WATERWORKS ADVISORY COMMITTEE MEETING

Sydnor Hydro, Inc., 2111 Magnolia St, Richmond, Virginia 23223

Wednesday, October 16, 2019

8:30 AM – 1:30 PM

AGENDA

Subject	Time
Meet and Greet with Stakeholders	8:30 – 9:00 AM
Call to Order Meeting Overview Adoption of Minutes from the 07/31/2019 Meeting	9:00 – 9:10 AM
Public Comment Period	9:10 – 9:20 AM
ODW Updates:	9:20 – 9:55 AM
EPA Updates:	9:55 – 10:40 AM
Break	
Capacity Development Update	10:50 – 11:20 AM
Data Management, SDWIS	11:20 – 11:50 AM
Break / Working Lunch	
Fluoridation	12:00 – 12:45 PM
Waterworks Operation Fees	12:45 – 1:15 PM
Plan for Next Meeting, Adjourn	1:30 PM

Waterworks Advisory Committee (WAC) Meeting Summary

Sydnor Hydro, Inc., 2111 Magnolia St, Richmond, Virginia 23223
Wednesday, October 16, 2019

FINAL

Members Present: Geneva Hudgins, AWWA; Jesse L. Royall, Jr. PE, Sydnor; Andy Crocker, SERCAP; Ryan Greer (sub for Scott Kudlas), DEQ; Bailey Davis, DCLS; Skip Harper, DHCD; Mark Estes, VRWA; David F. Van Gelder, Water Operator; Ignatius Mutoti, VSPE; Steven Herzog, PE, VWEA

Guest in Attendance: Robert Edelman, Christine Latino, Nelson Daniel, Dan Horne, Jeff Wells, Jeremy Hull, Barry Matthews, Tony Singh, James Reynolds, Aaron Moses, Jeanette Bowman

Russ Navratil, AWWA; Tom Fauber, VA ABPA; Paul Nyffeler, Aqua Law PLC; Steven Edgeman, Fairfax Water; Katie Krueger, Hampton Roads Planning District; Laura Bauer, VA American Water Company; Jerry Peaks, Bowman Consulting; Vincent Day, Cardno, Inc; Chris Harbin, City of Norfolk; Paul Saunders, DPOR; Katrina Cooke, Air Water & Soil Labs; JP Verheul, Air Water & Soil Labs

Meeting Overview

Tony Singh, VDH Office of Drinking Water Deputy Director chaired the meeting.

Adoption of Minutes from July 31, 2019 Meeting

WAC members voted unanimously to approve and adopt the draft minutes from the July 31, 2019 meeting. ODW will post the minutes as final on Town Hall.

Public Comment Period

No public comments

ODW Updates

Guidance on Water Main Breaks and when to issue Boil Water Advisories

ODW staff posted the Guidance on Town Hall for a 30-day public comment period beginning September 30, 2019. It will become effective October 30, 2019. Copies of the guidance and Town Hall notice are included with the meeting materials.

Source Water Manual

The Source Water Manual is the first of 9 planned technical manuals. The technical manuals will compile ODW's Working Memos into manuals (The Source Water Manual replaces Working Memos 777, 840, 852, and 878). ODW staff posted the manual on Town Hall for a 30-day public comment period beginning September 30, 2019. It will become effective October 30, 2019. A Copy of the Town Hall notice is included with the meeting materials.

Waterworks Regulations

The Governor's Office completed their review of the Proposed Amendments to the Waterworks Regulations and approved them on October 15, 2019. VDH submitted the proposed amendments to the Registrar's Office for review and publication in the November 11, 2019 edition of the Virginia Register.

Publication will start the 60-day public comment period. Members of the public may submit comments through the Town Hall website beginning on November 11.

WIIN Grants
EPA is reviewing Virginia's work plan for the Lead Testing in Schools and Child Care Programs grant, provided under the Water Infrastructure Improvements for the Nation (WIIN) Act of 2016. Staff expect EPA to approve the work plan and provide funds to Virginia later this year. ODW is starting to get more information about the Small and Disadvantaged Communities Drinking Water Grant (WIIN Act amendments to section 1459A of the Safe Drinking Water Act).

FCAP
The new FCAP director is Kelly Ward. Her start date is November 10, 2019.

Richmond Field Office
Tony Singh explained that ODW leadership analyzed the current workload in each field office (number of waterworks, distance between field offices and waterworks, and the ratio of engineers/inspectors working with waterworks) to find ways to balance the workload more evenly between field offices. To provide more uniformity, ODW will begin the process of shifting responsibility for waterworks in some counties from one field office to another field office. The transition involves: 1) identifying stakeholders, 2) transferring data from one field office to another, 3) transitioning staff and resources, 4) communicating with stakeholders (waterworks, local health districts, other state agencies), 5) training staff as required, and 6) working to revise emergency preparedness plans.

WAC member's suggestions/comments/questions related to this transition: 1) please post information about which District Engineer is responsible for waterworks in each county, 2) consider emails for counties instead of individual persons (i.e., odw_caroline county@vdh.virginia.gov), 3) asked if PWSID numbers would change as waterworks move from one field office to another, 4) need to ensure uniformity across field offices, 5) suggested the time line for the transition from one field office to another be longer than 1 month, 6) location of the Richmond Field Office – benefits and costs to being located in downtown Richmond. (A copy of the staff presentation is included with the meeting materials.)

<u>EPA Updates:</u>

PFOA/PFAS
PFOA/PFAS is a family of manmade chemicals originating in the 1940's. This non-degradable family of chemicals is being linked to cancer and other health concerns and has been determined that it can easily get into the food chain through fish and crops. The EPA issued a Health Advisory in 2016 and a PFAS action plan in 2019. Dan Horne gave an overview of PFOA/PFAS in a Power point presentation, "PFAS 101". (A copy is included with the meeting materials.)

Lead and Copper Rule Revisions
The EPA has proposed several changes to the Lead and Copper Rule. Bob Edelman provided an overview of the proposed revisions with a PowerPoint presentation titled, "Lead and Copper Rule Long Term Revisions." He also shared a handout, "Reference Guide for Public Water Systems Lead and Copper Rule Proposal Comparison," to help understand the proposed changes. (The presentation and handout are included with the meeting materials.)

Proposed Perchlorate Rule
The EPA has proposed the Perchlorate Rule. Bob Edelman presented a PowerPoint presentation titled, "Perchlorate Briefing". A copy is included with the meeting materials, along with a letter to Mr. Samuel Hernandez at EPA, transmitting ODW's comments on the proposed rule.

Capacity Development
Barry Matthews updated the WAC Committee on changes and additions to the Division of Training, Capacity Development and Outreach.

Additions to the Division of Training, Capacity Development and Outreach:
- A Capacity Development Supervisor, Julie Floyd
- A new Sustainability Coordinator, Tamara Anderson
- A new TNC Coordinator (hiring in process)

Other updates:
- Jason Yetter is working on operator certification
- Content review of all VT/VDH trainings (planned)
- Sanitary Survey training has been initiated
- New Employee Orientation training twice yearly for all new hires
- Development of a Staff Training Policy and Procedures Manual
- All Staff Meeting to educate and promote moral

With the new training, ODW is working on better consistency throughout the central and field offices.

Barry and WAC members also discussed scheduling operator certification testing so that it is immediately after the Virginia Tech Short School.

Data Management
Aaron Moses discussed updates to Data Management at ODW. The WAC requested he provide an example report identifying sampling requirements at the next meeting. WAC members raised questions about data accuracy, notice, and sample schedules when ODW updates Drinking Water Watch (a website with information about waterworks). (The presentation is included with the meeting materials.)

Fluoridation
Jeanette Bowman discussed the fluoridation program briefly and provided an analysis of the JAMA Pediatrics article, "Association Between Maternal Fluoride Exposure during Pregnancy and IQ Scores in Offspring in Canada." (The article and presentation are included with the meeting materials.)

Waterworks Regulations and Fees
Nelson Daniel presented a Power point titled "Waterworks Operation Fees" to begin the discussion and consideration involving waterworks operation fees and how to adjust the fee structure to increase revenue and ensure fairness among all waterworks.

Things to consider:
- Maximum waterworks fees for large systems
- NTNCs and TNCs

- Wholesalers
- Maximum connection fees
- Technical assistance used per waterworks
- Funding sources and needs
- Financial challenges faced from year to year
- ODW new/increased expenses:
    - 6^{th} field office
    - salaries
    - drinking water database management/digitization

Stakeholders group should include:

- Large, medium and small community waterworks (Hanover County would like to participate)
- NTNCs - which includes churches and schools
- SERCAP
- TNCs (restaurant association?)

Consider – representative for wineries, breweries, and distilleries (TNCs)

Suggested meeting time:

- Assemble stakeholder group in November - December
- Meet beginning in January
- Finish report by May (to be able to meet the schedule for submitting proposals for the agency/governor’s legislative initiatives)

WAC moved and approved a statement to the Commissioner that the committee supports a forming a workgroup to study the fee regulations.

Conclusion

The WAC Committee will meet on Wednesday, December 11, 2019 for the final meeting of this calendar year.

WAC Meeting

October 16, 2019

Attachments and Power Point presentations

Waterworks Advisory Committee (WAC)
Meeting Summary
July 31, 2019
Final

Members Present: Dwayne Roadcap, ODW (chair); Roger Cronin, ACEC; Geneva Hudgins, AWWA, Jesse L. Royall, Jr. PE, Sydnor; Eric Lasalle, NTNC; Amanda Kelley, sub for Andy Crocker, SERCAP, Scott Kudlas, DEQ; Bailey Davis, DCLS; Skip Harper, DHCD

Guest in Attendance: Robert Edelman, Christine Latino, Jim Moore, Nelson Daniel, Dan Horne, Jeff Wells, Jeremy Hull, Jennifer Coleman, Tony Singh, James Reynolds

Russ Navratil, AWWA; Tom Fauber, VA ABPA; Paul Nyffeler, Aqua Law PLC; John Kingsbury, Fairfax Water; Katie Krueger, Hampton Roads Planning District; Jillian Terhune, City of Norfolk; Laura Bauer, VA American Water Company

Public Comment Period
No public comments

Adoption of Minutes from April 30, 2019 Meeting
WAC members voted unanimously to approve and adopt the draft minutes from the April 30, 2019 meeting. ODW will post the minutes as final on Town Hall.

ODW Updates
Staff
Jim Moore, Director of the Lexington Field Office, will be retiring after 43 years of service with the Department of Health. His last day in the office will be August 30th. ODW leadership will interview candidates for the Lexington field office director position this week.

Tony Singh joined ODW as the Deputy Office Director. Tony is a PE and recently completed his Masters of Public Health at UVA.

James Reynolds is the Field Director for ODW's 6th field office, which will be based in Richmond. James is in the process of filling three additional positions for the field office.

The Division of Technical Services is reviewing applications from candidates to fill open GIS and data analyst positions.

Steve Pellei left ODW's Financial and Construction Assistance Program to pursue an opportunity with another state agency. Keith Kornegay is the acting FCAP director.

Jason Yetter is the Operator Certification Coordinator in the Capacity Development and Training Division and Julie Floyd recently became the Field Working Supervisor for Capacity Development. The Division is also going through the process of reclassifying a position to create new role for a small system coordinator. The small system coordinator with focus on ways to help owners of non-community waterworks achieve and remain in compliance with the Waterworks Regulations.

Waterworks Regulations
The Secretary of Health and Human Services reviewed and approved the proposed amendments to the Waterworks Regulations on June 7. The proposed amendments are currently under review in Governor's Office. The WAC asked staff to provide updates on the status of the regulations as they go through the review process. Updates are posted on the Town Hall website and staff can send email to the WAC when there are updates.

PFOA/PFAS
Mr. Roadcap presented a letter from EPA Assistant Administrator David Ross to U.S. Senator Thomas Carper that says EPA intends to establish a maximum contaminant level for PFOA and PFAS. Dan Horne, SEVFO Director, provided information about PFOA and PFAS (letter and Powerpoint slides are attached).

Proposed Revisions to the Lead & Copper Rule
Although very little is known about the revisions to the lead and copper rule (which is undergoing review at the Office of Management and Budget), VDH anticipates there will be significant changes.

Proposed Perchlorate Rule
EPA is seeking comment on its proposed perchlorate rule. The public comment period is open until August 26. Tony is on a working group with ASDWA that expects to offer comments. EPA proposes an MCL of 56 ppb, but is seeking comment on higher, lower, and no action alternatives.

Paperless work units
Staff are currently working on ways to reduce the number of paper-based processes ODW uses to conduct day-to-day operations. One example is using tablets in the field during sanitary surveys, instead of printing and filling out a paper form in the field, then creating an electronic version of the sanitary survey form in the office following the inspection.

Guidance on Water Main Breaks and when to issue Boil Water Advisories
ODW staff revised the draft guidance on Main Break Types and Responses based on feedback from WAC members at the April 30, 2019 meeting. These include adding a statement that says the guidance is for waterworks with permanent chlorination equipment, removing CT requirements, and adding notes that clarify when to contact ODW.

After discussions, committee members recommended adding a statement in the Type 1 Break and Type 2 Break columns saying, "Return main to Service." The statement would go in the same block as "No Boil Water Advisory (BWA)."

ODW expects to post the guidance on the drinking water section of the VDH website with a frequently asked questions section. Jeff Wells to be the point of contact for any questions or concerns.

WIIN Grant
The goal of the WIIN grant is to reduce exposure to lead in drinking water at schools and child care programs. States can work toward this goal by using grant funds to test for lead in drinking water at schools and child care programs. EPA has allocated $737,000 to the state of Virginia to pay for testing and education. ODW will manage the grant with assistance from several other VDH offices and state agencies (Department of Education, Department of Social Services, Department of Consolidated Lab Services, VA Tech, UVA, ODU and VCU). Following EPA's guidelines, ODW created and submitted a draft work plan to EPA Region 3 staff for review and comment. The final work plan is due to EPA by August

22. This fall, ODW plans to establish a database through which interested schools and child care programs can submit requests for sampling. Eligible schools and child care programs will receive sample kits (paid for by the grant); they will be responsible for collecting samples and returning them to the laboratory that provided the kit for testing. The labs will analyze the samples and return results to the school/child care program and ODW. This is a voluntary program and ODW will prepare a report of its findings at the conclusion of the program.

Policy and Field Office Metrics

Metrics – see Powerpoint slides in the attachments.

Data Management

SDWIS Prime

Technical Services staff attended a conference in Atlanta. They discovered that the SDWIS Prime is on hold and under assessment. ODW will continue to use SDWIS state. ODW currently has a contractor working on a transition plan for moving data from its proprietary database programs into SDWIS to help with the eventual transition to SDWIS Prime.

CMDP (Compliance Monitoring Data Portal)

In estimating time efficiency, Technical Services has noticed that a large amount of time is being spent keying-in lab data. DCLS transmits monitoring results directly to ODW electronically. However, there are a number of labs that waterworks use to test water samples that provide results via paper reports or in a form that requires ODW staff to enter results in the database manually. Technical Services estimates staff spend 10-15 hours per week in each field office to input data. It is ODW’s goal to get the labs to transition from paper-based data to being able to communicate their information electronically. CMDP is a tool that labs can use for electronic data reporting. Staff are going to set up CMDP in a test environment and work with labs to start importing data on a trial basis.

Technical Services staff are also working with software developers (GEC) to find programs to replace other proprietary database applications that are outdated (or develop custom software), such as:

SWIMR	R&R Replacement software
SWIFT	Sanitary Survey software
SWEPT	Replaces project tracking logs
SWPBT	Billing Software
SWLabs	Lab views

Waterworks Operation Fees

See Powerpoint slides in the attachments.

There has been some discussion about moving annual waterworks operation fees from $2.95 to $3.00 for each customer account. The total fee due to ODW each year is based on the number of customer accounts multiplied by $2.95. If the number of accounts multiplied by $2.95 exceeds $160,000, the annual operation fee is capped at $160,000.

NTNC waterworks pay $90.00 per year and there is no charge for TNC’s. Wholesale waterworks do not pay the operation fee if they do not have any individual consumer accounts/connections.

Based on feedback from the WAC and ODW concerns about future funding, ODW proposes to form a stakeholder group to discuss the need for changes to the operation fees and ways to increase revenue.

Nelson Daniel will coordinate the stockholder group for ODW and provide an update on its status at the next WAC meeting.

Emergency Preparedness Website

Bryan Wade showed the WAC what information has been added to the ODW website.

See: http://www.vdh.virginia.gov/drinking-water/emergency-preparedness-and-security/

There is information there including:

- Emergency Preparedness and Response plans,
- Links to AWIA and EPA,
- AWWA resources,
- ODW's response plan,
- rip & run sheets,
- disaster, security and water works related information,
- IT Security,
- water Supply interruption information,
- EPA Links,
- CDC toolbox for drinking water advisories,
- Response Protocol,
- Boil Water FAQ's and templates (information is available in English and Spanish, additional languages will be added later),
- Water Infrastructure security, and
- Links to the Office of Environmental Services' website with information for private wells.

The self-reporting tool is being developed, but not available yet.

By-Laws

Staff presented revised draft by-laws for the WAC. (See attachments that follow.)

