United States Environmental Protection Agency

Public Meeting and Webinar:
Revisions to the Unregulated Contaminant Monitoring Rule (UCMR 4) Meeting Presentations

Held June 25, 2014
USEPA, Office of Ground Water and Drinking Water

Office of Water (MLK 140) EPA 815-A-14-001 June 2014

Revisions to the Unregulated Contaminant Monitoring Rule (UCMR 4) for Public Water Systems

Public Meeting and Webinar

June 25th, 2014

Meeting starts at 9:00 a.m. E.T.

USEPA

Office of Ground Water and Drinking Water

If you are participating by webinar…

- You will be in listen-only mode.
- Submit question/comment by clicking on **"+"** on the Questions tab in the control panel (Figure 1).
- Type question in the box; press send (Figure 2).
- Submit questions as soon as possible.
- We will answer as many questions as possible at the end of each presentation. Remaining questions will be addressed during the afternoon Q&A Session.

Figure 1

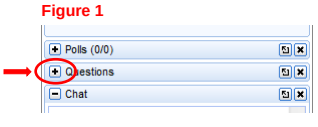
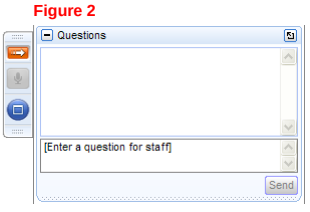


Figure 2



Adjusting the control panel

- Hide or show the control panel
  - Click the orange/red arrow button on the menu bar to hide (Figure 3) or show (Figure 4) the control panel.
  - You can move the menu bar by clicking and dragging to the desired location.
  - If you hide the panel, you will need to show it again to ask questions.

Figure 3

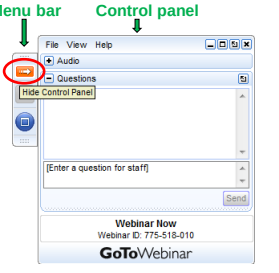


Figure 4

Adjusting to fullscreen

- Maximize GoToWebinar viewer to fullscreen view
  - The webinar will begin in window mode (presentation will only take up part of screen).
  - To view in fullscreen mode, click the blue button on the menu bar (Figure 5).
  - To return to window mode, click the same blue button (Figure 6).

Figure 5

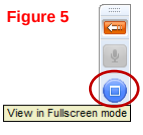
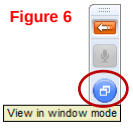


Figure 6



WELCOME

Revisions to the Unregulated Contaminant Monitoring Rule (UCMR 4) for Public Water Systems

Public Stakeholder Meeting and Webinar

General Meeting Information

- Purpose
  - Review the status of EPA's efforts in the areas of analyte selection, analytical methods, sampling design, determination of minimum reporting levels, and other possible revisions relative to the rule
- Webinar lines are muted to minimize background noise.
- On-site attendees:
  - Please mute electronic devices/cell phones.
  - Bathrooms in hall, follow signs; need door key cards, which should be returned after use.
  - Lunch break will be at 11:45; list of restaurants available at registration table.

Agenda

8:30-9:00	Stakeholder Sign-in
9:00-9:20	Welcome – Introduction and Agenda
9:20-9:50	Overview of the UCMR Program
9:50-10:30	UCMR 3 Status
10:30-10:45	BREAK
10:45-11:30	UCMR 4 Potential Sampling Design Change Relative to UCMR 3
11:30-11:45	Discussion
11:45-1:15	LUNCH
1:15-3:00	UCMR 4 Candidate Selections and Rationale
3:00-3:15	BREAK
3:15-3:45	Approval of Laboratories Supporting UCMR 4
3:45-5:00	Discussion

Overview of the Unregulated Contaminant Monitoring Program

Public Meeting and Webinar
Washington D.C.

June 25th, 2014 – 9:20 a.m.

Brenda Parris
USEPA, OGWDW, SRMD
Technical Support Center
Cincinnati, Ohio

Overview

- Unregulated Contaminant Monitoring (UCM) program
- Regulatory background for UCMR
  - Safe Drinking Water Act (SDWA) authority
  - Relationship to Contaminant Candidate List (CCL)
- Unregulated Contaminant Monitoring Rule (UCMR) approach
  - UCMR cycles
  - UCMR implementation

Safe Drinking Water Act

- Passed in 1974, amended in 1986 and 1996
- Authorized EPA to set enforceable health standards for contaminants in drinking water
  - National Primary Drinking Water Standards (NPDWS)
- Outlined a sound science approach to NPDWS development that required consideration of:
  - Occurrence Data
  - Health Effects Data
  - Cost Benefit Analysis

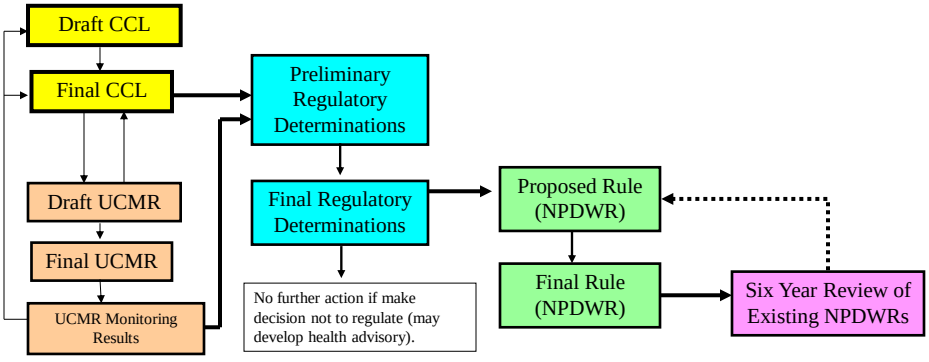
Unregulated Contaminant Monitoring

- 1986 SDWA amendments were the basis for the original UCM program
- UCM Rounds 1 (1988-1992, 62 contaminants) & 2 (1993-1997, 48 contaminants)
  - State drinking water programs managed the original UCM program
  - Public water systems (PWSs) serving > 500 people were required to monitor

Safe Drinking Water Act

- 1996 SDWA amendments changed the process of developing and reviewing NPDWS
  - Contaminant Candidate List
  - **Unregulated Contaminant Monitoring Rule**
  - Regulatory Determination
  - Six-Year Review

General Flow of Regulatory Process



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

Contaminant Candidate List

- SDWA requires EPA to list unregulated contaminants that may require a national drinking water regulation in the future
- Every five years CCL defines unregulated contaminants for which EPA needs
  - Occurrence data
  - Analytical methods
  - Potential health effects
  - Evaluation of treatment techniques

Contaminant Candidate List

- EPA considered approximately 7,500 potential chemical and microbial contaminants
- Screening process based on a contaminant's potential to occur in public water systems (PWSs) and the potential for public health concerns
- Further detailed evaluations, public input, and expert judgment and review are used in the final contaminant selection
- Final CCL 3 published October 8, 2009
  - 104 chemicals or chemical groups and 12 microbiological contaminants
- CCL 4 is in development

Unregulated Contaminant Monitoring Rule

- 1996 Safe Drinking Water Act Amendments
  - Redesigned the UCM program and included these requirements:
    - Monitor no more than 30 contaminants per 5-year cycle
    - Monitor only a representative sample of PWSs serving 10,000 or fewer people
    - Store analytical results in the National Contaminant Occurrence Database (NCOD)
    - Direct implementation – EPA managed program in partnership with States
    - EPA funds testing/analytical costs for small PWSs

Objective of UCMR Program

- Develop a list of contaminants, largely based on CCL, every five years
- Collect occurrence data for suspected drinking water contaminants that do not have health-based standards set under SDWA
- Occurrence information is used to support future regulatory decision-making
- Supports the Administrator's determination of whether (or not) to regulate a contaminant under the drinking water program

Unregulated Contaminant Monitoring Rule

- UCMR groups contaminants into three tiers based on their priority and analytical methodologies
  - Assessment Monitoring (List 1)
    - Employs commonly used analytical techniques
  - Screening Survey (List 2)
    - Uses more recently developed analytical techniques
  - Pre-Screen Testing (List 3)
    - Utilizes new or specialized techniques

UCMR 1

- UCMR 1 (2001-2005, 26 contaminants)
  - Published in Federal Register (FR) on September 17, 1999
  - Required all large PWSs and a nationally representative sample of small PWSs serving ≤10,000 people to monitor for contaminants on List 1
  - Required a random selection of 300 large and small PWSs to monitor for contaminants on List 2

UCMR 2

- UCMR 2 (2007-2011, 25 contaminants)
  - Published in Federal Register (FR) on January 4, 2007
  - More PWSs included under List 2 Screening Survey than for UCMR 1 to provide more representative results
  - Define monitoring schedules to improve compliance

UCMR 3

- UCMR 3 (2012-2016, 30 contaminants)
  - Currently ongoing - monitoring ends in 2015, data review will occur in 2016
  - Published in Federal Register (FR) on April 16, 2012

UCMR Implementation

- OGWDW, SRMD, Technical Support Center (Cincinnati)
  - Review and track PWS applicability and monitoring progress
  - Coordinate Laboratory Approval Program
  - Provide technical support for Regions, States, PWSs and laboratories
  - Coordinate outreach
  - Assist and support Regional compliance efforts

UCMR Implementation

- OGWDW, SRMD, Technical Support Center (Cincinnati)
  - Small PWS support
    - Maintain lab and implementation contracts to support UCMR
    - Manage sample kit distribution
    - Responsible for data review and reporting
    - Prepare data for NCOD
  - Large PWS support
    - Extract data from the Safe Drinking Water Accession and Review System (SDWARS) for evaluation and reporting to NCOD
    - Support SDWARS reporting system and users

Extended UCMR Implementation Team

- OGWDW, DWPD, Infrastructure Branch
  - Responsible for SDWARS
- EPA Regional Offices
  - Coordinate State partnership agreements
  - Assist States and PWSs with UCMR requirements, compliance and enforcement
- Partnering States
  - Support various levels of monitoring coordination

Status of the Third Unregulated Contaminant Monitoring Rule (UCMR 3)

Public Meeting and Webinar
Washington D.C.

June 25th, 2014 – 9:50 a.m.

Gregory J. Carroll
USEPA, OGWDW, SRMD
Technical Support Center
Cincinnati, Ohio

25

Overview

- Timing, Activities and Applicability
- Monitoring
  - List 1, List 2, List 3
- Reporting
  - Current Status
- Occurrence Data
  - NCOD
- Preparation for UCMR 4

Time Line of UCMR 3 Activities

2012	2013	2014	2015	2016

Pre-monitoring Implementation
• Lab Approval
• Notifications
• SDWARS Registration
  • Inventory
  • Schedule
	Sampling and Reporting Period
	One consecutive 12-month period during January 2013 - December 2015 (monitoring can span more than one calendar year, as long as conducted during a consecutive 12-month period).
				Post-monitoring Phase
				• Complete Resampling
				• Conclude Data Reporting
				• Finalize NCOD
				• Continue Enforcement

System Definitions and Sizes

- **Public water system** (PWS) provides water for human consumption through pipes or other constructed conveyances to at least 15 service connections or serves an average of at least 25 people for at least 60 days a year.
  - **Community Water System (CWS)** supplies water to the same population year-round.
  - **Non-Transient Non-Community Water System (NTNCWS)** regularly supplies water to at least 25 of the same people at least six months per year, but not year-round. Examples include schools, factories, office buildings, and hospitals that have their own water systems.
  - **Transient Non-Community Water System (TNCWS)** provides water in a place such as a gas station or campground where people do not remain for long periods of time.

