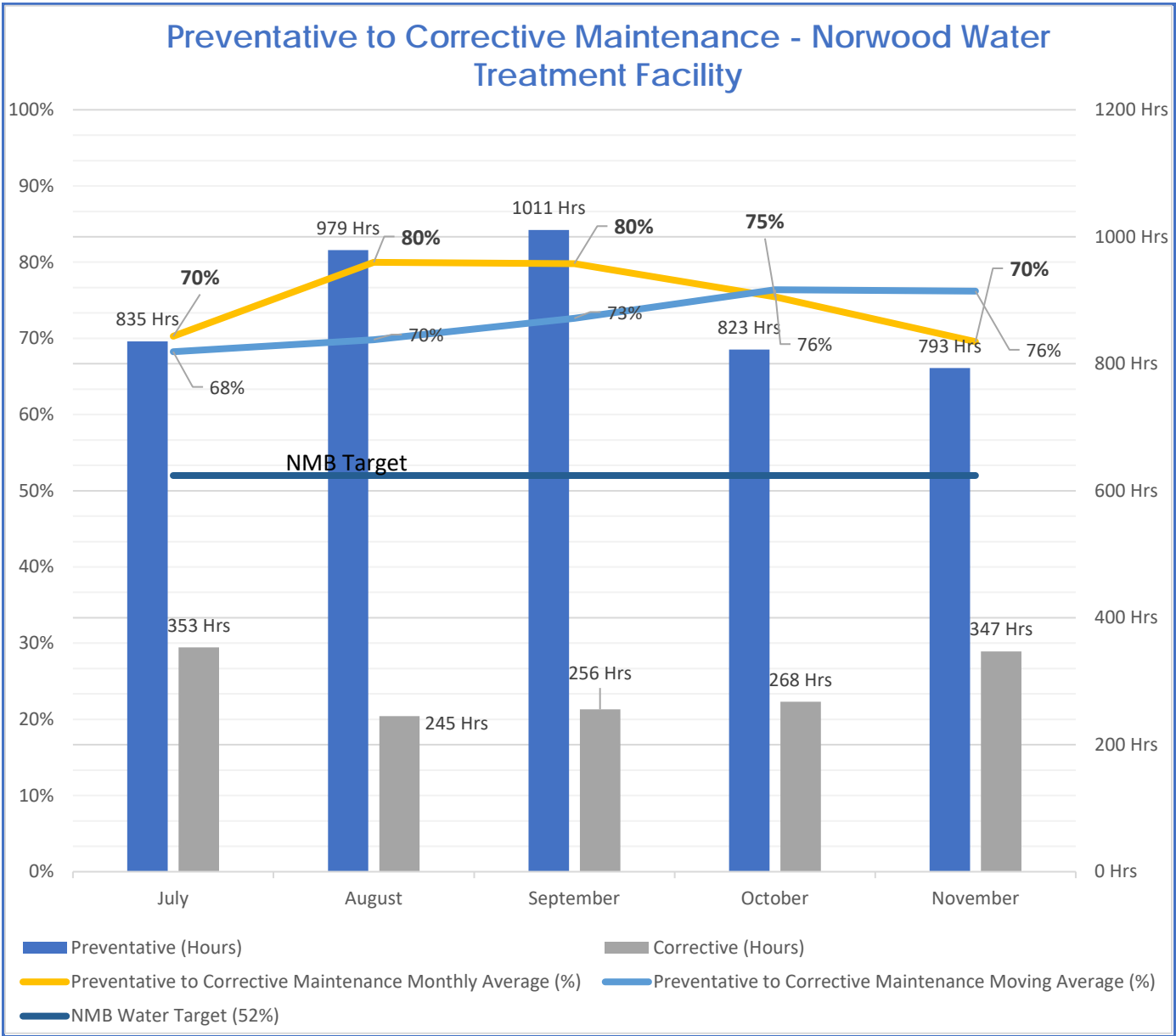
## 5. Water Distribution Maintenance (909)

### Preventative to Corrective

There was a marked drop in preventative maintenance and corrective maintenance hours due to the holiday season as well as focused work on an issue involving SCADA panel 1 and the Ammonia System. The maintenance team has completed a total of 335 work orders, of which 234 were preventative and 59 were for corrective maintenance work to address immediate concerns.

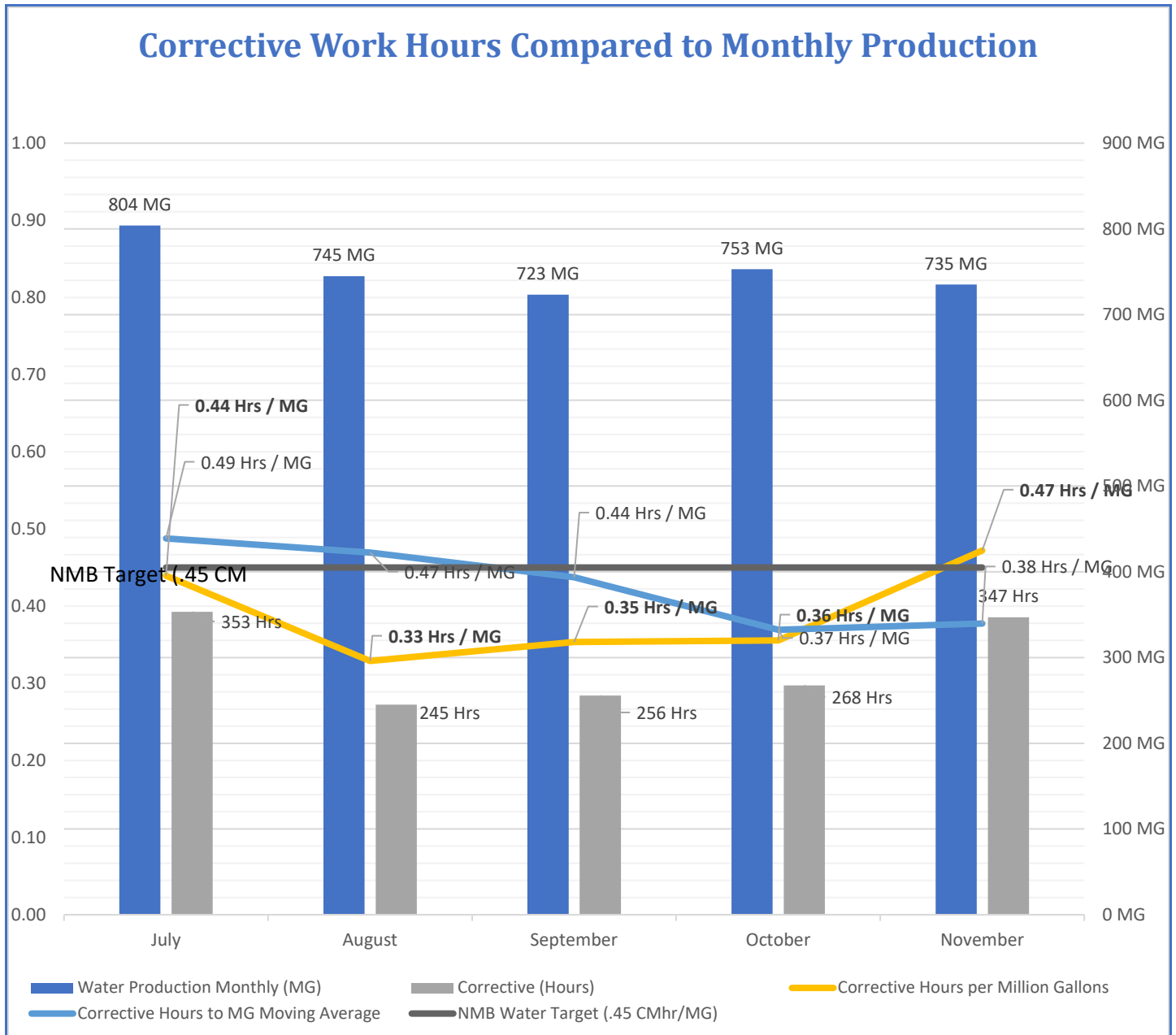
In general, the higher the orange line, the better the performance of the team. Also, we have included a moving average now in the report (blue line) to show the trend over a longer period. Ideally, we will be able to use this as our primary as it shows a more consistent progress.

This graph represents the percentage of preventative work hours when compared to corrective work hours. The team continues to exceed the target baseline of 52%.



### Corrective to Production

This KPI quantifies the completion of Corrective Vertical Maintenance (CM) relative to the water production at the Norwood water treatment plant. The time for CM activities includes time spent repairing assets that have failed. This indicator is calculated using data obtained every month from maintenance records for the Norwood WTP stored in Maintenance Connection, and data collected from the flow meter of the combined finished flow. The lower the **orange line**, the better the performance of the team. This graph represents the ratio of corrective work hours per million gallons of water produced. The overall target is at .45 hours per Million Gallons.



## Monthly Maintenance Overview: November 2024

### Total Work Orders Completed:

286 Preventative

37 Corrective

8 Enhancement / Upgrades

### Pending Challenges & Issues: (Reference Water Production Manager's Monthly Report)

- Well 10, 20, 1 and 3F are temporarily out of service.
  - Well #10 requires rehabilitation due to poor flow rates.
    - On schedule for FY25 with contractor.
    - Purchase Order issued; work is pending.
  - Well #20 was taken out of service due to High Amperage & Low Flow.
    - Inspection with the contractor revealed significant iron buildup on the pump & well.
      - Purchase Order issued; work is pending.
  - Well #3F was connected and ready for operational status.
    - Well 3F suffered a short after initial testing, and the motor is now dead.
    - Contractors will not warranty equipment.
    - Purchase Order issued; scheduled as high priority.
  - Well #1 is tripping intermittently.
    - Resistance is reading good. However, there may be an underlying problem internally in the motor. It is recommended that it be pulled for further diagnosis.

- Slaker #2 is temporarily out of service.
  - Slaker #2 is currently in a mothball condition and undergoing redesign and rebuild on a lower priority schedule. All fabrication, construction, designs, modifications, upgrades, and enhancements are being performed in-house.
    - Upgrades.
    - Upgraded Transfer Pump.
    - New Transfer Tank Design.
    - New Piping, with Flushing Ports.
    - New valves and Flow Controls.
    - Additional Piping Supports.
    - Enhanced Lighting.
  - Slaker #2 repair is pending parts delivery for rehabilitation.
- VOC Tower #1440 Leaking.
  - Pending parts arrival from the Warehouse.
- Backwash Tank 7134
  - Work in Progress.
- High Service Pump 5312.
  - Mechanical Seal is leaking. Parts have been ordered.
    - Incorrect Mechanical Seal ordered by Operations.
    - Incorrect Mechanical Seal installed as requested by Operations. Seal failed.
    - New seals ordered.
- High Pressure Pump 2235.
  - Mechanical Bearing Noise. Equipment placed on temporarily out of service status, but usable in emergency situations.

- On schedule to be replaced after Transfer Pump #s 4516 4511.
- Transfer Pump 1511.
  - Motor damaged due to age. Pending motor replacement. Quotes obtained.
    - Modified designs are being devised to perform removal and installation of motor in-house.
    - Pending Purchase Order approval.
- Transfer Pump 4512.
  - Equipment is operational; however, the Check Valve has a substantial leak. Pending component arrival for installation. Temporary installation fix to quell leak was fabricated. This, however, is not a permanent solution.
- Transfer Pump 4516.
  - Placed on TOS due to extreme bearing damage.
    - Contractor quotes obtained and a requisition has been submitted.
- Concentrate Pump 7033.
  - Concentrate Pump 7033 has a failing VFD. New VFD arrived, pending installation.
    - Pending further in-depth installation with the SCADA project.
- Interstate Booster Pumps 1, 2, 3, and 4.
  - Functional. Requires AC, but temporary solution found.
  - New Air Conditioners ordered.
- Switchgear #1 Lost Comms.
  - Switchgear #1 has partial communication loss with SCADA. System is operational and pending further troubleshooting for repair.
- RO & Nano Acid Pumps
  - Pending Piping from Warehouse.
  - Pending Tables and Shields from contractor.

- Pending further quotes for a requisition.
- Coagulant Pump #2 is replaced.
  - Spare needs to be ordered for inventory.
- Fluoride Pump #1 has damaged motor.
  - Pending Purchase Order issuance.
- Generators
  - Update pending.

#### Task Updates:

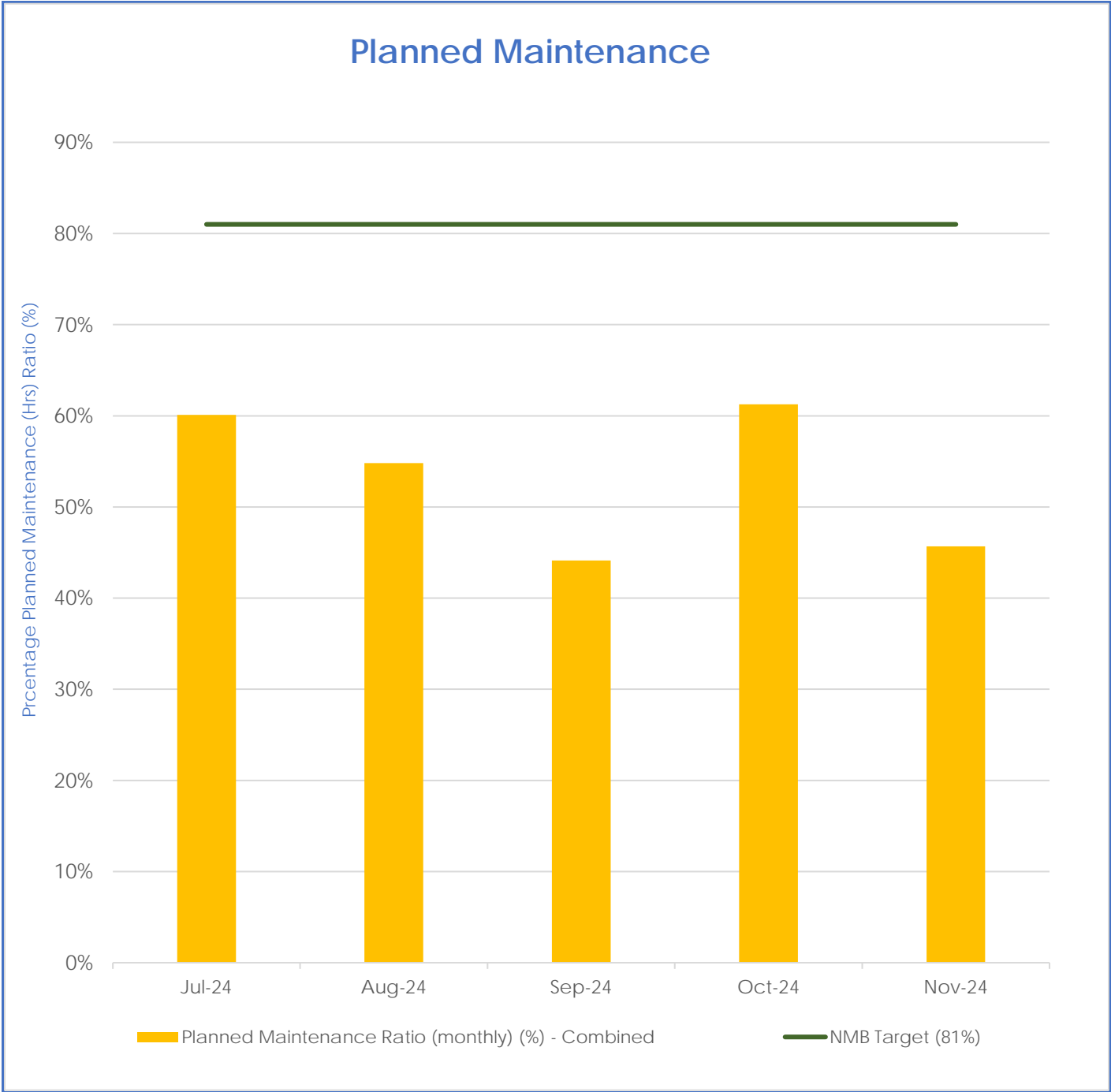
- I. Acid Room Upgrade.
  - a. Team to begin design stages for rebuilding the Acid Pump Rooms.
    - i. New piping designs to decrease failure points.
    - ii. New Valve locations to reduce Operations risk.
    - iii. New Solenoid & Bypass design to improve automation.
    - iv. New Pumps to reduce maintenance costs.
    - v. Painting
    - vi. Spares
- II. Caustic Room Upgrade.
  - a. Team to begin design stages for rebuilding the Caustic Pump Room.
    - i. New bypass design
    - ii. New table design.
    - iii. Caustic Walkway Design
    - iv. Shield Upgrade.



