



UCMR 4 – Implications for Public Water Supplies :

A Primer



Monrovia



South Bend



“People who know what they’re talking about don’t need PowerPoint.”

— Steve Jobs
From Walter Isaacson's
book *Steve Jobs*



But even Steve Jobs mis-stated things, attributing a quote to Picasso that he never said... so we are going to use PowerPoint to keep it accurate.

UCMR 4 – Implications for PWS



- **UCMR Purpose and Process**
- **Rule Schedule**
- **Which PWS are Included**
- **Methods and Analytes**
- **Monitoring Schedule**
- **Lab Approval**
- **Reporting Requirements**
- **FAQs**
- **Speculation...**

UCMR Purpose



“To collect occurrence data for contaminants suspected to be present in drinking water but don’t have health-based standards set under the Safe Drinking Water Act (SDWA).”*

- Drinking water occurrence information is used to support future regulatory actions to protect public health.
- Public will benefit from information about whether or not unregulated contaminants are present in their drinking water.

*EPA Fact Sheet EPA 815-F-12-003



Unregulated Contaminant Monitoring Rule

Negotiated agreement on how DW parameters are regulated

- **Contaminant Candidate List (CCL) – Parameters with known or suspected health effects that may be regulated in the future**
- **Occurrence Data – UCMR**
- **Treatment Feasibility**
 - **Technologically Possible**
 - **Economically Reasonable**

UCMR 4 – Schedule



- UCMR 4 proposed rule was published December 11, 2015
- Public comment period closed February 9, 2016
- UCMR 4 final rule signed 1/19/2017.. Just before all EPA Rules were put on hold.
- UCMR 4 monitoring 2018-2020

2018

January	February	March
M T W T F S S	M T W T F S S	M T W T F S S
1 2 3 4 5 6 7	1 2 3 4	1 2 3 4
8 9 10 11 12 13 14	5 6 7 8 9 10 11	5 6 7 8 9 10 11
15 16 17 18 19 20 21	12 13 14 15 16 17 18	12 13 14 15 16 17 18
22 23 24 25 26 27 28	19 20 21 22 23 24 25	19 20 21 22 23 24 25
29 30 31	26 27 28	26 27 28 29 30 31
April	May	June
M T W T F S S	M T W T F S S	M T W T F S S
1	1 2 3 4 5 6	1 2 3
2 3 4 5 6 7 8	7 8 9 10 11 12 13	4 5 6 7 8 9 10
9 10 11 12 13 14 15	14 15 16 17 18 19 20	11 12 13 14 15 16 17
16 17 18 19 20 21 22	21 22 23 24 25 26 27	18 19 20 21 22 23 24
23 24 25 26 27 28 29	28 29 30 31	25 26 27 28 29 30
July	August	September
M T W T F S S	M T W T F S S	M T W T F S S
1	1 2 3 4 5	1 2
2 3 4 5 6 7 8	6 7 8 9 10 11 12	3 4 5 6 7 8 9
9 10 11 12 13 14 15	13 14 15 16 17 18 19	10 11 12 13 14 15 16
16 17 18 19 20 21 22	20 21 22 23 24 25 26	17 18 19 20 21 22 23
23 24 25 26 27 28 29	27 28 29 30 31	24 25 26 27 28 29 30
October	November	December
M T W T F S S	M T W T F S S	M T W T F S S
1 2 3 4 5 6 7	1 2 3 4	1 2
8 9 10 11 12 13 14	5 6 7 8 9 10 11	3 4 5 6 7 8 9
15 16 17 18 19 20 21	12 13 14 15 16 17 18	10 11 12 13 14 15 16
22 23 24 25 26 27 28	19 20 21 22 23 24 25	17 18 19 20 21 22 23
29 30 31	26 27 28 29 30	24 25 26 27 28 29 30



UCMR 4 – Who Does What and When?



Assessment Monitoring (List 1 Contaminants)	10 Cyanotoxins	20 Additional Chemicals
Applicable Systems	All large + 800 randomly selected small SW and GWUDI systems	All large + 800 randomly selected small SW, GWUDI, and GW systems
Time Frame	March – November	January - December
Frequency	Twice a month for four consecutive months (total of eight sampling events).	SW/GWUDI: Monitor four times during your 12-month monitoring period. Sample events must occur three months apart. GW: Monitor two times during your 12-month monitoring period. Sample events must occur 5-7 months apart.