UCMR 3 System Applicability

Assessment Monitoring (List 1 Contaminants)		
System Type	***Systems Serving > 10,000***	***Systems Serving ≤ 10,000***
CWS & NTNCWS	All systems (~4,200)	800 randomly selected systems
TNCWS	No requirements	No requirements
Screening Survey (List 2 Contaminants)		
System Type	***Systems Serving > 10,000***	***Systems Serving ≤ 10,000***
CWS & NTNCWS	All systems(~410) serving more than 100,000, and ~320 randomly selected systems serving 10,001 to 100,000	480 randomly selected systems
TNCWS	No requirements	No requirements
Pre-Screen Testing (List 3 Contaminants)		
System Type	***Systems Serving > 1,000***	***Systems Serving ≤ 1,000***
CWS, TNCWS & NTNCWS	No requirements	800 randomly selected systems

UCMR 3 Monitoring

- PWSs must monitor during a consecutive 12-month period between 2013 - 2015
- Number of times a PWS samples is directly related to the sample point source
  - Surface water and ground water under the direct influence of surface water – must monitor quarterly during their 12-month schedule (sample three months apart)
  - Ground water – must monitor twice during their 12-month schedule (sample five to seven months apart)

UCMR 3 Monitoring Lists

- **Assessment Monitoring** (List 1 Contaminants) relies on common analytical method technologies used by drinking water laboratories
- **Screening Survey** (List 2 Contaminants) monitoring uses more specialized analytical method technologies
- **Pre-Screen Testing** (List 3 Contaminants) relies on newer method technologies not as commonly used by drinking water laboratories

  UCMR 3 Pre-Screen Testing involves ground water systems that:
  - Serve less than 1,000 people
  - Do not disinfect
  - Are located in vulnerable areas of karst or fractured bedrock

UCMR 3 Sampling Locations

Contaminant Type	Sampling Location Type
Assessment Monitoring: List 1 Contaminants	
Volatile Organic Compounds	EPTDS
Synthetic Organic Compound (1,4-dioxane)	EPTDS
Perfluorinated Compounds	EPTDS
Oxyhalide Anion (chlorate)	EPTDS and DSMRT
Metals	EPTDS and DSMRT
Chromium-6	EPTDS and DSMRT
Screening Survey: List 2 Contaminants	
Hormones	EPTDS
Pre-Screen Testing: List 3 Contaminants	
Viruses	EPTDS

UCMR 3 List 1 Contaminants

Assessment Monitoring: List 1 Contaminants	MRL (µg/L)
Volatile Organic Compounds – EPA Method 524.3	
chloromethane (methyl chloride)	0.2
bromomethane (methyl bromide)	0.2
chlorodifluoromethane (HCFC-22)	0.08
bromochloromethane (halon 1011)	0.06
1,1-dichloroethane	0.03
1,2,3-trichloropropane	0.03
1,3-butadiene	0.1
Synthetic Organic Compound – EPA Method 522	
1,4-dioxane	0.07

EPA will pay for all analytical and shipping costs associated with List 1 monitoring at small systems (≤ 10,000).

UCMR 3 List 1 Contaminants

Assessment Monitoring: List 1 Contaminants	MRL (µg/L)
Perfluorinated Compounds– EPA Method 537	
perfluorooctane sulfonic acid (PFOS)	0.04
perfluorooctanoic acid (PFOA)	0.02
perfluorononanoic acid (PFNA)	0.02
perfluorohexane sulfonic acid (PFHxS)	0.03
perfluoroheptanoic acid (PFHpA)	0.01
perfluorobutanesulfonic acid (PFBS)	0.09
Oxyhalide Anion – EPA Method 300.1; SM 4110D; ASTM D658-08	
chlorate	20

EPA will pay for all analytical and shipping costs associated with List 1 monitoring at small systems (≤ 10,000).

UCMR 3 List 1 Contaminants

Assessment Monitoring: List 1 Contaminants	MRL (µg/L)
Metals – EPA Method 200.8; SM 3125; ASTM D5763-10	
cobalt	1
molybdenum	1
strontium	0.3
vanadium	0.2
chromium	0.2
Chromium-6 – EPA Method 218.7	
chromium-6	0.03

EPA will pay for all analytical and shipping costs associated with List 1 monitoring at small systems (≤ 10,000).

UCMR 3 List 2 Contaminants

Screening Survey: List 2 Contaminants	MRL (µg/L)
Hormones – EPA Method 539	
17-β-estradiol	0.0004
17-α-ethynylestradiol (ethinyl estradiol)	0.0009
16-α-hydroxyestradiol (estriol)	0.0008
equilin	0.004
estrone	0.002
testosterone	0.0001
4-androstene-3,17-dione	0.0003

EPA will pay for all analytical and shipping costs associated with List 2 monitoring at small systems (≤ 10,000).

UCMR 3 List 3 Contaminants

Pre-Screen Testing: List 3 Contaminants	Detection Assay
Microbiological Contaminants – EPA Method 1615	
enterovirus	Cell culture; qPCR
norovirus	qPCR
Microbiological Indicators	
total coliforms	
E. coli	
Enterococci	
bacteriophage	
aerobic spores	

EPA will collect the samples from List 3 sampling locations, and will pay for all analytical and shipping costs associated with viruses and indicators at these small systems (≤ 1,000).

UCMR 3 Responsibilities

- Small PWSs serving 10,000 or fewer people are not responsible for the costs associated with analyses and shipping
  - EPA engages States and PWSs to collect samples for List 1 and List 2
  - EPA collects samples for List 3
  - EPA coordinates sample analyses with contracted laboratories and funds the analyses
  - EPA examines the results along with quality control data and generates reports

UCMR 3 Responsibilities

- Large PWSs serving more than 10,000 people are responsible for the costs associated with analyses
  - PWS coordinates sample analyses with an approved laboratory
  - Laboratories post the data to the Safe Drinking Water Accession and Review System (SDWARS 3)
  - PWS reviews and can act upon

    (e.g., approve) data in SDWARS 3

    States and EPA review results

UCMR 3 Occurrence Data

- Updated quarterly and posted in the National Contaminant Occurrence Database (NCOD)
- Quarterly updates can be accessed from
  - http://water.epa.gov/lawsregs/rulesregs/sdwa/ucmr/data.cfm#ucmr2013
  - Zipped file contains a summary document (PDF), occurrence data (.txt), disinfectant residual type (.txt) and U.S. postal service zip code(s) for all areas served by a PWS (.txt)
- Data will continue to be added and may be corrected on further review
  - Use caution when interpreting the data before the dataset is complete (mid-late 2016)

UCMR 3 Results To-Date

- OGWDW posted PWS results (submitted through April 2014) to the web (NCOD)
- Chemicals are studied at levels that are often significantly below those in previous UCMRs
- The detection of a UCMR 3 analyte above the MRL does not represent cause for concern, in and of itself
- The data should be judged considering health effects information (reference concentration)

UCMR 3 Preliminary Results

- ~3500 sample results from ~400 PWSs for hormones
- ~18,000 sample results from ~1900 PWSs for metals, chlorate
- ~11,000 sample results from 1800-1900 PWSs for other chemicals
- ~1/3 of data that will ultimately be collected

Preliminary Data Summary Points

- Metals
  - Many PWSs had **detections** of metals (i.e., above the MRL)
  - Between 0-3% of sample results were above the Reference Concentration (Ref Conc)
  - Vanadium above the Ref Conc at ~3% of PWSs; strontium above the Ref Conc at 1%; other metals measured above the Ref Conc by less than 1% of PWSs
- Chlorate
  - Many of the PWSs (~10,000 of ~18,000) had **detections** of chlorate
  - 35% of the PWSs had chlorate measurements above the Ref Conc

Preliminary Data Summary Points

- 1,4-dioxane
  - ~400 of ~1800 PWSs had **detections** of 1,4-dioxane
  - ~7% above the 10^{-6} Ref Conc of 0.35 µg/L; none above the 10^{-4} Ref Conc of 35 µg/L
- Volatile Organic Compounds (VOCs)
  - One or more VOCs **detected** by 104 of the ~1800 PWSs that reported data
  - Relatively few VOC measurements above the Ref Conc
  - 1,2,3-trichloropropane measured by ~1.4% of PWSs above the 10^{-4} Ref Conc; detected above MRL by ~1.7% (MRL > 10^{-6} Ref Conc)

Preliminary Data Summary Points

- Perfluorinated Compounds (PFCs)
  - 36 of the ~1900 PWSs **detected** one or more PFCs
  - 6 PWSs measured PFOS above the Ref Conc
  - Ref Conc currently only available for PFOA and PFOS
- Hormones
  - 17 of the ~400 PWSs **detected** one or more hormones
  - Ref Conc available for the 5 estrogenic hormones, not the 2 androgenic hormones
  - None of the PWSs had (estrogenic) hormone measurements above the Ref Conc

Preliminary Virus Data

- Pre-Screen Testing at 800 small GW systems for norovirus, enterovirus, and "indicator" organisms
- Field samples collected from ~376 PWSs; data available for ~173
  - 133 indicator detections
    - 26 enterococci
    - 9 bacteriophage
    - 84 aerobic spores
    - 2 *E. coli*
    - 12 total coliform
  - 3 norovirus detections

Timing for UCMR 3 and UCMR 4

- UCMR 3 monitoring activities are scheduled to end in December 2015
- UCMR 3 data will be finalized in 2016
- EPA anticipates proposing UCMR 4 in mid 2015
- UCMR 4 is anticipated to be final in late 2016
- Implementation activity for UCMR 4 expected to begin in 2017 with monitoring expected to begin in January 2018

Revisions to the Unregulated Contaminant Monitoring Rule (UCMR 4) for Public Water Systems

Public Stakeholder Meeting and Webinar

Morning Break

Resume at 10:45 a.m.

UCMR 4
Potential Sampling Design Changes Relative to UCMR 3

Public Meeting and Webinar
Washington D.C.

June 25th, 2014 – 10:45 a.m.

