Final AGENDA - November 6, 2014

National Drinking Water Advisory Council Meeting
EPA William Jefferson Clinton East Building – Room 1117 A
November 6 and 7, 2014

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DAY 1: Thursday – November 6, 2014		
8:00-8:30 AM	**Registration and Coffee for Members**	
8:30 - 9:00	**Welcome and Review Agenda**	Jill Jonas, NDWAC Chair Peter Grevatt, Office Director, EPA Office of Ground Water and Drinking Water (OGWDW)
9:00 – 9:30	**National Drinking Water Program Update** *Purpose: Provide an overview of the National Drinking Water Program Priorities for the year ahead and discussion.*	Peter Grevatt
9:30 - 10:30	**Drinking Water Regulatory Development Activities** *Purpose: Update on drinking water regulatory-related activities and discussion focused on the upcoming Six year review of drinking water regulations including update on Lead and Copper Working Group*	Eric Burneson, Director, Standards and Risk Management Division, OGWDW
10:30 -- 10:45	**Break**	
10:45 – 12:00 pm	**Consultation on Drinking Water Treatment Compliance Flexibility – issues relevant to the Long Term 2 Enhanced Surface Water Treatment Rule** *Purpose: Presentation and Consultation with the NDWAC*	Jill Jonas: Facilitator Eric Burneson – Introduction

		Ken Rotert Standards and Risk Management Division, OGWDW Mike Finn Drinking Water Protection Division, OGWDW Carol DeMarco King and Joyce Chandler, Office of Enforcement and Compliance Assurance
12:00-1:30	**Lunch on your own**	
1:30 – 2:30	**Consultation on Drinking Water Treatment Compliance Flexibility – issues relevant to the Long Term 2 Enhanced Surface Water Treatment Rule** *Purpose: Consultation Continued*	Jill Jonas: Facilitator Eric Burneson and Ron Bergman, Acting Director Drinking Water Protection Division, OGWDW
2:30 - 3:30	**Consultation on Methods for Setting Standards for Groups of Carcinogenic Volatile Organic Chemicals.** <u>Purpose:</u> *To discuss the optional risk-based methods for setting drinking water standards for groups of chemicals.*	Jill Jonas: Facilitator Lisa Christ, Chief of Targeting and Analysis Branch, Standards and Risk Management Division
3:30 – 4:00	**Break**	
4:00 – 5:00	**Title: Update on Climate-Ready Utilities** <u>Purpose:</u> *To discuss the actions taken since NDWAC 2011 Report to the Administrator. Also discuss of Agency's climate portfolio including resiliency and sustainability.*	Jill Jonas: Facilitator David Travers, Director Water Security Decision Office of Ground Water and Drinking Water

5:00 – 5:30	**Title: Introduction to Potable Reuse** <u>*Purpose:*</u> *Overview of Office of Water Activities*	Michelle Schutz, Senior Advisor on Reuse
5:30 – 6:30	**Walk to Restaurant for Dinner**	
6:30 PM – 8:30 PM	**Group Dinner at:** **The Hamilton – 14th and F Streets , NW** **And then Taxi, Metro or walk back to Hotels.**	Roy Simon, Facilitator

DAY 2: Friday – November 7, 2014		
8:00- 8:30 A.M.	**Coffee for Members**	
8:30-10:00	**Title: Update on activities to reduce nutrients and address algal blooms and algal toxins** <u>Purpose:</u> *Describe and Discuss EPA Activities* o *Introduction and Events in Toledo, OH* o *Update on cyanotoxin fact sheet, analytical methods, UCMR4 and CCL* o *OW Office of Science and Technology planned actions for Health Advisories for cyanotoxins* o *EPA Nutrient Reduction Actions and Opportunities for Source Water Protection.* ***Key Question for Discussion:*** *Are EPA* activities to reduce nutrients and address Algal Blooms and Algal Toxins the activities that EPA should be implementing?	Jill Jonas, Facilitator Peter Grevatt Eric Burneson Lesley D'Anglada, Dr.P.H. Microbiologist, Health and Ecological Division, Office of Science and Technology (OST), OW Tom Wall, Director Assessment and Watershed Protection Division Office of Wetlands, Oceans and Watersheds Peter Grevatt
10:00 – 10:30	**Break**	
10:30 – 11:30	**Title: Update on activities to reduce nutrients and address Algal Blooms and Algal Toxins** <u>Purpose:</u> *Continue discussion on the key question.*	Facilitators: Jill Jonas and Peter Grevatt

11:30 – Noon	***Title: Pres*entations for Terms of Service and Possible Future Issues for Council's next meeting**	Peter Grevatt, OD/OGWDW
12:00-1:00 P.M.	**Lunch on your own**	
1:00- 1:30	**Public Comments**	Jill Jonas and Roy Simon, DFO Facilitators
1:30 – 2:00	**Council Deliberations and Agenda Topics for Next Meeting**	Jill Jonas and Peter Grevatt as Co-facilitators
2:00-2:30	**Closing Remarks and Adjourn**	Jill Jonas Peter Grevatt Roy Simon

Comments related to a public meeting on drinking water regulations for approaches to regulating groups of carcinogenic volatile organic chemicals, harmful algal blooms, climate and drinking water issues and other program topics; and options for compliance schedules relative to the Long Term 2 Enhanced Surface Water Treatment Rule.

Reducing Nutrient Pollution under the Clean Water Act: EPA's Approach

Tom Wall, Director, Assessment and Watershed Protection Division

U.S. EPA Office of Water

November 7, 2014

Outline

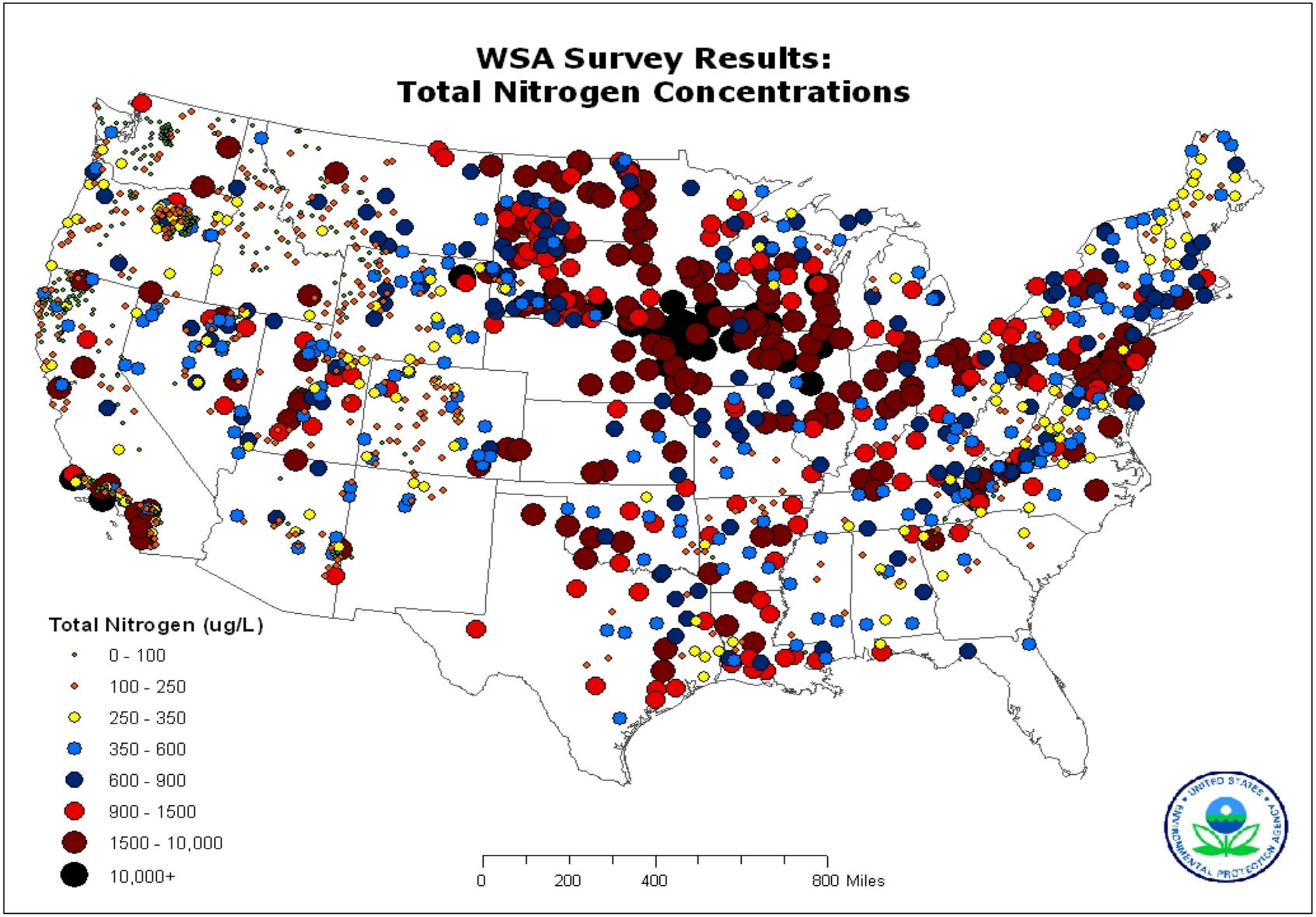
- National Scope of Nutrient Pollution
- Public Health and Aquatic Impacts
- Our Goals and How We Will Get There
- Nitrogen & Phosphorus Sources
- Call to Action: Helping State Progress via Nutrient Frameworks
- Looking Ahead

The Problem……

National Scope of Nutrient Problem

- **Well Documented Problem and Impacts, e.g.:**
  - EPA: Science Advisory Board (2007), Wadeable Streams and Lakes Assessments (2006, 2008), National Coastal Condition Report III (2008)
  - National Research Council: Mississippi River Water Quality (2008), Urban SW (2008)
  - USGS: Impact of Nutrients on Groundwater (2010), SPARROW Loadings (multiple)
  - Many published articles, State and university reports
  - State EPA Nutrient Innovations Task Group (NITG) *Call to Action* Report
- **15,000 Nutrient-related Impairment Listings in 49 States…an underestimate**
  - 2.5 Million Acres of Lakes and Reservoirs & 80,000 Miles of Rivers and Streams
  - >47% of Streams have Med to High P; >53% have Med to High N
- **78% of Assessed Continental U.S. Coastal Area Exhibits Eutrophication Symptoms**
- **168 Hypoxic Zones in U.S. Waters**
- **Public Health Risks – Contaminated Drinking Water is Significant & Costly**
  - Rate of nitrate violations in community water systems doubled over past 7 years

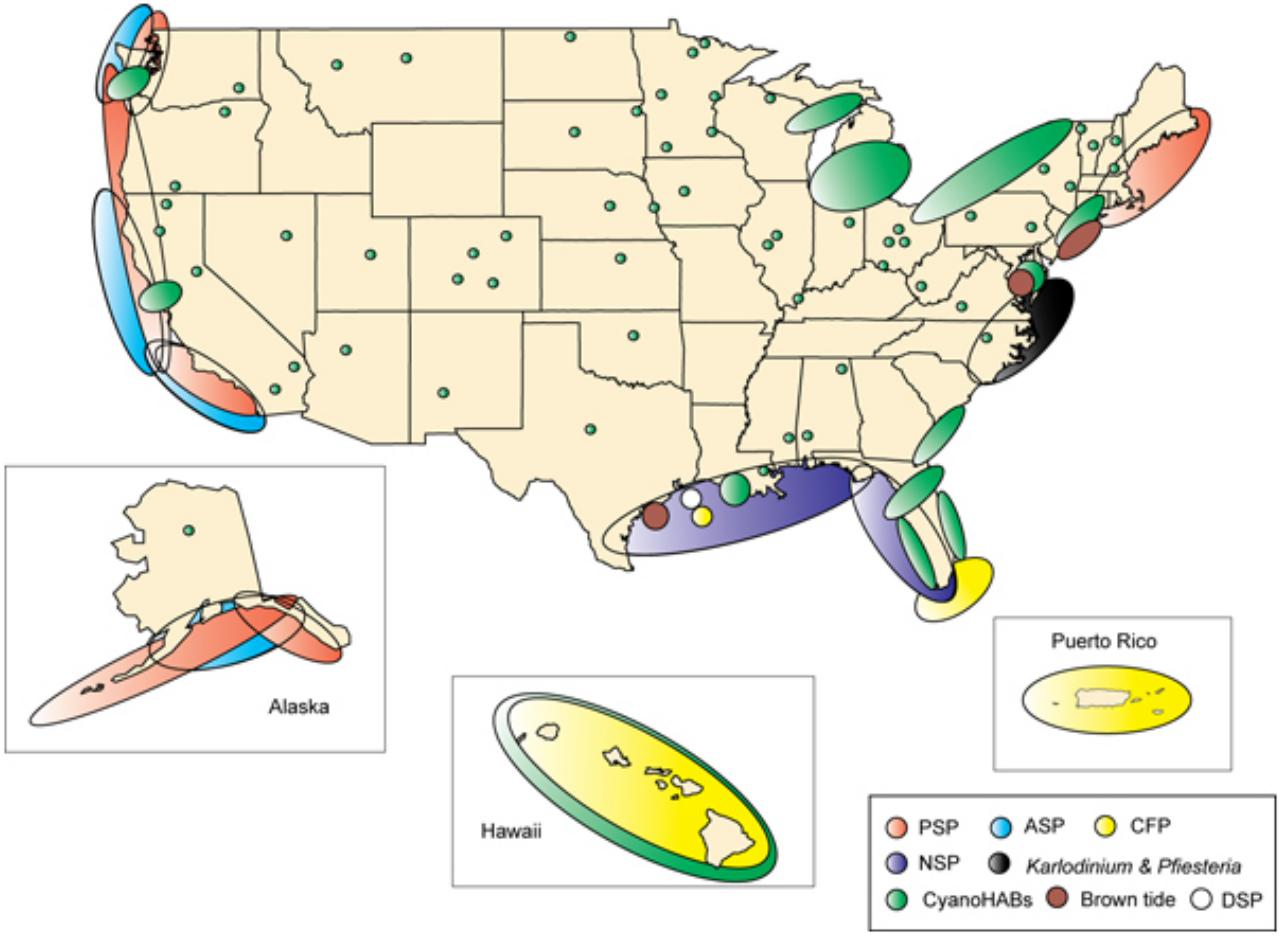
Concentrations of Nitrogen Nationally



2010 USGS Report
Nutrients in Streams & Groundwater

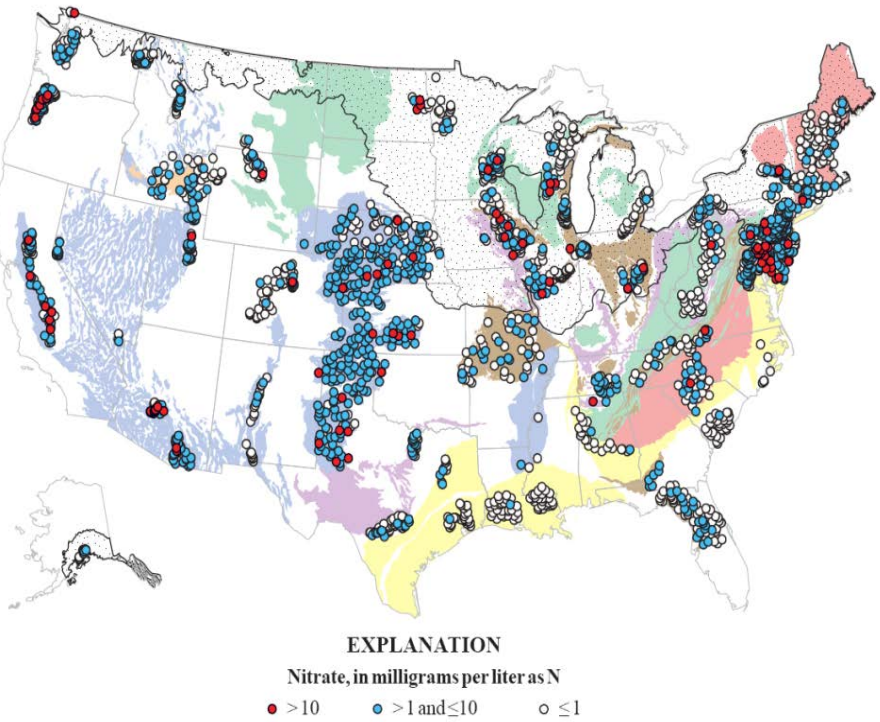
- Analysis of occurrence data from 1992 to 2004
- Nitrate MCLG exceeded in 7% of 2,400 DW wells sampled
- Nitrogen concentrations generally highest in Ag streams in Northeast, Midwest, & Northwest
- Despite substantial Federal, State and local efforts, limited national progress during this period
- Nitrate concentrations likely to increase in drinking water aquifers over next decade as nitrogen moves downward into the groundwater system.

Algal Bloom Occurrences in the United States (WHOI 2007).



National Drinking Water Impacts

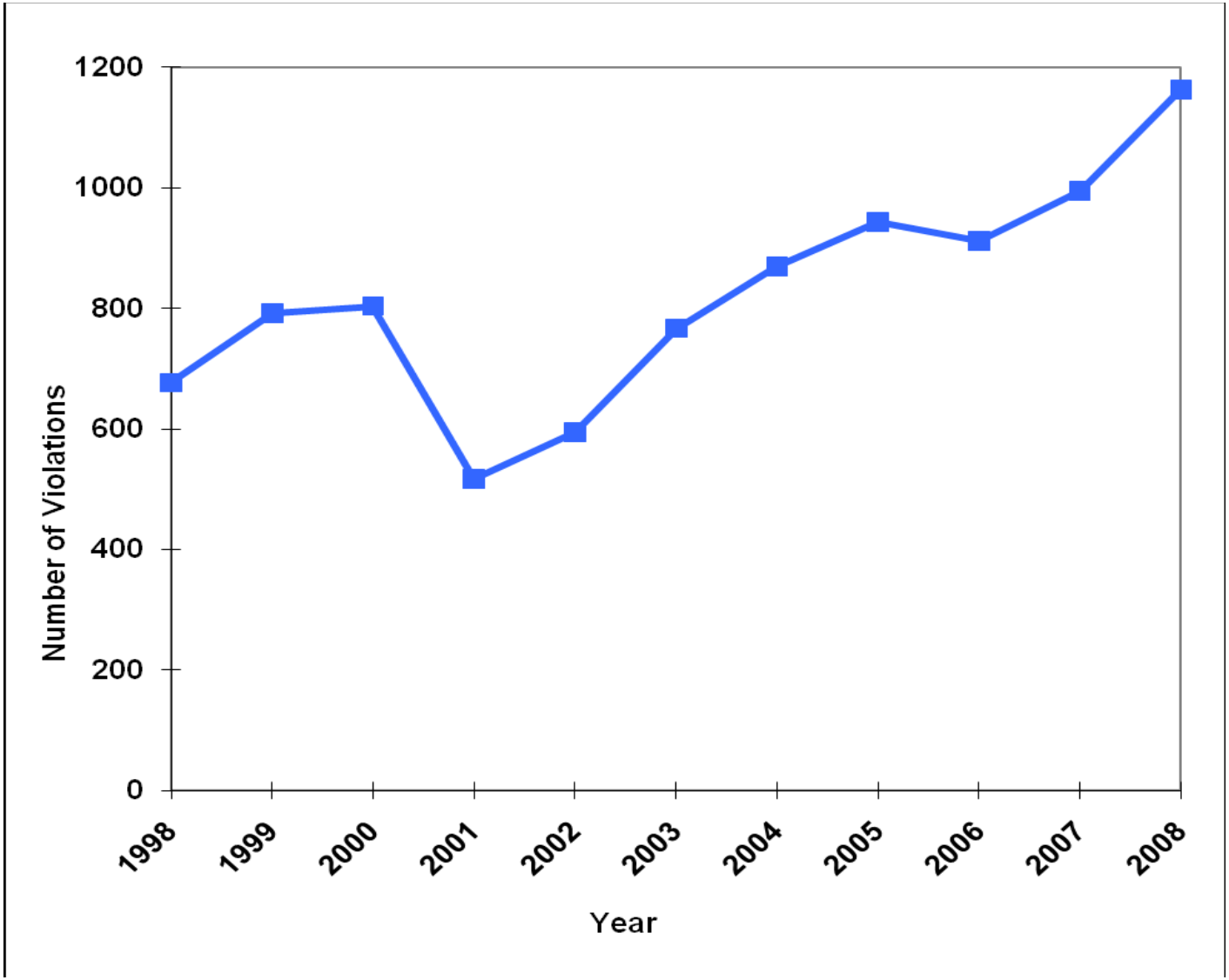
- Public Health Risks:



(MCL of 10 mg/l exceeded as N in 4.4 percent of the wells)

- Disinfectant by-products; significant & costly
- Contaminated drinking water supplies
- Rate of nitrate violations in community water systems has doubled over past 7 years
- Harmful algal blooms
- Increased treatment costs
  - Large Systems
  - Small Systems
  - Private Wells

Community Water System (CWS) Drinking Water Nitrate Violations



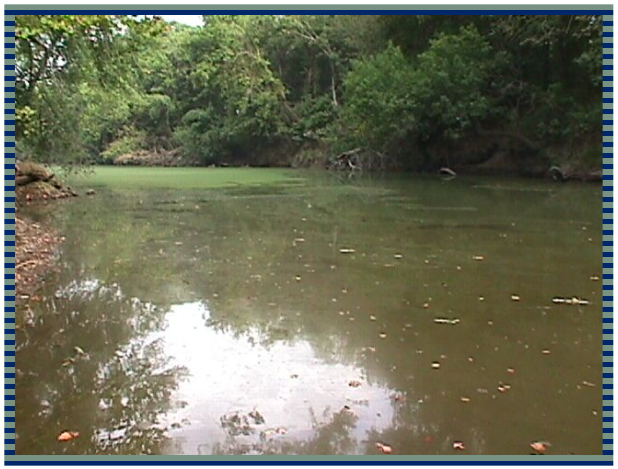
Impaired Reservoirs – examples

Microcystis bloom - August 2003

Toledo Water Intake

Grand Lake St. Mary's Ohio 2010

Impaired Streams – examples



Impacts on Downstream Waters

Microcystis Bloom – Goodby's Creek at the St. Johns River, Jacksonville, FL – September 14, 2005

Health Advisory listed by the FL Department of Health as a result of algal blooms and fish kill in the St. Johns River, Jacksonville, FL - June 15, 2010

National Population Growth

- **Nutrient Impacts Reflect Doubling of U.S. Population Over Past 50 Years**
- **Additional 135 Million People by 2050**
- **Nutrient Pollution Expected to Accelerate**

Year	U.S. Population
1950	152 million
2008	304 million
2050	439 million

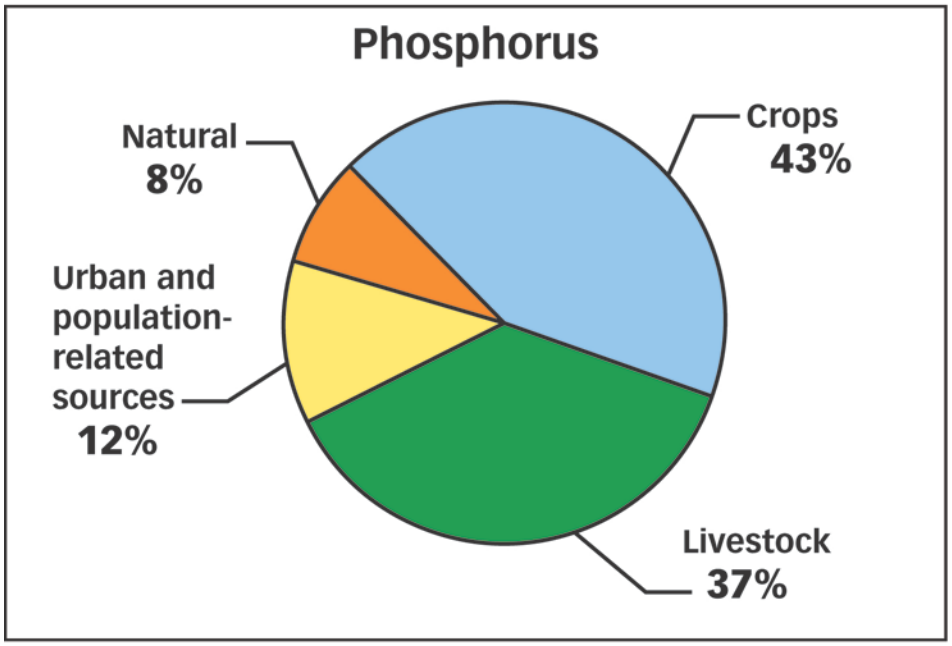
Our Goals

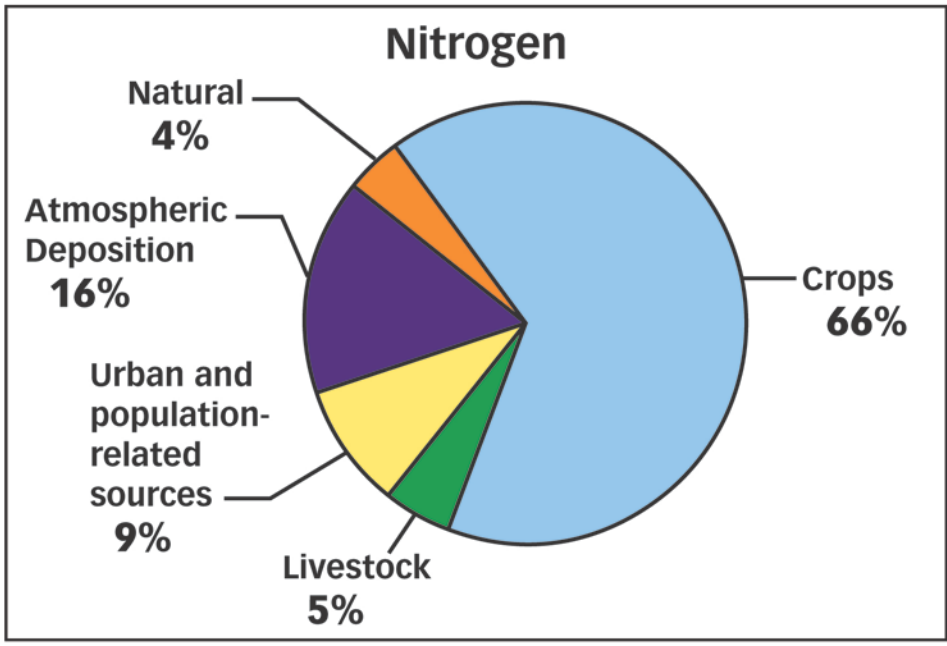
- **Reduce** sources of nitrogen and phosphorus pollution
- **Restore** surface and ground waters already degraded by nutrient pollution
- **Build** federal/state/local capacity to plan for and reduce such pollution through voluntary as well as regulatory means
- **Communicate** about the effects of nutrient pollution

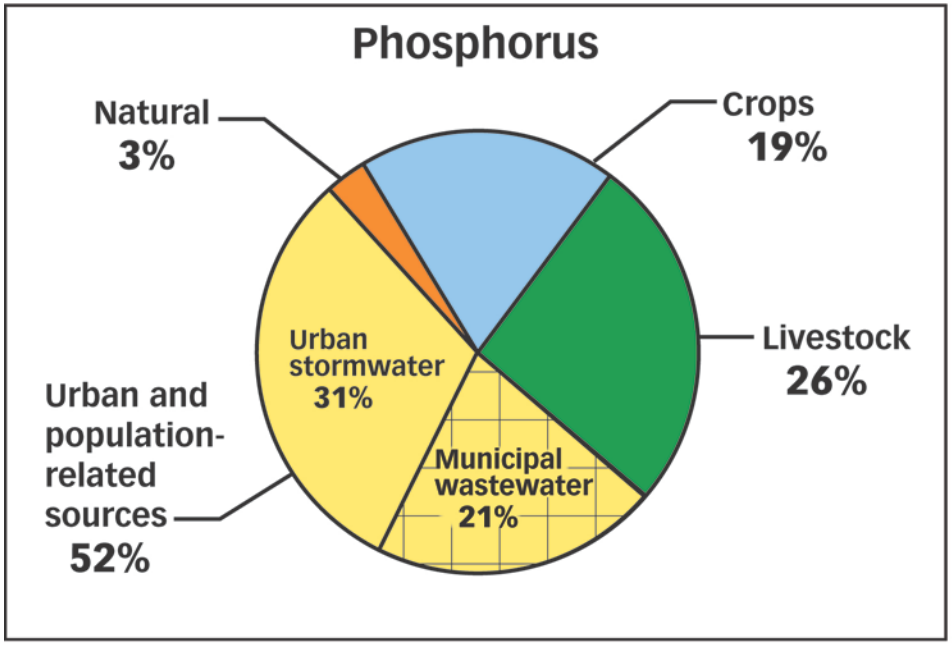
What are the N & P Sources?

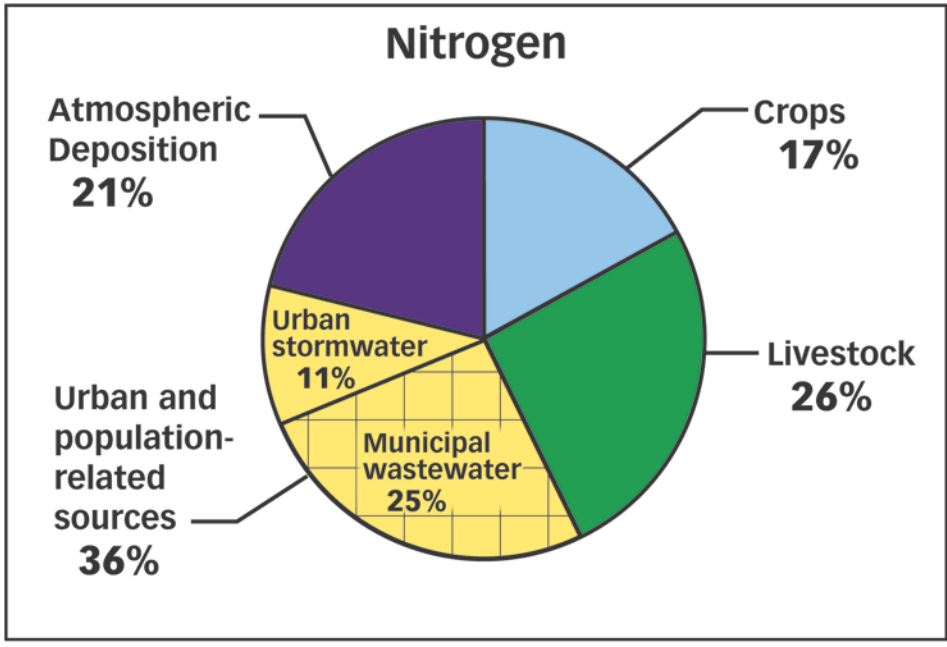
- **Municipal Wastewater Treatment**
  - Among most heavily regulated sectors in US, treat >18 mil tons of human waste annually
  - >16,500 municipal treatment system permits, ~7% have numeric limits for N or P, 18% monitor for these pollutants
- **Atmospheric Nitrogen Deposition**
  - Regulations in place, more underway
  - These sources can be significant, e.g., in the Chesapeake Bay and Mississippi River watersheds, Atmospheric N accounts for 21% of the source contributions
- **Urban Stormwater**
  - 80% of U.S. pop lives on 10% of land, urban pop impacting coastal areas
  - 50% of existing urban landscape will be redeveloped by 2030, and additional 30% of currently undeveloped land likely to be developed
- **Agricultural Livestock**
  - $130 Billion Industry , >1 bil tons of manure annually
  - Substantial Production is Largely Unregulated by CAFO Rule
- **Agricultural Row Crops**
  - $120 Billion Industry, in many areas a significant source of N&P
  - Ag SW Runoff and Irrigation Return Flows Exempt from CWA, Variable Controls at State Level

Gulf of Mexico









Chesapeake Bay

How Will We Get There?

- Set the stage – work with states nutrient frameworks (more below)
- Pollution prevention, protecting source water and healthy waters, plus restoring waters
- Innovation – promote cost effective and practical solutions
- Assess how we're doing
- Reach the public

Clean Water Act Framework

Set Standards

Technology-Based Approach

- Effluent limitation guidelines for industry and secondary treatment for wastewater plants

Water Quality-Based Approach

- EPA develops water quality criteria information
- States and tribes develop water quality standards and criteria

Implement Programs

Point Source Permits – regulatory (NPDES)

Nonpoint Source Program -- voluntary

Restoring Polluted Waters - TMDLs

Funding & Technical Assistance

Wetlands Protection

Watershed Approaches

What are the Tools?

- **TMDLs (Clean-up Plans)– Essential, but really enough?**
  - Wait Until There's a Problem?
  - Restoration over Prevention - Expensive
  - No Protection for High Quality or Attained Waters
  - We're Losing Ground
- **Permit Limits**
  - Hard to Manage Without Clear Numeric Targets
- **Priority Best Management Practices in Priority Watersheds**
- **Nutrient Criteria**
  - Narrative - Qualitative Goals (traditional approach)
  - Numeric - Quantitative & Measureable Goals
    - Causal and/or response variables?

