



NC
Nothing Compares
NORTH CAROLINA

UCMR4 Results


Department of Environmental Quality

October 9, 2019
Rebecca Sadosky, Ph.D.




Overview

- UCMR
- UCMR4 General
- UCMR4 Sampling and Frequency
- Data



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Objective of UCMR Program

- Collect nationally representative occurrence data for unregulated contaminants that may require regulation under the SDWA

Consider data collected as part of future EPA decisions on actions to protect public health

Provide data to States, local governments and to the public to use when making decisions related to public health protection

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Safe Drinking Water Act

Contaminant Candidate List (CCL)


UCMR

1996 SDWA Amendments provided for:

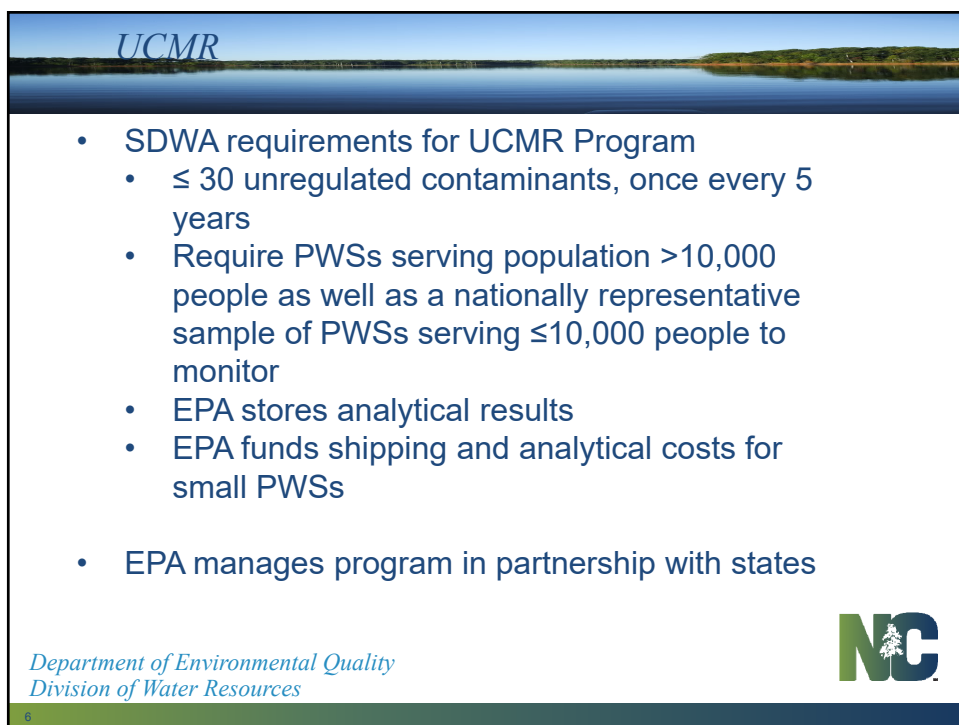
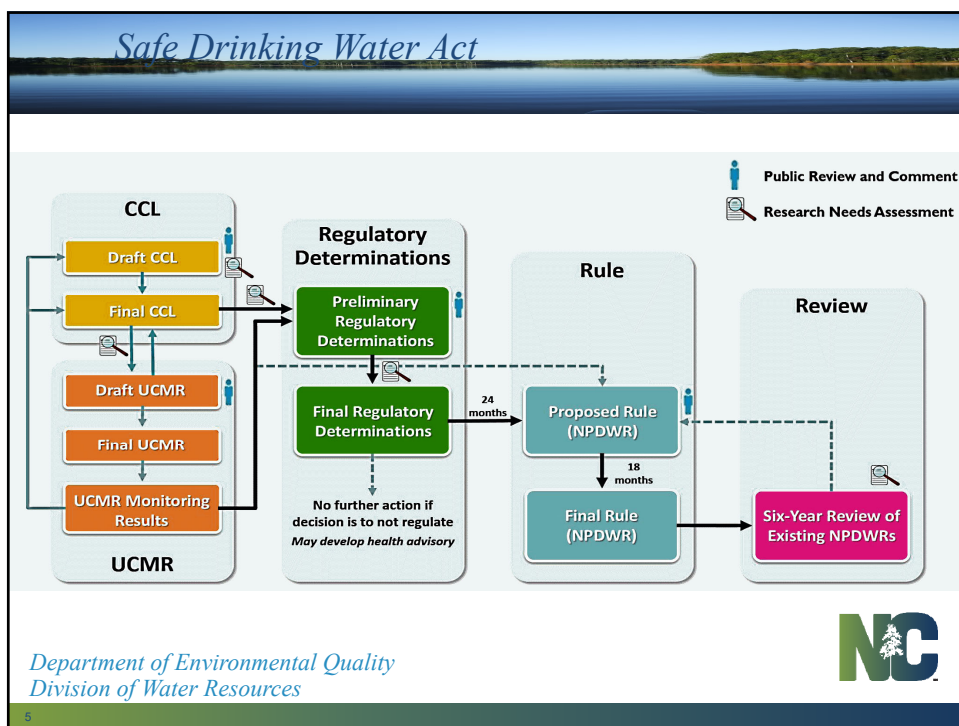
Regulatory Determinations (RD)

