

How Do You Evaluate The Results?

- Results are reported in mg/L (ppm) or ug/L (ppb)
- The 90th percentile is calculated and compared to the Action Levels (ALs)
- ALs are based on the practical feasibility of reducing lead through controlling corrosion
- AL vs MCL (Maximum Contaminant Level)
- MCLG = Maximum Contaminant Level Goal

Lead AL = 0.015 mg/L (15 ug/L)

Copper AL = 1.3 mg/L (1300 ug/L)



The MCLG is 0 mg/L

The MCLG is 1300 mg/L

Why Monitor (and evaluate) ?

- Health risks
 - Lead - especially to infants, pregnant women and young children
 - Copper – person's with Wilson's disease
- Water is the universal solvent (corrosive)
 - Breaks down pipe materials
 - Lead and copper are indicators of corrosion
- Lead in plumbing & fixtures
 - Dissolved in the water
 - Particulate release – gets trapped in aerators

How Many Samples Are Required?

LCR Tap Monitoring Requirements:

Required number of sample sites determined by water supply population served

Supply Size (# of People Served)	Number of Sites (Standard Monitoring)	Number of Sites (Reduced Monitoring)
More than 100,000	100	50
10,001 - 100,000	60	30
3,301 – 10,000	40	20
501 – 3,300	20	10
101 - 500	10	5
Fewer than 101	5	5

How Often Do You Sample?

- Depends on several factors
 - Sampling history
 - Water quality & treatment
 - Compliance with the rules
- Frequency Possibilities
 - Semi-Annual (6 month intervals)
 - Annual
 - Triennial (every 3 years)

2018 Monitoring Schedule

ABC Water Utility

WSSN: 12345

Collect samples early in the monitoring period. This schedule reflects your expected routine monitoring and is subject to change. To receive credit for monitoring, include the **WSSN, Site Code, and County** on your request for analysis form. Collect Bacteriological and Automated Partial Chemistry samples close to the shipping time and send overnight delivery. Send all sample results to your Department of Environmental Quality (DEQ) district office unless you use the DEQ laboratory. Test codes, sample units, and costs are listed to help you complete the DEQ laboratory form. Prices are subject to change without notice. The DEQ laboratory is closed on state holidays.

Location: Plant Tap (Well No. 1 and 2)

Collect these samples at the entry point to the distribution system (after treatment, if applicable.)

Sample Type	# Samples/ Frequency	Collect Before	Site Code	Fee	Unit Number	Test Code
Automated Partial Chemistry	This DEQ lab scan includes nitrate, nitrite, fluoride, and sodium whose monitoring frequency requirements differ from one another. Before requesting analyses from a laboratory other than the DEQ laboratory, check with your DEQ district staff for the specific monitoring requirements.					
	1/12 months	09/30/2018	CH500	\$18.00	32	R
Volatile Organic Compounds	1/36 months	09/30/2020	CH500	\$100.00	36VO	CXVO
Complete Metals	1/108 months	09/30/2020	CH500	\$102.00	36ME	CMET2
Arsenic	Included in Metals	Included in Metals	CH500	\$18.00	36ME	CAS
Cyanide	1/108 months	09/30/2020	CH500	\$25.00	36CN	CCN
SOC – Pesticides	1/36 months	09/30/2020	CH500	\$125.00	36PT	CXPT
SOC – Herbicides	1/36 months	09/30/2020	CH500	\$120.00	36HB	CXHB
SOC – Carbamates	1/36 months	09/30/2020	CH500	\$120.00	36LP	CXLP
Gross Alpha (Radiological)	1/108 months	09/30/2024	CH500	Not performed at the DEQ Laboratory. A list of certified labs is at www.michigan.gov/DEQ . Select Water, Drinking Water, Community Water Supply, then Certified Labs under Programs and Activities.		
Radium 226 & Radium 228	1/72 months	09/30/2021	CH500			

Location: Distribution System

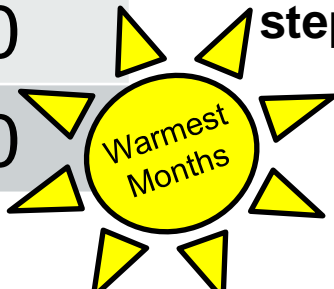
Sample Type	Collect Samples According to the ...	# Samples/ Frequency	Collect	Site Code	Fee	Unit Number	Test Code
Bacteriological – coliforms	TCR Sampling Site Plan	1/Monthly	Monthly	DIST	\$16.00	30	BPTC
Lead Copper for Corrosion Control	Lead and Copper Sampling Pool	5/36 months	Between 06/01 and 9/30/2018	DIST	\$26.00	36CC	CCUB

What is a Monitoring Period?