The WAC reviewed the draft and made the following suggestions:

Increase the number of ex officio members so that they include:

(1) Transient Non community (TNC) representative
(2) Community Waterworks owners – one from a large system, one from a small system
(1) Representative from the Virginia Chapter of the American Backflow Prevention Association
(1) Representative from the Fire Sprinkler Association
(1) Representative from the Virginia Plumbing and Mechanical Inspectors Association

Conduct meetings every other month (6 times per year) on Wednesdays.

Staff will make the suggested revisions to the draft bylaws.

Conclusion

ODW staff will poll members to confirm the next meeting dates in the fall and before the end of the year (October and December).

equipment that is installed and operating to respond to water main breaks and depressurization events. This guidance classifies certain water line breaks as not needing a boil water advisory, and recommends boil water advisories only in events likely to involve contamination intrusion. This will result in fewer boil water advisories and waterworks will have specific guidelines for when ODW recommends they issue a boil water advisory. Waterworks customers will receive fewer boil water advisories and, when there is an advisory, will be more likely to follow the recommendation to boil their water prior to consumption. ODW based the guidelines on Effective Microbial Control Strategies for Main Breaks and Depressurization, Water Research Foundation Project #4307. The Waterworks Advisory Committee reviewed and accepted the guidelines prior to this notice.

Guidance Document(s) for this Comment Forum

Document ID	Document Title	Document In Effect	Proposed Document
WTR-2019-02 (W)	Office of Drinking Water Guidance on Main Break Types and Responses	n/a	Proposed Document

Contact Information

Name: Jeffrey S. Wells, PE Title: Field Director, Danville Field Office

Email: jeff.wells@vdh.virginia.gov

Address: 211 Nor Dan Drive, Suite 1040

City: Danville State: VA Zip: 24540

Phone: (434)836-8416 Fax: (434)836-8424

The Virginia Register

Publication Date: 9/30/2019 Volume: 36 Issue: 3

The public comment period is ◆ In Progress! closes at 11:59pm on **10/30/2019**

View and Enter Comments

Planned Effective Date: 10/31/2019

Back to View Guidance Documents

GUIDANCE ON MAIN BREAK TYPES AND RESPONSES

For waterworks with permanent chlorination equipment installed and operating

Type 1 Break	Type 2 Break	Type 3 Break	Type 4 Break
Positive pressure maintained during break	Positive pressure maintained during break	Loss of pressure at break site/possible local depressurization adjacent to the break	Loss of pressure at break site/widespread depressurization in the system
Pressure maintained during repair	Pressure maintained until controlled shutdown	Partial or uncontrolled shutdown; isolated quickly[1]	Catastrophic event/ failure; widespread unmanageable pressure loss
No signs of contamination intrusion	No signs of contamination intrusion	Possible contamination intrusion[1]	Possible/actual contamination intrusion
Procedures	**Procedures**	**Procedures**	**Procedures**
Excavate to below break	Excavate to below break	Excavate to below break	Catastrophic failure response
Maintain pit water level below break	Maintain pit water level below break	Maintain pit water level below break / Document possible contamination	Document possible contamination
Repair under pressure	Controlled shutdown to minimize impacts	Notify customers in the vicinity	Notify customers in the vicinity, if possible
Disinfect repair parts, conduct repairs	Disinfect repair parts, conduct repairs	Disinfect repair parts, conduct repairs	Disinfect repair parts, conduct repairs
Check residual disinfectant level in distribution system	Conduct low velocity flush (flush 3 pipe volume)	Conduct scour flush (3 ft/ sec for 3 pipe volumes)	Conduct scour flush (3 ft/ sec for 3 pipe volumes)
No Boil Water Advisory (BWA), return main to service	Check residual disinfectant level in distribution system and ensure it is adequate	Check residual disinfectant level in distribution system and ensure it is adequate	Check residual disinfectant level in distribution system and ensure it is adequate
No bacteriological sample	No Boil Water Advisory (BWA), return main to service	Instruct customers to flush premise plumbing upon return to service	Instruct customers to flush premise plumbing upon return to service
	Collect one bacteriological sample downstream[2,3]	BWA - TBD; based on depressurization extent and potential presence of contamination[1,4]	Issue Boil Water Advisory (BWA); Contact ODW[4,5]
		If no BWA - Collect one set of bacteriological samples bracketing the site[2,3] (If BWA issued, use Type 4 procedures)	Collect two sets of bacteriological samples 16 hours apart[2,3]
			Lift BWA with concurrence from ODW

Notes 1-5 are on the following page.

Office of Drinking Water Guidance on Main Break Types and Responses

Notes:

1. The waterworks should consider the following factors when deciding whether a Boil Water Advisory (BWA) is necessary: sanitary conditions of repair trench, timeliness of the repair, adherence to American Water Works Association (AWWA) disinfection procedures (AWWA C651-14 Disinfecting Water Mains), disinfectant residual levels after repairs are completed, water clarity after flushing, and the extent of the depressurization area. If the waterworks cannot flush or disinfect the entire depressurization area, then it should consider issuing a BWA and performing additional bacteriological testing.

2. If any bacteriological sample is positive for total coliform, then the waterworks should collect additional samples until it receives results of two satisfactory samples (total coliform negative) collected 16 hours apart. Additional disinfection and/or flushing may be necessary. If the waterworks does not issue a BWA initially, then these results (total coliform positive) alone will not require that the waterworks issue a BWA.

3. If any bacteriological sample is positive for *E coli*, then the waterworks should immediately issue a BWA, perform flushing in the area, ensure adequate disinfectant residual levels in the area and collect additional samples until it receives results of two satisfactory samples collected 16 hours apart.

4. If the waterworks issues a BWA, then notify your ODW Field Office representative for additional guidance.

5. For situations that do not conform to the above guidelines or, if the waterworks is unsure how to proceed, then contact your ODW Field Office representative for guidance.

Proposal

Workload Re-distribution and Revised Boundary Maps for Office of Drinking Water Field Offices

Tony Singh, PhD, MPH, PE, BCEE

Deputy Director, Office of Drinking Water
Tony.Singh@vdh.virginia.gov
(804) 310-3927 or (804) 864-7517
October 8-9, 2019

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Need for Workload Redistribution

- VCU-PMG audit report recommended ODW 6th field office
- Sixth field office based in Richmond is currently functional
- Number of waterworks / Number of technical professional is not uniform across field offices
- Some field office staff travel more than 120 miles to reach farthest waterworks that were closer to other field office
- Field office boundaries were not evaluated in last >25+ years

ODW Strategic Field Planning (SFP) meeting

- Strategic Field Planning (SFP) meeting, Waynesboro, VA on August 28-29, 2019
- Attended by all Field Directors, Office Director, Deputy Office Director, Enforcement Director, & CAPDEV Director
- Number of waterworks/number of technical Staff, and travel distance were two major parameters considered
- Other options were discussed earlier and ruled out
- Best effort was made to keep LHD intact wherever possible

Current Scenario and Proposed Plan

ODW Field Office	Current Field office workload			Proposed Field Office Workload Plan		
	Tech Staff	Number of Waterworks	Number of Waterworks per tech staff	Tech Staff	Number of Waterworks	Number of Waterworks per tech staff
DFO	8	446	56	8	431	54
AFO	8	346	43	7	344	49
LFO	9	583	65	9	472	52
CFO	8	415	52	9	505	56
SEVFO	9	522	58	9	504	56
RFO	10	504	50	10	556	56

Proposed Plan Contd..

City / County	Number of Waterworks	Moved From	Moved To
York	15	RFO	SEVFO
Hampton	2	RFO	SEVFO
Mathew	36	RFO	SEVFO
Gloucester	28	RFO	SEVFO
Northumberland	60	SEVFO	RFO
Lancaster	39	SEVFO	RFO
Frederick	40	LFO	CFO
Winchester	2	LFO	CFO
Clarke	17	LFO	CFO
Warren	31	LFO	CFO
Louisa	34	LFO	RFO
Amherst	13	DFO	LFO

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Office of Drinking Water

www.vdh.virginia.gov/odw

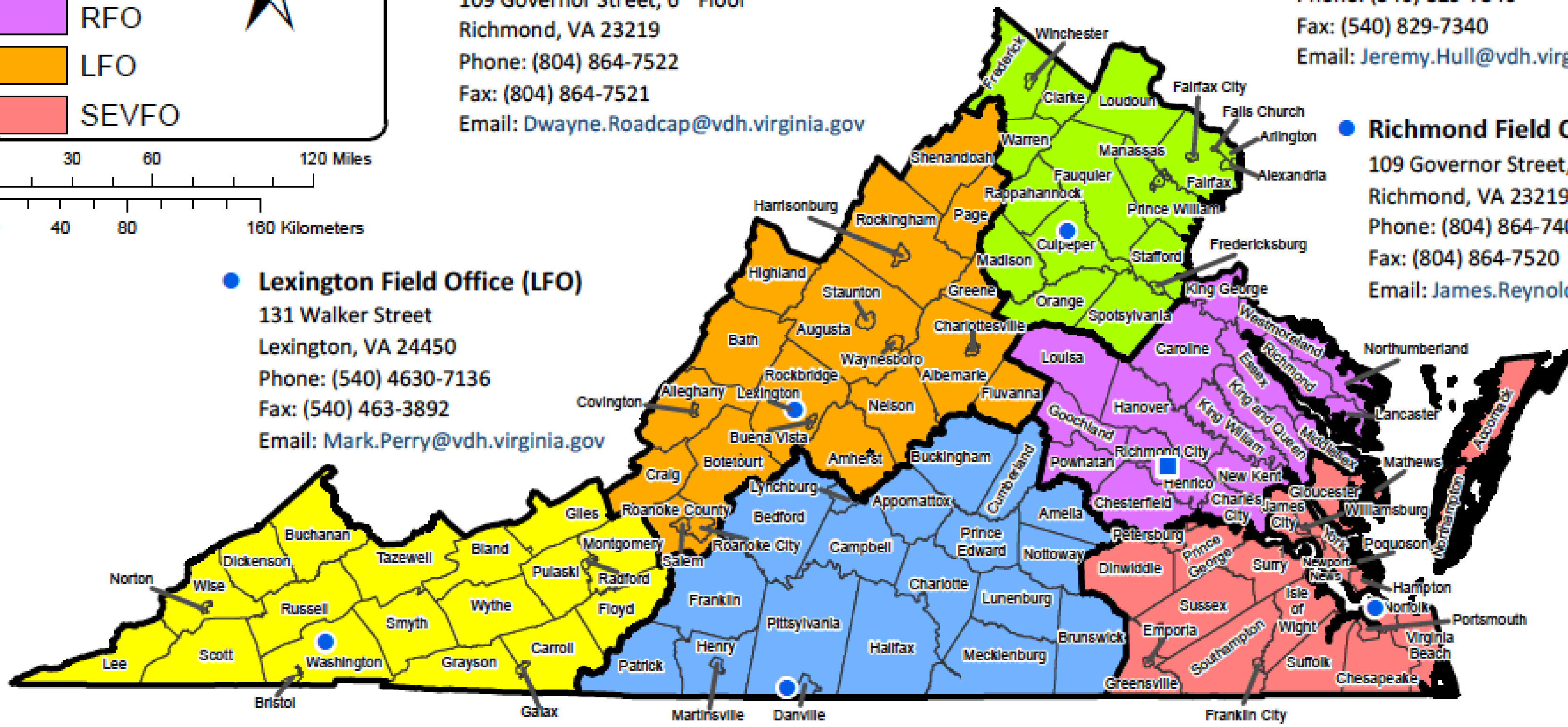
ODW Field Offices

- AFO
- CFO
- DFO
- RFO
- LFO
- SEVFO

N

0 30 60 120 Miles

0 40 80 160 Kilometers



■ **Central Office**
109 Governor Street, 6th Floor
Richmond, VA 23219
Phone: (804) 864-7522
Fax: (804) 864-7521
Email: Dwayne.Roadcap@vdh.virginia.gov

● **Culpeper Field Office (CFO)**
400 South Main Street – 2nd Floor
Culpeper, VA 22701-3318
Phone: (540) 829-7340
Fax: (540) 829-7340
Email: Jeremy.Hull@vdh.virginia.gov

● **Richmond Field Office (RFO)**
109 Governor Street, UB 23
Richmond, VA 23219
Phone: (804) 864-7409
Fax: (804) 864-7520
Email: James.Reynolds@vdh.virginia.gov

● **Lexington Field Office (LFO)**
131 Walker Street
Lexington, VA 24450
Phone: (540) 4630-7136
Fax: (540) 463-3892
Email: Mark.Perry@vdh.virginia.gov

● **Abingdon Field Office (AFO)**
407 East main Street, Suite 2
Abingdon, VA 24210
Phone: (276) 676-5650
Fax: (276) 676-5659
Email: Brian.Blankenship@vdh.virginia.gov

● **Danville Field Office (DFO)**
211 Nor Dan Drive, Suite 1040
Danville, VA 24540
Phone: (434) 836-8416
Fax: (434) 836-8424
Email: Jeff.Wells@vdh.virginia.gov

● **Southeast Virginia Field Office (SEVFO)**
830 Southampton Avenue, Room 2058
Norfolk, VA 23510
Phone: (757) 683-2000
Fax: (757) 683-2007
Email: Daniel.Horne@vdh.virginia.gov

Proposed reconfiguration of field office boundaries

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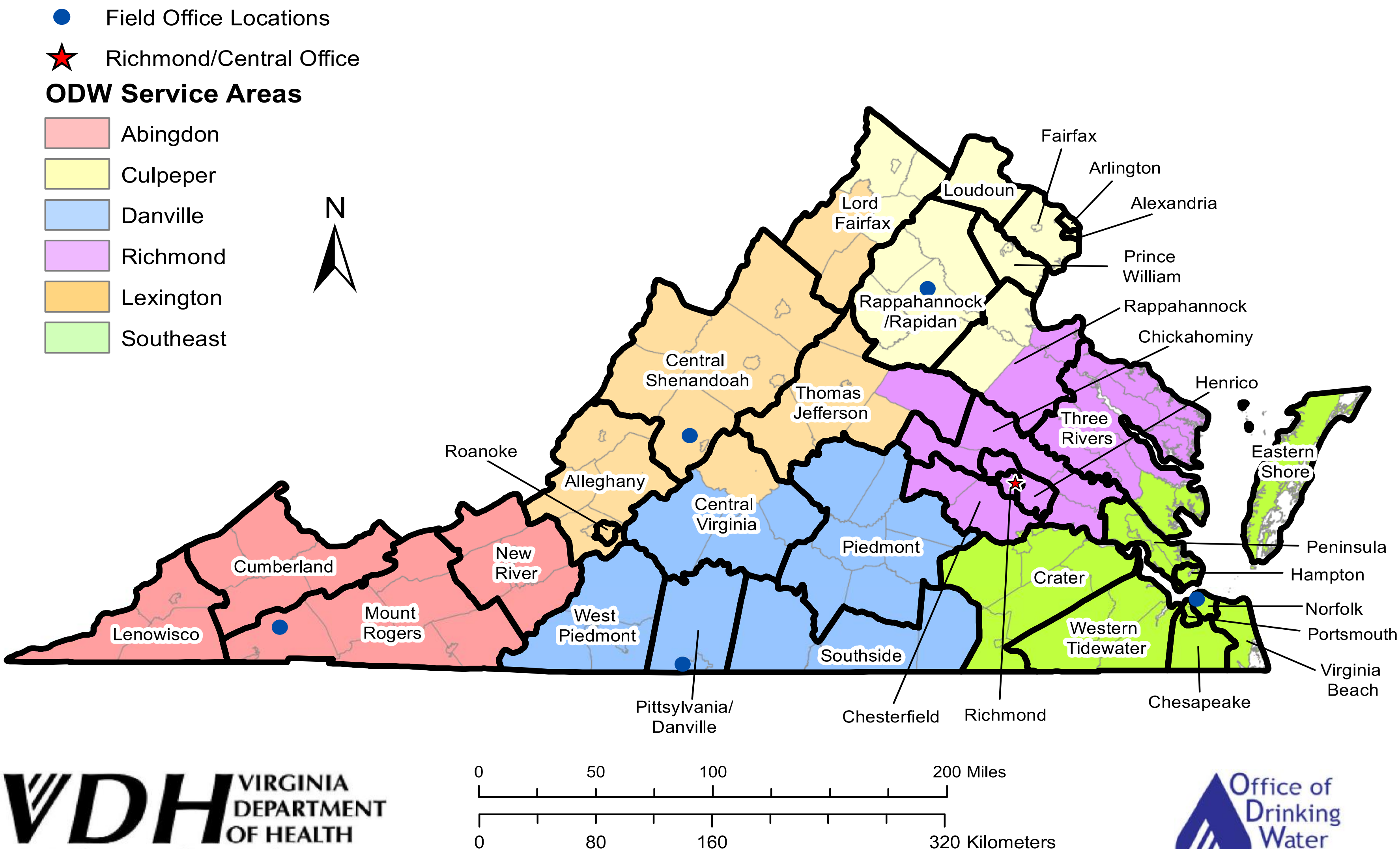
ODW & Local Health Districts

Proposed reconfiguration of field office boundaries



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Office of Drinking Water
Safe Drinking Water for a Healthy Virginia

Communication and Implementation Plan

- **Identifying stakeholders** – Waterworks, LHD, emergency coordinators, cities/municipalities, EPA
- **Data transfer Data Management Team** – SDWIS, emergency contacts, and transferring paper records
- **Resource/Staff transition** – Moving resources across field office
- **Training requirement** – One month of handoff
- **Emergency preparedness** – Changing contacts at localities, state and federal level

Dates	Proposed Activity
09/20/2019	Share Proposed Workload redistribution plan with ODW Leadership team
10/20/2019	Share with Dr. Jaberi's & OCOM approval
10/01/2019 – 10/20/2019	Develop "**Communication and Implementation Plan (CIP)**"
10/08/2019	Share proposed plan with ODW staff at ALL Staff Meeting; Seek feedback on "Communication & Implementation Plan"
11/01/2019	Start implementing Communication part of CIP
12/01/2019	Review the status of CIP activities
01/01/2020	Handoff month – "Buddies Month"
02/01/2020	Final transition
08/01/2020	Six month review followed by annual review for first two years

Thank you

PFAS 101

Waterworks Advisory Committee Meeting
October 16, 2019

Daniel B. Horne, PE
ODW – Southeast Virginia Field Office

Agenda

- What are PFAS, anyway?
- Why are we concerned?
- What's the current regulatory status?
- What are the treatment options?
- What's the status in Virginia?