6 Year Review of NPDWRs

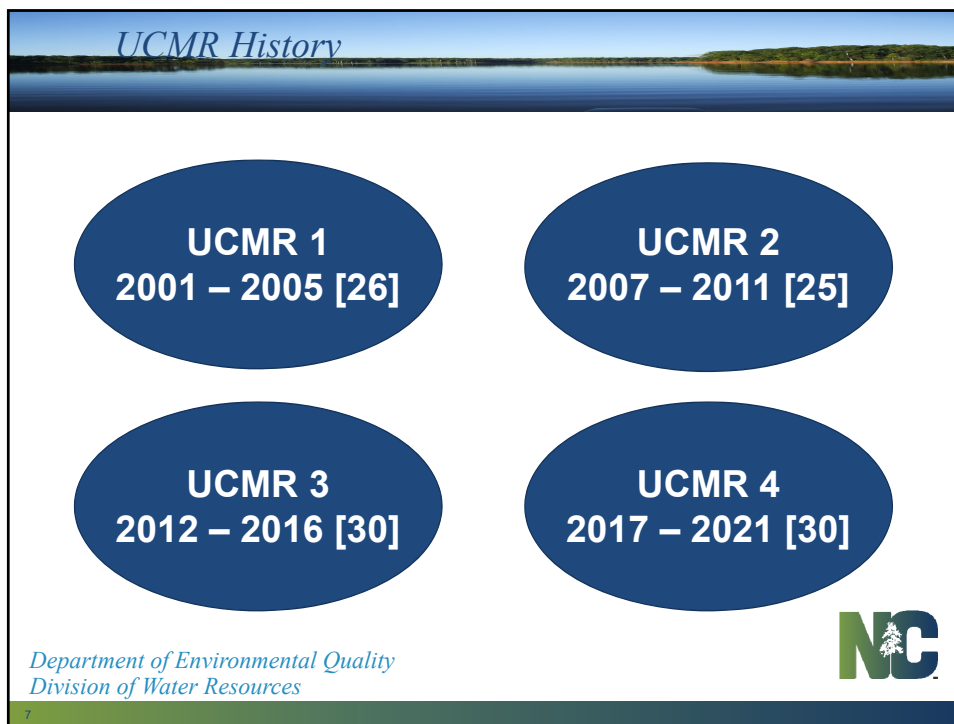
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UCMR History



The UCMR History slide features a header with a scenic lake image and the title "UCMR History". Below the header, four blue ovals are arranged in a 2x2 grid, each containing text about a specific UCMR cycle. The bottom right corner contains the logo for the Department of Environmental Quality, Division of Water Resources, and a small number "7".