## 6. Wastewater Collection Maintenance (910)

### Planned Maintenance

NMB Water is focused on wellfield protection maintenance needed as identified in the SSES report and continue working on FDOT relocations in Miami Gardens. Crews also continue to handle customer service requests and emergency repairs.

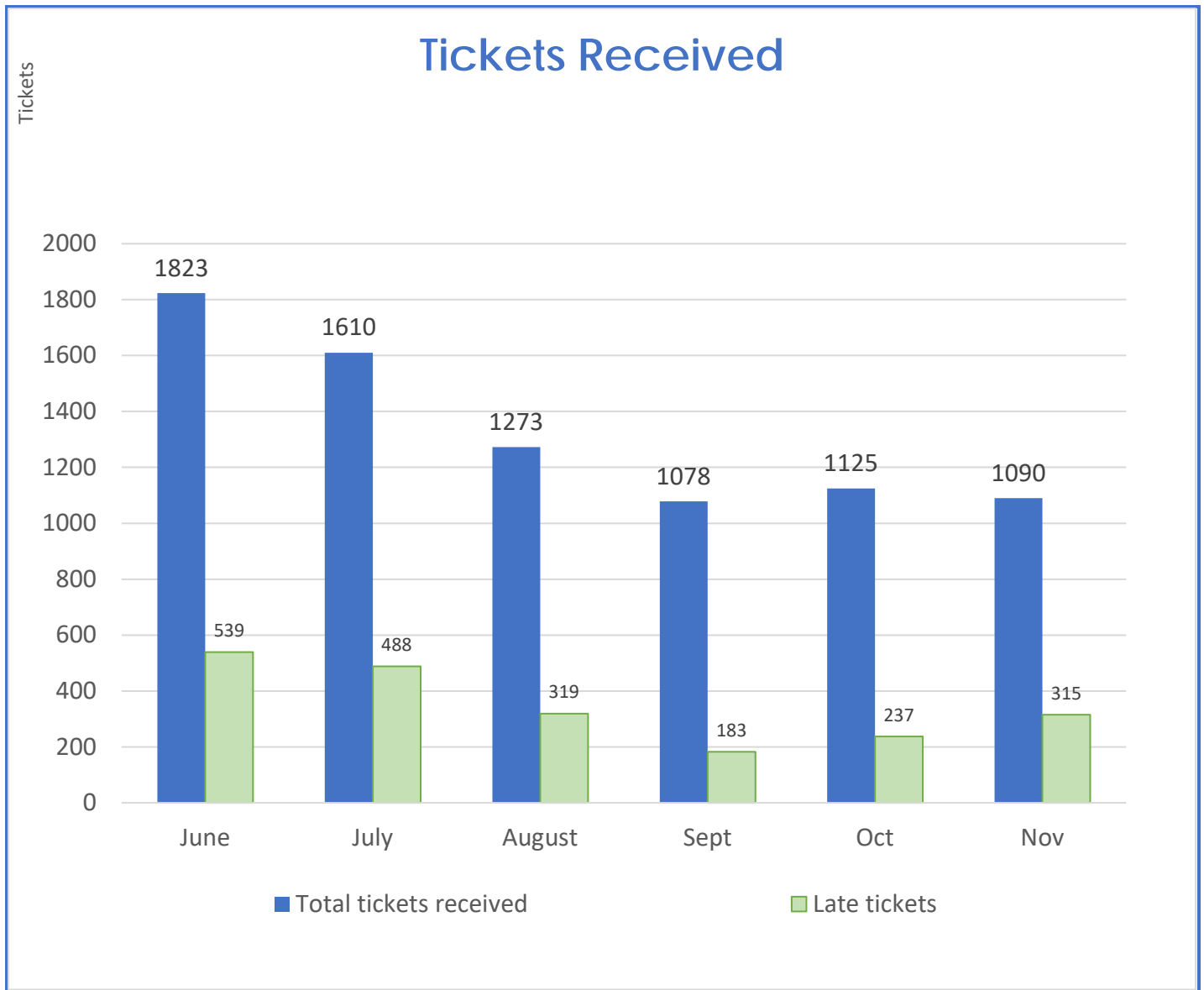


## 7. Infrastructure Coordination (912)

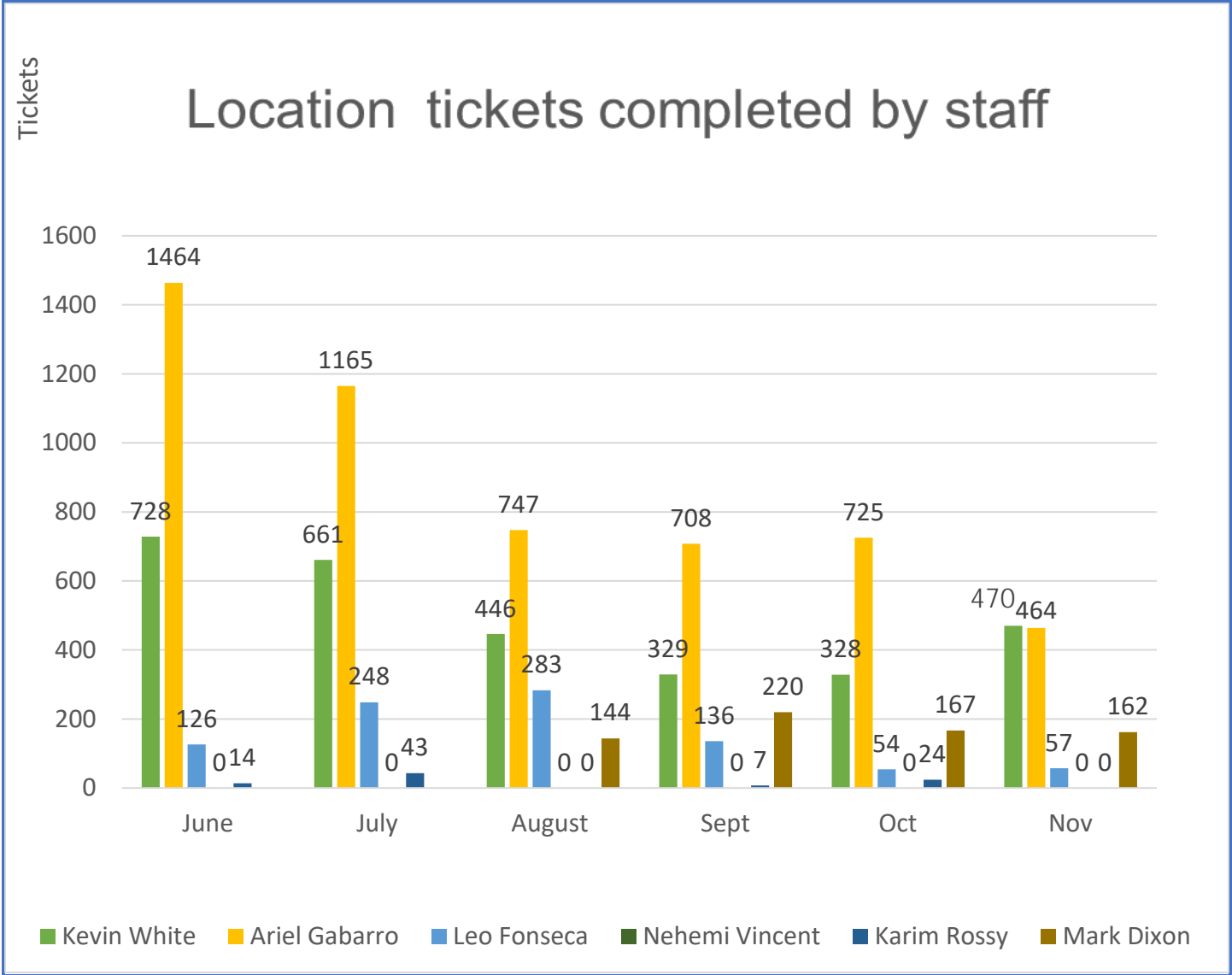
### Location Tickets

NMB Water is mandated by Florida Statute Chapter 556 to respond to the Sunshine 811 locate ticket within two full business days from receipt. That is our goal.

Note: we have seen these past couple of years an influx of construction in the service area and have had upwards of 100 new tickets a day and backlogs of close to 500 tickets. Currently, the team has two full-time locators and three additional staff, including inspectors and an infrastructure manager, that help as needed to protect NMB Water infrastructure. The current backlog is between 200-300 tickets daily.

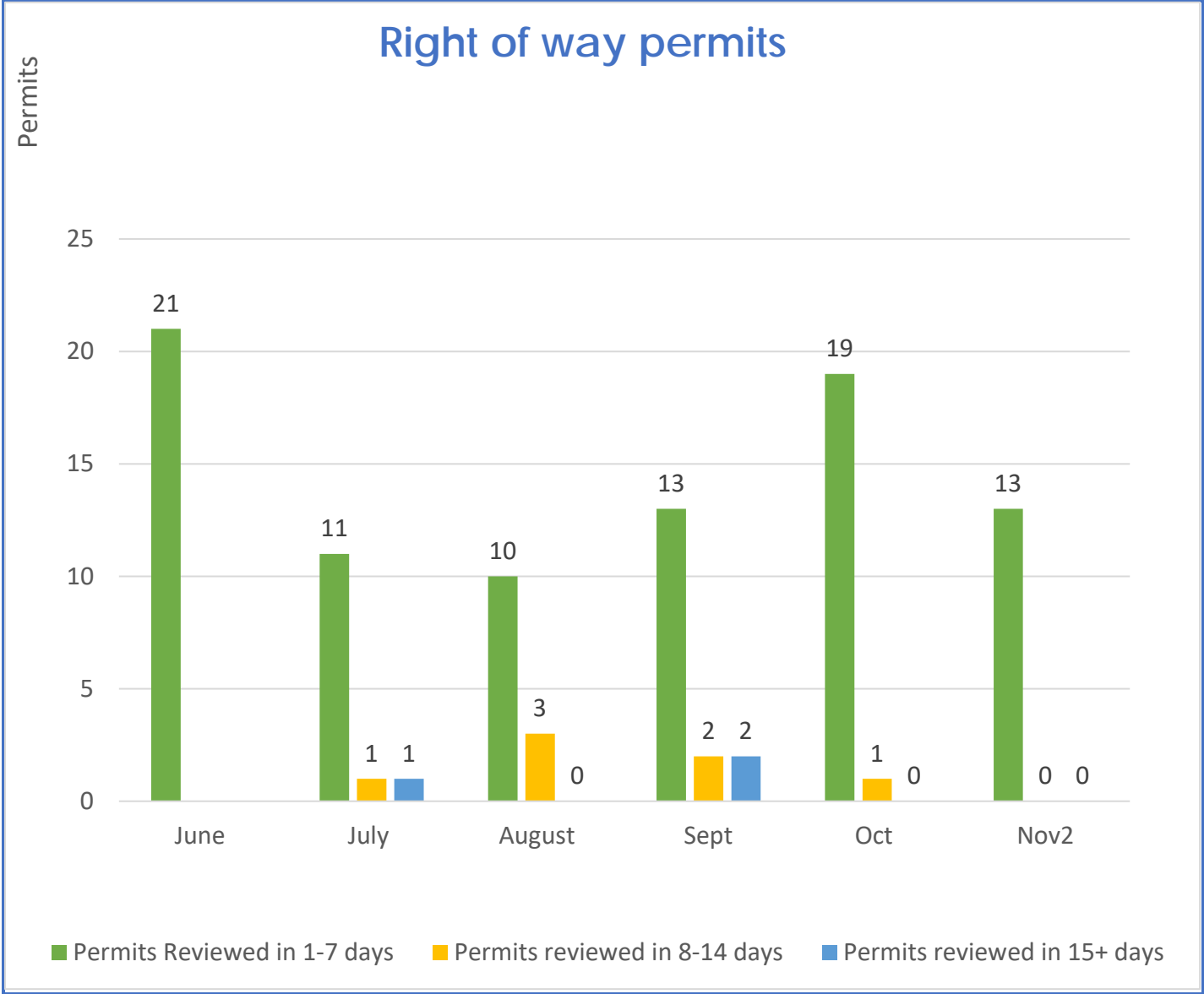


The Engineering and Infrastructure Division currently has two full-time locators. Staff has tried to keep up with the workload by assisting however they can. To deal with the high volume of work, they are in the process of hiring a new (third) locator to alleviate this need.



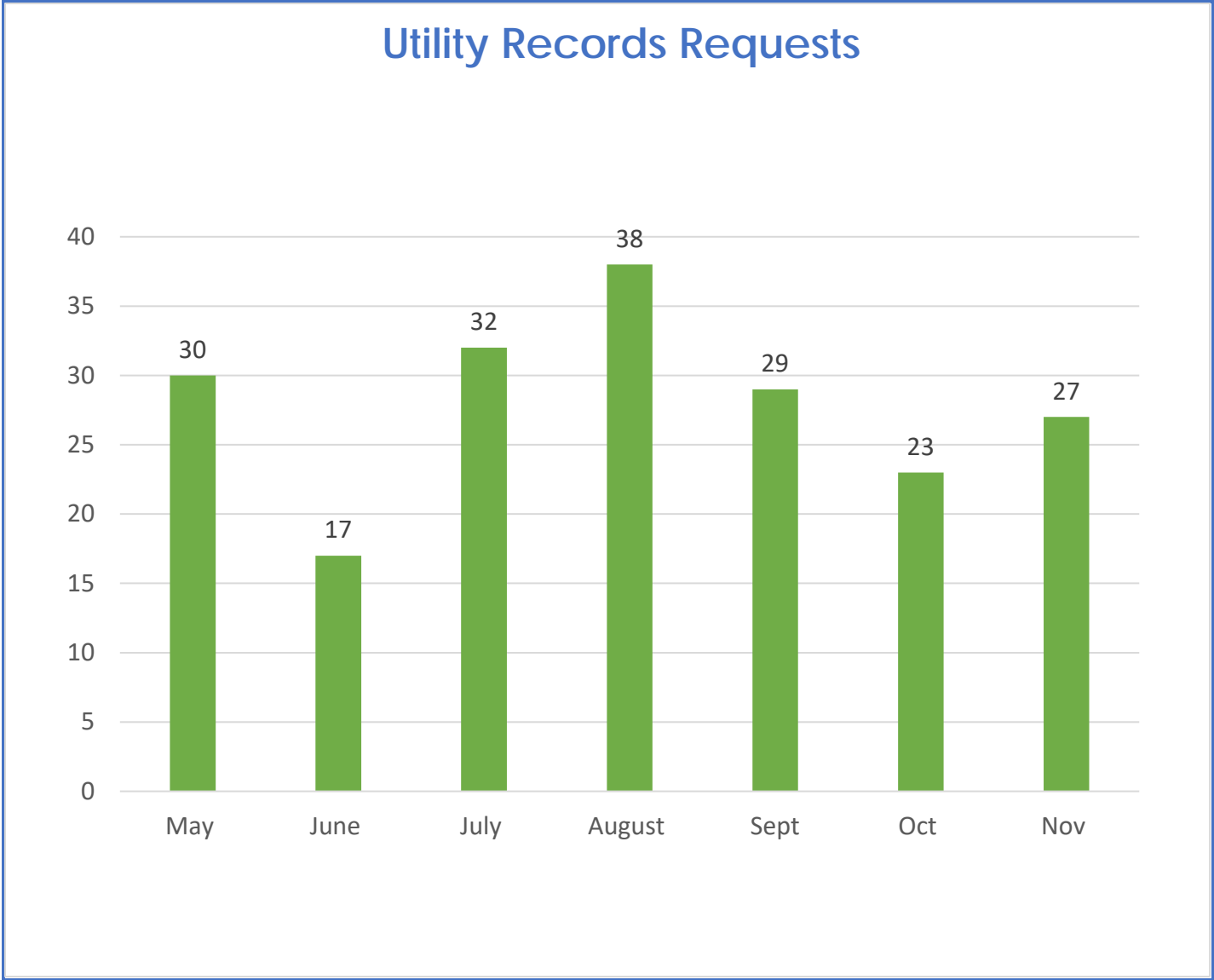
### Right-of-Way Permits

The Engineering and Infrastructure division receives Public Works Engineering Permits (Right of way) permits to review for compliance with our water and sewer requirements. Our goal is to turn them around within a week of receipt.