What are PFAS? (1)

- Perfluorinated (or polyfluorinated) alkyl substances are a family of man-made organic chemicals that have been manufactured since the mid-1940s
- The generic term is PFAS (PFCs is used to refer to air pollutants)

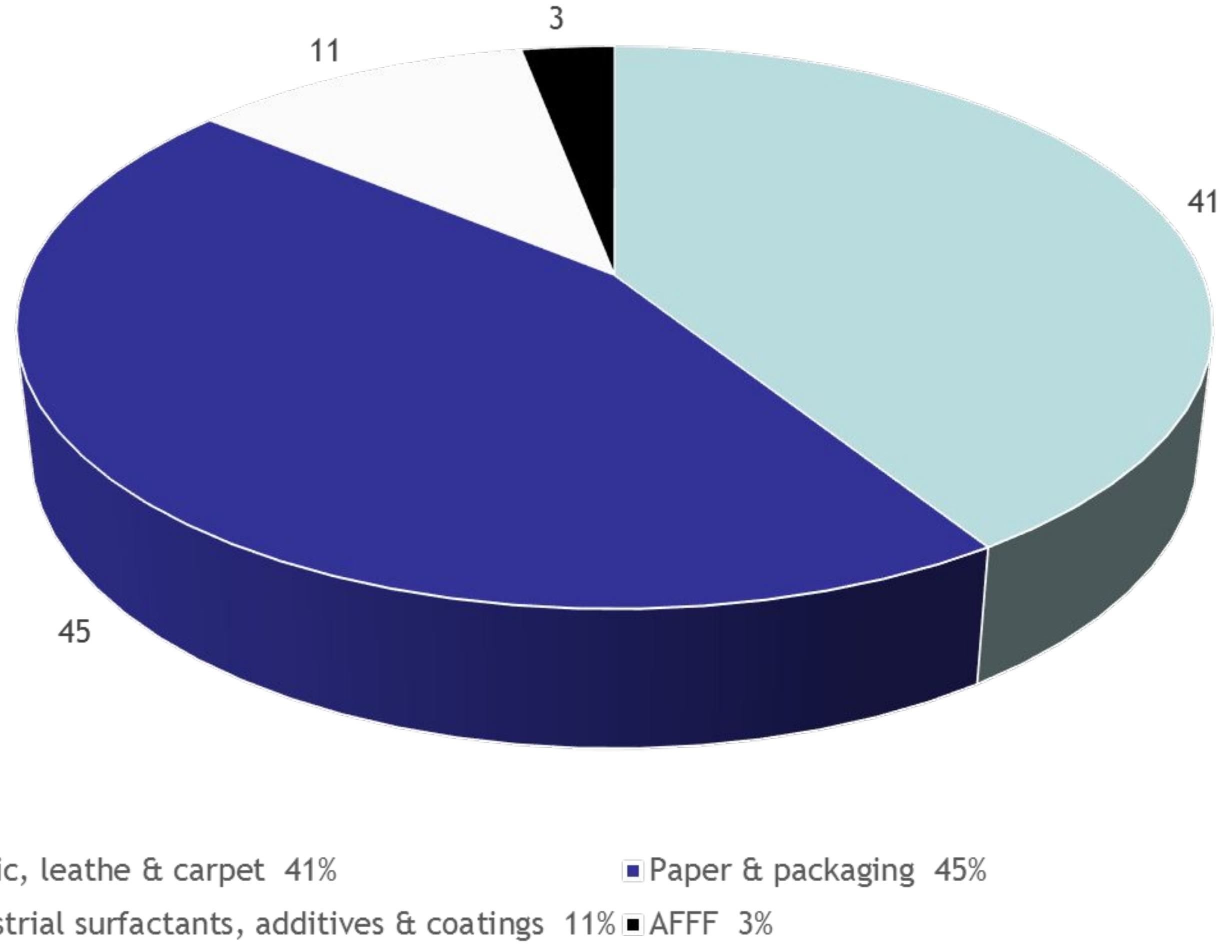
What are PFAS? (2)

- Originally created as long-chain carbon-fluorine chemicals – original production → “straight-chain”, with some “branched” (depending on process)
- “Next generation” started new manufacturing processes, with a number of variations
  - Short-chains
  - Ethers and alcohols
  - Fluoro-telomers
  - Other variations

What are PFAS? (3)

- Extensively produced and used world-wide – many industrial and commercial applications:
  - Aqueous film-forming foam (AFFF)
  - Water-proofing or stain-resistance for clothing, carpet, furniture
  - Food wraps and microwave popcorn bags
  - Non-stick cookware
  - Metal plating operations
  - Photolithographic chemicals
  - and many more….
- Several US manufacturers – others elsewhere

Example of PFAS production/use

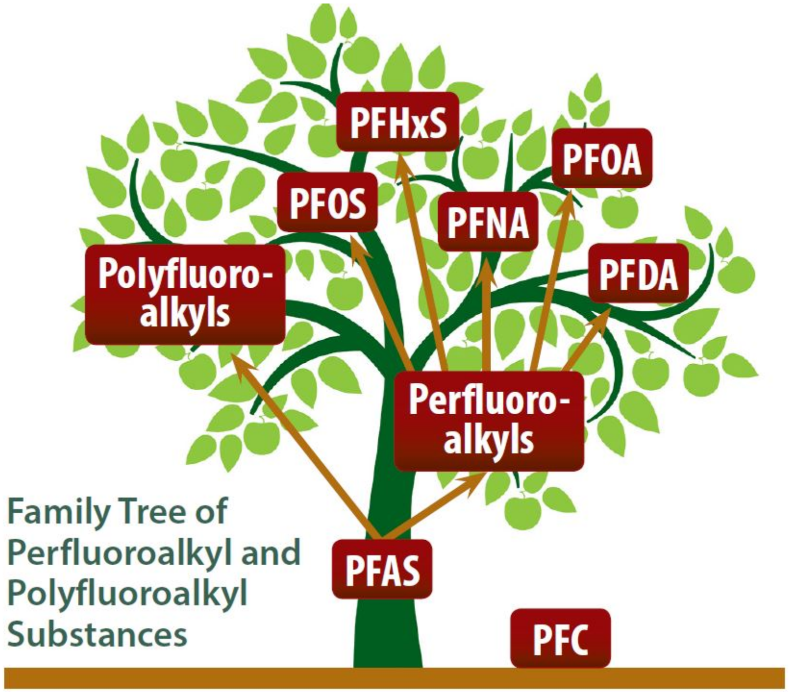


After Schultz, *et.al., 2003, Env. Eng. Sci.,* Vol 20, Number 8

Family Tree of PFAS

There are THOUSANDS of chemicals in the PFAS family, with various chain lengths and differing "add-ins"

- Carboxylic acids
- Sulfonic acids
- Fluorotelomers, with many different kinds of "add-ins"



Picture Source: ATSDR

Are PFAS *REALLY* a Problem?

- **2005** – Ohio River Valley – OH & WV – numerous SW & GW sources (C8 – early name for PFOA)
- Harvard University study (published in Aug 2016) – 66 water systems – 6 million people – samples > 70 ng/L
- June 2016 – Colorado – 3 cities – 80,000 people with PFCs > 70 ng/L (SW and GW)
- May 2016 – New Hampshire – 50 public wells, 11 private wells – PFCs > 70 ng/L
- May 2016 – Alabama – 8 cities (SW) – PFCs > 70 ng/L
- Jan 2016 – Naval Landing Field Fentress (Chesapeake VA) – GW contamination > 70 ng/L
- May 2017 – NASA Wallops Flight Facility (Accomack County VA) – GW contamination > 70 ng/L

UCMR 3 and PFAS

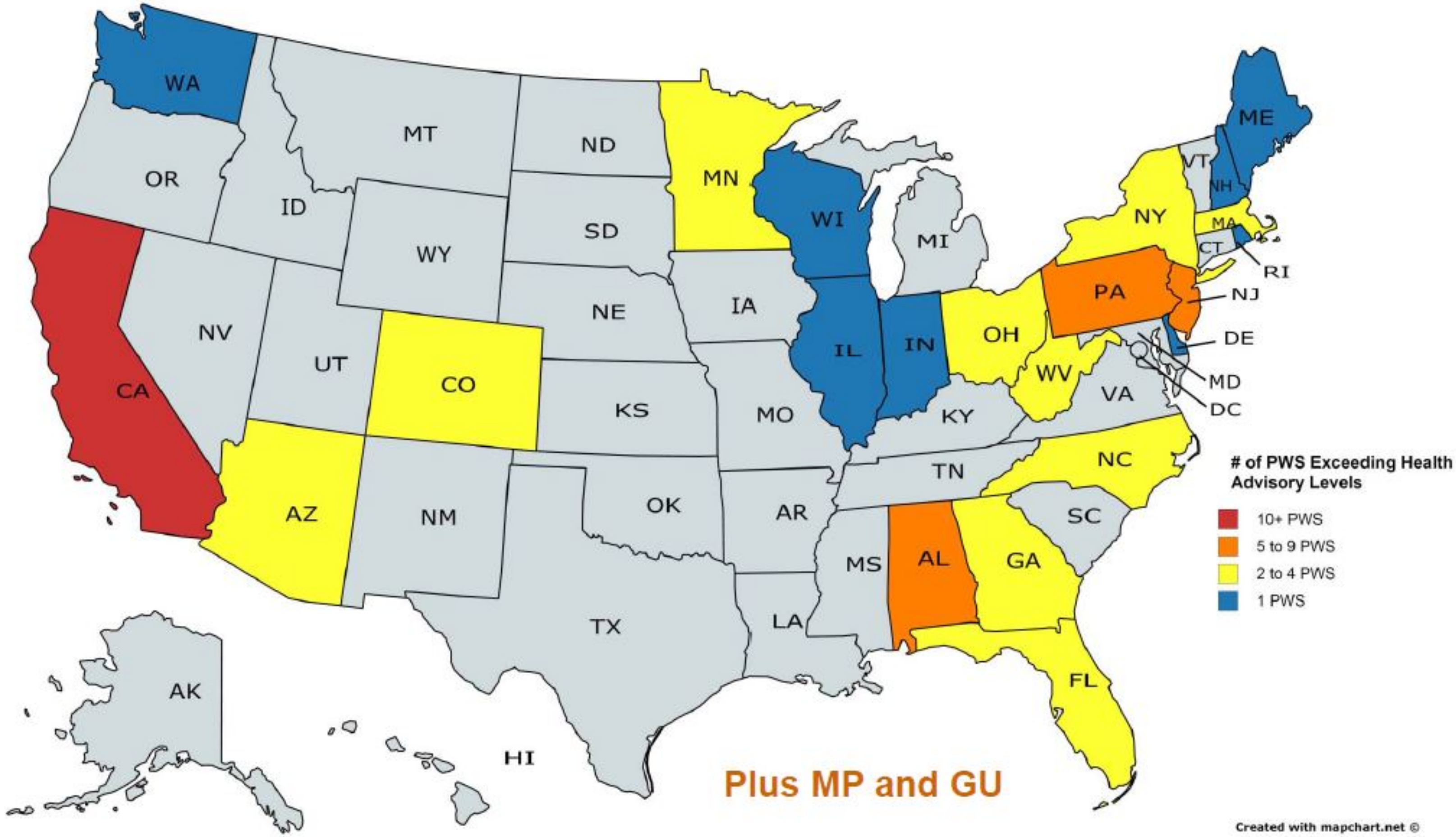
- UCMR 3 required monitoring for six PFAS compounds – monitoring done Jan 2013 – Dec 2015 – all PWS serving > 10,000 persons plus representative sample of ≤ 10,000 persons

Compound	MRL (ng/L)	Occurrence (%)	Max. Conc. (ppt)
PFHpA (C7)	10	0.64	410
PFOA (C8)	20	1.03	349
PFNA (C9)	20	0.05	56
PFBS	90	0.05	370
PFHxS	30	0.56	1,600
PFOS	40	0.79	7,000

Problems with UCMR3

- Some data differences got masked by the national average:
  - Parts of New England and NC had much higher "hit" rates
  - Differences between surface water and groundwater occurrence
- UCMR3 only looked at these 6 compounds – many areas have high presence of other compounds
- Analytical methodology wasn't precise enough to pick up very low levels

PFCs Occurrence (early 2016)



From Andrew Eaton, “PFAS Monitoring in a Post-Advisory World”, AWWA WQTC, Nov 2016

VDH VIRGINIA DEPARTMENT OF HEALTH
To protect the health and promote the well-being of all people in Virginia.

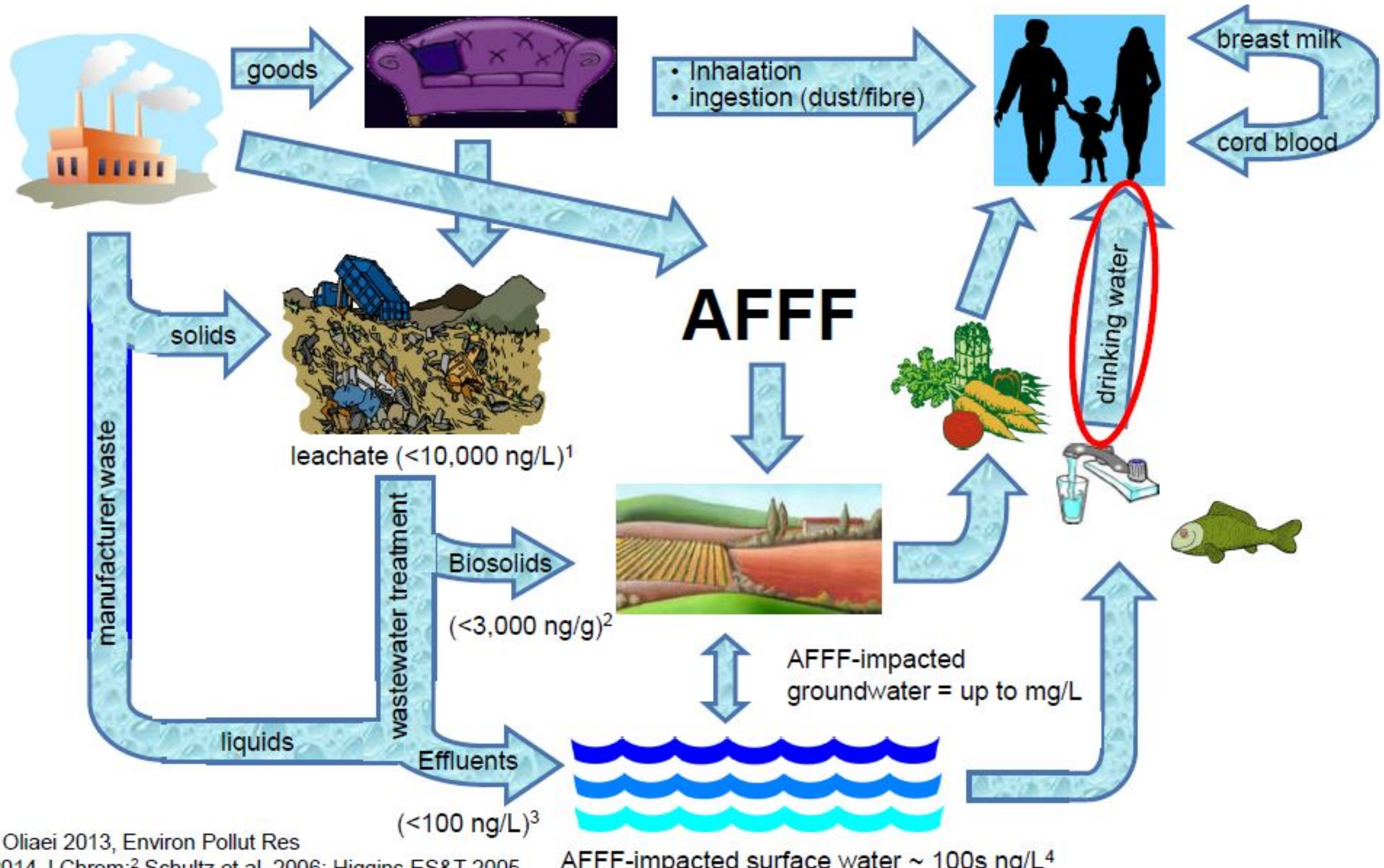
Why Are We Concerned?

