

LT2 Rule

Second Round of Source Water Monitoring

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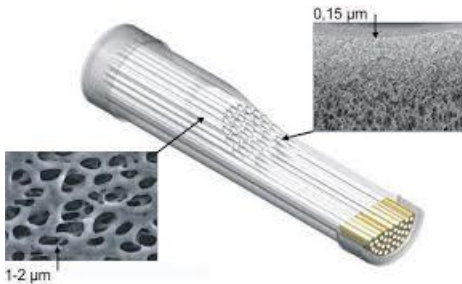


Purpose of LT2 Rule



Monitoring:

The primary purpose of the LT2 Rule is to find raw water sources that have elevated levels of *Cryptosporidium*.



Treatment:

Provide additional *Cryptosporidium* treatment to better protect public health.

Ohio Administrative Code Rules

The federal LT2 rules have been adopted into the Ohio Administrative Code.

- OAC Rule 3745-81-64
- OAC Rule 3745-81-65
- OAC Rule 3745-81-66
- OAC Rule 3745-81-67
- OAC Rule 3745-81-68
- OAC Rule 3745-81-69
- OAC Rule 3745-81-27
- OAC Rule 3745-89-11



Staggered Implementation

- Schedule 1s: Population >100,000
- Schedule 2s: Population 50,000 to 100,000
- Schedule 3s: Population 10,000 to 50,000
- Schedule 4s: Population less than 10,000



LT2 Rule

Round One

- Monitoring (*Cryptosporidium*, *E. coli* counts, turbidity): 2006- 2012
- Treatment: 2012-ongoing

Round Two

- Monitoring (*Cryptosporidium*, *E. coli* counts, turbidity): 2015-2021
- Treatment: Three to five years following completion of monitoring



Ohio LT2 First Round Monitoring Results

	Total number of systems	Number of systems required to provide additional treatment (ALL BIN 2)
Schedule 1	9	1
Schedule 2	8	0
Schedule 3	43	7
Schedule 4	61	2
Total	121	10



What are the deadlines for monitoring?

	Sampling Plan Deadline	Begin Monitoring Deadline
Schedule 1 <i>(at least 100,000 people)</i>	January 1, 2015	April 1, 2015
Schedule 2 <i>(50,000 to 99,999 people)</i>	July 1, 2015	October 1, 2015
Schedule 3 <i>(10,000 to 49,999 people)</i>	July 1, 2016	October 1, 2016
Schedule 4— monitoring for E. coli <i>(Less than 10,000 people)</i>	July 1, 2017	October 1, 2017
Schedule 4— monitoring for Cryptosporidium	January 1, 2019	April 1, 2019

LT2 Sampling Plans

- Contact information
- Notes on sampling
- Sampling location worksheet
- Schematic showing sampling location in proximity to treatment
- Calendar (Field samples and matrix spike samples)

Sampling Plan:

Contact Information>> Cryptosporidium Laboratory

Acceptable Labs/Acceptable Methods for *Cryptosporidium* (2nd Round)

- Analytical Services (USEPA 1623, USEPA 1623.1)---Vermont
- EMSL Analytical (USEPA 1623.1)----New Jersey
- Environmental Associates (USEPA 1623)----New York
- Eurofins Easton Analytical (USEPA 1623)----New York
- McCoy & McCoy Laboratories (USEPA 1623)----Kentucky
- Mohawk Valley Water Authority (USEPA 1623)----New York
- Scientific Methods (USEPA 1623, USEPA 1623.1)----Indiana

Contact information at:

<http://epa.ohio.gov/Portals/28/documents/reporting/lt2/Ohio%20accepted%20Crypto%20Labs%20List.pdf>



Sampling Plan:

Contact Information>> E. Coli Lab Information

Acceptable E. Coli Methods for 2nd Round

- Standard Methods 9221B.1/9221F (Multiple tube/mpn)
- Standard Methods 9223B (Colilert-multiple tube/multiple well)
- Standard Methods 9222B/9222G (Membrane Filtration, two step)
- Standard Methods 9222D/9222G (Membrane Filtration, two step)
- Standard Methods 9213D/EPA Method 1103.1 (mTEC)(Membrane filtration, one step)
- EPA Method 1603 (modified mTEC)
- EPA Method 1604 MI medium (Membrane filtration, one step)
- M-ColiBlue24 Broth (Membrane filtration, one step)

Acceptable E. coli Labs:

http://epa.ohio.gov/Portals/28/documents/labcert/February2015_MicroList.pdf



Schematic: Sample Location

- Requirements for Location:
 - Before any type of treatment
 - Before any recycled flow is introduced back into the treatment flow
- Multiple sources:
 - System must sample from the source water in use on the designated sampling date following normal operating practices.