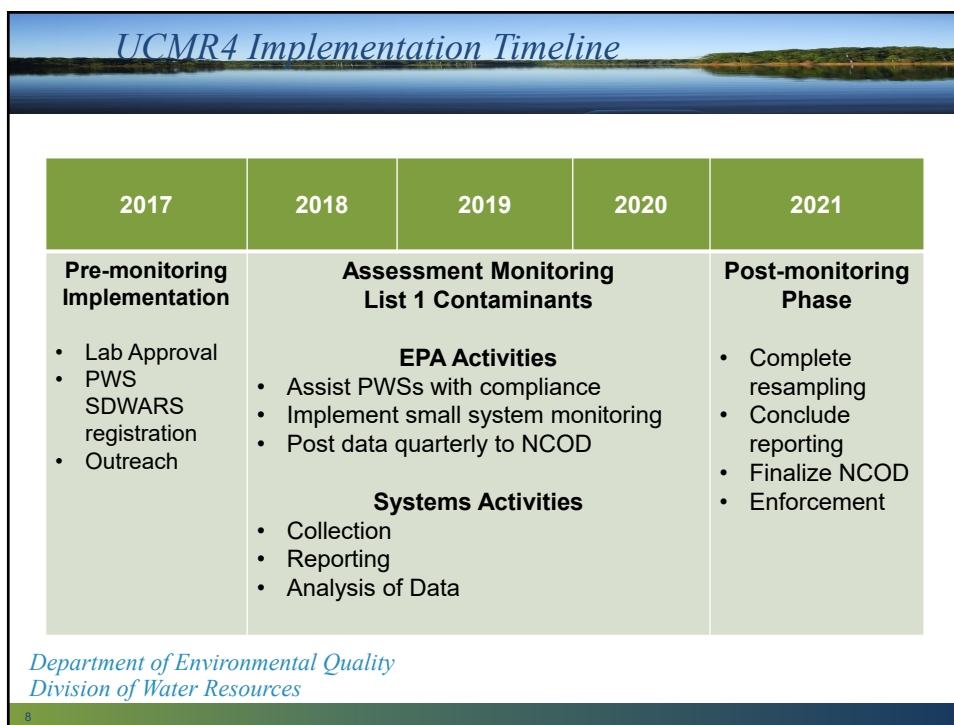
UCMR 1 2001 – 2005 [26]	UCMR 2 2007 – 2011 [25]
UCMR 3 2012 – 2016 [30]	UCMR 4 2017 – 2021 [30]

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UCMR4 Implementation Timeline



The UCMR4 Implementation Timeline slide features a header with a scenic lake image and the title "UCMR4 Implementation Timeline". Below the header is a table with five columns representing the years 2017 through 2021. The table is divided into three phases: Pre-monitoring Implementation (2017), Assessment Monitoring List 1 Contaminants (2018-2020), and Post-monitoring Phase (2021). The bottom left corner contains the logo for the Department of Environmental Quality, Division of Water Resources, and a small number "8".

2017	2018	2019	2020	2021
Pre-monitoring Implementation	Assessment Monitoring List 1 Contaminants			Post-monitoring Phase
<ul style="list-style-type: none"> • Lab Approval • PWS SDWARS registration • Outreach 	<p style="text-align: center;">EPA Activities</p> <ul style="list-style-type: none"> • Assist PWSs with compliance • Implement small system monitoring • Post data quarterly to NCOD <p style="text-align: center;">Systems Activities</p> <ul style="list-style-type: none"> • Collection • Reporting • Analysis of Data 			<ul style="list-style-type: none"> • Complete resampling • Conclude reporting • Finalize NCOD • Enforcement

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UCMR4 Applicability to NC PWSs

System Size (# of people served)	10 Cyanotoxins	20 Additional Chemicals	Total # of Systems per Size Category
Small Systems (25 – 10,000)	32 randomly selected SW or GWUDI systems	22 randomly selected SW, GWUDI and GW systems	54
Large Systems (10,001 and over)	All SW or GWUDI systems (100)	All SW, GWUDI and GW systems (134)	134
Total	132	156	188

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Methods and Analytes (17 compounds)