- The length or portion of time to collect samples
- Can collect at any time between these dates
- “Compliance period”

	Sampling Frequency	Monitoring Period	
Standard monitoring →	Semi-Annual	Jan-Jun	or Jul-Dec
Reduced monitoring and reduced sites ←	Annual	Jun 1 – Sept 30	
	Triennial	Jun 1 – Sept 30	

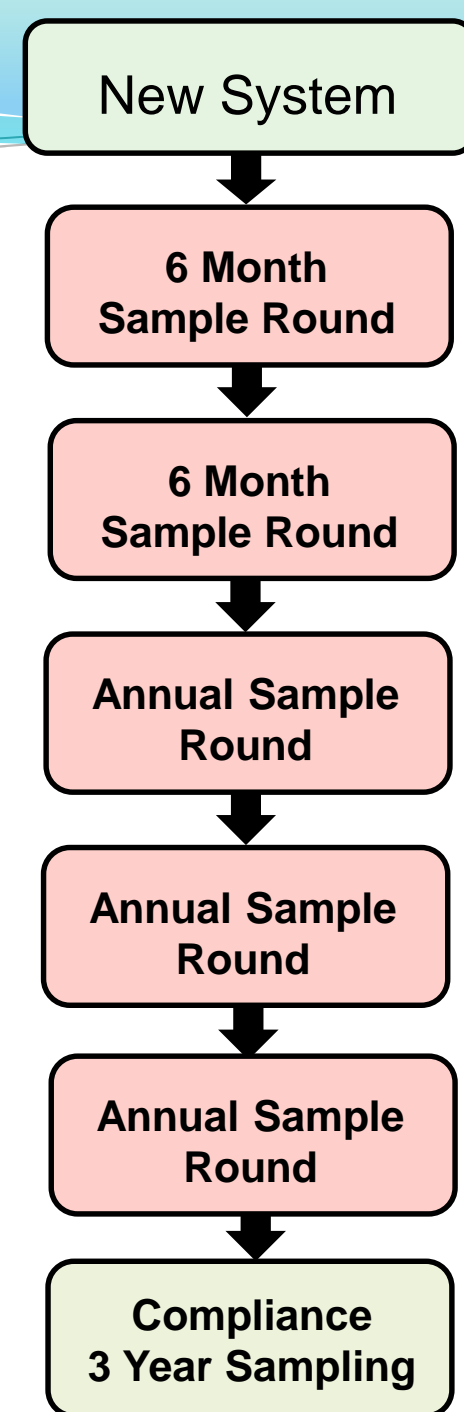
← ALE Exceptions: not required during some CC steps



Typical pathway to reduction (LCR)

Systems are eligible for reduction after demonstrating lead and copper levels below the Action Level or WQPs within set ranges.

Reduction is a privilege, not a right.



Reduced Monitoring

6-Month Annual

- Small and medium systems ($\leq 50,000$)
 - Two consecutive 6-month rounds \leq ALs for both lead and copper
- Systems without Corrosion Control Treatment (CCT)
 - Meets optimal WQP AND two consecutive 6-month rounds \leq ALs

Accelerated reduced monitoring
Two consecutive 6-month rounds
90th percentile levels ≤ 0.005 mg/L for
lead and ≤ 0.65 mg/L for copper

Reduced Monitoring

Annual **➔** Triennial

- Systems without Optimum Corrosion Control Treatment (OCCT)
 - Small and medium systems ($\leq 50,000$)
 - Three consecutive years of monitoring \leq ALs
 - Any system
 - Meets optimal WQP AND three consecutive years of monitoring \leq ALs
- Supplies with OCCT
 - new rules (next slide)

Reduced Monitoring for Supplies with OCCT

- The water supply cannot reduce to triennial lead and copper tap monitoring unless...
 - They meet water quality parameter ranges
AND EITHER
 - They have no lead services lines or
 - They have three annual rounds of sampling **≤ 0.005 mg/L** for lead and **≤ 0.65 mg/L** for copper

How to Conduct Lead and Copper Compliance Tap Sampling



Pre-Sampling Preparation



Order Bottles
Order Early!
Order Extra!