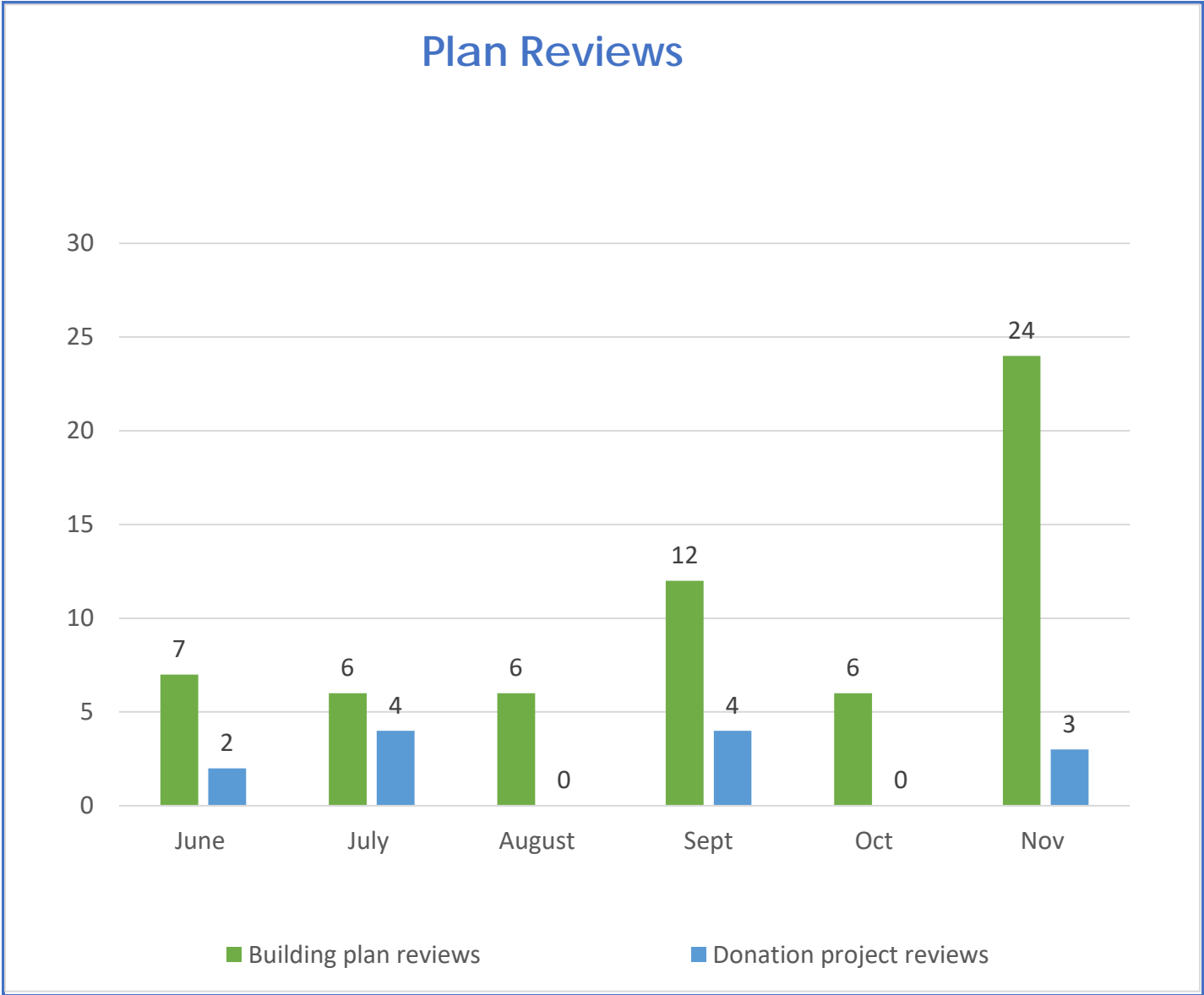
### Utility Records Requests

The Engineering and Infrastructure division receives Utility Records requests from consultants designing developer driven projects as well as other utility consultants doing work in the right of way. They need to show what else is in the right of way near their project to avoid conflicts or simply to connect to our utility lines. This provides another layer of damage prevention. The goal is to turn these requests around within 5 business days and usually do. Record requests include GIS and related documents such as scanned as-builts. Occasionally, we receive requests from public records requests from the City Clerk office.



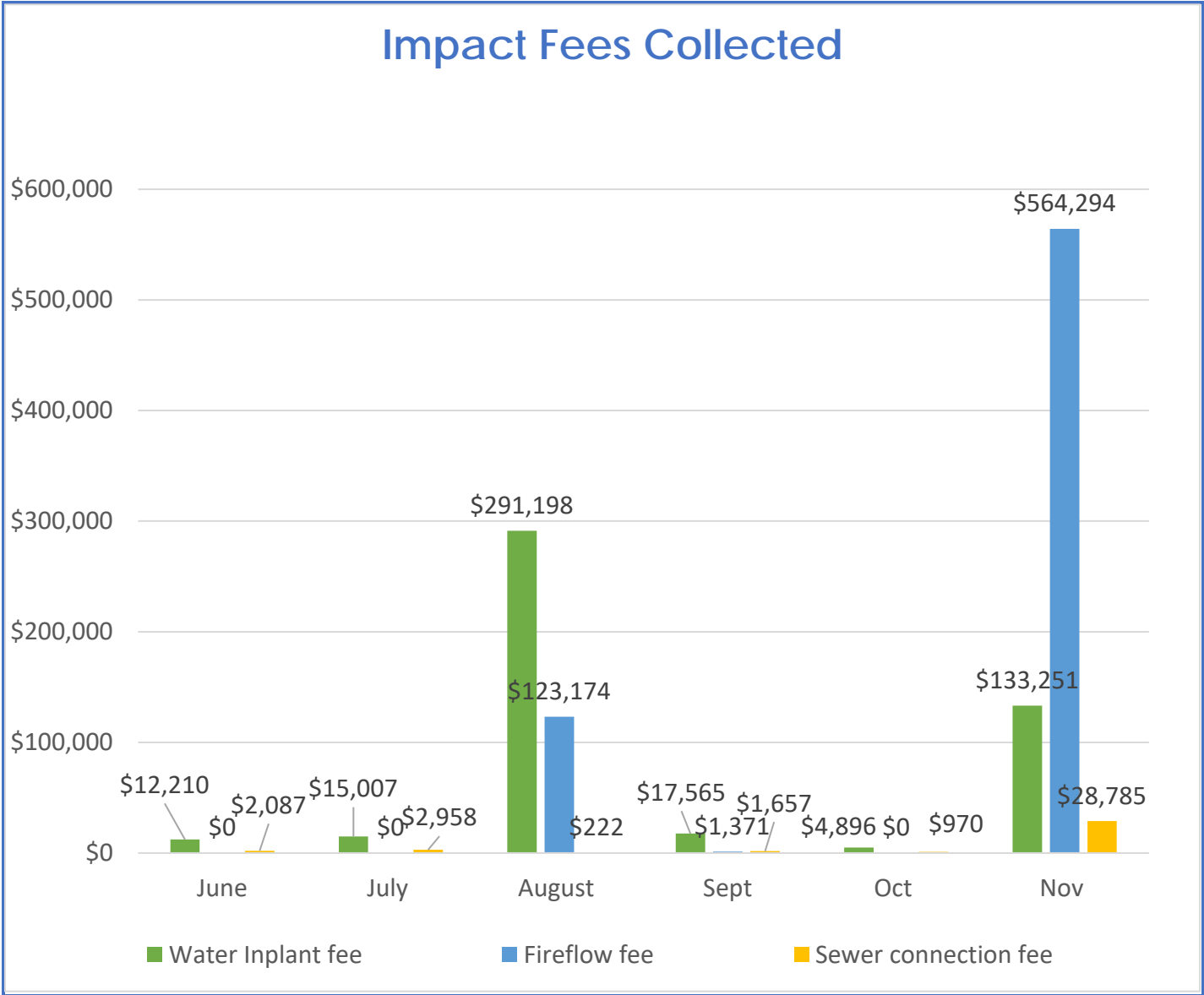
### Plan Reviews

The Engineering and Infrastructure division reviews building plans for assessment of water and sewer connection and Fire flow fees. They also review developer driven donation projects for water actual connections to our system. This type of review can be time consuming and sometimes requires a lot of back-and-forth interaction.



**Impact Fees Collected**

The Engineering and Infrastructure division reviews building plans for assessment of sewer connection and fire flow fees. The amounts collected are based on regional growth at the present time and not an indicator of our performance. The amounts collected are based on regional growth at the present time and not an indicator of our performance.