Why a Nitrogen and Phosphorus Pollution Framework Now?

- Current Efforts to Address Hard Fought but Collectively Inadequate at State and National Level
- Serious problem that is getting worse; potential to become one of the costliest and most challenging environmental problems
- Growing population = more N and P pollution from urban stormwater, municipal and industrial wastewater discharges, air dep., agriculture
- To protect public health and the environment, need to act *now* to reduce N and P loadings -- while states continue to develop numeric nutrient criteria and standards
  - Since 1998, EPA has encouraged states to develop numeric nutrient criteria to gauge N and P pollution and develop and implement appropriate solutions

Framework: Guiding Principles

- **Results, results, results**: build from existing state work but accelerate progress and demonstrate clear results

- Encourage a collaborative approach between federal partners, states, and stakeholders

- States need flexibility to achieve near-term reductions in N and P pollution while they make progress on their long term strategies to adopt NNC

Framework Elements: Assessment and Prioritization

- Prioritize watersheds on a statewide basis for nutrient loading reductions
  - Estimate N & P loadings delivered to waters in all major watersheds across the state at HUC8 scale or smaller
  - ID watersheds that account for substantial portion of urban and/or ag
  - ID targeted/priority HUC12 or similar watersheds for targeted N & P load reduction activities, considering receiving water problems, public and private drinking water supply impacts, nutrient loadings, opportunity to address high risk nutrient problems, or other related factors

- Set watershed load reduction goals based upon best available information
  - Set numeric goals for loading reductions for each targeted/priority HUC12 that will collectively reduce the majority of N & P loads from ID'd HUC8

Framework Elements: ID and Implement Metrics, Measures, and Practices to Reduce Loads

- Ensure Effectiveness of Point Source Permits in Targeted/ Priority Sub-watersheds
  - Municipal and Industrial Wastewater Treatment Facilities
  - Concentrated Animal Feeding Operations (CAFOs) that discharge
  - Urban Stormwater
- Agricultural Areas
  - Partner w/ Federal & State Agricultural partners, NGOs, landowners
  - Consider innovative approaches (e.g., stewardship initiatives, markets)
  - Accelerate adoption of the most effective conservation practices where they are most needed
- Reduce Stormwater Runoff and Septic System Impacts
  - Use state, county and local government tools in communities not covered by the MS4 program to address runoff (including LID/GI approaches) and septic systems, consider limits on P use

Framework Elements: Accountability and Transparency

- Accountability and Verification Measures
  - Identify which tools will be used within targeted/priority sub-watersheds to assure reductions will occur
  - Verify that load reduction practices are in place
  - Assess/demonstrate progress in implementing and maintaining management activities and achieving load reductions goals

- Annual public reporting of implementation activities and biannual reporting of load reductions and environmental impacts associated with each management activity in targeted watersheds
  - Establish process to annually report for each watershed
  - Share annual report publically on the state's website with request for comments and feedback for an adaptive management approach

Framework Elements: Numeric Criteria

- Develop work plan and phased schedule for developing numeric criteria for classes of waters (lakes/reservoirs, rivers/streams, and estuaries)
  - Should contain interim milestones, e.g., data collection, data analysis, criteria proposal, and criteria adoption consistent with the CWA
  - Reasonable timetable: complete numeric N & P criteria for at least one class of waters in accordance with a robust, state-specific workplan and phased schedule

- Fundamental goal of the approach is for states to develop numeric WQS on a longer but reasonable schedule while making progress on reducing loads in the near term

Potential Federal Resources

- US EPA –through the State Water Quality Agencies
  - Water Quality Management Planning – Section 604(b)
  - Water Pollution Control Program Grants – Section 106
  - Nonpoint Source Implementation Grants – Section 319
  - State Revolving Fund Program
- USDA Farm Bill Conservation Programs
  - EQIP, CRP, RCPP, CIG, …
- USGS (Cooperative Monitoring Program – state contracts with USGS for water quality monitoring)
- Department of the Army (USACE: 1135, 204, 206)

EPA Technical Assistance: N and P Pollution Data Access Tools

- NPDAT - Consists of a geospatial viewer, introductory website, and data download tables, available at: www.epa.gov/nutrientpollution/npdat
  - Provides streamlined access to these data in one place, in commonly-used formats
- Nutrient Indicators Data Set - http://www2.epa.gov/nutrient-policy-data/nutrient-indicators-dataset
- Supports states as they consider
  - Extent and magnitude of N and P pollution
  - Water quality problems and vulnerabilities related to this pollution
  - Potential pollution sources

Looking Ahead – Key Priorities

- Drinking Water & Ecological Risks and Economic Impacts Documentation
- Broader EPA–USDA Coordination
- Continued Commitment to Science
- Nutrient Management Frameworks
- State Numeric Nutrient Standards
- Broader and More Effective Outreach to Stakeholders
- Stormwater

For More Information:

http://www2.epa.gov/nutrientpollution

Billing Code 6560-50-P

ENVIRONMENTAL PROTECTION AGENCY

[FRL-XXXX-X]

Meeting of the National Drinking Water Advisory Council

AGENCY: Environmental Protection Agency (EPA).

ACTION: Notice of a Public Meeting.

SUMMARY: The U.S. Environmental Protection Agency (EPA) is announcing a meeting of the National Drinking Water Advisory Council (Council), as authorized under the Safe Drinking Water Act (SDWA). The meeting is scheduled for November 6 and 7, 2014. The Council typically considers various issues associated with drinking water protection and public water systems. During this meeting, the Council will focus discussions on the approaches to regulating groups of carcinogenic volatile organic chemicals, harmful algal blooms, climate and drinking water issues and other program topics. In addition, the Council will also discuss options for compliance schedules relative to the Long Term 2 Enhanced Surface Water Treatment Rule.

DATES: The meeting on November 6, 2014, will be held from 8:30 a.m. to 5:00 p.m., eastern time, and on November 7, 2014, from 8:30 a.m. to 2:00 p.m., eastern time.

ADDRESS: The public meeting will be held in Room 1117-A at the EPA William Jefferson Clinton East Building, 1201 Constitution Avenue, NW, Washington, DC, 20004. All attendees must go through a metal detector, sign in with the security desk and show government-issued photo identification to enter government buildings.

FOR FURTHER INFORMATION CONTACT: Members of the public who would like to register and receive pertinent information, present an oral statement or submit a written statement for the November 6 and 7 meeting should contact Roy Simon by October 17, 2014, by e-mail at *Simon.Roy@epa.gov*; by phone at 202-564-3868; or by regular mail at the United States Environmental Protection Agency, Office of Ground Water and Drinking Water, William Jefferson Clinton East, (Mail Code 4601-M), 1200 Pennsylvania Avenue, NW, Washington, DC, 20460. Further details about participating in the meeting can be found in the **SUPPLEMENTARY INFORMATION** section.

SUPPLEMENTARY INFORMATION:

Details about Participating in the Meeting: If you wish to attend the meeting, you should provide your e-mail address when you register. The EPA will provide updated information on the November 6 and 7 meeting to registered individuals and organizations by October 29, 2014. The Council will allocate one hour for the public's input (1:00 p.m. – 2:00 p.m., eastern time) at the meeting on November 7, 2014. Oral statements will be limited to five minutes at the meeting. It is preferred that only one person present a statement on behalf of a group or organization. To ensure adequate time for public involvement, individuals or organizations interested in presenting an oral statement should notify Roy Simon no later than October 17, 2014. Any person who wishes to file a written statement can do so before or after the Council meeting. Written statements intended for the meeting must be received by October 29, 2014, to be distributed to all members of the Council before any final discussion or vote is completed. Any

statements received on or after the date specified will become part of the permanent file for the meeting and will be forwarded to the Council members for their information.

National Drinking Water Advisory Council: The Council was created by Congress on December 16, 1974, as part of the SDWA of 1974, Public Law 93-523, 42 U.S.C. 300j-5, and is operated in accordance with the provisions of the Federal Advisory Committee Act (FACA), 5 U.S.C. App.2. The Council was established under the SDWA to provide practical and independent advice, consultation and recommendations to the EPA Administrator on the activities, functions, policies and regulations required by the SDWA.

Special Accommodations: For information on access or services for individuals with disabilities, please contact Roy Simon at 202-564-3868 or by e-mail at *Simon.Roy@epa.gov*. To request an accommodation for a disability, please contact Roy Simon at least 10 days prior to the meeting to give the EPA as much time as possible to process your request.

Dated: SEP - 8 2014

Peter Grevatt, Director,
Office of Ground Water and Drinking Water.

Approaches for Setting Drinking Water Standards for Groups of Carcinogenic Volatile Organic Compounds (cVOCs)

Presenter: Lisa Christ, Chief

U.S. EPA, Office of Ground Water and Drinking Water, Standards and Risk Management Division, Targeting and Analysis Branch,

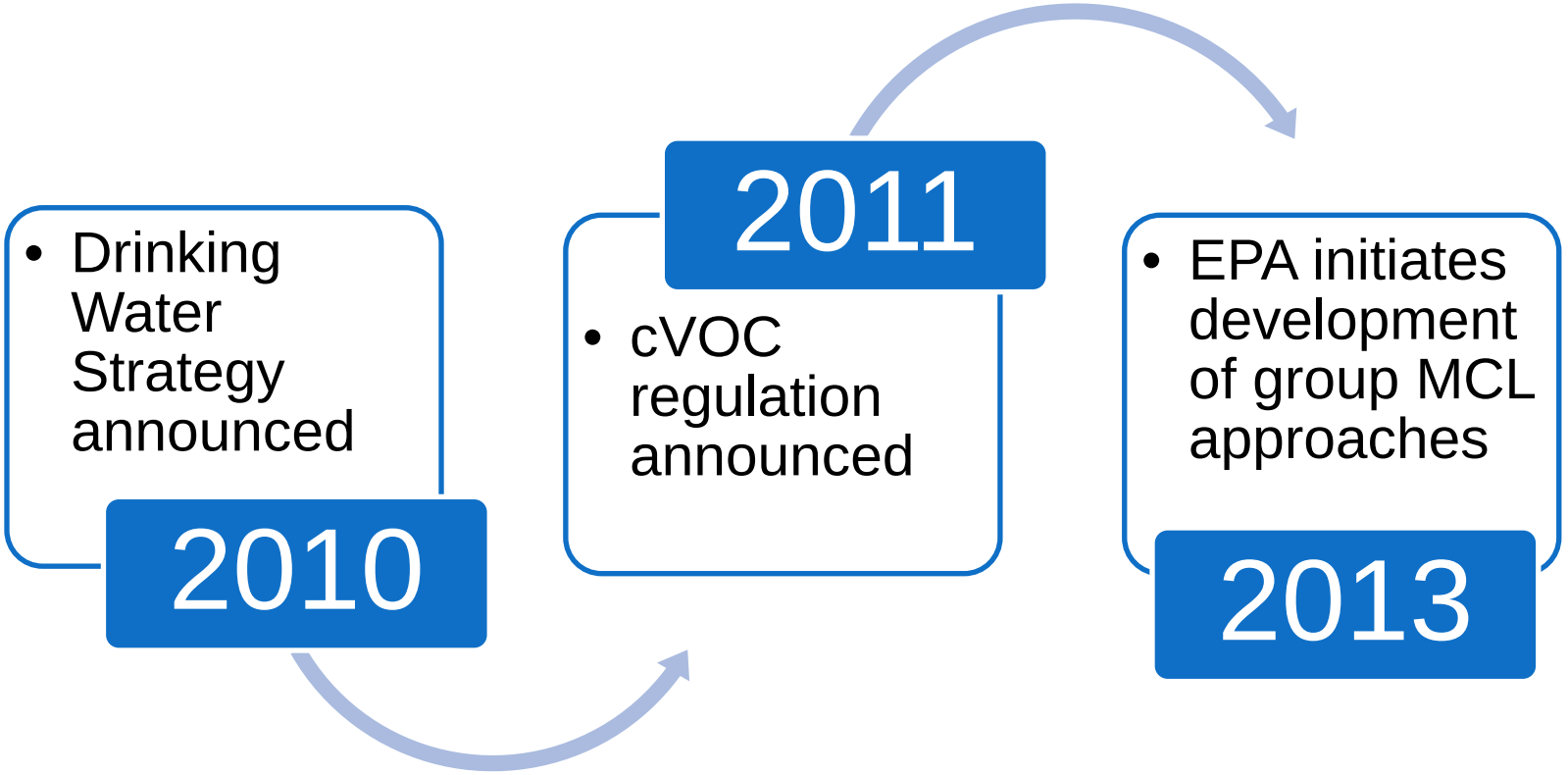
Purpose

- Present approaches for developing a maximum contaminant level (MCL) for a group of contaminants
- Obtain feedback on two approaches for a group MCL

Overview

- Why develop group maximum contaminant level (MCL) approaches
- The carcinogenic volatile organic compound group (cVOC)
- Safe Drinking Water Act considerations
- Two approaches
  - Group MCL development
  - MCL compliance
  - Advantages and disadvantages

Why is EPA Looking at Group MCL Approach



Group Characteristics for cVOCs

- All **carcinogens** (presume all MCLGs would be zero)
  - Cancer, but different target organs
- **No health interactions** at levels found in drinking water
  - Cancer risks are additive
- **Co-occurrence** is possible
- **Treatment** can remove all cVOCs, but effectiveness can vary
- **Common analytical** method

Group MCL Framework - Guiding Principles

- Comply with the requirements of SDWA
- Efficiently accounts for risks of exposure to multiple contaminants in one regulation
- Provide water systems with an opportunity to make the best long-term decisions on capital investments
- Allows for future changes in health information or analytical methods capabilities to be incorporated in the group MCL
- Provides a framework for EPA to address emerging contaminants in the future
- Consistent methods for developing a group MCL for future regulations

Safe Drinking Water Act establishes criteria for MCL development

1. Set maximum contaminant level goal (MCLG) based on health risk

2. Set MCL as close to MCLG as feasible
   - Analytical feasibility
   - Treatment feasiblity

3. However, can set MCL at higher level if benefits don't justify costs at feasible level

Based on the SDWA criteria, EPA developed two approaches

Group MCL must meet SDWA requirement to set MCL as close to MCLG as feasible

Approach 1: based on feasible level addition

Approach 2: based on risk-weighted feasible level addition

Two Group MCL Approaches

- Approach 1: Analytical Feasible Level Addition
  - MCL is based on concentration
- Approach 2: Risk-Weighted Feasible Level Addition
  - MCL is based on risk

Illustrations Based on Simple Group of Three cVOCs

VOC	MRL (µg/L)	Unit Risk $(\frac{1}{\mu g/L})$
1,2,3-Trichloropropane	0.03	2.29×10^{-3}
Vinyl chloride	0.056	4.20×10^{-5}
Trichloroethylene	0.021	2.00×10^{-6}

Approach 1: Feasible Level Addition

- Feasible level for carcinogens
  - Setting the MCL as close as feasible to MCLG is limited by analytical method quantitation level [i.e. minimum reporting level (MRL)]
- The group MCL is derived by adding the MRLs for each member of the group
  - The group MCL is the total of all MRLS

Example: Feasible Level Addition Group MCL

VOC	MRL (µg/L)	Unit Risk $(\frac{1}{\mu g/L})$
1,2,3-Trichloropropane	0.03	2.29×10^{-3}
Vinyl chloride	0.056	4.20×10^{-5}
Trichloroethylene	0.021	2.00×10^{-6}
Group MCL	**0.107**	

Compliance Determination

- Systems collect sample; the measured concentration for each cVOC are added.
- The total of all concentrations are compared to the group MCL.

Example: Compliance Determination for Approach 1 at Three Hypothetical Systems

cVOC	System 1 Conc. (ug/L)	System 2 Conc. (ug/L)	System 3 Conc. (ug/L)
1,2,3-Trichloropropane	0	0.03	0.09
Vinyl chloride	0.1	0	0
Trichloroethylene	0.2	0.03	0
Sum	**0.3**	**0.06**	**0.09**

Exceeds group MCL of 0.107 ug/L

Feasible Level Addition

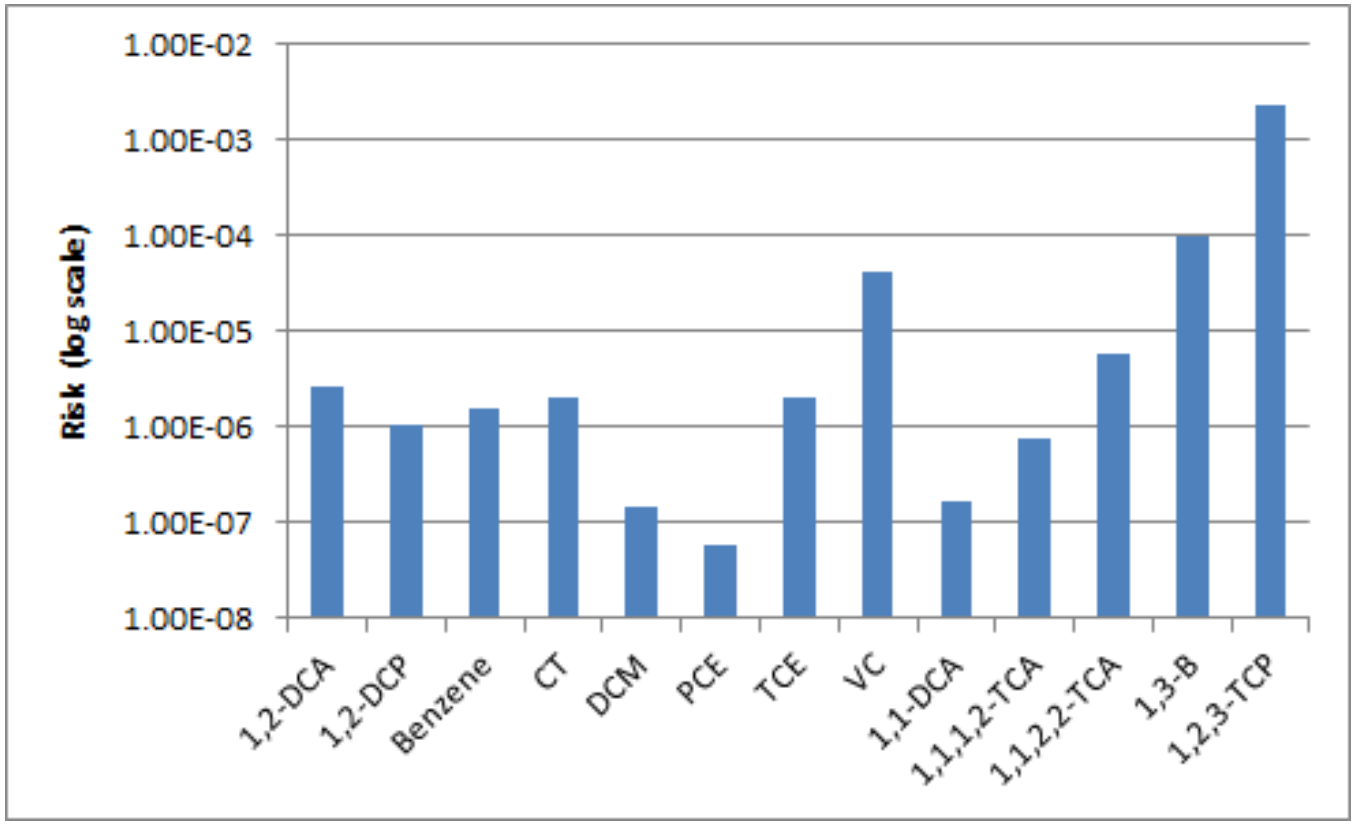
Advantages

- Straight-forward and easy to implement.
- Compliance determination equation is not difficult.

Disadvantages

- Doesn't take into account health risk variation between cVOCs.
- May require systems to install treatment for less risky members of the group resulting in minimal health benefit.
- Effects of adding emerging VOCs may change the group MCL.

Unit Risk (per ug/L) Variation



Approach 2: Risk-Weighted Feasible Level Addition

- Multiply the MRLs for each cVOC by its unit risk and total these values
  - Results in an overall risk level for the group that cannot be exceeded
- To provide a risk "weight" for each cVOC
  - The unit risk is divided by the total risk to derive the risk "weight"

Example: Risk-Weighted Feasible Level Addition Group MCL

VOC	MRL (µg/L)	Unit Risk ($\frac{1}{\mu g/L}$)	Risk-Weighted Feasible Level (unitless)
1,2,3-Trichloropropane	0.03	2.29×10^{-3}	6.87×10^{-5}
Vinyl chloride	0.056	4.20×10^{-5}	2.35×10^{-6}
Trichloroethylene	0.021	2.00×10^{-6}	4.20×10^{-8}
Group MCL (aggregate risk at feasible level)			7.11×10^{-5}

Example: Risk-Weighted Feasible Level Addition Group MCL

Risk-Weights (unit risk divided by total risk weight feasible level):

1,2,3-Trichloropropane: $2.29 \times 10^{-3} / 7.11 \times 10^{-5} = 32.2$

Vinyl chloride: $4.20 \times 10^{-5} / 7.11 \times 10^{-5} = 0.59$

Trichloroethylene: $2.00 \times 10^{-6} / 7.11 \times 10^{-5} = 0.028$

The resulting group MCL is a unitless value of 1.

Compliance Determination

- Systems collect sample; the measured concentration for each cVOC are multiplied by its risk "weight"
- The total of all concentrations times its risk weight are compared to the group MCL.
- EPA would provide the risk "weights" for compliance determination purposes

Example: Compliance Determination for Approach 2

VOC	System 1 (Contaminant Conc. ug/L)	Risk Weights	Risk-Weighted level (Conc. X Risk Weights)
1,2,3-Trichloropropane	0	32.2	0
Vinyl chloride	0.1	0.59	0.059
Trichloroethylene	0.2	0.028	0.0056
Risk-Weighted Sum			**0.0646**

Less than the group MCL of 1

Compliance Determination for Approach 2 at Three Hypothetical Systems

VOC	System 1 Conc. (ug/L)	System 2 Conc. (ug/L)	System 3 Conc. (ug/L)
1,2,3-Trichloropropane [risk weight 32.2]	0	0.03	0.09
Vinyl chloride [risk weight 0.59]	0.1	0	0
Trichloroethylene [risk weight 0.028]	0.2	0.03	0.0
Risk-Weighted Sum [concentration x risk weight]	**0.0646**	**0.97**	**2.9**

Exceeds group MCL of 1

Risk-Weighted Feasible Level Addition

Advantages

- Accounts for risks variation across a group of contaminants with unit risks that vary by several orders of magnitude
- Will not impose undue burden on systems that do not offer much by way of health risk reduction
- Systems that exceed the group MCL install treatment to reduce the riskiest contaminant(s) in the group

Disadvantages

- Unusual approach (but similar to radionuclide beta emitters)
- Changes in cancer slope factors may change the group MCL
- New cVOCs added to the group in the future may change the group MCL

Compliance Determination Comparison of Approaches

Approach 1

cVOC	System 1 Conc. (ug/L)	System 2 Conc. (ug/L)	System 3 Conc. (ug/L)
1,2,3-Trichloropropane	0	0.03	0.09
Vinyl chloride	0.1	0	0
Trichloroethylene	0.2	0.03	0
Sum	**0.3**	**0.06**	**0.09**

Approach 2

VOC	System 1 Conc. (ug/L)	System 2 Conc. (ug/L)	System 3 Conc. (ug/L)
1,2,3-Trichloropropane [risk weight 32.2]	0	0.03	0.09
Vinyl chloride [risk weight 0.59]	0.1	0	0
Trichloroethylene [risk weight 0.028]	0.2	0.03	0.0
Risk-Weighted Sum [concentration x risk weight]	**0.0646**	**0.97**	**2.9**

Simple Cost-Benefit Comparison for Approaches

Item	Feasible Level Addition	Risk-Weighted Feasible Level Addition
Compliance Action	Systems 2 & 3 – **no action** System 1 uses PTA to remove combined TCE and VC to less than 0.107 ug/L	Systems 1 & 2 – **no action** System 3 uses GAC to target 1,2,3-TCP so risk-weighted sum is less than 1
Annual Costs	**$268,000**	**$450,000**
Annual Benefits	**$11,000**	**$526,000**

For estimating cost & benefits, EPA assumed that systems 1,2, & 3 serve ~21,000 people
PTA: Packed Tower Aeration; GAC: Granular Activated Carbon

Comparison of Approaches

Factor	Feasible Level Addition	Risk-Weighted Feasible Level Addition
Ease of implementation	More familiar MCL and compliance equation (TTHMs, HAA5s)	MCL and compliance equation require more effort, but is simpler than beta rule
Cost effectiveness	Encourages cost-effective reduction in contaminant **levels**	Encourages cost-effective reduction in contaminant **risk**
Risk reduction	Less targeted	More targeted

Questions

Appendix: Current list of cVOCs being considered for Group Regulation

Regulated cVOCs	Unregulated cVOCs
1,2-Dichloroethane (Ethylene Dichloride) (107-06-2)	1,1-Dichloroethane (75-34-3)
1,2-Dichloropropane (78-87-5)	1,2,3-Trichloropropane (96-18-4)
Benzene (71-43-2)	1,3-Butadiene (106-99-0)
Carbon Tetrachloride (56-23-5)	**5 removed from original list**
Dichloromethane (Methylene Chloride) (75-09-2)	~~Aniline~~
Tetrachloroethylene (PCE) (127-18-4)	~~Benzyl Chloride~~
Trichloroethylene (TCE) (79-01-6)	~~Nitrobenzene~~
Vinyl chloride (75-01-4)	~~Oxirane, methyl-~~
	~~Urethane~~
	2 additional under consideration
	1,1,1,2-Tetrachloroethane (630-20-6)
	1,1,2,2-Tetrachloroethane (79-34-5)

A Public Statement from The Humane Society of the United States (The HSUS)

To the National Drinking Water Advisory Council Meeting

(Submitted by Jacqueline Tiaga/jtiaga@humanesociety.org on October 17, 2014)

On behalf of The Humane Society of the United States, the largest animal protection organization in the nation, we would like to thank the Environmental Protection Agency and National Drinking Water Advisory Council for holding this meeting to discuss drinking water protection. As a Harmful Algal Bloom Task Force Partner, The HSUS is particularly interested in and supportive of the Council's work on harmful algal blooms, otherwise known as HABs.

As many of you know, there are over 15,000 bodies of water across the country with issues related to nutrient pollution, affecting all 50 states. [1] While this is a serious concern with regards to safe drinking water, we ask you to also consider how pets, particularly dogs, are adversely affected. In 2013, a Toxins report on select veterinary hospital records discovered 368 cases of cyanotoxic poisoning found in dogs between the late 1920's and 2012. [2] This figure only represents a small subset of outbreaks, but it indicates a real threat to pets. Numerous studies and reports have found that because of their more active behavior, dogs are more susceptible to coming into contact with harmful algae by ingesting toxins while swimming or grooming, drinking infected water, or coming into contact with toxic algae mats. The exact number of affected pets is difficult to assess since the total number of cyanobacterial poisonings is underreported. However, we know the rate of pet mortality as a result of HABs has significantly increased over recent years, probably in conjunction with increased runoff from agricultural or urban sources. Unfortunately, since no federal or state agencies require the regular testing of bodies of water for toxins such as cyanobacteria, pets are usually the first to discover harmful algae blooms.

This problem is likely to worsen in coming years. HAB events are projected to increase overtime due to climate change and other environmental concerns, as well as population growth. Another serious risk to humans and animals is the ability of algae blooms to serve as vectors for other serious diseases, such as avian botulism, from which tens of thousands of fish and birds in the Great Lakes have perished since 1999,[3] or malaria,[4] to name a few.

The HSUS implores the Council to think about pet safety and wildlife conservation, and to recommend action by EPA to improve practices now in order to curtail future HAB poisonings. We would especially like to see efforts to increase public awareness, including signage at known HAB sites to warn pet owners of the dangers, collaborate with veterinary hospitals to report incidents of cyanobacterial poisoning, and institute routine water testing. Thank you for your consideration.

Sources:

1. Nutrient Pollition Impacts on the Nation. (n.d.). Retrieved from http://www2.epa.gov/sites/production/files/2013-08/infographic-nutrient-pollution-explained.png
2. Backer, L., Landsberg, J., Miller, M., Keel, K., & Taylor, T. (2013). Canine Cyanotoxin Poisonings in the United States (1920s–2012): Review of Suspected and Confirmed Cases from Three Data

Sources. *Toxins, 5*(9), 1597–1628-1597–1628. Retrieved October 15, 2014, from http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3798876/

3. USGS Great Lakes Restoration Initiative - Habitat & Wildlife - Avian botulism in distressed Great Lakes environments. (n.d.). Retrieved October 16, 2014, from http://cida.usgs.gov/glri/projects/habitat_and_wildlife/avian_botulism.html
4. Johnson, P., Townsend, A., Cleveland, C., Gilbert, P., Howarth, R., Mckenzie, V., ... Ward, M. (2010). Linking environmental nutrient enrichment and disease emergence in humans and wildlife. *Ecol Appl., 20*(1), 16-29. Retrieved October 15, 2014, from http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2848386/

EPA United States Environmental Protection Agency

Long Term 2 Enhanced Surface Water Treatment Rule: A Quick Reference Guide For Schedule 2 Systems

Overview of the Rule

Title	Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR) 71 FR 654, January 5, 2006, Vol. 71, No. 3
Purposes	Improve public health protection through the control of microbial contaminants by focusing on systems with elevated *Cryptosporidium* risk. Prevent significant increases in microbial risk that might otherwise occur when systems implement the Stage 2 Disinfectants and Disinfection Byproducts Rule (Stage 2 DBPR).
General Description	The LT2ESWTR requires systems to monitor their source water, calculate an average *Cryptosporidium* concentration, and use those results to determine if their source is vulnerable to contamination and may require additional treatment.
Utilities Covered	▸ Public water systems (PWSs) that use surface water or ground water under the direct influence of surface water (GWUDI). ▸ Schedule 2 systems include PWSs serving 50,000 to 99,999 people OR wholesale PWSs that are part of a combined distribution system in which the largest system serves 50,000 to 99,999 people.

Major Provisions

Control of *Cryptosporidium*

Source Water Monitoring	Filtered and unfiltered systems must conduct 24 months of source water monitoring for *Cryptosporidium*. Filtered systems must also record source water *E. coli* and turbidity levels. Filtered systems will be classified into one of four "Bins" based on the results of their source water monitoring. Unfiltered systems will calculate a mean *Cryptosporidium* level to determine treatment requirements. Systems may also use previously collected data (i.e., Grandfathered data). Filtered systems providing at least 5.5 log of treatment for *Cryptosporidium* and unfiltered systems providing at least 3-log of treatment for *Cryptosporidium* and those systems that intend to install this level of treatment are not required to conduct source water monitoring.
Installation of Additional Treatment	Filtered systems must provide additional treatment for *Cryptosporidium* based on their bin classification (average source water *Cryptosporidium* concentration), using treatment options from the "microbial toolbox." Unfiltered systems must provide additional treatment for *Cryptosporidium* using chlorine dioxide, ozone, or UV.
Uncovered Finished Water Storage Facility	Systems with an uncovered finished water storage facility must either: ▸ Cover the uncovered finished water storage facility; or, ▸ Treat the discharge to achieve inactivation and/or removal of at least 4-log for viruses, 3-log for *Giardia lamblia*, and 2-log for *Cryptosporidium*.

Disinfection Profiling and Benchmarking

After completing the initial round of source water monitoring any system that plans on making a significant change to their disinfection practices must:

- Create disinfection profiles for *Giardia lamblia* and viruses;
- Calculate a disinfection benchmark; and,
- Consult with the state prior to making a significant change in disinfection practice.

Bin Classification For Filtered Systems

Cryptosporidium Concentration (oocysts/L)	Bin Classification	Additional *Cryptosporidium* Treatment Required			Alternative Filtration
		Conventional Filtration	Direct Filtration	Slow Sand or Diatomaceous Earth Filtration	
< 0.075	Bin 1	No additional treatment required	No additional treatment required	No additional treatment required	No additional treatment required
0.075 to < 1.0	Bin 2	1 log	1.5 log	1 log	(1)
1.0 to < 3.0	Bin 3	2 log	2.5 log	2 log	(2)
≥ 3.0	Bin 4	2.5 log	3 log	2.5 log	(3)

(1) As determined by the state (or other primacy agency) such that the total removal/inactivation > 4.0-log.
(2) As determined by the state (or other primacy agency) such that the total removal/inactivation > 5.0-log.
(3) As determined by the state (or other primacy agency) such that the total removal/inactivation > 5.5-log.