- **Do Not Use** any small/narrow mouth bottles you may have lying around....

Pre-Sampling Preparation

Michigan.gov/lcr

DEQ | WATER | DRINKING WATER | COMMUNITY WATER SUPPLY

Lead and Copper Rule

The purpose of the Lead and Copper Rule (LCR) is to protect public health by minimizing lead and copper levels in drinking water, primarily by reducing corrosivity. Lead and copper enter drinking water mainly from corrosion of lead and copper containing plumbing materials. The rule establishes an action level (AL) of 0.015 milligrams per liter (mg/L) for lead and 1.3 mg/L for copper based on a 90th percentile level of tap water samples. An action level exceedance is not a violation but triggers other requirements to minimize exposure to lead and copper in drinking water, that include water quality parameter monitoring, corrosion control treatment, source water monitoring/treatment, public education, and lead service line replacement. All community water supplies are subject to the LCR requirements.

For more information on the [Lead and Copper Rule](#), including the final rules and the Web site of the U.S. EPA at <http://water.epa.gov/lawsregs/rulesregs/sdwa/lcr/index.cfm>

Preparing to conduct lead and copper tap monitoring? These tools are for you:

- [Lead and Copper Tap Sampling Checklist](#)
To avoid missing steps or deadlines, use this checklist as you prepare for and sampling and report results to MDEQ.
- [Sampling Instructions in Word and in Adobe Acrobat](#)
Samples are collected by the resident after the water has sat undisturbed for at least six hours in the morning or after returning from work. Water supplies need to provide very clear instructions to customers. Supplies may use these instructions.
- [Lead and Copper Report and Consumer Notice of Lead and Copper Results Certificate](#)
This form serves two purposes:
(1) [Lead and Copper Reporting \(pages 1 and 2\)](#): Report lead and copper sampling information to the DEQ within 10 days of the end of the monitoring period.
(2) [Consumer Notice of Lead and Copper Results \(pages 3 and 4\)](#): Within 30 days of receiving the results, notify occupants of homes tested of their individual results using the template on page 4. Certify to the DEQ that all requirements were met by completing the statement on the bottom of one example copy of a notice sent to a customer.
Note: Refer to instructions (pages 5 and 6) when completing the form to be sure it is completed completely and accurately.