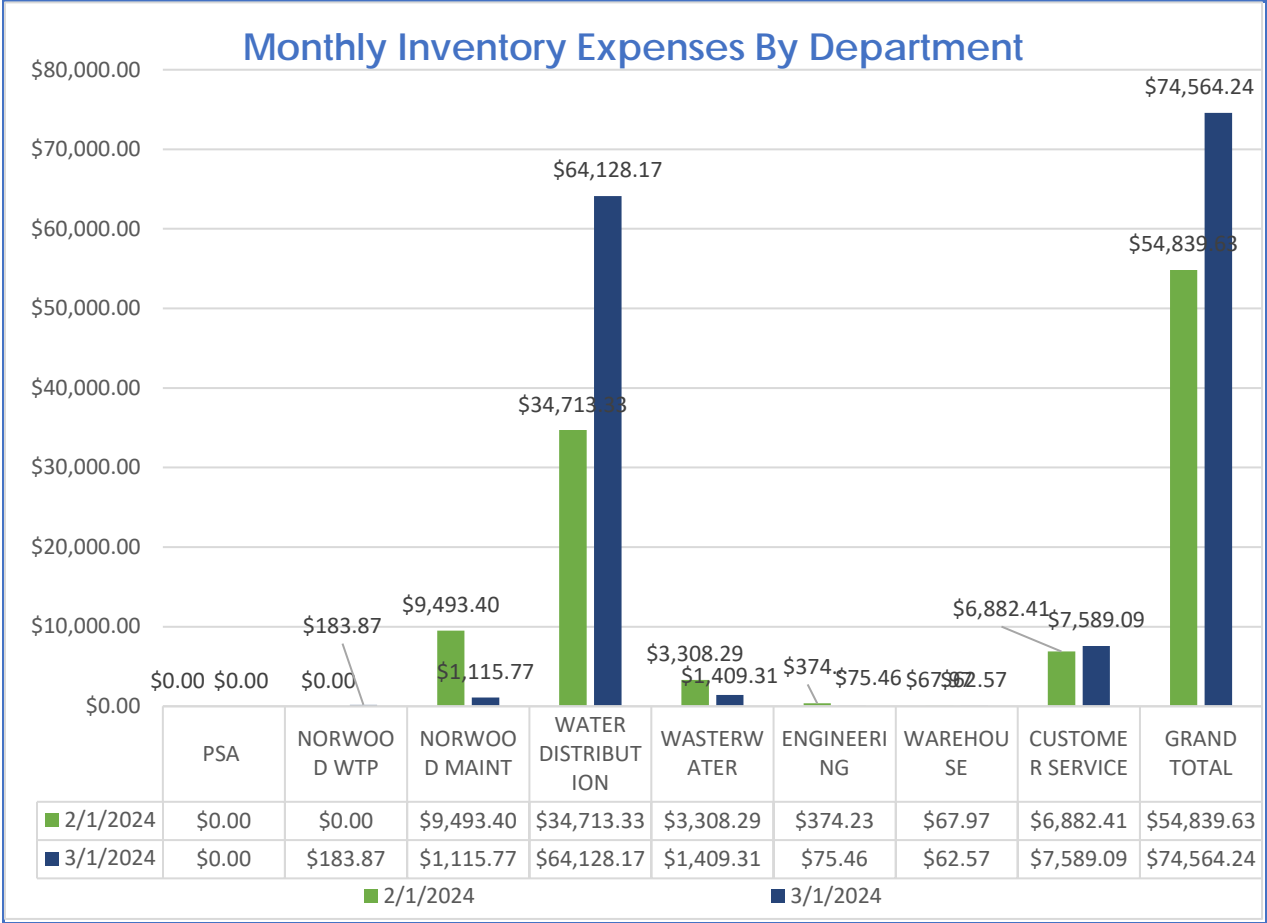




## 8. Warehouse

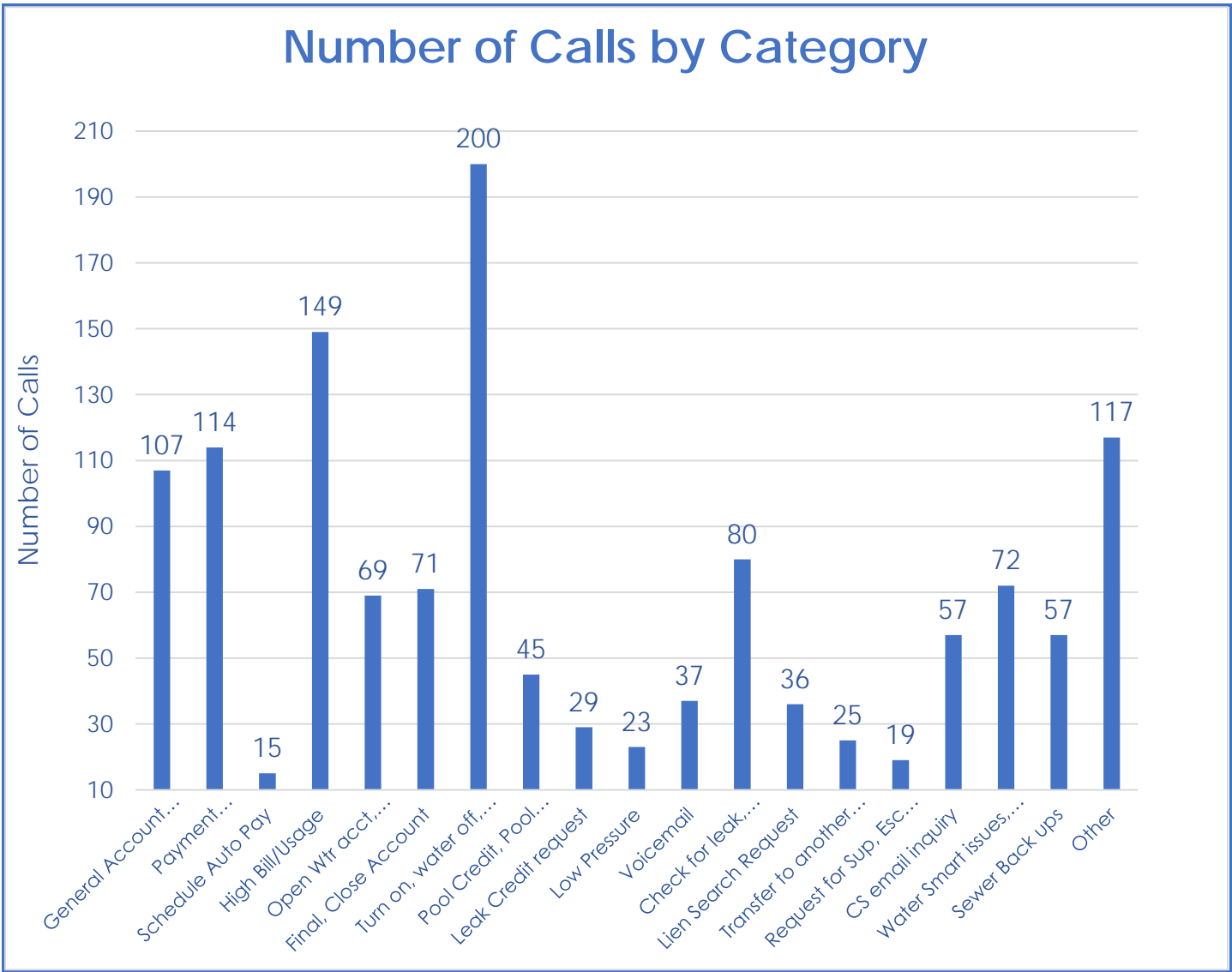
The Operation Center Warehouse is located at: 2101 NE 159<sup>th</sup> Street and is part of the NMB Water Division. The warehouse is comprised of approximately 4,000 square feet of covered space and 1,000 square feet of open space (Phase II).

**Currently, we do not have the proper information, but we continue to work with staff to provide viable information for the next report.**



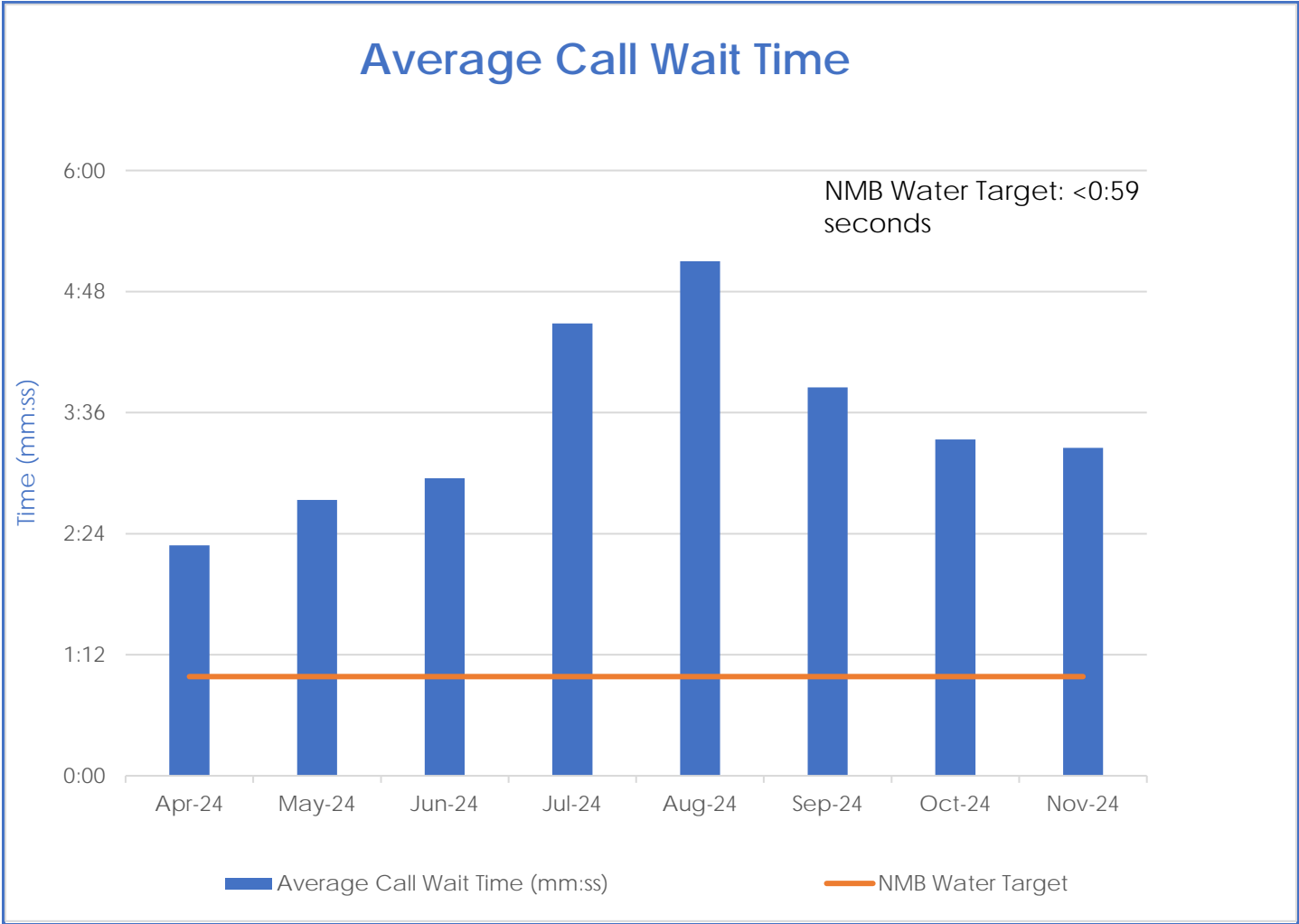
## 9. Customer Service (916)

Customer Service (CS) provides services for meter reading, Itron and Invoice Cloud management, billing, money-collection, and call center to approximately 34,950 customer accounts. A total of 1,345 calls were received during this reporting period. A total of 1,322 calls were answered in which the average hold time per call was 1 minute and 41 seconds. The chart below shows the number of calls per category recorded for the month of November 2024. In October, the call volume increased significantly due to residential and commercial billing cycles and collections. This led to a higher volume of calls from customers requesting payment arrangements. Category labeled "other" includes late fee waivers, estimated bill, meter and sanitation inquiries. (Note: Not all the calls were categorized)



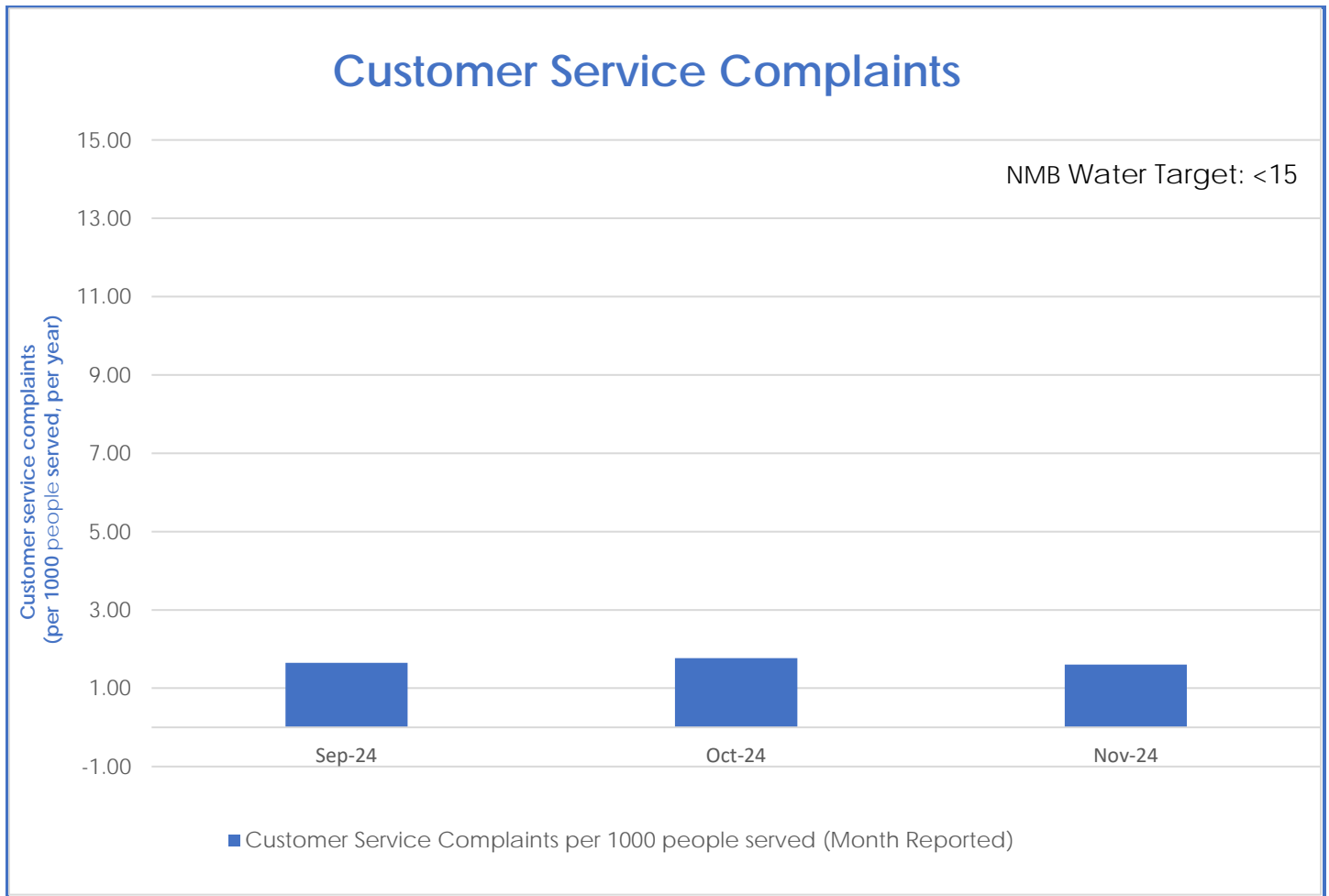
### Average Call Wait Time

Average call wait time is the amount of time an inbound call spends waiting in queue or for a callback, also known as the average speed of answer. The traditional wait time for a call uses the wait time of <0:59 seconds. Average call wait time decreased slightly this month. This decrease continues to illustrate a significant improvement in efficiency.



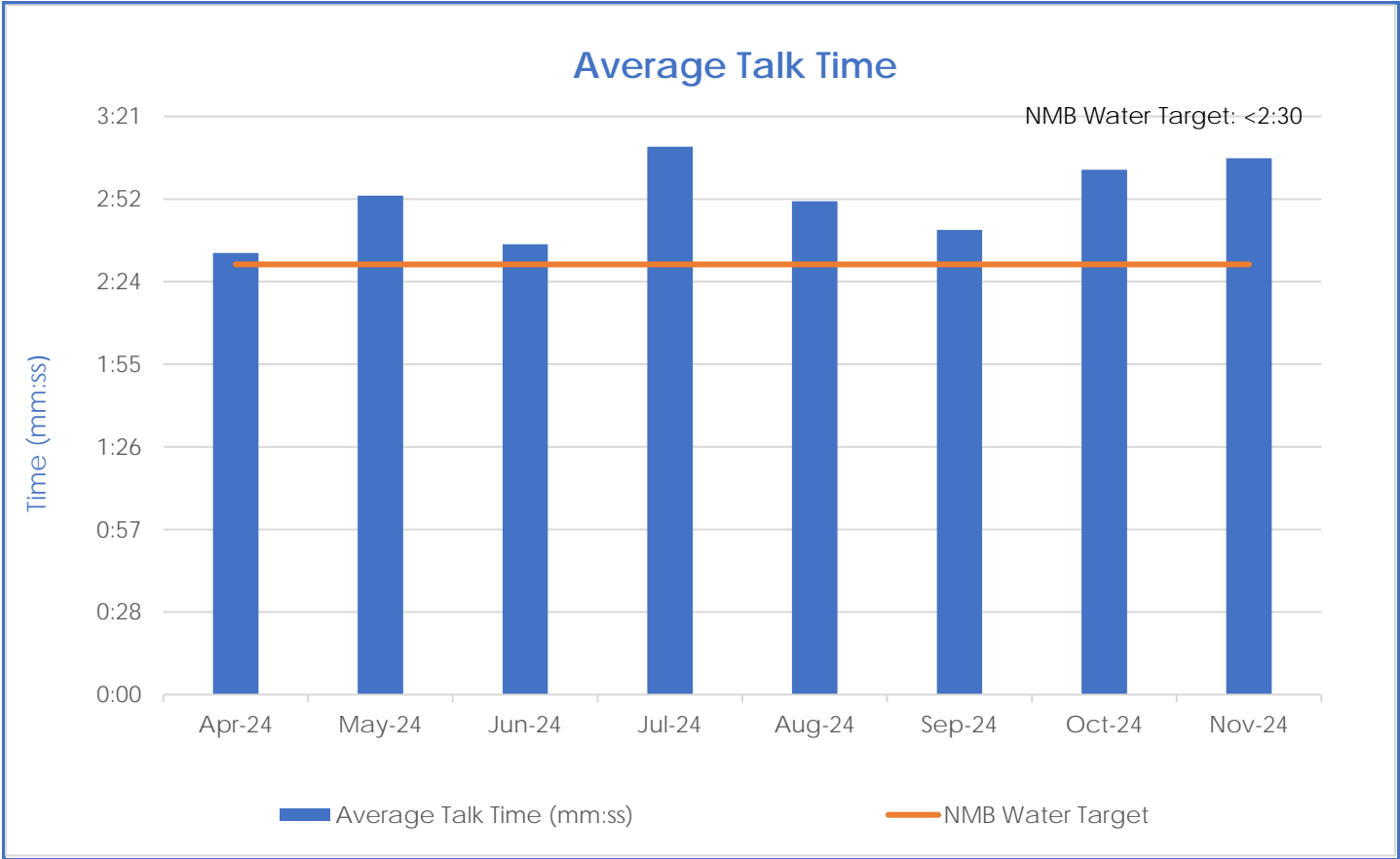
### Customer Service Complaints

This KPI captures the complaint frequency provided by the utility per 1,000 accounts. AWWA defines customer service complaints in reference to relationship factors such as courteousness, helpfulness, professionalism, and responsiveness. We will utilize the following to capture customer complaints: estimated bills, high bills, low water pressure, leaks, request for supervisor, Water Smart issues, sanitation issues, and sewer backups. Our target goal has been adjusted from five (5) to fifteen (15) complaints per 1000 customers a month because of the influx of complaints during billing cycles. Customer service complaints decreased by 9.65%. Most of the complaints received this month were related to high bill inquiries.