Brenda Parris
USEPA, OGWDW, SRMD
Technical Support Center
Cincinnati, OH

49

Overview

- Background for the Unregulated Contaminant Monitoring Rule (UCMR) sampling design
- UCMR 4 sampling design considerations
- Approach to tiered monitoring
  - Assessment Monitoring (List 1)
  - Screening Survey (List 2)
  - Pre-Screen Testing (List 3)
- Potential changes between UCMR 3 and UCMR 4
- Implementation considerations

UCMR Background

- UCMR program designed for Safe Drinking Water Act (SDWA) specifications
- Under § 1445(a)(2)(A) of SDWA, as amended in 1996, EPA required to:
  - "vary the frequency and schedule for monitoring ...based on the number of persons served by the system, the source of supply, and the contaminants likely to be found;"
  - ensure "that only a representative sample of systems serving 10,000 persons or fewer are required to monitor;" and
  - "pay the reasonable cost of such testing and laboratory analysis..." for small systems

PWS Types

- Community water system
  - Public Water System (PWS) that supplies water to the same population year-round
- Non-transient non-community water system
  - PWS that supplies water to at least 25 of the same people at least six months per year, but not year-round
    - Schools
- Transient non-community water system
  - PWS that provides water where people do not remain for long periods of time
    - Gas stations and campgrounds

PWS Sizes

- Small PWSs serve 10,000 people or less
- Large PWSs serve 10,001-100,000 people
- "Extra large" PWSs serve over 100,001 people

Sampling Design Considerations

- UCMR 4 expected to be based on the sampling and statistical design used in UCMR 1, 2 and 3
  - Vetted with stakeholders
  - Peer reviewed
  - Three rounds of public comment

Sampling Design Considerations

Data Quality Objectives

- Unbiased national exposure estimates; small margin of error
- Account for differential occurrence
- Stratify across system size and source water type to account for differences
- Multiple sample events over multiple years to address temporal variability
- Allocation across states proportional to population served; at least two per state

Assessment Monitoring (List 1): Statistical Approach

- Expect to maintain same statistical design for Assessment Monitoring used in UCMR 1, 2 and 3
  - Nationally representative sample of 800 small systems
  - Census of large water systems
- Small system statistical sample combined with large system census data provides a powerful tool for assessing contaminant occurrence

Sample Allocation for Small Systems in Assessment Monitoring (List 1)

Size Category	Ground Water Systems	Surface Water Systems	**Total**
500 and under	85	10	***95***
501 to 3,300	223	83	***306***
3,301 to 10,000	220	179	***399***
Total	**528**	**272**	**800**

Screening Survey (List 2): Statistical Approach

- Designed to ensure the data can be used to support regulatory determinations and rule development (if warranted)
- Account for possible laboratory capacity issues related to use of recently developed or technically complex methods

Screening Survey (List 2): Statistical Approach

- Considering similar approach as UCMR 2 and 3:
  - National sample of 800 systems, allocated across systems serving 100,000 or fewer:
    - Small system (serving 10,000 or fewer) sample would not overlap with Assessment Monitoring
    - Sample again allocated across strata of system size and source water type
  - Census of all systems serving 100,001 and over (~400 systems)
    - Adds further confidence in the sampling results by including a census of the largest systems
- **Total number of systems ~1,200**

UCMR Pre-Screen Testing (List 3)

- Envisioned for use with methods that are in the early stages of development, and/or very specialized (such as those for viruses or DNA/microchips)
- May be conducted by limited number of PWSs identified as vulnerable (by EPA and/or State agencies)
- **Not** currently anticipated to be utilized for UCMR 4

UCMR 4 Implementation Considerations

- The same sampling frequency used in UCMR 3 for Assessment Monitoring (AM) and Screening Survey (SS) is expected to be utilized for the majority of potential UCMR 4 analytes
  - Surface water systems (including groundwater under the direct influence of surface water) would sample four times during their year of monitoring
  - Ground water systems would sample two times during their year of monitoring
- Considering altering the sampling frequency for selected AM and/or SS analytes in UCMR 4

Potential Change Between UCMR 3 and UCMR 4: Monitoring

- Selective monitoring for List 1 and 2 contaminants, such as cyanotoxins and pesticides?
  - **UCMR 3:** Selective monitoring was conducted with List 3 viruses but has not been conducted with List 1 or 2 contaminants
  - **UCMR 4 potential change:** Target the monitoring of cyanotoxins and potentially pesticides by sampling in the warmer months of the year and only sampling surface water or ground water under the direct influence of surface water?
  - **Reason for considering change:**
    - To obtain more accurate occurrence data on contaminants whose concentrations fluctuate
    - Target timeframes when the contaminant is most likely to found, vulnerable period(s)

UCMR 4 Implementation Considerations

- Same monitoring schedule anticipated for AM and SS
  - Months assigned to ensure coverage of temporal vulnerability and variability
  - System monitoring spread across 3-year period to provide temporal coverage and to accommodate lab capacity
    - Year and months of monitoring assigned to small systems
    - Large systems can re-define their year and month(s) of monitoring

Potential Change Between UCMR 3 and UCMR 4: Monitoring

- Reduce the period of UCMR monitoring?
  - **UCMR 3:** 3 years were allocated for sample monitoring
  - **UCMR 4 potential change:** Compress the monitoring period to 2 years?
  - **Reason for considering change:**
    - UCMR data would be available earlier to support regulatory determinations

UCMR 4 Implementation Considerations

- Sampling locations for potential AM and SS chemicals
  - All chemicals would be sampled at the entry points to the distribution systems (EPTDSs)
  - Metals, if any, would also be sampled at the distribution maximum residence time (DSMRT) location in the distribution systems
  - Some adjustment in sampling locations may be warranted depending on the final selection of UCMR 4 contaminants

Potential Change Between UCMR 3 and UCMR 4: QC Data

- Collect additional quality control (QC) data in SDWARS?
  - **UCMR 3:** EPA collects more extensive small system QC data from contract laboratories, large systems report limited QC data
  - **UCMR 4 potential change:** Require similar QC data to be submitted for both large and small systems?
  - **Reason for considering change:**
    - Ensure a more robust dataset

Potential Change Between UCMR 3 and UCMR 4: SDWARS

- Improve SDWARS reporting functionality?
  - **UCMR 3:** Compliance reports offer a summary of the reporting status of **individual** PWSs and if they have fulfilled their monitoring requirements
  - **UCMR 4 potential change:** Update the functionality of SDWARS to include compliance reports for **multiple** PWSs **simultaneously**?
  - **Reason for considering change:**
    - Facilitates compliance tracking by the Regions and States

Revisions to the Unregulated Contaminant Monitoring Rule (UCMR 4) for Public Water Systems

Discussion

11:30 a.m. – 11:45 a.m.

Revisions to the Unregulated Contaminant Monitoring Rule (UCMR 4) for Public Water Systems

Public Stakeholder Meeting and Webinar

Lunch Break

Meeting will resume at 1:15 p.m.

UCMR 4 Candidate Selection, Rationale and Method Considerations

Public Meeting and Webinar
Washington D.C.

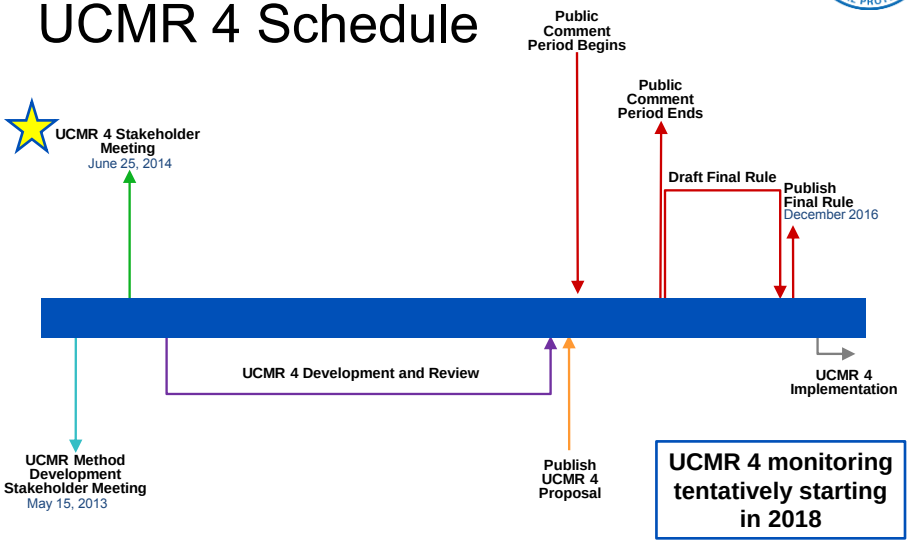
June 25th, 2014 – 1:15 p.m.

Melissa Simic and Steve Wendelken
United States Environmental Protection Agency
Office of Ground Water and Drinking Water
Technical Support Center

Overview

- UCMR 4 Schedule
- Candidate Selection Process and Rationale
- Method Considerations
- Health and Occurrence Data with Sources
- Contaminant Specific Information by Method
- Other UCMR 4 Contaminants Under Consideration

UCMR 4 Schedule



UCMR 4 Prioritization Process

CCL 3 [106 chemicals + 12 microbes] + 48 CCL 4 nominations[1] = 166 contaminants

- Not currently regulated or previous regulatory determination
- Not monitored for on UCMR 2 or UCMR 3
- Low national occurrence is not anticipated
- Have a completed drinking water method

45 CCL + 48 related non-CCL analytes [16 methods]

Most contaminants in method group:
- Have an available health assessment to facilitate regulatory determinations and/or high public concern
- Have critical health endpoints, probable carcinogens, active pesticides
- Have an occurrence data gap

UCMR 4 Candidates:
31 CCL + 18 related non-CCL analytes [9 methods] + other contaminants under consideration[2]

- Workgroup and stakeholder input
- Cost-effective method group
- Implementation considerations

Propose up to 30 contaminants for comment

After considering comments, publish up to 30 contaminants for UCMR 4 monitoring tentatively starting in 2018

[1] ***59 unique CCL 4 nominations; 11 removed because already on CCL 3 or regulated***
[2] ***Nitrate/Nitrite, 4 unregulated brominated DBPs***

June 25, 2014 U.S. Environmental Protection Agency 73

CCL and Related Candidates for UCMR 4

Assessment Monitoring (List 1)

Method 200.8 + 2 Analytes	
Germanium	
Manganese (CCL 4 nomination)	
Nickel	
Thorium	
Method 525.3	
Disulfoton	Profenofos
Ethoprop	Oxyfluorfen
alpha-Hexachlorocyclohexane	Vinclozolin
Permethrin, trans-	Dimethipin (Method 530)
Permethrin, cis-	Tebuconazole
Tribufos	
Method 530 – In Development	
Quinoline	
o-Toluidine	
Butylated hydroxyanisole	
Dimethipin (Method 525.3)	
Method 538	
Dicrotophos	
Oxydemeton-methyl	
Methamidophos	
Acephate	
Method 541 – In Development	
1-Butanol	
2-Propen-1-ol	
2-Methoxyethanol	

Method 542 + 10 Analytes – In Development	
Erythromycin	Diclofenac
Triclosan (CCL 4 nomination)	Naproxen
Carbamazepine	Gemfibrozil
Diazepam	Fluoxetine
Sulfamethoxazole	Enalapril
Trimethoprim	Phenytoin
Method 556.1	
Formaldehyde	
Acetaldehyde	

Screening Survey (List 2)

Method 544 + 6 Analytes – In Development	
Microcystin-LR	Microcystin-LF
Microcystin-YR	Microcystin-LY
Microcystin-RR	Nodularin
Microcystin-LA	
Method 545 – In Development	
Anatoxin-a	
Cylindrospermopsin	

Under Evaluation

Potential methods being investigated
Legionella pneumophila

The candidates highlighted in gray are related non-CCL 3 analytes

June 25, 2014 U.S. Environmental Protection Agency 74

Potential EPA Methods

Assessment Monitoring (List 1)	Screening Survey (List 2)
Method 200.8 (ICP-MS)	Method 544 (LC/MS/MS)
Method 525.3 (GC/MS)	Method 545 (LC/ESI-MS/MS)
Method 530 (GC/MS)	
Method 538 (DAI-LC/MS/MS)	
Method 541 (GC/MS)	
Method 542 (LC/MS/MS)	
Method 556.1 (Fast GC)	
• Inductively Coupled Plasma (ICP) • Gas Chromatography (GC) • Direct Aqueous Injection (DAI)	• Mass Spectrometry (MS) • Liquid Chromatography (LC) • Electrospray Ionization (ESI)
• The monitoring location(s) are still being determined	

Health Effects Data

- Identify health effects information compiled during CCL 3 + CCL 4 nominations
  - Potential health effects
  - Reference Dose (RfD) or other non-cancer health value
  - Cancer Slope Factor (CSF)
  - Health Reference Levels (HRLs)*
  - Cancellation Status for Pesticides
- Determine health assessment status:
  - **(1)** Available health assessment from an EPA (i.e., IRIS, OPP, OW) or comparable non-EPA source (e.g., ATSDR)
  - **(2)** Available health assessment from an EPA or comparable non-EPA source needs to be updated
  - **(3)** A health assessment is not currently available but sufficient information may exist to conduct a health assessment
  - **(4)** A health assessment is not currently available and there are substantial data needs

*Note: HRLs are risk-derived concentrations against which to evaluate the occurrence data to determine if contaminants occur at levels of potential public health concern. HRLs are not final determinations about the level of a contaminant in drinking water that must not be exceeded to protect any particular population.