Are You Impacted by UCMR 4?



➤ Chemical and HAA Monitoring (GW,SW,GWUDI)

- ~6,000 systems serving >10,000 people
- 800 systems serving 25-10,000 people
- Includes consecutive systems

➤ Source waters for Br and TOC (GW,SW,GWUDI)

- ~6,000 systems serving > 10,000 people
- Same 800 systems serving 25-10,000 people
- **Excludes** consecutive systems

Are You Impacted by UCMR 4? (Cyanotoxins)



- **Cyanotoxin monitoring (SW and GWUDI)**
 - ~2,000 systems serving >10,000 people
 - 800 DIFFERENT systems serving 25-10,000 people
 - Includes consecutive systems

Are There Any Waivers Available?

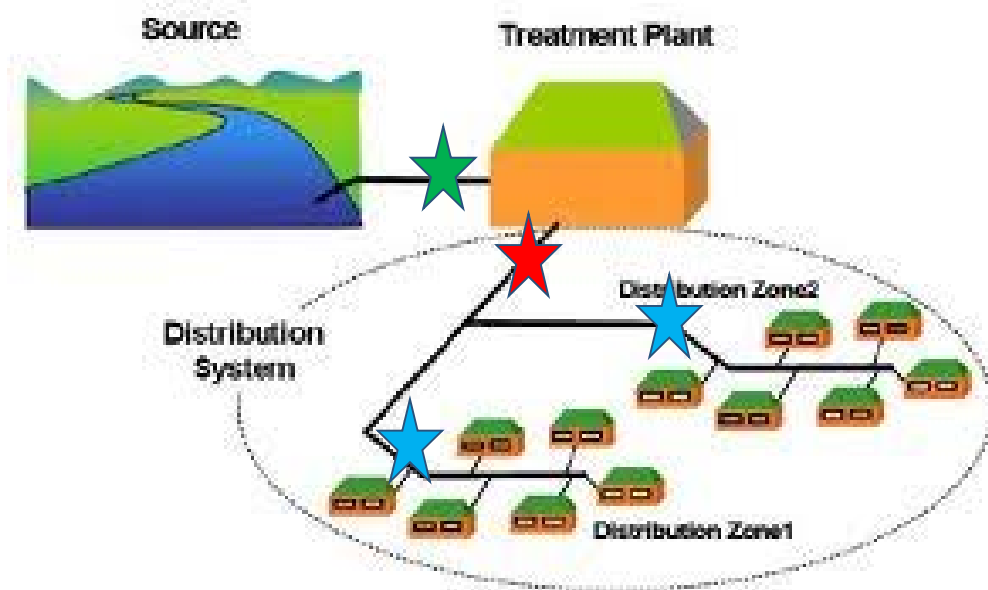


- HAA monitoring **is not required** for systems that are exempt from Stage 2 D/DBP monitoring.
- Thus those systems are also exempt from the TOC and Br source monitoring.
- Consecutive systems don't need to do TOC/Br.
- These systems **STILL** need to do the rest of the tests, as applicable.

Where Do You Sample?



- ★ ➤ Br and TOC – at D/DBP TOC site, or if no TOC requirement, at LT 2 site.
- ★ ➤ Cyanotoxins and chemicals – Entry Point to the Distribution System (post all treatment)
- ★ ➤ HAAs – at ALL Stage 2 DBP sites



How Many Methods Are Required for UCMR 4?



- There are 3 unique methods for cyanotoxins.
- There are 4 unique methods for chemicals.
- There is 1 method for HAAs
- There are 2 methods to do Br and TOC.

So if you are a surface water system you could be required to sample for 10 individual methods. This is a lot more than prior UCMRs.