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

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

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

- Plus TOC and Bromide at the intake to each treatment plant



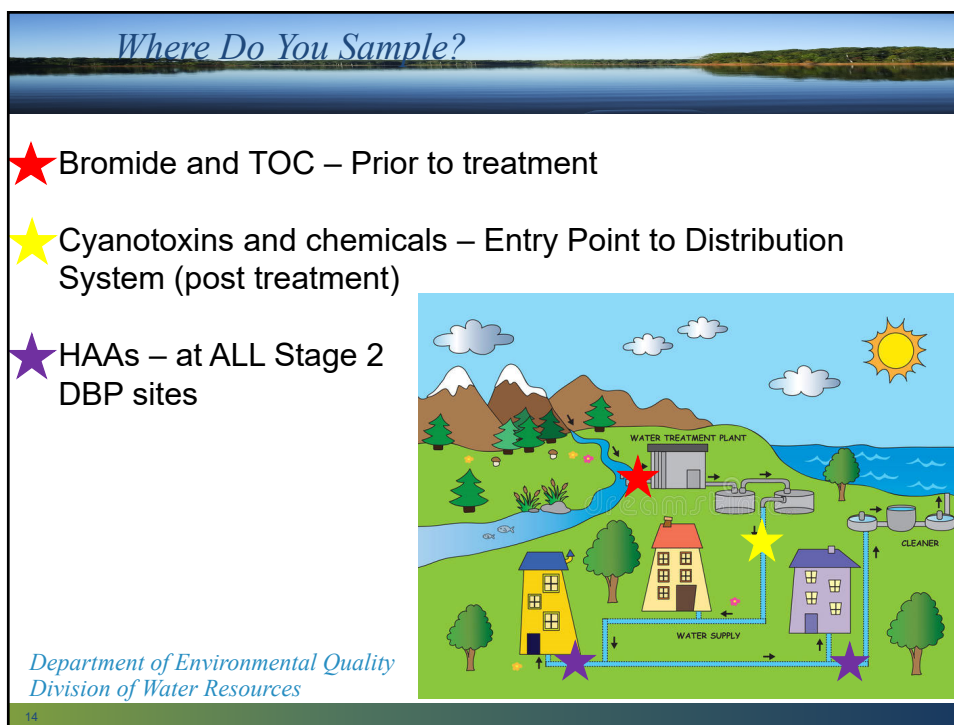
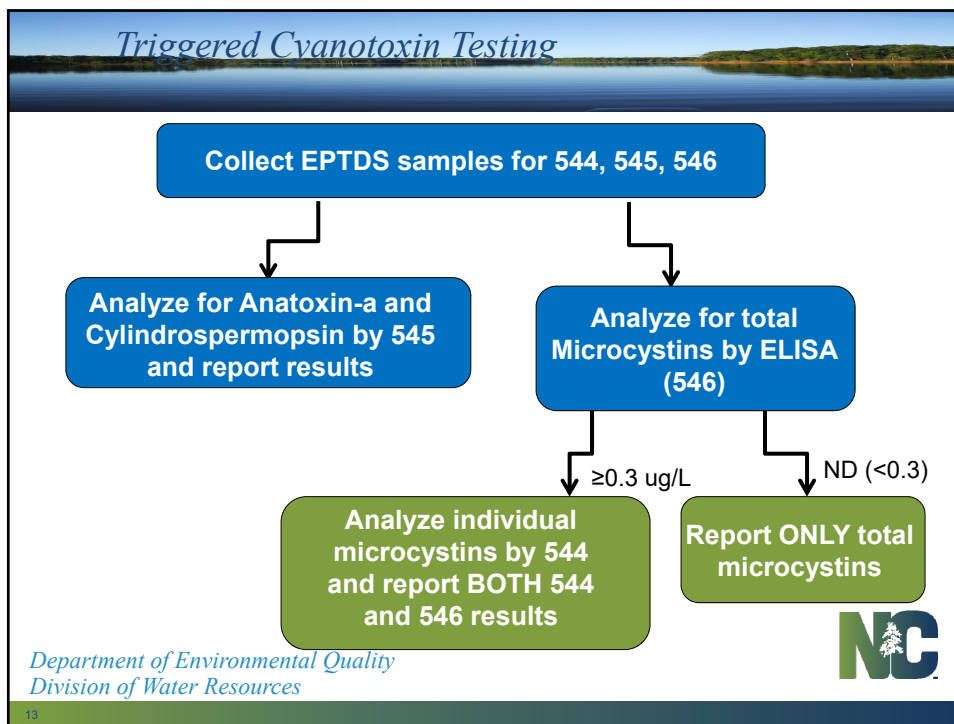
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Cyanotoxins

Contaminant	CAS Registry Number ¹	Minimum Reporting Level	Sampling Points ²	Analytical Methods
total microcystin	N/A	0.3 µg/L	EPTDS	EPA 546 (ELISA)
microcystin-LA	96180-79-9	0.008 µg/L	EPTDS	EPA 544
microcystin-LF	154037-70-4	0.006 µg/L	EPTDS	EPA 544
microcystin-LR	101043-37-2	0.02 µg/L	EPTDS	EPA 544
microcystin-LY	123304-10-9	0.009 µg/L	EPTDS	EPA 544
microcystin-RR	111755-37-4	0.006 µg/L	EPTDS	EPA 544
microcystin-YR	101064-48-6	0.02 µg/L	EPTDS	EPA 544
nodularin	118399-22-7	0.005 µg/L	EPTDS	EPA 544
anatoxin-a	64285-06-9	0.03 µg/L	EPTDS	EPA 545
cylindrospermopsin	143545-90-8	0.09 µg/L	EPTDS	EPA 545