Health Effects Data Sources

- EPA
  - Office of Pesticide Programs (OPP)
  - Integrated Risk Information System (IRIS)
  - Office of Water Health Advisory (HA)
- Agency for Toxic Substances and Disease Registry (ATSDR)
- California Office of Environmental Health and Hazard Assessment (OEHHA)
- Risk Assessment Information System (RAIS)
- Registry of Toxic Effects of Chemical Substances (RTECS)
- Joint FAO/WHO Expert Committee on Food Additives (JECFA)
  - Food and Agriculture Organization of the United Nations (FAO) and the World Health Organization (WHO)
- Center for Disease Control (CDC)
- Single Studies

Note: The health values are derived using the health effects information available during CCL 3. The health values are subject to change as health assessments are completed or updated based on more recent health effects information.

Calculating CCL 3 Health Reference Levels

Non-Cancer CCL3 HRL (mg/L) = [(RfD x BW)/DWI] x RSC]

Where:

- RfD = Reference Dose (mg/kg-day)
  RfD = Point of Departure (POD) ÷ Uncertainty Factors (UF)
  Point of Departure = the dose (e.g., No Observed Adverse Effect Level (NOAEL) or Lowest Observed Adverse Effect level (LOAEL))
- BW = Body Weight for an adult, assumed to be 70 kilograms (kg)
- DWI = Drinking Water Intake for an adult, assumed to be 2 L/day (90th percentile)
- RSC = 20% Relative Source Contribution, assumed to be the level of exposure from drinking water when compared to other sources.

Calculating CCL 3 Health Reference Levels

Cancer Unit Risk $(\mu g/L)^{-1}$ = CSF x [(DWI x CW)/BW]

Where:

- CSF = Cancer Slope Factor $(mg/kg/day)^{-1}$
- DWI = Drinking Water Intake for an adult, assumed to be 2 L/day (90th percentile)
- CW = Unit risk concentration in drinking water of 0.001 mg/L (1 µg/L)
- BW = Body Weight for an adult, assumed to be 70 kilograms (kg)

The cancer HRL is the concentration of a contaminant in drinking water corresponding to an excess estimated lifetime cancer risk of one-in-a-million ($1x\ 10^{-6}$), calculated as follows:

Cancer HRL (µg/L) = Risk Level of 10^{-6} ÷ Unit Risk $(\mu g/L)^{-1}$

Occurrence Data and Information Sources

Finished Water Data

- Unregulated Contaminant Monitoring Rule (UCMR)
  - UCMR 1 Screening Survey/Assessment Monitoring (2001 – 2003)
- National Inorganics and Radionuclides Survey (NIRS) (1984 – 1986)
- Disinfection By-Product Information Collection Rule (DBP-ICR) Data (1997 – 1998)
- U.S. Department of Agriculture Pesticide Data Program (PDP)
- Pesticides Pilot Monitoring Program (PPMP)
- California Department of Health Services (CAL DHS)
- Small-Scale Local Occurrence Studies

Note: Occurrence results are presented as a number or percent of detects at systems/sites. Where available, a statement is included about the maximum concentration being above or below the health reference level (HRL).

Occurrence Data and Information Sources (cont.)

Supplemental Drinking Water and Ambient Water Data

- United States Geological Survey (USGS), Ambient Water
  - National Water Quality Assessment Program (NAWQA)
  - National Reconnaissance of Emerging Contaminants (NREC)
  - National Random and Focused Source Water Surveys (with AWWARF)
  - Special reports
- Other specialized studies and literature

Production, Release, Usage and Other Data

- Toxic Release Inventory (TRI)
- National Center for Food and Agricultural Policy (NCFAP)
- OPP Reregistration Eligibility Document (RED)
  - Data from pesticide registrants
- Chemical Update System/Inventory Update Reporting Program (CUS/IUR)
- Cancellation Status for Pesticides
- Persistent, Bioaccumulative and Toxic (PBT) Profiler

Metals

EPA Method 200.8 (ICP/MS), 1994

Determination of trace elements in waters by inductively coupled plasma - mass spectrometry, revision 5.4

Analytes	
• **Manganese (2)**	• **Germanium (4)**
• Nickel	• Thorium

Manganese: Background

- Heavy metal element found in over 100 naturally occurring minerals, including silicates, carbonates, sulfides, oxides, phosphates and borates; ubiquitous in soil, water, food and air
- Small amounts found in foods are an essential nutrient for humans and animals
- Commercially imported manganese compounds include ferromanganese (used in the production of steel), manganese sulfate (fertilizer), manganese dioxide (matches, batteries, fireworks) and potassium permanganate (wastewater and drinking water treatment chemical)
- Common manganese compounds range from insoluble to moderately soluble in water

Manganese: Health Effects

- Health Assessment Status = 2
  - 1995 IRIS Risk Assessment
- RfD = 0.047 mg/kg-day
  - Critical Effect = Central nervous system effects
  - NOAEL = 0.14 mg/kg-day; UF = 3 [Reflects a modifying factor of 3 to adjust for increased bioavailability when in drinking water]
- HRL: 300 µg/L (non-cancer)
- Sensitive populations: Children, the elderly, pregnant women, iron deficient individuals, and individuals with impaired liver function
  - Recent studies indicate concern for neurological effects in children and infants

Manganese: Occurrence

- National Inorganics and Radionuclides Survey (NIRS), Finished Water, 1984-1986 (MRL = 1 µg/L):
  - 672 detections (median = 11.96 µg/L) out of 989 sites; Maximum detect (1,341 µg/L) > HRL (300 µg/L)
- USGS, National Water-Quality Assessment Program (NAWQA), Ambient Water, 1992-2001:
  - 6,447 detections (median = 19 µg/L) out of 8,002 sites; Maximum detect (70,000 µg/L) > HRL (300 µg/L)
- USGS, Toccalino et al., 2010, Ambient Water:
  - 543 detections (median = 8.99 µg/L) out of 808 samples; Maximum detect (1,923 µg/L) > HRL (300 µg/L)
- Toxic Release Inventory – Total:
  - 15,872,968 lbs/yr in 48 states in 2010

Germanium: Background

- Naturally-occurring element in earth's crust and oceans, widely distributed in low concentrations in oxide and sulfide minerals; commercially available in combination with other elements and produced mainly as a byproduct of zinc ore processing
- Used primarily in infrared optics, fiber-optic systems, electronics and solar electric applications
- Some germanium compounds (e.g., germanium dioxide) are water soluble

Germanium: Health Effects

- Health Assessment Status = 4
  - Registry of Toxic Effects of Chemical Substances (RTECS): Single Study (Obara et al. 1991)
- RfD-like = 0.0001 mg/kg-day
  - Critical Effect = Kidney, Ureter, Bladder - changes in tubules (including acute renal failure, acute tubular necrosis)
  - LOAEL = 0.318 mg/kg-day*; Default UF = 3,000
- CCL 3 HRL: 0.744 µg/L (non-cancer)
- Sensitive populations: Individuals with compromised renal function

*OW did not obtain the same LOAEL as RTECS using the data in the identified paper. Based on OW's evaluation of the dose information in the report, the LOAEL should be about ten times larger (i.e., 3.18 mg/kg-day).

Germanium: Occurrence

- National Inorganics and Radionuclides Survey (NIRS), Finished Water, 1984-1986 (MRL = 22 µg/L):
  - 4 detections (median = 220 µg/L) out of 989 PWSs; Minimum detection (26 µg/L) > HRL (0.744 µg/L)
- Chemical Update System / Inventory Update Reporting:
  - <500K lbs/yr in 2006
- Toxic Release Inventory – Total:
  - No data in 2004 or 2010

Semivolatile Organic Chemicals

EPA Method 525.3 (GC/MS), 2012

Determination of semivolatile organic chemicals in drinking water by solid phase extraction and capillary column gas chromatography/mass spectrometry, version 1.0

Analytes	
• **Disulfoton (1)**	• **Tribufos (1)**
• **Ethoprop (1)**	• **Profenofos (1)**
• **Alpha-Hexachlorocyclohexane (2)**	• **Oxyfluorfen (2)**
• **Permethrin, trans - (1)**	• **Vinclozolin (2)**
• **Permethrin, cis- (1)**	• **Dimethipin (method 530) (1)**
• **Tebuconazole (1)**	

Disulfoton: Background

- Organophosphate pesticide; used as an insecticide; currently registered for use on over 35 crops, plus domestic outdoor use on potted plants and ornamentals
- Production cancelled 2009 (74 FR 48551)
- Expected to be not very mobile to moderately mobile in water, based on physical and chemical properties
- Projected half-life in water is 7 - 41 days (PBT Profiler)
- The PBT Profiler (2009) predicts that 17% of disulfoton will partition to water when modeled in a four-compartment system (water, air, soil and sediment)
- Moderately persistent in the environment

Disulfoton: Health Effects

- Health Assessment Status = 1
  - 2006 OPP Risk Assessment
- RfD = 0.00013 mg/kg-day
  - Critical Effect = Plasma, RBC, brain and corneal cholinesterase (ChE) inhibition
  - NOAEL = 0.013 mg/kg-day; UF = 100
- CCL3 HRL: 0.91 µg/L (non-cancer)
- Sensitive populations: None identified

Disulfoton: Occurrence

- UCMR 1 Screening Survey, Finished Water, 2001-2003 (MRL = 0.5 µg/L):
  - No detections of 2k samples in 295 systems
- USDA, Pesticide Data Program (PDP), Finished Water, 2001-2009 (min detect = N/A):
  - No detections in 4k samples
- USGS, Toccalino et al. 2010, Ambient Water (MRL = 0.01 - 0.02 µg/L)
  - No detections in 647 samples/systems
- National Center for Food and Agricultural Policy (NCFAP) Pesticide Application:
  - 1,196,066 lbs/yr in 33 states in 1997

Ethoprop: Background

- A phosphorodithioate pesticide; used as an insecticide
- Expected to be moderately mobile in water, based on physical and chemical properties
- PBT Profiler (2009) predicts 23% of ethoprop will partition to water when modeled in a four-compartment system (water, air, soil and sediment)

Ethoprop: Health Effects

- Health Assessment Status = 1
  - 2001 OPP Risk Assessment
- RfD = 0.0001 mg/kg-day*
  - Critical Effect = Plasma cholinesterase (ChE) inhibition
  - NOAEL = 0.01 mg/kg-day; UF = 100
- CCL 3 HRL: 0.7 µg/L (non-cancer)
- Sensitive populations: None identified

*Note: 2006 OPP Risk Assessment; RfD = 0.0014 Brain ChE inhibition; Likely carcinogen, CSF = 0.0281 mg/kg-day^{-1}