Methods and Analytes: Assessment Monitoring (17) – All Systems



Metals: EPA Method 200.8, ASTM D5673-10, SM 3125

Contaminant	MRL (ug/L)	Additional Information
germanium	0.3	Naturally-occurring element;
manganese	0.4	Naturally-occurring element;

Pesticides and a Pesticide Manufacturing Byproduct: EPA Method 525.3

Contaminant	MRL (ug/L)	Additional Information
alpha-hexachlorocyclohexane	0.01	Component of benzene hexachloride (BHC); formerly used as an insecticide
chlorpyrifos	0.03	Organophosphate; used as an insecticide, acaricide and miticide
dimethipin	0.2	Used as an herbicide and plant growth regulator
ethoprop	0.03	Used as an insecticide
oxyfluorfen	0.05	Used as an herbicide
profenofos	0.3	Used as an insecticide and acaricide
tebuconazole	0.2	Used as a fungicide
total permethrin (cis- & trans-)	0.04	Used as an insecticide
tribufos	0.07	Used as an insecticide and cotton defoliant

Alcohols: EPA Method 541

Contaminant	MRL (ug/L)	Additional Information
1-butanol	2.0	Used as a solvent, food additive and in production of other chemicals
2-methoxyethanol	0.4	Used in a number of consumer products, such as synthetic cosmetics,
2-propen-1-ol	0.5	Used in the production flavorings, perfumes and other chemicals

Semivolatile Chemicals: EPA Method 530

Contaminant	MRL (ug/L)	Additional Information
butylated hydroxyanisole	0.03	Food Additive/Anti oxidant
o-toluidine	0.007	Production of dyes, etc.
quinoline	0.02	Pharmaceutical, flavoring agent, component of coal

Methods and Analytes: Cyanotoxin Monitoring (10) – SW and GWUDI Systems



Contaminant	MRL (µg/L)	Method
“total microcystins”	0.3	EPA 546
microcystin-LA	0.008	EPA 544
microcystin-LF	0.006	EPA 544
microcystin-LR	0.02	EPA 544
microcystin-LY	0.009	EPA 544
microcystin-RR	0.006	EPA 544
microcystin-YR	0.02	EPA 544
nodularin	0.005	EPA 544
anatoxin-a	0.03	EPA 545
cylindrospermopsin	0.09	EPA 545

Haloacetic Acid (HAA) Groups (3) plus TOC and Br



- HAAs included as groups:
 - HAA5 (regulated)
 - HAA6Br
 - HAA9

- Labs post individual HAAs for QC purposes

- UCMR 4 HAA samples and HAA5 Stage 2 DBPR compliance samples can be collected at the same time
 (Note that labs **must be state certified** for the UCMR 4 HAA method to use the UCMR 4 data for regular compliance).

HAA Groups (EPA Method 552.3 or 557)			
dichloroacetic acid (DCAA)	HAA5		HAA9
monochloroacetic acid (MCAA)			
trichloroacetic acid (TCAA)			
monobromoacetic acid (MBAA)	HAA6Br		
dibromoacetic acid (DBAA)			
bromochloroacetic acid (BCAA)			
bromodichloroacetic acid (BDCAA)			
chlorodibromoacetic acid (CDBAA)			
tribromoacetic acid (TBAA)			

PLUS TOC and Bromide at “Intake” to each treatment plant

UCMR 4 – Monitoring Schedule for Groundwater systems



➤ GW PWS are relatively simple

➤ Collect 2 times during your 12 month assigned monitoring period.

➤ Collection events must be 5-7 months apart so ideally....

- January & July
- February & August
- March & September
- April & October
- May & November
- June & December

Jan	Feb	Mar
Apr	May	June
Jul	Aug	Sept
Oct	Nov	Dec

UCMR 4 – Monitoring Schedule SW/GWUDI - Chemicals



- **SW/GWUDI PWS are a bit more complicated**
 - **Everything but cyanotoxins. Collect 4 times during your 12 month assigned monitoring period.**
 - **Collection events must be 3 months apart so....**

- **Jan, Apr July, Oct**
- **Feb, May, Aug & Nov**
- **Mar, Jun, Sept, Dec**

Jan	Feb	Mar
Apr	May	June
Jul	Aug	Sept
Oct	Nov	Dec

UCMR 4 – Monitoring Schedule Cyanotoxins (SW and GWUDI)



- **Collect samples March → November**
 - More vulnerable time frame for blooms of cyanotoxin producing algae
- **December, January and February are “dark” months - only recollections**
- **Collect 2 times a month for 4 consecutive months during assigned monitoring period so....**

You must start no later than August to finish by November.