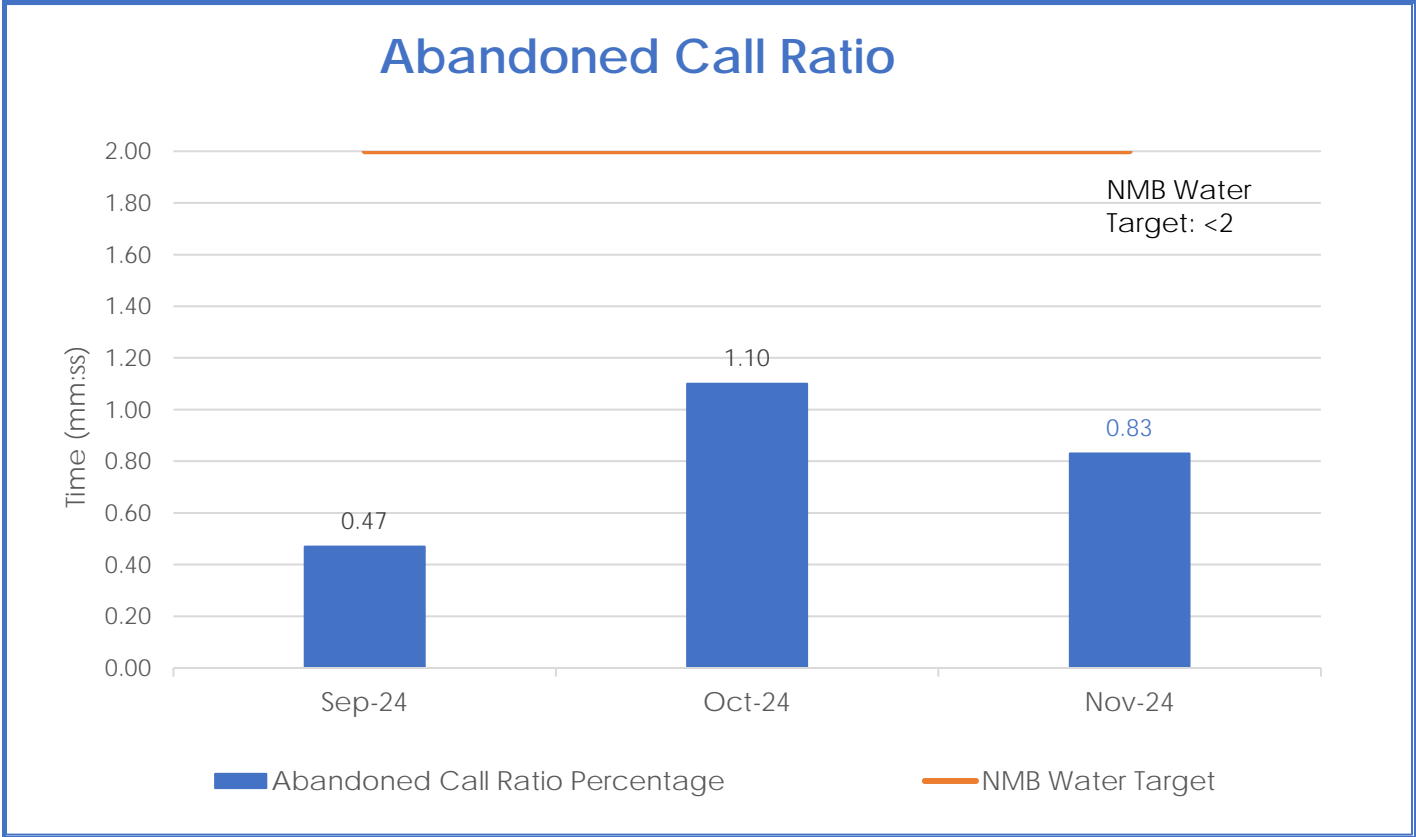
### Average Talk Time

Average talk time (ATT) is the amount of time that a Customer Service Representative (CSR) spends handling customer calls and resolving their queries. Average Talk Time increased slightly in November due to a high volume of calls related to delinquent accounts and subsequent payment arrangements as residential bills were due.



### Abandoned Call Ratio

The abandoned call rate is the ratio between the number of the calls terminated before they could be answered and the total number of calls. This is important for KPIs that indicate customer satisfaction and service level. A high abandonment rate is often used as a signal by call centers to improve the response time. The abandoned call ratio decreased slightly this month as agents were able to assist customers in a timely manner.





**City Manager's Report  
16.4.**

City of North Miami Beach  
17011 NE 19 Avenue  
North Miami Beach, FL 33162  
305-947-7581  
www.citynmb.com

**MEMORANDUM**

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<b>TO:</b>	Mayor and City Commission
<b>FROM:</b>	
<b>VIA:</b>	
<b>DATE:</b>	January 21, 2025

---

**RE:** Washington Park Update

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**Description**

**BACKGROUND**

**ANALYSIS:**

**RECOMMENDATION:**

**FISCAL/ BUDGETARY**

**IMPACT:**

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**ATTACHMENTS:**

Description

- Washington Park Update Memo
- Washington Park Project Update





## ***City of North Miami Beach, Florida***

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### ***Public Works Department***

TO: Mario Diaz, City Manager

FROM: Sam Zamacona, Public Works Director

CC: Gregory Christian, Interim Capital Improvements Program Manager

DATE: January 14, 2025

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**SUBJECT: Washington Park Community Center Project Update 1-14-2025**

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#### **Background:**

The construction mobilization of the Washington Park Community Center project was the week of 12/16/2024. To date, trees have been removed from the public right of way to accommodate the construction work, Lucenda Park has been closed to the public and the park benches have been relocated to the Washington park Basketball court grounds, the project staging area site has been constructed on the grounds of the Lucenda Park, trees within the construction staging area has been protected, permits have been pulled and the pipe materials and related fixtures have been ordered.

#### **The status update is as follows:**

##### **Phase 1**

- The signed NTP was received on 12/27/2024 and the project is currently on schedule.
- Construction of the staging area is completed, and a new container type site office is being procured and expected on site within the next weeks
- Pipe materials have been purchased and are expected onsite at the end of January

to the first week in February, due to lead time constraints.

- NMB Right of Way permit was received three weeks ago, and some minor comments were given to the contractor. The contractor is working on updating the plans to resubmit, for approval, within the next week and a half.
- The pump shop-drawings package is being reviewed by the city's consultant, Hazen and Sawyer, for approval. This will be completed within the next week and a half.
- Shop drawings for the concrete structures and pipe work are being done by the contractor and will be completed by the 3<sup>rd</sup> week in January 2025 for review by City.
- Site excavation and laying of pipes are scheduled to begin by the 2<sup>nd</sup> week of February.

## **Phase 2**

- A curtesy plan review has commenced with the City's Building Department from the week of 12/23/2024
- The building permit application has been submitted to the Building Department. This will be followed by payment of the application fees.



# Washington Park Community Center Project (Building & Park Construction)

15280 NE 15 CT.



## Project Overview

### Project Description

Design and construction of community complex to include new covered basketball courts, multi purpose field, aquatic attractions and new recreation center

### In Progress

Status

07/09/19

Start

10/13/26

Finish

\$27,933,683.00

Budget

\$1,406,809

Spend to Date

\$26,526,874

Remaining

Key Milestones	Status	Start	Finish
Study	Complete	07/09/19	06/25/20
Outreach Pre-Design	Complete	06/26/20	07/16/20
Planning	Complete	07/26/19	12/03/21
Design	In Progress	07/10/19	01/10/25
Procurement (Sewer Lift Station & Force Main)	Complete	08/09/24	11/28/24
Public Outreach Ground Breaking Ceremony (Sewer Lift Station & Force Main)	Complete	10/29/24	10/29/24
Construction (Sewer Lift Station & Force Main)	In Progress	12/13/24	12/25/25
Permitting (Non-Sewer Scope)	Not Started	01/10/25	06/10/25
Plan revisions	In Progress	01/13/25	06/27/25
Outreach Planning	Not Started	01/13/25	01/30/25
Bidding Assistance (Non-Sewer Scope)	Not Started	03/14/25	07/03/25
Outreach Pre-Construction	Not Started	07/04/25	07/04/25
Construction (Building and Park Amenities)	Not Started	07/04/25	09/15/26
Closeout	Not Started	09/16/26	10/05/26

### What to Expect

Neal Park will be closed effective 12/09/24 for duration of project.

Temporary Road Closures:

- Between 152 Terr-153Terr (Along NE 14 Ct)
- Between 152 Terr-153Terr (Along NE 15 Ct)
- Between NE14 Ct - NE 15 Ct (Along 152 Terr)

Permanent Road Closures:

- Between NE14 Ct - NE 15 Ct (Along NE 153rd Terr)



**City Manager's Report  
16.5.**

City of North Miami Beach  
17011 NE 19 Avenue  
North Miami Beach, FL 33162  
305-947-7581  
www.citynmb.com

**MEMORANDUM**

---

<b>TO:</b>	Mayor and City Commission
<b>FROM:</b>	
<b>VIA:</b>	
<b>DATE:</b>	January 21, 2025

---

**RE:** Capital Improvement Program (CIP) Portfolio Dashboard

---

**Description**

**BACKGROUND**

**ANALYSIS:**

**RECOMMENDATION:**

**FISCAL/ BUDGETARY**

**IMPACT:**

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**ATTACHMENTS:**

Description

- ▣ CIP Portfolio Dashboard

Note: \*Excludes CIP Projects/Assets managed by NMB Water/Sewer



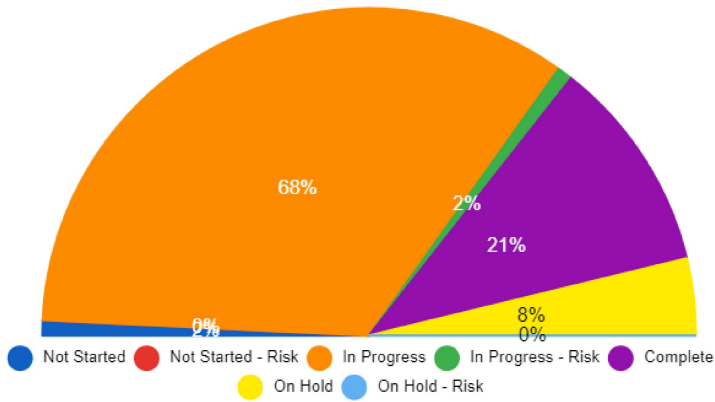
**Links**

- [CIP Project Request Form](#)
- [Active Projects Report](#)
- [Project Managers Report](#)
- [Construction Quarters Report](#)

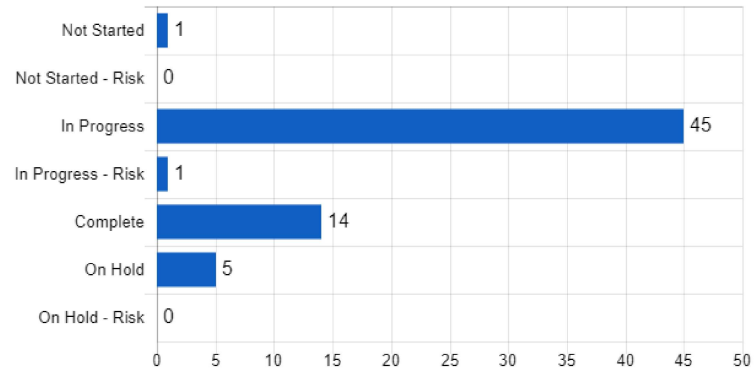
## Capital Improvement Program Portfolio Dashboard