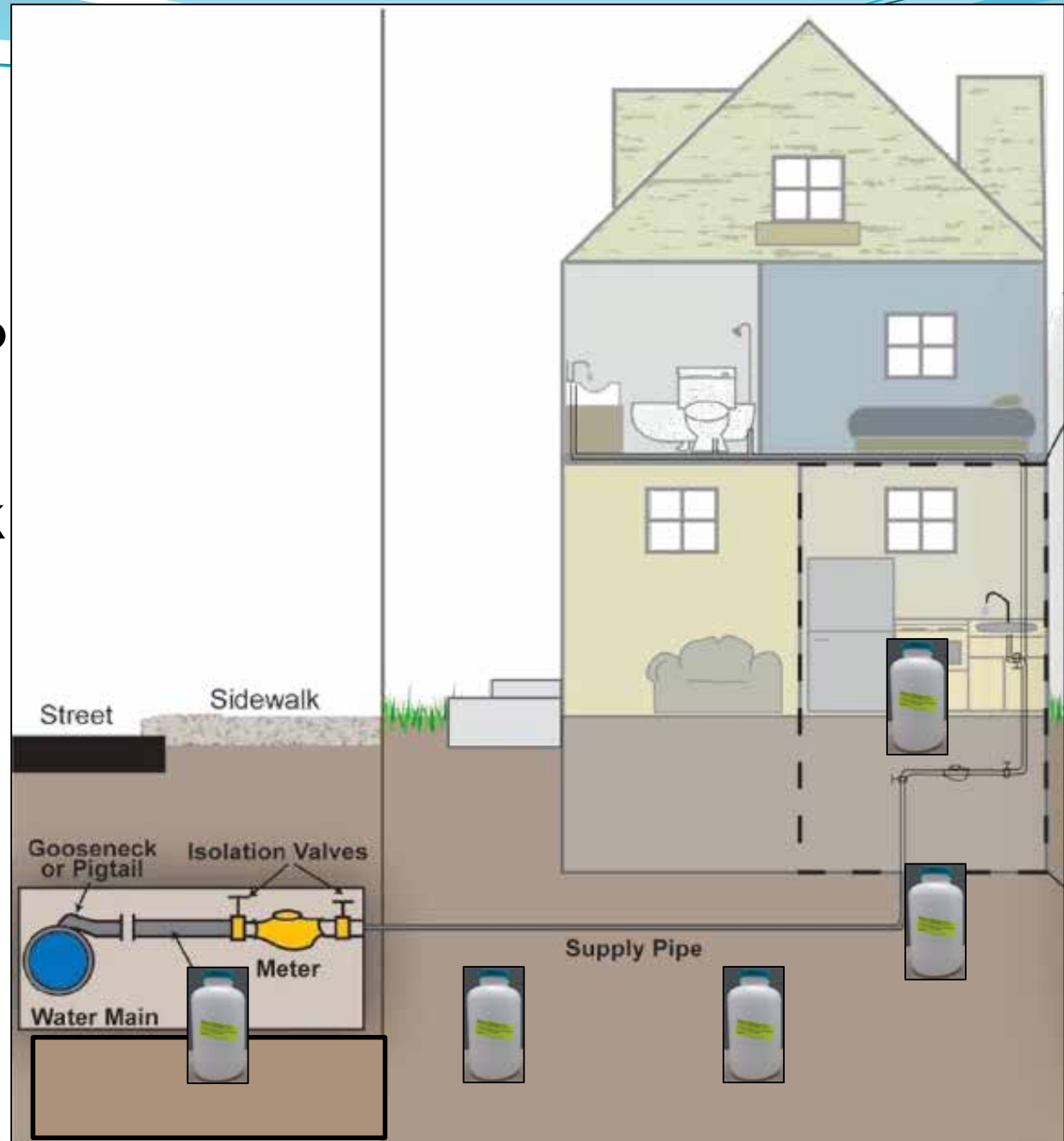
ALWAYS
go to EGLE website for
current reporting forms!

Who Collects the Samples?

- Water supply is ultimately responsible
- Rule allows customers to collect lead and copper tap samples ONLY when provided with proper instruction
 - Operator must make sure sample collection was done properly *before* sending sample to the lab
 - You don't have to accept the sample if you believe it was collected improperly

Why the 5th liter?

- Why collect a second sample?
 - The first draw sample does not always represent the highest risk to public health for a site with an LSL
- Why the fifth liter?
 - More likely to represent water in the LSL rather than in-home plumbing



Tap Sampling – 5th liter sample

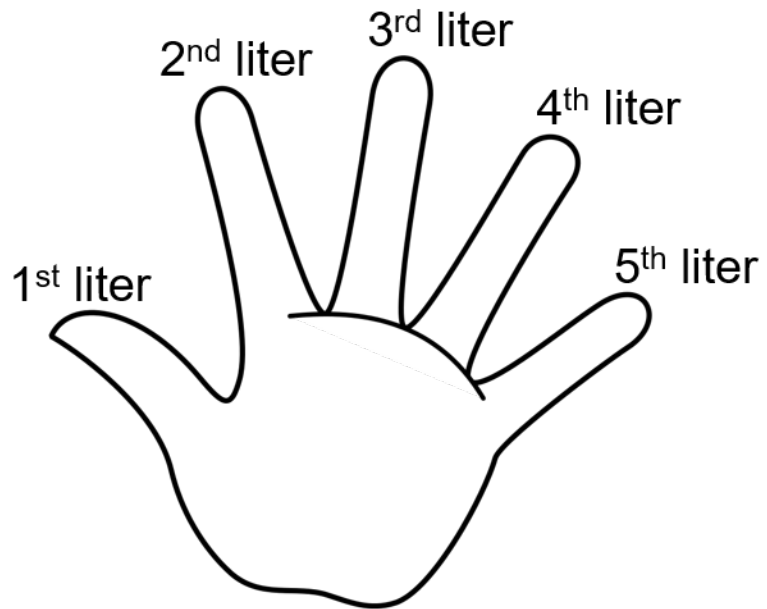


For EGLE lab:

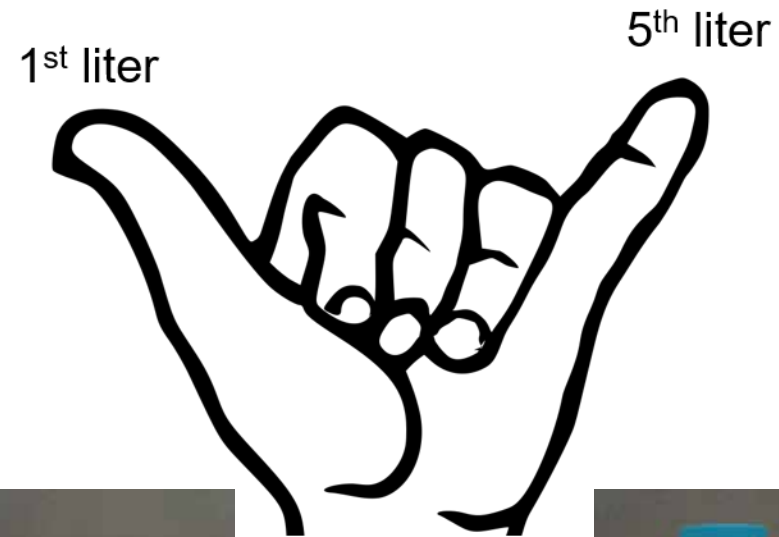
- 2nd through 4th liter are collected, but are not sent to the lab for analysis
- Bottles 2-4 do not have lids

Tap Sampling – Lead Service Lines

Collect



Keep



Tap Sampling – Lead Service Lines

1st liter

- 6hr stagnation
- 1st draw
- 1-L volume
- Wide-mouth bottle
- Cold water, kitchen or bathroom tap
- No filter or other device designed to remove inorganics
- Do not remove aerators
- Do not systematically flush

5th liter

- Collect first liter
- Collect and waste three liters
- Collect 5th liter
 - 1-L volume
 - Cold water, kitchen or bathroom tap
 - No filter or other device designed to remove inorganics
- DO NOT turn off tap between bottles
- DO NOT let any water run down the drain between bottles

Tap Sampling – Hold Time

- Samples must be to the lab and preserved within 14 days.
- Do not wait too long for that last sample!

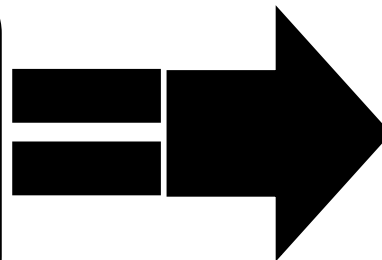


Evaluation of Tap Sample Results

- A statistical calculation is done with all results to find the “90th percentile” value
- The 90th is compared to the ALs to determine if treatment technique actions are needed
- If the values are below the ALs, it indicates that 90% of distribution system sites are in compliance with the LCR
- *A supply exceeds the 90th percentile if more than 10% of all samples are over the ALs*
- ALs are not health standards, they help determine if treatment changes are needed

90th Percentile Calculations

>15 ug/L (0.015 mg/L) Lead
>1300 ug/L (1.3 mg/L) Copper



Action Level Exceedance

90th Percentile Calculation Steps

Step 1: Place results in ascending order

Step 2: Assign each a number, 1 for the lowest value

Step 3: Multiply number of samples by 0.9*

–Example: 20 samples x 0.9 – 18th sample

Step 4: Compare result with action level

–Example above, 90th percentile is value of 18th result

* If number of samples x 0.9 is not a whole number, interpolation is used

90th Percentile Calculation Example

90th percentiles are now calculated using the highest lead and highest copper results from each site