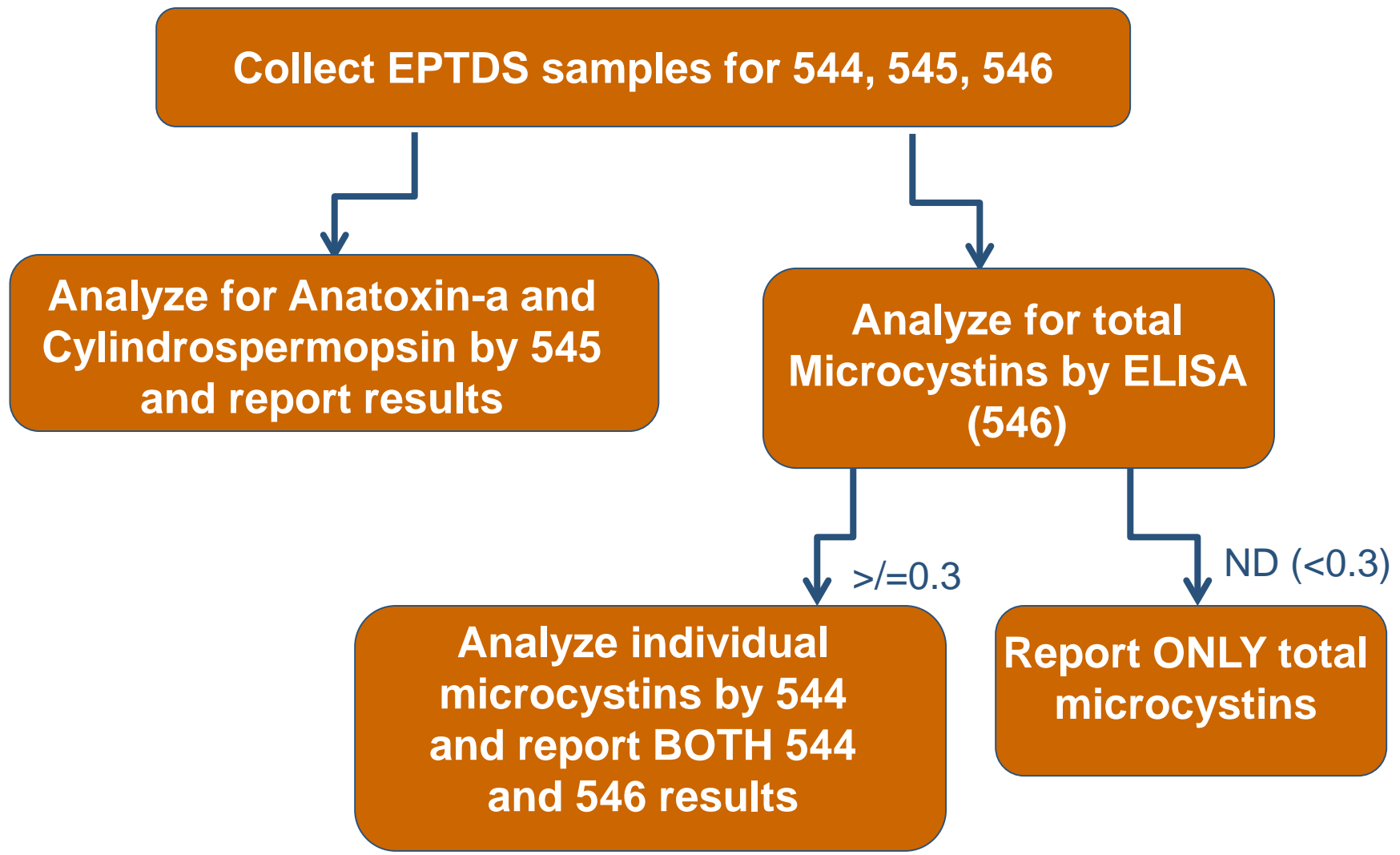
Jan	Feb	Mar
Apr	May	June
Jul	Aug	Sept
Oct	Nov	Dec