### CIP - Projects Portfolio

Percent of Projects by Status

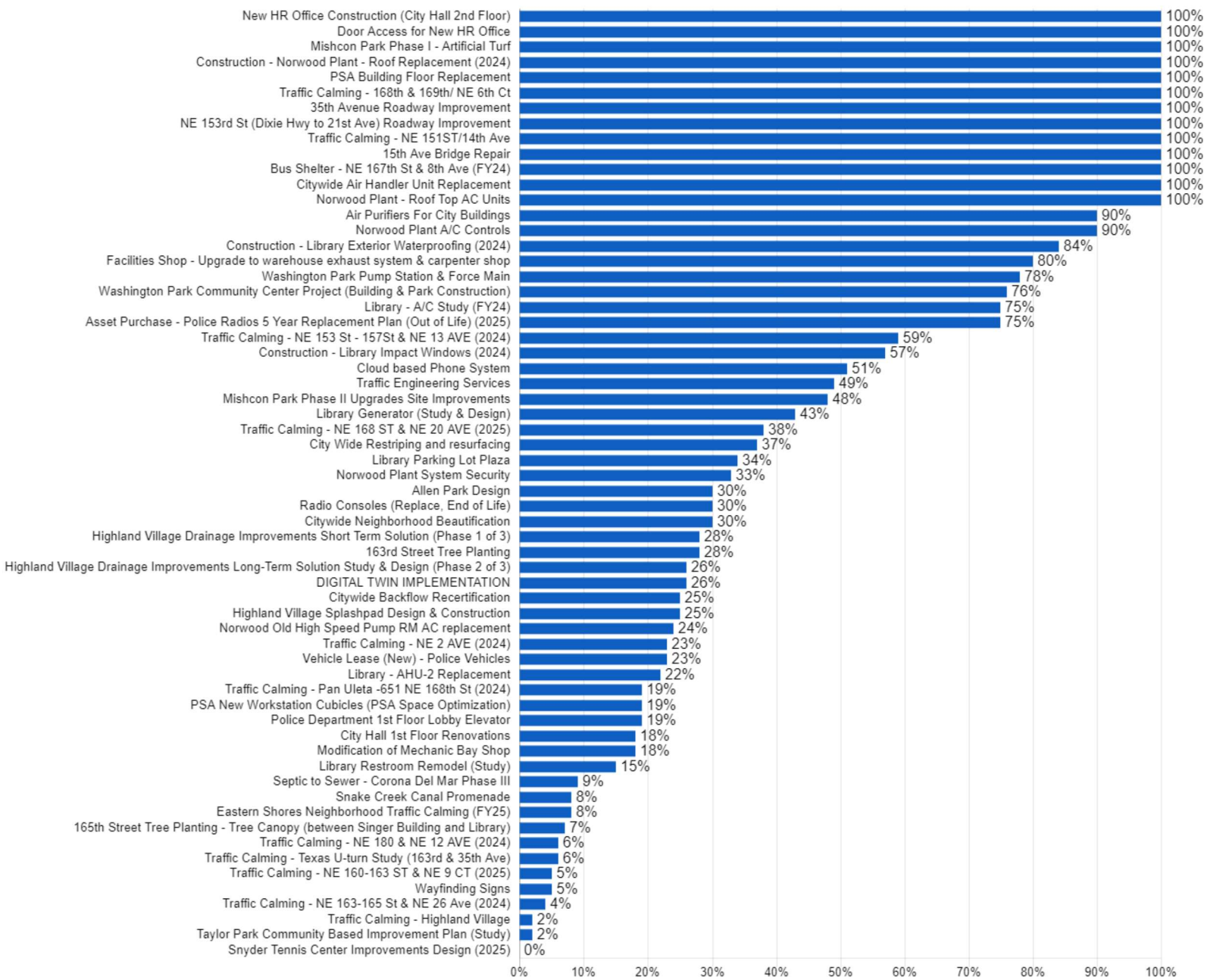


Count of Projects by Status



### Overall Project Progress (% Complete)

Project Percent Complete



### CIP - Projects Portfolio

Project Name	Project Location	Project Description/Scope	Weekly Updates/Comments	Status	Actual Start	Actual End	% Complete	Amount (Funded)	Project Dashboard
<b>58</b>								<b>\$52,165,990</b>	
<b>Current Phase</b>				<b>Count</b>				<b>Sum</b>	
<b>1. Not Started</b>				<b>1</b>				<b>\$180,000</b>	
Snyder Tennis Center Improvements Design (2025)	16851 West Dixie Hwy	Community charrette to get vision for Tennis Center and Park, and do design drawings.	Project cost estimated \$350k;CRA funding \$180k, project cost \$350, possible P3 project (change in scope). Some work assumed through private partnership. Project At Risk due to funding	Not Started	10/01/24	09/30/25	0%	\$180,000	<a href="#">Snyder Tennis Center Improvement - Project Toolkit</a>
<b>Current Phase</b>				<b>Count</b>				<b>Sum</b>	
<b>2. Study</b>				<b>10</b>				<b>\$3,035,000</b>	
Library - A/C Study (FY24)	Library Annex - 1601 NE 164th Street	A/C Distribution Study for the Library. Analysis of library and use of the library. Recommendation will include a/c system set-up needed to efficiency cool building	Study is ongoing. Findings have been reviewed by staff and returned to consultant for modifications.	In Progress	07/01/24	03/03/25	75%	\$25,000	<a href="#">Library - A/C Study (FY24) - Project Toolkit</a>
Construction - Library Impact Windows (2024)	1601 NE 164 St	Revitalization and renovation of Laffe Allen Library	A proposal for the work has been obtained and approved. Staff is in the process of obtaining a schedule from the contractor for the proposed work.	In Progress	10/01/24	09/30/25	57%	\$330,000	<a href="#">Construction - Library Impact Wi - Project Toolkit</a>
Library Generator (Study & Design)	1601 NE 164 St	Design and installation of Generator for Emergency power	Survey proposal was received for an additional scope of work. The P.O for this additional work has been approved and printed. Study/ design is ongoing.	In Progress	10/07/24	02/13/26	43%	\$160,000	<a href="#">Library Generator (Study &amp; Design - Project Toolkit</a>
163rd Street Tree Planting	163rd Street between 12th Ave and W	plant trees on 163rd. Not resolved yet	Received approval from CRA Board. Currently working on survey. Requested Survey from potential vendor. Proposal	In Progress	10/01/24	09/30/25	28%	\$350,000	<a href="#">163rd Street Tree Planting - Project Toolkit</a>



	Ave. and vv. Dixie Highway.		Survey from potential vendor. Proposal review and discussion is scheduled for 01/16/25.							
Citywide Backflow Recertification		Citywide Backflow Certification	Currently obtaining quotes for review and approval.	In Progress	10/01/24	09/30/25	25%	\$20,000	<a href="#">Citywide Backflow Recertification - Project Toolkit</a>	
Library - AHU-2 Replacement	1601 NE 164 St	Revitalization and renovation of Laffe Allen Library	Awaiting completed study from engineers. This will include feedback for air distribution. Project may require duct work. FY25 study and design, FY25-26 design and installation. FY25 approved \$200k may not suffice for installation pending results of engineers' feedback and recommendation	In Progress	09/02/24	05/01/26	22%	\$200,000	<a href="#">Library - AHU-2 Replacement - Project Toolkit</a>	
Snake Creek Canal Promenade	Snake Creek Canal between 15th and FEC Right of Way	Design feasible program improvements for Snake Creek Canal Promenade.	Project to be brought to CRA Committee in January. Traffic engineering and preliminary visibility study needed.	In Progress	10/01/24	08/31/26	8%	\$300,000	<a href="#">Snake Creek Canal Promenade - Project Toolkit</a>	
Eastern Shores Neighborhood Traffic Calming (FY25)	Eastern Shores	Design of raised intersection 35th ave and design of speed humps	Project String received from Finance 10/24/24. Proposal has been received from Engineering Company. Requisition to go to commission for approval in February's commission meeting.	In Progress	10/01/24	03/10/26	8%	\$700,000	<a href="#">Eastern Shores Neighborhood Traf - Project Toolkit</a>	
Traffic Calming - Texas U-turn Study (163rd & 35th Ave)	163rd St/35 Ave	Texas U-turn that provides for westbound NE 163rd Street traffic to make a right turn into the property prior to reaching NE 35th Avenue. Eastbound traffic will continue to enter the property from a left turn onto NE 35th Avenue.	Study has been approved by City Commission for FY25. Requisition to go before commission in February for approval.	In Progress	10/01/24	10/06/26	6%	\$700,000	<a href="#">Traffic Calming - Texas U-turn S - Project Toolkit</a>	
Taylor Park Community Based Improvement Plan (Study)	Taylor Park	Create a community-approved plan to rebuild Taylor Park.	Site is under environmental remediation. CRA has approved \$250k for study and design. Waiting on environmental.	On Hold	10/17/24	09/30/25	2%	\$250,000	<a href="#">Taylor Park Community Based Imp - Project Toolkit</a>	
Current Phase <b>3. Planning</b>				Count <b>13</b>	Sum <b>\$3,126,915</b>					

Facilities Shop - Upgrade to warehouse exhaust system & carpenter shop	Operations Center	Upgrade fleet exhaust system & carpenter shop	Project String received, estimated completed May 2025. Mobilization for construction has begun.	In Progress	10/01/24	05/30/25	80%	\$20,000	<a href="#">Facilities Shop - Upgrade to warehouse exhaust system &amp; carpenter shop - Project Toolkit</a>	
Kevin R. Sims Aquatic Center at Victory Park Lighting Upgrade to LED			Going to commission in January. Proposed start in February 2025. 30 days for completion.	In Progress	10/14/24	09/30/25	55%	\$125,000	<a href="#">Kevin R. Sims Aquatic Center at - Project Toolkit</a>	
Traffic Engineering Services		Traffic Engineering Services	Project ongoing.	In Progress	10/01/24	10/08/25	49%	\$0	<a href="#">Traffic Engineering Services - Project Toolkit</a>	
City Wide Restriping and resurfacing		Milling, resurfacing and restriping of streets that are presently in a poor state of repair/ poor condition.	Work has commenced. Work to date has been at the following locations: (NE 181st Street Between 19th Ave & 21st Ave), (NE 182nd Street between 20th Ave & 21st Ave), (NE 18th Ave Between 182nd & 183rd Street) and (Right of Way Parking Area along NE 169th, 170th, 171st Street between 14th and 15th Ave).	In Progress	10/01/24	09/30/25	37%	\$373,200	<a href="#">City Wide Restriping and resurfacing - Project Toolkit</a>	
Allen Park Design		Allen Park Design	Received project string from Finance 10/24/24. Floor plan layout options are being reviewed by the City's Upper Management. Pending approved of design.	In Progress	10/01/24	09/30/25	30%	\$40,000	<a href="#">Allen Park Design - Project Toolkit</a>	
Citywide Neighborhood Beautification	163rd St + Hansford Blvd	Beautification of 163rd St & major corridors (trees, landscaping, irrigation, corridor sidewalks) 163rd street wall	Proposals/Quote requests submitted. Reviewing of proposal and scope of work will be done on 01/16/25	In Progress	10/01/24	12/30/25	30%	\$500,000	<a href="#">Citywide Neighborhood Beautification - Project Toolkit</a>	
DIGITAL TWIN IMPLEMENTATION	Norwood	DIGITAL TWIN IMPLEMENTATION, IBM, IGNITION/SCADA, TELESCOPIC HANDLER (REPLACES FORKLIFT & BOBCAT) BOBCAT (REPLACEMENT SIDEBYSIDE UTV) HUDSON PUMP (CHEMICAL/SLAKER REPLACEMENT PUMP)	Project is currently in the planning stage.	In Progress	11/06/24	12/31/25	26%	\$755,500	<a href="#">DIGITAL TWIN IMPLEMENTATION - Project Toolkit</a>	
Highland Village Splashpad Design & Construction		Increase recreational facilities for community children	Proposals have been obtained for the construction of the splashpad facility and are being reviewed by staff. An additional component to the design phase has been included to cover drainage/ stormwater management of the park grounds. A P.O has been processed.	In Progress	12/02/24	07/13/26	25%	\$323,215	<a href="#">Highland Village Splashpad Design - Project Toolkit</a>	
Norwood Old High Speed Pump RM AC replacement	Norwood 19150 NW 8th Ave	The existing Units are over 15 years old and non repairable. The equipment that is cooled by the units are vital to the operation of the water plant production. Equipment Replacement	Quote received (~\$135k), Project String Needed	In Progress	10/01/24	09/12/25	24%	\$160,000	<a href="#">Norwood Old High Speed Pump RM AC - Project Toolkit</a>	
McDonald Center Room Divider Replacement & Sound System Upgrade			In planning stage. Getting quotes. Planned start by Quarter 3. Will need to go to commission. 3 months for construction	In Progress	10/01/24	09/30/25	21%	\$220,000	<a href="#">McDonald Center Room Divider Rep - Project Toolkit</a>	
PSA New Workstation Cubicles (PSA Space Optimization)	17050 ne 19th Ave	PSA Building Reconfiguration	Planning ongoing. Proposed floor plan layout and proposals received and are being reviewed by staff.	In Progress	10/01/24	06/16/26	19%	\$220,000	<a href="#">PSA Building Reconfiguration - Project Toolkit</a>	
Police Department 1st Floor Lobby Elevator	Police - 16901 NE 19th Avenue	Upgrade to Mechanics and Cab	Waiting on updated quotes. Planning and expected to start in Mid-January	In Progress	01/31/25	09/30/25	19%	\$150,000	<a href="#">Police Department 1st Floor Lobby - Project Toolkit</a>	
Modification of Mechanic Bay Shop		Modification of Fleet Mechanic Bay Shop	In planning stage	In Progress	10/01/24	09/30/25	18%	\$15,000	<a href="#">Modification of Mechanic Bay Shop - Project Toolkit</a>	
Library Restroom Remodel (Study)	16901 NE 19TH AVE	Upgrade restroom to family/ADA restroom. Gain access through exterior of building	Scope of work has been defined. Staff are reviewing architect's proposal. This will be followed by the procurement process.	In Progress	02/17/25	09/30/25	15%	\$100,000	<a href="#">Library Restroom Remodel (Study) - Project Toolkit</a>	
Julius Littman Theater for the Performing Arts Lighting Equipment Replacement			Contacted vendor waiting on proposals	In Progress	10/18/24	09/30/25	12%	\$50,000	<a href="#">Julius Littman Theater for the P - Project Toolkit</a>	
Wayfinding Signs	throughout CRA	Create a wayfinding sign program, and install signage as needed.	CRA funded FY25. Project on Hold. CRA Awaiting approved City Branding to move forward.	On Hold	10/01/24	09/30/25	5%	\$75,000	<a href="#">Wayfinding Signs - Project Toolkit</a>	
Current Phase <b>4. Design</b>				Count <b>16</b>	Sum <b>\$31,063,788</b>					

Washington Park Community Center Project (Building & Park Construction)	15280 NE 15 CT.	Design and construction of community complex to include new covered basketball courts, multi purpose field, aquatic attractions and new recreation center	Phase 1 • Construction of the staging area is completed. • Pipe materials have been purchased and are expected onsite at the end of January to the first week in February. • The pump shop-drawings package is being reviewed by the city's consultant, Hazen and Sawyer, for approval. This will be completed within the next • Site excavation and laying of pipes are scheduled to begin by the 2nd week of February. Phase 2 • A courtesy plan review has commenced with the City's Building Department from the week of 12/23/2024 • Existing trees, within the right of way, were removed as per plans by City staff on 11/14, 2024	In Progress	07/09/19	10/13/26	76%	\$27,933,683	<a href="#">Washington Park Community Center - Project Toolkit</a>
Traffic Calming - NE 153 St - 157 St & NE 13 AVE (2024)	NE 13 Ave Traffic Calming	Raised intersections at NE 153 St, NE 155 St & 157 St (Install 25 MPH Speed Signs), not funded so can't start design; Design Funded in FY24. Construction FY25  CMA submitted proposal for design 11/9/2022, CMA awaiting p.o. to proceed with design	Project approved FY25. Received project string 10/24/24. Awaiting updated proposal from CMA. Construction FY25-26	In Progress	08/01/22	04/09/26	59%	\$908,500	<a href="#">Traffic Calming - NE 153 St - 157 St - Project Toolkit</a>
Mishcon Park Phase II Upgrades Site Improvements	Mishcon Park	Upgrade to restrooms, concession, dugouts and other amenities	Work has started. Obtaining quotes for a new score board	On Hold	10/18/24	10/31/25	48%	\$95,000	<a href="#">Mishcon Park Phase II Upgrades S - Project Toolkit</a>
Traffic Calming - NE 168 ST & NE 20 AVE (2025)	NE 168 Street & NE 20 Avenue Roundabout	Mini Roundabout Installation intersection of NE 168th St/20 Ave	Presently going through permitting with the county.	In Progress	01/01/24	11/21/25	38%	\$250,000	<a href="#">Traffic Calming - NE 168 ST &amp; NE 20 AVE - Project Toolkit</a>