- Applies to systems with lead services lines (1st and 5th liter samples)
- Any other system that collects multiple samples at the same site

	1st Liter		5th Liter	
	Lead (ppm)	Copper (ppm)	Lead (ppm)	Copper (ppm)
123 Main St	0.001	0.6	0	0.04
124 ABC Rd	0.001	0.2	0	0
125 North St	0.002	0.01	0.010	0
126 South Blvd	0.002	0.04	0.002	0.02
127 West Ave	0.002	0.025	0.030	0.01

90th percentiles
 Lead = 0.020 ppm
 Copper = 0.4 ppm

Lead ALE

What Happens if the 90th Percentile Exceeds an AL?

- Triggers numerous actions to be completed by the supply
- Extensive communication with the public
- Source review and sampling
- Increased monitoring frequency and numbers
- Increased LSL replacement (7%), if applicable

Lead Action Level Exceedance Activities

When an AL is exceeded for Lead, supplies must do the following:

- Return to standard lead and copper tap monitoring
- Conduct source water monitoring
- Return to standard water quality parameter monitoring
 - ⊗ pH, temperature, alkalinity, calcium, conductivity, orthophosphate or silicate (if applicable), chloride, sulfate
- Distribute Public Advisory - within 3 business days
- Distribute Public Education - within 60 days
- Distribute Consumer Notice of Lead and Copper Results
 - ⊗ 30 days from receipt of result
- Conduct Corrosion Control treatment steps (study, install, and demonstrate)
- Report the exceedance on the Consumer Confidence Report
- Lead Service Line replacement - at a rate of 7% per year if OCCT already in place

Copper Action Level Exceedance Activities

When an Action Level is exceeded for Copper, supplies must do the following:

- Return to standard lead and copper tap monitoring
- Conduct source water monitoring
- Return to standard water quality parameter monitoring
 - ∅ pH, temperature, alkalinity, calcium, conductivity, orthophosphate or silicate (if applicable), chloride, sulfate
- Distribute Consumer Notice of Lead and Copper Results
 - ∅ 30 days from receipt of result
- Conduct Corrosion Control treatment steps (study, install, and demonstrate)
- Report the exceedance on the Consumer Confidence Report

ALE Letter and Timetable

- Extensive letter detailing the triggered requirements
 - Emailed to supply, operator and District
- Provides a chronological list of requirements
 - Not on monitoring schedule
- Each requirement has the opportunity to be a monitoring, reporting or treatment technique violation