- The carbon-fluorine bond is shortest & strongest chemical bond in nature
- PFAS are persistent – don't break down naturally and are hard to remove from water – can easily move into the food chain – they also bioaccumulate
- Possible health effects currently indicated:
  - Developmental effects to fetuses or breast-fed infants
  - Thyroid, prostate, kidney, liver, and testicular effects (including cancer)
  - Immune effects (antibody production)

Toxicological Issues

- Half-lives in humans varies, depending on the compound
  - PFOA = 3.8 years
  - PFOS = 5.4 years
  - PFBS = 4 months
- Toxicokinetic differences between different test animals → animals may not represent humans well
  - 17-19 days in mice
  - 4 hours in female rats

Exposure Routes



Adapted from Oliaei 2013, Environ Pollut Res
[1]Allred et al. 2014 J Chrom;[2] Schultz et al. 2006; Higgins ES&T 2005
[3]Schultz et al. 2006 a&b ES&T; [4]Ahrens et al. Chemosphere 2015

EPA’s Health Advisories

- Lifetime Health Advisories issued 16 May 2016:
  - Covers PFOA , PFOS, and PFOA+PFOS – doesn’t address any of the other PFAS
  - Exposure Pathway: oral ingestion of drinking water by pregnant or lactating women
  - Protects the most sensitive populations
  - These are “chronic” advisories, but often applied as “acute”
- “Non-enforceable, non-regulatory”

Chemical	Advisory Level
PFOA	70 ng/L (ppt)
PFOS	70 ng/L (ppt)
PFOA + PFOS	70 ng/L (ppt)

Current Regulatory & Legislative Status

- EPA issued a Lifetime Health Advisory in 2016
  - PFOA, PFOS, and PFOA+PFOS
  - Not a regulation
- EPA issued a PFAS Action Plan in Feb 2019
- EPA has committed to propose a Regulatory Determination in Dec 2019
- UCMR5 will likely require more PFAS monitoring
- Lots of Congressional interest – both current Defense Reauthorization bills include PFAS amendments but differ

Treatment Options

- Not many, and nothing works on all PFAS
- Conventional water treatment and wastewater treatment processes will not remove PFAS
- Currently, only RO, IX, and GAC/PAC will remove PFAS – may need to combine processes
- A number of design/operational considerations
  - Competing chemicals
  - Type of PFAS to be removed
  - Disposal issues

What's happening in Virginia? (1)

- PFAS has been found in GW at several federal sites – currently affecting four waterworks
  - Treatment installed at one waterworks, being installed at a second site (two waterworks)
  - Monitoring the fourth waterworks (not found yet in wells currently in use)
  - Other military sites had hits, but are central water – surrounding waterworks not yet affected
- UCMR3 had two hits at other waterworks, but… follow-up sampling showed not in sources

What's happening in Virginia? (2)

- DEQ is co-lead agency at the federal sites, working with EPA – GW clean-up actions, remediation efforts
- VDH and DEQ communicate about PFAS issues and findings of PFAS in source waters
- ODW hired Tony Singh as Deputy Office Director – he has expertise with PFAS!!!

Suggested Resources

- AWWA PFAS page

https://www.awwa.org/Resources-Tools/Resource-Topics/PFAS

Includes PFAS Fact Sheets, links to Journal articles, etc.

- Water Research Foundation
  - Research project reports, webinars, “State of the Science”, etc.
- EPA – PFAS page

https://www.epa.gov/pfas

  - Lots of information – Action Plan, Health Advisories, and other materials

Questions?

VIRGINIA DEPARTMENT OF HEALTH

To protect the health and promote the well-being of all people in Virginia.

Lead and Copper Rule Revisions

October 16, 2019

Timeline

- October 10, 2019 – Signed Proposal
- TBD – Published Proposal in Federal Register – comment period opens
- [60 days after published in Federal Register] – comment period ends
- [three years after publication of the final rule in FR] – CWS and NTNC must comply

Significant Changes

- A new trigger level of P90 > 10 µg/L that triggers additional planning, monitoring and treatment requirements
- Sample Site Selection
  - Prioritizes sampling from sites with LSLs
  - Copper pipes with lead solder – no prioritization by date

Sampling

- Decouple Pb sampling frequency from Cu
- Copper follows the same criteria as the current rule
- Lead monitoring:
  - P90 > 15 µg/L – Semiannually at standard number of sites
  - P90 > 10 to 15 µg/L – Annually at standard number of sites
  - P90 ≤10 µg/L – Annually and triennially at reduced number of sites (Cu P90 not considered)

Corrosion Control Treatment (CCT)

- P90 > 10 to ≤ 15 µg/L:
  - No CCT: Must conduct a CCT study
  - With CCT: Must re-optimize CCT
- P90 > 15 µg/L
  - No CCT: Must complete CCT installation regardless of subsequent P90 levels
  - With CCT: Must re-optimize CCT

Lead Service Lines

FOCUS

- All systems must develop an LSL inventory or demonstrate absence of LSLs within 3 years of final rule
- LSL inventory updated annually
- All systems with known or possible LSL (“unknown material”) must develop a LSL Replacement Plan
- P90 > 10 to 15 µg/L triggers LSLR Program
- P90 > 15 µg/L triggers LSLR Program with specific goals
- Inform customers annually that they are served by a LSL

Public Education and Outreach

- Updated health effects language RE LSLR Program in CCR
- P90 > 15 µg/L
  - Current PE requirement apply
  - Notify customers of P90 > 15 µg/L within 24 hours
- Provide lead consumer notice to customers with tap sample > 15 µg/L within 24 hours

Schools and Child Care Facilities

- CWSs conduct lead in drinking water testing and PE in service area at 20% every year:
  - K-12 schools
  - Licensed child care facilities
- Sample results and PE provided to:
  - Sampled school/child care facility
  - Primacy Agency
  - Local or state health department
- Facilities built after January 1, 2014 excluded
- 3Ts for Reducing Lead in Drinking Water Toolkit

Comments to EPA

- ODW will participate in ASDWA Workgroup
  - Weekly conference calls through November
- ASDWA intends to request extension of the comment period to 90 days
- Separately, ODW may develop and submit comments

Questions?

Reference Guide for Public Water Systems
Lead and Copper Rule Proposal Comparison

EPA's proposed Lead and Copper Rule (LCR) includes a suite of actions to reduce lead exposure in drinking water where it is needed the most. The proposed rule will identify the most at-risk communities and ensure systems have plans in place to rapidly respond by taking actions to reduce elevated levels of lead in drinking water. For more information on the proposed rule, please visit: www.epa.gov/safewater/LCRproposal

The following table compares the major differences between the current Lead and Copper Rule (LCR) and proposed Lead and Copper Rule revisions (LCRR). In general, requirements that are unchanged are not listed. For existing rule requirements please visit: https://www.epa.gov/dwreginfo/lead-and-copper-rule

CURRENT LCR	PROPOSED LCRR
Action Level (AL) and Trigger Level (TL)	
• 90th percentile (P90) level above lead AL of 15 µg/L or copper AL of 1.3 mg/L requires additional actions.	• 90th percentile (P90) level above lead AL of 15 µg/L or copper AL of 1.3 mg/L requires more actions than the current rule. • Defines trigger level (TL) of P90 > 10 and ≤15 µg/L that triggers additional planning, monitoring, and treatment requirements.
Lead and Copper Tap Monitoring	
Sample Site Selection • Prioritizes collection of samples from sites with sources of lead in contact with drinking water. • Highest priority given to sites served by copper pipes with lead solder installed after 1982 but before the ban on lead pipes and/or lead service lines (LSLs). • Systems must collect 50% of samples from LSLs, if available.	**Sample Site Selection** • Changes priorities for collection of samples with a greater focus on lead service lines. • Prioritizes collecting samples from sites served by LSLs. • No distinction in prioritization of copper pipes with lead solder by installation date. • Systems must collect all samples from sites served by LSLs, if available.
Collection Procedure • Requires collection of a one-liter sample after water has sat stagnant for a minimum of 6 hours.	**Collection Procedure** • Adds requirement that samples must be collected in wide-mouth bottles. • Prohibits sampling instructions that include recommendations for aerator cleaning/removal and pre-stagnation flushing prior to sample collection.

October 2019

CURRENT LCR	PROPOSED LCRR
Monitoring Frequency • Samples are analyzed for both lead and copper. • Systems must collect standard number of samples based on population semi-annually unless they qualify for reduced monitoring. • Systems can qualify for annual or triennial monitoring at reduced number of sites. Schedule based on number of consecutive years meeting the following criteria: ○ Serves ≤ 50,000 people and ≤ lead & copper ALs. ○ Serves any population size, meets State-specified optimal water quality parameters (OWQPs), and ≤ lead AL. • Triennial monitoring also applies to any system with P90 and copper 90^{th} percentile levels ≤ 0.005 mg/L and ≤ 0.65 mg/L, respectively, for 2 consecutive 6-month monitoring periods. • 9-year monitoring waiver available to systems serving ≤ 3,300.	**Monitoring Frequency** • Some samples may be analyzed for lead only when lead monitoring is conducted more frequently than copper. • Copper follows the same criteria as the current rule. • Lead monitoring schedule is based on P90 level for all systems as follows: ○ **P90 > 15 µg/L**: Semi-annually at the standard number of sites. ○ **P90 > 10 to 15 µg/L**: Annually at the standard number of sites. ○ **P90 ≤ 10 µg/L**: ▪ Annually and triennially at reduced number of sites using same criteria as current rule except copper 90^{th} percentile level is not considered. ▪ Every 9 years based on current rule requirements for a 9-year monitoring waiver.
Corrosion Control Treatment (CCT) and Water Quality Parameters (WQPs)	
CCT • Systems serving > 50,000 people were required to install treatment by January 1, 1997 with limited exception. • Systems serving ≤ 50,000 that exceed lead and/or copper AL are subject to CCT requirements (e.g., CCT recommendation, study if required by Primacy Agency, CCT installation). Can discontinue CCT steps if no longer exceed both ALs for two consecutive 6-month monitoring periods. • Systems must operate CCT to meet any Primacy Agency-designated OWQPs that define optimal CCT. • There is no requirement for systems to re-optimize.	**CCT** • Specifies CCT requirements for systems with P90 level > 10 to ≤ 15 µg/L: ○ **No CCT:** must conduct a CCT study if required by Primacy Agency. ○ **With CCT:** must follow the steps for re-optimizing CCT, as specified in the rule. • Systems with P90 level > 15 µg/L: ○ **No CCT:** must complete CCT installation regardless of their subsequent P90 levels. ○ **With CCT:** must re-optimize CCT. • Community water systems (CWSs) serving ≤ 10,000 people and non-transient water systems (NTNCWSs) can select an option other than CCT to address lead. ***See Small System Flexibility.***
CCT Options: Includes alkalinity and pH adjustment, calcium hardness adjustment, and phosphate or silicate-based corrosion inhibitor.	**CCT Options:** Removes calcium hardness as an option and specifies any phosphate inhibitor must be orthophosphate.

CURRENT LCR	PROPOSED LCRR
Regulated WQPs: • **No CCT**: pH, alkalinity, calcium, conductivity, temperature, orthophosphate (if phosphate-based inhibitor is used), silica (if silica-based inhibitor is used). • **With CCT**: pH, alkalinity, and based on type of CCT either orthophosphate, silica, or calcium.	**Regulated WQPs:** • Eliminates WQPs related to calcium hardness (i.e., calcium, conductivity, and temperature).
WQP Monitoring • Systems serving ≥ 50,000 people must conduct regular WQP monitoring at entry points and within the distribution system. • Systems serving ≤ 50,000 people conduct monitoring only in those periods > lead or copper AL. • Contains provisions to sample at reduced number of sites in distribution system less frequency for all systems meeting their OWQPs.	**WQP Monitoring** • Systems serving ≥ 50,000 people must conduct regular WQP monitoring at entry points and within the distribution system. • Systems serving ≤ 50,000 people must continue WQP monitoring until they no longer > lead and/or copper AL for two consecutive 6-month monitoring periods. • To qualify for reduced WQP distribution monitoring, P90 must be ≤ 10 µg/L and the system must meet its OWQPs.
Sanitary Survey Review: • Treatment must be reviewed during sanitary surveys, no specific requirement to assess CCT or WQPs.	**Sanitary Survey Review:** • CCT and WQP data must be reviewed during sanitary surveys against most recent CCT guidance issued by EPA.
Find and Fix: No required follow-up samples or additional actions if an individual sample exceeds 15 µg/L.	**Find and Fix:** If individual tap sample > 15 µg/L, systems must: • Collect a follow-up sample at each location > 15 µg/L. • Conduct WQP monitoring at or near the site > 15 µg/L. • Perform needed corrective action.
LSL Inventory and LSLR Plan	
Initial LSL Program Activities: • Systems were required to complete a materials evaluation by the time of initial sampling. No requirement to update materials evaluation. • No LSLR plan is required.	**Initial LSL Program Activities:** • All systems must develop an LSL inventory or demonstrate absence of LSLs within first 3 years of final rule publication. • LSL inventory must be updated annually. • All systems with known or possible LSLs must develop an LSLR plan.

CURRENT LCR	PROPOSED LCRR

LSLR:
• Systems with LSLs with P90 > 15 µg/L after CCT installation must annually replace ≥7% of number of LSLs in their distribution system when the lead action level is first exceeded.
• Systems must replace the LSL portion they own and offer to replace the private portion at the owner's expense.
• Full LSLR, partial LSLR, and LSLs with lead sample results ≤15 µg/L ("test-outs") count toward the 7% replacement rate.
• Systems can discontinue LSLR after 2 consecutive 6-month monitoring periods ≤ lead AL.
	LSLR:
	• Rule specifies replacement programs based on P90 level for CWSs serving > 10,000 people:
	  o If P90 > 15 µg/L: Must fully replace 3% of LSLs per year (mandatory replacement) for 4 consecutive 6-month monitoring periods.
	  o If P90 > 10 to 15 µg/L: Implement an LSLR program with replacement goals in consultation with the Primacy Agency for 2 consecutive 1-year monitoring periods.
	• Small CWSs and NTNCWSs that select LSLR as their compliance option must complete LSLR within 15 years if P90 > 15 µg/L. ***See Small System Flexibility.***
	• Annual LSLR rate is based on number of LSLs when the system first exceeds the action level plus the current number of service lines of unknown materials.
	• Only full LSLR (both customer-owned and system-owned portion) count toward mandatory rate or goal-based rate.
	• All systems must replace their portion of an LSL if notified by consumer of private side replacement within 3 months of the private replacement.
	• Following each LSLR, systems must:
	  o Provide pitcher filters/cartridges to each customer for 3 months after replacement. Must be provided within 24 hours for full and partial LSLRs.
	  o Collect a lead tap sample at locations served by replaced line within 3 to 6 months after replacement.

LSL-Related Outreach:
• When water system plans to replace the portion it owns, it must offer to replace customer-owned portion at owner's expense.
• If system replaces its portion only:
  o Provide notification to affected residences within 45 days prior to replacement on possible elevated short-term lead levels and measures to minimize exposure.
	LSL-Related Outreach:
	• Inform consumers annually that they are served by LSL or service line of unknown material.
	• Systems subject to goal-based program must:
	  o Conduct targeted outreach that encourages consumers with LSLs to participate in the LSLR program.
	  o Conduct an additional outreach activity if they fail to meet their goal.

CURRENT LCR	PROPOSED LCRR
○ Include offer to collect lead tap sample within 72 hours of replacement. ○ Provide test results within 3 business days after receiving results.	• Systems subject to mandatory LSLR include information on LSLR program in public education (PE) materials that are provided in response to P90 > AL.
Small System Flexibility	
No provisions for systems to elect an alternative treatment approach but sets specific requirements for CCT and LSLR.	Allows CWSs serving ≤ 10,000 people and all NTNCWSs with P90 > 10 µg/L to elect their approach to address lead levels at P90 > 15 µg/L with Primacy Agency approval: • Systems can choose CCT, LSLR, or provision and maintenance of point-of-use devices. • NTNCWSs can also elect to replace all lead-bearing materials.
Public Education and Outreach	
• All CWSs must provide education material in the annual Consumer Confidence Report (CCR). • Systems with P90 > AL must provide public education and outreach (PE) to customers about lead sources, health effects, measures to reduce lead exposure, and additional information sources. • Systems must provide lead consumer notice to individuals served at tested taps within 30 days of learning results.	• CWSs must provide updated health effects language and information regarding LSLR program in the CCR. • If P90 > AL: ○ Current PE requirements apply. ○ Systems must notify customers of P90 > AL within 24 hours. • In addition, CWSs must: ○ Improve public access to lead information including LSL locations and respond to requests for LSL information. ○ Deliver notice and educational materials to customers during water-related work that could disturb LSLs. ○ Provide increased information to healthcare providers. ○ Provide lead consumer notice to customers whose individual tap sample is > 15 µg/L within 24 hours. • *Also see LSL-Related Outreach in LSLR section of table.*
Change in Source or Treatment	
Systems on a **reduced** tap monitoring schedule must obtain prior Primacy Agency approval before changing their source or treatment.	Systems on **any** tap monitoring schedule must obtain prior Primacy Agency approval before changing their source or treatment.
Source Water Monitoring and Treatment	

CURRENT LCR	PROPOSED LCRR

• Periodic source water monitoring is required for systems with:
  o Source water treatment; or
  o P90 > AL and no source water treatment.
	• Primacy Agencies can waive continued source water monitoring if the:
	  o System has already conducted source water monitoring for a previous P90 > AL;
	  o Primacy Agency has determined that source water treatment is not required; ***and***
	  o System has not added any new water sources.