Ethoprop: Occurrence

- USGS, National Water-Quality Assessment Program (NAWQA), Ambient Water, 1992-2001:
  - 84 detections (median = 0.011 µg/L) out of 7,118 sites; Maximum detection (1.95 µg/L) > HRL (0.7 µg/L)
- Pesticide Pilot Monitoring Program (PPMP), Finished Water, 1999:
  - 0 detections out of 228 samples
- National Center for Food and Agricultural Policy (NCFAP) Pesticide Application:
  - 1,010,807 lbs/yr in 28 states in 1997
- EPA OPP estimate of pesticide usage:
  - 691,000 lbs/yr (2006 estimate)
- Toxic Release Inventory – Total:
  - 77,786 lbs/yr in 4 states in 2004; 35,660 lbs/yr in 2 states in 2010

alpha-Hexachlorocyclohexane: Background

- A cyclic halogenated alkane; component of lindane, formerly used as an insecticide
- Expected to be not very to moderately mobile in water, based on physical and chemical properties
- The PBT Profiler (2009) predicts that 6% of alpha-hexachlorocyclohexane will partition to water when modeled in a four-compartment system (water, air, soil and sediment)

alpha-Hexachlorocyclohexane: Health Effects

- Health Assessment Status = 2
  - 1987 IRIS Risk Assessment
- Slope Factor = 6.3 $(mg/kg\text{-}day)^{-1}$
- Cancer Class = B2
  - Sufficient evidence of carcinogenicity in animals
- CCL 3 HRL: 0.006 µg/L (cancer)
- Sensitive populations: Children may be more sensitive, but no definitive studies

alpha-Hexachlorocyclohexane: Occurrence

- USGS, National Water Quality Assessment Program (NAWQA), Ambient Water, 1992-2001 (MRL = 0.002 µg/L):
  - 21 detections (median = 0.011 µg/L) out of 7,119 sites; Maximum detection (0.21 µg/L) > HRL (0.006 µg/L)
- National Center for Food and Agricultural Policy (NCFAP) Pesticide Application:
  - No data in 1997
- Chemical Update System / Inventory Update Reporting:
  - No Reports in 2002
- Toxic Release Inventory – Total:
  - No data in 2004 or 2010

Permethrin, cis- and trans-: Background

- Permethrin is a substituted diphenyl ether; used as an insecticide
- Expected to be not very to moderately mobile in water, based on physical and chemical properties
- The PBT Profiler (2009) predicts that 2% of permethrin will partition to water when modeled in a four-compartment system (water, air, soil and sediment)
- May or may not be persistent in the environment

Permethrin, cis- and trans-: Health Effects

- Health Assessment Status = 1
  - 2009 OPP Risk Assessment
- Slope Factor = 0.0096 $(mg/kg\text{-}day)^{-1}$
- Cancer Class = L
  - Likely to be carcinogenic to humans
- CCL 3 HRL: 3.65 µg/L (cancer)
- Sensitive populations: None identified

Permethrin, cis- and trans-: Occurrence

- National Center for Food and Agricultural Policy (NCFAP) Pesticide Application:
  - 1,066,056 lbs/yr in 48 states in 1997
- EPA OPP estimate of pesticide usage:
  - 2 million lbs/yr (2007 estimate)
- Chemical Update System / Inventory Update Reporting:
  - No data in 2002 or 2006
- Toxic Release Inventory – Total:
  - 17,979 lbs/yr in 7 states in 2004; 2,116 lbs/yr in 5 states in 2010

Tribufos: Background

- Alkylated phosphorotrithioate pesticide; used as an insecticide and cotton defoliant
- Mobility in water uncertain, physical and chemical properties provide conflicting indications
- The PBT Profiler (2009) predicts that 14% of tribufos will partition to water when modeled in a four-compartment system (water, air, soil and sediment)
- Not persistent in the environment

Tribufos: Health Effects

- Health Assessment Status = 1
  - 2006 OPP Risk Assessment
- RfD = 0.001 mg/kg-day
  - Critical Effect = Plasma cholinesterase (ChE) inhibition
  - NOAEL = 0.1 mg/kg-day; UF = 100
- CCL 3 HRL: 7 µg/L (non-cancer)
- Sensitive populations: None identified

Tribufos: Occurrence

- Pesticide Pilot Monitoring Program (PPMP), Finished Water, 1999:
  - 0 detections out of 221 samples
- National Center for Food and Agricultural Policy (NCFAP) Pesticide Application:
  - 4,918,265 lbs/yr in 16 states in 1997
- EPA OPP estimate of pesticide usage:
  - 4.5 million lbs/yr (2006 estimate)
- Chemical Update System / Inventory Update Reporting:
  - 10K – 500K lbs/yr in 2002; <500K lbs/yr in 2006
- Toxic Release Inventory – Total:
  - 7 lbs/yr in 1 state in 2004; 9 lbs/yr in 2 states in 2010

Profenofos: Background

- A phosphorothioate pesticide, applied as an insecticide
- Mobility in water uncertain, physical and chemical properties provide conflicting indications
- The PBT Profiler (2009) predicts that 9% of profenofos will partition to water when modeled in a four-compartment system (water, air, soil and sediment)
- Persistent in the environment

Profenofos: Health Effects

- Health Assessment Status = 1
  - 2006 OPP Risk Assessment
- RfD = 0.00005 mg/kg-day
  - Critical Effect = Plasma and RBC cholinesterase (ChE) inhibition
  - NOAEL = 0.005 mg/kg-day; UF = 100
- CCL 3 HRL: 0.35 µg/L (non-cancer)
- Sensitive populations: None identified

Profenofos: Occurrence

- Pesticide Program Monitoring Program (PPMP), Finished Water, 1999:
  - 0 detections out of 221 samples
- National Center for Food and Agricultural Policy (NCFAP) Pesticide Application:
  - 879,776 lbs/yr in 14 states in 1997
- EPA OPP estimate of pesticide usage:
  - 775,000 lbs/yr (2006 estimate)
- Chemical Update System / Inventory Update Reporting:
  - No data in 2002 or 2006
- Toxic Release Inventory – Total:
  - 255 lbs/yr in 1 state in 2004; no data 2010

Oxyfluorfen: Background

- A substituted diphenyl ether; used as a herbicide
- Expected to be not very to moderately mobile in water, based on physical and chemical properties
- The PBT Profiler (2009) predicts that 5% of oxyfluorfen will partition to water when modeled in a four-compartment system (water, air, soil and sediment)
- Persistent in the environment

Oxyfluorfen: Health Effects

- Health Assessment Status = 2
  - 1986 IRIS Risk Assessment
- RfD = 0.003 mg/kg-day
  - Critical Effect = Liver toxicity (e.g., increased liver weight and lesions)
  - NOAEL = 0.3 mg/kg-day; UF = 100
- CCL 3 HRL: 21 µg/L (non-cancer)
- Sensitive populations: Individuals with pre-existing liver conditions

*Note: 2002 OPP Risk Assessment; RfD = 0.03 mg/kg-day based on liver toxicity

Oxyfluorfen: Occurrence

- Pesticide Pilot Monitoring Program (PPMP), Finished Water, 1999:
  - 0 detections out of 221 samples
- National Center for Food and Agricultural Policy (NCFAP) Pesticide Application:
  - 705,255 lbs/yr in 37 states in 1997
- EPA OPP estimate of pesticide usage:
  - 761,000 lbs/yr on average between 1990 and 1999; usage increasing
- Chemical Update System / Inventory Update Reporting:
  - No data in 2002 or 2006
- Toxic Release Inventory – Total:
  - 5 lbs/yr in 2 states in 2004; 2,503 lbs/yr in 1 state in 2010

Vinclozolin: Background

- An oxazolidine pesticide; used as a fungicide
- Expected to be moderately to very mobile in water, based on physical and chemical properties
- The PBT Profiler (2009) predicts that 12% of vinclozolin will partition to water when modeled in a four-compartment system (water, air, soil and sediment)
- Persistent in the environment

Vinclozolin: Health Effects

- Health Assessment Status = 2
  - 2000 OPP Risk Assessment
- RfD = 0.012 mg/kg-day
  - Critical Effect = Lesions in the lungs, liver, ovaries and eye
  - NOAEL = 1.2 mg/kg-day; UF = 100
- CCL 3 HRL: 84 µg/L (non-cancer)
- Sensitive populations: Fetuses, neonates, and adolescents during puberty could be a sensitive population

Vinclozolin: Occurrence

- National Center for Food and Agricultural Policy (NCFAP) Pesticide Application:
  - 121,959 lbs/yr in 26 states in 1997
- EPA OPP estimate of pesticide usage:
  - 141,000 lbs/yr in 2000; expected to drop to 71,000 lbs/yr after the phase-out of several uses was completed in 2004
- Chemical Update System / Inventory Update Reporting:
  - No data in 2002 or 2006
- Toxic Release Inventory – Total:
  - No data in 2004 or 2010

Dimethipin: Background

- A cyclic dithiane pesticide; used as an herbicide and plant growth regulator
- Expected to be very mobile in water, based on physical and chemical properties
- The PBT Profiler (2009) predicts that 46% of dimethipin will partition to water when modeled in a four-compartment system (water, air, soil and sediment)
- Moderately persistent in the environment

Dimethipin: Health Effects

- Health Assessment Status = 1
  - 2005 OPP Risk Assessment
- RfD = 0.0218 mg/kg-day
  - Critical Effect = Kidney, lungs, duodenum, liver, glandular stomach, heart, aortic artery and testes toxicity. Decreased body weight gain
  - NOAEL = 2.18 mg/kg-day; UF = 100
- CCL 3 HRL: 153 µg/L (non-cancer)
- Sensitive populations: Non identified

Dimethipin: Occurrence

- National Center for Food and Agricultural Policy (NCFAP) Pesticide Application:
  - 282,458 lbs/yr in 14 states in 1997
- Chemical Update System / Inventory Update Reporting:
  - No data in 2002 or 2006
- Toxic Release Inventory – Total:
  - 250 lbs/yr in 1 state in 2004; 87 lbs/yr in 1 state in 2010

Tebuconazole: Background

- A substituted triazole pesticide; used as a fungicide
- Expected to be moderately to very mobile in water, based on physical and chemical properties
- The PBT Profiler (2009) predicts that 9% of tebuconazole will partition to water when modeled in a four-compartment system (water, air, soil and sediment)
- Persistent in the environment

Tebuconazole: Health Effects

- Health Assessment Status = 1
  - 2008 OPP Risk Assessment
- RfD = 0.03 mg/kg-day
  - Critical Effect = Decreased body weights, absolute brain weights, brain measurements and motor activity in offspring
  - LOAEL = 8.8 mg/kg-day; UF = 300
- CCL 3 HRL: 210 µg/L (non-cancer)
- Sensitive populations: Infants and children

Tebuconazole: Occurrence

- National Center for Food and Agricultural Policy (NCFAP) Pesticide Application:
  - 478,568 lbs/yr in 16 states in 1997
- Chemical Update System / Inventory Update Reporting:
  - No data in 2002 or 2006
- Toxic Release Inventory – Total:
  - No data in 2004 or 2010

Semivolatile Organic Chemicals

Draft EPA Method 530 (GC/MS)
Anticipated Publication Year 2014

Determination of select semivolatile organic chemicals in drinking water by solid phase extraction and capillary column gas chromatography/mass spectrometry

Analytes	
• **Quinoline (1)**	• **Butylated hydroxyanisole (3)**
• **o-Toluidine (4)**	• **Dimethipin (1) (method 525.3)**

Quinoline: Background

- Fused aromatic amine; used as a pharmaceutical (anti-malarial) and flavoring agent, also produced as a chemical intermediate
- Mobility in water uncertain, physical and chemical properties provide conflicting indications
- PBT Profiler (2009) predicts 31% of quinoline will partition to water when modeled in a four-compartment system (water, air, soil and sediment)
- Not persistent in the environment

Quinoline: Health Effects

- Health Assessment Status = 1
  - 2001 IRIS Risk Assessment
- Slope Factor = 3 $(mg/kg\text{-}day)^{-1}$
- Cancer Class = B2
  - Sufficient evidence of carcinogenicity in animals
- CCL 3 HRL: 0.01 µg/L (cancer)
- Sensitive populations: None identified