Sampling Plan: Calendar of sampling dates

- 24 sampling dates (at least)
- 2 matrix spike sampling dates (1 for every 20 samples)---as required by standard methods.
- Most systems choose Wednesday sampling dates since you are allowed to collect samples 2 days before or 2 days after the date. That puts sampling in the Monday through Friday workweek.

Monitoring:

What parameters must be monitored?

Schedules 1, 2, and 3 are required to monitor at least once a month for 24 months for the following:

Cryptosporidium

+ 2 Matrix Spike Samples

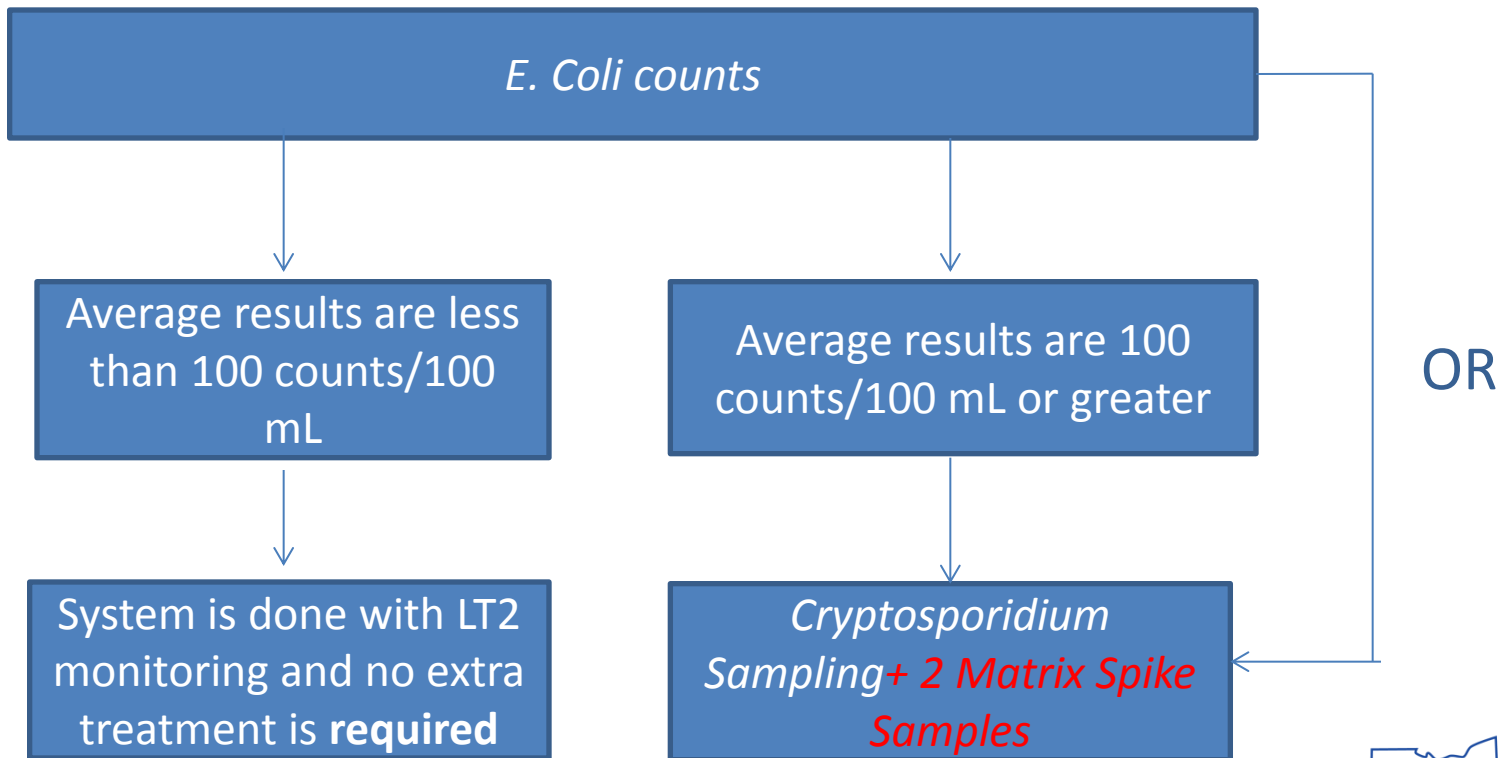
E. Coli counts

Turbidity

Monitoring:

What parameters must be monitored?