Lead in Drinking Water at Schools and Child Care Facilities	
• Does not include separate testing and education program for CWSs at schools and child care facilities. • Schools and child cares that are classified as NTNCWSs must sample for lead and copper.	• CWSs must conduct lead in drinking water testing and PE at 20% of K-12 schools and licensed child cares in service area every year. • Sample results and PE must be provided to each sampled school/child care, Primacy Agency and local or State health department. • Excludes facilities built after January 1, 2014.
Primacy Agency Reporting	
Primacy Agencies must report information to EPA that includes but is not limited to: • All P90 levels for systems serving > 3,300 people, and only levels > 15 µg/L for smaller systems. • Systems that are required to initiate LSLR and the date replacement must begin. • Systems for which optimal corrosion control treatment (OCCT) has been designated.	Expands current requirements to include: • All P90 values for all system sizes. • The current number of LSLs and service lines of unknown material for every water system. • OCCT status of all systems including Primacy Agency-specified OWQPs.

COMMONWEALTH of VIRGINIA
Department of Health

M. Norman Oliver, MD, MA
State Health Commissioner

P O Box 2448
RICHMOND, VA 23218

TTY 7-1-1 OR
1-800-828-1120

August 26, 2019

Samuel Hernandez
Office of Ground Water and Drinking Water,
Standards and Risk Management Division
Environmental Protection Agency
1200 Pennsylvania Avenue NW
Washington, D.C. 20460

Re: Proposed National Primary Drinking Water Regulation: Perchlorate
Docket No. EPA–HQ–OW–2018–0780

Dear Mr. Hernandez:

The Virginia Department of Health, Office of Drinking Water (VDH ODW) is the primacy agency responsible for the public drinking water program in the Commonwealth of Virginia. VDH ODW thanks you for the opportunity to comment of EPA's proposed National Primary Drinking Water Regulations: Perchlorate and submits the following comments and concerns in response to EPA's request that was published in the Federal Register on June 26, 2019:

- Based on the UCMR1 data collected (300 samples collected from 58 public water systems) in Virginia, only one Virginia public water system (PWS) had detectable levels of perchlorate at the system entry point. The UCMR1 data indicate that perchlorate is not present in Virginia PWSs at or above the proposed MCLG and MCL of 56 µg /L. However, we suspect that the UCMR1 data most likely underestimates the extent to which perchlorate might be present in Virginia if more PWSs conduct monitoring for perchlorate (especially groundwater and small systems that could have perchlorate from hypochlorite degradation).

- Based on the very limited UCMR1 data collected, we would expect typical detections of perchlorate in Virginia in the detection limit to 10 µg/L range, with some results above this range. We feel that detections above the proposed MCLGs and MCLs of 56 µg /L or 90 µg /L are very unlikely. Adopting these levels (56 µg/L and 90 µg /L) will cause the Perchlorate Rule to become a monitoring exercise for the regulated community (and a record-keeping exercise for VDH ODW) with no meaningful opportunity for increased public health protection. However, we suspect a MCL of 18 µg /L could possibly be exceeded in Virginia, imposing the requirement on the affected PWS to take action to reduce the concentration of perchlorate and resulting in increased public health protection.

- Our suggested MCL of 18 μg/L is based on the possible detection of perchlorate at PWSs. It is not based on the assessment and modeling of the health effects of perchlorate.

- EPA is considering perchlorate an acute contaminant, with the requirement for a Tier 1 public notice if a PWS exceeds the MCL. However, EPA is proposing to regulate only community and non-transient noncommunity (NTNC) waterworks. This is not consistent with EPA's approach to regulate acute contaminants, such as nitrate. Therefore, we would expect the perchlorate monitoring requirements to be the same for all PWSs. Please reconcile or explain this discrepancy.

- Monitoring waivers will be a significant activity for this rule. VDH ODW will receive, review, and approve/deny monitoring waivers for each entry point, based on the sources represented by the entry point, rather than issuing waivers for an entire PWS. VDH ODW currently routinely reviews and issues monitoring waivers for cyanide monitoring, similar to the perchlorate proposal. We do not know if in the future, perchlorate monitoring waivers could be reviewed and processed concurrently with cyanide monitoring waivers.

- VDH ODW supports the option to waive the final two quarters of the initial four quarters of perchlorate monitoring for groundwater sources if the results of the samples from the previous two quarters are below the detection limit. Note that if this option is included in the final rule, this would move the waiver activity earlier in the rule implementation timeframe.

- Hypochlorite degradation is a potential source of perchlorate; however, the proposal does not acknowledge this. EPA should acknowledge degradation of hypochlorite as a potential source of perchlorate and provide guidance to the regulated community on best practices to minimize hypochlorite degradation.

VDH ODW appreciates the opportunity to comment on this important drinking water issue. If you have any questions about these comments or need additional information, please feel free to email me or give me a call at (804) 864-7522.

Sincerely,

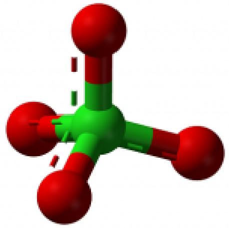
for Dwayne Roadcap
Director, Office of Drinking Water
Virginia Department of Health

Perchlorate Briefing

Robert D. Edelman, P.E.
Division of Technical Services
October, 2019

VIRGINIA DEPARTMENT OF HEALTH
Protecting You and Your Environment

Background



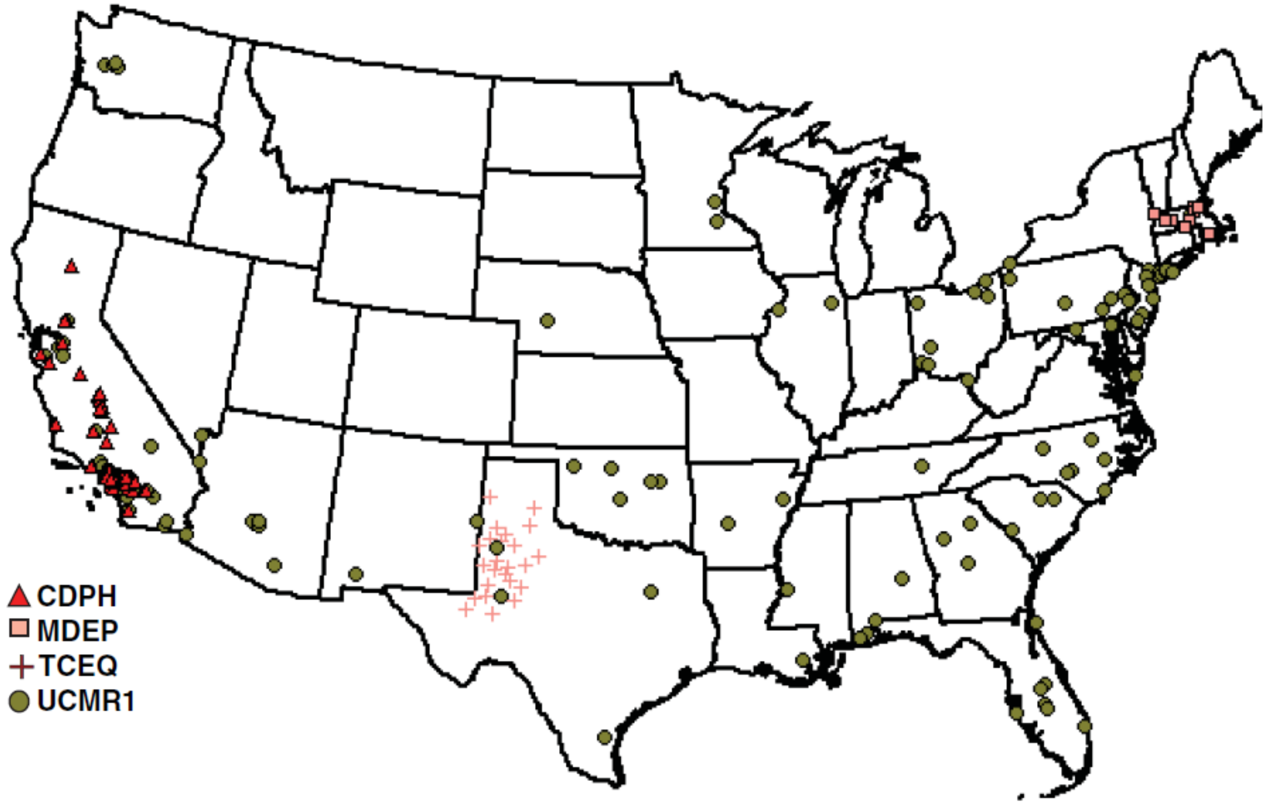
Perchlorate is

- ClO_4^-
- Both naturally occurring and manufactured
- Majority is manufactured for use in the defense and aerospace industries
- Perchlorate may occur naturally in the desert southwest

Health Effects

- Thyroid gland
- Fetuses, infants and young children.
- Interfere with iodide uptake into the thyroid gland
- Disrupt the functions of the thyroid
- Reduce the production of thyroid hormones.
- Acute contaminant

Occurrence



CDPH—California Department of Public Health, MDEP—Massachusetts Department of Environmental Protection, TCEQ—Texas Commission on Environmental Quality, UCMR1—Unregulated Contaminants Monitoring Rule 1

Brandhuber, S., 2009. A Review of Perchlorate Occurrence in Public Drinking Water Systems, *Journal AWWA*, November 2009

Perchlorate

- Community and NTNCs to monitor at entry points
- MCL and MCLG of 0.056 mg/L
- Alternatives of 0.018 and 0.090 mg/L

Surface Water or GUDI	Groundwater
Four Quarterly Samples	Four Quarterly Samples
Three Annual Samples	Three triennial samples
Apply for Waiver (once every nine years)	Apply for Waiver (once every nine years)

- Standardized Monitoring Framework
- States can reduce frequency to annual, three years or nine years with a waiver if the system is reliably and consistently below the MCL.
- Exceeding the MCL will trigger quarterly monitoring and a violation
- Waivers may be granted

Schedule

- Draft Regulation (June 26, 2019)
- 60 Day public comment period closed August 26, 2019
- EPA must issue a final regulation 18 months after the proposed regulations (which may be extended by 9 months).
- Rule will be effective 3 years after promulgation
- States have 2 years to submit a revised program to EPA for approval
- Compliance monitoring for CWS > 10,000 required in January 2023 – December 2025
- Compliance monitoring for NTNC and CWS $\leq$10,000 required in January 2026 – December 2028

ODW Comments to EPA

- Believe UCMR1 data likely underestimates occurrence in VA
- Expect typical detections in 10 ug/L range
- Adopting MCLGs and MCLs of 56 ug/L or 90 ug/L would have no meaningful opportunity for increased public health protection
- Draft considers Perchlorate as an acute contaminant but is not consistent (TNCs excluded).
- Monitoring waivers will be a significant activity.
- Support option to waive final two quarters of initial quarterly monitoring for a GW source if < DL.
- EPA should acknowledge hypochlorite degradation as a source of perchlorate and provide guidance on best practices.

Questions?

Data Management Update

Aaron Moses, PE
Field Services Engineer
October 16, 2019

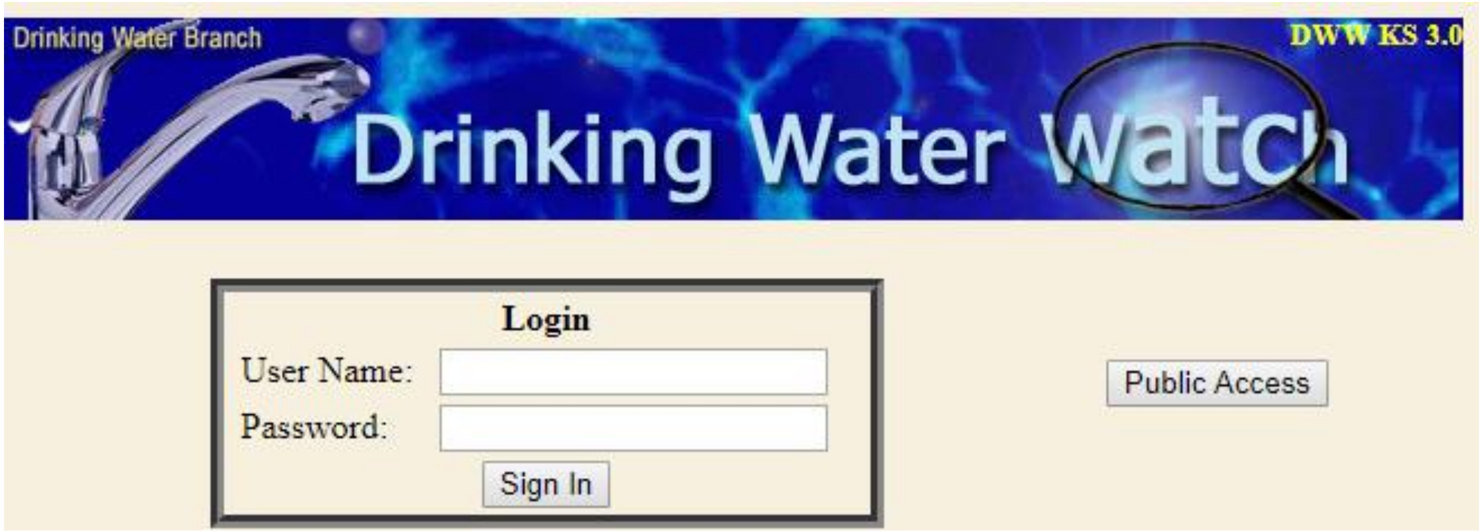
Data Management Update

- New Data Analyst
- GEC Software
- CMDP Pilot Program
- Drinking Water Watch Upgrades
  - Temporarily removed waterworks contacts
  - Testing GEC's DWW

GEC's Drinking Water Watch

- Effectively a "free" upgrade
- Minimal security approvals required
- Replaces some features of MS Access databases
- More information available to waterworks and public

GEC's Drinking Water Watch



Sign Ins	Available info
ODW	All
Waterworks	All for their waterworks, limited for others
Public Access	Limited (determined by ODW)

GEC's Drinking Water Watch

- Water System Facilities
- Sample Schedules
- Coliform Sample Results
- Coliform Sample Summary Results
- Lead And Copper Sample Summary Results
- Non-Coliform Samples/Results
- Non-Coliform Samples/Results by Analyte
- Violations/Enforcement Actions
- Site Visits
- Milestones

Current DWW

GEC's DWW

	Search Dashboard		Help
Water System Facilities	Violations Enforcement Actions	TCR Sample Results	TTHM Summaries
Sample Points	Assistance Actions	Recent Positive TCR Results	HAA5 Summaries
Sample Schedules / FANLs / Plans	Compliance Schedules	Other Chemical Results	PBCU Summaries
Site Visits Milestones	TOC/Alkalinity Results	Other Chemical Results by Analyte	Chlorine Summaries
TCR Sample Summaries	LRAA (TTHM/HAA5)	Recent Non-TCR Sample Results	Turbidity Summaries
		Ground Water Rule Sample Results	

GEC’s Drinking Water Watch

Initial customization:

- “Customer Service” contact
- Simple data query
- Next chemical sample due

GEC's DWW - Next chemical sample

To include for each analyte:

- Number of samples
- Facility ID and Name
- Sample Point IDs and Names
- Date range when next samples are due (begin date and end date)

Process Improvements – Chemical Results

Current Process	Proposed Process
Print all results	Routinely run SDWIS compliance reports and other custom reports
Run and print all compliance calculations	
Manually determine compliance and other required actions	Take required actions (NOV's, monitoring schedule changes, ect), based on report results
Sign documents	
Scan documents	
Email documents to waterworks	All information available to waterworks on DWW
File documents	

Process Improvements – Chemical Results

- Phase 1 – Make information available in DWW
  - Sample results and calculations
  - Next sample due
  - Compliance determination **?**
- Phase 2 – Provide reports and procedures
  - SDWIS compliance reports (federal rules)
  - Custom reports in GEC software (other req's)

Sample Results

Analyte Code	Analyte Name	Method	Less Than Ind.	Level Type	Reporting Level	Concentration	MCL	Mon Period
2356	ALDRIN	508	<	MRL	.05 UG/L			
2388	AROCLOR 1016	508	<	MRL	.25 UG/L			
2390	AROCLOR 1221	508	<	MRL	.2 UG/L			
2392	AROCLOR 1232	508	<	MRL	.25 UG/L			
2394	AROCLOR 1242	508	<	MRL	.25 UG/L			
2396	AROCLOR 1248	508	<	MRL	.3 UG/L			
2398	AROCLOR 1254	508	<	MRL	.35 UG/L			
2400	AROCLOR 1260	508	<	MRL	.35 UG/L			
2050	ATRAZINE	507				1.2 UG/L	0.003 MG/L	04-01-2019 06-30-2019
2010	BHC-GAMMA	508	<	MRL	.02 UG/L		0.0002 MG/L	01-01-2019 12-31-2019
2076	BUTACHLOR	507	<	MRL	.5 UG/L			
2046	CARBOFURAN	507	<	MRL	.5 UG/L		0.04 MG/L	
2959	CHLORDANE	508	<	MRL	.2 UG/L		0.002 MG/L	01-01-2019 12-31-2019
2070	DIELDRIN	508	<	MRL	.05 UG/L			
2005	ENDRIN	508	<	MRL	.2 UG/L		0.002 MG/L	01-01-2019 12-31-2019
2065	HEPTACHLOR	508	<	MRL	.04 UG/L		0.0004 MG/L	01-01-2019 12-31-2019
2067	HEPTACHLOR EPOXIDE	508	<	MRL	.02 UG/L		0.0002 MG/L	01-01-2019 12-31-2019
2274	HEXACHLOROBENZENE	525.2	<	MRL	.1 UG/L		0.001 MG/L	01-01-2019 12-31-2019
2042	HEXACHLOROCYCLOPENTADIENE	508	<	MRL	5 UG/L		0.05 MG/L	
2051	LASSO	507	<	MRL	.2 UG/L		0.002 MG/L	01-01-2019 12-31-2019
2015	METHOXYCHLOR	508	<	MRL	4 UG/L		0.04 MG/L	01-01-2019 12-31-2019
2045	METOLACHLOR	508				1.4 UG/L		