Inactivation Requirements for Unfiltered Systems

Cryptosporidium Concentration (oocysts/L)	Required *Cryptosporidium* Inactivation
≤ 0.01	2-log
> 0.01	3-log

Critical Deadlines and Requirements

For Drinking Water Systems (Schedule 2)

January 1, 2007	**Systems must submit their:** ▸ **Sampling schedule that specifies the dates of sample collection and location of sampling for initial source water monitoring to EPA electronically; or** ▸ **Notify EPA or the state of the systems intent to submit results for grandfathering data; or** ▸ **Notify EPA or the state of the systems intent to provide at least 5.5 log of treatment for *Cryptosporidium*. Systems should consult with EPA or their state prior to submitting this notice.**
April 2007	**No later than this month, systems must begin 24 months of source water monitoring.**
June 10, 2007	**System submit results for first month of source water monitoring.**
June 1, 2007	**No later than this date, systems must submit monitoring results for data that they want to have grandfathered.**
April 1, 2008	**No later than this date, systems must notify the EPA or the state of all uncovered treated water storage facilities.**
March 2009	**No later than this month, systems must complete their inital round of source water monitoring.**
April 1, 2009	**No later than this date, uncovered finished water storage facilities must be covered, or the water must be treated before entry into the distribution system, or the system must be in compliance with a state approved schedule.**
September 2009	**No later than this month, filtered systems must report their initial bin classification to the EPA or the state for approval.**
September 2009	**No later than this month, unfiltered systems must report the mean of all *Cryptosporidium* sample results to the EPA or the state.**
September 30, 2012	**Systems must install and operate additional treatment in accordance with their bin classification.†**
July 1, 2015	**Systems must submit their sampling schedule that specifies the dates of sample collection and location of sampling for second round of source water monitoring to the state.**
Ocotber 1, 2015	▸ **Systems are required to begin conducting a second round of source water monitoring.** ▸ **Based on the results, systems must re-determine their bin classification and provide additional *Cryptosporidium* treatment, if necessary.**

For States

January - June 2006	**States are encouraged to communicate with affected systems regarding LT2ESWTR requirements.**
April 1, 2007	**States are encouraged to communicate LT2ESWTR requirements related to treatment, uncovered finished water reservoirs, and disinfection profiling to affected systems.**
October 5, 2007	**States are encouraged to submit final primacy applications or extension requests to EPA.**
January 5, 2008	**Final primacy applications must be submitted to EPA, unless granted an extension.**
December 31, 2008	**States should begin awarding *Cryptosporidium* treatment credit for primary treatments in place.**
January 5, 2010	**Final primacy revision applications from states with approved 2-year extensions agreements must be submitted to EPA.**
June 30, 2013	**States should award *Cryptosporidium* treatment credit for toolbox option implementation.**

† States may allow up to an additional 24 months for compliance for systems making capital improvements.

For additional information on the LT2ESWTR

Call the Safe Drinking Water Hotline at 1-800-426-4791; visit the EPA web site at www.epa.gov/safewater; or contact your State drinking water representative.

Long Term 2 Enhanced Surface Water Treatment Rule: A Quick Reference Guide For Schedule 3 Systems

Overview of the Rule

Title	Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR) 71 FR 654, January 5, 2006, Vol. 71, No. 3
Purposes	Improve public health protection through the control of microbial contaminants by focusing on systems with elevated *Cryptosporidium* risk. Prevent significant increases in microbial risk that might otherwise occur when systems implement the Stage 2 Disinfectants and Disinfection Byproducts Rule (Stage 2 DBPR).
General Description	The LT2ESWTR requires systems to monitor their source water, calculate an average *Cryptosporidium* concentration, and use those results to determine if their source is vulnerable to contamination and may require additional treatment.
Utilities Covered	▸ Public water systems (PWSs) that use surface water or ground water under the direct influence of surface water (GWUDI). ▸ Schedule 3 systems include PWSs serving 10,000 to 49,999 people OR wholesale PWSs that are part of a combined distribution system in which the largest system serves 10,000 to 49,999 people.

Major Provisions

Control of *Cryptosporidium*

Source Water Monitoring	Filtered and unfiltered systems must conduct 24 months of source water monitoring for *Cryptosporidium*. Filtered systems must also record source water *E. coli* and turbidity levels. Filtered systems will be classified into one of four "Bins" based on the results of their source water monitoring. Unfiltered systems will calculate a mean *Cryptosporidium* level to determine treatment requirements. Systems may also use previously collected data (i.e., Grandfathered data). Filtered systems providing at least 5.5 log of treatment for *Cryptosporidium* and unfiltered systems providing at least 3-log of treatment for *Cryptosporidium* and those systems that intend to install this level of treatment are not required to conduct source water monitoring.
Installation of Additional Treatment	Filtered systems must provide additional treatment for *Cryptosporidium* based on their bin classification (average source water *Cryptosporidium* concentration), using treatment options from the "microbial toolbox." Unfiltered systems must provide additional treatment for *Cryptosporidium* using chlorine dioxide, ozone, or UV.
Uncovered Finished Water Storage Facility	Systems with an uncovered finished water storage facility must either: ▸ Cover the uncovered finished water storage facility; or, ▸ Treat the discharge to achieve inactivation and/or removal of at least 4-log for viruses, 3-log for *Giardia lamblia*, and 2-log for *Cryptosporidium*.

Disinfection Profiling and Benchmarking

After completing the initial round of source water monitoring any system that plans on making a significant change to their disinfection practices must:

- Create disinfection profiles for *Giardia lamblia* and viruses;
- Calculate a disinfection benchmark; and,
- Consult with the state prior to making a significant change in disinfection practice.

Bin Classification For Filtered Systems

Cryptosporidium Concentration (oocysts/L)	Bin Classification	Additional *Cryptosporidium* Treatment Required			Alternative Filtration
		Conventional Filtration	Direct Filtration	Slow Sand or Diatomaceous Earth Filtration	
< 0.075	Bin 1	No additional treatment required	No additional treatment required	No additional treatment required	No additional treatment required
0.075 to < 1.0	Bin 2	1 log	1.5 log	1 log	(1)
1.0 to < 3.0	Bin 3	2 log	2.5 log	2 log	(2)
≥ 3.0	Bin 4	2.5 log	3 log	2.5 log	(3)

(1) As determined by the state (or other primacy agency) such that the total removal/inactivation > 4.0-log.
(2) As determined by the state (or other primacy agency) such that the total removal/inactivation > 5.0-log.
(3) As determined by the state (or other primacy agency) such that the total removal/inactivation > 5.5-log.

Inactivation Requirements for Unfiltered Systems

Cryptosporidium Concentration (oocysts/L)	Required *Cryptosporidium* Inactivation
≤ 0.01	2-log
> 0.01	3-log

Critical Deadlines and Requirements

For Drinking Water Systems (Schedule 3)

January 1, 2008	**Systems must submit their:** ▸ **Sampling schedule that specifies the dates of sample collection and location of sampling for initial source water monitoring to EPA electronically; or** ▸ **Notice to EPA or the state of the system's intent to submit results for grandfathering data; or** ▸ **Notice to EPA or the state of the system's intent to provide at least 5.5-log of treatment for *Cryptosporidium* for filtered systems or 3-log of treatment for unfiltered systems. Systems should consult with EPA or their state prior to submitting this notice.**
April 2008	**No later than this month, systems must begin 24 months of source water monitoring.**
April 1, 2008	**No later than this date, systems must notify the EPA or the state of all uncovered treated water storage facilities.**
June 10, 2008	**Systems submit results for first month of source water monitoring.**
June 1, 2008	**No later than this date, systems must submit monitoring results for data that they want to have grandfathered.**
April 1, 2009	**No later than this date, uncovered finished water storage facilities must be covered, or the water must be treated before entry into the distribution system, or the system must be in compliance with a state approved schedule.**
March 2010	**No later than this month, systems must complete their inital round of source water monitoring.**
September 2010	**No later than this month, filtered systems must report their initial bin classification to the EPA or the state for approval.**
September 2010	**No later than this month, unfiltered systems must report the mean of all *Cryptosporidium* sample results to the EPA or the state.**
September 30, 2013	**Systems must install and operate additional treatment in accordance with their bin classification (filtered systems) or mean *Cryptosporidium* level (unfiltered systems).†**
July 1, 2016	**Systems must submit their sampling schedule that specifies the dates of sample collection and location of sampling for second round of source water monitoring to the state.**
Ocotber 1, 2016	▸ **Systems are required to begin conducting a second round of source water monitoring.** ▸ **Based on the results, systems must re-determine their bin classification (filtered systems) or mean *Cryptosporidium* level (unfiltered systems) and provide additional *Cryptosporidium* treatment, if necessary.**

For States

July - December 2006	**States are encouraged to communicate with affected systems regarding LT2ESWTR requirements.**
April 1, 2007	**States are encouraged to communicate LT2ESWTR requirements related to treatment, uncovered finished water reservoirs, and disinfection profiling to affected systems.**
October 5, 2007	**States are encouraged to submit final primacy applications or extension requests to EPA.**
January 5, 2008	**Final primacy applications must be submitted to EPA, unless granted an extension.**
December 31, 2009	**States should begin determining *Cryptosporidium* treatment credit for primary treatments already in place.**
January 5, 2010	**Final primacy revision applications from states with approved 2-year extensions agreements must be submitted to EPA.**
June 30, 2014	**States should award *Cryptosporidium* treatment credit for toolbox option implementation.**

† States may allow up to an additional 24 months for compliance for systems making capital improvements.

For additional information on the LT2ESWTR

Call the Safe Drinking Water Hotline at 1-800-426-4791; visit the EPA web site at www.epa.gov/safewater/disinfection/lt2; or contact your state drinking water representative.

EPA United States Environmental Protection Agency

Long Term 2 Enhanced Surface Water Treatment Rule: A Quick Reference Guide For Schedule 4 Systems

Overview of the Rule

Title	Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR) 71 FR 654, January 5, 2006, Vol. 71, No. 3
Purposes	Improve public health protection through the control of microbial contaminants by focusing on systems with elevated *Cryptosporidium* risk. Prevent significant increases in microbial risk that might otherwise occur when systems implement the Stage 2 Disinfectants and Disinfection Byproducts Rule (Stage 2 DBPR).
General Description	The LT2ESWTR requires systems to monitor their source water, calculate an average *Cryptosporidium* concentration, and use those results to determine if their source is vulnerable to contamination and may require additional treatment. Filtered systems serving fewer than 10,000 may be eligible to conduct *E. Coli* source water monitoring in lieu of *Cryptosporidium* monitoring.
Utilities Covered	▸ Public water systems (PWSs) that use surface water or ground water under the direct influence of surface water (GWUDI). ▸ Schedule 4 systems include PWSs serving fewer than 10,000 people OR wholesale PWSs that are part of a combined distribution system in which the largest system serves less than 10,000 people.

Major Provisions

Control of *Cryptosporidium*

Source Water Monitoring	Filtered systems must conduct 12 months of source water monitoring for *E. coli* . If the *E. coli* trigger level is exceeded, the system must conduct an additional 12 to 24 months of source water monitoring for *Cryptosporidium*. Systems may also use previously collected data (i.e., Grandfathered data). Unfiltered systems must sample their source water for *Cryptosporidium* at least twice per month for 12 months or once per month for 24 months. Unfiltered systems will calculate a mean *Cryptosporidium* level to determine treatment requirements. Filtered systems providing at least 5.5 log of treatment for *Cryptosporidium* and unfiltered systems providing at least 3-log of treatment for *Cryptosporidium* and those systems that intend to install this level of treatment are not required to conduct source water monitoring.
Installation of Additional Treatment	Filtered systems must provide additional treatment for *Cryptosporidium* based on their bin classification (average source water *Cryptosporidium* concentration), using treatment options from the "microbial toolbox." Unfiltered systems must provide additional treatment for *Cryptosporidium* using chlorine dioxide, ozone, or UV.
Uncovered Finished Water Storage Facility	Systems with an uncovered finished water storage facility must either: ▸ Cover the uncovered finished water storage facility; or, ▸ Treat the discharge to achieve inactivation and/or removal of at least 4-log for viruses, 3-log for *Giardia lamblia*, and 2-log for *Cryptosporidium*.

Disinfection Profiling and Benchmarking

After completing the initial round of source water monitoring any system that plans on making a significant change to their disinfection practices must:

- Create disinfection profiles for *Giardia lamblia* and viruses;
- Calculate a disinfection benchmark; and,
- Consult with the state prior to making a significant change in disinfection practice.

Bin Classification For Filtered Systems

Cryptosporidium Concentration (oocysts/L)	Bin Classification	Additional *Cryptosporidium* Treatment Required			Alternative Filtration
		Conventional Filtration	Direct Filtration	Slow Sand or Diatomaceous Earth Filtration	
< 0.075	Bin 1††	No additional treatment required			
0.075 to < 1.0	Bin 2	1 log	1.5 log	1 log	(1)
1.0 to < 3.0	Bin 3	2 log	2.5 log	2 log	(2)
≥ 3.0	Bin 4	2.5 log	3 log	2.5 log	(3)

†† Systems serving < 10,000 people that are not required to monitor for *Cryptosporidium* are placed in Bin 1.
(1) As determined by the state (or other primacy agency) such that the total removal/inactivation > 4.0-log.
(2) As determined by the state (or other primacy agency) such that the total removal/inactivation > 5.0-log.
(3) As determined by the state (or other primacy agency) such that the total removal/inactivation > 5.5-log.

Inactivation Requirements for Unfiltered Systems

Cryptosporidium Concentration (oocysts/L)	Required *Cryptosporidium* Inactivation
≤ 0.01	2-log
> 0.01	3-log

For additional information on the LT2ESWTR

Call the Safe Drinking Water Hotline at 1-800-426-4791; visit the EPA web site at www.epa.gov/safewater/disinfection/lt2; or contact your state drinking water representative.

July 1, 2008	**Systems must submit their:** ▸ **Sampling schedule that specifies the dates of sample collection and location of sampling for initial source water monitoring; or** ▸ **Notice to EPA or the state of the system's intent to submit results for grandfathering data; or** ▸ **Notice to EPA or the state of the system's intent to provide at least 5.5-log of treatment for *Cryptosporidium* for filtered systems or 3-log of treatment for unfiltered systems. Systems should consult with EPA or their state prior to submitting this notice.** ▸ **Notice to EPA or the state of the system's intent to conduct *Cryptosporidium* monitoring instead of *E. coli* monitoring.**
October 2008	**No later than this month, filtered systems must begin 12 months of bi-weekly source water monitoring for *E. coli*.**
December 1, 2008	**No later than this date, systems must submit *E. coli* monitoring results for data that they want to have grandfathered.**
December 10, 2008	**Systems submit results for first month of *E. coli* source water monitoring.**
April 1, 2008	**No later than this date, systems must notify the EPA or the state of all uncovered treated water storage facilities.**
April 1, 2009	**No later than this date, uncovered finished water storage facilities must be covered, or the water must be treated before entry into the distribution system, or the system must be in compliance with a state approved schedule.**
September 2009	**No later than this month, systems that were required to monitor their source water for *E. coli* complete their inital round of source water monitoring.**
January 1, 2010	**Filtered systems required to monitor for *Cryptosporidium* must submit their sampling schedule that specifies the dates of sample collection and location of sampling for source water monitoring.**
April 2010	**No later than this month, systems required to conduct *Cryptosporidium* monitoring must begin 12 or 24 months of source water monitoring.**
June 1, 2010	**No later than this date, systems must submit *Cryptosporidium* monitoring results for data that they want to have grandfathered.**
June 10, 2010	**Systems submit results for first month of *Cryptosporidium* source water monitoring.**
March 2012	**No later than this month, systems that were required to monitor their source water for *Cryptosporidium* complete their inital round of source water monitoring**
September 2012	**No later than this month, filtered systems that were required to monitor their source water for *Cryptosporidium* must report their initial bin classification to the EPA or the state for approval.**
September 2012	**No later than this month, unfiltered systems must report the mean of all *Cryptosporidium* sample results to the EPA or the state.**
September 30, 2014	**Systems must install and operate additional treatment in accordance with their bin classification or mean *Cryptosporidium* level.†**
July 1, 2017	**Systems must submit their sampling schedule that specifies the dates of sample collection and location of sampling for second round of *E. coli* source water monitoring to the state.**
October 1, 2017	**Systems are required to begin conducting a second round of *E. coli* source water monitoring. Based on the results, systems must re-determine their bin classification and provide additional treatment, if necessary.**
January 1, 2019	**Systems must submit their sampling schedule that specifies the dates of sample collection and location of sampling for second round of *Cryptosporidium* source water monitoring to the state.**
April 1, 2019	**Systems are required to begin conducting a second round of *Cryptosporidium* source water monitoring. Based on the results, systems must re-determine their bin classification (filtered systems) or mean *Cryptosporidium* level (unfiltered systems) and provide additional treatment, if necessary.**
July - December 2006	**States are encouraged to communicate with affected systems regarding LT2ESWTR requirements.**
April 1, 2007	**States are encouraged to communicate LT2ESWTR requirements related to treatment, uncovered finished water reservoirs, and disinfection profiling to affected systems.**
October 5, 2007	**States are encouraged to submit final primacy applications or extension requests to EPA.**
January 5, 2008	**Final primacy applications must be submitted to EPA, unless granted an extension.**
June 30, 2010	**States should begin determining *Cryptosporidium* treatment credit for primary treatments already in place.**
January 5, 2010	**Final primacy revision applications from states with approved 2-year extensions agreements must be submitted to EPA.**
June 30, 2015	**States should award *Cryptosporidium* treatment credit for toolbox option implementation.**

† States may allow up to an additional 24 months for compliance for systems making capital improvements.

Method for Deriving a Group MCL

Draft

October 28, 2014

1. Introduction

This paper presents the approach that the U.S. Environmental Protection Agency (EPA or the Agency) developed for establishing a single maximum contaminant level (MCL) for a group of drinking water contaminants. The approach, which incorporates health risk values, is applicable for a group of contaminants that cause a variety of cancers.

Following a background discussion (Section 1.1), this paper notes that there are various types of group MCLs in use (Section 2.1), and presents two general approaches that reflect current practices (Section 2.2). The presentation includes a hypothetical example to illustrate the approaches to demonstrate the advantages and disadvantages of each approach. In Section 3, EPA provides a summary of the advantages and disadvantages of the two approaches and a rationale for its selection of a preferred approach (Section 3).

1.1 Background

This background section provides the context for the analysis of approaches to a group MCL. First, it provides an outline of the requirements for an MCL under the Safe Drinking Water Act (SDWA). Then, it has a brief description of the group rule strategy, which is the motivation for the analysis.

A MCL is the maximum level of a contaminant that EPA allows in drinking water to protect human health [SDWA §1401 (3)]. The SDWA requires that EPA regulate the level of a contaminant in drinking water through a national primary drinking water regulation (NPDWR). EPA must first identify a maximum contaminant level goal (MCLG) for a contaminant, which is not enforceable. Then EPA must establish the MCL, which is an enforceable standard.

SDWA §1412 (b)(4)(A) requires that EPA set the MCLG at the level at which no known or anticipated adverse effects on the health of persons occur while providing an adequate margin of safety. EPA generally sets the MCLG for a carcinogen equal to zero if the Agency does not identify a non-linear mode of action (i.e., if there is no evidence that there is a safe threshold quantity below which there are no cancer risks). EPA bases the MCLG for noncarcinogens on a reference dose (RfD).[1]

EPA must consider multiple criteria when setting an enforceable MCL. First, SDWA §1412 (b)(4)(B) requires EPA to specify an MCL which is as close to the MCLG as is feasible. SDWA §1412(b)(4)(D) defines feasible to mean with the use of the best technology, treatment techniques, and other means which EPA finds to be available, after considering efficacy under field conditions, and cost. SDWA §1412 (b)(6)(A), however, gives the EPA Administrator the discretion to set an MCL at a higher value if the benefits do not justify the costs of an MCL at the feasible level.

In 2010, EPA announced a new strategy of regulating drinking water contaminants in groups, to speed progress towards addressing unregulated contaminants as well as taking advantage of available treatment technologies that address several contaminants at once (EPA, 2010). The Agency

[1] EPA's Integrated Risk Information System (IRIS) defines an RfD as: An estimate of a daily oral exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime.

considered several factors in evaluating which contaminants might effectively be regulated as a group, including whether the contaminants in the group: (a) cause similar adverse health endpoints, (b) can be measured using the same analytical methods, (c) can be removed from water using the same technology or treatment technique approach and/or (d) potentially co-occur. Stakeholders generally agreed that these are some of the more important factors to consider in evaluating which contaminants to include in a group regulation.

Pursuant to this strategy, EPA is evaluating optional approaches for setting a single MCL – in lieu of multiple MCLs – for a group of contaminants. EPA seeks to identify an approach that meets the SDWA requirements for setting an MCL. Although EPA regulated most drinking water contaminants individually, it established group MCLs for a few: disinfection byproducts [total trihalomethanes (TTHM) and five haloacetic acids (HAA5)], and radionuclides (alpha emitters and beta emitters). Thus, the group MCL concept is not entirely new to drinking water regulations. EPA does not, however, have a formal approach to setting a group MCL. If future regulatory efforts will focus opportunities to develop group MCLs, a formal approach will facilitate NPDWR development.

2. Group MCL Approaches

The section begins with brief descriptions of group MCLs among the existing NPDWRs. Next, this section provides general descriptions for two alternative approaches to establishing group MCLs. It also provides a hypothetical contaminant group for illustration purposes.

2.1 Existing Group MCLs

The first type of group MCL relates to the sum of contaminant concentrations. EPA uses two of these group MCLs to regulate disinfection byproducts. The TTHM MCL of 0.08 milligrams per liter (mg/L) applies to the sum of measured concentrations of chloroform, bromodichloromethane, dibromochloromethane, and bromoform; the HAA5 MCL of 0.06 mg/L applies to the sum of measured concentrations of mono-, di-, and trichloroacetic acids, and mono- and dibromoacetic acids (EPA, 1998). Appendix A provides the MCLGs for individual contaminants as well as the TTHM and HAA5 MCLs.

The second type of group MCL pertains to the sum of the risk-weighted contaminant concentrations. EPA uses this approach to regulate over 170 emitters of beta particle and photon radioactivity with a single MCL. The risk-weighted sum of beta and photon emitter measurements cannot exceed an effective dose of 4 millirems per year (mrem /yr) (40 CFR 141.66(d)(2)), which corresponds to a 10^{-4} lifetime cancer risk (EPA, 1991). Thus, the MCL is essentially a limit on the allowable level of risk across a contaminant group.

The radionuclide rule establishes a "sum-of-the-fractions" equation for compliance (40 CFR 141.66(d)). Appendix B provides the equation and an example of use. The equation contains a risk-based multiplier for each radionuclide. The multiplier is based on the cancer risk that each radionuclide poses. Thus, radionuclides that pose greater health risk will have greater multipliers or more weight in what is essentially a risk-weighted concentration sum.

2.2 Two Approaches to Setting a Group MCL

Although EPA has regulated some drinking water contaminants using a group approach, it has promulgated individual MCLs for most contaminants. As part of the effort to fulfill its 2010 Drinking Water Strategy, EPA evaluated alternative approaches for setting a group MCL. EPA sought an approach that satisfies the SDWA requirement that EPA set an MCL as close to the MCLG as feasible to maximize health risk reductions.

In 2011, EPA announced that the initial group under consideration would be carcinogenic volatile organic compounds (cVOCs) (EPA, 2011). The rationale for considering these contaminants as a group is: a) the MCLG for each cVOC is currently or would likely be set at zero because they are carcinogens; b) they can be measured by the same analytical methods (e.g., EPA Method 524.3); c) many can be treated using the same treatment processes (i.e., aeration and/or granular activated carbon); and d) some may co-occur. In addition, there are variations in target organs and EPA knows of no antagonistic or synergistic effects of mixtures at the concentration levels observed in drinking water. Therefore, EPA has determined that cVOC health effects are independent for the purpose of deriving a group MCL. According to EPA guidance for addressing the health risks of chemical

mixtures (EPA, 1999; EPA 2000b), this independence means that the health risks for cVOCs are additive.

For this paper, the characteristics of the cVOC group provide a relatively simple example to illustrate the approaches for a developing a group cVOC MCL. To keep the illustration straightforward yet informative, EPA selected a small subset of three contaminants with ingestion unit risks (in units of risk per microgram per liter, µg/L) that span three orders of magnitude. Exhibit 2-1 shows the contaminants along with ingestion unit risk values and quantitation limits or minimal reporting levels (MRLs). The MRLs are the lowest feasible MCL for each individual contaminant.[2] Applicable treatment technologies can remove the contaminants to below their respective MRLs, although optimal treatment varies across the contaminants. Finally, these contaminants are known to co-occur, which means system populations can be exposed to a variety of mixtures.

Exhibit 2-1. Illustrative Carcinogenic Contaminant Group

Contaminant	Unit Risk $(\mu g/L)^{-1}$	MRL (µg/L)
1,2,3-Trichloropropane	2.29×10^{-3}	0.030
Vinyl chloride	4.20×10^{-5}	0.056
Trichloroethylene	2.00×10^{-6}	0.021

µg/L = micrograms per liter
Note that the values in this table are for illustration, and are subject to changes in underlying data. For the illustration, also suppose that there is no MCL for either vinyl chloride or trichloroethylene.

2.2.1 Addition of Feasible Concentrations

One approach to establishing a group MCL is to set it equal to the sum of the MRLs for the contaminants in the group. This section provides a general description of the approach, followed by an illustration of the approach based on the cVOC group in Exhibit 2-1. Next, this section provides a discussion of how systems will determine compliance with the MCL and provides an illustration using hypothetical cVOC concentrations for three systems. Although the concentrations are hypothetical, they represent realistic levels for drinking water systems.

Establishing the MCL

For a general case, let MRL_i be the MRL for the contaminant i, where i = 1 to I. The group MCL formula is:

$$MCL = \sum_{i=1}^{I} MRL_i.$$

[2] In the context of drinking water regulations, an MRL for a chemical is an estimate of a lowest concentration minimum reporting level (LCMRL) that is achievable, with 95% confidence, by a capable analyst/laboratory at least 75% of the time using a specified analytical method. An LCMRL is the lowest spiking concentration at which recovery of between 50% and 150% is expected 99% of the time by a single analyst. (76 Federal Register 11713, March 3, 2011)

For each contaminant, the MRL represents the lowest feasible level for an individual MCL. Because of laboratory limitations, the MRL is the closest that an individual MCL can be to the MCLG of zero.[3] Because the group MCL is equal to the sum of the MRL values, it is the lowest feasible limit for aggregate exposure across the contaminants that regulation can achieve.

Exhibit 2-2 shows the MRL values for the example of a group of three cVOCs. In this example, the group MCL would be 0.107 µg/L.

Exhibit 2-2. Derivation of Group MCL based on Feasible Level Addition Approach

Contaminant	MRL (µg/L)
1,2,3-Trichloropropane	0.030
Vinyl chloride	0.056
Trichloroethylene	0.021
Group MCL (sum of 3 MRLs)	**0.107**

MCL = maximum contaminant level
MRL = minimum reporting level

Determining Compliance

To determine compliance with an MCL for an individual contaminant, a drinking water system obtains a measurement of the level of the contaminant in its treated water. If the measurement is less than or equal to the MCL, then the system is in compliance. If, however, the measurement exceeds the MCL, then the system is not in compliance.

This same approach applies to a group MCL. For a group MCL based on the sum of feasible limits, if the sum of the measured concentrations across the group of contaminants is less than or equal to the group MCL, then the system is in compliance. Let C_i be the measured concentration of contaminant i.[4] Compliance with the group MCL requires:

$$MCL \geq \sum_{i=1}^{I} C_i.$$

To illustrate compliance determination for the cVOC example, suppose three systems have hypothetical measured concentrations. Exhibit 2-3 shows these measurements for each cVOC. It also shows the concentration sum at each system. The sum for System 1 is 0.30 µg/L; the sum for System 2 is 0.06 µg/L; and the sum for System 3 equals 0.09 µg/L. Only System 1 exceeds the example group MCL of 0.107 µg/L.

[3] If the feasible treatment level is higher than the MRL, then the feasible treatment level is a lower bound on the MCL. To generalize the MCL formula, the values in the sum are the maximum of the MRL or treatment level for each contaminant.

[4] Per 40 CFR 141.23(i)(1), if a contaminant is not present at a level equal to or greater than the MRL, then C_i is zero.

Exhibit 2-3. Example Monitoring Results and Compliance Determination for Three Systems*

Concentration (µg/L)	System 1	System 2	System 3
1,2,3-Trichloropropane	0.00	0.03	0.09
Vinyl chloride	0.10	0.00	0.00
Trichloroethylene	0.20	0.03	0.00
Sum	0.30	0.06	0.09
Does the sum exceed the MCL (0.107 µg/L)?	Yes	No	No

MCL = maximum contaminant level
µg/L = micrograms per liter
* In monitoring compliance, systems set measurements for which there is no detectable quantity equal to zero [see 40 CFR 141.23(i)(1)].

To achieve compliance, System 1 needs to reduce the sum of the contaminants detected by 0.193 µg/L (i.e., 0.3 – 0.107). Exhibit 2-4 shows two potential compliance solutions. The first compliance solution illustrates the effect of a granular activated carbon (GAC) treatment process, which would mainly reduce trichloroethylene levels. To achieve compliance, the GAC process would have to reduce trichloroethylene to below the MRL of 0.021 µg/L. The second compliance solution shows the effect of an aeration process. This process would most likely remove vinyl chloride to below detection because vinyl chloride is very volatile and easy to remove from water. Aeration would also reduce trichloroethylene. For compliance purposes, the aeration process can reduce both vinyl chloride and trichloroethylene by any combination of amounts that sum to 0.193 µg/L.

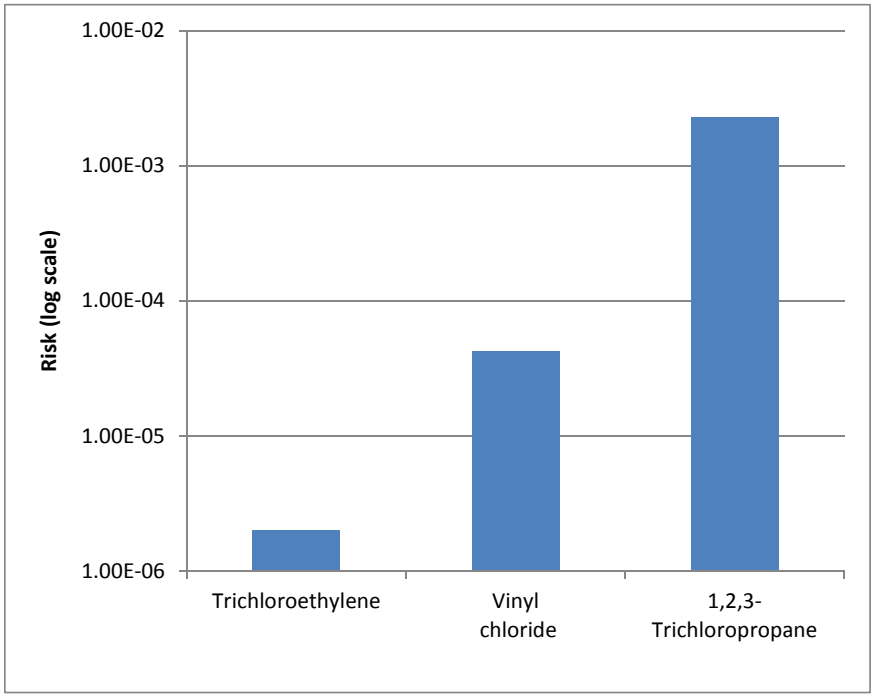
Exhibit 2-4. Illustrative Compliance for System 1 with Group MCL

Contaminant	Baseline Concentration (µg/L)	Compliance Solution 1 GAC Concentration (µg/L)	Compliance Solution 1 GAC Reduction	Compliance Solution 2 Aeration Concentration (µg/L)	Compliance Solution 2 Aeration Reduction
1,2,3-Trichloropropane	0.00	0.00	NA	0.00	NA
Vinyl chloride	0.10	0.10	0%	0.00	>44%*
Trichloroethylene	0.20	0.00	>90%**	0.10	50%
Sum	0.30	0.10	NA	0.10	NA
Does the sum exceed the MCL (0.107 µg/L)?	Yes	No	NA	No	NA

MCL = maximum contaminant level;
µg/L = micrograms per liter
* The percent reduction is greater than 44% because a reduction from the baseline concentration of 0.10 µg/L to the MRL of 0.056 µg/L is a reduction of 44% from baseline, but the actual reduction is to some unknown level below the MRL. Because trichloroethylene must also be reduced by 50% to achieve compliance, an aeration design to remove approximately 70% of vinyl chloride would also achieve the necessary trichloroethylene removal.
** The percent reduction is greater than 90% because a reduction from the baseline concentration of 0.20 µg/L to the MRL of 0.021 µg/L is a reduction of 90% from baseline, but the actual reduction is to some unknown level below the MRL.

System 1 can choose the compliance solution that achieves the MCL at the lowest cost without regard to whether it maximizes health risk reduction. Exhibit 2-5 shows the relative unit risks of the three VOCs. Based on relative risks, the aeration compliance option that reduces vinyl chloride will have greater health benefits than the GAC option that reduces trichloroethylene. If, however, the GAC process is the least-cost option, then System 1 can choose the GAC process over the aeration process to meet the group MCL based on feasible level addition.

Exhibit 2-5. Unit Risks for Three Volatile Organic Compounds



2.2.2 Addition of Feasible Level Risks

To develop a group MCL that takes into account the risk variability across group constituents, EPA identified an approach that incorporates the relative risk of each contaminant in the group. For this approach, the group MCL is the sum of the contaminant risks at the MRL.