Schedule 4 systems are required to once every two weeks for 12 months for:



Monitoring:

What parameters must be monitored?

Schedule 4 *Cryptosporidium* monitoring:

- Twice a month for 12 months; or
- Once a month for 24 months

(+ 2 Matrix Spike Samples)

Analyzing Sampling Results

- 48 samples or more:
 - Arithmetic mean of all samples
- 24-47 samples:
 - Highest arithmetic mean of all samples in any 12 consecutive months
- Schedule 4s that sample in 12 months:
 - Arithmetic mean of all samples

Spreadsheet Available at:

<http://water.epa.gov/lawsregs/rulesregs/sdwa/lt2/compliance.cfm>



Monitoring Results: Bin Classification

Water treatment plants are placed into one of four bins based on the results of *Cryptosporidium* monitoring.

Bin 1	Cryptosporidium < than 0.075 oocysts/L;
Bin 2	0.075 oocysts/L to < 1.0 oocysts/L
Bin 3	1.0 oocysts/L to <3.0 oocysts/L
Bin 4	3.0 oocysts/L and greater

Bin Classification:

How much additional *Cryptosporidium* treatment is required?

- Treatment requirements for plants that use conventional (including softening) and alternative treatment plants.

	Conventional or Alternative	Total Cryptosporidium removal
Bin 1...	No additional treatment	No additional treatment
Bin 2...	1-log treatment	Total Crypto treatment is at least 4.0 log
Bin 3...	2-log treatment	Total Crypto treatment is at least 5.0 log***
Bin 4...	2.5 log treatment	Total Crypto treatment is at least 5.5 log***

***At least 1 log made up of bag filters, bank filtration, cartridge filters, chlorine dioxide, membranes, ozone or UV.



Treatment

“Toolbox Options”

- Source
 - **Watershed Control Program (0.5 log)**
 - Alternative Source/ Intake Management (no specific prescribed credit)
- Pre Filtration
 - Presedimentation with coagulation (0.5 log)
 - **Two Stage Lime Softening (0.5 log)**
 - Bank Filtration (0.5 log)
- Treatment Performance
 - **Combined Filter Performance (0.5 log)**
 - **Individual Filter Performance (0.5 log)**
 - Demonstration of Performance (no specific prescribed credit)
- Additional Filtration
 - Bag or Cartridge Filters (up to 2.5 log based on demonstration)
 - **Membrane Filtration (Based on demonstration)**
 - **Second Stage Filtration (i.e. GAC contactors) (0.5 log)**
 - Slow Sand Filters (2.5 log when used as secondary filtration)
- Inactivation
 - Chlorine Dioxide (log credited based on CT tables)
 - Ozone (log credited based on CT tables)
 - **UV (log credit based on CT tables)**



Cryptosporidium Monitoring For LT2

THINGS TO DO!

- ☑ Learn about LT2
- ☑ Preparation For Sampling
- ☑ Implementation
- ☑ Follow-Up

Learning About LT2

- Attend the OTCO Analysts Workshop and/or other trainings which are offered.
- Go to the Ohio EPA Web Site:
www.epa.ohio.gov/ddagw - Topics Index
 - “Reporting”
 - “Forms and Instructions”
 - “LT2”
 - Lists of Approved Labs (Crypto and E-Coli)
 - Guidance Manuals (on US EPA Web Site Link)
 - US EPA web link
 - Fact Sheets



LT2 SOURCE WATER MONITORING GUIDANCE MANUAL FOR PUBLIC WATER SYSTEMS

ABOUT THE MANUAL

- This is a US EPA Manual
- The Source Water Monitoring Guidance Manual is targeted towards:
 - Laboratories
 - Public Water Systems
 - Administrators (Regulatory Personnel)
- Note: Grandfathering of data not allowed in round 2



ABOUT THE MANUAL (Continued)

- Section 2 - Lab Contracting (PWSs will have to use an out-of-state laboratory).
- Manual may be somewhat outdated, should still be applicable in most circumstances.
- DCTS is not being used
- Ignore References to “unfiltered” systems (not allowed in Ohio).
- There is a separate Microbial Laboratory Guidance Manual for labs to use.