Sample Result Calculations

TOC Data

TOC/Alkalinity Sample Results					
Mon Period	Mon Period Avg. #Samples	Running Annual Avg. #Samples	Removal Ratio	Site	Analyte Name
09-01-2019 09-30-2019	160.0 MG/L 1 Sample	160.0 MG/L 1 Sample		COMBINED RAW SOURCE	ALKALINITY, TOTAL
09-01-2019 09-30-2019	7.9 MG/L 1 Sample	8.4 MG/L 12 Samples		COMBINED RAW SOURCE	CARBON, TOTAL
09-01-2019 09-30-2019	4.1 MG/L 1 Sample	4.3 MG/L 12 Samples	1.92	TP001	CARBON, TOTAL

DBP LRAAs

TTHM Locational Running Annual Average			
Site	Monitoring Period	Locational Running Annual Avg.	Samples
LRAA1 - 720 SW LANE	10-01-2019 to 12-31-2019	0.051 mg/L	3
	07-01-2019 to 09-30-2019	0.051 mg/L	4

LCR Data

PBCU Sample Summary Results						
Mon Period	Type	# Samples	Measure	Units	Analyte Code/Name	Last Sample Date
01-01-2015 12-31-2017	90%	50	.029	MG/L	CU90 - COPPER SUMMARY	08-17-2017
01-01-2015 12-31-2017	95%	50	.032	MG/L	CU90 - COPPER SUMMARY	
01-01-2015 12-31-2017	AL	0 Exceeding Action Level			CU90 - COPPER SUMMARY	
01-01-2015 12-31-2017	AL	0 Exceeding Action Level			PB90 - LEAD SUMMARY	
01-01-2015 12-31-2017	90%	50	.0025	MG/L	PB90 - LEAD SUMMARY	08-17-2017
01-01-2015 12-31-2017	95%	50	.003	MG/L	PB90 - LEAD SUMMARY	

Questions?

JAMA Pediatrics | Original Investigation

Association Between Maternal Fluoride Exposure During Pregnancy and IQ Scores in Offspring in Canada

Rivka Green, MA; Bruce Lanphear, MD; Richard Hornung, PhD; David Flora, PhD; E. Angeles Martinez-Mier, DDS; Raichel Neufeld, BA; Pierre Ayotte, PhD; Gina Muckle, PhD; Christine Till, PhD

IMPORTANCE The potential neurotoxicity associated with exposure to fluoride, which has generated controversy about community water fluoridation, remains unclear.

OBJECTIVE To examine the association between fluoride exposure during pregnancy and IQ scores in a prospective birth cohort.

DESIGN, SETTING, AND PARTICIPANTS This prospective, multicenter birth cohort study used information from the Maternal-Infant Research on Environmental Chemicals cohort. Children were born between 2008 and 2012; 41% lived in communities supplied with fluoridated municipal water. The study sample included 601 mother-child pairs recruited from 6 major cities in Canada; children were between ages 3 and 4 years at testing. Data were analyzed between March 2017 and January 2019.

EXPOSURES Maternal urinary fluoride (MUF_{SG}), adjusted for specific gravity and averaged across 3 trimesters available for 512 pregnant women, as well as self-reported maternal daily fluoride intake from water and beverage consumption available for 400 pregnant women.

MAIN OUTCOMES AND MEASURES Children's IQ was assessed at ages 3 to 4 years using the Wechsler Primary and Preschool Scale of Intelligence-III. Multiple linear regression analyses were used to examine covariate-adjusted associations between each fluoride exposure measure and IQ score.

RESULTS Of 512 mother-child pairs, the mean (SD) age for enrollment for mothers was 32.3 (5.1) years, 463 (90%) were white, and 264 children (52%) were female. Data on MUF_{SG} concentrations, IQ scores, and complete covariates were available for 512 mother-child pairs; data on maternal fluoride intake and children's IQ were available for 400 of 601 mother-child pairs. Women living in areas with fluoridated tap water (n = 141) compared with nonfluoridated water (n = 228) had significantly higher mean (SD) MUF_{SG} concentrations (0.69 [0.42] mg/L vs 0.40 [0.27] mg/L; $P = .001$; to convert to millimoles per liter, multiply by 0.05263) and fluoride intake levels (0.93 [0.43] vs 0.30 [0.26] mg of fluoride per day; $P = .001$). Children had mean (SD) Full Scale IQ scores of 107.16 (13.26), range 52-143, with girls showing significantly higher mean (SD) scores than boys: 109.56 (11.96) vs 104.61 (14.09); $P = .001$. There was a significant interaction ($P = .02$) between child sex and MUF_{SG} (6.89; 95% CI, 0.96-12.82) indicating a differential association between boys and girls. A 1-mg/L increase in MUF_{SG} was associated with a 4.49-point lower IQ score (95% CI, −8.38 to −0.60) in boys, but there was no statistically significant association with IQ scores in girls ($B = 2.40$; 95% CI, −2.53 to 7.33). A 1-mg higher daily intake of fluoride among pregnant women was associated with a 3.66 lower IQ score (95% CI, −7.16 to −0.14) in boys and girls.

CONCLUSIONS AND RELEVANCE In this study, maternal exposure to higher levels of fluoride during pregnancy was associated with lower IQ scores in children aged 3 to 4 years. These findings indicate the possible need to reduce fluoride intake during pregnancy.

Editorial and Editor's Note

Supplemental content

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Author Affiliations: Author affiliations are listed at the end of this article.

Corresponding Author: Christine Till, PhD, Department of Psychology, York University, 4700 Keele St, Toronto, ON M3J 1P3, Canada (ctill@yorku.ca).

For decades, community water fluoridation has been used to prevent tooth decay. Water fluoridation is supplied to about 66% of US residents, 38% of Canadian residents, and 3% of European residents.[1] In fluoridated communities, fluoride from water and beverages made with tap water makes up 60% to 80% of daily fluoride intake in adolescents and adults.[2]

Fluoride crosses the placenta,[3] and laboratory studies show that it accumulates in brain regions involved in learning and memory[4] and alters proteins and neurotransmitters in the central nervous system.[5] Higher fluoride exposure from drinking water has been associated with lower children's intelligence in a meta-analysis[6] of 27 epidemiologic studies and in studies[7,8] including biomarkers of fluoride exposure. However, most prior studies were cross-sectional and conducted in regions with higher water fluoride concentrations (0.88-31.6 mg/L; to convert to millimoles per liter, multiply by 0.05263) than levels considered optimal (ie, 0.7 mg/L) in North America.[9] Further, most studies did not measure exposure during fetal brain development. In a longitudinal birth cohort study involving 299 mother-child pairs in Mexico City, Mexico, a 1-mg/L increase in maternal urinary fluoride (MUF) concentration was associated with a 6-point (95% CI, −10.84 to −1.74) lower IQ score among school-aged children.[10] In this same cohort, MUF was also associated with more attention-deficit/hyperactivity disorder–like symptoms.[11] Urinary fluoride concentrations among pregnant women living in fluoridated communities in Canada are similar to concentrations among pregnant women living in Mexico City.[12] However, it is unclear whether fluoride exposure during pregnancy is associated with cognitive deficits in a population receiving optimally fluoridated water.

This study examined whether exposure to fluoride during pregnancy was associated with IQ scores in children in a Canadian birth cohort in which 40% of the sample was supplied with fluoridated municipal water.

Key Points

Question Is maternal fluoride exposure during pregnancy associated with childhood IQ in a Canadian cohort receiving optimally fluoridated water?

Findings In this prospective birth cohort study, fluoride exposure during pregnancy was associated with lower IQ scores in children aged 3 to 4 years.

Meaning Fluoride exposure during pregnancy may be associated with adverse effects on child intellectual development, indicating the possible need to reduce fluoride intake during pregnancy.

Methods

Study Cohort

Between 2008 and 2011, the Maternal-Infant Research on Environmental Chemicals (MIREC) program recruited 2001 pregnant women from 10 cities across Canada. Women who could communicate in English or French, were older than 18 years, and were within the first 14 weeks of pregnancy were recruited from prenatal clinics. Participants were not recruited if there was a known fetal abnormality, if they had any medical complications, or if there was illicit drug use during pregnancy. Additional details are in the cohort profile description.[13]

A subset of 610 children in the MIREC Study was evaluated for the developmental phase of the study at ages 3 to 4 years; these children were recruited from 6 of 10 cities included in the original cohort: Vancouver, Montreal, Kingston, Toronto, Hamilton, and Halifax. Owing to budgetary restraints, recruitment was restricted to the 6 cities with the most participants who fell into the age range required for the testing during the data collection period. Of the 610 children, 601 (98.5%) completed neurodevelopmental testing; 254 (42.3%) of these children lived in nonfluoridated regions and 180 (30%) lived in fluoridated regions; for 167 (27.7%) fluoridation status was unknown owing to missing water data or reported not drinking tap water (**Figure 1**).

This study was approved by the research ethics boards at Health Canada, York University, and Indiana University. All women signed informed consent forms for both mothers and children.

Maternal Urinary Fluoride Concentration

We used the mean concentrations of MUF measured in urine spot samples collected across each trimester of pregnancy at a mean (SD) of 11.57 (1.57), 19.11 (2.39), and 33.11 (1.50) weeks of gestation. Owing to the variability of urinary fluoride measurement and fluoride absorption during pregnancy,[14] we only included women who had all 3 urine samples. In our previous work, these samples were moderately correlated; intraclass correlation coefficient (ICC) ranged from 0.37 to 0.40.[12]

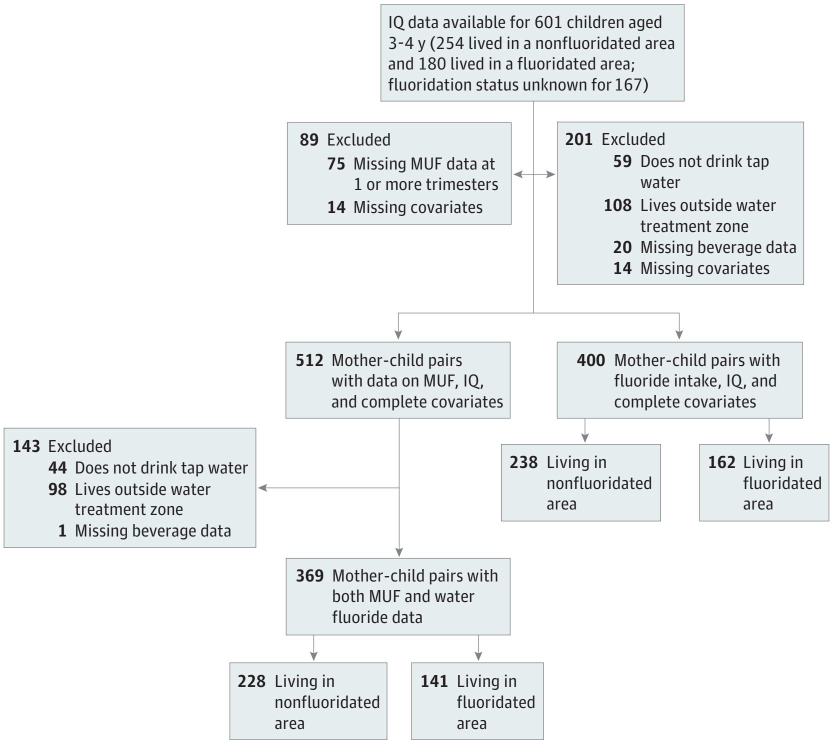
Urinary fluoride concentration was analyzed at the Indiana University School of Dentistry using a modification of the hexamethyldisiloxane (Sigma Chemical Co) microdiffusion procedure[15] and described in our previous work.[12] Fluoride concentration could be measured to 0.02 mg/L. We excluded 2 samples (0.002%) because the readings exceeded the highest concentration standard (5 mg/L) and there was less certainty of these being representative exposure values.

To account for variations in urine dilution at the time of measurement, we adjusted MUF concentrations for specific gravity (SG) using the following equation: $MUF_{SG} = MUF_i \times (SG_M\text{-}1)/(SG_i\text{-}1)$, where MUF_{SG} is the SG-adjusted fluoride concentration (in milligrams of fluoride per liter), MUF_i is the observed fluoride concentration, SG_i is the SG of the individual urine sample, and SG_M is the median SG for the cohort.[16] For comparison, we also adjusted MUF using the same creatinine adjustment method that was used in the 2017 Mexican cohort.[10]

Water Fluoride Concentration

Water treatment plants measured fluoride levels daily if fluoride was added to municipal drinking water and weekly or monthly if fluoride was not added to water.[12] We matched

Figure 1. Flowchart of Inclusion Criteria



MUF indicates maternal urinary fluoride.

participants' postal codes with water treatment plant zones, allowing an estimation of water fluoride concentration for each woman by averaging water fluoride concentrations (in milligrams per liter) during the duration of pregnancy. We only included women who reported drinking tap water during pregnancy.

Daily Fluoride Intake in Mothers

We obtained information on consumption of tap water and other water-based beverages (tea and coffee) from a self-report questionnaire completed by mothers during the first and third trimesters. This questionnaire was used in the original MREC cohort and has not been validated. Also, for this study, we developed methods to estimate and calculate fluoride intake that have not yet been validated. To estimate fluoride intake from tap water consumed per day (milligrams per day), we multiplied each woman's consumption of water and beverages by her water fluoride concentration (averaged across pregnancy) and multiplied by 0.2 (fluoride content for a 200-mL cup). Because black tea contains a high fluoride content (2.6 mg/L),[17,18] we also estimated the amount of fluoride consumed from black tea by multiplying each cup of black tea by 0.52 mg (mean fluoride content in a 200-mL cup of black tea made with deionized water) and added this to the fluoride intake variable. Green tea also contains varying levels of fluoride; therefore, we used the mean for the green teas listed by the US Department of Agriculture (1.935 mg/L).[18] We multiplied each cup of green tea by 0.387 mg (fluoride content in a 200-mL cup of green tea made with deionized water) and added this to the fluoride intake variable.

Primary Outcomes

We assessed children's intellectual abilities with the Wechsler Preschool and Primary Scale of Intelligence, Third Edition. Full Scale IQ (FSIQ), a measure of global intellectual functioning, was the primary outcome. We also assessed verbal IQ (VIQ), representing verbal reasoning and comprehension, and performance IQ (PIQ), representing nonverbal reasoning, spatial processing, and visual-motor skills.

Covariates

We selected covariates from a set of established factors associated with fluoride metabolism (eg, time of void and time since last void) and children's intellectual abilities (eg, child sex, maternal age, gestational age, and parity) (**Table 1**). Mother's race/ethnicity was coded as white or other, and maternal education was coded as either bachelor's degree or higher or trade school diploma or lower. The quality of a child's home environment was measured by the Home Observation for Measurement of the Environment (HOME)-Revised Edition[19] on a continuous scale. We also controlled for city and, in some models, included self-reported exposure to secondhand smoke (yes/no) as a covariate.