Establishing the MCL

The first step in this approach is to estimate the risk of each contaminant in the group:

$$R_i = U_i \times MRL_i.$$

where:

R_i = risk for contaminant i at a given concentration

U_i = drinking water unit risk for contaminant i, in $\mu g/L^{-1}$

MRL_i = minimum reporting level for contaminant i, in µg/L.

The next step is to sum the risks across all contaminants in the group to derive the MCL:

$$MCL = R_1 + R_2 + R_3 + \ldots R_I.$$

Substituting for the R_i values, the equation becomes:

$$MCL = U_1 \times MRL_1 + \ldots + U_I \times MRL_I.$$

Exhibit 2-6 illustrates this approach for the three cVOCs.

Exhibit 2-6. Derivation of Group MCL Based on Feasible Level Risk Addition Approach

Contaminant	Unit Risk $(\mu g/L)^{-1}$	MRL (µg/L)	Risk at Feasible Level (unit less)
1,2,3-Trichloropropane	2.29×10^{-3}	0.030	6.87×10^{-5}
Vinyl chloride	4.20×10^{-5}	0.056	2.35×10^{-6}
Trichloroethylene	2.00×10^{-6}	0.021	4.20×10^{-8}
Group MCL (aggregate risk at feasible levels)			7.11×10^{-5}

µg/L = micrograms per liter

For the example in Exhibit 2-6, the group MCL is 7.11×10^{-5}. The MCL is unit less instead of having the mass-per-volume units of concentration-based MCLs.

The risk-weighted MCL formula is similar to the health risk assessment concept of response addition. A response addition equation can be used to estimate the risk of a mixture of contaminants that pose independent health risks (EPA, 1999; EPA, 2000b).[5] When the contaminants in a group pose independent health risks, the risk-weighted MCL formula can also be interpreted as a reasonable approximation to the aggregate risk of cancer from a mixture of the contaminants at the MRL values.

Determining Compliance

To determine compliance with a risk-weighted MCL, systems would measure the concentrations (C_i) of all contaminants in the group, multiply each concentration by the corresponding unit risk, sum the results across contaminants, and compare to the MCL:

$$MCL \geq U_1 \times C_1 + \cdots + U_I \times C_I.$$

[5] The approach also reflects an assumption that the probabilities are small enough that all possible joint probabilities are insignificant, which can be a reasonable assumption given very small incremental cancer risks. Consider a simple example of two independent events X and Y, where p(X) is the probability that event X occurs and p(Y) is the probability that event Y occurs. The aggregate probability of either event X or Y occurring is: $p(X \cup Y) = p(X) + p(Y) - p(X \cap Y)$, where the latter term is the joint probability that is double counted in the simple sum of the two probabilities. When the two event probabilities are very small, however, the joint probability can be treated as inconsequential. Suppose that p(X) is 2×10^{-5} and p(Y) 2×10^{-6}. The probability is: $2 \times 10^{-5} + 2 \times 10^{-6} - (2 \times 10^{-5} \times 2 \times 10^{-6}) = 2.2 \times 10^{-5} - 4 \times 10^{-11} \approx 2.2 \times 10^{-5}$.

To simplify the compliance equation, it is possible to divide both sides by the group MCL:

$$MCL \times \left(\frac{1}{MCL}\right) \geq \left(\frac{1}{MCL}\right) \times (U_1 \times C_1 + \cdots + U_I \times C_I).$$

$$1 \geq \left(\frac{U_1}{MCL}\right) \times C_1 + \cdots + \left(\frac{U_I}{MCL}\right) \times C_I.$$

Given this transformation, let W_i be the risk weight equal to U_i divided by the group MCL. The simplified compliance equation is:

$$1 \geq W_1 \times C_1 + \cdots + W_I \times C_I.$$

Exhibit 2-7 illustrates the calculation of risk for the three contaminants at the measured concentrations at hypothetical System 1 in Exhibit 2-3.

Exhibit 2-7. Calculation of Risk for System 1

Contaminant	Risk Weight* $(\mu g/L)^{-1}$	Concentration (µg/L)	Risk-Weighted Level** (unit less)
1,2,3-Trichloropropane	32.2	0.00	0.00
Vinyl chloride	0.591	0.10	0.0591
Trichloroethylene	0.0281	0.20	0.00563
Risk-weighted sum			0.0647

µg/L = micrograms per liter
* Each risk weight equals unit risk divided by the aggregate risk of 7.11×10^{-5}.
** Risk weight multiplied by concentration. Detail may not add to total due to independent rounding.

Exhibit 2-8 shows the risk-weighted sums for all three hypothetical systems. Given the simplified group MCL of 1.0, systems 1 and 2 are in compliance. System 3, however, is out of compliance because of the high risk associated with 1,2,3-trichloropropane. System 3 can achieve compliance only by reducing 1,2,3-trichloropropane; if it had co-occurring trichloroethylene, reductions in trichloroethylene would have no significant effect on the compliance equation. System 3 can use either GAC or aeration to achieve approximately a two-thirds reduction in 1,2,3-trichloropropane to achieve compliance (i.e., essentially to the MRL value). It can choose a treatment option that is cost-effective.

Exhibit 2-8. Compliance Determination for Risk-Weighted Group MCL*

Contaminant	System 1	System 2	System 3
1,2,3-Trichloropropane (risk-weighted level)	0.0	0.966	2.90
Vinyl chloride (risk-weighted level)	0.0591	0.0	0.00
Trichloroethylene (risk-weighted level)	0.00563	0.000844	0.00
Risk-Weighted Sum	0.0647	0.967	2.90
Does the sum exceed the MCL (simplified to 1.0)?	No	No	Yes

MCL = maximum contaminant level

* Values are based on the concentrations in Exhibit 2-3 and the risk weights in Exhibit 2-8Exhibit 2-7. Consistent with compliance monitoring practice, systems set measurements that do not have a detection result equal to zero.

3. Advantages and Disadvantages of the Group MCL Approaches

This section provides a comparison of the advantages and disadvantages of the two group MCL approaches. Topics addressed include ease of implementation, cost effectiveness, and health risk reduction.

Both approaches provide opportunities to select a single cost-effective compliance solution across a group of contaminants. For the feasible level addition approach, a system can choose the most cost-effective solution to meet an aggregate contaminant concentration. For the risk-weighted approach, a system can choose the most cost-effective solution to meet an aggregate risk or risk-weighted sum. As the example showed, the compliance results may vary dramatically across the two group MCL approaches. Under the feasible level approach, System 1 needed treatment to remove trichloroethylene and/or vinyl chloride to achieve compliance with the group MCL, but Systems 2 and 3 were in compliance. Under the risk-weighted approach, however, System 1 met the group MCL whereas System 3 did not because of a high 1,2,3-trichloropropane level.

The feasible level addition approach in Section 2.2.1 has the advantage of being more straightforward than the risk-weighted approach in Section 0. Many systems already have experience using contaminant concentration sums to determine compliance with the TTHM and HAA5 MCLs. By comparison, the risk-weighted approach involves more calculations to determine compliance. Systems or laboratories would need to calculate risk-weighted sums of monitoring results. Although this calculation would be an additional step, the beta emitter rule establishes precedence for manipulating concentrations to determine compliance.

A disadvantage of the feasible level addition approach is that it is less able to maximize health risk reduction compared to the risk-weighted approach. As the hypothetical example in Exhibit 2-3 shows, compliance with the feasible level addition approach would require System 1 to reduce trichloroethylene, which is the least potent contaminant of the group. Conversely, Exhibit 2-8 shows the risk-weighted approach results in compliance efforts at the system having a mixture with higher risks. Based on the risk-weighted sums, System 1 has the lowest overall risk despite having the highest aggregate concentration, and System 3 has a substantially more potent mixture that violates the risk-weighted MCL despite being in compliance with the group MCL based on feasible level addition. Thus, this example demonstrates that the risk-weighted approach to setting a group MCL is the better of the two approaches for minimizing overall risk and targeting compliance efforts to reduce exposure to contaminants with the highest health risk.

Exhibit 3-1 contains a summary of the advantages and disadvantages. Based on a review of advantages and disadvantages, EPA determined that the risk-weighted approach is appropriate for future group MCLs for groups such as cVOCs that meet the criteria listed in Section 2: all carcinogens for which the MCLG is zero, and health risks are independent. These contaminants can occur in mixtures, and the analytical methods or treatment options are also similar. EPA will evaluate risk-based group MCL approaches for groups with different characteristics at a later time.

Exhibit 3-1. Summary of Advantages and Disadvantages of the Group MCL Approaches

Topic	Feasible Level Addition	Risk-Weighted
Cost effectiveness	Encourages cost-effective reduction in contaminant levels	Encourages cost-effective reduction in contaminant risk
Ease of implementation	More familiar MCL and compliance equation	MCL and compliance equation require more effort, but simpler than beta rule
Risk reduction	Less targeted	More targeted

The risk-weighted approach has the potential to provide better risk management compared to the approach of feasible level addition. As the hypothetical example shows, the risk-weighted approach focuses compliance actions on the mixtures that pose higher health risks. Furthermore, it provides systems with an incentive to adopt compliance strategies that target reductions in the riskiest contaminants. Thus, the approach may result in more cost-effective investments in control technologies in terms of cost per incremental health risk reduction. EPA believes that the improvement in risk management outweighs the additional complexity of incorporating risk weights.

4. References

National Bureau of Standards (NBS). 1963. *Maximum Permissible Body Burdens and Maximum Permissible Concentrations of Radionuclides in Air or Water for Occupational Exposure*. U.S. Department of Commerce. Handbook 69 as amended August 1963.

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Appendix A: MCLs and MCLGs for TTHM and HAA5

EPA proposed the TTHM and HAA5 MCLs in 1994 and finalized them in 1998 via a negotiated rule-making process (59 *Federal Register* 38668; July 29, 1994; 63 *Federal Register* 69390, December 16, 1998). The MCLs reflect the limit of treatment feasibility given uncertainties about disinfection byproduct formation kinetics and the variability of formation conditions across drinking water systems. Thus, the group MCLs were not derived using the approach shown in 2.2.1.

Exhibit A-1 shows the two group MCLs, 0.08 mg/L for TTHMs and 0.06 mg/L for HAA5. It also lists the contaminants in each group, along with their respective MCLG values. These two groups are unique in that they include carcinogens with MCLG values of zero and noncarcinogens. EPA did not promulgate MCLG values for two of the HAA5 contaminants because health effects information was insufficient.

Exhibit A-1. MCLGs and MCLs for Regulated Disinfection Byproducts

DBP	MCLG (mg/L)	MCL (mg/L)
TTHMs*	(a)	0.080
Chloroform	0	(a)
Bromodichloromethane	0.07	(a)
Dibromochloromethane	0.06	(a)
Bromoform	0	(a)
HAA5**	(a)	0.060
Monochloroacetic acid	0.07	(a)
Dichloroacetic acid	0	(a)
Trichloroacetic acid	0.02	(a)
Monobromoacetic acid	(b)	(a)
Dibromoacetic acid	(b)	(a)

Source: Stage 1 Disinfectants and Disinfection Byproducts Rule; Table II-2. 63 FR 69390, December 16, 1998, and Stage 2 Disinfectants and Disinfection Byproducts Rule, 71 FR 388, January 4, 2006.
(a) = not applicable
(b) = not promulgated
* TTHM refers to the sum of the concentrations of chloroform, bromodichloromethane, dibromochloromethane, and bromoform.
** HAA5 refers to the sum of the concentrations of mono-, di-, and Trichloroacetic acids, and mono- and dibromoacetic acids.

Appendix B: Beta Emitter Sum of the Fractions Compliance Equation

The unit of measurement for beta and photon emitters in drinking water is activity per volume, measured in picocuries per liter (pCi/L). Therefore, the compliance determination equation must convert each beta and photon emitter quantity, denoted C_i and measured in pCi/L, to a fraction of the maximum exposure risk 4 mrem /yr. Therefore, the compliance equation contains a multiplier for each radionuclide *i*, which is the concentration of radionuclide *i* that is equivalent to a 4 mrem /yr exposure risk (C_i^m) (EPA, 2000a). Multiplying each radionuclide concentration by the inverse of its maximum exposure quantity converts the concentration to fraction of a 4 mrem /yr dose. Thus, the compliance equation is a "sum of the fractions" function (EPA, 2002):

$$4\ mrem\ \geq 4\ \times \sum_{i=1}^{B} \frac{C_i}{C_i^m}.$$

To illustrate the compliance equation, Exhibit B-1 shows the calculation for an example of four radionuclides.

Exhibit B-1. Illustrative Conversion of Beta Particle and Photon Emitters

Emitter	(X) Lab Analysis (pCi/L)	(Y) Conversion Factor (pCi/4mrem)*	(X/Y=A) Calculated Fraction**	(A*4) Calculated Total mrem
Cessium-134	5,023	20,000	0.25115	NA
Iodine-131	2	3	0.7	NA
Cessium-137	30	200	0.150	NA
Strontium-90	4	8	0.5	NA
Sum	NA	NA	1.60115	7

Source: EPA (2002); the rounding variations shown occur in the original source.
NA = not applicable
* pCi/L equivalent of 4 mrem of exposure.
** Fraction of the maximum 4 mrem / year exposure limit.

The conversion factors for individual beta/photon emitters correspond approximately to a lifetime fatal cancer risk of 1×10^{-4}. EPA (2000a; see Table III-3) provides a table of the factors, which were based on factors in NBS (1963).

FACT SHEET

NATIONAL DRINKING WATER ADVISORY COUNCIL

http://water.epa.gov/drink/ndwac/index.cfm

What is the National Drinking Water Advisory Council?

The National Drinking Water Advisory Council (NDWAC) is a Federal Advisory Committee that supports EPA in performing its duties and responsibilities related to the national drinking water program. The Council was created on December 16, 1974, through a provision in the Safe Drinking Water Act of 1974.

NDWAC provides advice, information, and recommendations on matters related to activities, functions, policies, and regulations required by the Safe Drinking Water Act.

What is the composition of membership?

NDWAC has 15 members who serve as Special Government Employees. Members are appointed by EPA's Administrator or he/she may delegate this responsibility to the Deputy Administrator. Five (5) members are appointed from each of the following areas: 1) appropriate State and local agencies concerned with public water supply and public health protection, 2) water-related or other organizations and interest groups having an active interest in public water supply/public health protection, and 3) the general public. Two (2) of the 15 members must represent small, rural public water systems.

Technical Advisors from Other Federal Advisory Committees/Federal Agencies

A member of the Science Advisory Board, a Federal Advisory Committee on science and research issues, serves as a liaison to the NDWAC and attends NDWAC meetings and conference calls. A liaison from the Centers for Disease Control and Prevention also serves as a liaison to the NDWAC and attends the meetings.

Schedule of Meetings

Customarily, the Council has one meeting each year. The Chair of NDWAC and/or the Designated Federal Officer can also schedule conference calls on which a majority of the members must participate. Consistent with the Federal Advisory Committee Act, the Council holds open meetings and provides opportunities for interested persons to make statements within a designated time period at the one meeting or to file statements/comments before or after such meetings.

Subgroups

EPA may form NDWAC subcommittees or working groups for any purpose consistent with the Charter. Such subcommittees or working groups work through NDWAC. Subcommittees or working groups have no authority to make decisions on behalf of the NDWAC nor can they report directly to the Agency.

Drinking Water Health Advisories for Cyanotoxins

Lesley V. D'Anglada, Dr.PH
US Environmental Protection Agency
Office of Water/Office of Science and Technology

November 7th, 2014

Presentation Overview

- Describe public health guidelines for cyanotoxins in place
- Discuss the toxicity assessment done for the three cyanotoxins listed in CCL
- Opportunity for Questions

Overview of Harmful Algal Blooms

- The prevalence and duration of Harmful algal blooms (HABs) in freshwater is rapidly expanding in the U.S. and worldwide.
- Some algal blooms can produce toxins at levels that may be of concern for human health and ecological impact.
- HABs have caused economic losses to the fishing and recreation industries while increasing costs for managing and treating potable water supplies.




Guidelines and Regulations for Drinking Water

- No federal regulations or guidelines for cyanobacteria or cyanotoxins in drinking water in the U.S.
- Candidate Contaminant List (CCL):
- Guidance values for drinking water have been adopted by 3 states

State	Drinking Water Guidance/Action Level
Minnesota	Microcystin-LR: 0.04 µg/L
Ohio	Microcystin : 1 µg/L Tox Eq ; Anatoxin-a: 20 µg/L; Cylindrospermopsin: 1 µg/L; Saxitoxin: 0.2 µg/L
Oregon	Microcystin: 1 µg/L Tox Eq; Anatoxin-a: 3 µg/L ; Cylindrospermopsin: 1 µg/L; Saxitoxin: 3 µg/L

Guidelines for Cyanotoxins

- WHO 1998 (provisional)
  - microcystins (based on LR) value for drinking water of 1µg/L and 20µg/L for recreational contact
- Canada 2002 (final)
  - total microcystins value for drinking water of 1.5µg/L
- EPA NCEA 2006 (draft for drinking water)
  - microcystin-LR short term/subchronic: 1.4 µg/L; chronic 0.1 µg/L
  - Cylindrospermopsin subchronic: 1 µg/L
  - Anatoxin a: short term: 70 µg/L; subchronic 14 µg/L
- Australia 2011 (suggested for drinking water)
  - microcystin-LR: 1.3 µg/L
  - Cylindrospermopsin: 1 µg/L
  - Anatoxin a: 3 µg/L

DW Health Advisories (HA) for Cyanotoxins

Microcystin-LR, Anatoxin-a, and Cylindrospermopsin

- Joint collaboration with Health Canada
- HA are non-regulatory concentrations at which adverse health effects are not anticipated to occur over specific exposure durations: one-day, ten-day, and Lifetime.
- Includes:
  - General information and properties
  - Occurrence and exposure
  - Toxicokinetics
  - Health effects data
  - Quantification of toxicological effects
  - Other criteria, guidance, and standards
  - Analytical methods
  - Treatment technologies

Cyanotoxins Toxicity Assessment

- Health Effects Support Document
  - Comprehensive Review of health effects information form exposure to cyanotoxins
  - Includes a Quantification of Dose-Response
    - RfD for microcystin-LR
    - RfD for cylindrospermopsin
  - External and Internal Peer Review
    - EPA currently addressing the comments

$$RfD = \frac{NOAEL(LOAEL)}{UF}$$

Preliminary Human Health Assessment on Microcystin

Toxicity Assessment Summary:

- The toxicological database is almost exclusively limited to data on the MC-LR congener.
- Acute and sub-chronic toxicity studies confirm the liver, kidney and testes as target organs.
- Chronic toxicity studies have not observed clinical signs of toxicity.
- Reproductive and developmental toxicity studies showed decreased in sperm counts and a reduction in sperm motility after 3 and 6 months with severity increasing with longer duration of exposure.
- Research gaps identified:
  - None of the available studies are considered adequate for carcinogenicity assessment of microcystins.
  - Very limited information is available on the toxicity via inhalation exposure.
  - Limited information on the relative potencies of other microcystin congeners when compared to MC-LR

Preliminary Human Health Assessment on Cylindrospermopsin

Toxicity Assessment Summary:

- Based on acute and sub-chronic studies done in mice, liver and kidneys appear to be the primary target organs for cylindrospermopsin toxicity.
- There are no chronic exposure studies on cylindrospermopsin.
- There are few studies on the genotoxicity of cylindrospermopsin, and there is some evidence of potential damage to DNA in mouse liver or causes mutations.
- Research gaps identified:
  - The chronic toxicity of cylindrospermopsin is unknown.
  - None of the available studies are considered adequate for carcinogenicity assessment of cylindrospermopsin.
  - No information on acute or chronic inhalation toxicity of cylindrospermopsin was identified.

Preliminary Human Health Assessment on Anatoxin-a

Toxicity Assessment Summary:

- The main known toxic effect of anatoxin-a is acute neurotoxicity.
- There are no cancer, genotoxicity, acute or chronic exposure studies on anatoxin-a, thus there is inadequate information to assess carcinogenic potential.
- Not enough information on sensitive endpoints and associated dose-response relationships to develop an RfD.
- Research gaps identified:
  - No acute oral studies using purified anatoxins could be found.
  - No chronic oral studies have been performed.
  - There is no information on carcinogenicity in humans or animals or on possible carcinogenic processes.
  - No information regarding mutagenicity or genotoxicity of anatoxin-a was identified.

Next Steps DW Health Advisories

- Development of DW Health Advisories for Microcystin and Cylindrospermopsin
  - Quantification of Toxicological Effects (HA values)
  - Analytical Methods
  - Treatment Techniques
- Internal Review
- External Review
- Publication – Spring 2015

Contact Information

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CyanoHABs website
http://water.epa.gov/scitech/swguidance/standards/criteria/nutrients/cyanohabs.cfm

Introduction to Water Reuse

Background and Overview of the Office of Water Activities

Presenter: Michelle Schutz

Office of Ground Water and Drinking Water

Water Supply Challenges

- In response to current water challenges including drought, cities and states are looking to augment their water supplies
- A Potential Framework to Maximize Water Availability
  - Conservation
  - Water Efficiency
  - Consolidation
  - Alternate Water Supplies
  - Water Reuse
    - Indirect Potable Reuse
    - Direct Potable Reuse

Indirect versus Direct Potable and Potable versus Non-Potable Reuse

- Indirect Potable Reuse (IPR) occurs when a utility discharges reclaimed water into surface water or groundwater supplies for the specific purpose of augmenting the drinking water supply
- Direct Potable Reuse (DPR), for purposes of this discussion, means the use of water from a regulated water reclamation plant or recycling facility (which may or may not include an engineered buffer such as tanks)
- Potable Water is water that has been treated, cleaned filtered or disinfected and meets established drinking water standards
- Non-Potable Water is water that is not of drinking water quality, but which may still be used for many other purposes depending on the quality and need

Reuse as an Option

- The ability to reuse water has positive benefits that are also the key motivators for implementing reuse programs
- Water Reuse Drivers
  - Water Availability
  - Climate Change
  - Population Growth
  - Climate Independent Water Source

Reuse Guidelines

- In the U.S., water reclamation and reuse standards are the responsibility of state and local agencies. Currently there are no federal regulations.
- 1980 EPA developed the first *Guidelines for Water Reuse* as a technical research report for ORD
- 2012 the Guidelines were updated and mainly address Indirect Potable Reuse

States Implementing Reuse

- As of 2012, a number of states have adopted regulations, guidelines or design standards to cover direct or indirect potable water reuse (Examples include: CA, AZ, NM, TX, CO, FL, GA, VA, WY, WA)

Office of Water Reuse Activities

- Cooperative Research and Development Agreement (CRADA) with Camp Dresser McKee (CDM) Smith – Developing a compendium to the 2012 Guidelines on on the state of play for potable water reuse
  - Status: Scheduled to be complete in Early 2015
- Member of Project Advisory Committee for WateReuse White Paper
  - Provide oversight on a white paper being developed to inform a DPR Framework
  - Goal of Framework will be to a provide a source of information and expert judgement on potable reuse

Office of Water Reuse Activities

- Evaluating ambient water quality criteria for viruses
- Currently collecting data on viruses in raw sewage with coordination of the FDA (FDA considers viruses to be an effective indicator for wastewater treatment). This will inform any additional activities regarding IPR and DPR.

Next Steps

- Work with states to determine the need for an EPA guidance on Direct Potable Reuse
- Provide an update to NDWAC at the Spring 2015 meeting

National Drinking Water Advisory Council

NDWAC Climate Report: Progress and Challenges

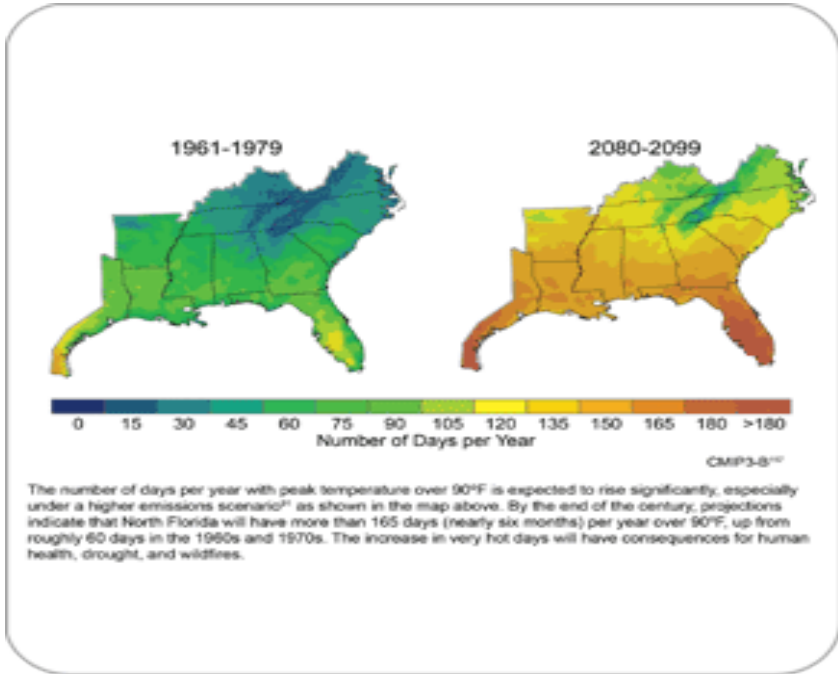
David Travers
Water Security Division,
Office of Ground Water and Drinking Water, USEPA

NDWAC Climate Working Group

In 2009, NDWAC approved the formation of a working group to evaluate "Climate Ready Water Utilities"

The charge included:

1. Developing attributes of climate ready water utilities
2. Identifying climate change-related tools, training and products to address utilities' short- and long-term needs
3. Identifying mechanisms that would facilitate the adoption of climate change adaptation and mitigation strategies by the water sector



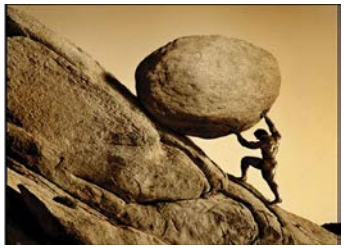
The number of days per year with peak temperature over 90°F is expected to rise significantly, especially under a higher emissions scenario[47] as shown in the map above. By the end of the century, projections indicate that North Florida will have more than 165 days (nearly six months) per year over 90°F, up from roughly 60 days in the 1960s and 1970s. The increase in very hot days will have consequences for human health, drought, and wildfires.

NDWAC Climate Working Group

- **Twenty members of CRWU Working Group**
  - 12 from water utilities
  - 3 from state and local governments
  - 5 from academic, environmental, and other organizations
- **Federal partners include**
  - US Army Corps of Engineers, Centers for Disease Control and Prevention, and Federal Emergency Management Agency

Summary of Recommendations

- **11 findings, 12 recommendations (slides 26-30)**
- **Create and implement a Climate Ready program**
- **Improve coordination on climate change among federal agencies and partners**
- **Strengthen and deploy decision support models and tools**



Summary of Recommendations

- **Integrate climate information into existing technical assistance initiatives**
- **Establish training programs for utilities**
- **Develop adaptive regulatory capacity**

Continuum of Engagement

Climate ready utilities respond adaptively based on local conditions, needs, and capacity

- ***Basic Engagement***: General awareness and implementation of "effective utility management" choices
- ***Focused Engagement***: Explicit, climate-related planning; and operational adaptation and mitigation actions and investments

CRWU Mission Statement

To provide the water sector with the practical tools and training to adapt to climate change by promoting a clear understanding of climate science and adaptation options.



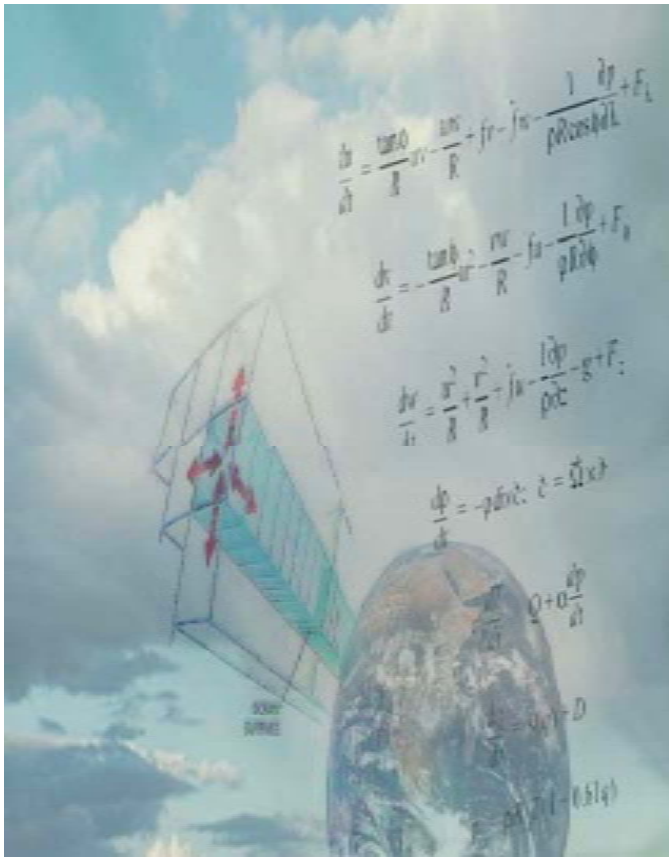

Climate Ready Tools & Resources

Adaptation: Uncertainty

- **First step**

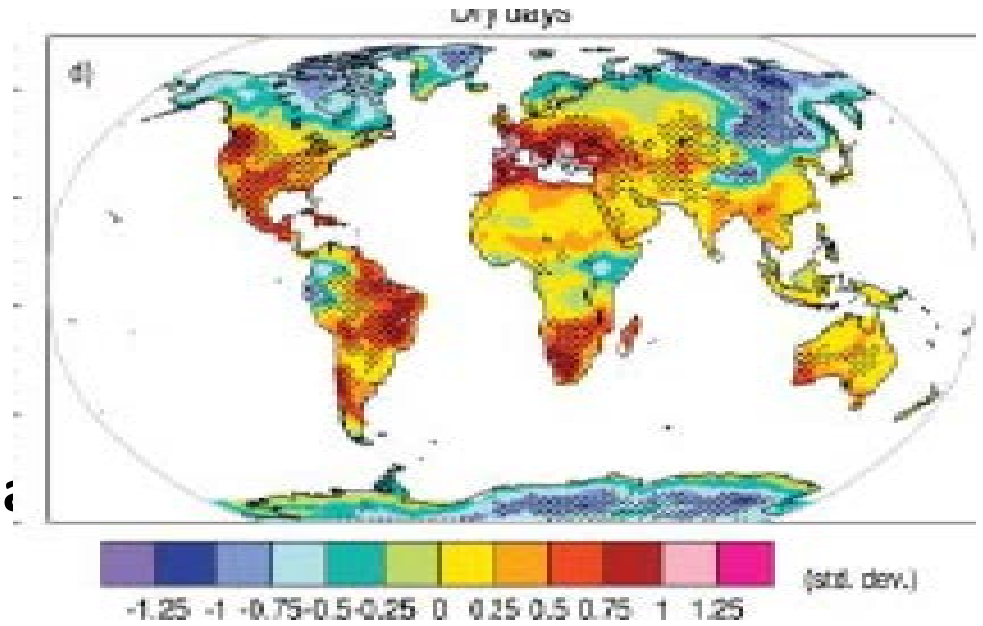
  Provision of Impact Forecasts → Understanding/ Action

- **Downscaling**
  - Universal obsession with
  - Were they designed for decision making?
    - Nassim Taleb: We're suckers for those who provide guidance for the future
  - Critical, but more supplementary



Adaptation: Uncertainty

- **Adaptation strategies require more accurate predictions than are possible with current models**
- **Such predictions are a prerequisite for effective adaptation decision making**
- **Emphasis on downscaling, refining models resulting in a no-regrets or wait-and-see approach**



optimization vs robustness

Adaptation: Uncertainty (is the only certainty there is)

- **Uncertainty stems from limited knowledge, randomness, and human actions**
- **Such uncertainty will persist indefinitely**
- **Design a provisional approach to create awareness of potential impacts, adaptation and mitigation options**
  - Reduce and/or manage uncertainty (adaptive management)
  - Range of plausible impact scenarios (scenario-based planning)
  - Vulnerability analysis → Decisions → Data
  - What we should be doing anyway as part of sound stewardship

National Drinking Water Advisory Council

Climate Change Drivers

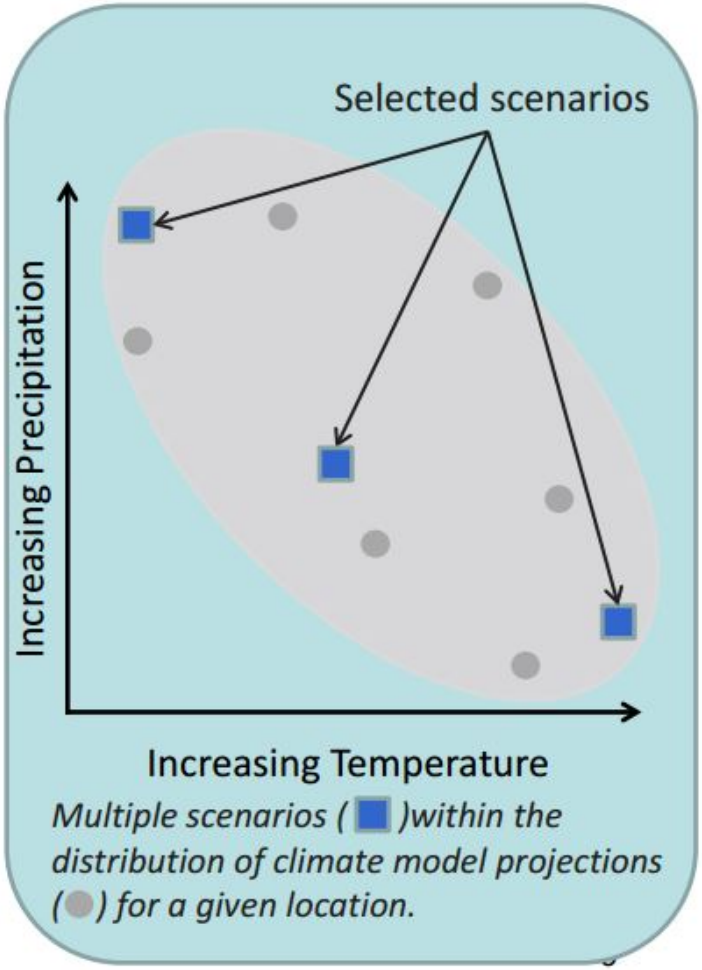
Increasing Temperature	Changing Precipitation	Changing Storm Intensity & Freq.	Rising Sea Level	Relevant Regional Threat
☑	☑	☑	☑	☑

The list of threats below are those related to at least one selected driver. You can scroll as needed to see the threats that are available for selection.