Library Parking Lot Plaza	Amphitheater parking lot	Install public artwork in Amphitheater parking lot next to library, ADA improvement, Sprinkler/Electrical improvement	CRA confirmed this project is budgeted for FY25. Already in design (90%).	In Progress	10/01/24	09/30/25	34%	\$200,000	<a href="#">Library Parking Lot Plaza - Project Toolkit</a>
Norwood Plant System Security		Norwood Plant System Security	Plans are being designed. There has been an increase in the scope that has triggered the need for an updated proposal. Awaiting the updated proposal.	In Progress	11/06/24	12/30/25	33%	\$187,890	<a href="#">Norwood Plant System Security - Project Toolkit</a>
Highland Village Drainage Improvements Short Term Solution (Phase 1 of 3)	Highland Village	Phase I: Install backflow preventers and additional piping to the existing outfalls to mitigate flooding in the Highland Village Neighborhood. (Valves to allow water to flow to canal)	Not Funded FY25. Estimated Cost \$600k. Design of this Phase of the project is completed. The bidding process is in progress	On Hold	02/12/24	12/30/26	28%	\$0	<a href="#">Highland Village Drainage Improv - Project Toolkit</a>
Highland Village Drainage Improvements Long-Term Solution Study & Design (Phase 2 of 3)	Highland Village	Phase II: Study & Design of a long term sustainable solution for Highland Village (installing catch basins, pipes, etc) Studies under Environmental Review	Project not funded FY25, Estimated Cost \$1.2Mil (On Hold) Two design option proposals are being reviewed by the design consultants and staff. Next step involves a decision to be made on the best design option.	In Progress	04/01/24	03/31/27	26%		<a href="#">Highland Village Drainage Improv - Project Toolkit</a>
Traffic Calming - NE 2 AVE (2024)	NE 2 Ave Traffic Calming	-Recommendation was to install speed hump at segment between NE 169th St & NE 169th Terrace (completed \$5000 - no design required, need date that was done) -2nd recommendation was to raise intersection at NE 171 St/NE 2nd Ave (requires \$64k design but no money) -Design Funded FY24 (FY24 \$75K CITT & \$200k in FY25)  Yulet to send copy of study and CMA needs approval of traffic study to move forward. Then CMA will send proposal to design. FY25 estimate \$100k for design only (2 raised intersections). Construction FY26	Proposal received. Requisition to go before commission in January for approval. Project is for design in FY25, construction in FY26	In Progress	07/30/24	09/30/25	23%	\$70,000	<a href="#">Traffic Calming - NE 2 AVE (2024 - Project Toolkit</a>
Traffic Calming - Pan Uleta -651 NE 168th St (2024)	651 NE 168th Street	Install speed bumps mini circulator and curb eliminator and guard rails	Two traffic calming speed tables with related street signs have been installed to address speeding concerns. Updated proposal received and requisition to go before commission in January for approval. This updated proposal is for the design of additional traffic calming devices.	In Progress	08/01/23	05/29/26	19%	\$250,000	<a href="#">Traffic Calming - Pan Uleta -Project Toolkit</a>
City Hall 1st Floor Renovations	17011 NE 19th AVE	City Hall First Floor Renovations (Lobby Floors & Bathroom Upgrade)	Proposals have been received and accepted. Staff and contractor are in the process of going over the finishes to be used for the proposed work.	In Progress	10/15/24	01/30/26	18%	\$273,000	<a href="#">City Hall 1st Floor Renovations - Project Toolkit</a>
165th Street Tree Planting - Tree Canopy (between Singer Building and Library)	165th Street between 15th and 16th	Install trees for shade along park edge between Singer Building and Library.	Purchase Order is being processed.	In Progress	10/01/24	09/30/25	7%	\$250,000	<a href="#">165th Street Tree Planting - Tre - Project Toolkit</a>
Traffic Calming - NE 180 & NE 12 AVE (2024)	NE 180 St & NE 12 Ave Traffic Calming	Study results will determine design cost (Recommendation: speed bumps on 180th, and signage).  CMA sent proposal to design on 3/6/24. CMA awaiting P.O. to move forward. Design + Construction can be completed in FY25	Study complete 1/13/23, proposal to design received 3/6/24, requisition to go before commission in January for approval.	In Progress	11/11/22	12/31/25	6%	\$112,000	<a href="#">Traffic Calming - NE 180 &amp; NE 12 - Project Toolkit</a>
Traffic Calming - NE 160-163 ST & NE 9 CT (2025)	NE 9 Ct Traffic Calming	Study results will determine design cost. Recommendation speed hum at the segments between ne 160th terrace & ne 163rd st, also recommend a crosswalk at the intersection of NE 160th Terrace with NE 9th Court. Only adding crosswalks and speedbumps. Unfunded FY24  Study recommendation results speed humps, signage, new crosswalk. CMA is pending to submit a fee proposal for design.	Study received 2/26/23, scope crosswalks and speedbumps. Project String received 10/24/24, awaiting CMA fee proposal. Project is for design in FY25, construction in FY26	In Progress	12/26/22	12/31/26	5%	\$104,040	<a href="#">Traffic Calming - NE 160-163 ST - Project Toolkit</a>
Traffic Calming - NE 163-165 St & NE 26 Ave (2024)	NE 163-165St & NE 26th Ave	Location NE 26th Ave, Eastern Shores, Traffic Calming Project. This project includes the installation of 1) a high visibility high raised mid-block crosswalk near the NE 26th Ave. and NE 165th Street intersection, 2) electronic speed feedback signs (ESFS) north of NE 165th St and north of NE 163rd Streets and 3) sidewalk along the west side of the section of 26th Ave from 165th Street to 163rd Street.  CMA submitted a fee proposal to design on 03/6/2024. CMA awaiting P.O. Design + construction can complete in FY25	Study received 1/13/23. Requisition submitted to proceed Design and Construction. Requisition to go before commission in January for approval. Project is for design in FY25. Project can complete in FY25	In Progress	11/11/22	09/30/25	4%	\$179,675	<a href="#">Traffic Calming - NE 163-165 St - Project Toolkit</a>
Traffic Calming - Highland Village	Highland Village	Master plan to convert streets to one way network, with bike lanes on both sides. Awaiting Drainage work to be complete prior to moving forward. Awaiting proposal for design from CMA	Striping Completed. Project on Hold waiting Drainage work to be complete prior to moving forward. Awaiting proposal for design from CMA. ETA for completion FY27	On Hold	12/01/22	12/31/27	2%	\$250,000	<a href="#">Traffic Calming - Highland Villa - Project Toolkit</a>
Current Phase <b>7. Construction</b>			Count <b>4</b>				Sum <b>\$8,159,836</b>		
Air Purifiers For City Buildings		Safety and Health, remove impurities from air. Covid initiative	Project ongoing, expected close out 03/2025	In Progress	10/07/24	03/31/25	90%	\$102,131	<a href="#">Air Purifiers For City Buildings - Project Toolkit</a>
Construction - Library Exterior Waterproofing (2024)	1601 NE 164 St	Revitalization and renovation of Laffe Allen Library	Substantial completion has been reached. Final walk-thru and closeout are pending	In Progress	02/14/24	12/19/24	84%	\$114,752	<a href="#">Construction - Library Exterior - Project Toolkit</a>
Washington Park Pump Station & Force Main	Washinton Park	Pump Station and force main	- The plans were submitted to DERM on 10/09/24, awaiting approval -Meeting held with FPL 10/23/24, discuss 3 phase power to project site. Detailed drawings were submitted to FP&L on 10/25/24. Awaiting reply from FPL. -Bids were over 1.9 million above the budgeted amount. Procurement is working on Phase 1 Notice of Contract commencement (NCC) to issue for 30-45 days and the execution of the contract. These are expected to be completed during the week of 11/4/24. During NCC, the POs or Notice of Intent is issued. This may adjust based on Permit approval requirements. NTP will be issued on or before 45 days after NCC issuance. During NCC, the POs or Notice of Intent is issued. NMB Water & PWD are working with Finance to ensure the accounts are sufficiently funded to process the requisitions for 1st Phase.	In Progress	07/06/23	11/28/25	78%	\$6,492,953	<a href="#">Washington Park Pump Station &amp; F - Project Toolkit</a>
Septic to Sewer - Corona Del Mar Phase III	Between 17th Ave and West Dixie Hwy on 163rd	connect all business on Low Pressure Main on 163 to sewer and abandon septic.	Funded by CRA. Funds transferred, project is ongoing.	In Progress	08/01/24	09/30/25	9%	\$1,450,000	<a href="#">Septic to Sewer - Corona Del Mar - Project Toolkit</a>
Current Phase <b>8. Closeout</b>			Count <b>1</b>				Sum <b>\$109,808</b>		
Norwood Plant A/C Controls	Norwood Water Plant	Air Conditioning Controls Upgrade to integrate Web Controlled System	Project completed, in closeout phase	In Progress	10/16/24	09/30/25	90%	\$109,808	<a href="#">Norwood Plant A/C Controls - Project Toolkit</a>
Current Phase <b>9. Completed</b>			Count <b>13</b>				Sum <b>\$6,490,643</b>		
New HR Office Construction (City	17011 NE 19th AVE	Facility Renovation (Human Resources)	Project Complete	Complete	10/01/23	05/31/24	100%	\$616,144	<a href="#">New HR Office Construction (City -</a>



Hall 2nd Floor)										<a href="#">Project Toolkit</a>
Door Access for New HR Office	17011 NE 19th AVE	Facility Renovation (Human Resources)	The installation of the card reader system in completed. The vendor is scheduling the testing of the system and final inspections with the County and City to close out the opened permits. This process should take about a week to complete.	Complete	04/17/24	10/25/24	100%	\$7,000		<a href="#">Door Access for New HR Office - Project Toolkit</a>
Mishcon Park Phase I - Artificial Turf	16601 NE 15th Ave	This phase of the project will include the removal of contaminated soil, site remediation and the installation of artificial turf. the completed field will accommodate baseball football and soccer.	Installation of Turf completed	Complete	09/05/23	06/04/24	100%	\$2,608,314		<a href="#">Mishcon Park Phase I - Artificial Turf - Project Toolkit</a>
Construction - Norwood Plant - Roof Replacement (2024)	Norwood Water Plant, 19150 NW 8th Ave	Replace Roof @ Norwood Plant	Project Complete	Complete	02/22/23	06/23/23	100%	\$552,265		<a href="#">Construction - Norwood Plant - R - Project Toolkit</a>
PSA Building Floor Replacement	PSA Building, 17011 NE 19th Ave, NMB, FL	Replacement of PSA carpet in offices & common spaces	Final inspections walkthrough week of 9/9/24 and IT workstation set-up. Project to schedule	Complete	07/01/24	09/13/24	100%	\$190,000		<a href="#">PSA Building Floor Replacement - Project Toolkit</a>
Traffic Calming - 168th & 169th/ NE 6th Ct	168 & 169/NE 6 Ct-8th Ave	Installation of Speed Humps (traffic calming measure)	Project Complete	Complete	01/01/24	03/29/24	100%	\$17,479		<a href="#">Traffic Calming - 168th &amp; 169th/ - Project Toolkit</a>
35th Avenue Roadway Improvement	35th Ave/Eastern Shores	Roadway and Sidewalk Improvements (Road Striping/Resurfacing, Street Signs, Drainage, Sidewalk restoration and landscaping)	Project Complete	Complete	06/08/23	03/29/24	100%	\$1,243,391		<a href="#">35th Avenue Roadway Improvement - Project Toolkit</a>
NE 153rd St (Dixie Hwy to 21st Ave) Roadway Improvement	NE 153rd between Dixie Hwy & 21st Ave	Roadway and Sidewalk Improvements (Road Striping/Resurfacing, Street Signs, Drainage, Sidewalk restoration and landscaping)	Project Complete	Complete	11/01/23	06/12/24	100%	\$653,904		<a href="#">NE 153rd St (Dixie Hwy to 21st Ave) - Project Toolkit</a>
Traffic Calming - NE 151ST/14th Ave	NE 151st & 14th Ave	Installation of traffic circle (Round-About)	Project Complete	Complete	05/31/22	10/11/23	100%	\$422,822		<a href="#">Traffic Calming - NE 151ST/14th - Project Toolkit</a>
15th Ave Bridge Repair	NE 15th Ave(between 171st & 170 St)	Bridge repair	Project Complete	Complete	03/05/24	06/05/24	100%	\$27,440		<a href="#">15th Ave Bridge Repair - Project Toolkit</a>
ADA ramps near 4-Way Intersection Stop at 171st NE 3ct	NE 171st ST & NE 3rd CT		Project completed 9/20/24	Complete	08/01/24	09/20/24	100%	\$14,950		<a href="#">ADA ramps near 4-Way Intersection - Project Toolkit</a>
Bus Shelter - NE 167th St & 8th Ave (FY24)	Near 167th Street and 8th Avenue	Bus Shelter that is needed for bus users within the City of NMB	Two bus shelters were installed near 167th street and 8th Avenue. This installation was done on the sidewalk that bounds with the 167th street west bound lane. The construction work on the project commenced on 8/26/24 and concluded on 9/9/24.	Complete	06/14/24	09/09/24	100%	\$23,474		<a href="#">Bus Shelter - NE 167th St &amp; 8th - Project Toolkit</a>
Citywide Air Handler Unit Replacement		Replacement of outdated and out of life AHU	Project completed	Complete	10/07/24	12/27/24	100%	\$15,000		<a href="#">Citywide Air Handler Unit Replac - Project Toolkit</a>
Norwood Plant - Roof Top AC Units	Norwood Water Plant	Procurement and installation of two 17.5 ton and one 4 Ton Packaged Units.	Project complete	Complete	02/14/24	05/15/24	100%	\$98,460		<a href="#">Norwood Plant - Roof Top AC Unit - Project Toolkit</a>

#### CIP Asset Purchases

Project Name	Project Location	Project Description/Scope	Weekly Updates/Comments	Status	Actual Start	Actual End	% Complete	Amount (Funded)	Type of Project
<b>Total</b>		Count	<b>4</b>					Sum <b>\$1,450,300</b>	
<b>Status</b>		Count	<b>4</b>					Sum <b>\$1,450,300</b>	
<b>In Progress</b>									
Asset Purchase - Police Radios 5 Year Replacement Plan (Out of Life) (2025)	Police Department	Our current radio system is antiquated and are at the end of life. New radios have better technological features that are vital to officer's safety such as GPS, LTE capabilities that eliminate dead stops which is critical for Officer Safety. The new radios have the capabilities to receive missing persons and wanted person photos as well as flyers which contain information crucial to Officer Safety. Approx 160	Contract Signed, Radios are currently awaiting programming, ETA Feb 2025	In Progress	10/01/24	02/28/25	75%	\$433,300	Goods & Services (Furniture, Fixture, Equipment, Hardware, Software)
Cloud based Phone System	CITY HALL	CLOUD BASED PHONE SYSTEM	Went to commission in October 2024. Waiting for contract to be executed by legal. Start in December. 3-4 months to complete.	In Progress	10/01/24	09/30/25	51%	\$125,000	Goods & Services (Furniture, Fixture, Equipment, Hardware, Software)
Radio Consoles (Replace, End of Life)	CITY HALL	THE MAESTROS AND BASE STATIONS HAVE REACHED THEIR END OF LIFE AND EVENTUALLY WILL REQUIRE REPLACE FOR FULL OPERATIVE FUNCTIONS	Requisition has been approved. The procuring of the equipment is in progress and has a lead time of three months.	In Progress	10/01/24	09/30/25	30%	\$92,000	Goods & Services (Furniture, Fixture, Equipment, Hardware, Software)

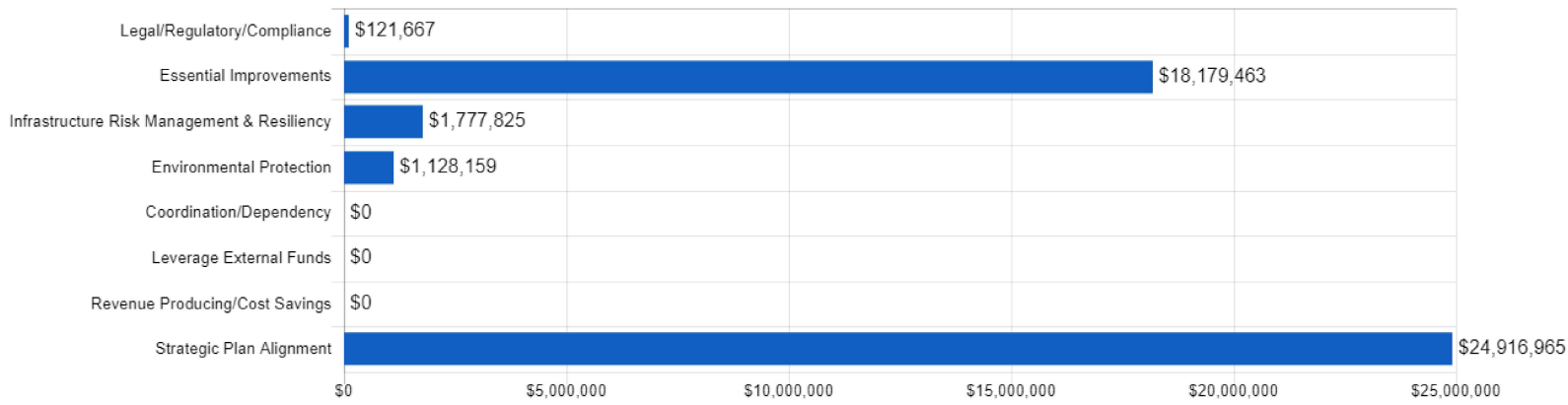
#### Construction Proj Only (Construction Est Schedule)