ABOUT THE MANUAL (Continued)

- Appendix E contains LT2 Sample Collection Schematics
- Tools for developing your schematic particularly if:
 - You have multiple raw water sources
 - Your flow from each source varies (proportioning)
 - Chemical Pre-Treatment
 - Recycle Flow
 - Pre-Sed Basins
 - Water Systems which operate part time or on a seasonal basis.



Figure 8. Raw Water Off-Stream Storage

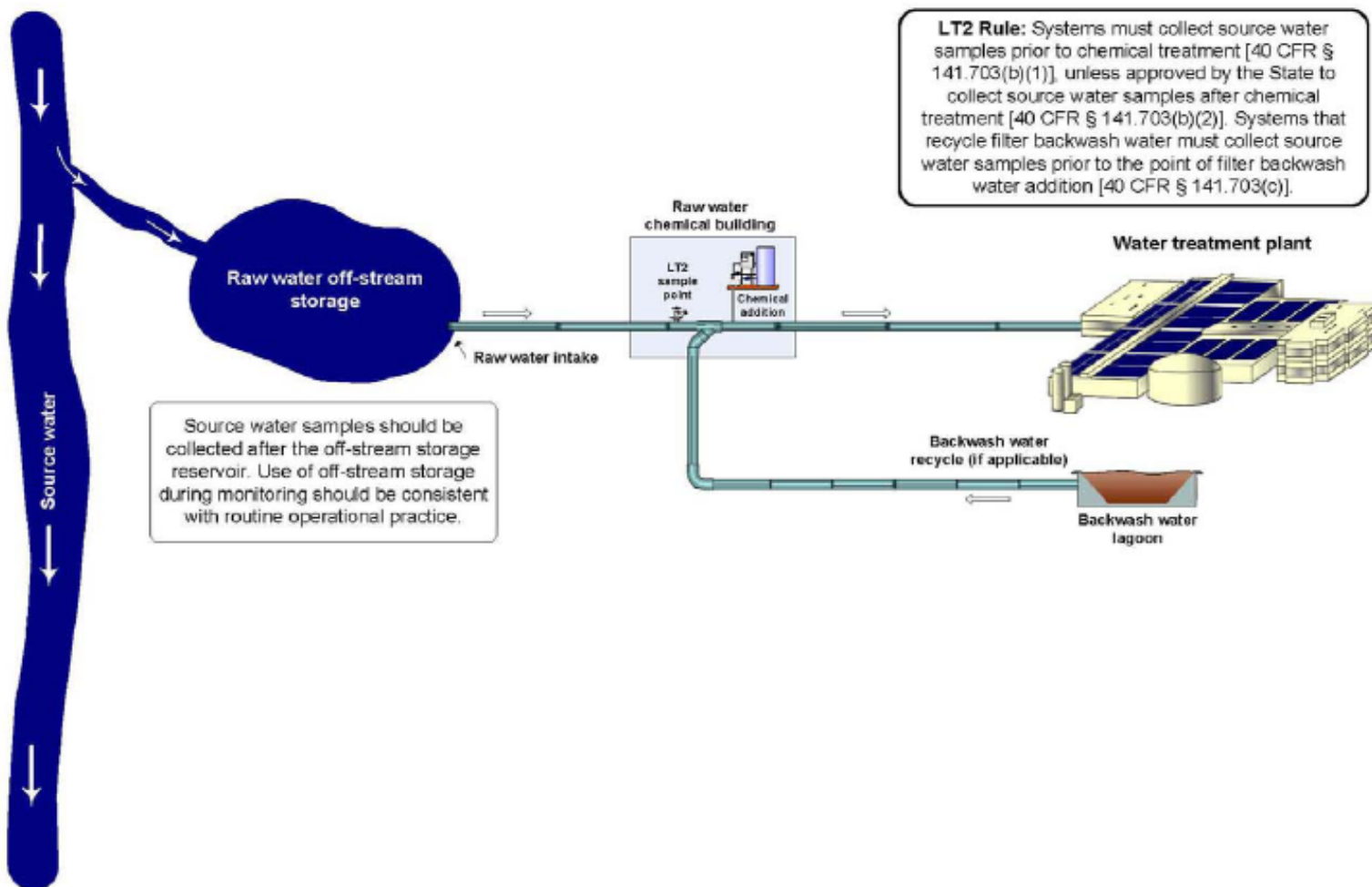


Figure 10. Blank Schematic for Submission to EPA

Public Water System (PWS) name: _____
 PWS ID: _____
 Water treatment plant name: _____
 Water system facility ID: _____