Quinoline: Occurrence

- Chemical Update System / Inventory Update Reporting:
  - 10K – 500K lbs/yr in 2002; 1M – <10M lbs/yr in 2006
- Toxic Release Inventory – Total:
  - 28,629 lbs/yr in 8 states in 2004; 15,789 lbs/yr in 9 states in 2010

o-Toluidine: Background

- Aminated aromatic compound; used in production of dyes, rubber, pharmaceuticals and pesticides
- Expected to be moderately to very mobile in water based on physical and chemical properties
- PBT Profiler (2009) predicts 41% of o-toluidine will partition to water when modeled in a four-compartment system (water, air, soil and sediment)
- Not persistent in the environment

o-Toluidine: Health Effects

- Health Assessment Status = 4
  - California Office of Environmental Health and Hazard Assessment (OEHHA), 2008: Study not provided
- Slope Factor = 0.18 $(mg/kg\text{-}day)^{-1}$
- IARC Cancer Group = 2A
  - Probably carcinogenic to humans
- CCL 3 HRL: 0.194 µg/L (cancer)
- Sensitive populations: Infants and children

o-Toluidine: Occurrence

- Chemical Update System / Inventory Update Reporting:
  - >10M – 50M lbs/yr in 2002; 10M – <50M lbs/yr in 2006
- Toxic Release Inventory – Total:
  - 10,774 lbs/yr in 9 states in 2004; 6,623 lbs/yr in 1 state in 2010

Butylated hydroxyanisole: Background

- Alkylated methoxyphenol; used as an antioxidant in foods, particularly those with high fat content and packaged foods
- Expected to be moderately mobile to not very mobile in water, based on physical and chemical properties
- PBT Profiler (2009) predicts 15% of butylated hydroxyanisole will partition to water when modeled in a four-compartment system (water, air, soil and sediment)
- Projected half-life in water is 38 days (PBT Profiler)
- Moderately persistent in the water

Butylated hydroxyanisole: Health Effects

- Health Assessment Status = 3
  - Registry of Toxic Effects of Chemical Substances (RTECS), 2006: Single Study (Adelaide, S.A., Australia 1959)
- RfD-like = 0.000083 mg/kg-day
  - Critical Effect = Changes in liver weight
  - LOAEL = 0.249 mg/kg-day; Default UF = 3,000
- CCL 3 HRL: 0.581 µg/L (non-cancer)
- Sensitive populations: Fetus and neonate may be sensitive to neurodevelopmental effects from exposure to high levels

Butylated hydroxyanisole: Occurrence

- USGS, National Reconnaissance of Emerging Contaminants (NREC), Ambient Surface Water, 1999-2004:
  - 2 detections (median = 0.1 µg/L) in 85 sites; Median of detections < HRL (0.581 µg/L)
- USGS, Koplin, et al., 2002, Ambient Water:
  - 2.4% detection rate (median = 0.1 µg/L) out of 85 sites; Maximum detect (0.2 µg/L) < HRL
- USGS, Focazio, et al., 2008, Ambient Water:
  - No detects out of 73 sites
- Chemical Update System / Inventory Update Reporting:
  - 10K – 500K lbs/yr in 2002; <500K lbs/yr in 2006
- Toxic Release Inventory – Total:
  - No data in 2004; No data in 2010

Presenter

Steve Wendelken, USEPA

Organic Contaminants

EPA Method 538 (DAI-LC/MS/MS), 2009

Determination of selected organic contaminants in drinking water by direct aqueous injection-liquid chromatography/tandem mass spectrometry, version 1.0

Analytes	
• **Dicrotophos (1)**	• **Methamidiphos (1)**
• **Oxydemeton-methyl (1)**	• **Acephate (1)**

Dicrotophos: Background

- Organophosphate pesticide; used as an insecticide on cotton
- Expected to be moderately mobile to very mobile in water, based on chemical and physical properties
- The PBT Profiler (2009) predicts that 39% of dicrotophos will partition to water when modeled in a four-compartment system (water, air, soil and sediment)
- Moderately persistent in the environment

Dicrotophos: Health Effects

- Health Assessment Status = 1
  - 2006 OPP Risk Assessment
- RfD = 0.00007 mg/kg-day
  - Critical Effect = Plasma, RBC and brain cholinesterase (ChE) inhibition
  - LOAEL = 0.02 mg/kg-day; UF = 300
- CCL 3 HRL: 0.49 µg/L (non-cancer)
- Sensitive populations: None identified

Dicrotophos: Occurrence

- Pesticide Pilot Monitoring Program (PPMP), Finished Water, 1999:
  - 0 detections
- National Center for Food and Agricultural Policy (NCFAP) Pesticide Application:
  - 359,726 lbs/yr in 13 states in 1997
- OPP Pesticide Usage Estimate
  - 500,000 lbs/yr (2006 estimate)
- Chemical Update System / Inventory Update Reporting:
  - No data in 2002 or 2006
- Toxic Release Inventory – Total:
  - No data in 2004 or 2010

Oxydemeton-methyl: Background

- Thiophosphate pesticide, used as an insecticide on broccoli, lettuce and other crops
- Expected to be very mobile in water based on chemical and physical properties
- The PBT Profiler (2009) predicts that 39% of oxydemeton-methyl will partition to water when modeled in a four-compartment system (water, air, soil and sediment)
- Moderately persistent in the environment

Oxydemeton-methyl: Health Effects

- Health Assessment Status = 1
  - 2006 OPP Risk Assessment
- RfD = 0.00013 mg/kg-day
  - Critical Effect = RBC and brain cholinesterase (ChE) inhibition
  - NOAEL = 0.013 mg/kg-day; UF = 100
- CCL 3 HRL: 0.91 µg/L (non-cancer)
- Sensitive populations: None identified

Oxydemeton-methyl: Occurrence

- Pesticide Pilot Monitoring Program (PPMP) Finished Water, 1999:
  - 0 detections
- National Center for Food and Agricultural Policy (NCFAP) Pesticide Application:
  - 154,227 lbs/yr in 19 states in 1997
- OPP Pesticide Usage Estimate
  - 145,000 – 186,000 lbs/yr (2006 estimate)
- Chemical Update System / Inventory Update Reporting:
  - No data in 2002 or 2006
- Toxic Release Inventory – Total:
  - No data in 2004 or 2010

Methamidophos: Background

- Phosphoramidothioate pesticide used as an insecticide on potatoes and other crops; also a degradation product of acephate, an organic phosphoramide insecticide
- Expected to be very mobile in water, based on chemical and physical properties
- The PBT Profiler (2009) predicts that 39% of methamidophos will partition to water when modeled in a four-compartment system (water, air, soil and sediment)
- Moderately persistent in the environment

Methamidophos: Health Effects

- Health Assessment Status = 1
  - 2006 OPP Risk Assessment
- RfD = 0.0003 mg/kg-day
  - Critical Effect = Brain cholinesterase (ChE) inhibition
  - NOAEL = 0.03 mg/kg-day; UF = 100
- CCL 3 HRL: 2.1 µg/L (non-cancer)
- Sensitive populations: None identified

Methamidophos: Occurrence

- National Center for Food and Agricultural Policy (NCFAP) Pesticide Application:
  - 965,584 lbs/yr in 39 states in 1997
- OPP Pesticide Usage Estimate
  - 640,000 lbs/yr (2006 estimate)
- Chemical Update System / Inventory Update Reporting:
  - No data in 2002 or 2006
- Toxic Release Inventory – Total:
  - No data in 2004 or 2010

Acephate: Background

- Organic phosphoramide pesticide; used as an insecticide on cotton, tobacco and other crops
- Expected to be very mobile in water, based on chemical and physical properties
- Projected half-life in water of 38 days (PBT Profiler)
- PBT Profiler (2009) predicts 46% of acephate will partition to water when modeled in a four-compartment system (water, air, soil and sediment)
- Not persistent in the environment

Acephate: Health Effects

- Health Assessment Status = 1
  - 2006 OPP Risk Assessment
- RfD = 0.0012 mg/kg-day
  - Critical Effect = Brain cholinesterase (ChE) inhibition
  - NOAEL = 0.12 mg/kg-day; UF = 100
- CCL 3 HRL: 8.4 µg/L (non-cancer)
- Sensitive populations: None identified

Acephate: Occurrence

- National Center for Food and Agricultural Policy (NCFAP) Pesticide Application:
  - 2,462,354 lbs/yr in 35 states in 1997
- EPA OPP estimate of pesticide usage:
  - 4-5 million lbs/yr (2006 estimate)
- Chemical Update System / Inventory Update Reporting:
  - No data in 2002 or 2006
- Toxic Release Inventory – Total:
  - 20,751 lbs/yr in 5 states in 2004; 5,816 lbs/yr in 2 states in 2010

Alcohols

Draft EPA Method 541 (GC/MS)
Anticipated Publication Year 2014

Analysis of low molecular weight alcohols in drinking water by gas chromatography mass spectrometry

Analytes	
• **1-Butanol (2)**	• **2-Methoxyethanol (3)**
• **2-Propen-1-ol (2)**	

1-Butanol: Background

- Alkyl alcohol compound; used as a paint solvent and food additive, also formed as a chemical intermediate
- Expected to be moderately mobile to very mobile in water, based on chemical and physical properties
- PBT Profiler (2009) predicts 40% of 1-butanol will partition to water when modeled in a four-compartment system (water, air, soil and sediment)
- Not persistent in the environment

1-Butanol: Health Effects

- Health Assessment Status = 2
  - 1987 IRIS Risk Assessment
- RfD = 0.1 mg/kg-day
  - Critical Effect = Abnormally diminished activity in the body/organs; inability to control muscles
  - NOAEL = 125 mg/kg-day; UF = 1,000
- CCL 3 HRL: 700 µg/L (non-cancer)
- Sensitive populations: None identified

1-Butanol: Occurrence

- Chemical Update System / Inventory Update Reporting:
  - >1B lbs/yr in 2002; ≥1B lbs/yr in 2006
- Toxic Release Inventory – Total:
  - 17,648,846 lbs/yr in 44 states in 2004; 11,093,815 lbs/yr in 47 states in 2010

2-Propen-1-ol: Background

- Alkene/alcohol compound; chemical intermediate used in the manufacturing of flavorings and perfumes
- Expected to be moderately mobile to very mobile in water, based on chemical and physical properties
- PBT Profiler (2009) predicts 48% of 2-propen-1-ol will partition to water when modeled in a four-compartment system (water, air, soil and sediment)
- Not persistent in the environment

2-Propen-1-ol: Health Effects

- Health Assessment Status = 2
  - 1987 IRIS Risk Assessment
- RfD = 0.005 mg/kg-day
  - Critical Effect = Impaired renal function and increased relative liver, spleen and kidney weights
  - NOAEL = 4.8 mg/kg-day; UF = 1,000
- CCL 3 HRL: 35 µg/L (non-cancer)
- Sensitive populations: Individuals with impaired pulmonary function may be particularly sensitive to the toxic effects of allyl alcohol through inhalation

2-Propen-1-ol: Occurrence

- Chemical Update System / Inventory Update Reporting:
  - >100M – 500M lbs/yr in 2002; 100M – <500M lbs/yr in 2006
- Toxic Release Inventory – Total:
  - 604,872 lbs/yr in 13 states in 2004; 445,833 lbs/yr in 13 states in 2010

2-Methoxyethanol: Background

- Monoalkylated alcohol; used in synthetic cosmetics, perfumes, fragrances, hair preparations, skin lotions and other consumer products
- Expected to be moderately mobile to very mobile in water, based on chemical and physical properties
- PBT Profiler (2009) predicts 45% of 2-methoxyethanol will partition to water when modeled in a four-compartment system (water, air, soil and sediment)
- Not persistent in the environment