Statistical Analyses

In our primary analysis, we used linear regression analyses to estimate the associations between our 2 measures of fluoride exposure (MUF_{SG} and fluoride intake) and children's FSIQ scores. In addition to providing the coefficient corresponding to a 1-mg difference in fluoride exposure, we also estimated coefficients corresponding to a fluoride exposure

Table 1. Demographic Characteristics and Exposure Outcomes for Mother-Child Pairs With MUF_{SG} (n = 512) and Fluoride Intake Data (n = 400) by Fluoridated and Nonfluoridated Status[a]

Variable[b]	No. (%)		
		Maternal-Child Pairs With Fluoride Intake, IQ, and Complete Covariate Data (n = 400)	
	MUF_{SG} Sample (n = 512)[c]	Nonfluoridated (n = 238)	Fluoridated (n = 162)
Mothers			
Age of mother at enrollment, mean (SD), y	32.33 (5.07)	32.61 (4.90)	32.52 (4.03)
Prepregnancy BMI, mean (SD)	25.19 (6.02)	25.19 (6.35)	24.33 (5.10)
Married or common law	497 (97)	225 (95)	159 (98)
Born in Canada	426 (83)	187 (79)	131 (81)
White	463 (90)	209 (88)	146 (90)
Maternal education			
Trade school diploma/high school	162 (32)	80 (34)	38 (24)
Bachelor's degree or higher	350 (68)	158 (66)	124 (76)
Employed at time of pregnancy	452 (88)	205 (86)	149 (92)
Net income household >$70 000 CAD	364 (71)	162 (68)	115 (71)
HOME total score, mean (SD)	47.32 (4.32)	47.28 (4.48)	48.14 (3.90)
Smoked in trimester 1	12 (2)	7 (3)	2 (1)
Secondhand smoke in the home	18 (4)	9 (4)	2 (1)
Alcohol consumption, alcoholic drink/mo			
None	425 (83)	192 (81)	136 (84)
<1	41 (8)	23 (10)	11 (7)
≥1	46 (9)	23 (10)	15 (9)
Parity (first birth)	233 (46)	119 (50)	71 (44)
Children			
Female	264 (52)	118 (50)	83 (51)
Age at testing, mean (SD), y	3.42 (0.32)	3.36 (0.31)	3.49 (0.29)
Gestation, mean (SD), wk	39.12 (1.57)	39.19 (1.47)	39.17 (1.81)
Birth weight, mean (SD), kg	3.47 (0.49)	3.48 (0.48)	3.47 (0.53)
FSIQ	107.16 (13.26)	108.07 (13.31)	108.21 (13.72)
Boys[d]	104.61 (14.09)	106.31 (13.60)	104.78 (14.71)
Girls[d]	109.56 (11.96)	109.86 (12.83)	111.47 (11.89)
Exposure variables			
MUF_{SG} concentration, mg/L[e]			
No.	512	228	141
Mean (SD)	0.51 (0.36)	0.40 (0.27)	0.69 (0.42)
Fluoride intake level per day, mg			
No.	369[a]	238	162
Mean (SD)	0.54 (0.44)	0.30 (0.26)	0.93 (0.43)
Water fluoride concentration, mg/L			
No.	369[a]	238	162
Mean (SD)	0.31 (0.23)	0.13 (0.06)	0.59 (0.08)

Abbreviations: BMI, body mass index (calculated as weight in kilograms divided by height in meters squared); CAD, Canadian dollars; FSIQ, Full Scale IQ; HOME, Home Observation for Measurement of the Environment; MUF_{SG}, maternal urinary fluoride adjusted for specific gravity.

SI conversion factor: To convert fluoride to millimoles per liter, multiply by 0.05263.

[a] Owing to missing water treatment plant data and/or MUF data, the samples are distinct with some overlapping participants in both groups (n = 369).

[b] All of the listed variables were tested as potential covariates, as well as the following: paternal variables (age, education, employment status, smoking status, and race/ethnicity); maternal chronic condition during pregnancy and birth country; breastfeeding duration; and time of void and time since last void.

[c] Maternal urinary fluoride (averaged across all 3 trimesters) and corrected for specific gravity.

[d] The FSIQ score has a mean (SD) of 100 (15); US population norms used.

[e] Owing to missing water treatment plant data, the samples in the fluoridated and nonfluoridated regions do not add up to the MUF sample size.

difference spanning the 25th to 75th percentile range (which corresponds to a 0.33 mg/L and 0.62 mg F/d difference in MUF_{SG} and fluoride intake, respectively) as well as the 10th to 90th percentile range (which corresponds to a 0.70 mg/L and 1.04 mg F/d difference in MUF_{SG} and fluoride intake, respectively).

We retained a covariate in the model if its *P* value was less than .20 or its inclusion changed the regression coefficient of the variable associated factor by more than 10% in any of the IQ models. Regression diagnostics confirmed that there were no collinearity issues in any of the IQ models with MUF_{SG} or fluoride intake (variance inflation factor <2 for all covariates). Residuals from each model had approximately normal distributions, and their Q-Q plots revealed no extreme outliers. Plots of residuals against fitted values did not suggest any assumption violations and there were no substantial influential observations as measured by Cook distance. Including quadratic or natural-log effects of MUF_{SG} or fluoride intake did not significantly improve the regression models. Thus, we present the more easily interpreted estimates from linear regression models. Additionally, we examined separate models with 2 linear splines to test whether the MUF_{SG} association significantly differed between lower and higher levels of MUF_{SG} based on 3 knots, which were set at 0.5 mg/L (mean MUF_{SG}), 0.8 mg/L (threshold seen in the Mexican birth cohort),[10] and 1 mg/L (optimal concentration in the United States until 2015).[20] For fluoride intake, knots were set at 0.4 mg (mean fluoride intake), 0.8 mg, and 1 mg (in accordance with MUF_{SG}). We also examined sex-specific associations in all models by testing the interactions between child sex and each fluoride measure.

In sensitivity analyses, we tested whether the associations between MUF_{SG} and IQ were confounded by maternal blood concentrations of lead,[21] mercury,[21] manganese,[21,22] perfluoro-octanoic acid,[23] or urinary arsenic.[24] We also conducted sensitivity analyses by removing IQ scores that were greater than or less than 2.5 standard deviations from the sample mean. Additionally, we examined whether using MUF adjusted for creatinine instead of SG affected the results.

In additional analyses, we examined the association between our 2 measures of fluoride exposure (MUF_{SG} and fluoride intake) with VIQ and PIQ. Additionally, we examined whether water fluoride concentration was associated with FSIQ, VIQ, and PIQ scores.

For all analyses, statistical significance tests with a type I error rate of 5% were used to test sex interactions, while 95% confidence intervals were used to estimate uncertainty. Analyses were conducted using R software (the R Foundation).[25] The *P* value level of significance was .05, and all tests were 2-sided.

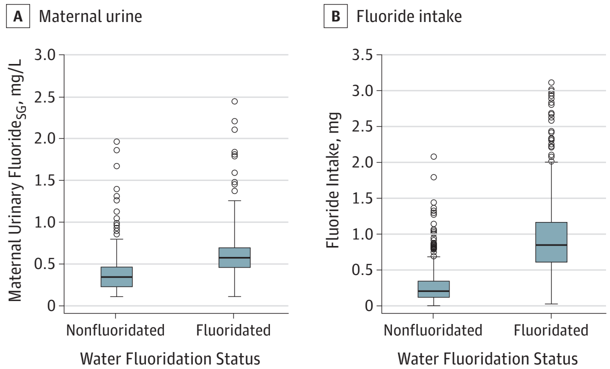
Results

For the first measure of fluoride exposure, MUF_{SG}, 512 of 601 mother-child pairs (85.2%) who completed the neurodevelopmental visit had urinary fluoride levels measured at each trimester of the mother's pregnancy and complete covariate data (Figure 1); 89 (14.8%) were excluded for missing MUF_{SG} at 1 or more trimesters (n = 75) or missing 1 or more covariates included in the regression (n = 14) (Figure 1). Of the 512 mother-child pairs with MUF_{SG} data (and all covariates), 264 children were female (52%).

For the second measure of fluoride exposure, fluoride intake from maternal questionnaire, data were available for 400 of the original 601 mother-child pairs (66.6%): 201 women (33.4%) were excluded for reporting not drinking tap water (n = 59), living outside of the predefined water treatment plant zone (n = 108), missing beverage consumption data (n = 20), or missing covariate data (n = 14) (Figure 1).

Children had mean FSIQ scores in the average range (population normed) (mean [SD], 107.16 [13.26], range = 52-143), with girls (109.56 [11.96]) showing significantly higher scores than boys (104.61 [14.09]; $P < .001$) (Table 1). The demographic characteristics of the 512 mother-child pairs included in the primary analysis were not substantially different from the original MIREC cohort or subset of mother-child pairs without 3 urine samples (eTable 1 in the Supplement). Of the 400 mother-child pairs with fluoride intake data (and all covariates), 118 of 238 (50%) in the group living in a nonfluoridated region were female and 83 of 162 (51%) in the group living in a fluoridated region were female.

Figure 2. Distribution of Fluoride Levels in Maternal Urine and for Estimated Fluoride Intake by Fluoridation Status



To convert fluoride to millimoles per liter, multiply by 0.05263.

Fluoride Measurements

The median MUF_{SG} concentration was 0.41 mg/L (range, 0.06-2.44 mg/L). Mean MUF_{SG} concentration was significantly higher among women (n = 141) who lived in communities with fluoridated drinking water (0.69 [0.42] mg/L) compared with women (n=228) who lived in communities without fluoridated drinking water (0.40 [0.27] mg/L; $P < .001$) (Table 1; **Figure 2**).

The median estimated fluoride intake was 0.39 mg per day (range, 0.01-2.65 mg). As expected, the mean (SD) fluoride intake was significantly higher for women (162 [40.5%]) who lived in communities with fluoridated drinking water (mean [SD], 0.93 [0.43] mg) than women (238 [59.5%]) who lived in communities without fluoridated drinking water (0.30 [0.26] mg; $P < .001$) (Table 1; Figure 2). The MUF_{SG} was moderately correlated with fluoride intake ($r = 0.49$; $P < .001$) and water fluoride concentration ($r = 0.37$; $P < .001$).

Maternal Urinary Fluoride Concentrations and IQ

Before covariate adjustment, a significant interaction (*P* for interaction = .03) between MUF_{SG} and child sex ($B = 7.24$; 95% CI, 0.81- 13.67) indicated that MUF_{SG} was associated with FSIQ in boys; an increase of 1 mg/L MUF_{SG} was associated with a 5.01 (95% CI, −9.06 to −0.97; $P = .02$) lower FSIQ score in boys. In contrast, MUF_{SG} was not significantly associated with FSIQ score in girls ($B = 2.23$; 95% CI, −2.77 to 7.23; $P = .38$) (**Table 2**).

Adjusting for covariates, a significant interaction (*P* for interaction = .02) between child sex and MUF_{SG} ($B = 6.89$; 95% CI, 0.96-12.82) indicated that an increase of 1 mg/L of MUF_{SG} was associated with a 4.49 (95% CI, −8.38 to −0.60; $P = .02$) lower FSIQ score for boys. An increase from the 10th to 90th percentile of MUF_{SG} was associated with a 3.14 IQ decrement among boys (Table 2; **Figure 3**). In contrast, MUF_{SG} was not significantly associated with FSIQ score in girls ($B = 2.43$; 95% CI, −2.51 to 7.36; $P = .33$).

Table 2. Unadjusted and Adjusted Associations Estimated From Linear Regression Models of Fluoride Exposure Variables and FSIQ Scores

	Difference (95% CI)			
		Adjusted Estimates, Regression Coefficients Indicate Change in Outcome per[a]		
Variable	Unadjusted	1 mg	25th to 75th Percentiles	10th to 90th Percentiles
MUF_{SG}[b,c]	−2.60 (−5.80 to 0.60)	−1.95 (−5.19 to 1.28)	−0.64 (−1.69 to 0.42)	−1.36 (−3.58 to 0.90)
Boys	−5.01 (−9.06 to −0.97)	−4.49 (−8.38 to −0.60)	−1.48 (−2.76 to −0.19)	−3.14 (−5.86 to −0.42)
Girls	2.23 (−2.77 to 7.23)	2.40 (−2.53 to 7.33)	0.79 (−0.83 to 2.42)	1.68 (−1.77 to 5.13)
Fluoride intake[d,e]	−3.19 (−5.94 to −0.44)	−3.66 (−7.16 to −0.15)	−2.26 (−4.45 to −0.09)	−3.80 (−7.46 to −0.16)

Abbreviations: FSIQ, Full Scale IQ; HOME, Home Observation for Measurement of the Environment; MUF_{SG}, maternal urinary fluoride adjusted for specific gravity.

[a] Adjusted estimates pertain to predicted FSIQ difference for a value spanning the interquartile range (25th to 75th percentiles) and 80th central range (10th to 90th percentiles): (1) MUF_{SG}: 0.33 mg/L, 0.70 mg/L, respectively; (2) fluoride intake: 0.62 mg, 1.04 mg, respectively.

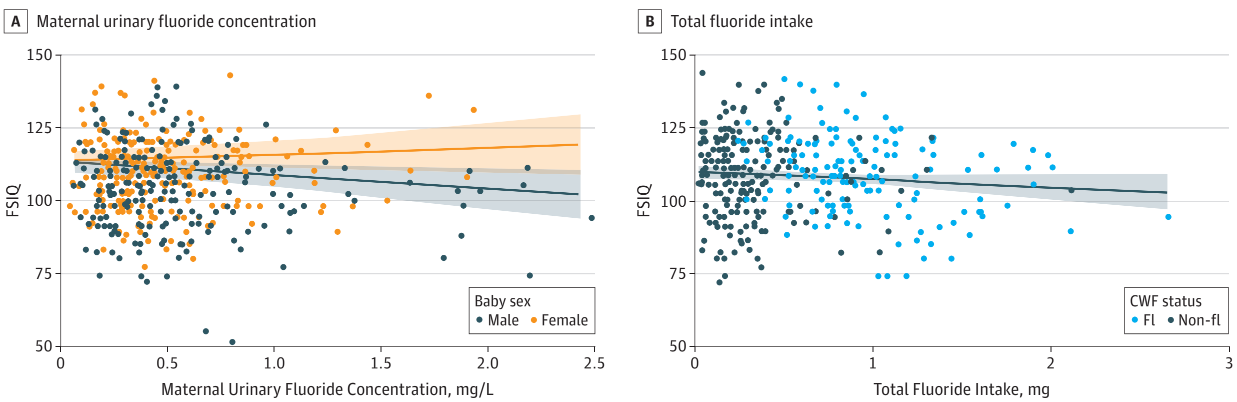
[b] n = 512.

[c] Adjusted for city, HOME score, maternal education, race/ethnicity, and including child sex interaction.

[d] n = 400.

[e] Adjusted for city, HOME score, maternal education, race/ethnicity, child sex, and prenatal secondhand smoke exposure.

Figure 3. Covariate Results of Multiple Linear Regression Models of Full Scale IQ (FSIQ) from Maternal Urinary Fluoride Concentration by Child Sex (n = 512) and Total Fluoride Intake Estimated from Daily Maternal Beverage Consumption (n = 400)



B, Community fluoridation status (CWF) is shown for each woman; black dots represent women living in nonfluoridated (non-Fl) communities and blue dots represent women living in fluoridated (Fl) communities.

Estimated Fluoride Intake and IQ

A 1-mg increase in fluoride intake was associated with a 3.66 (95% CI, −7.16 to −0.15; *P* = .04) lower FSIQ score among boys and girls (Table 2; Figure 3). The interaction between child sex and fluoride intake was not statistically significant (*B* = 1.17; 95% CI, −4.08 to 6.41; *P* for interaction = .66).

Sensitivity Analyses

Adjusting for lead, mercury, manganese, perfluorooctanoic acid, or arsenic concentrations did not substantially change the overall estimates of MUF_{SG} for boys or girls (eTable 2 in the Supplement). Use of MUF adjusted for creatinine did not substantially alter the associations with FSIQ (eTable 2 in the Supplement). Including time of void and time since last void did not substantially change the regression coefficient of MUF_{SG} among boys or girls.

Estimates for determining the association between MUF_{SG} and PIQ showed a similar pattern with a statistically significant interaction between MUF_{SG} and child sex (*P* for interaction = .007). An increase of 1 mg/L MUF_{SG} was associated with a 4.63 (95% CI, −9.01 to −0.25; *P* = .04) lower PIQ score in boys, but the association was not statistically significant in girls (*B* = 4.51; 95% CI, −1.02 to 10.05; *P* = .11). An increase of 1 mg/L MUF_{SG} was not significantly associated with VIQ in boys (*B* = −2.85; 95% CI, −6.65 to 0.95; *P* = .14) or girls (*B* = 0.55; 95% CI, −4.28 to 5.37; *P* = .82); the interaction between MUF_{SG} and child sex was not statistically significant (*P* for interaction = .25) (eTable 3 in the Supplement).

Consistent with the findings on estimated maternal fluoride intake, increased water fluoride concentration (per 1 mg/L) was associated with a 5.29 (95% CI, −10.39 to −0.19) lower FSIQ score among boys and girls and a 13.79 (95% CI, −18.82 to −7.28) lower PIQ score (eTable 4 in the Supplement).

Discussion

Using a prospective Canadian birth cohort, we found that estimated maternal exposure to higher fluoride levels during pregnancy was associated with lower IQ scores in children. This association was supported by converging findings from 2 measures of fluoride exposure during pregnancy. A difference in MUF_{SG} spanning the interquartile range for the entire sample (ie, 0.33 mg/L), which is roughly the difference in

MUF_{SG} concentration for pregnant women living in a fluoridated vs a nonfluoridated community, was associated with a 1.5-point IQ decrement among boys. An increment of 0.70 mg/L in MUF_{SG} concentration was associated with a 3-point IQ decrement in boys; about half of the women living in a fluoridated community have a MUF_{SG} equal to or greater than 0.70 mg/L. These results did not change appreciably after controlling for other key exposures such as lead, arsenic, and mercury.

To our knowledge, this study is the first to estimate fluoride exposure in a large birth cohort receiving optimally fluoridated water. These findings are consistent with that of a Mexican birth cohort study that reported a 6.3 decrement in IQ in preschool-aged children compared with a 4.5 decrement for boys in our study for every 1 mg/L of MUF.[10] The findings of the current study are also concordant with ecologic studies that have shown an association between higher levels of fluoride exposure and lower intellectual abilities in children.[7,8,26] Collectively, these findings support that fluoride exposure during pregnancy may be associated with neurocognitive deficits.