Timetable of Upcoming Requirements

Complete By	Requirement	Comments
Within three business days	Distribute a Public Advisory	Distribute a public advisory to inform all persons served by the water supply of the lead AL exceedance. Distribution of the notice must be in a form and manner designed to fit the specific situation and must be reasonably calculated to reach all persons served by the public water supply.
Right away	Deliver Consumer Notice of Lead and Copper Results to persons served at each site tested within 30 days of knowing the result.	Download Lead and Copper Report and Consumer Notice of Lead and Copper Results Certificate in Microsoft Word or PDF format from http://michigan.gov/deqleadcopper .
November 29, 2018	Perform PE activities including delivering PE materials to all consumers.	PE required activities are listed in enclosed template and checklist. Repeat every year until the lead AL is met in the most recent round of sampling.
November 30, 2018	Collect WQP samples.	Collect two sets of WQP samples from your <u>entry point</u> to the distribution system. Collect two sets of WQP samples at least 24 hours apart from ten locations in the distribution system. Repeat each lead and copper monitoring period until both ALs are met.
December 9, 2018	Send us certification of PE compliance along with a sample copy of the materials delivered.	Sample certification enclosed. Required within 10 days of PE distribution.
December 29, 2018	For the Jun-Sep 2018 monitoring, send us certification of consumer notice of lead and copper results compliance along with a sample copy of the notice delivered.	Download Lead and Copper Report and Consumer Notice of Lead and Copper Results Certificate in Microsoft Word or PDF format from http://michigan.gov/deqleadcopper .
Between January 1 and June 30, 2019	Collect 60 samples from the distribution system and have them analyzed for lead and copper.	Report the results to the DEQ and deliver the consumer notice of individual lead and copper results using the downloadable Lead and Copper Report and Consumer Notice of Lead and Copper Results Certificate. Report due July 10, 2019.
Between January 1 and June 30, 2019	Collect WQP samples.	Collect two sets of WQP samples from your <u>entry point</u> to the distribution system. Collect two sets of WQP samples at least 24 hours apart from ten locations in the distribution system. Repeat each lead and copper monitoring period until both ALs are met.
March 31, 2019	Collect one lead and copper sample from your entry point to the distribution system.	Repeat every third year until both ALs are met for the whole three-year period.
March 31, 2019	Submit a proposal for optimal corrosion control treatment or a corrosion control study.	Contact us for guidance on corrosion control options. Corrosion control study and treatment installation may cease if both ALs are met during two consecutive six-month monitoring periods.
July 1, 2019	Report the 2018 AL exceedance in the Consumer Confidence Report.	Specific lead health effects language must be included.
Between July 1 and December 31, 2019	Collect 60 samples from the distribution system and have them analyzed for lead and copper.	Report the results to the DEQ and deliver the consumer notice of individual lead and copper results using the downloadable Lead and Copper Report and Consumer Notice of Lead and Copper Results Certificate. Report due January 10, 2020.
Between July 1 and December 31, 2019	Collect WQP samples.	Collect two sets of WQP samples from your <u>entry point</u> to the distribution system. Collect two sets of WQP samples at least 24 hours apart from ten locations in the distribution system. Repeat each lead and copper monitoring period until both ALs are met.
September 28, 2019	For the Jan-June 2019 monitoring, send us certification of Consumer Notice of Lead and Copper results compliance along with a sample copy of the notice delivered.	Download Lead and Copper Report and Consumer Notice of Lead and Copper Results Certificate in Word or PDF format from http://michigan.gov/deqleadcopper .
March 31, 2020	For the July-Dec 2019 monitoring, send us certification of Consumer Notice of Lead and Copper results compliance along with a sample copy of the notice delivered.	Download Lead and Copper Report and Consumer Notice of Lead and Copper Results Certificate in Word or PDF format from http://michigan.gov/deqleadcopper .
March 31, 2022	Collect one lead and copper sample from your entry point to the distribution system.	Repeat every third year until both ALs are met for the whole three-year period.

Change in ALs

Lead

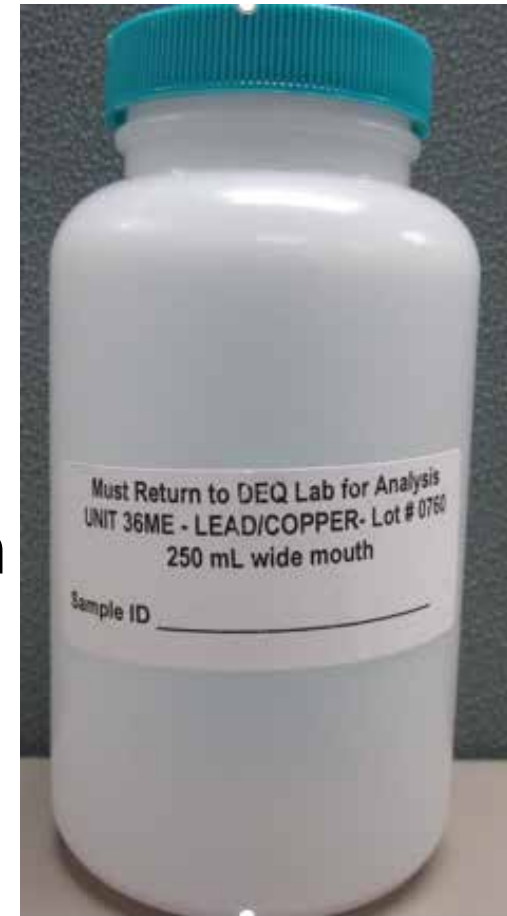
- The lead action level of 15 ppb remains in effect through December 31, 2024
- The new lead action level of **12 ppb** takes effect *January 1, 2025*