Challenges / Threats					
Altered demand and competing use					
Changes in agricultural practices & outdoor use	X	X	X		
Changes in energy sector water needs	X	X			X
Changes in influent flow & temperature	X	X	X		X
Changes in residential use	X				X
Altered or loss of ecosystem services					
Altered vegetation / wildfire risk	X	X			X
Loss of coastal landforms			X	X	
Loss of wetlands	X	X	X	X	
Degraded water quality					
Altered surface water quality	X	X	X	X	
Saline intrusion into aquifers		X		X	
Increased flood frequency & extent					
Coastal storm surges			X	X	
High flow events		X	X		X
Increased incidence of droughts					
Lower lake and reservoir levels	X	X			X
Reduced groundwater recharge	X	X			

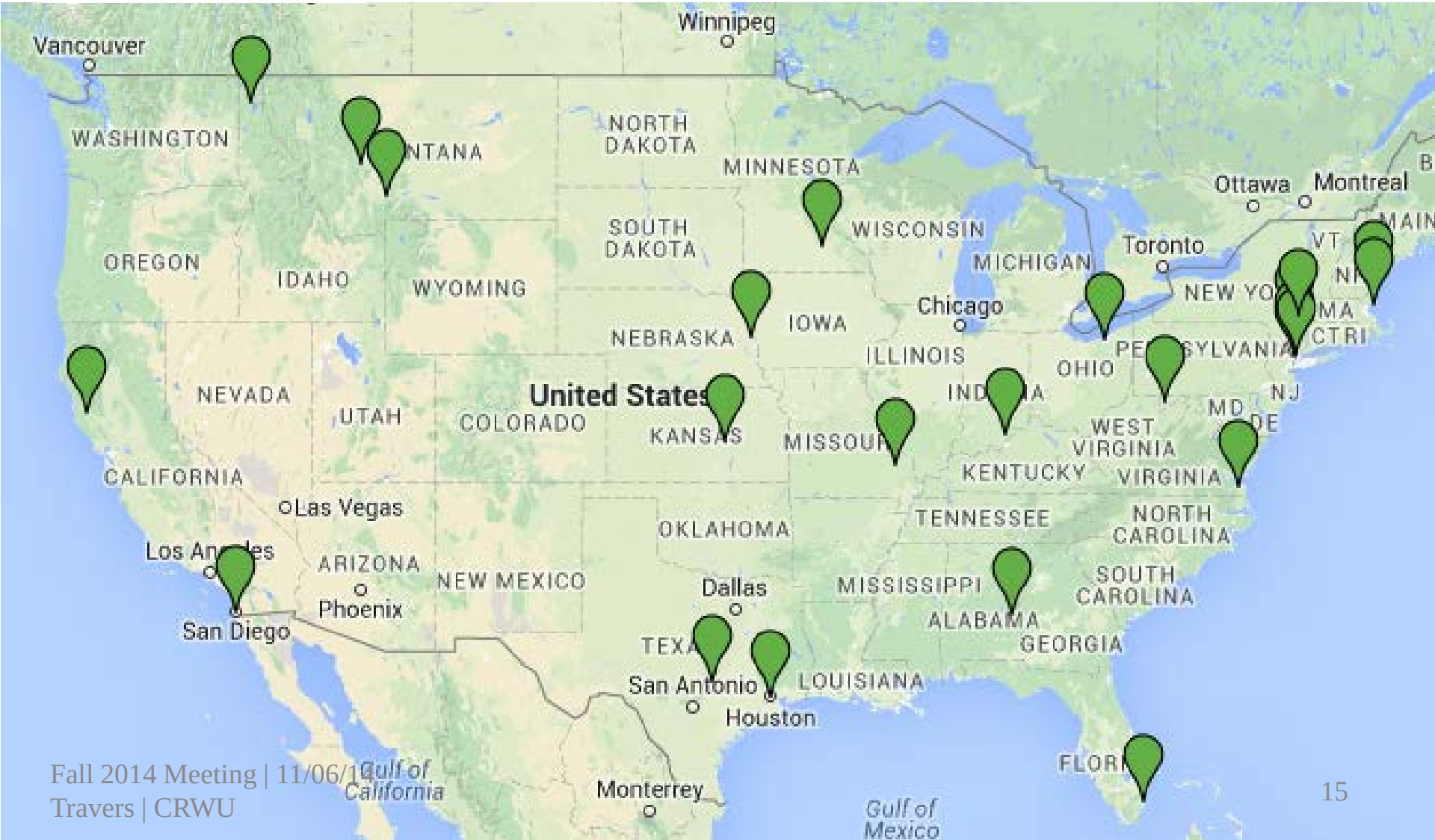
CREAT

- Scenarios, based on a single model projection, selected for each grid cell
  - Hot and Dry model
  - Central model
  - Warm and wet model
- Data provided for two time periods (2020-2050 and 2045-2075)




Projected CREAT Climate Scenarios
Changes in Annual Temperature
Period Hot/Dry Central Warm/Wet
2035 2.41°F 2.27°F 1.76°F
2060 4.41°F 4.14°F 3.22°F
Changes in Annual Precipitation
Period Hot/Dry Central Warm/Wet
2035 -9.08% -1.59% 7.95%
2060 -16.62% -2.91% 14.55%
Changes in 100-y Storm Intensity
Period Hot/Dry Central Warm/Wet
2035 5.72% 15.83% 6.81%
2060 10.46% 28.89% 12.44%
Rise in Sea Level by 2060
+7.25 to 18.47 inches
Esri, DeLorme, FAO, USGS, NOAA, EPA, NPS

CREAT Pilots (2015 only)



EPA United States Environmental Protection Agency

CLIMATE READY WATER UTILITIES
EPA

Adaptation Strategies Guide for Water Utilities

With information from the 2014 National Climate Assessment
UPDATED
& Water Demand Management Sustainability Brief

United States Environmental Protection Agency

CLIMATE READY WATER UTILITIES

EPA

Climate Region Brief > SOUTHWEST

Return to Introduction

Climate change in the southwestern United States is projected to continue to follow already observable trends. Temperature rise, shifts in precipitation patterns and timing, and altered hydrologic cycles can be expected due to climate change. The following statements, drawn from U.S. Global Change Research Program assessments (USGCRP 2009, USGCRP 2014), are based on projections for climate conditions at the end of the 21st century – using both high and low emissions scenarios (IPCC 2000).

OBSERVED AND PROJECTED CHANGES

- The 2001-2010 decade was the warmest on record. Average observed temperatures in the Southwest were almost 2°F higher than historic averages, with the region experiencing more heat waves and fewer cold snaps.
- Projected increases in summertime temperatures are greater than the increase of annual average temperature in parts of the region and will likely be exacerbated locally by expanding urban heat island effects.
- Less winter precipitation falling as snow and earlier spring snow melt are projected to shift runoff and most of the annual streamflow to earlier in the year.
- Future droughts are projected to be substantially hotter. For major river basins, such as the Colorado River Basin, drought is projected to become more frequent, intense and longer lasting than in the historical record (Cayan et al. 2012).
- Increasing temperature will cause more droughts, wildfires and invasive species colonization, which will accelerate transformation of the landscape. Models project a doubling of burned area in the Southern Rockies (Litschert et al. 2012) and up to 74% more fires in California (Westerling et al. 2012). The area burned in the Southwest has increased by more than 300% compared to the 1970s and 1980s. Drought has been widespread in the Southwest since 2000; the drought conditions during the 2000s were the most severe average drought conditions of any decade.
- Increased flood risk in the Southwest is likely to result from a combination of decreased snow cover on the lower slopes of high mountains and an increased fraction of winter precipitation falling as rain, which will run off more rapidly and alter the timing of flooding.

GROUP		DW	WW
Drought	Reduced groundwater recharge	💧	
	Lower lake & reservoir levels	💧	
	Changes in seasonal runoff & loss of snowpack	💧💧	
Water Quality Degradation	Low flow conditions & altered water quality		💧💧
	Saltwater intrusion into aquifers	💧	
	Altered surface water quality	💧	💧
Floods	High flow events & flooding	💧💧	💧💧
	Flooding from coastal storm surges	💧	💧
Ecosystem Changes	Loss of coastal landforms / wetlands	💧	💧
	Increased fire risk & altered vegetation	💧💧	💧💧
Service Demand & Use	Volume & temperature challenges	💧💧	💧💧
	Changes in agricultural water demand	💧💧	
	Changes in energy sector needs	💧💧	
	Changes in energy needs of utilities	💧💧	💧💧

Click on a group name above to read more about these impacts or click on a water drop above to read more about a specific impact.

💧💧 = Particularly relevant to Southwest 💧 = Somewhat relevant

Continued on page 2

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CLIMATE READY WATER UTILITIES

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Group: DROUGHT (DW)

Return to Introduction

Observed data indicate that drought intensity and frequency have been increasing in the United States during the last few decades, especially in much of the West. Average values of the Palmer Drought Severity Index from 2000-2010 indicated the most severe average drought of any decade on record. Summer droughts are expected to intensify in most regions of the United States (USGCRP 2014). The impacts to water utilities from drought associated with climate change may be driven or forced by changing water levels in aquifers and reservoirs, loss of snowpack and reductions in surface water flows. Clicking on the drinking water icon next to each impact name will bring you to that particular Strategy Brief. Clicking on the Green Infrastructure or Water Demand Management icon will bring you to that Sustainability Brief.

Reduced Groundwater Recharge

Reduced precipitation and higher loss of water from plants and evaporation due to higher temperatures will decrease surface water supplies and groundwater recharge, especially impacting utilities that rely on groundwater supplies. Review this brief to learn more about how the Inland Empire Utilities Agency (IEUA) used stormwater capture and water recycling to counteract the effects of reduced groundwater recharge and how Tucson Water has constructed a large-scale recharge and recovery system to secure its water supply through 2050.

Lower Lake and Reservoir Levels

Decreases in mean annual precipitation and higher loss of water from vegetation and evaporation due to higher temperatures will lead to lower levels in the lakes and reservoirs that water utilities rely on for surface water supplies. These lower levels may make it difficult to meet water demands, especially in the summer months, and may drop water levels below intake infrastructure. Review this brief to learn more about how Southern Nevada Water Authority (SNWA) uses aggressive conservation practices and new construction to address falling water levels in Lake Mead.

Changes in Runoff and Loss of Snowpack

Increased temperatures and shifting precipitation patterns will alter seasonal runoff and storage of water in snowpack. These changes in water supply could strain the capacity of reservoirs to hold larger and earlier peak runoff flows, cause shortages in the summer due to longer duration of the warmer and drier season and compromise biodiversity goals (e.g., managing cold-water fish, such as salmon and trout). Lower annual precipitation will lead to lower streamflow in many locations, which may lead to diminished water quality. Diminished water quality in receiving waters may lead to more stringent requirements for wastewater discharges, leading to higher treatment costs and the need for capital improvements. Review this brief to learn more about how the Portland Water Bureau is considering expanding its groundwater supply or surface water storage to offset the impacts seasonal runoff changes will have on water supply and how East Bay Municipal Utility District (EBMUD) used results of a "bottom up" sensitivity analysis to plan for impacts related to projected earlier runoff.

ADAPTATION OPTIONS

Click to left of name to check off options for consideration; $'s ($-$$$) indicate relative costs
Click name of any option to review more information in the Glossary
No Regrets options - actions that would provide benefits to the utility under current climate conditions as well as any future changes in climate. For more information on No Regrets options, see Page 11 in the Introduction.
Click on the , , or icon to review the relevant Sustainability Brief.

✓	PLANNING	COST
	Develop models to understand potential water quality changes (e.g., increased turbidity) and costs of resultant changes in treatment.	$
	Incorporate monitoring of groundwater conditions and climate change projections into groundwater models.	$

Continued on page 2


CLIMATE READY
WATER UTILITIES
EPA
Preparing for Extreme Weather Events:
Workshop Planner for the Water Sector
Intro
Workshop Process
Climate Science
Regional Info
Plan Workshop
Resources
Help
Introduction
Extreme weather events such as heavy precipitation and prolonged drought can have very high and expensive consequences for drinking water, wastewater, and stormwater utilities such as damage to infrastructure, changing water quality, and disruption of service. The National Oceanic and Atmospheric Administration (NOAA) reported that in 2011, the US experienced the most billion-dollar weather disasters on record. Climatologists project that future extreme weather events will become more frequent and more intense due to climate change. During 2012, eleven extreme weather and climate events in the US reached the billion-dollar threshold in losses, according to NOAA. While the total number of billion-dollar natural disasters is down from 14 in 2011, estimates indicate that economic losses in 2012 are expected to exceed those from 2011.
Intro
Workshop Process
Climate Science
Regional Info
Plan Workshop
Resources
Help
Understanding and addressing impacts from extreme weather and climate change events is an important part of utility planning and decision making.
The Workshop Planner provides the information and materials needed to conduct a customized
Home
Plan Workshop
1. Objectives
2. Participants
3. Logistics
4. Materials
5. Report

EPA United States Environmental Protection Agency

FLOOD RESILIENCE

A Basic Guide for Water and Wastewater Utilities

Select a menu option below.
First time users should start with the Overview.

Overview

Approach

Mitigation Options

Pilot Project

FLOOD RESILIENCE: A Basic Guide for Water and Wastewater Utilities

EPA

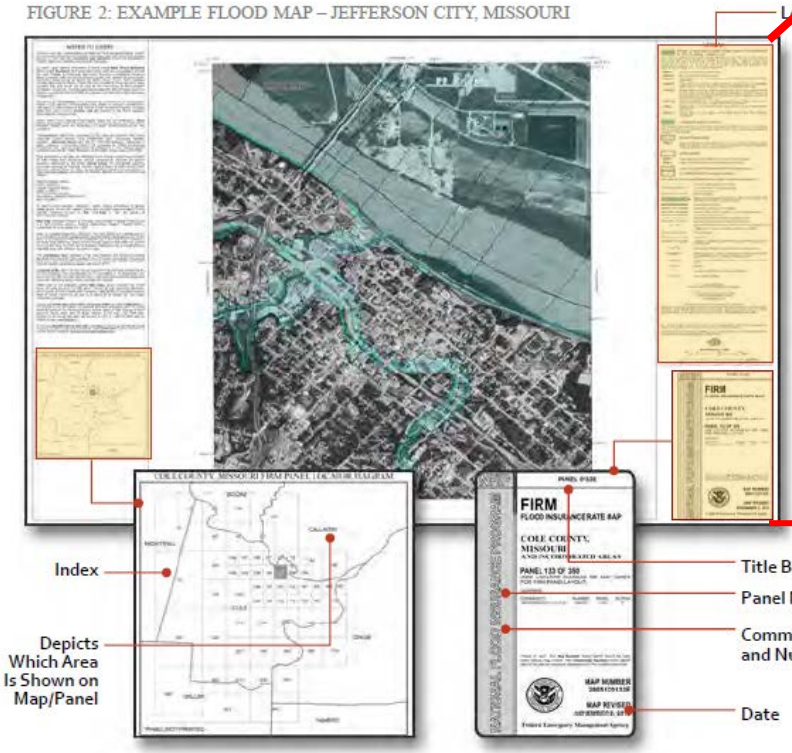
Return to Step 1 Worksheet

Interpreting FEMA Flood Maps

FLOOD MAP

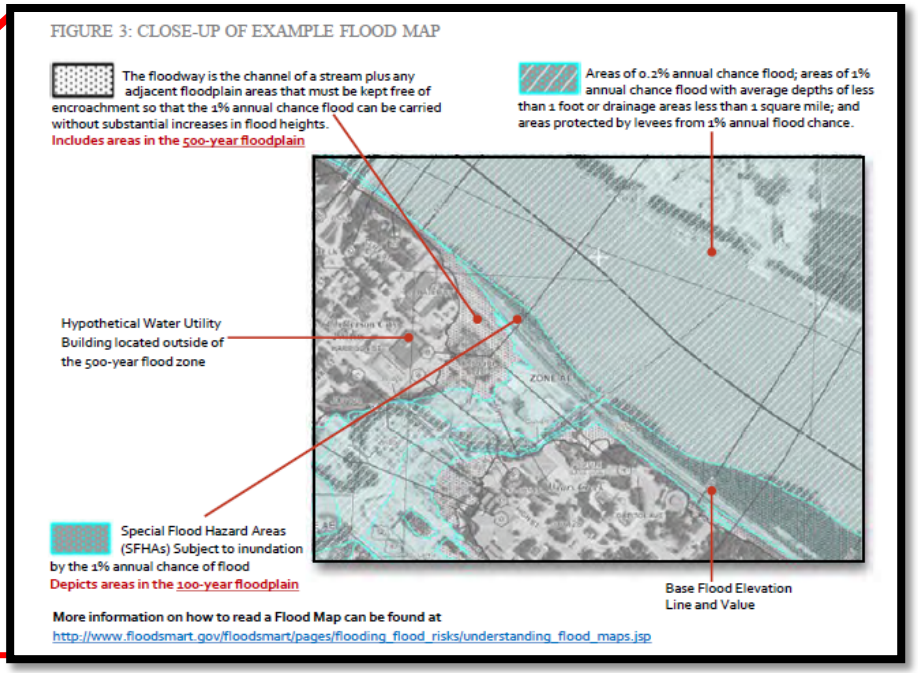
Flood Map is the common term used to refer to a Flood Insurance Rate Map (FIRM) developed by FEMA. Local and state governments use these maps to understand the threat of flooding and to devise hazard mitigation plans (including possible projects) to mitigate the effects of flooding in their communities. Flood Maps can be obtained through FEMA's Map Service Center. To identify your relevant Flood Map, enter the address of your facility or vulnerable asset(s). An example map including legend, index and title box is provided in Figure 2.

FIGURE 2: EXAMPLE FLOOD MAP – JEFFERSON CITY, MISSOURI



Previous | Main Menu | Next

FIGURE 3: CLOSE-UP OF EXAMPLE FLOOD MAP



FLOOD RESILIENCE: A Basic Guide for Water and Wastewater Utilities

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Return to Mitigation Options

Mitigation Options

BOOSTER STATIONS AND OTHER PUMPS

☑ Drinking water

Flood waters can severely damage pumps, thereby impacting the entire drinking water system from intake through distribution. Similarly, loss of facility power could render pumps inoperable without adequate backup power. Vulnerable water facility control systems include pump controls, variable frequency drives, electrical panels, motor control centers and Supervisory Control and Data Acquisition (SCADA) systems.

See the following checklist for potential flood mitigation optior

✓	Mitigation Options for Booster Stations and Other Pumps	Cost
	1. Prevent booster stations from flooding.	
	a) Procure temporary flood barriers (e.g., sandbags) for use in minor floods.	$
	b) Install permanent physical barriers (e.g., flood walls, levees, sealed doors).	$$
	2. Protect critical components if booster stations do flood.	
	a) During upgrades or design of new equipment, develop capability to temporarily remove and safely store vulnerable components in advance of a flood.	$-$$$
	b) Waterproof, relocate or elevate motor controls, variable frequency drives, computers and electrical panels to a higher elevation by constructing platforms or integrating controls into existing buildings or infrastructure on-site.	$$
	c) De-energize systems prior to flooding to mitigate damage to electrical components.	$
	d) Replace non-submersible pumps with submersible pumps, if cost effective.	$$-$$$
	e) Replace standard electrical conduits with sealed, waterproof conduits. Replace	$$$

Ongoing Work and Goals

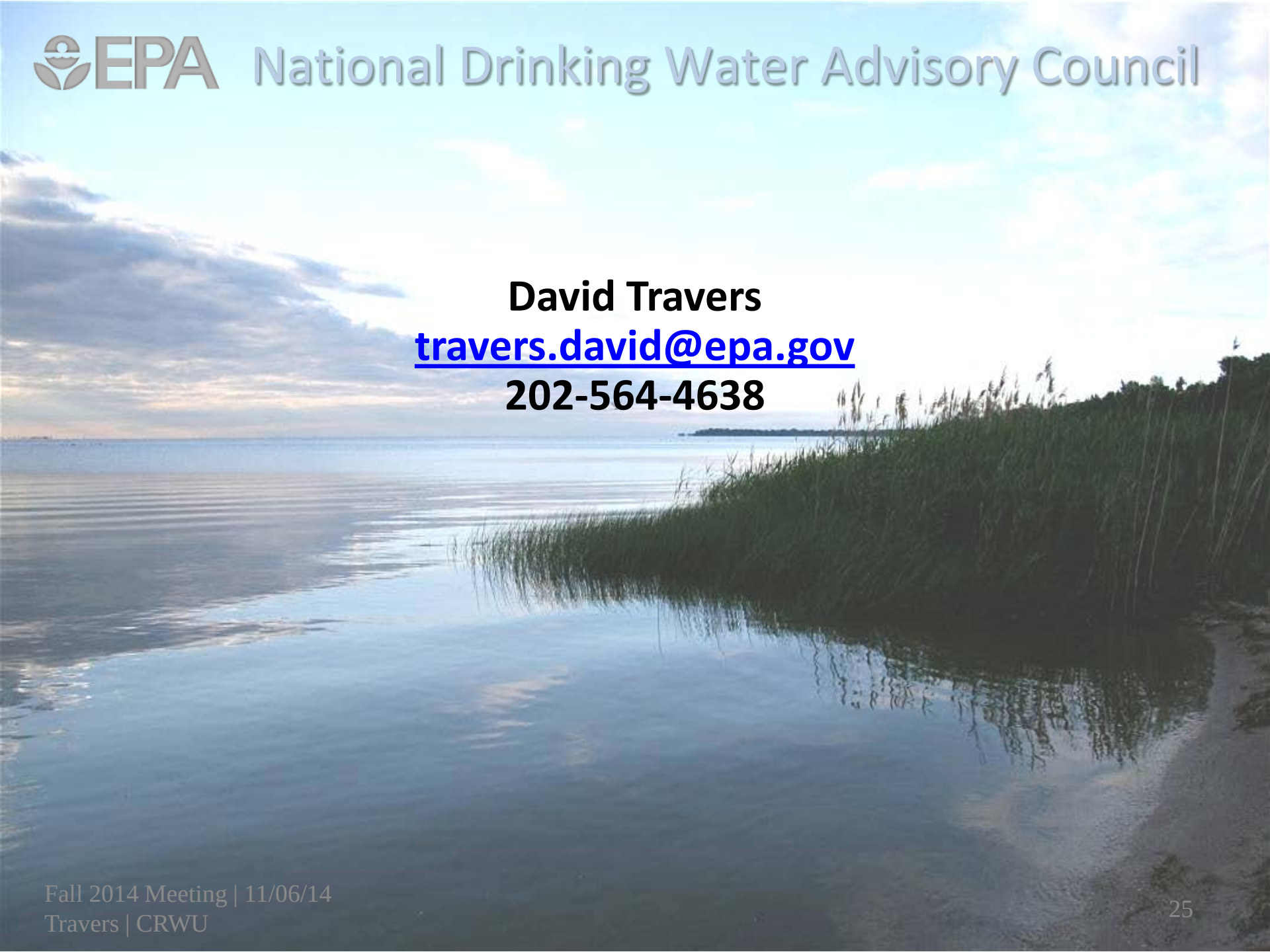
CRWU continues to improve program tools

- **Provide training and assistance for pilot utilities using CREAT**
- **Update CREAT**
- **Drought Resiliency Guide**

- **Updates to Adaptation Strategies Guide to include information on sustainability, energy and cost**

Challenges

- **Interpreting and translating climate data into actionable data**
- **More compelling incentives (bonds)**
- **Reaching small systems**
- **Competing priorities relative to climate change**
- **How to bring impacts on decadal horizons into current day thinking**
- **Political dimension**
- **Credibility**



David Travers
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202-564-4638

Key Theme of the Findings: Climate "Readiness"

- Readiness should reflect adaptive learning and management
- Expanded concept of infrastructure is a key element
- Inclusion of sector interdependencies in decisions is critical
- Capacity to engage in climate ready activities varies
- Robust enabling environment needed for success
- Research should be guided by specific needs of water sector

Findings

1. The water sector faces important and potentially substantial climate change adaptation challenges, but also opportunities.
2. Proactive, climate ready actions will enhance water sector utility resilience.
3. Different local conditions will dictate different climate ready responses.
4. Utility “climate readiness” is an emerging concept that must therefore reflect an adaptive learning and management framework.
5. An expanded concept of “water system infrastructure” is a key element of utility climate readiness.
6. To succeed, individual utilities need a robust enabling environment.

Findings (cont.)

7. Many utilities do not have the capacity to become climate ready.
8. Climate change impacts create challenges for current "regulatory stationarity."
9. Water sector utilities are overwhelmed with climate change information and lack of coordination by federal agencies, state agencies, and other water sector actors.
10. The water sector is underserved by climate science and by information regarding adaptation and mitigation costs and benefits.
11. Water sector utility greenhouse gas (GHG) mitigation efforts are an important aspect of the sector's climate-related strategy.

Climate Ready Water Utilities Working Group

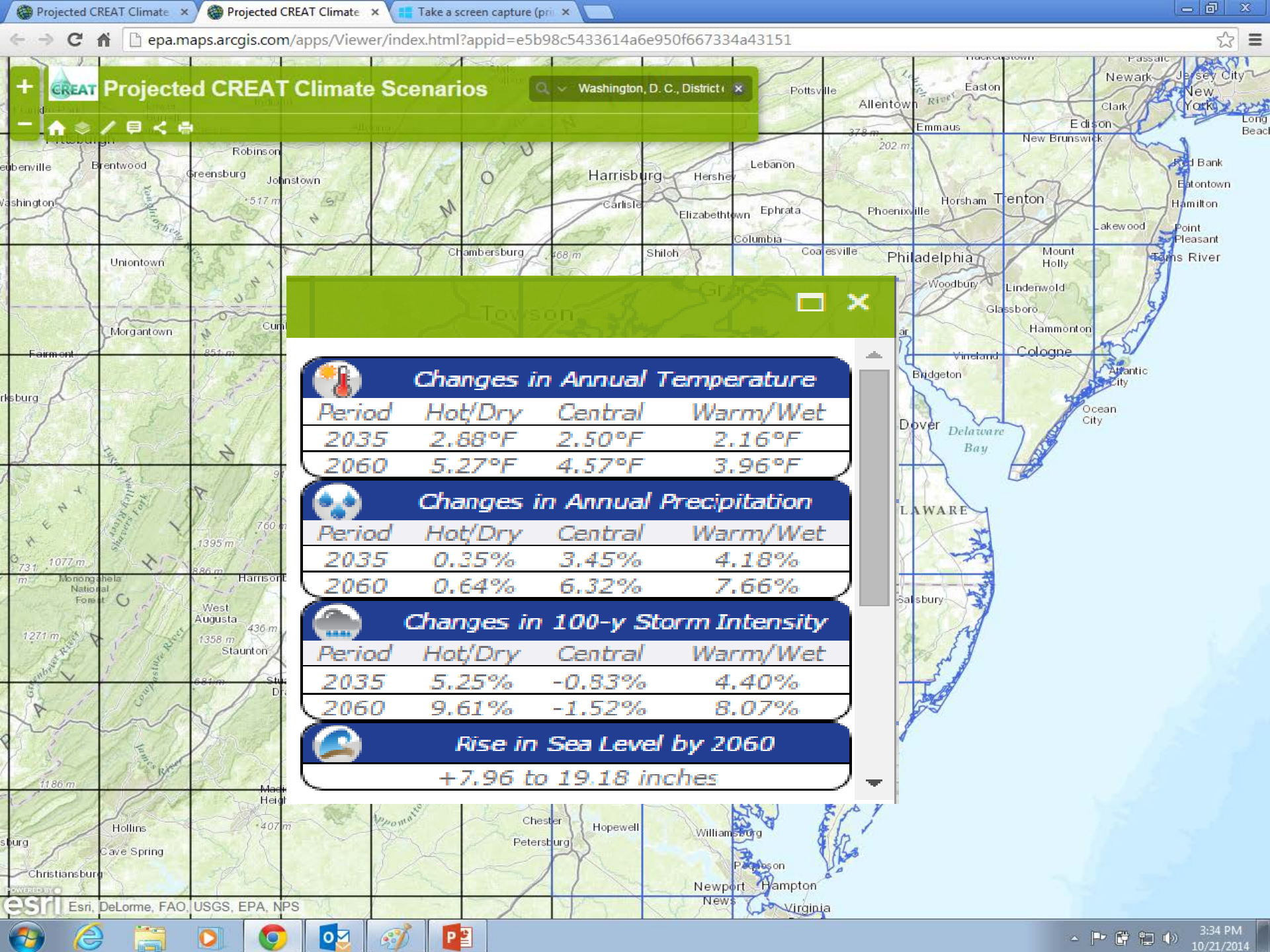
Recommendations

1. EPA should develop a program to support the adoption of climate ready activities.
2. EPA should build out the concept of "climate ready" utilities based on the Findings and CRWU Adaptive Response Framework.
3. Establish for utility staff a climate change continuing education and training program.
4. Build on and strengthen advanced decision support models and tools to support utility climate change efforts.
5. Increase interdependent sector knowledge of water sector climate-related challenges and needs.
6. Improvements in, and better integration of, watershed planning and management in response to climate uncertainty and impacts.

Climate Ready Water Utilities Working Group

Recommendations (cont.)

7. Improve access to and dissemination of easy-to-understand and locally relevant climate information.
8. Better integrate climate change information into existing utility technical assistance initiatives.
9. Develop an adaptive regulatory capacity in response to potential climate change alteration of underlying ecological conditions and systems.
10. Develop a comprehensive water sector, climate change research strategy.
11. Advocate for better coordination of federal agency climate change programs and services.
12. EPA should take the following early action steps in close cooperation with applicable federal agencies, NGOs, and water sector professional associations.