➤ Cyanotoxins

- Collect 546 sample from EPTDS. Also **record metadata about blooms**
- Collect 544 and 545 samples from EPTDS **at the same time** as the 546 sample.
- 545 (Anatoxin-a and Cylindrospermopsin) **will be analyzed on all EPTDS samples.**
- 544 (Microcystins by LC-MS-MS) is **triggered** by 546 results. See next slide. **(EPA estimates 2% of samples will trigger)**

Cyanotoxin Monitoring is “Triggered”





➤ Cyanotoxins, Metals, Pesticides, Alcohols and SOCs

- Collect from the EPTDS

➤ HAAs

- Collect from Stage 2 D/DBP sites. HAA5 Stage 2 DBP compliance samples can be collected at the same time.
- Also need to collect a sample for TOC and Br analysis from source water intake.

UCMR 4 Lab Approval Process (2017 Actions)



- **Similar to UCMR 3**
 - Review of data package by EPA
 - Pass one PT

Jan	Feb	Mar
Apr	May	June
Jul	Aug	Sept
Oct	Nov	Dec

- **First PT was in January**
 - Did not include all methods and HAA data were discarded due to stability issues.

➤ **Additional PTs – March, June, and August**

➤ **All applications must be complete by April 19.**

➤ **Exception:** TOC and Bromide by December 15.
(document state approval)

QC Requirements during UCMR 4



Labs analyzing small system samples in UCMR 3 already submitted QC data to EPA

For UCMR 4, labs analyzing large system samples must also submit QC data to EPA

QC and reporting requirements must be met before data can be uploaded to SDWARS 4

Labs will have time to practice uploading data to SDWARS 4 before monitoring starts

Allow prioritization of data audits

Further ensures data are valid and robust



Data Quality and Review by EPA for UCMR 4



➤ Goal is to ensure a quality data set will be in UCMR 4.

Elements include:

- Lab Approval Program
- QC and reporting requirements expanded
- Confirmation of extreme outliers ($1,000 * \text{MRL}$) by the lab
- Pull-down menus for data entry to prevent typos
- Confirmation of questionable results from labs
- Checking for duplicate data and resolving by contacting labs, states, and water systems
- Looking for matrix spike data reported as field samples

UCMR 4 – Reporting Requirements and Key Dates



➤ Almost like UCMR 3

➤ >10k PWS

- APPROVED labs post data to SDWARS within **120 days** of sample collection **plus ALL QC data.**
 - PWS review / approve the data via CDX within **60 days of lab posting** – automatic approval after 60 days
 - Post any hits in your CCR
- All data publicly available in EPA National Contaminant Occurrence Database (NCOD)

26 UCMR 4 Data Elements to be Entered for Chemistry Monitoring



Utility Data Entry		Lab Data Entry		
Public Water System Identification (PWSID) Code	Sampling Point Identification Code	Sample Collection Date	Analysis Batch Identification Code	Laboratory Identification Code
Public Water System Name	Sampling Point Name	Sample Identification Code	Analysis Date	Sample Event Code
Public Water System Facility Identification Code	Sampling Point Type Code	Contaminant	Sample Analysis Type	
Public Water System Facility Name	Disinfectant Type	Analytical Method Code	Analytical Results-Sign	
Public Water System Facility Type	Treatment Information	Extraction Batch Identification Code	Analytical Result-Measured Value	
Water Source Type	Disinfectant Residual Type	Extraction Date	Additional Value (for spikes)	

Items in red are new lab requirements for large system monitoring in UCMR 4.

ADDITIONAL Utility Data Elements for Cyanotoxin Monitoring



Bloom Occurrence	Cyanotoxin Occurrence
Indicator of Possible Bloom – Treatment	Indicator of Possible Bloom – Source Water Quality Parameters

- **Must be entered for each round of sample collection for cyanotoxins**

UCMR 4 – EPA Cost Estimates (including shipping)