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Sample Schedule

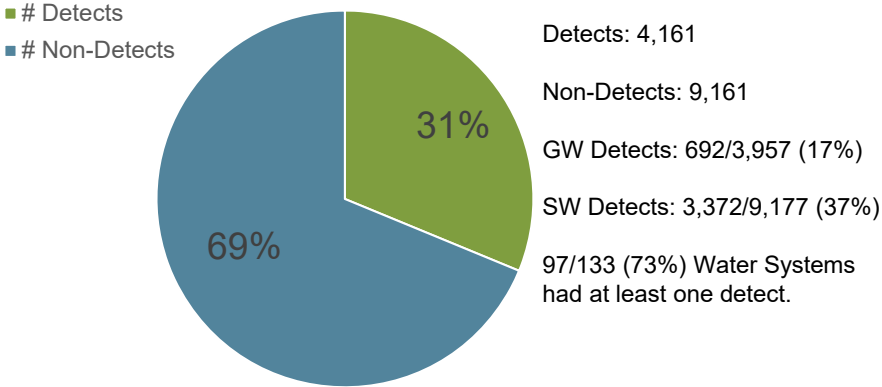
- Groundwater
 - Collect samples 2 times during 12 month assigned monitoring period
 - 5-7 months apart

- Surface Water
 - Everything except cyanotoxins - Collect 4 times during 12 month assigned monitoring period
 - 3 months apart
 - Cyanotoxins - Collect 2 times per month for 4 consecutive months during assigned monitoring period (8 sampling events)
 - Between March and November

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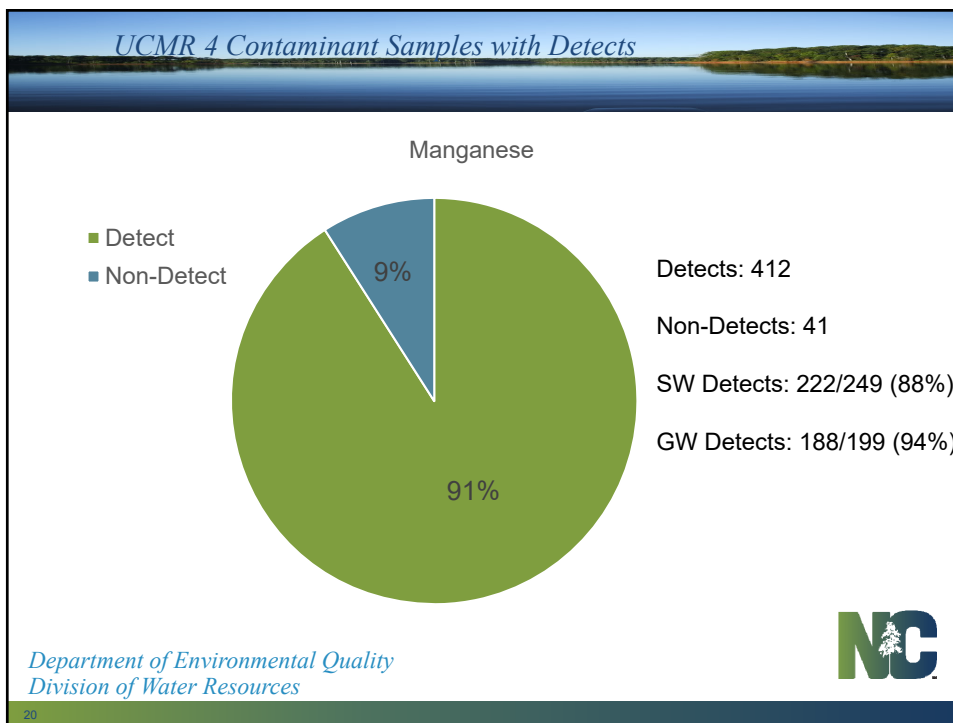
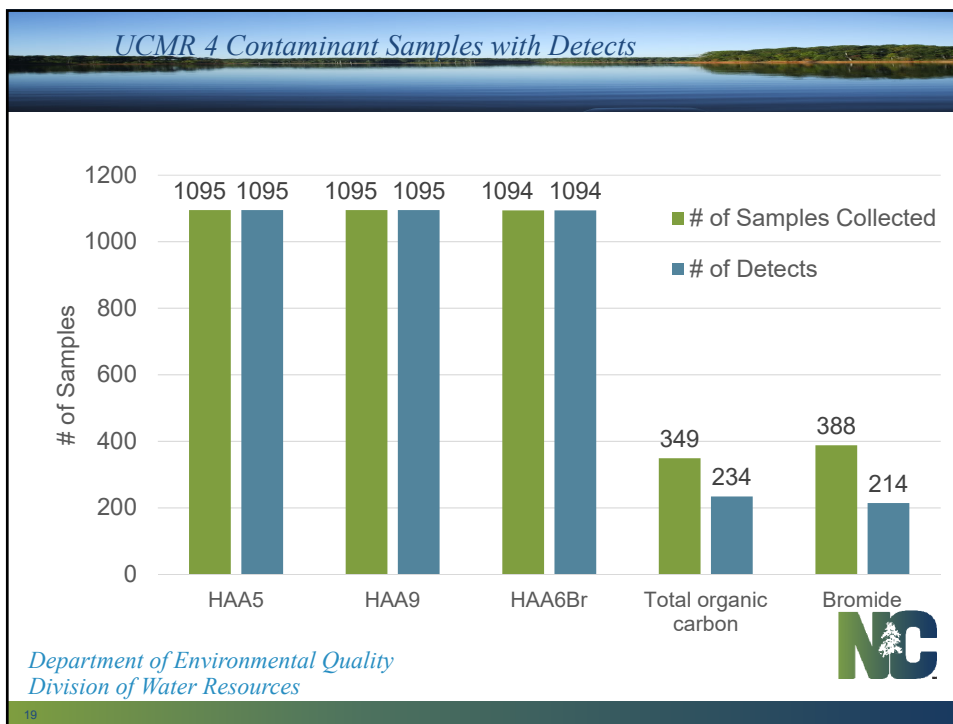
% of Samples Collected in UCMR 4