Projected CREAT Climate
Projected CREAT Climate
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Projected CREAT Climate Scenarios
Washington, D. C., District
Changes in Annual Temperature
Period Hot/Dry Central Warm/Wet
2035 2.88°F 2.50°F 2.16°F
2060 5.27°F 4.57°F 3.96°F
Changes in Annual Precipitation
Period Hot/Dry Central Warm/Wet
2035 0.35% 3.45% 4.18%
2060 0.64% 6.32% 7.66%
Changes in 100-y Storm Intensity
Period Hot/Dry Central Warm/Wet
2035 5.25% -0.83% 4.40%
2060 9.61% -1.52% 8.07%
Rise in Sea Level by 2060
+7.96 to 19.18 inches
Esri, DeLorme, FAO, USGS, EPA, NPS
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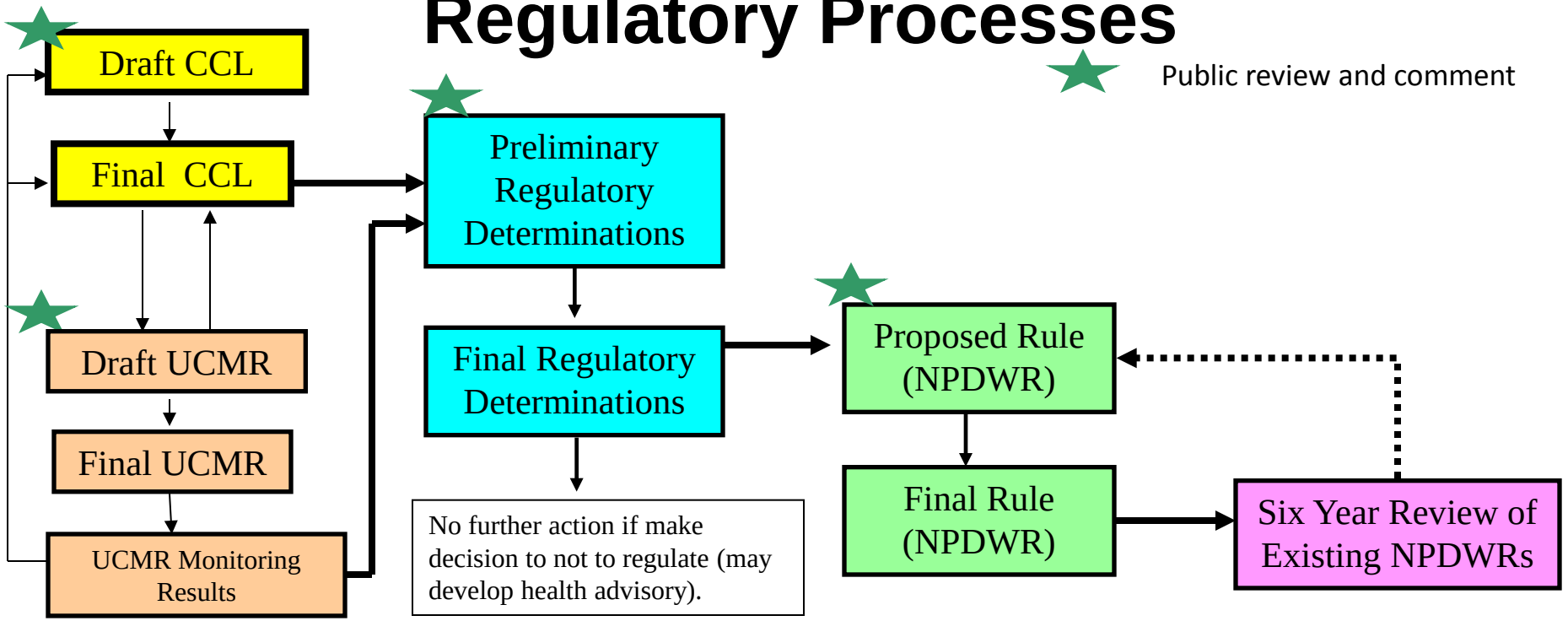
10/21/2014

National Drinking Water Advisory Council

Drinking Water Regulatory Development Activities

Presenter: Eric Burneson, Director
Standards and Risk Management Division
Office of Ground Water and Drinking Water
Office of Water, US EPA

General Flow of Safe Drinking Water Act Regulatory Processes



At each stage, need increased specificity and confidence in the type of supporting data used (e.g. health, occurrence, treatment).

CCL = Contaminant Candidate List
UCMR = Unregulated Contaminant Monitoring Rule
NPDWR = National Primary Drinking Water Rule

Presentation Overview

- Contaminant Candidate List
- Regulatory Determinations
- Unregulated Contaminant Monitoring
- Rules Under Development/Revision
- Six Year Review of Regulations

Contaminant Candidate List (CCL)

- Published Third Contaminant Candidate List (CCL 3) in October 2009, which listed 116 contaminants:
  - 12 microbes (e.g., viruses, bacteria)
  - 104 chemicals (pesticides, industrial chemicals, pharmaceuticals, inorganics)
- Spring 2012 - Published FR notice requesting nominations of contaminants to be considered for inclusion on CCL 4
  - 59 unique contaminants were nominated by 10 organizations and individuals
    - 5 microbes and 54 chemicals
    - 8 contaminants were nominated more than once
  - The nomination letters and web site submittals can be found in the CCL 4 docket (EPA-HQ-OW-2012-0217) at www.regulations.gov
  - Expect Draft CCL 4 publication in 2014

Regulatory Determinations

SDWA requires EPA to make regulatory determinations for at least 5 CCL contaminants every 5 years. EPA must regulate if:

1) *The contaminant may have an adverse effect on the health of persons;*

2) *The contaminant is known to occur or there is substantial likelihood that the contaminant will occur in public water systems with a frequency and at levels of public health concern; and*

3) *In the sole judgment of the Administrator, regulation of such contaminant presents a meaningful opportunity for health risk reduction for persons served by public water systems*

***SDWA Section 1412(b)(1)**

Regulatory Determination Outcomes

- **No Regulatory Determination**
  - Insufficient data to assess contaminant on three criteria

- **Positive Determination**
  - Affirmative determination for all three criteria
  - Begin process to develop a drinking water regulation
  - Not considered a final agency action

- **Negative Determination**
  - Negative determination for any one of the three criteria
  - Considered a final agency action
  - Drinking water regulation is not developed
  - Health Advisory is a non-regulatory option

#	Outcome
1	✔
2	✔
3	✔

#	Outcome
1	✓
2	X
3	X

National Drinking Water Advisory Council

Regulatory Determination – Strontium

	Background➔ Statutory Criteria ➓	**Strontium:** Primarily from naturally occurring inorganic compounds that are widely present in soils. Also used in fertilizers and pyrotechnics.
1	Adverse Effect? **Yes**	• Health endpoint = decreased bone calcification, which could lead to fractures and osteoporosis; 0-18 year olds are more sensitive since bones still developing • Health Reference Level (HRL) – 1500 µg/L (based on sensitive life stage)
2	Known or likely to occur? **Yes**	• Found in 7% of 989 water systems greater than HRL (older national survey of ground water systems) • USGS found > HRL in 12% of ground water systems • Preliminary UCMR 3 data* - 100% of 1,858 systems have detected at levels ≥ reporting level (0.3 µg/L) and ~5% of systems (ground and surface water) have found at health levels of concern
3	Meaningful opportunity? **Yes**	• 11% of population exposed for systems with detects greater than HRL in the ground water survey • National extrapolation of NIRS for ground water population ~10 M • Sensitive populations include growing children [especially those with low dietary calcium and Vitamin D, people with renal problems, and Padget's disease (a bone condition – mostly impacts elderly)]

Note: Currently collecting surface and ground water occurrence data as part of UCMR 3 (2013-2015). The first 18 months of data (half) will be available for making the final determination. All of the UCMR 3 data will be available for the proposed and final rulemakings.

Regulatory Determination – 1,3-Dinitrobenzene, Dimethoate, Terbufos & Terbufos Sulfone

	Background➔ Statutory Criteria ➘	**1,3-Dinitrobenzene:** Used as industrial chemical and in the production of other substances.	**Dimethoate:** Organophosphate pesticide used on field crops.	**Terbufos & Terbufos Sulfone:** Organophosphate pesticide, primarily used on corn and beets.
1	Adverse Effect? **Yes for all**	• Increased spleen weight	• Cholinesterase enzyme (ChE) inhibition	• Cholinesterase (ChE) enzyme inhibition
2	Known or likely to occur? **No for all**	• No to very low occurrence in public water systems at health levels of concern based on national surveys		
3	Meaningful opportunity? **No for all**	• No sensitive populations of concern with the exception of 1,3-Dinitrobenzene (individuals w/ blood disorders & sperm complications) • Because no/very low national occurrence at health levels of concern in drinking water, expect no/very low population exposure		

Status and Next Steps for Regulatory Determinations 3 (RD3)

- Preliminary RD3 Federal Register Notice - published October 20, 2014
  - 60 day public comment period
- Hold stakeholder meeting and solicit public input during the 60-day comment period.
- Publish final regulatory determination ~December 2015.
- If the agency makes a final determination to regulate strontium, then:
  - Proposed regulation 24 months after final regulatory determination notice.
  - Promulgate final regulation 18 months after proposal.

Unregulated Contaminant Monitoring Rule ("UCMR 3")

- Final rule published May 2, 2012
  - *http://water.epa.gov/lawsregs/rulesregs/sdwa/ucmr/ucmr3/index.cfm*
- Monitoring taking place January 2013 – December 2015; reporting through ~mid-2016
- 28 chemicals and 2 viruses
- Chemical contaminants include hormones, perfluorinated compounds (e.g., PFOS/PFOA), VOCs, metals (including Cr-6 and total Cr), 1,4-dioxane, chlorate

UCMR 3 Preliminary Results

- Results updated and posted quarterly
  - http://water.epa.gov/lawsregs/rulesregs/sdwa/ucmr/data.cfm
  - Currently reflects reported data as of July 1, 2014
  - November 2014 update will reflect data as of October 1, 2014
- UCMR 3 minimum reporting levels (MRLs) are based on analytical method quantitation limits
  - comparably lower than UCMR 1 and UCMR 2 MRLs;
  - more frequent detection of UCMR 3 contaminants expected

UCMR 4 Regulatory Development

- Development of rule for the next cycle of monitoring initiated early 2014
- Public meeting/webinar held May 2014 to discuss potential UCMR 4 contaminants
- Anticipate publishing proposed rule mid-2015 and inviting public comment
- Anticipate publishing final rule late 2016
- Implementation preparation by EPA, States, PWSs, and labs would take place through 2017
- Anticipate starting monitoring January 2018

Other Rules Under Development: Perchlorate

- EPA is developing a proposed perchlorate standard:
  - Continue to evaluate available data on perchlorate occurrence
  - Evaluating the feasibility of treatment technologies to remove perchlorate and examine the costs and benefits of potential standards
- Science Advisory Board Recommendations for methodologies to derive a Maximum Contaminant Level Goal (MCLG) May 29, 2013
  - Develop a perchlorate MCLG using Physiologically Based Pharmacokinetic (or “PBPK”) modeling rather than the traditional approach of using the reference dose and exposure factors.
- EPA is working with FDA scientists to evaluate options for PBPK modeling to derive a perchlorate MCLG

Other Rules Under Development: Carcinogenic VOCs Group

- EPA is developing a proposed group cVOC standard
  - Considering regulated (TCE, PCE and others) and unregulated carcinogenic VOCs (cVOCs)
  - Assess potential cVOCs for the group based upon similar health effect endpoints; common analytical method(s); common treatment or control processes; and occurrence/co-occurrence in drinking water
  - Occurrence data is being collected for 3 unregulated cVOCs currently under UCMR 3
  - Consulting today on options for group MCLs

Six Year Review

- EPA must review and, if appropriate, revise existing NPDWR every six years
  - In 2003, EPA completed the 1st Six Year Review of 69 NPDWRs; made decision to revise 1989 Total Coliform Rule
  - In 2010, EPA completed the 2nd Six Year Review of 71 NPDWRs and identified tetrachloroethylene (PCE), trichloroethylene (TCE), acrylamide and epichlorohydrin as candidates for revision.
  - Expect to complete 3rd Six Year Review by 2016
    - 46 states and 8 primacy agencies have supplied EPA with their compliance monitoring data
    - We are continuing our review of the data and are working directly with the states and primacy agencies to resolve any data questions

Six-Year Review Protocol – Key Elements

- Rules with revisions underway or recently promulgated
- Health effects evaluation
- MCLs and treatment techniques
- Analytical methods
- Treatment evaluation
- Occurrence analysis
- Implementation issues

Six Year Review – Current Activities

- This is the first time EPA is reviewing the entire suite of Microbial and Disinfection Byproducts (MDBP) Rules
- Chemical and radiological rules also are currently undergoing review
- We plan to retain the same key elements as were used for SYR1 and SYR2
  - Minor clarifications are being made to the protocol where necessary to better reflect the third Six Year Review (SYR3) review process for MDBP Rules.

MDBP Rules Undergoing Six Year Review

- Surface Water Treatment Rules (SWTR, IESWTR, LT1, LT2) – addresses microbial contaminants in SW systems; includes NPDWRs for *Giardia*, Viruses, *Legionella*, Coliforms, *Cryptosporidium*, Heterotrophic Plate Count, and Turbidity
- Ground Water Rule – addresses microbial contaminants in GW systems; includes NPDWR for Viruses
- Disinfectants/Disinfection Byproducts Rules – addresses disinfectants and disinfection byproducts; includes NPDWRs for TTHM, HAA5, Bromate, Chlorite, and Disinfectants (Chlorine, Chloramine, and Chlorine Dioxide)
- Filter Backwash Recycling Rule

Review of Long Term 2 Enhanced Surface Water Treatment (LT2) Rule

- 2011 - EPA announced plans to initiate the review of LT2 in response to executive Order 13563 (Improving Regulation and Regulatory Review).
- Have held three stakeholder meetings to solicit/gather information on the Round 1 monitoring results/bin placement, analytical methods improvements, uncovered finished reservoirs, and microbial toolbox options.

Storage Inspection and Cleaning

- In the 2010 proposed revisions to the Total Coliform Rule, EPA requested comment on "the value and cost of periodic storage facility inspection and cleaning".
  - Many commenters suggested cleaning and inspection requirements citing outbreaks (i.e. Alamosa, CO 2008) and conditions found in some tanks.
  - Other commenters stated that sanitary survey requirements are adequate and information collection should continue.
- On October 15, 2014, EPA held a public meeting and webinar to gather more information and exchange ideas on how best to assure drinking water quality is not degraded in storage facilities.

Update on Lead and Copper Rule Working Group

Presenters: Chris Wiant and Marilyn Christian

Long Term 2 Enhanced Surface Water Treatment Rule

Compliance Flexibility for Public Water Systems

Presenter: Ken Rotert and Mike Finn

Office of Ground Water and Drinking Water

Environmental Protection Agency

Outline

- Congressional Language
- Background
- Federal Advisory Committee Involvement
- Overview of LT2 Rule
- Implementation
- Microbial Toolbox
- Training and Technical Assistance by EPA/States
- Compliance Status
- SDWA: Public Water System Enforcement
- Discussion Questions

Congressional Language

Drinking Water Treatment Compliance Flexibility.

- The Committees recognize that the Long Term 2 Enhanced Water Treatment Rule presents significant costs and technical challenges for systems serving fewer than 100,000 persons while current time frames present significant challenges for communities seeking to annualize the capital investment.
- The Committees direct EPA and the States to work as partners with municipalities that are progressing in good faith to comply with the rule and need additional time to minimize volatility in water utility rates for ratepayers.
- The Committee directs EPA to convene a working group of Federal, State, and local stakeholders to discuss options for compliance schedules and report to the Committees within 180 days of enactment of this Act about interim options for ensuring protection of human health and the environment under the rule without the use of an enforcement action or an administrative order.

Source: (http://docs.house.gov/billsthisweek/20140113/113-HR3547-JSOM-G-I.pdf)

BACKGROUND

National Drinking Water Advisory Council
General Background

- 1989 – Surface Water Treatment Rule (Filtration, Disinfection, Turbidity, *Giardia lamblia*, viruses, *Legionella* and Heterotrophic Bacteria)
- 1992-93 – Regulatory negotiation process
- 1993 – Milwaukee outbreak - The most notable outbreak of cryptosporidiosis in U.S. history. (403,000 ill; at least 54 died)
- 1996 – Safe Drinking Water Act (SDWA) Amendments
- 1997 - Stage 1 Microbial/Disinfection Byproducts (M/DBP) Federal Advisory Committee Act (FAC) Agreement in Principle (AIP) signed

National Drinking Water Advisory Council
General Background (cont'd)

- 1998 – Interim Enhanced Surface Water Treatment Rule (IESWTR) - Applies to public water systems (PWSs) that use surface water or ground water under the direct influence of surface water (GWUDI) and serve ≥ 10,000 people
- 2000 - Stage 2 M/DBP FAC AIP signed
- 2002 – Long Term 1 Enhanced Surface Water Treatment Rule (LT1) - applies to all small PWSs (serving less than 10,000 people) that use surface water or GWUDI
- 2006 – Long Term 2 Enhanced Surface Water Treatment Rule (LT2) – Targets systems with elevated source water Crypto concentrations

Public Health Concerns

- Crypto is a pathogenic protozoan parasite primarily introduced to water via waterfowl and mammal feces
- Most human infections are caused by 2 of 12 Crypto species detected in humans (*C. hominis* and *C. parvum*)
- Crypto can cause gastrointestinal illness (e.g., diarrhea, vomiting, cramps)
  - Healthy people recover within several weeks, but illness may persist and lead to death in those with compromised immune systems (e.g., AIDS patients, the elderly)
  - Other sensitive subpopulations include young children and pregnant woman who may be more susceptible to dehydration resulting from diarrhea
- LT2 estimated more than 100,000 cryptosporidiosis cases per year were occurring subsequent to the IESWTR and LT1 requirements

Occurrence and Treatment

- Monitoring data from the 1990s found large differences in source water Crypto occurrence across different water sources
  - Some systems may not have been getting adequate treatment while implementing the IESWTR and LT1
- Crypto is resistant to most disinfectants except for ultraviolet light disinfection (UV)
  - UV especially cost effective (big help for unfiltered systems)
  - Other technologies available (e.g., membranes, enhanced filtration)

FEDERAL ADVISORY COMMITTEE INVOLVEMENT

Federal Advisory Committee/Agreement in Principle

- During the 1992-1993 regulatory negotiation process, stakeholders suggested a phased risk-risk tradeoff M/DBP strategy
- The IESWTR and LT1 built upon stakeholder agreements reached in 1993 but also reflected the recommendations from the 1997 Stage 1 M/DBP FAC Agreement in Principle
- During 1999 – 2000, Stage 2 M/DBP FAC developed recommendations for the Stage 2 DBP and LT2 rules
  - M-DBP FAC membership included EPA, States, environmental and public health advocates, drinking water utilities, chemical and equipment manufacturers
- EPA agreed to develop a proposed rulemaking that reflected the recommendations of the M/DBP FAC Agreement in Principle
  - EPA proposed LT2 in 2003, which reflected the recommendations

Federal Advisory Committee/Agreement in Principle "FLEXIBILITY FOR SYSTEMS"

- The Stage 2 M/DBP FAC recognized that systems may need to provide additional protection against Crypto, and that such decisions should be made on a system specific basis
- This approach involves assignment of systems into different categories (or bins) based on Crypto source water monitoring results.
- Additional treatment requirements depend on the bin to which the system is assigned.
  - Flexibility - Systems will choose technologies to comply with additional treatment requirements from a 'toolbox' of options

Federal Advisory Committee/Agreement in Principle

- Additional treatment requirements assume that conventional treatment plants in compliance with the IESWTR achieve an average of 3 logs removal of Crypto
- Meeting the requirements for each "Action Bin" may necessitate one or more management strategies which include watershed control, reducing influent Crypto concentrations, improved system performance, and additional treatment barriers

OVERVIEW OF LT2 RULE

Overview of LT2 Rule

- LT2 is a national primary drinking water regulation (NPDWR) that aims to reduce disease incidence associated with Crypto and other pathogenic microorganisms in drinking water

Drivers for LT2 development

- Some Crypto strains highly infectious
- Feasible to measure Crypto concentrations in source water
- Some systems have high source water Crypto concentrations
- Feasible to lower Crypto source concentrations

Overview of LT2 Rule

- Targeted approach supplements existing regulations (e.g., SWTR) to address Crypto in systems with higher risk
  - Filtered systems with high source water concentration must provide additional treatment
  - All unfiltered systems must provide at least 2-log inactivation (or 3-log depending on source water concentration)*
  - Systems must complete implementation of toolbox options no later than 3 years following bin placement
- LT2 also addresses concerns with uncovered finished water reservoirs (UCFWRs)

* Systems meeting Surface Water Treatment Rule criteria for avoiding filtration.

Source Water Monitoring Requirements

- Filtered Systems serving ≥ 10,000 people - Monthly sampling for Crypto, *E. coli*, and turbidity for 24 months
  - Second round of monitoring starts no later than April 2015 – October 2016, depending on system size
  - All unfiltered systems monitor for Crypto unless they provide at least 3-log Crypto inactivation
- Systems <10,000 People - *E. coli* monitoring biweekly for one year to determine need for Crypto monitoring
  - If *E. coli* above trigger value then conduct Crypto sampling (24 samples)
  - Second round of monitoring starts no later than October 2017 for *E. coli* and no later than April 2019 for Crypto

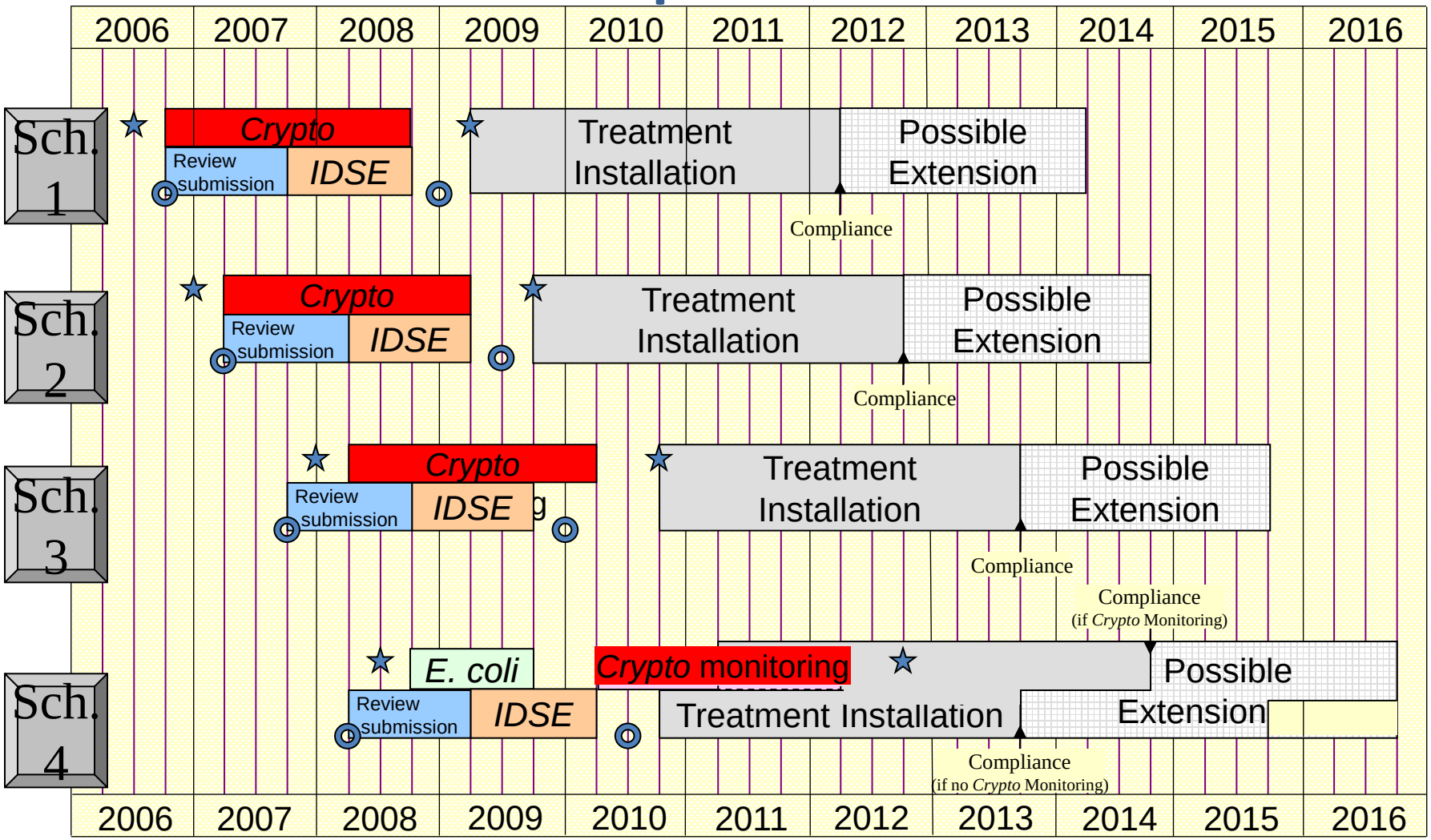
Bin Boundaries

- Bin 1 – Fewer than 0.075 oocysts/liter
  - No additional treatment needed
- Bin 2 – From 0.075 to fewer than 1.0 oocysts/liter
  - 1 – 1.5 log additional treatment depending on filtration in place
- Bin 3 – From 1.0 to fewer than 3.0 oocysts/liter
  - 2 – 2.5 log additional treatment depending on filtration in place
- Bin 4 – 3.0 oocysts/liter or more
  - 3 – 3.5 log additional treatment depending on filtration in place
- Systems in Bins 2-4 select tools from a toolbox to use for additional treatment credits

IMPLEMENTATION

National Drinking Water Advisory Council

LT2 Rule Compliance Schedule



* *Includes associated consecutive systems*

Binning Results and Predictions of Filtered Systems ≥10,000 People

Sources

- Data Collection and Tracking System (DCTS) binning report
  - Retrieved from DCTS based on Round 1 monitoring data
- Non-DCTS binning result
  - Provided by regions and states including grandfathered and "missing" system information
- Systems providing treatment instead of monitoring
- Information Collection Rule (ICR) - 350 plants in systems serving ≥ 100,000
- Information Collection Rule Supplemental Survey Large Systems (ICRSSL) - 40 plants in systems serving ≥ 100,000
- Information Collection Rule Supplemental Survey Medium Systems (ICRSSM) - 40 plants in systems serving 10,000-99,999

Binning Results and Predictions of Filtered Systems ≥10,000 People

Data Source	Bin 2	Bin 3	Bin 4	Percent in An Action Bin
DCTS	80	1	0	5.9% (81 of 1,381)
Non-DCTS	41	1	0	11.9% (42 of 352*)
Total	121	2	0	7.1% (123 of 1,733**)
ICR Predicted	All Bin 2 or higher			Mean=34.8 %
ICRSSL Predicted	All Bin 2 or higher			Mean=22.4%
ICRSSM Predicted	All Bin 2 or higher			Mean=27.2 %

* Assuming that the difference between 1,733 and 1,381 is the basis for non-DCTS bin determination.

** Based on monitoring baseline for filtered plants in LT2 Economic Analysis (EPA, 2006).

Systems Providing Treatment Instead of Monitoring

- 204 filtered systems submitted Intent to Provide total 5.5-Log of Treatment Instead of Monitoring (equivalent to Bin 4)
  - 21 systems serving ≥10K
  - 183 systems serving <10K
- 15 unfiltered systems submitted Intent to Provide 3-Log of Treatment Instead of Monitoring
  - 2 systems serving ≥10K
  - 13 systems serving <10K
- 51 systems had unknown filtration status

MICROBIAL TOOLBOX

Overview of Toolbox Tools

- Source Toolbox Components
  - Watershed Control Program
    - 0.5 log credit for filtered sources
    - Unfiltered systems not eligible for credit
  - Alternative Source/Intake Management
    - No prescribed credit
    - Simultaneous monitoring for treatment bin classification

Overview of Toolbox Tools (continued)

- Pre-Filtration Toolbox Components
  - Pre-sedimentation basin with coagulation
    - 0.5 log-credit for systems achieving 0.5 log turbidity reduction or state approved criteria
    - Basins must be operated continuously with coagulant addition and all plant flow must pass through the basin
  - Two-Stage Lime Softening
    - 0.5-log credit for two-stage softening where chemical addition and hardness precipitation occur in both stages.
    - All plant flow must pass through both stages
  - Bank Filtration
    - 0.5-log credit for 25-foot setback; 1.0-log credit for 50-foot setback
    - Aquifer must be unconsolidated sand containing at least 10 percent fines; average turbidity in wells must be less than 1 NTU
    - Systems using wells followed by filtration when conducting source water monitoring must sample the well to determine bin classification and are not eligible for additional credit

Overview of Toolbox Tools (continued)

- Treatment Performance Toolbox Components
  - Combined Filter Performance
    - 0.5-log credit for combined filter effluent turbidity ≤ 0.15 NTU in at least 95 % of measurements each month
  - Individual Filter Performance
    - 0.5-log credit (in addition to 0.5-log combined filter performance credit) if individual filter effluent turbidity ≤ 0.15 NTU in at least 95 % of samples each month in each filter and is never > 0.3 NTU in two consecutive measurements in any filter
  - Demonstration of Performance
    - Credit awarded to unit process or treatment train based on a demonstration to the state with a state-approved protocol

Overview of Toolbox Tools (continued)

- Additional Filtration Toolbox Options
  - Bag or Cartridge Filters (Individual)
    - Up to 2-log credit based on the removal efficiency demonstrated during challenge testing with a 1.0-log factor of safety
  - Bag or Cartridge Filters (In Series)
    - Up to 2.5-log credit based on the removal efficiency demonstrated during challenge testing with a 0.5-log factor of safety
  - Membrane Filtration
    - Log credit equivalent to removal efficiency demonstrated in challenge test for device if supported by direct integrity testing
  - Second Stage Filtration
    - 0.5-log credit for second separate granular media filtration stage if treatment train includes coagulation prior to first filter
  - Slow Sand Filters
    - 2.5-log credit as a secondary filtration step; 3.0-log credit as a primary filtration process; No prior chlorination for either option

Overview of Toolbox Tools (continued)

- Inactivation Toolbox Components
  - Chlorine Dioxide
    - Log credit based on measured CT in relation to CT table
  - Ozone
    - Log credit based on measured CT in relation to CT table
  - UV
    - Log credit based on validated UV dose in relation to UV dose table
    - Reactor validation testing required to establish UV dose and associated operating conditions

Summary of Toolbox Technology Usage-Round 1

Toolbox Options	Percentage of systems using the tool*
Watershed Control Program	10.4%
Alternative Intake/Source Management	3.1%
Pre-sedimentation basin with coagulation	2.1%
Two-Stage Lime Softening	No information available
River Bank Filtration	3.1%
Combined Filter Performance/Individual Filter Performance	37.5%/34.4%
Filter Optimization (?)	3.1%
Demonstration of Performance	3.1%
Bag or Cartridge Filters (Individual or In series)	1.0%
Membrane Filtration	15.6%
Second Stage Filtration	1.0%
Slow Sand Filters	No information available
Chlorine Dioxide	1.0%
Ozone	2.1%
UV	19.8%

*Percentage of 96 PWSs using specific tools based on information obtained from the EPA Regions and States. Some PWS reports indicat they plan to use a particular tool or that they use a tool but not it is unclear whether they claim credit for LT2 compliance purposes.

TRAINING AND TECHNICAL ASSISTANCE BY EPA/STATES

Training and Technical Assistance

- Webinar series to introduce rule and requirements.
- Guidance Documents, Fact sheets, Small Entity compliance guide.
- Safe Drinking Water Act Hotline.
- Rule presentations and training at conferences and seminars (AWWA,ASDWA,NRWA).
- Face to face training in each EPA Region.
- Toolbox treatment tools focused webinars.
- Training and technical assistance for analytical laboratories.

COMPLIANCE STATUS

Compliance Status*-LT2ESWTR Round 1

PWS Size Category	PWSs with LT2 TT** violations	Total PWSs in size category	% LT2 TT** violations
<=500*	20	1588	1.26
501-3300*	16	1250	1.28
3301-10000*	9	961	0.94
10001-100000	4	1404	0.28
	Total violations	Total LT2 PWSs	Total % violations
Totals	49	5203	0.94

*Compliance date for PWS serving <10,000 was October 1, 2014, and the state may allow a two year extension for capital improvements.

** Treatment Technique Violations-Failure to report bin level, failure to meet bin treatment requirements, failure to meet toolbox tool performance requirements.