2-Methoxyethanol: Health Effects

- Health Assessment Status = 3
  - Risk Assessment Information System (RAISHE): Single Study (Gulati, et al. 1990)
- RfD-like = 0.003 mg/kg-day
  - Critical Effect = Reproductive effects
  - LOAEL = 9 mg/kg-day; Default UF = 3,000
- CCL 3 HRL: 21 µg/L (non-cancer)
- Sensitive populations: None identified

2-Methoxyethanol: Occurrence

- Chemical Update System / Inventory Update Reporting:
  - >10M – 50M lbs/yr in 2002; 1M – <10M lbs/yr in 2006
- Toxic Release Inventory – Total:
  - 153,774 lbs/yr in 16 states in 2004; 23,240 lbs/yr in 16 states in 2010

Pharmaceuticals

Draft EPA Method 542 (LC/MS/MS)

Anticipated Publication Year 2014

Determination of pharmaceuticals and personal care products (PPCP) in drinking water by solid phase extraction (SPE) and liquid chromatography electrospray ionization tandem mass spectrometry

Analytes	
• **Erythromycin (3)**	• **Triclosan (1)**
• Carbamazepine	• Naproxen
• Diazepam	• Gemfibrozil
• Sulfamethoxazole	• Fluoxetine
• Trimethoprim	• Enalapril
• Diclofenac	• Phenytoin

Erythromycin: Background

- Used in pharmaceutical formulations as an antibiotic
- Expected to be moderately mobile to very mobile in water, based on chemical and physical properties
- Projected half-life in water of 180 days (PBT Profiler)
- The PBT Profiler (2009) predicts that 6% of erythromycin will partition to water when modeled in a four-compartment system (water, air, soil and sediment)
- Persistent in the environment

Erythromycin: Health Effects

- Health Assessment Status = 3
  - Joint FAO/WHO Expert Committee on Food Additives (JECFA), 2006
- Acceptable Daily Intake (ADI) = 0.0007 mg/kg-day
  - Critical Effect = Inhibition of beneficial gastrointestinal bacteria
- CCL 3 HRL: 4.9 µg/L (non-cancer)
- Sensitive populations: None identified

Erythromycin: Occurrence

- USGS, National Reconnaissance of Emerging Contaminants (NREC), Ambient Surface Water, 1999-2004:
  - 22 detections (median = 0.1 µg/L) out of 104 sites; Maximum detect (1.7 µg/L) < HRL (4.9 µg/L)
- USGS, Focazio, et al., 2008, Ambient Water:
  - Maximum detect value = 0.3 µg/L; Maximum < HRL (4.9 µg/L)
- Chemical Update System / Inventory Update Reporting:
  - No data in 2002 or 2006
- Toxic Release Inventory – Total:
  - No data in 2004 or 2010

Triclosan: Background

- Antimicrobial agent found in many personal care products such as soaps, toothpaste; also used in many other products including clothing and plastics
- Expected to be not very mobile to immobile in water, based on chemical and physical properties
- Projected half-life in water of 60 days (PBT Profiler)
- The PBT Profiler (2009) predicts that 7% of triclosan will partition to water when modeled in a four-compartment system (water, air, soil and sediment)
- Persistent in the environment

Triclosan: Health Effects

- Health Assessment Status = 1
  - 2008 OPP Risk Assessment
- RfD = 0.3 mg/kg-day
  - Critical Effect = Vomiting, diarrhea, loss of appetite
  - NOAEL = 30 mg/kg-day; UF = 100
- HRL: 2,100 µg/L (non-cancer)
- Sensitive populations: None identified

Triclosan: Occurrence

- USGS, National Reconnaissance of Emerging Contaminants (NREC), Ambient Ground Water, 1999-2004:
  - Median = 0.19 µg/L; < HRL (2,100 µg/L)
- USGS, NREC Ambient Surface Water, 1999-2004:
  - Median = 0.17 µg/L; < HRL (2,100 µg/L)
- USGS, Hopple, et al., 2008, Finished Water:
  - Maximum detect value = 0.065 µg/L; Maximum < HRL
- USGS, Kolpin , et al., 2002, Ambient Water:
  - 49 detections (maximum = 2.3 µg/L, median = 0.14 µg/L) out of 85 sites; Maximum detect (2.3 µg/L) < HRL (2,100 µg/L)

Carbonyl Compounds

EPA Method 556.1 (Fast GC), 1999

Determination of carbonyl compounds in drinking water by fast gas chromatography, revision 1.0

Analytes	
• **Formaldehyde (2)**	• **Acetaldehyde (4)**

Formaldehyde: Background

- Aliphatic aldehyde; used as a fungicide and tissue preservative
- Drinking water disinfection byproduct (from chlorination, ozonation)
- Present in smoked foods and in living systems as a metabolic intermediate
- Expected to be very mobile in water, based on chemical and physical properties
- The PBT Profiler (2009) predicts that 44% of formaldehyde will partition to water when modeled in a four-compartment system (water, air, soil and sediment)
- Not persistent in the environment

Formaldehyde: Health Effects

- Health Assessment Status = 2
  - 1990 IRIS Risk Assessment
- RfD = 0.2 mg/kg-day
  - Critical Effect = Reduced weight gain; decreased absolute heart, liver, testes and kidney weights; increased relative brain weights
  - NOAEL = 15 mg/kg-day; UF = 100
- CCL 3 HRL: 1,400 µg/L (non-cancer)
- Sensitive populations: Deficiencies of folic acid and factors causing low activity of aldehyde reductase may increase the toxicity of formaldehyde

Formaldehyde: Occurrence

- Disinfection By-product Information Collection Rule DBP-ICR, Finished Water, 1997-1998:
  - 126 detections (median = 7.6 µg/L) out of 227 sites using ozone; Maximum detect (30.6 µg/L) < HRL (1,400 µg/L) (only at plants with ozone)
- Chemical Update System / Inventory Update Reporting:
  - >1B lbs/yr in 2002; ≥1B lbs/yr in 2006
- Toxic Release Inventory – Total:
  - 26,992,234 lbs/yr in 46 states in 2004; 19,381,048 lbs/yr in 45 states in 2010

Acetaldehyde: Background

- Aliphatic aldehyde; used as a pesticide and a food additive, also formed as a chemical intermediate in production of other substances
- Drinking water disinfection byproduct (from chlorination, ozonation)
- Expected to be moderately mobile to very mobile in water, based on chemical and physical properties
- The PBT Profiler (2009) predicts that 49% of acetaldehyde will partition to water when modeled in a four-compartment system (water, air, soil and sediment)
- Not persistent in the environment

Acetaldehyde: Health Effects

- Health Assessment Status = 4
  - Registry of Toxic Effects of Chemical Substances (RTECS), 2008
- RfD-like = 0.00333 mg/kg-day
  - Critical Effect = Behavioral changes in motor activity (specific assay)
  - LOAEL 10 mg/kg-day; Default UF = 3,000
- CCL 3 HRL: 23.3 µg/L (non-cancer)
- Sensitive populations: Individuals with polymorphism of the aldehyde dehydrogenase (ALDH) gene

Acetaldehyde: Occurrence

- Disinfection By-Product Information Collection Rule (DBP-ICR), Finished Water, 1997-1998:
  - 27 detections (median = 7.4 µg/L) out of 236 sites using ozone; Maximum detect (18.3 µg/L) < HRL (23.3 µg/L)
- California Department of Health Services, Finished Water (CAL DHS):
  - 3 detections (median = 2 µg/L) out of 8 sites; Maximum detect (24 µg/L) > HRL
- Chemical Update System / Inventory Update Reporting:
  - >100M – 500M lbs/yr in 2002; 100M – <500M lbs/yr in 2006
- Toxic Release Inventory – Total:
  - 14,683,890 lbs/yr in 38 states in 2004; 9,926,083 lbs/yr in 38 states in 2010

Cyanotoxins

Draft EPA Method 544 (LC/MS/MS)
Anticipated Publication Year 2014

Determination of microcystins and nodularin in drinking water by solid phase extraction and liquid chromatography/tandem mass spectrometry

Analytes	
• **Microcystin-LR (3)**	•Microcystin-LF
• Microcystin-RR	•Microcystin-LY
• Microcystin-YR	•Nodularin
• Microcystin-LA	

Microcystin-LR: Background

- Cyanotoxin (toxin produced and released by cyanobacteria) that targets the liver
- Insufficient data to characterize mobility in water or environmental persistence

Microcystin-LR: Health Effects

- Health Assessment Status = 3
  - Single Study (Ueno, Makita, Nagata et al. 1999)
- RfD-like = 0.000003 mg/kg-day
  - Critical Effect = Liver effects
  - NOAEL = 0.003 mg/kg-day; Default UF = 1,000
- CCL 3 HRL: 0.021 µg/L (non-cancer)
- Sensitive populations: None identified

Microcystin-LR: Occurrence

- US and Canadian drinking water (bloom area, source, finished water):
  - 542 detections out of 677 sites; Typical maximum (0.1 µg/L) < HRL (0.021 µg/L)
- Chemical Update System / Inventory Update Reporting:
  - No data in 2002 or 2006
- Toxic Release Inventory – Total:
  - No data in 2004 or 2010

Cyanotoxins

Draft EPA Method 545 (LC/ESI-MS/MS)
Anticipated Publication Year 2014

Determination of cylindrospermopsin and anatoxin-a in drinking water by liquid chromatography electrospray ionization tandem mass spectrometry

Analytes	
• **Anatoxin-a (4)**	• **Cylindrospermopsin (3)**

Anatoxin-a: Background

- Cyanotoxin (toxin produced and released by cyanobacteria) that targets the nervous system
- Insufficient data to characterize mobility in water or environmental persistence

Anatoxin-a: Health Effects

- Health Assessment Status = 4
  - Single Study (Astrachan and Archer, 1981)
- RfD-like = 0.0005 mg/kg-day
  - Critical Effect = Mortality in rats (7-day)
  - NOAEL = 0.5 mg/kg-day; Default UF = 1,000
- CCL 3 HRL: 3.5 µg/L (non-cancer)
- Sensitive populations: People using anticholinergic agents for therapeutic purposes could be at risk of increased side effects after exposure to anatoxin-a, due to the potential for the additivity of adverse effects

Anatoxin-a: Occurrence

- CyanoHABs - The Florida Experience, 2000:
  - Maximum detect (~10 µg/L); Maximum detect > HRL (3.5 µg/L)
- UCMR 1 Meeting summary:
  - 4% detection rate in Lake Champlain
- Chemical Update System / Inventory Update Reporting:
  - No data in 2002 or 2006
- Toxic Release Inventory – Total:
  - No data in 2004 or 2010

Cylindrospermopsin: Background

- Cyanotoxin (toxin produced and released by cyanobacteria) that affects the liver and kidney
- Insufficient data to characterize mobility in water or environmental persistence

Cylindrospermopsin: Health Effects

- Health Assessment Status = 3
  - Single Study (Humpage and Falconer, 2003)
- RfD-like = 0.00003 mg/kg-day
  - Critical Effect = Increased kidney weight
  - NOAEL = 0.03 mg/kg-day; Default UF = 1,000
- CCL 3 HRL: 0.21 µg/L (non-cancer)
- Sensitive populations: Children; individuals with liver or kidney disease