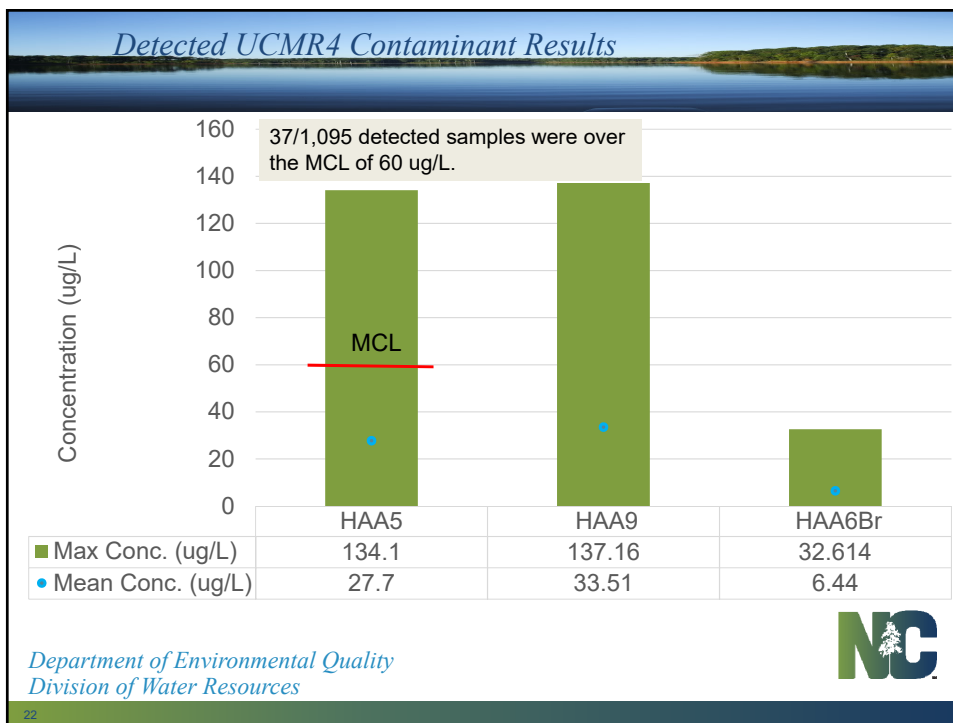
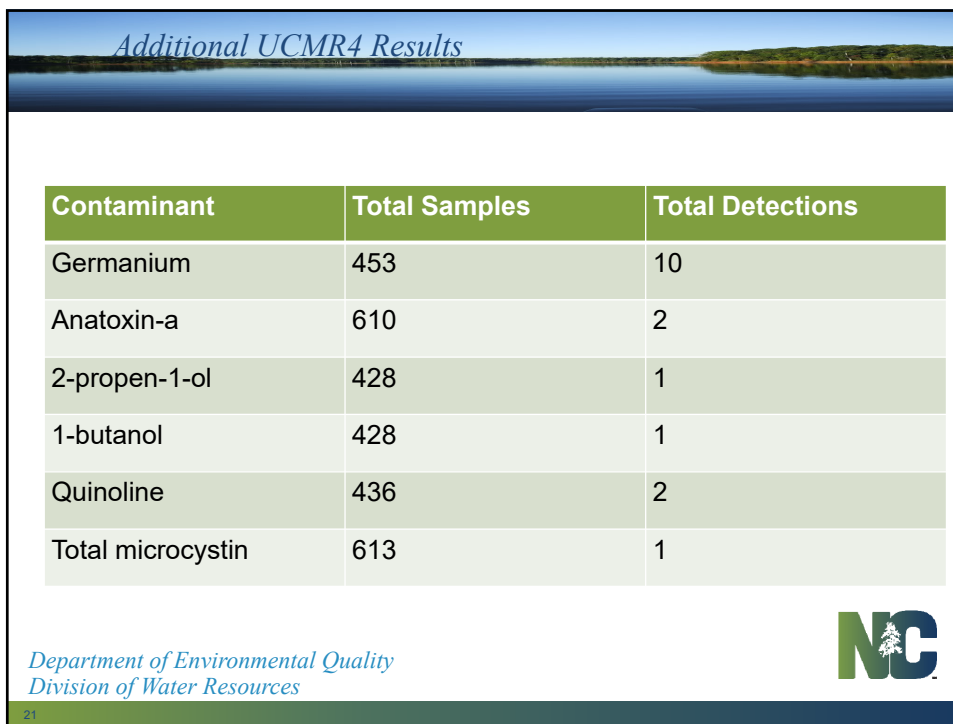