Data reported to SDWIS -status as of June 30,2014

SDWA Public Water System Enforcement

Presenters: Carol DeMarco King and Joyce Chandler, Office of Enforcement and Compliance Assurance, Environmental Protection Agency

PWS Enforcement Overview

- "Assuring safe drinking water" is a longstanding EPA enforcement national area of focus
- Relevant SDWA authorities include:
  - Section 1414 authorizes EPA to issue an administrative order or bring a civil action to require compliance with applicable requirements
  - Section 1431 authorizes EPA to take action administratively or judicially if a contaminant may present an imminent and substantial endangerment to the health of persons

PWS Enforcement Overview

- States and EPA may handle public water system (PWS) formal enforcement matters administratively and/or judicially
- Relief sought in PWS actions includes:
  - Install new treatment equipment to address maximum contaminant level violations
  - Improve operation and maintenance
  - Routine monitoring
  - Provide an alternate supply of water until contamination is remediated
  - Transfer system to a new owner/operator

National Drinking Water Enforcement Response Policy (ERP)

- EPA's Office of Enforcement and Compliance Assurance issued the ERP in December 2009
- Created in consultation with states and EPA's Office of Water and Regions
- Replaced complicated rule-based significant noncompliance (SNC) prioritization with a more holistic, PWS-based approach
- Enforcement Targeting Tool (ETT) developed based on the ERP's principles to provide a single ranking score for each PWS with unaddressed violation(s)

Use of the ERP

- The ERP/ETT is a management tool to help identify PWSs that rise to a level of national significance for enforcement
- EPA and states discuss priority PWSs identified by the ETT on a quarterly basis to ensure they are addressed through return to compliance (RTC) or formal enforcement
- States and EPA should not wait until a system shows up on the ETT list to take action to bring it back into compliance with SDWA and the National Primary Drinking Water Regulations (NPDWRs)

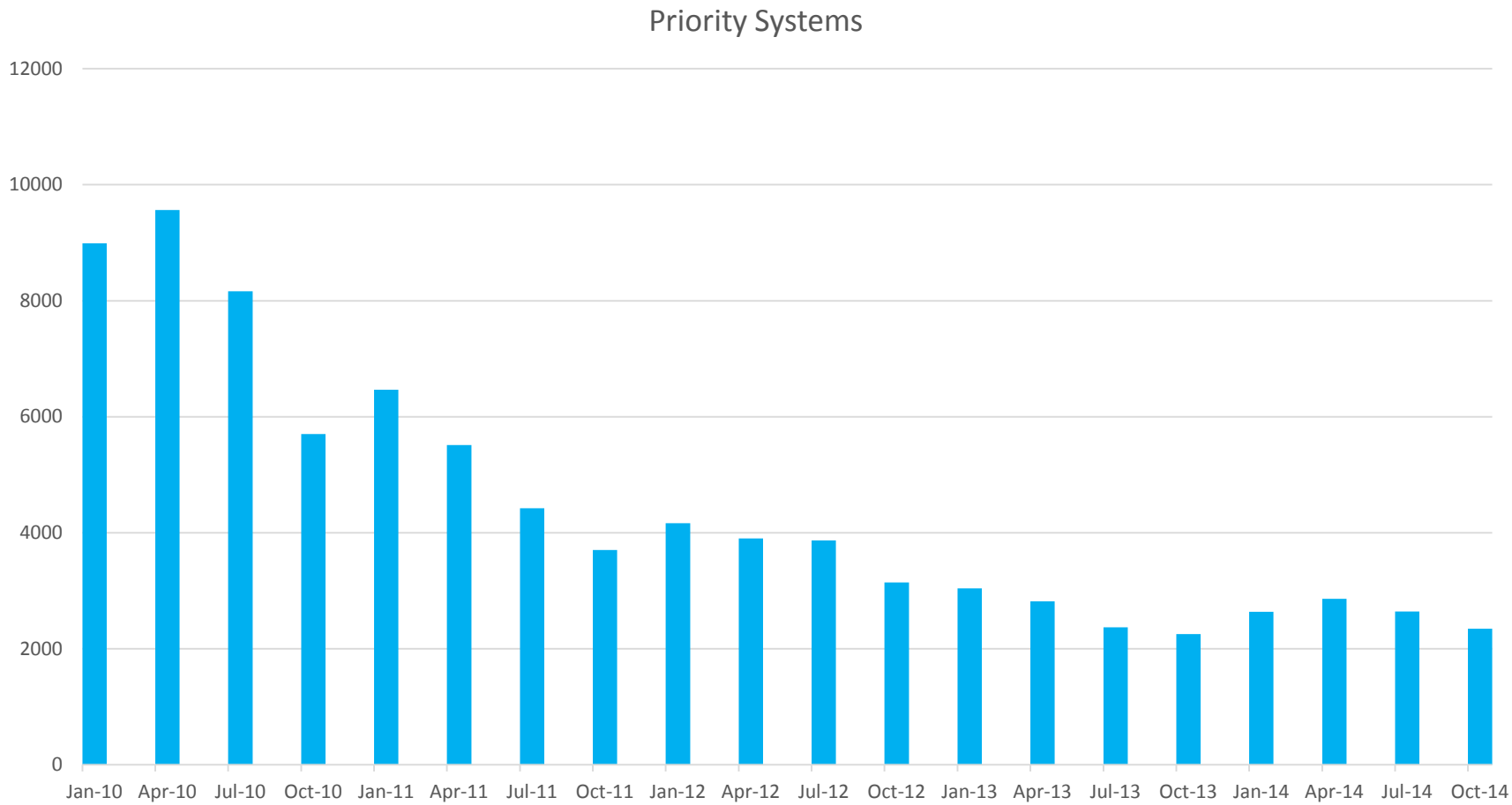
ETT Scores

- Identifies PWSs for enforcement targeting
- Scores PWSs based on unaddressed violations
- Both health-based and non-health-based violations are included and count for 1, 5 or 10 points
- PWSs with ETT scores >= 11 are priorities for enforcement
- Within six months primacy agencies must either return priority systems to compliance or initiate formal enforcement actions
- The ultimate goal is RTC

Enforcement Results under ERP/ETT

- Improved coordination with states
  - Memos issued since 2009 to further facilitate ERP implementation
  - Development of additional tools to meet regional, state and program office needs
- Decrease in the number of PWSs identified as enforcement priorities
- Increase in state enforcement actions to address priority systems

Overall Decline in Priority PWSs



ETT Scoring for LT2 Rule

- If a PWS fails to meet its deadline to install *cryptosporidium* treatment as required by 40 C.F.R. Section 141.713, then the ETT assesses 5 points

- A PWS would not become a priority for enforcement until it reaches 11 points

DISCUSSION QUESTIONS

Discussion Questions

1. **The LT2 treatment compliance schedule provides flexibility by allowing for possible extensions, how do you think systems serving fewer than 100,000 persons could maximize the benefits of such extensions when seeking to annualize the capital investments?**

2. **What challenges have you observed or been made aware of with regard to systems in your states having trouble complying with the LT2 treatment compliance schedule?**

3. **What additional flexibility do you believe may exist with respect to treatment or management options as well as for timelines for implementing these options?**

4. **What are your recommendations about interim options for ensuring protection of human health and the environment under the rule without the use of enforcement action or an administrative order"?**
   - **What would be your response to those systems who have taken measures to install treatment in accordance to the LT2 rule to avoid non-compliance and might question why EPA is rewarding systems who delay actions to become compliant?**

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

DEC 8 2009

OFFICE OF
ENFORCEMENT AND
COMPLIANCE ASSURANCE

MEMORANDUM

SUBJECT: Drinking Water Enforcement Response Policy

FROM: Cynthia Giles
Assistant Administrator

TO: Regional Administrators

Attached is a new enforcement approach designed to help our nation's public water systems comply with the requirements of the Safe Drinking Water Act. This new approach replaces the existing contaminant by contaminant compliance strategy with one that focuses enforcement attention on the drinking water systems with the most serious or repeated violations. The new strategy will bring the systems with the most significant violations to the top of the list for enforcement action in states, territories and in federal Indian Country, so that we can return those systems to compliance as quickly as possible. As we work to protect the public's access to clean and safe drinking water, we need to be especially vigilant about noncompliance that has the potential to affect children, such as violations at schools and day care centers.

This policy was developed through the intensive cooperation of the Association of State Drinking Water Administrators, all EPA Regions, the Office of Water and Office of Enforcement and Compliance Assurance, and reflects our shared commitment to clean and safe drinking water. This new approach will be implemented starting in January of 2010, and will be evaluated during the coming year to see if improvements are necessary to best protect public health.

Thank you for the work your staff does, working closely with the states, to achieve the goals of the Safe Drinking Water Act. We expect that this new enforcement approach will help us do an even better job of increasing compliance with this important law.

If you have any questions, please contact me, or have your staff contact Mark Pollins at (202-564-4001 or Karin Koslow at (202)564-0171.

cc:
Peter Silva
Cynthia Dougherty
Adam Kushner

Lisa Lund
Regional Enforcement Directors
Regional Water Division Directors
Regional Counsel, Regions II - VII, IX, X
Regional Legal Enforcement Managers, Regions I, VIII

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

DEC 8 2009

OFFICE OF
ENFORCEMENT AND
COMPLIANCE ASSURANCE

MEMORANDUM

SUBJECT: Proposed Revision to Enforcement Response Policy for the Public Water System Supervision (PWSS) Program under the Safe Drinking Water Act and Implementation of the Enforcement Targeting Tool

FROM: Mark Pollins, Director
Water Enforcement Division
Office of Civil Enforcement

for Karin Koslow, Acting Director
Compliance Assistance and Sector Programs Division
Office of Compliance

TO: Office of Regional Counsel, Regions 1-10
Drinking Water Program Managers, Regions 1-10
Drinking Water Enforcement Managers, Regions 1-10
Association of State Drinking Water Administrators

Introduction

EPA is proposing a new approach for enforcement targeting under the Safe Drinking Water Act (SDWA) for Public Water Systems. The new approach is designed to identify public water systems with violations that rise to a level of significant noncompliance by focusing on those systems with health-based violations and those that show a history of violations across multiple rules. This system-based methodology is intended to ensure consistency and the integrity of the PWSS national enforcement program. The new approach includes a revised Enforcement Response Policy (ERP) and new Enforcement Targeting Tool (ETT).

The Enforcement Response Policy and Enforcement Targeting Tool re-emphasize a focus on "return to compliance" (RTC) rather than simply "addressing" a violation. The policy is intended to increase our

effectiveness in the protection of public health. Together the ERP and ETT will prioritize and direct enforcement response to systems with the most systemic noncompliance by considering all violations incurred by a system in a comprehensive way. The policy and tool identify priority systems for enforcement response, provide a model to escalate responses to violations; define timely and appropriate actions; and clarify what constitutes a formal action.

In general, the goal of the revised ERP and new ETT is to allow States and EPA to:

- Align public water system violations of the Safe Drinking Water Act within a prioritization that is more protective of public health;

- View public water system compliance status comprehensively;

- Ensure that both EPA and the States act on and resolve drinking water violations;

- Recognize the validity of informal enforcement response efforts while ensuring that, if these efforts have proven ineffective, enforceable and timely action is taken;

- Ensure that EPA and the States escalate enforcement efforts based on the prioritization approach;

- Increase the effectiveness of state and federal enforcement targeting efforts by providing a "tool" that calculates comprehensive noncompliance status for all systems and identifies those systems not meeting national expectations as set by EPA. It also provides an additional resource for identifying systems possibly in need of other State/EPA assistance in the areas of Capacity Development and Sustainability.

The final revised Enforcement Response Policy will supersede the following existing guidance by revising the definition of "timely" and "appropriate" enforcement response: *"Change in the PWSS Program's Definition of Timely and Appropriate Actions"* WSG 56 (Water Supply Guidance), April 20, 1990 and *"Revised Definition of Significant Non-complier (SNC) and the Model for Escalating Responses to Violations for the PWSS Program"* WSG 57 (Water Supply Guidance), May 22, 1990.

Identification of Priority Systems for Enforcement Using the Enforcement Targeting Tool

This system-based approach uses a tool that enables the prioritization of public water systems by assigning each violation a "weight" or number of points based on the assigned threat to public health. For example, a violation of a microbial rule maximum contaminant level will carry more weight than that of a Consumer Confidence Report reporting violation. Points for each violation at a water system are summed to provide a total score for that water system. Water systems whose scores exceed a certain threshold will be considered a priority system for enforcement. Based on this approach, States and EPA will be able to target resources to address those public water systems which EPA determines have the most significant problems.

Currently it is difficult to identify a systematic pattern of violations for a PWS because the focus of the current approach has been to assign "significant non-compliance" (SNC) status based on failure to comply with individual drinking water rules. Under the existing system, all SNCs are treated equally, without regard to the gravity of the violation and without considering other violations a system may have that are not identified as SNC. The new approach will look at PWS noncompliance comprehensively across all rules without using the rule-based SNC definitions and will ultimately replace the current rule-based SNC definitions to identify systems that are a high priority for an enforcement response.

Enforcement Targeting Formula

The enforcement targeting formula is the basis for the enforcement targeting tool that identifies public water systems having the highest total noncompliance across all rules, within a designated period of time. A higher weight is placed on health-based violations (including Treatment Technique and Maximum Contaminant Level violations). The formula calculates a score for each water system based on open ended violations and violations that have occurred over the past 5 years, but does not include violations that have returned to compliance or are on the "path to compliance" through a specified enforceable action. The "path to compliance" is the status of a public water system that has been placed under an enforceable action to return it to compliance. These enforceable actions have different names in different states but the characteristic they all share is that an enforceable consequence results if the schedule is not met. The formula only considers violations for Federally-regulated contaminants.

As part of any State or Federal program, it is expected that enforceable actions will be adequately tracked to make certain compliance is ultimately achieved.

The formula provides a rank-order of all public water systems based on the total points assigned for each violation and the length of time since the first unaddressed violation. The factors of the formula are:

- The severity of the violation—which is based on a modification of Public Notification Tiers, as set forth in Title 40 of the Code of Federal Regulations at Part 141, Subpart Q, "Public Notification of Drinking Water Violations," Section 141.201. The severity or weight of the violation is highest for acute contaminant health based violations, with a lower weight for chronic and other health based violations (and nitrate monitoring and total coliform repeat monitoring violations), and with the lowest weighting for other monitoring, reporting, and other violations.

- The number of years that a system's violations have been unaddressed

For each public water system (PWS), a point score of non-compliance is calculated using this formula:

$$\textbf{Sum } (S_1+S_2+S_3+\ldots) + n$$

The total points for each violation are added together, and a time factor is added to achieve the total score for the public water system, where:

S = violation severity factor

10 For each acute health-based violation

5 For each other health-based violation and Total Coliform Rule (TCR) repeat monitoring violation

For each Nitrate monitoring and reporting violation

1 For each other monitoring and reporting, or any other violation

n = number of years that the system's oldest violations have been unaddressed (0 to 5)

Examples of Priority Systems for Enforcement

During the trial period, any public water system with a score resulting from the application of the enforcement targeting formula which is greater than or equal to 11 points will be considered a priority system for an enforcement response under this policy. Public water systems whose violations score at this level have at least one recent acute health-based violation, or at least two recent other non-acute health-based violations, or eleven other recent non-health-based violations. The following table illustrates examples of how a public water system may exceed the 11-point threshold:

Violations (S)	Years since first unaddressed violation (n)	Score $(\Sigma S)+n$	
2 acute turbidity exceedances	0 (occurred in current year)	(10+10)+0	=20
2 non-acute TCR MCL violations	1 (1 in previous year)	(5+5) +1	=11
11 monthly TCR monitoring violations	0 (all in current year)	(1+1+1+1+1+1+1+1+1+1+ 1) +0	=11
6 quarterly TCR monitoring violations, 1 annual nitrate monitoring violation	1 (first violations occurred in previous year)	((1+1+1+1+1+1)+5) + 1	=12
Failure to monitor annual VOC, SOC, IOC, Stage 1 DBP and 2 TCR MCL	2 (chemical violations occurred 2 years ago)	((1+1+1+1)+5+5) + 2	=16

Violations of tier 1 public notification requirements are significant because they reflect the failure to provide critical and real-time information to the public regarding drinking water. Although these violations are assigned a "1" under the policy, they would, by definition, be accompanied by an underlying violation of the health-based standard and would receive a score of at least 11.

Model for Escalating Responses to Violations

The existing model for escalating responses to violations sets forth EPA's expectation for EPA and the States' responses to a violation. The following concepts continue to be part of this new Enforcement Response Policy:

> The primacy agency should respond to each violation of the national primary drinking water regulations.
>
> Responses to violations should escalate in formality as the violation continues or recurs.
>
> Some violations are very serious and pose an immediate risk to public health. In these circumstances, it is appropriate to proceed directly to a formal action, such as an emergency administrative order, an injunction or a temporary restraining order (TRO), or an emergency civil referral.
>
> States have primary enforcement responsibility, and EPA retains independent enforcement authority under the Safe Drinking Water Act. In cases where the EPA Region is directly implementing the program "State" should be read to include the EPA Regional office. In addition, these guidelines should not be interpreted to preclude federal action at any point in the process if the situation warrants it.
>
> Historically, the majority of enforcement actions taken for violations at public water systems are administrative in nature and these actions continue to be an important tool. Judicial cases also are an important enforcement tool and the use of judicial authority is encouraged.

EPA recognizes that States carry out both formal and informal enforcement and compliance assistance activities. These activities are effective tools for achieving compliance. Nevertheless, systems specifically identified by the targeting tool as priorities must be returned to compliance (RTC) or EPA will expect formal, enforceable mechanisms to return such systems to compliance. States will be expected to escalate their response to ensure that return to compliance is accomplished. Systems that are unable to sustain compliance should receive additional scrutiny.

Timely and Appropriate Response

Once a PWS is identified as an enforcement priority on the targeted list, an appropriate formal action or return to compliance will be required within two calendar quarters to be considered "timely." However, regardless of a public water system's position on a State's enforcement target list, EPA expects that States will act immediately on acute, health-based violations and subsequently confirm that systems with such violations return to compliance.

Formal enforcement response includes: administrative orders with and without penalty, civil/criminal referral, and civil/criminal case filed. (See Table A, below, for a complete list.) Nevertheless, it should be noted that EPA has broad prosecutorial discretion to discuss specific timetables and mechanisms to return a system to compliance. For example, if a system can show that RTC is imminent but for reasons such as installation of new treatment or construction or other reason, RTC may take just over two quarters, EPA may not require a formal action by the State to give the system the opportunity to RTC. This discretion allows for some flexibility for systems that simply need a little more time but whose return to compliance is imminent. It is not, however, something that can be extended indefinitely as a way to avoid formal action.

The return to compliance or enforcement action needs to be achieved within two quarters of a system appearing as a priority system for enforcement and recorded such that it is reflected in the next update of the national database. For example, if a system is identified in January as an enforcement priority, the state would have until June to RTC the system's violations or take a formal enforcement action. The return to compliance or enforcement action should be reported to EPA so that it is reflected in the Federal database in October.

Formal Enforcement

EPA has defined what constitutes a "formal" enforcement response in Water Supply Guidance 27 (WSG 27), *"Guidance for FY 1987 PWSS Enforcement Agreements"*. That guidance states: "According to the Agency's policy framework, a formal action is defined as one which requires specific actions necessary for the violator to return to compliance, is based on a specific violation, and is independently enforceable without having to prove the original violation". The definition of "formal" enforcement response in WSG 27 will be adopted by this Policy. A formal enforcement action has the

intent and effect of bringing a non-compliant system back into compliance by a certain time with an enforceable consequence if the schedule is not met. This may be accomplished through a variety of mechanisms, depending on a State's legal authorities. The enforcement mechanism selected by the State must (1) contain a description of the non-compliant violation, a citation to the applicable State, or federal law or rule, a statement of what is required to return to compliance, and a compliance schedule; and (2) provide the State with authority to impose penalties for violation of the State's enforcement document.

Trial and Implementation of the Enforcement Response Policy and Targeting Tool

During the trial period, EPA will generate a national scored list using the enforcement targeting tool and formula described above. This list will include only systems with violations that have not been returned to compliance nor are on the path to compliance. Systems on the list with a score of 11 points or more will be considered as priority systems for enforcement response. This list will also indicate those systems that scored 11 points or higher on a previous list for tracking systems on the path to compliance and to help ensure return to compliance is achieved. EPA and the States will discuss the priority water systems on the list each quarter and determine additional steps that may be needed to achieve RTC.

As discussed above, a State may use initial compliance assistance to resolve the violations, as long as the return to compliance (RTC) takes place within two quarters of the system appearing as a priority for enforcement response. If RTC is not likely during those two quarters, escalation of the response is expected via an enforceable action within the "timely" period to compel the system to RTC in the shortest time possible. In many cases, this response will be in the form of an administrative order with or without penalties or other enforceable mechanism. States will enter the appropriate code in the SDWIS data base to reflect the State formal action or that compliance has been achieved.

Once a system's violations are on the path to compliance (i.e. incorporated into a formal enforcement action) or returned to compliance, the system drops off the targeting list and is no longer a priority for enforcement response. Those systems on the path to compliance will continue to be tracked by States and EPA until return to compliance is achieved with appropriate escalated enforcement response, as necessary.

Return to compliance is the ultimate goal and the State and Federal data systems should reflect all final return to compliance codes.

Defining the Status of Systems on the "Targeting List"

Until a State has returned a system's violations to compliance, the violations have not been completely resolved. The following categories are the general categories that States and EPA can use when discussing whether a system's violations are being adequately addressed. The focus under the new Enforcement Response Policy is to have a public water system return to compliance in the shortest time possible.

No Action/Unaddressed- Violation reported by State, with either no action taken to return the public water system to compliance, or where the initial informal action(s) or compliance assistance have not been successful to return to compliance. Further action will be needed.

Returned to Compliance- The public water system has completed monitoring, reporting or implementation of treatment or other activities to be in compliance with the regulations. All forms of compliance assistance and informal or formal enforcement actions are appropriate means to return to compliance. The appropriate return to compliance code shall be entered into SDWIS.

Unresolved but on the Path to Compliance: This category includes systems that have an EPA or State enforceable compliance order or schedule in place to resolve violations. In these cases, formal enforcement is expected to be successful toward implementing a schedule for sampling, treatment or construction, and therefore no further enforcement is required. The State and/or EPA will continue to monitor compliance with schedules and other requirements of the order.

Unresolved: Systems with continuing, ongoing violations that have had compliance assistance, informal and/or formal enforcement response without a return to compliance. This category is for those systems with a chronic failure to return to compliance.

Additional Factors to Consider in the Evaluation of the Targeting Formula: *Population and System-Type Factors*

The joint EPA-ASDWA workgroup recommended initiating the policy using the formula previously described. However, there was significant discussion over whether population and system type factors should be included in the formula. Concern was generally expressed that an emphasis on large population systems might skew the relative ranking of systems toward those servicing large population centers. Care must be given, however, to make certain small systems receive attention, particularly since those systems often serve vulnerable populations and have the most difficulty maintaining compliance. During the trial period evaluation, EPA requests that States consider whether including population and system-type factors, or other variables, should be incorporated into the targeting formula. The details of this analysis may be found in the Appendix to this Memorandum.

Safe Drinking Water Information System (SDWIS) Enforcement Codes and Descriptions

The following table evaluates the existing enforcement codes available for use in SDWIS and categorizes them into formal and informal categories.

FORMAL According to the Agency's Policy Framework, a formal action is defined as:

- One which requires specific actions necessary for the violator to return to compliance,
- Is based on a specific violation, and
- Is independently enforceable without having to prove the original violation.

A formal enforcement action has the intent and effect of bringing a non-compliant system back into compliance by a certain time with an enforceable consequence if the schedule is not met. This may be accomplished through a variety of mechanisms, depending on a State's legal authorities.

To be formal, the enforcement mechanism selected by the State must:

1. Contain a description of the non-compliant violation, a citation to the applicable State, or federal law or rule, a statement of what is required to return to compliance, and a compliance schedule; and
2. Provide the State with authority to impose penalties for violation of the State's enforcement document.

Current SDWIS Code	Description
SFL or EFL	St or Fed AO (w/o penalty) issued
SFO	St AO (w/penalty) issued
None – closest is SFK or EFK	*St or Fed BCA signed (if meets "Formal" definition)*
SF& or EF&	St or Fed Crim Case referred to AG
SF9 or EF9	St or Fed Civil Case referred to AG or Fed case referred to DOJ
SFQ or EFQ	St or Fed Civil Case filed
SFV or EFV	St or Fed Crim Case filed
EF/	Fed 1431 (Emergency) Order
SF% or EF%	*St or Fed Civil Case concluded*
SFR or EFR	*St or Fed Consent Decree/Judgment*
SFW or EFW	*St or Fed Criminal Case concluded*
SFM	*St Admin Penalty assessed* NOTE: EPA recognizes the use of administrative penalty actions as a valid tool to move a system toward compliance even though the penalty action may not include a compliance schedule per EPA's definition of "formal action".

EF-	*Fed Complaint for Penalty Consent Agreement/Final Order with penalty*
EF=	*Fed Complaint for Penalty Default Judgment*
EF<	*Fed Complaint for Penalty issued*
Once a system reaches the level of a priority system for enforcement, the actions above will put the system on the path to compliance. These systems will continue to be tracked until a resolution is achieved.	

* *Changes from the current "addressing" approach are in italics.*

Resolving		
SOX or EOX	St or Fed Compliance achieved	
SO0 or EO0	St or Fed No Longer Subject to Rule	
SO6 or EO6 for violation types 9, 12, 29, 37, 56, 57, 58, 59, 63, 64.	St or Fed Intentional no-action for violation types: 9 Record Keeping; 12 Treatment Technique No Certif. Operator; 29 M&R Filter Profile/CPE Failure; 37 Treatment Technique State Prior Approval; **the following codes are also applicable if a PWS has "tested back into compliance" and no longer has lead/copper results over the action level:** 56 Initial, Follow-up, or Routine SOWT M&R ; 57 OCCT Study Recommendation; 58 OCCT Installation/ Demonstration; 59 WQP Entry Point Non-Compliance; 63 MPL Non-Compliance; 64 Lead Service Line Replacement (LSLR)	
These six resolving actions/ codes mean that the violation has been resolved either by return to compliance, a determination that the rule is no longer applicable, or a determination that no further action is needed.		

Note that any violation that has one of the above Formal or Resolving codes will not count against a system's total score using the formula.

INFORMAL	The actions below are informal. Violations with these codes will continue to count against a system until a formal or resolving action is taken and recorded in SDWIS/Fed. If a system has reached the level of a priority system for enforcement, these actions will **NOT** count for putting the system on a "path to compliance."	
Current SDWIS Code	**Description**	**Examples of States Actions**
None - closest is SFK or EFK	St or Fed BCA signed (if does not meet "Formal" definition)	
SFJ or EFJ	St or Fed Formal NOV issued	Violation Notice; Notice of Violation(NOV);
SO6 or EO6 for violation types not specified in resolving list	St or Fed Intentional no-action	
None – propose new code SIU	Referral to U.S. EPA	
None – propose new code SIT or EIT	Treatment Installed	
SF2 or EF2	Referred for Higher St or Fed Level Review	
SFH or EFH	St or Fed Boil Water Order	
SF3	St Case appealed	
SF4	St Case dropped	
SFP	St Civil Case under development	
SIB or EIB	St or Fed Compliance Meeting conducted	
SFS or EFS	St or Fed Default Judgment	
SF5	St Hook-up/Extension Ban	
SFT or EFT	St or Fed Injunction	
SO+ or EO+	St or Fed no additional Formal Action needed	
SO8 or EO8	St or Fed Other	
SFG or EFG	St or Fed Public Notification issued	
SIF or EIF	St or Fed Public Notification received	
SIE or EIE	St or Fed Public Notification requested	
SFN or EFN	St or Fed Show-cause Hearing	
SID or EID	St or Fed Site Visit (enforcement)	
SIC or EIC	St or Fed Tech Assistance Visit	
SFU or EFU	St or Fed Temp Restrain Order/Prelim Injunction	
SOZ or EOZ	St or Fed Turbidity Waiver issued	
SO7 or EO7	St or Fed Unresolved	
SOY or EOY	St or Fed Variance/Exemption issued	
SIA or EIA	St or Fed Violation/Reminder Notice	
SII or EII	St or Fed CCR Follow-up Notice	

APPENDIX

In an effort to analyze the influence of a population factor on the outcome of the system's ranking, the States and EPA Regions should calculate the results using the following formula. The results should then be compared to the results of the non population-based formula.

The alternative formula would calculate a point score for each drinking water system using this formula:

Alternate Formula:

Sum (S*T*P) + n

Where:

S and n = use the definitions on page 4

T = water system type factor

2	CWS, NTNCWS
1	TNCWS

P = retail population served factor

1	Very small	(less than 501)
1.5	Small	(501-3,300)
2	Medium	(3,301-10,000)
2.5	Large	(10,001-100,000)
3	Very large	(100,001...)

Fact Sheet: Preliminary Regulatory Determinations for the Third Drinking Water Contaminant Candidate List (CCL 3)

The EPA has drinking water regulations for more than 90 contaminants. To assess and address risks posed by unregulated contaminants, the EPA, in accordance with the Safe Drinking Water Act (SDWA), identifies a list of contaminants which may require regulation in the future. Every five years, the EPA determines whether we should regulate at least five contaminants in drinking water with a national primary drinking water regulation (NPDWR).

In October 2009, the EPA published the third Drinking Water Contaminant Candidate List (CCL3). After extensive review of health effects and occurrence data, on October 20, 2014, the agency announced its preliminary regulatory determinations for five contaminants listed on CCL3. The EPA is making preliminary determinations to regulate strontium in drinking water and to not regulate four contaminants (i.e., dimethoate, 1,3-dinitrobenzene, terbufos and terbufos sulfone). The EPA is requesting comment on these preliminary determinations in the 60-day period following publication of the notice in the *Federal Register*. During the comment period, the EPA expects to hold a stakeholder meeting to discuss and solicit input on the preliminary determinations. The EPA will evaluate public comments prior to making the final regulatory determinations in 2015.

Questions and Answers

What is the drinking water CCL?

The drinking water CCL is the primary source of priority contaminants for making decisions about whether drinking water regulations are needed. The contaminants on the list are known or anticipated to occur in public water systems. However, they are currently unregulated by existing NPDWRs.

How often is the CCL published?

The Safe Drinking Water Act (SDWA) directs the EPA to publish a CCL every five years. The EPA published the first CCL (CCL1) of 60 contaminants in March 1998. The agency published the second CCL (CCL2) of 51 contaminants in February 2005. The EPA then published the third CCL (CCL3) of 116 contaminants in October 2009. The CCL 3 includes 104 chemicals or chemical groups and 12 microbiological contaminants. You can find a list of these 116 contaminants at the following the EPA website: http://water.epa.gov/scitech/drinkingwater/dws/ccl/ccl3.cfm.

What is a regulatory determination?

A regulatory determination is a formal decision on whether the EPA should initiate a rulemaking process to develop a national primary drinking water regulation for a specific contaminant. The law requires that we make regulatory determinations for at least five contaminants from the most recent CCL every five years.

What criteria does the EPA consider in making regulatory determinations?

When making a determination to regulate, SDWA requires that the EPA consider three criteria:

- the potential adverse effects of the contaminant on the health of humans,
- the extent of contaminant occurrence (or likely occurrence) in public drinking water, and
- in the sole judgment of the Administrator, whether regulation of the contaminant presents a meaningful opportunity for reducing health risks for persons served by public water systems.

If the EPA determines that all three of these statutory criteria are met and makes a final determination to regulate a contaminant, the agency has 24 months to publish a proposed Maximum Contaminant Level Goal (MCLG) and NPDWR. After the proposal, the agency has 18 months to publish a final MCLG and promulgate a final NPDWR, but may extend this deadline by up to 9 months if needed. If the answer to any of the three statutory criteria is negative based on the available data, then the agency makes a determination that an NPDWR is not necessary for that contaminant at that time. If the EPA has insufficient information/data to evaluate a contaminant according to the statutory criteria, it will not make a decision until such data become available.

What are the preliminary regulatory determinations for CCL3?

The EPA announced preliminary regulatory determinations for five contaminants listed on CCL3: dimethoate, 1,3-dinitrobenzene, strontium, terbufos, and terbufos sulfone. Based on a review of available health information, the agency has made the preliminary determination that strontium may have an adverse health effect in people without enough calcium in their diet because it replaces calcium in the bone during development. The EPA has also determined that strontium occurs frequently in public water systems. Therefore, the EPA is making a preliminary determination to regulate strontium so that the agency can further evaluate whether regulation of strontium in drinking water provides an opportunity for public health protection. The EPA has also made a preliminary determination that dimethoate, 1,3-dinitrobenzene, terbufos, and terbufos sulfone are not occurring, or occur infrequently, in drinking water. Therefore, the EPA's preliminary determination is that these contaminants do not require regulations for drinking water. After considering public comments, the EPA plans to make the final regulatory determinations in 2015.

What about nitrosamines and chlorate?

The agency is reviewing the existing microbial and disinfection byproduct (MDBP) regulations as part of the Six Year 3 (SY3). Because chlorate and nitrosamines are DBPs that can be introduced or formed in public water systems partly because of disinfection practices, the agency believes it is important to evaluate these unregulated DBPs in the context of the review of the existing DBP regulations. DBPs need to be evaluated collectively because the potential exists that the chemical disinfection used to control a specific DBP could affect the concentrations of other DBPs. Therefore, the agency is not making a regulatory determination for chlorate and nitrosamines at this time. The agency expects to complete the review of these DBPs by the end of 2015.

Does the EPA have to wait until the next regulatory determination cycle to decide whether to develop a drinking water standard for an unregulated contaminant?

It is important to note that the agency is not precluded from making a determination prior to the end of the next regulatory determination cycle and/or regulating a contaminant at any time when it is necessary to address an urgent threat to public health, including any contaminant not listed on the CCL.

Do these regulatory determinations impose any requirements on public water systems?

No. These regulatory determinations do not impose any requirements on public water systems at this time. Instead, this action notifies interested parties of the EPA's preliminary regulatory determinations for five unregulated contaminants and requests comment on this action.

Where can I find more information about this notice and the CCL 3 Regulatory Determinations?

For information on the regulatory determinations for CCL3, please visit the following website: http://water.epa.gov/scitech/drinkingwater/dws/ccl/ccl3.cfm.

For general information on drinking water, please visit the EPA’s drinking water homepage at www.epa.gov/drink or contact the Safe Drinking Water Hotline at 1-800-426-4791. The Safe Drinking Water Hotline is open Monday through Friday, excluding legal holidays, from 10:00 a.m. to 4:00 p.m., Eastern time.

Inter Tribal Council of Arizona, Inc.
Presented by Brian Bennon, ITCA Tribal Water Systems Program Manager

Twelve percent of homes in Indian Country lack access to safe drinking water and adequate sanitation. Additional and sustained federal funding, in parity with existing funding to states, for tribally-led water-sector workforce capacity building is necessary for public health and economic viability.

To meaningfully address safe drinking water and sanitation needs in Indian Country is to protect appropriate infrastructure construction with sustained operations and maintenance capacity building (technical assistance, training, and professional certification). The few federal funding opportunities that exist for water-sector capacity building initiatives are short-term in nature and are geared towards large nation-wide corporations. As a result, very few tribally-led organizations have programs that provide water-sector capacity building services and the survival of those tribally-led programs are gravely threatened. Under the Safe Drinking Water Act, a portion of the State Revolving Fund is used by the states for capacity building (non-infrastructure construction). In contrast, the Tribal Set-Aside under the Safe Drinking Water Act is reserved only for infrastructure construction (no capacity building). Furthermore, jurisdictionally-appropriate licensing of tribal water/wastewater system operators is primarily an unfunded mandate. To protect public health and economic viability in Indian Country, a dedicated and sustained funding mechanism, which is non-discretionary and multi-year in nature, is needed for tribally-led capacity building initiatives. However, such funding must not diminish appropriations for infrastructure construction, but instead protect tax-payer infrastructure investments through sustainable operations and maintenance.