Cylindrospermopsin: Occurrence

- CyanoHABs - The Florida Experience, 2000:
  - Maximum detect (~100 µg/L); Maximum detect > HRL (0.21 µg/L)
- UCMR 1 Meeting summary:
  - Maximum detect (90 µg/L); Maximum detect > HRL (0.21 µg/L)
- Chemical Update System / Inventory Update Reporting:
  - No data in 2002 or 2006
- Toxic Release Inventory – Total:
  - No data in 2004 or 2010

Legionella pneumophila

Under Evaluation: Potential methods being investigated

Analytes
• ***Legionella pneumophila***

Legionella: Background

- *Legionella* bacteria are aerobic gram-negative rods associated with respiratory infections
- *Legionella* are ubiquitous in fresh and marine waters; exist in varied temperatures, pH levels and nutrient and oxygen contents
- EPA is leading a multi-agency taskforce to develop a document characterizing the effectiveness of available treatment technologies for control of *Legionella* as well as the regulatory implications for consecutive systems that may become PWSs after installing additional treatment. The document is scheduled to be completed by Spring 2015

Legionella: Health Effects

- Legionellosis
  - Major risk factors: immunosuppression, smoking, travel, use of undisinfected well water, chronic heart or lung disease and chronic renal failure
  - Community or hospital acquired legionellosis can occur
  - Approximately 1,000-2,000 cases are reported to CDC each year
  - Prompt diagnosis and treatment results in 95-99% recovery rates
  - Mortality in untreated cases is approximately 15% of previously healthy patients and 75% of severely immunocompromised patients
- Pontiac Fever
  - Resembles an acute allergic reaction
  - Self-limiting; no specific treatment is advised and hospitalization is not required

Legionella: Occurrence

- Can colonize plumbing fixtures, hot water tanks, warm water spas and cooling towers
- May have evolved a symbiotic relationship with free-living amoebae, which may facilitate movement and colonization of domestic and industrial water systems
- Colonization of hot water systems in hospitals has resulted in numerous hospital outbreaks
- Community acquired cases are typically associated with cooling towers or untreated well water exposures
- 52 documented waterborne disease outbreaks affecting 225 people caused by *L. pneumophila* as reported by CDC between 1990 and 2010
  - Outbreaks associated with drinking water exposure mostly due to premise plumbing colonization, which is not under jurisdiction of the water utility

Other UCMR 4 Contaminants Under Consideration

Presenter

Melissa Simic, USEPA

Other UCMR 4 Contaminants Under Consideration

- Nitrate/Nitrite (currently regulated)
  - Nitrate and nitrite levels may increase in the distribution system, especially when chloramines are used as residual disinfectants
  - Currently, monitoring is only required at the entry point to the distribution system and is not required in the distribution system or for all consecutive systems
  - UCMR 4 data could be used to better characterize the exposure of nitrite and nitrate in the distribution system on a national scale

Other UCMR 4 Contaminants Under Consideration

- 4 unregulated brominated DBPs (bromochloroacetic acid, bromodichloroacetic acid, dibromochloroacetic acid, and tribromoacetic acid)
  - Monitor at Stage 2 DBPR compliance locations
  - Brominated haloacetic acids (HAAs) may pose higher health risks than chlorinated species
  - UCMR 4 data could help inform brominated HAA occurrence and exposure relative to the regulated HAA5 (i.e., monochloroacetic acid, dichloroacetic acid, trichloroacetic acid, monobromoacetic acid, dibromoacetic acid)

Appendices

Appendix A: Unregulated CCL 3 Contaminants 106 Chemicals and 12 Microbes

Chemicals

1,1,1,2-Tetrachloroethane
1,1-Dichloroethane
1,2,3-Trichloropropane
1,3-Butadiene
1,3-Dinitrobenzene
1,4-Dioxane
17 alpha-Estradiol
1-Butanol
2-Methoxyethanol
2-Propen-1-ol
3-Hydroxycarbofuran (degradate)
4,4'-Methylenedianiline
Acephate
Acetaldehyde
Acetamide
Acetochlor
Acetochlor ethanesulfonic acid (ESA)
Acetochlor oxanilic acid (OA)
Acrolein
Alachlor ethanesulfonic acid (ESA)
Alachlor oxanilic acid (OA)
alpha-Hexachlorocyclohexane
Anatoxin-a
Aniline
Bensulide
Benzyl chloride
Butylated hydroxyanisole
Captan
Chlorate (also D-DBP)
Chloromethane (Methyl chloride)
Clethodim
Cobalt
Cumene hydroperoxide
Cylindrospermopsin
Dicrotophos
Dimethipin
Dimethoate
Disulfoton
Diuron
Equilenin
Equilin
Erythromycin
Estradiol (17-beta)
Estriol
Estrone
Ethinyl Estradiol (17-alpha)
Ethoprop
Ethylene glycol
Ethylene oxide
Ethylene thiourea
Fenamiphos
Formaldehyde
Germanium
Halon 1011 (Bromochloromethane)
HCFC-22
Hexane
Hydrazine
Mestranol
Methamidophos
Methyl bromide (Bromomethane)
Methyl tert-butyl ether
Metolachlor
Metolachlor ethanesulfonic acid (ESA)
Metolachlor oxanilic acid (OA)
Microcystin-LR
Molinate
Molybdenum
Nitrobenzene
Nitroglycerin
N-Methyl-2-pyrrolidone
N-Nitrosodiethylamine (NDEA)
N-nitrosodimethylamine (NDMA)
N-Nitroso-di-n-propylamine (NDPA)
N-Nitrosodiphenylamine
N-nitrosopyrrolidine (NPYR)
Norethindrone (19-Norethisterone)
n-Propylbenzene
o-Toluidine
Oxirane, methyl-
Oxydemeton-methyl
Oxyfluorfen
Perchlorate
Perfluorooctane sulfonic acid (PFOS)
Perfluorooctanoic acid (PFOA)
Permethrin (cis, trans)
Profenofos
Quinoline
RDX
sec-Butylbenzene
Strontium
Tebuconazole
Tebufenozide
Tellurium
Terbufos
Terbufos sulfone
Thiodicarb
Thiophanate-methyl
Toluene diisocyanate
Tribufos
Triethylamine
Triphenyltin hydroxide (TPTH)
Urethane
Vanadium
Vinclozolin
Ziram

Microbes

Adenovirus
Caliciviruses
Campylobacter jejuni
Enterovirus
Escherichia coli (0157)
Helicobacter pylori
Hepatitis A virus
Legionella pneumophila
Mycobacterium avium
Naegleria fowleri
Salmonella enterica
Shigella sonnei

UCMR 4 Candidates

Appendix B: CCL 4 Nominations

Chemicals

3-chloro-4-dichloromethyl-5-hydroxy-2(5H)-furanone1,1,1,2-Tetrachloroethane
Alkylphenol mono- to tri-oxylates
Amoxicillin
Azinphos-methyl
Bacitracin zinc
Bentazone
Benzyl butyl phthalate
Bisphenol A
Bromoxynil
Carbaryl
Chlorothalonil
Chlorpyrifos
Dibutyl phthalate
Dicamba
Dichlorvos
Dicofol
Dicyclohexyl phthalate
Diethyl phthalate
Di-isononyl phthalate
Dimethyl phthalate
Di-n-octyl phthalate
Endosulfan
Fluometuron
Linezolid
Linuron
Malathion
Manganese
Methicillin
Methyl parathion
Nonylphenol
Nonylphenol ethoxylate
Octylphenol
Octylphenol ethoxylate
Oxacillin
Penicillin
Phosmet
Progesterone
Spiramycin
Testosterone
Trichlorfon
Triclocarban
Triclosan
Tylosin
Vancomycin
Virginiamycin
Chlorate (also D-DBP)
Chloromethane (Methyl chloride)
Clethodim
Cobalt
Cumene hydroperoxide

Microbes

Toxoplasma gondii
Vibrio cholerae

UCMR 4 Candidates

Note: There were a total of 59 unique nominations for CCL 4. Only 48 are presented here because eleven contaminants were removed for either having an existing NPDWR or are already on CCL 3.

Revisions to the Unregulated Contaminant Monitoring Rule (UCMR 4) for Public Water Systems

Public Stakeholder Meeting and Webinar

Afternoon Break

Resume at 3:15 p.m.

Approval of Laboratories Supporting UCMR 4

Public Meeting and Webinar
Washington D.C.

June 25th, 2014 – 3:15 p.m.

Brenda Parris
USEPA, OGWDW, SRMD
Technical Support Center
Cincinnati, OH

Overview

- Expected approach to the UCMR 4 Laboratory Approval Program
- Maintaining approval

General Expectations

- Laboratory Approval Program expected to be similar to the process used in UCMR 3
- Water systems would need to use EPA UCMR-approved laboratories for analysis
- Labs would need to meet the required equipment, laboratory performance and data reporting criteria to become approved
- Labs would still need to be approved to support UCMR 4 even if already certified by state, primacy entity or accredited through the National Environmental Accreditation Program (NELAP) for a particular method being used for compliance monitoring

General Procedure

- **Step 1:** Request to participate and register
- **Step 2:** Application
- **Step 3:** EPA review of application
- **Step 4:** Proficiency Testing
- **Step 5:** EPA approval

Step 1

- Request to participate and register
  - Submit a written participation request to EPA Laboratory Approval Coordinator
  - EPA provides registration material
  - Submit complete registration material within 90 days of Final Rule publication in Federal Register
  - EPA provides a custom application package based on registration information

Step 2

- Application Package
  - Separate application for each method
  - Lab would receive a copy of the Laboratory Approval Manual
  - Completed package would be submitted within 210 days of publication of the Final Rule in the Federal Register

Laboratory Approval Manual

- Procedures for obtaining UCMR approval and procedures for revocation of approval
- Quality Assurance requirements
- Quality Control requirements
  - Initial demonstration of capability
  - Initial calibration
  - Continuing calibration checks
  - Surrogate and internal standard criteria
  - Reagent blanks and fortified blanks
  - Quality control samples
  - Spiked field samples
  - Field blank criteria (if required by the method)
- Sample handling requirements

Step 2 continued

- Completed application package anticipated to include:
  - Precision, accuracy and minimum reporting level (MRL) studies with documentation
  - Documentation of certification or accreditation of drinking water compliance analyses/selected methods as requested
  - Personnel and quality assurance information
  - Description of analytical equipment and sample handling procedures

Step 3

- Review of Application Package
  - EPA would review the package and could request more information
  - Email notifying lab would be sent following EPA's confirmation of successful completion of the application package
  - Once the application has been accepted, the lab could participate in the corresponding PT studies

Step 4

- Proficiency Testing
  - EPA would provide PT samples
  - Labs would analyze PT sample(s) for each method
  - Labs would likely have several opportunities to analyze PT samples
  - Only one successful analysis of PT samples per method would be required

Step 5

- EPA Approval
  - Once all steps are completed, EPA would grant formal written approval (for each method, as appropriate)

Maintaining Approval

- Adhere to quality assurance/quality control (QA/QC) measures in both the methods and the Laboratory Approval Manual
- Post occurrence data and required QC data via the Safe Drinking Water Accession and Review System (SDWARS) within prescribed timeframe
- Participate and pass on-site and/or paper audits
- Respond to requests for data outside of SDWARS

Revisions to the Unregulated Contaminant Monitoring Rule (UCMR 4) for Public Water Systems

Public Presentations – 3:45 p.m.

Pre-registered speakers only

Revisions to the Unregulated Contaminant Monitoring Rule (UCMR 4) for Public Water Systems

Discussion

Closing Remarks

- On-site attendees must turn in any door keycards to the sign-in desk.
- Meeting materials were sent to all registered participants; if you did not receive a copy, please email UCMRwebinar@cadmusgroup.com and we will send you a copy.