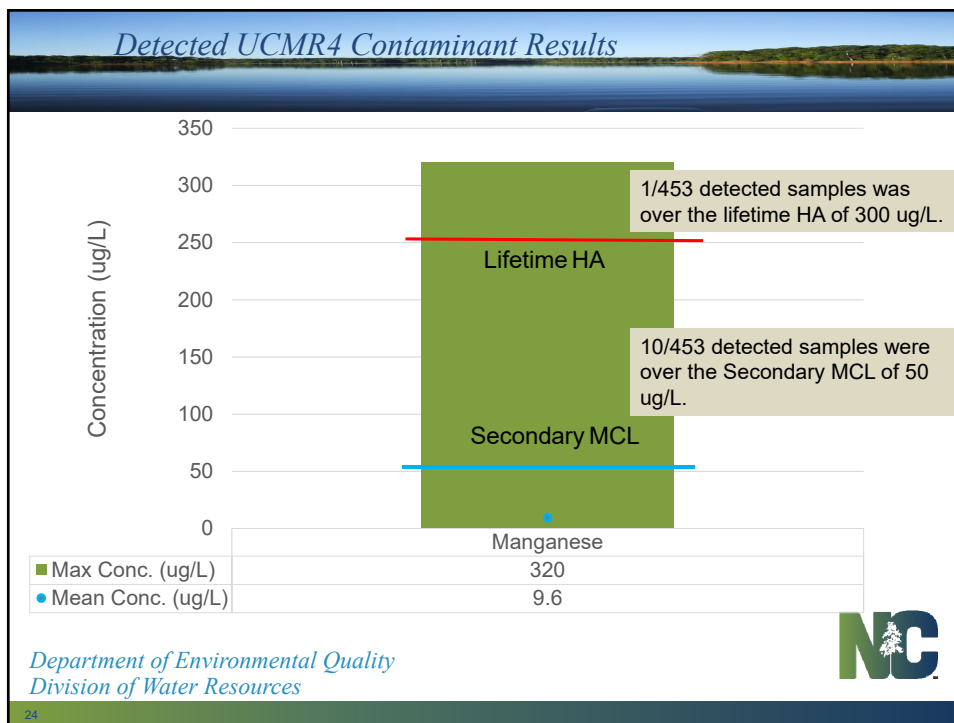
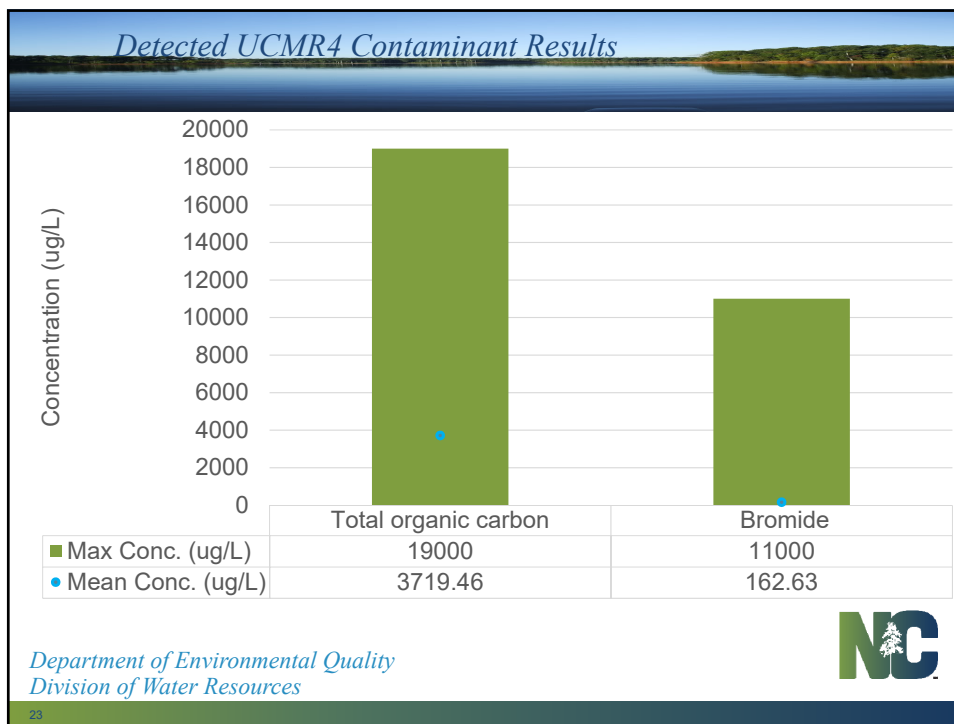
Category	Count	Percentage
# Detects	4,161	31%
# Non-Detects	9,161	69%
GW Detects	692	17% (of 3,957 total GW)
SW Detects	3,372	37% (of 9,177 total SW)
Water Systems with at least one detect	97	73% (of 133 total)