Indicate the following on the diagram that best represents your facility type (if applicable):

1. LT2 sampling location
2. Points of chemical treatment prior to the treatment plant
3. Filter backwash water addition
4. Pretreatment processes (e.g., presedimentation basins, bank filtration)
5. Multiple source waters (show by adding additional sources)



Preparing for LT2 “Round 2”

- A letter and “packet” will be mailed to each water system in advance of their sampling date.
- Preparation of a sampling plan is required. The sampling plan will include submission of a schedule for Cryptosporidium (and E-Coli and Turbidity) monitoring as well as a plant schematic showing the raw water sampling point.
- Prepare for the financial commitment of 2 years of Cryptosporidium Monitoring (rough estimate 4,000 – 5,000 dollars per year). Schedule 4 systems will be less because they are only required to monitor for E-Coli in the first year.



Preparing for LT2 (Continued)

- Costs will vary depending on the lab, type of sampling (on-site filtration or bulk sampling), shipping etc.
- Personnel commitment (ensure you have a primary and a “back-up” sampler).
- Supplies (purchase or rent). Usually sampling apparatus supplied by the lab. Filters are purchased for each event.
- Matrix Spike samples are always bulk samples, and therefore will cost more to ship.



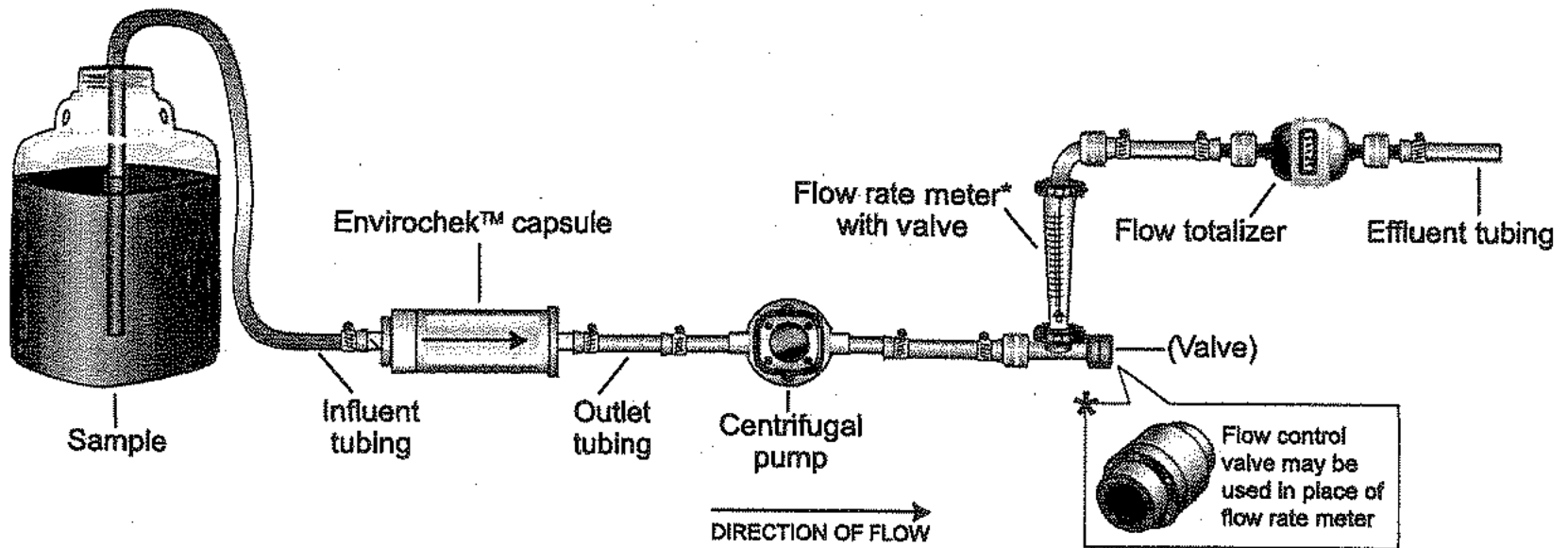
Implementation of LT2 Monitoring

- Begin sampling during prescribed time periods in accordance with your approved monitoring plan.
- Be sure to review sampling protocol and SOPs prior to sampling.
- Review the Source Water Guidance Manual prior to sampling:
 - Apparatus set-up and supplies
 - Filter Clogging or potential sampling issues (prior to them occurring!)
 - Sample Submission Information
 - Shipping Arrangements