In contrast with the Mexican study,[10] the association between higher MUF_{SG} concentrations and lower IQ scores was observed only in boys but not in girls. Studies of fetal and early childhood fluoride exposure and IQ have rarely examined differences by sex; of those that did, some reported no differences by sex.[10,27-29] Most rat studies have focused on fluoride exposure in male rats,[30] although 1 study[31] showed that male rats were more sensitive to neurocognitive effects of fetal exposure to fluoride. Testing whether boys are potentially more vulnerable to neurocognitive effects associated with fluoride exposure requires further investigation, especially considering that boys have a higher prevalence of neurodevelopmental disorders such as ADHD, learning disabilities, and intellectual disabilities.[32] Adverse effects of early exposure to fluoride may manifest differently for girls and boys, as shown with other neurotoxicants.[33-36]

The estimate of maternal fluoride intake during pregnancy in this study showed that an increase of 1 mg of fluoride was associated with a decrease of 3.7 IQ points across boys and girls. The finding observed for fluoride intake in both boys and girls may reflect postnatal exposure to fluoride, whereas MUF primarily captures prenatal exposure. Importantly, we excluded women who reported that they did not drink tap water and matched water fluoride measurements to time of pregnancy when estimating maternal fluoride intake. None of the fluoride concentrations measured in municipal drinking water were greater than the maximum acceptable concentration of 1.5 mg/L set by Health Canada; most (94.3%) were lower than the 0.7 mg/L level considered optimal.[37]

Water fluoridation was introduced in the 1950s to prevent dental caries before the widespread use of fluoridated dental products. Originally, the US Public Health Service set the optimal fluoride concentrations in water from 0.7 to 1.2 mg/L to achieve the maximum reduction in tooth decay and minimize the risk of enamel fluorosis.[38] Fluorosis, or mottling, is a symptom of excess fluoride intake from any source occurring during the period of tooth development. In 2012, 68% of adolescents had very mild to severe enamel fluorosis.[39] The higher prevalence of enamel fluorosis, especially in fluoridated areas,[40] triggered renewed concern about excessive ingestion of fluoride. In 2015, in response to fluoride overexposure and rising rates of enamel fluorosis,[39,41,42] the US Public Health Service recommended an optimal fluoride concentration of 0.7 mg/L, in line with the recommended level of fluoride added to drinking water in Canada to prevent caries. However, the beneficial effects of fluoride predominantly occur at the tooth surface after the teeth have erupted.[43] Therefore, there is no benefit of systemic exposure to fluoride during pregnancy for the prevention of caries in offspring.[44] The evidence showing an association between fluoride exposure and lower IQ scores raises a possible new concern about cumulative exposures to fluoride during pregnancy, even among pregnant women exposed to optimally fluoridated water.

Strengths and Limitations

Our study has several strengths and limitations. First, urinary fluoride has a short half-life (approximately 5 hours) and depends on behaviors that were not controlled in our study, such as consumption of fluoride-free bottled water or swallowing toothpaste prior to urine sampling. We minimized this limitation by using 3 serial urine samples and tested for time of urine sample collection and time since last void, but these variables did not alter our results. Second, although higher maternal ingestion of fluoride corresponds to higher fetal plasma fluoride levels,[45] even serial maternal urinary spot samples may not precisely represent fetal exposure throughout pregnancy. Third, while our analyses controlled for a comprehensive set of covariates, we did not have maternal IQ data. However, there is no evidence suggesting that fluoride exposure differs as a function of maternal IQ; our prior study did not observe a significant association between MUF levels and maternal education level.[12] Moreover, a greater proportion of women living in fluoridated communities (124 [76%]) had a university-level degree compared with women living in nonfluoridated communities (158 [66%]). Nonetheless, despite our comprehensive array of covariates included, this observational study design could not address the possibility of other unmeasured residual confounding. Fourth, fluoride intake did not measure actual fluoride concentration in tap water in the participant's home; Toronto, for example, has overlapping water treatment plants servicing the same household. Similarly, our fluoride intake estimate only considered fluoride from beverages; it did not include fluoride from other sources such as dental products or food. Furthermore, fluoride intake data were limited by self-report of mothers' recall of beverage consumption per day, which was sampled at 2 points of pregnancy, and we lacked information regarding specific tea brand.[17,18] In addition, our methods of estimating maternal fluoride intake have not been validated; however, we show construct validity with MUF. Fifth, this study did not include assessment of postnatal fluoride exposure or consumption. However, our future analyses will assess exposure to fluoride in the MIREC cohort in infancy and early childhood.

Conclusions

In this prospective birth cohort study from 6 cities in Canada, higher levels of fluoride exposure during pregnancy were associated with lower IQ scores in children measured at age 3 to 4 years. These findings were observed at fluoride levels typically found in white North American women. This indicates the possible need to reduce fluoride intake during pregnancy.

ARTICLE INFORMATION

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Author Affiliations: Faculty of Health, York University, Toronto, Ontario, Canada (Green, Flora, Neufeld, Till); Faculty of Health Sciences, Simon Fraser University, Burnaby, British Columbia, Canada (Lanphear); Child and Family Research Institute, British Columbia Children's Hospital, University of British Columbia, Vancouver, British Columbia, Canada (Lanphear); Pediatrics and Environmental Health, Cincinnati Children's Hospital Medical Center, Cincinnati, Ohio (Hornung); School of Dentistry, Indiana University, Indianapolis (Martinez-Mier); Department of Social and Preventive Medicine, Laval University, Québec City, Québec, Canada. (Ayotte); Centre de Recherche du CHU de Québec, Université Laval, Québec City, Québec, Canada (Ayotte, Muckle); School of Psychology, Laval University, Québec City, Québec, Canada (Muckle).

Author Contributions: Ms Green and Dr Till had full access to all of the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis.
Concept and design: Green, Lanphear, Martinez-Mier, Ayotte, Muckle, Till.
Acquisition, analysis, or interpretation of data: All authors.
Drafting of the manuscript: Green, Flora, Martinez-Mier, Muckle, Till.
Critical revision of the manuscript for important intellectual content: All authors.
Statistical analysis: Green, Hornung, Flora, Till.
Obtained funding: Lanphear, Muckle, Till.
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Supervision: Flora, Till.

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Waterworks Operation Fees

Office of Drinking Water/VDH

October 16, 2019

Overview of this Presentation

- Authority for operation fees
- Considerations / Questions
- Identify stakeholders
- Scheduling

Authority (Code of Virginia)

§ 32.1-171.1. Waterworks operation fee required. (1992)

A. Every owner of a waterworks shall pay a fee of no more than $160,000 per year to the Department based on the Board's regulations, 12VAC5-600.

B. The fee may be based upon the number of persons served, the number of connections, or the classification of the waterworks … may exempt classes and sizes.

C. The income and principal used only for technical assistance (training for operator certification, engineering evaluation/advice, sample collection, and educational seminars)

Authority (Virginia Administrative Code)

12VAC5-600-50. Community Waterworks (CWW) Operation Fee.

- A fee not to exceed $160,000 is charged on July 1 each year to each community waterworks.
  - The number of customer accounts multiplied by no more than **$3.00. (Currently $2.95)**
  - The number of customer accounts is based on best available data six months prior to the close of business on June 30 each year.

12VAC5-600-60. Nontransient Non-community (NTNC) Waterworks Operation Fee.

* A fee of no more than **$90** per NTNC waterworks is due November 1.

VDH VIRGINIA DEPARTMENT OF HEALTH
Protecting You and Your Environment

Considerations

Fee Structure:

- Adjust to ensure fairness to the regulated community
- Largest waterworks pay highest fees
  - Do they receive value for what they pay?
- Consecutive waterworks do not pay fees
- TNCs do not pay fees
  - Enforcement issues?

Authority (Virginia Administrative Code)

12VAC5-600-20. Purpose of the Regulation.

- "…nor is it the intent that an owner be charged this fee on water transferred to another waterworks."

12VAC5-600-90. Exemptions.

- "Customer accounts through which water is sold or delivered to another waterworks are exempted from the fee calculated in 12VAC5-600-50."

ODW Effort

Here are our estimates of sanitary survey effort hours:

	Staff Hours per Inspection		
Type of PWS	Typical	Minimum	Maximum
Surface Water	30	25	32
GUDI Source	20	20	20
GW PWS with treatment	10	10	14
GW without treatment	8	8	10
Consecutive	8	7	12

ODW Effort
Sanitary Surveys, 2017-18

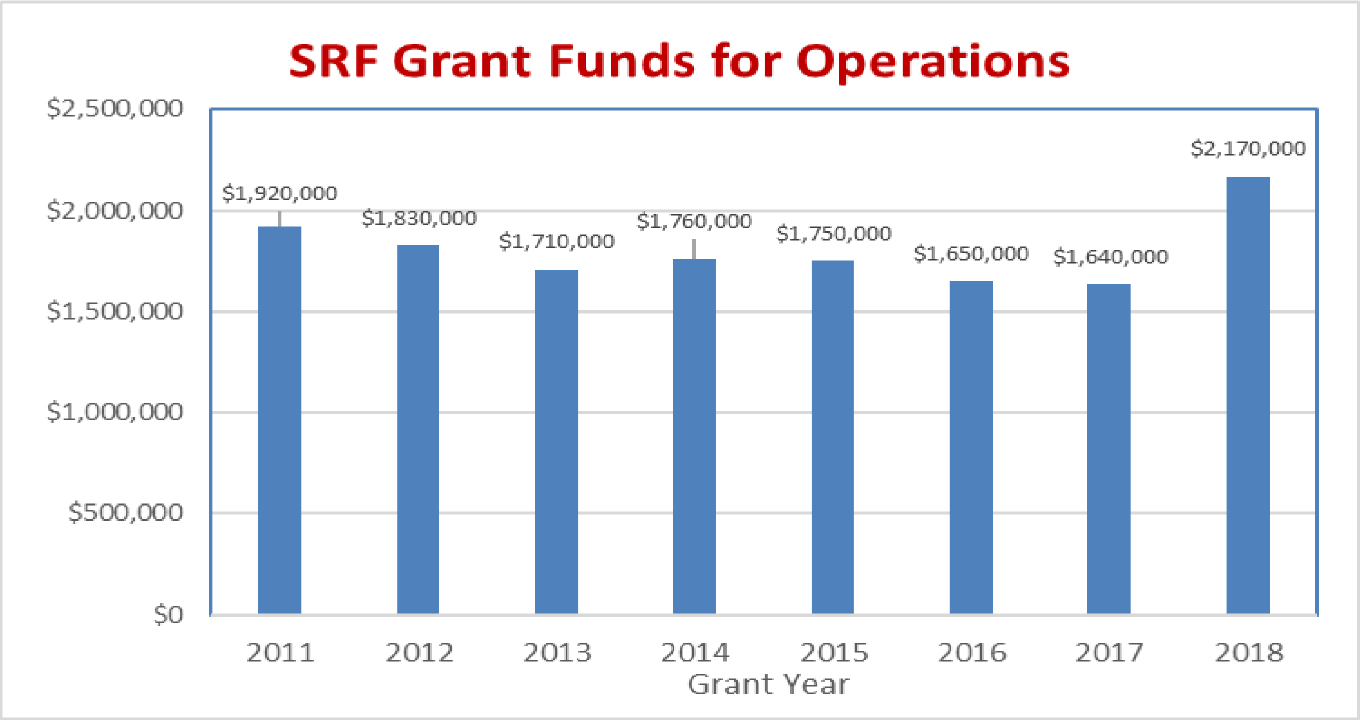
Count of TINVISIT_IS_NUMBER	Column Labels					
Row Labels	<501	>100,000	10,001 - 100,000	3301 - 10,000	501-3300	Grand Total
Sanitary Survey, Complete	**5284**	**94**	**253**	**320**	**1077**	**7028**
C	**1849**	**94**	**247**	**312**	**696**	**3198**
Ground	1508		8	30	317	1863
Purchasing	180	9	37	45	130	401
Surface & GUDI	161	85	202	237	249	934
NC	**2460**		**1**	**2**	**155**	**2618**
Ground	2449			2	153	2604
Purchasing	4		1		2	7
Surface & GUDI	7					7
NTNC	**975**		**5**	**6**	**226**	**1212**
Ground	955			6	212	1173
Purchasing	4		5		3	12
Surface & GUDI	16				11	27

Considerations

<u>Funding needs for the Drinking Water program</u>:

- PWSS grant, GF appropriations, operation fees are consistent year to year
- DWSRF has fluctuated
  - It makes up a significant portion of the operating budget
- Allow operation fee amount to fluctuate?
  - Uncertainty for rate payers/waterworks

SRF Grant challenges



Challenges related to federal funding:

- ODW does not know the amount of the SRF grant until after we apply.
- Fluctuations! Accurate forecasting is impossible, which can create cash flow issues.
- The grant amount requires a minimum state match.

ODW Funding: 2012-2019

Year	**PWSS Grant**	General Fund	PWSS Match	**GF minus PWSS Match**	SRF Grant	SRF Match Requirement	Appropriation	**Difference**	**SRF Funds for Operations (12% of SRF Grant)**	**WW Op Fees**	**Funds for Operations**
2019	$2,064,000	$1,351,893	$688,000	$663,893	$17,954,000	$3,590,800	$3,142,200	($448,600)	$2,154,480	$4,700,000	**$9,133,773**
2018	$1,995,000	$1,306,599	$665,000	$641,599	$18,123,000	$3,624,600	$3,142,200	($482,400)	$2,170,000	$4,700,000	**$9,024,199**
2017	$2,005,000	$1,518,374	$674,667	$843,707	$13,690,000	$2,738,000	$3,142,200	$404,200	$1,640,000	$4,700,000	**$9,592,907**
2016	$2,006,000	$1,369,898	$668,667	$701,231	$13,771,000	$2,754,200	$3,142,200	$388,000	$1,650,000	$4,700,000	**$9,445,231**
2015	$2,011,000	$1,322,718	$682,667	$640,051	$14,557,000	$2,911,400	$3,142,200	$230,800	$1,750,000	$4,700,000	**$9,331,851**
2014	$2,038,000	$1,294,677	$682,667	$612,010	$14,654,000	$2,930,800	$3,142,200	$211,400	$1,710,000	$4,700,000	**$9,271,410**
2013	$2,045,000	$1,247,670	$719,333	$528,337	$14,275,000	$2,855,000	$3,142,200	$287,200	$1,830,000	$4,700,000	**$9,390,537**
2012	$2,158,000	$2,036,507	$720,667	$1,315,840	$15,215,000	$3,043,000	$3,859,516	$816,516	$1,920,000	$3,600,000	**$9,810,356**

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New ODW Expenses (CY 2019)

- Re-establish sixth field office, based in Richmond
  - 4 new positions: ~ $400,000+/yr

- Retain valued/experienced staff with in-band adjustments:
  - 55 employees, ~ $350,000+/yr

- Replace MS Access databases with Oracle … move to support from GEC
  - ~ $250,000+/yr

New ODW Expenses – Update Data Mgmt.

Contract	Item	Initial Costs	Annual costs (subsequent years)
GEC Software	SWIFT Surveys	$ 120,396.00	$ 56,396.00
	SWIMR Web	$ 75,344.00	$ 36,344.00
	SWLab	$ 40,232.00	$ 3,860.00
	SWPBT	$ 64,504.00	$ 36,344.00
	SWEPT	$ 64,504.00	$ 36,344.00
	SWCCR	$ 40,580.00	$ 12,420.00
	Custom Software Development and Data Migration	$ 156,000.00	$ -
GEC MS Access Database Support		$ 234,968.00	$ -
GEC SDWIS Support		$ 25,000.00	$ 25,000.00
Total Costs		$ 821,528.00	$ 206,708.00
DWSRF Funds		$ 654,968.00	$ -
Additional Budget Needs		**$ 166,560.00**	**$ 206,708.00**
Budget Request		$ 150,000.00	$ 250,000.00

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Considerations

Unfunded Mandates:

- PFAS/PFOA
- Lead in drinking water (lead testing at schools and child care programs)
- Water system restructuring and consolidation

Next Step: Approach and Guidelines

The purpose of the Fee Regs Stakeholders Group is to assess the current fee structure and determine if it is appropriate to serve its intended purpose going forward. VDH intends to provide transparency, capture input, recommend policies, and ultimately suggest implementation procedures to maximize the effectiveness of the Operation Fee Regulations.

Next Step: Stakeholders

Large Community Waterworks

Medium Community Waterworks

Small Community Waterworks

Wholesale Waterworks

NTNC Waterworks

TNC Waterworks

WAC Representatives

Next Step: Stakeholders

Large Community Waterworks (>50,000 consumers)

- Fairfax Water
- Newport News
- Prince William County Service Authority
- City of Norfolk
- City of Richmond
- Virginia American Water

Next Step: Stakeholders

Medium Community Waterworks (3,300 – 50,000)

- Hanover County
- Halifax County
- Aqua Virginia

Small Community Waterworks (<3,300)

- Virginia Rural Water Association
- Sydnor Hydro

Next Step: Stakeholders

Wholesale Waterworks

- NRV Regional Water Authority
- Appomattox River Water Authority

NTNC Waterworks

- Virginia Manufacturers Association

TNC Waterworks

- Virginia Restaurant, Lodging, and Travel Association
- Virginia Campground Owners Association

Next Step: Stakeholders

Virginia Water Environment Association
Virginia Section American Water Works Association
Virginia Water Well Association
Virginia Association of Counties
Virginia Municipal League

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Next Step: Scheduling

November

December: Holidays

January – March: General Assembly