Reducing Nutrient Pollution under the Clean Water Act: EPA's Approach

Tom Wall, Director, Assessment and Watershed Protection Division

U.S. EPA Office of Water

November 7, 2014

Outline

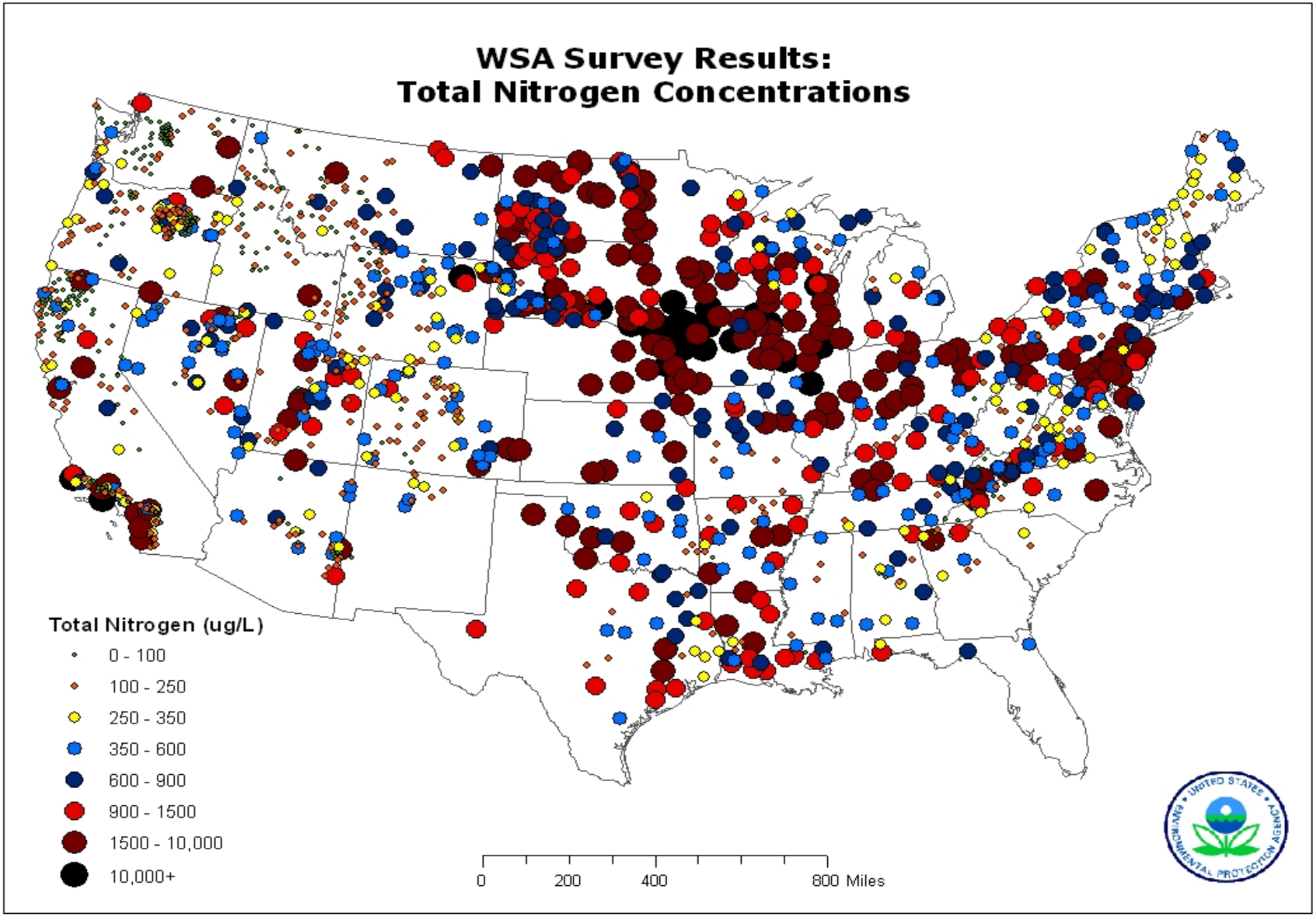
- National Scope of Nutrient Pollution
- Public Health and Aquatic Impacts
- Our Goals and How We Will Get There
- Nitrogen & Phosphorus Sources
- Call to Action: Helping State Progress via Nutrient Frameworks
- Looking Ahead

The Problem……

National Scope of Nutrient Problem

- **Well Documented Problem and Impacts, e.g.:**
  - EPA: Science Advisory Board (2007), Wadeable Streams and Lakes Assessments (2006, 2008), National Coastal Condition Report III (2008)
  - National Research Council: Mississippi River Water Quality (2008), Urban SW (2008)
  - USGS: Impact of Nutrients on Groundwater (2010), SPARROW Loadings (multiple)
  - Many published articles, State and university reports
  - State EPA Nutrient Innovations Task Group (NITG) *Call to Action* Report
- **15,000 Nutrient-related Impairment Listings in 49 States…an underestimate**
  - 2.5 Million Acres of Lakes and Reservoirs & 80,000 Miles of Rivers and Streams
  - >47% of Streams have Med to High P; >53% have Med to High N
- **78% of Assessed Continental U.S. Coastal Area Exhibits Eutrophication Symptoms**
- **168 Hypoxic Zones in U.S. Waters**
- **Public Health Risks – Contaminated Drinking Water is Significant & Costly**
  - Rate of nitrate violations in community water systems doubled over past 7 years

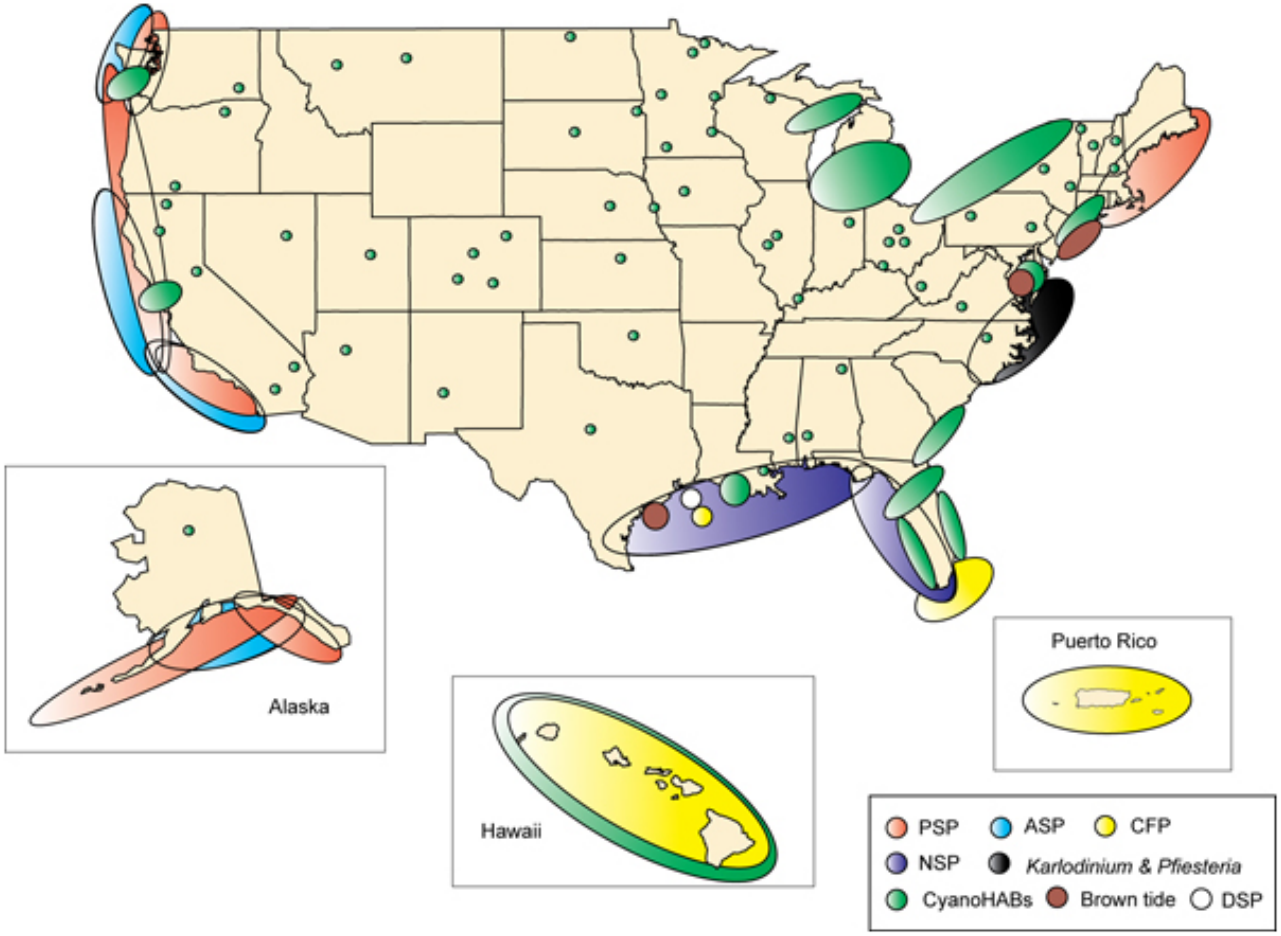
Concentrations of Nitrogen Nationally



2010 USGS Report
Nutrients in Streams & Groundwater

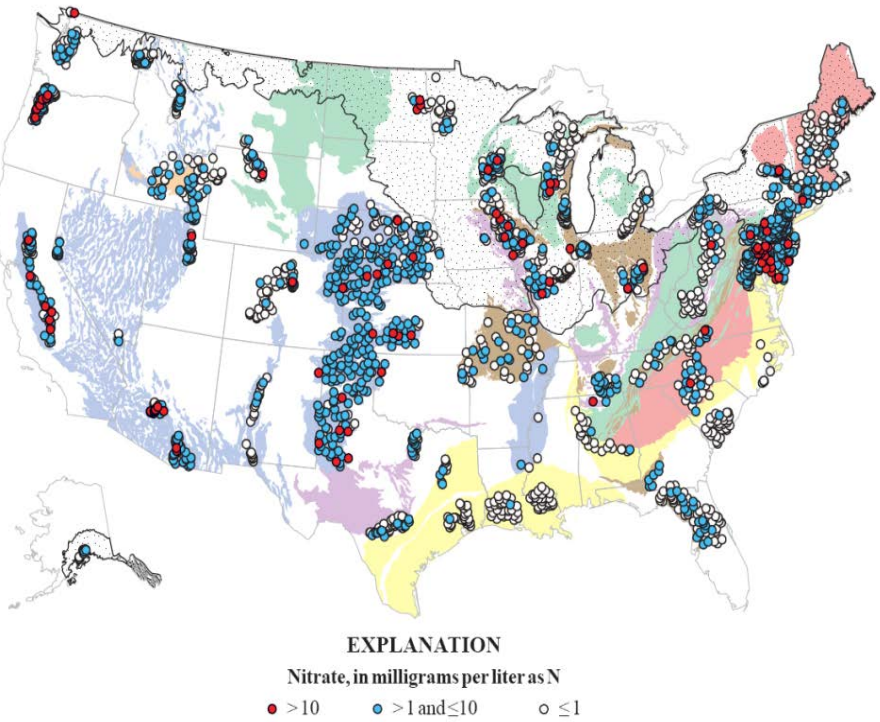
- Analysis of occurrence data from 1992 to 2004
- Nitrate MCLG exceeded in 7% of 2,400 DW wells sampled
- Nitrogen concentrations generally highest in Ag streams in Northeast, Midwest, & Northwest
- Despite substantial Federal, State and local efforts, limited national progress during this period
- Nitrate concentrations likely to increase in drinking water aquifers over next decade as nitrogen moves downward into the groundwater system.

Algal Bloom Occurrences in the United States (WHOI 2007).



National Drinking Water Impacts

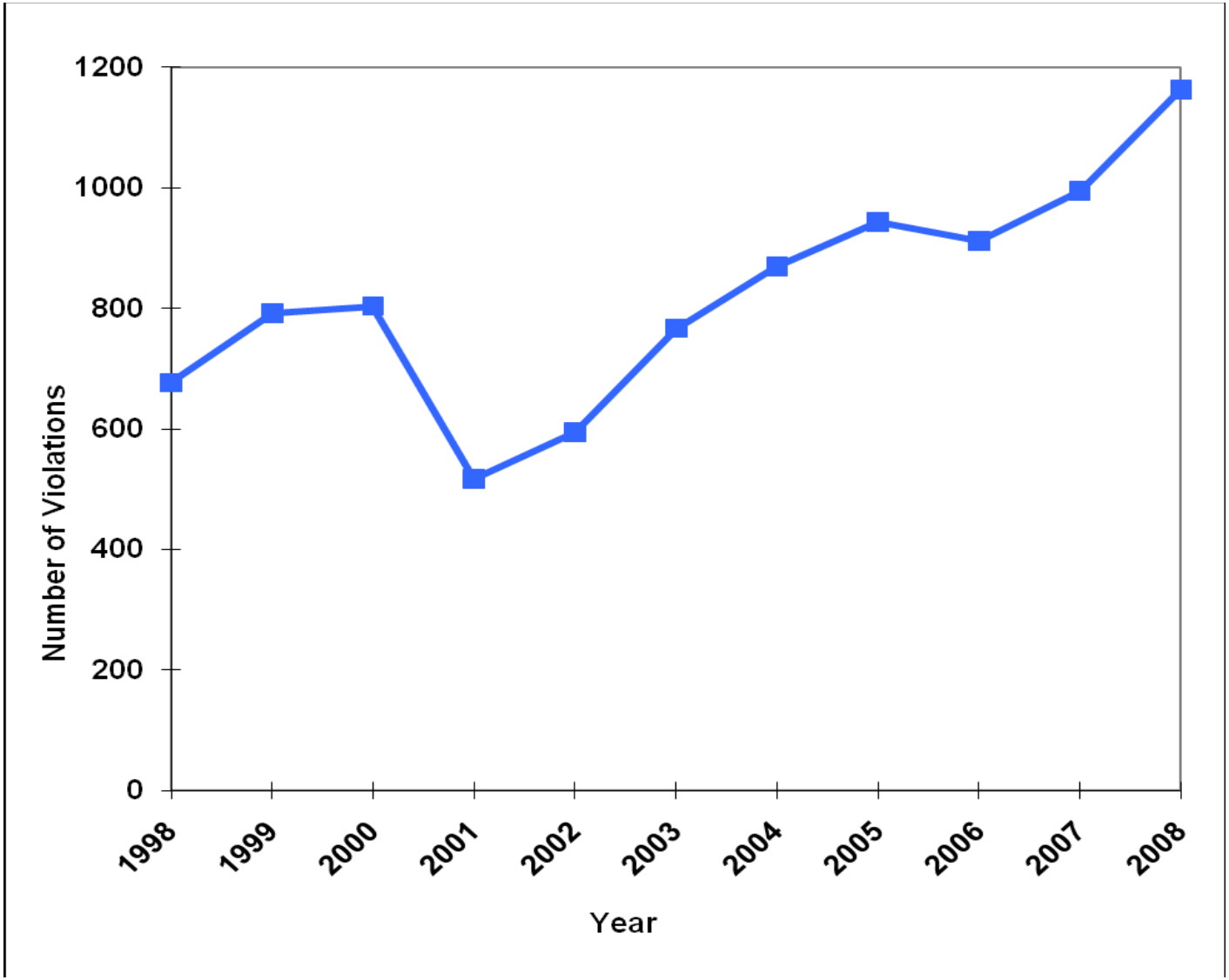
- Public Health Risks:



(MCL of 10 mg/l exceeded as N in 4.4 percent of the wells)

- Disinfectant by-products; significant & costly
- Contaminated drinking water supplies
- Rate of nitrate violations in community water systems has doubled over past 7 years
- Harmful algal blooms
- Increased treatment costs
  - Large Systems
  - Small Systems
  - Private Wells

Community Water System (CWS) Drinking Water Nitrate Violations



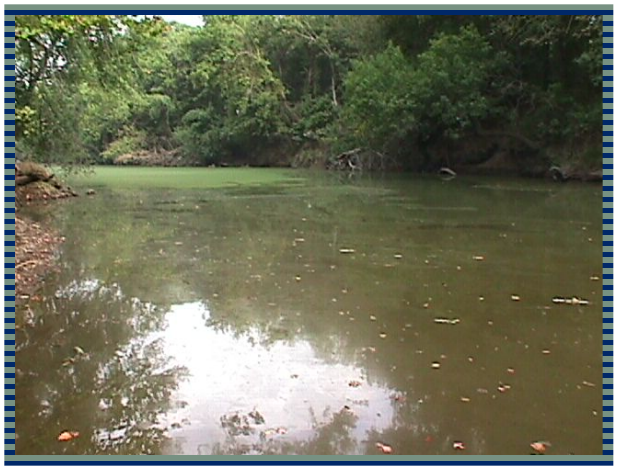
Impaired Reservoirs – examples

Microcystis bloom - August 2003

Toledo Water Intake

Grand Lake St. Mary's Ohio 2010

Impaired Streams – examples



Impacts on Downstream Waters

Microcystis Bloom – Goodby's Creek at the St. Johns River, Jacksonville, FL – September 14, 2005

Health Advisory listed by the FL Department of Health as a result of algal blooms and fish kill in the St. Johns River, Jacksonville, FL - June 15, 2010

National Population Growth

- **Nutrient Impacts Reflect Doubling of U.S. Population Over Past 50 Years**
- **Additional 135 Million People by 2050**
- **Nutrient Pollution Expected to Accelerate**

Year	U.S. Population
1950	152 million
2008	304 million
2050	439 million

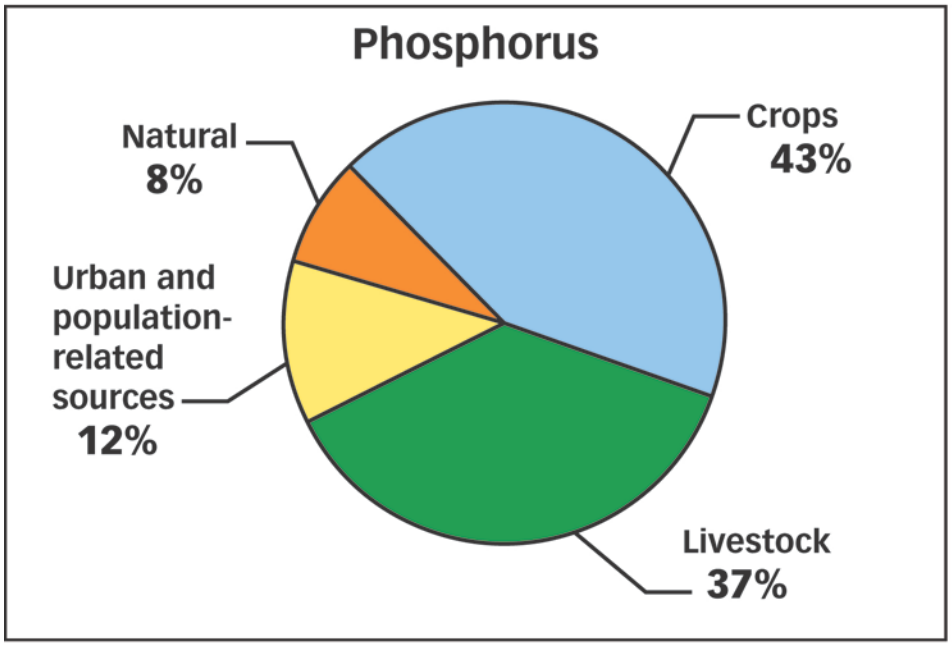
Our Goals

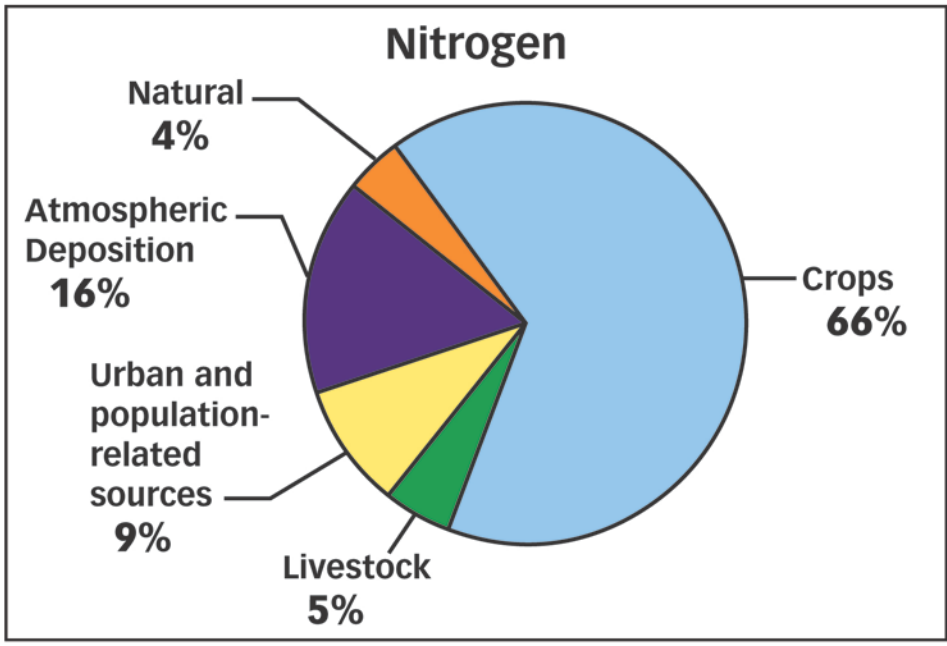
- **Reduce** sources of nitrogen and phosphorus pollution
- **Restore** surface and ground waters already degraded by nutrient pollution
- **Build** federal/state/local capacity to plan for and reduce such pollution through voluntary as well as regulatory means
- **Communicate** about the effects of nutrient pollution

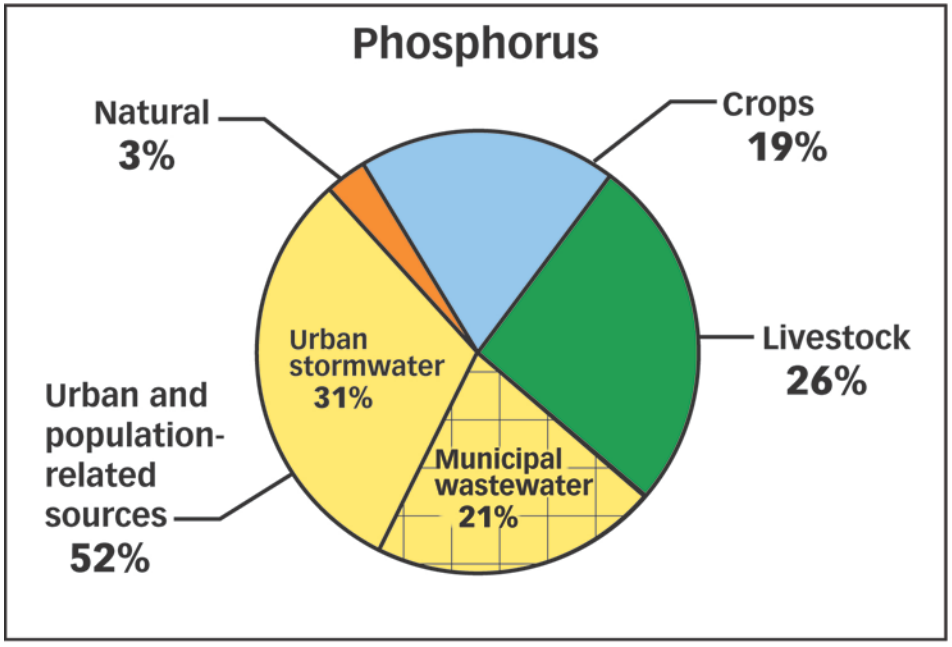
What are the N & P Sources?

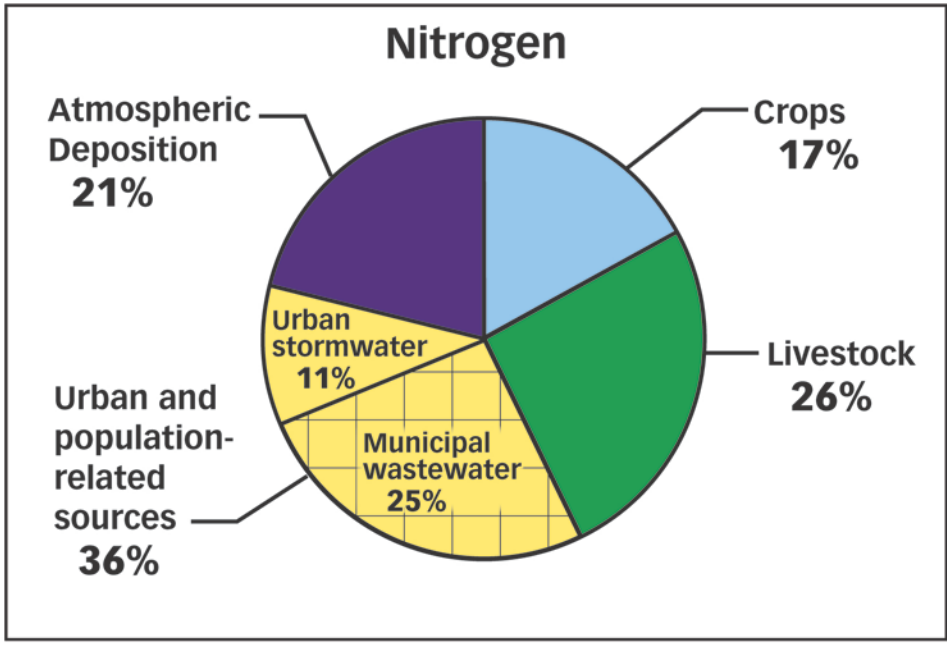
- **Municipal Wastewater Treatment**
  - Among most heavily regulated sectors in US, treat >18 mil tons of human waste annually
  - >16,500 municipal treatment system permits, ~7% have numeric limits for N or P, 18% monitor for these pollutants
- **Atmospheric Nitrogen Deposition**
  - Regulations in place, more underway
  - These sources can be significant, e.g., in the Chesapeake Bay and Mississippi River watersheds, Atmospheric N accounts for 21% of the source contributions
- **Urban Stormwater**
  - 80% of U.S. pop lives on 10% of land, urban pop impacting coastal areas
  - 50% of existing urban landscape will be redeveloped by 2030, and additional 30% of currently undeveloped land likely to be developed
- **Agricultural Livestock**
  - $130 Billion Industry , >1 bil tons of manure annually
  - Substantial Production is Largely Unregulated by CAFO Rule
- **Agricultural Row Crops**
  - $120 Billion Industry, in many areas a significant source of N&P
  - Ag SW Runoff and Irrigation Return Flows Exempt from CWA, Variable Controls at State Level

Gulf of Mexico









Chesapeake Bay

How Will We Get There?

- Set the stage – work with states nutrient frameworks (more below)
- Pollution prevention, protecting source water and healthy waters, plus restoring waters
- Innovation – promote cost effective and practical solutions
- Assess how we're doing
- Reach the public

Clean Water Act Framework

Set Standards

Technology-Based Approach

- Effluent limitation guidelines for industry and secondary treatment for wastewater plants

Water Quality-Based Approach

- EPA develops water quality criteria information
- States and tribes develop water quality standards and criteria

Implement Programs

Point Source Permits – regulatory (NPDES)

Nonpoint Source Program -- voluntary

Restoring Polluted Waters - TMDLs

Funding & Technical Assistance

Wetlands Protection

Watershed Approaches

What are the Tools?

- **TMDLs (Clean-up Plans)– Essential, but really enough?**
  - Wait Until There's a Problem?
  - Restoration over Prevention - Expensive
  - No Protection for High Quality or Attained Waters
  - We're Losing Ground
- **Permit Limits**
  - Hard to Manage Without Clear Numeric Targets
- **Priority Best Management Practices in Priority Watersheds**
- **Nutrient Criteria**
  - Narrative - Qualitative Goals (traditional approach)
  - Numeric - Quantitative & Measureable Goals
    - Causal and/or response variables?

Why a Nitrogen and Phosphorus Pollution Framework Now?

- Current Efforts to Address Hard Fought but Collectively Inadequate at State and National Level
- Serious problem that is getting worse; potential to become one of the costliest and most challenging environmental problems
- Growing population = more N and P pollution from urban stormwater, municipal and industrial wastewater discharges, air dep., agriculture
- To protect public health and the environment, need to act *now* to reduce N and P loadings -- while states continue to develop numeric nutrient criteria and standards
  - Since 1998, EPA has encouraged states to develop numeric nutrient criteria to gauge N and P pollution and develop and implement appropriate solutions

Framework: Guiding Principles

- **Results, results, results**: build from existing state work but accelerate progress and demonstrate clear results

- Encourage a collaborative approach between federal partners, states, and stakeholders

- States need flexibility to achieve near-term reductions in N and P pollution while they make progress on their long term strategies to adopt NNC

Framework Elements: Assessment and Prioritization

- Prioritize watersheds on a statewide basis for nutrient loading reductions
  - Estimate N & P loadings delivered to waters in all major watersheds across the state at HUC8 scale or smaller
  - ID watersheds that account for substantial portion of urban and/or ag
  - ID targeted/priority HUC12 or similar watersheds for targeted N & P load reduction activities, considering receiving water problems, public and private drinking water supply impacts, nutrient loadings, opportunity to address high risk nutrient problems, or other related factors

- Set watershed load reduction goals based upon best available information
  - Set numeric goals for loading reductions for each targeted/priority HUC12 that will collectively reduce the majority of N & P loads from ID'd HUC8

Framework Elements: ID and Implement Metrics, Measures, and Practices to Reduce Loads

- Ensure Effectiveness of Point Source Permits in Targeted/ Priority Sub-watersheds
  - Municipal and Industrial Wastewater Treatment Facilities
  - Concentrated Animal Feeding Operations (CAFOs) that discharge
  - Urban Stormwater
- Agricultural Areas
  - Partner w/ Federal & State Agricultural partners, NGOs, landowners
  - Consider innovative approaches (e.g., stewardship initiatives, markets)
  - Accelerate adoption of the most effective conservation practices where they are most needed
- Reduce Stormwater Runoff and Septic System Impacts
  - Use state, county and local government tools in communities not covered by the MS4 program to address runoff (including LID/GI approaches) and septic systems, consider limits on P use

Framework Elements: Accountability and Transparency

- Accountability and Verification Measures
  - Identify which tools will be used within targeted/priority sub-watersheds to assure reductions will occur
  - Verify that load reduction practices are in place
  - Assess/demonstrate progress in implementing and maintaining management activities and achieving load reductions goals

- Annual public reporting of implementation activities and biannual reporting of load reductions and environmental impacts associated with each management activity in targeted watersheds
  - Establish process to annually report for each watershed
  - Share annual report publically on the state's website with request for comments and feedback for an adaptive management approach

Framework Elements: Numeric Criteria

- Develop work plan and phased schedule for developing numeric criteria for classes of waters (lakes/reservoirs, rivers/streams, and estuaries)
  - Should contain interim milestones, e.g., data collection, data analysis, criteria proposal, and criteria adoption consistent with the CWA
  - Reasonable timetable: complete numeric N & P criteria for at least one class of waters in accordance with a robust, state-specific workplan and phased schedule

- Fundamental goal of the approach is for states to develop numeric WQS on a longer but reasonable schedule while making progress on reducing loads in the near term

Potential Federal Resources

- US EPA –through the State Water Quality Agencies
  - Water Quality Management Planning – Section 604(b)
  - Water Pollution Control Program Grants – Section 106
  - Nonpoint Source Implementation Grants – Section 319
  - State Revolving Fund Program
- USDA Farm Bill Conservation Programs
  - EQIP, CRP, RCPP, CIG, …
- USGS (Cooperative Monitoring Program – state contracts with USGS for water quality monitoring)
- Department of the Army (USACE: 1135, 204, 206)

EPA Technical Assistance: N and P Pollution Data Access Tools

- NPDAT - Consists of a geospatial viewer, introductory website, and data download tables, available at: www.epa.gov/nutrientpollution/npdat
  - Provides streamlined access to these data in one place, in commonly-used formats
- Nutrient Indicators Data Set - http://www2.epa.gov/nutrient-policy-data/nutrient-indicators-dataset
- Supports states as they consider
  - Extent and magnitude of N and P pollution
  - Water quality problems and vulnerabilities related to this pollution
  - Potential pollution sources

Looking Ahead – Key Priorities

- Drinking Water & Ecological Risks and Economic Impacts Documentation
- Broader EPA–USDA Coordination
- Continued Commitment to Science
- Nutrient Management Frameworks
- State Numeric Nutrient Standards
- Broader and More Effective Outreach to Stakeholders
- Stormwater

For More Information:

http://www2.epa.gov/nutrientpollution