Filter Set-Up Example From Source Water Monitoring Guidance Manual

Figure 3. Sample System Setup for Collecting *Cryptosporidium* Samples from an Unpressurized Source



Implementation of LT2 Monitoring (Continued)

- ✓ The Crypto sample must be maintained at less than or equal to 20 degrees Celsius during shipping, but not frozen. (Some labs supply dry ice for shipping).
- ✓ Holding times: The laboratory must begin “elution” of the sample no more than 96 hours (4 days) of the collection date and time.
- ✓ The laboratory also prepares the concentration, purification and slide preparation within the same day as the elution step.
- ✓ The slide is stained within 72 hours of preparation, and the slide is examined within 168 hours (seven days) of staining.
- ✓ Oocyst calculation is based on total volume of sample analyzed.



Implementation of LT2 Monitoring (Continued)

- Proper submission of data to Ohio EPA:
 - ✓ Cryptosporidium results are to be submitted on the Cryptosporidium Monitoring Form to Ohio EPA Central Office, Attention: Judy Stottsberry - via fax (614) 644-2909 or email (preferred) judy.stottsberry@epa.ohio.gov
 - ✓ **For labs located inside Ohio**, E-Coli and Turbidity results are to be submitted electronically through the eDWR.
 - ✓ **For labs located outside of Ohio**, E. Coli results are to be submitted on the E-Coli and Turbidity Monitoring Form to Ohio EPA Central Office, Attention: Judy Stottsberry - via fax (614) 644-2909 or email judy.stottsberry@epa.ohio.gov



Implementation Of LT2 (Continued): Seasonal Schedule 4 Systems

- In lieu of Cryptosporidium monitoring, schedule 4 systems (those which serve less than 10,000 people) may conduct E-Coli Monitoring :
- If operating year-round - monitor for *E.Coli* at least every two weeks for one year (minimum of 26 samples).
- Seasonal systems that operate at least 6 months out of the year must collect samples every two weeks during the period of operation, for one year.
- Seasonal systems that are open less than 6 months would collect 12 samples, evenly spaced throughout the period the system is open, for one year



Implementation of LT2 Monitoring (Continued)

- Notify Ohio EPA if, for any reason, a sample was not collected or analyzed (i.e. collection protocol was not followed, shipping problems, failure to maintain quality control).
- Matrix Spike Samples are always “bulk” samples. Take the matrix spike sample early in the sampling regiment. One matrix spike sample is required for every twenty *Cryptosporidium* samples.
- Failure to sample properly could cost \$\$\$\$\$ and result in violations (you want to avoid this).



Follow-Up to Monitoring for LT2

- Bin Calculation is to be performed by the PWS and submitted to Ohio EPA Central Office within 6 months following monitoring.
- Section 6 of the Source Water Monitoring Guidance Manual For Public Water Systems provides guidance on Bin Calculations.
- PWS will receive notification from Central Office regarding formal determination of Bin Classification.
- Work with your Ohio EPA District Representative if you are in a “Bin” Classification greater than 1.



Ohio EPA Office	LT2 Representative	Phone Number	E-mail Address
Northwest District Office	Justin Bowerman	419-352-8461	justin.bowerman@epa.ohio.gov
Northeast District Office	Anne Karney	330-963-1200	anne.karney@epa.ohio.gov
Southwest District Office	Dan Cloyd	937-285-6357	robert.cloyd@epa.ohio.gov
Southeast District Office	Russell Flagg	740-385-8501	russell.flagg@epa.ohio.gov
Central District Office	Mike Santone	614-728-3778	michael.Santone@epa.ohio.gov
Central Office	Judy Stottsberry (Group Leader)	614-644-2752	judy.stottsberry@epa.ohio.gov

Ohio EPA, Division of Environmental Services Representatives:

Mark Tomasi, Laboratory Certification Officer, 614-644-4067, mark.tomasi@epa.ohio.gov

Charles Vasulka, Laboratory Certification Officer, 614-644-4266, charles.vasulka@epa.ohio.gov