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Detected UCMR4 Contaminant Results

Analyte	Max Concentration (ug/L)
2-propen-1-ol	1.7
1-butanol	6.3788
Germanium	0.93
Total microcystin	0.79
Anatoxin-a	0.068
Quinoline	0.0357

Note: there is currently no available health advisory data to go along with these contaminants.

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Summary

- UCMR 4 Data:
 - 12/30 UCMR4 contaminants detected so far
 - 31% of total samples were detects
 - 97/133 Water Systems sampled (73%) had at least one detection
 - HAA group and Manganese - highest sampling detect rate (100% & 91%)
 - Many contaminants currently have no health advisory information

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References

- EPA UCMR4 reference materials
- UCMR4 Primer by Andy Eaton with Eurofins

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Thank You!



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Safe Drinking Water Act

- 1974 – SDWA authorized EPA to set enforceable health standards for contaminants in drinking water
 - National Primary Drinking Water Regulations (NPDWRs)
- 1986 – SDWA amendments were the basis for the original UCMR
 - State drinking water programs managed the original Unregulated Contaminant Monitoring program
 - PWSs serving >500 people required to monitor



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UCMR4 Applicability

- All large Community water Systems and Non-transient non-community water systems serving more than 10,000
- Nationally representative sample of small CWSs and NTNCWSs
- Transient non-community water systems are not required to monitor

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UCMR4 EPA Cost Estimates (w/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.

Cyanotoxin Health Advisories

Analyte	EPA Health Advisory
Total Microcystins (Includes all individual analytes)	1.6 ug/L (ten-day HA for school-age children and adults); 0.3 ug/L (ten-day HA for bottle-fed infants and young children)
Cylindrospermopsin	3 ug/L (ten-day HA for school-age children through adult); 0.7 ug/L (ten-day HA for bottle-fed infants and young children)

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