Project Name	Project Location	Project Description/Scope	Weekly Updates/Comments	Status	Actual Start	Actual End	% Complete	Amount (Funded)	Type of Project
<b>Total</b>		Count	<b>31</b>					Sum <b>\$42,014,847</b>	
<b>Construction (Quarter)</b>		Count	<b>7</b>					Sum <b>\$8,735,905</b>	
<b>Q1 (Oct-Dec)</b>									
Construction - Library Exterior Waterproofing (2024)	1601 NE 164 St	Revitalization and renovation of Laffe Allen Library	Substantial completion has been reached. Final walk-thru and closeout are pending	In Progress - F	02/14/24	12/19/24	84%	\$114,752	Construction - Build Improvements
Facilities Shop - Upgrade to warehouse exhaust system & carpenter shop	Operations Center	Upgrade fleet exhaust system & carpenter shop	Project String received, estimated completed May 2025. Mobilization for construction has begun.	In Progress	10/01/24	05/30/25	80%	\$20,000	Construction - Build Improvements
Washington Park Pump Station & Force Main	Washinton Park	Pump Station and force main	- The plans were submitted to DERM on 10/09/24, awaiting approval -Meeting held with FPL 10/23/24, discuss 3 phase power to project site. Detailed drawings were submitted to FP&L on 10/25/24. Awaiting reply from FPL. -Bids were over 1.9 million above the budgeted amount. Procurement is working on Phase 1 Notice of Contract commencement (NCC) to issue for 30-45 days and the execution of the contract. These are expected to be completed during the week of 11/4/24. During NCC, the POs or Notice of Intent is issued. This may adjust based on Permit approval requirements. NTP will be issued on or before 45 days after NCC issuance. During NCC, the POs or Notice of Intent is issued. NMB Water & PWD are working with Finance to ensure the accounts are sufficiently funded to process the requisitions for 1st Phase.	In Progress	07/06/23	11/28/25	78%	\$6,492,953	Construction/Infrast Projects Utility
Kevin R. Sims Aquatic Center at Victory Park Lighting Upgrade to LED			Going to commission in January. Proposed start in February 2025. 30 days for completion.	In Progress	10/14/24	09/30/25	55%	\$125,000	Construction - Non Building

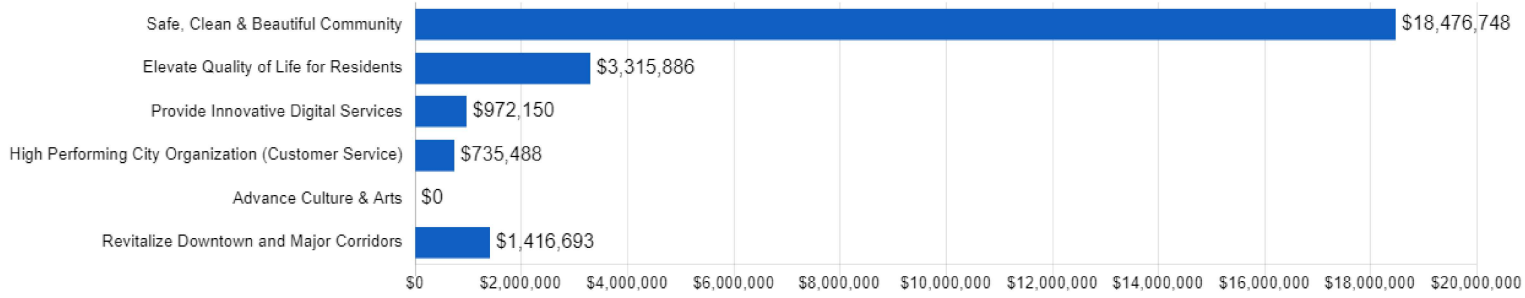
Traffic Engineering Services		Traffic Engineering Services	Project ongoing.	In Progress	10/01/24	10/08/25	49%	\$0	Construction/Infrast Projects Traffic Calr
City Wide Restriping and resurfacing		Milling, resurfacing and restriping of streets that are presently in a poor state of repair/ poor condition.	Work has commenced. Work to date has been at the following locations: (NE 181st Street Between 19th Ave & 21st Ave), (NE 182nd Street between 20th Ave & 21st Ave), (NE 18th Ave Between 182nd & 183rd Street) and (Right of Way Parking Area along NE 169th, 170th, 171st Street between 14th and 15th Ave).	In Progress	10/01/24	09/30/25	37%	\$373,200	Restriping/Resurfac
Norwood Old High Speed Pump RM AC replacement	Norwood 19150 NW 8th Ave	The existing Units are over 15 years old and non repairable. The equipment that is cooled by the units are vital to the operation of the water plant production. Equipment Replacement	Quote received (~\$135k), Project String Needed	In Progress	10/01/24	09/12/25	24%	\$160,000	Construction - Build Improvements
Septic to Sewer - Corona Del Mar Phase III	Between 17th Ave and West Dixie Hwy on 163rd	connect all business on Low Pressure Main on 163 to sewer and abandon septics.	Funded by CRA. Funds transferred. project is ongoing.	In Progress	08/01/24	09/30/25	9%	\$1,450,000	Construction/Infrast Projects Utility
Construction (Quarter) <b>Q2 (Jan - Mar)</b>			Count <b>4</b>					Sum <b>\$1,032,131</b>	
Air Purifiers For City Buildings		Safety and Health, remove impurities from air. Covid initiative	Project ongoing, expected close out 03/2025	In Progress	10/07/24	03/31/25	90%	\$102,131	Construction - Build Improvements
Construction - Library Impact Windows (2024)	1601 NE 164 St	Revitalization and renovation of Laffe Allen Library	A proposal for the work has been obtained and approved. Staff is in the process of obtaining a schedule from the contractor for the proposed work.	In Progress	10/01/24	09/30/25	57%	\$330,000	Construction - Build Improvements
163rd Street Tree Planting	163rd Street between 12th Ave. and W. Dixie Highway.	plant trees on 163rd. Not resolved yet	Received approval from CRA Board. Currently working on survey. Requested Survey from potential vendor. Proposal review and discussion is scheduled for 01/16/25.	In Progress	10/01/24	09/30/25	28%	\$350,000	Landscaping
165th Street Tree Planting - Tree Canopy (between Singer Building and Library)	165th Street between 15th and 16th	Install trees for shade along park edge between Singer Building and Library.	Purchase Order is being processed.	In Progress	10/01/24	09/30/25	7%	\$250,000	Landscaping
Construction (Quarter) <b>Q3 (Apr - Jun)</b>			Count <b>9</b>					Sum <b>\$29,464,381</b>	
Norwood Plant A/C Controls	Norwood Water Plant	Air Conditioning Controls Upgrade to integrate Web Controlled System	Project completed, in closeout phase	In Progress	10/16/24	09/30/25	90%	\$109,808	Goods & Services (Furniture, Fixture, Equipment, Hardwa Software)
Washington Park Community Center Project (Building & Park Construction)	15280 NE 15 CT.	Design and construction of community complex to include new covered basketball courts, multi purpose field, aquatic attractions and new recreation center	Phase 1 • Construction of the staging area is completed. • Pipe materials have been purchased and are expected onsite at the end of January to the first week in February. • The pump shop-drawings package is being reviewed by the city's consultant, Hazen and Sawyer, for approval. This will be completed within the next • Site excavation and laying of pipes are scheduled to begin by the 2nd week of February. Phase 2 • A curtesy plan review has commenced with the City's Building Department from the week of 12/23/2024 • Existing trees, within the right of way, were removed as per plans by City staff on 11/14, 2024	In Progress	07/09/19	10/13/26	76%	\$27,933,683	Construction - New Building
Library Parking Lot Plaza	Amphitheater parking lot	Install public artwork in Amphitheater parking lot next to library, ADA improvement, Sprinkler/Electrical improvement	CRA confirmed this project is budgeted for FY25. Already in design (90%).	In Progress	10/01/24	09/30/25	34%	\$200,000	Construction - Build Improvements
Norwood Plant System Security		Norwood Plant System Security	Plans are being designed. There has been an increase in the scope that has triggered the need for an updated proposal. Awaiting the updated proposal.	In Progress	11/06/24	12/30/25	33%	\$187,890	Construction - Build Improvements
Citywide Backflow Recertification		Citywide Backflow Certification	Currently obtaining quotes for review and approval.	In Progress	10/01/24	09/30/25	25%	\$20,000	Goods & Services (Furniture, Fixture, Equipment, Hardwa Software)
Traffic Calming - NE 2 AVE (2024)	NE 2 Ave Traffic Calming	-Recommendation was to install speed hump at segment between NE 169th St & NE 169th Terrace (completed \$5000 - no design required, need date that was done) -2nd recommendation was to raise intersection at NE 171 St/NE 2nd Ave (requires \$64k design but no money) -Design Funded FY24 (FY24 \$75K CITT & \$200k in FY25)  Yulet to send copy of study and CMA needs approval of traffic study to move forward. Then CMA will send proposal to design. FY25 estimate \$100k for design only (2 raised intersections). Construction FY26	Proposal received. Requisition to go before commission in January for approval. Project is for design in FY25, construction in FY26	In Progress	07/30/24	09/30/25	23%	\$70,000	Construction/Infrast Projects Traffic Calr
McDonald Center Room Divider Replacement & Sound System Upgrade			In planning stage. Getting quotes. Planned start by Quarter 3. Will need to go to commission. 3 months for construction	In Progress	10/01/24	09/30/25	21%	\$220,000	Construction - Build Improvements
Traffic Calming - Pan Uleta -651 NE 168th St (2024)	651 NE 168th Street	Install speed bumps mini circulator and curb eliminator and guard rails	Two traffic calming speed tables with related street signs have been installed to address speeding concerns. Updated proposal received and requisition to go before commission in January for approval. This updated proposal is for the design of additional traffic calming devices.	In Progress	08/01/23	05/29/26	19%	\$250,000	Construction/Infrast Projects Traffic Calr
Police Department 1st Floor Lobby Elevator	Police - 16901 NE 19th Avenue	Upgrade to Mechanics and Cab	Waiting on updated quotes. Planning and expected to start in Mid-January	In Progress	01/31/25	09/30/25	19%	\$150,000	Construction - Build Improvements
City Hall 1st Floor Renovations	17011 NE 19th AVE	City Hall First Floor Renovations (Lobby Floors & Bathroom Upgrade)	Proposals have been received and accepted. Staff and contractor are in the process of going over the finishes to be used for the proposed work.	In Progress	10/15/24	01/30/26	18%	\$273,000	Construction - Build Improvements
Julius Littman Theater for the Performing Arts Lighting Equipment Replacement			Contacted vendor waiting on proposals	In Progress	10/18/24	09/30/25	12%	\$50,000	Goods & Services (Furniture, Fixture, Equipment, Hardwa Software)
Construction (Quarter) <b>Q4 (Jul - Sept)</b>			Count <b>10</b>					Sum <b>\$2,459,215</b>	
Traffic Calming - NE 153 St - 157St & NE 13 AVE (2024)	NE 13 Ave Traffic Calming	Raised intersections at NE 153 St, NE 155 St & 157 St (Install 25 MPH Speed Signs), not funded so can't start design; Design Funded in FY24. Construction FY25  CMA submitted proposal for design 11/9/2022, CMA awaiting p.o. to proceed with design	Project approved FY25. Received project string 10/24/24. Awaiting updated proposal from CMA. Construction FY25-26	In Progress	08/01/22	04/09/26	59%	\$908,500	Construction/Infrast Projects Traffic Calr
Mishcon Park Phase II Upgrades Site Improvements	Mishcon Park	Upgrade to restrooms, concession, dugouts and other amenities	Work has started. Obtaining quotes for a new score board	On Hold	10/18/24	10/31/25	48%	\$95,000	Construction - Build Improvements
Traffic Calming - NE 168 ST & NE 20 AVE (2025)	NE 168 Street & NE 20 Avenue Roundabout	Mini Roundabout Installation intersection of NE 168th St/20 Ave	Presently going through permitting with the county.	In Progress	01/01/24	11/21/25	38%	\$250,000	Construction/Infrast Projects Traffic Calr
Citywide Neighborhood Beautification	163rd St + Hansford Blvd	Beautification of 163rd St & major corridors (trees, landscaping, irrigation, corridor sidewalks) 163rd street wall	Proposals/Quote requests submitted. Reviewing of proposal and scope of work will be done on 01/16/25	In Progress	10/01/24	12/30/25	30%	\$500,000	Landscaping
PSA New Workstation Cubicles (PSA Space Optimization)	17050 ne 19th Ave	PSA Building Reconfiguration	Planning ongoing. Proposed floor plan layout and proposals received and are being reviewed by staff.	In Progress	10/01/24	06/16/26	19%	\$220,000	Construction - Build Improvements

Modification of Mechanic Bay Shop		Modification of Fleet Mechanic Bay Shop	In planning stage	In Progress	10/01/24	09/30/25	18%	\$15,000	Construction - Build Improvements
Traffic Calming - NE 180 & NE 12 AVE (2024)	NE 180 St & NE 12 Ave Traffic Calming	Study results will determine design cost (Recommendation: speed bumps on 180th, and signage).  CMA sent proposal to design on 3/6/24. CMA awaiting P.O. to move forward. Design + Construction can be completed in FY25	Study complete 1/13/23, proposal to design received 3/6/24, requisition to go before commission in January for approval.	In Progress	11/11/22	12/31/25	6%	\$112,000	Construction/Infrast Projects Traffic Calr
Traffic Calming - NE 160-163 ST & NE 9 CT (2025)	NE 9 Ct Traffic Calming	Study results will determine design cost. Recommendation speed hum at the segments between ne 160th terrace & ne 163rd st, also recommend a crosswalk at the intersection of NE 160th Terrace with NE 9th Court. Only adding crosswalks and speedbumps. Unfunded FY24  Study recommendation results speed humps, signage, new crosswalk. CMA is pending to submit a fee proposal for design.	Study received 2/26/23, scope crosswalks and speedbumps. Project String received 10/24/24, awaiting CMA fee proposal. Project is for design in FY25, construction in FY26	In Progress	12/26/22	12/31/26	5%	\$104,040	Construction/Infrast Projects Traffic Calr
Wayfinding Signs	throughout CRA	Create a wayfinding sign program, and install signage as needed.	CRA funded FY25. Project on Hold. CRA Awaiting approved City Branding to move forward.	On Hold	10/01/24	09/30/25	5%	\$75,000	ROW Signage
Traffic Calming - NE 163-165St & NE 26 Ave (2024)	NE 163-165St & NE 26th Ave	Location NE 26th Ave. Eastern Shores, Traffic Calming Project. This project includes the installation of 1) a high visibility high raised mid-block crosswalk near the NE 26th Ave. and NE 165th Street intersection, 2) electronic speed feedback signs (ESFS) north of NE 165th St and north of NE 163rd Streets and 3) sidewalk along the west side of the section of 26th Ave from 165th Street to 163rd Street.  CMA submitted a fee proposal to design on 03/6/2024. CMA awaiting P.O. Design + construction can complete in FY25	Study received 1/13/23. Requisition submitted to proceed Design and Construction. Requisition to go before commission in January for approval. Project is for design in FY25. Project can complete in FY25	In Progress	11/11/22	09/30/25	4%	\$179,675	Construction/Infrast Projects Traffic Calr
Construction (Quarter) <b>Blank</b>								Count <b>1</b>	Sum <b>\$323,215</b>
Highland Village Splashpad Design & Construction		Increase recreational facilities for community children	Proposals have been obtained for the construction of the splashpad facility and are being reviewed by staff. An additional component to the design phase has been included to cover drainage/ stormwater management of the park grounds. A P.O has been processed.	In Progress	12/02/24	07/13/26	25%	\$323,215	Construction - Build Improvements

### City Strategic Plan Alignment



### Strategic Plan Alignment



### By Department

#### Allocated \$ by Department