Method Type	Average Analysis Cost per UCMR 4 Sample ¹
3 Alcohols using EPA Method 541 (Gas Chromatography/Mass Spectrometry (GC/MS))	\$327
Bromide ²	\$55
3 Brominated HAA Groups using EPA Method 552.3 (Gas Chromatography/Electron Capture Detection (GC/ECD) or 557 (Ion Chromatography/Electrospray Ionization/Tandem Mass Spectrometry (IC/ESI-MS/MS))	\$209
1 Cyanotoxin group using Adda ELISA (EPA Method 546)	\$193
7 Cyanotoxins using EPA Method 544 (Solid Phase Extraction (SPE) Liquid Chromatography/Tandem Mass Spectrometry(LC/MS/MS))	\$469
2 Cyanotoxins using EPA Method 545 (Liquid Chromatography/Electrospray Ionization-Tandem Mass Spectrometry (LC/ESI-MS/MS))	\$388
2 Metals using EPA Method 200.8 (Inductively Coupled Plasma Mass Spectrometry (ICP-MS)) or alternate SM ³ or ASTM ⁴	\$75
8 Pesticides and a Pesticide Byproduct using EPA Method 525.3 (SPE GC/MS)	\$371
3 Semivolatile Organic Chemicals using EPA Method 530 (GC/MS)	\$346
TOC ²	\$63
Total	\$2,496

¹ The average analytical cost for Assessment Monitoring was determined by averaging estimates provided by five drinking water laboratories.

There Are a Lot of Uncertainties in Your Individual Lab Costs



- **It depends...**

- **Surface water systems**
 - # of total microcystin detects
 - # of Stage 2 sites

- **Groundwater systems**
 - GWRMP?
 - # of stage 2 sites

UCMR 4 – Key 2017 Dates for PWS



- **By Dec 31, 2017....>10k PWS review and revise SDWARS**
 - Update sampling location information (including Stage 2 sites and TOC/Br source sites)
 - Update monitoring schedule
- **After Dec 31, 2017....>10k PWS must request changes through the EPA**
- **By October 31, 2107 ... GW systems that want to use a GWRMP must notify EPA **(note: extended from Rule date of April 19)**. *This INCLUDES prior approved plans.***

FAQs – Sample Sites



- **Do I need to use the same sample IDs/sample point IDs that I did for past UCMRs?**
 - **Not a requirement, but anything that is already in SDWARS will default to existing IDs**

- **How many distribution sites do I need to sample?**
 - **ALL of your required stage 2 DBP sites (e.g. reduced monitoring means fewer sites)**

- **How do I get approval for TOC and Bromide if I want to do it in my own lab?**
 - **Contact EPA by Dec 1, 2017 to get registration form.**
 - **Provide documentation of state approval for compliance monitoring of Br and TOC by Dec 15, 2017.**



- **How often do I need to sample my distribution sites for UCMR 4?**
 - **2X if GW, 4X if SW/GWUDI. This does NOT relieve you of your required D/DBP compliance sampling. And once you start your UCMR 4 monitoring, you MUST sample all the sites each time, even if you “lose” some from new reduced monitoring.**
- **Do I absolutely need to sample my intakes the same time/day as the stage 2 sites?**
 - **Not if it is not practical to do so – EPA is applying some flexibility because they recognize that there can be great distances involved.**

UCMR 4 – Additional Information



➤ Public Meeting/Webinar scheduled for April 12, 2017 to go over:

- Final UCMR 4 requirements for monitoring, sampling and reporting,
- Analytical methods and the laboratory approval process,
- GW representative monitoring plans and
- Consecutive system monitoring plans.

➤ *Registration Info*

<https://www.eventbrite.com/e/ucmr-4-publicstakeholder-meeting-registration-28264984329>

What Are We Actually Going to See in UCMR 4?



- **HAA5... those data are readily available...**
- **HAA6... the addition of BCAA. Expected in higher bromide systems. EEA has a lot of existing data so we know it will occur.**
- **HAA9.. Some BDCAA and CDBAA.. Not likely to see much, if any TBAA**
- **Manganese. Was included in small systems for UCMR 3 and it was frequent even sometimes at levels above the SMCL.**
- **Germanium. Maybe some but not much..**

Will We See Anything Else?



- For the chemistry, I highly doubt it (but we are looking pretty low, so I could be wrong).
- Total microcystins: maybe, but we are monitoring finished water at a “high” MRL (0.3 ug/L), so there won’t be many hits.
- Individual microcystins by 544: **If** there are positives for total microcystins, we **will** see the individuals because the 544 MRLs are VERY low.
- Anatoxin-a and Cylindrospermopsin: Probably not, because again we are measuring finished water samples.

Any Questions?



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