Copper

- The copper action level of 1.3 mg/L (1300 ppb) does not change

Lead and Copper - Investigative Sampling

- To locate potential source of lead/copper
 - Fixture, connective plumbing, valves, building pipes
- Use smaller bottle sizes (250 ml, or 125 ml)
 - Do not use a 1-liter bottle
- Proper investigation with multiple bottles
- First sample collected is 1st draw after 6 hrs. stagnation
- Report all results to EGLE



Lead Service Line Replacement Sampling

- In the event of an emergency partial LSLR, supply shall collect a sample at its expense within 72 hours after partial LSLR completion
 - 1st and 5th liter
 - 6-hr stagnation
- Supply shall report results to the customer w/in 3 business days of receiving the results

Water Quality Parameter (WQP) Sampling



What are Water Quality Parameters (WQP)?

- Alkalinity, pH, conductivity, temp, calcium, chloride, sulfate, and if used – orthophosphate & silica
- Used to determine the corrosivity of the water
- Helps EGLE determine the type of CCT that a system might need to install and how the treatment should be operated
 - For most water systems that require treatment, CCT is the primary mechanism for reducing lead and copper levels

What Are Optimal Water Quality Parameters (OWQP)?

- Specific ranges or minimums determined by the State for each relevant WQP
- Represent the conditions under which systems must operate their CCT to most effectively minimize lead & copper exposure at users' taps

WQP Monitoring

- WQP sampling is now required for *all* supplies with OCCT, and all other supplies exceeding an action level
 - Includes smalls and mediums
- WQPs have been expanded to include chloride and sulfate
- Compliance with WQP ranges necessary to be eligible for reduced tap monitoring
 - WQP monitoring can reduce to annual if criteria is met, but can no longer be reduced to triennial monitoring
- Rules clarified to require establishment of WQP ranges in the distribution system

WQP Monitoring - Sites

Required number of sample sites determined by water supply population served

Supply Size (# of People Served)	Number of Sites (Standard Monitoring)	Number of Sites (Reduced Monitoring)
More than 100,000	25	10
10,001 - 100,000	10	7
3,301 – 10,000	3	3
501 – 3,300	2	2
101 - 500	1	1
Fewer than 101	1	1

- Standard Monitoring – Six Month Monitoring
- Reduced Monitoring – Six Month or Annual Monitoring

WQP Monitoring - Frequency

Sampling for non-CCT systems in response to an ALE

- Each point of entry (POE) and # of locations in the distribution system
- 6-months from the beginning of the monitoring period
 - November 30 – Summer monitoring period
 - June 30 – Jan 1-June 30 monitoring period
 - December 31 – July 1-December 31 monitoring period
- Two sets of samples required each monitoring period
 - Quarterly

Continued ALE à Corrosion Control treatment steps and eventual installation and transition to sampling requirements for CCT systems

WQP Monitoring - Analytes

BEFORE INSTALLING CCT		
Entry Point & Distribution		
WQP1a	WQP1b	WQP1c
No inhibitor used	Phosphate inhibitor used	Silicate inhibitor used
pH alkalinity calcium conductivity temperature sulfate chloride	pH alkalinity calcium conductivity temperature sulfate chloride orthophosphate	pH alkalinity calcium conductivity temperature sulfate chloride silica

WQP Monitoring - Frequency

Sampling for CCT systems

- Each point of entry (POE)
 - One sample every two weeks
- # of locations in the distribution system
- 6-months from the beginning of the monitoring period
 - November 30 – Summer monitoring period
 - June 30 – Jan 1-June 30 monitoring period
 - December 31 – July 1-December 31 monitoring period
- Two sets of samples required each monitoring period
 - Quarterly

Impact: Lot of small and medium systems will have new schedules for entry point and distribution WQP monitoring in 2019

WQP Monitoring - Analytes

AFTER INSTALLING CCT		
Entry Point		
WQP2a	WQP2b	WQP2c
Phosphate inhibitor used	Alkalinity adjusted as part of CC	Silicate inhibitor used
pH sulfate chloride orthophosphate dosage orthophosphate residual	pH sulfate chloride alkalinity dosage alkalinity concentration	pH sulfate chloride silica dosage silica residual
Distribution		
WQP3a	WQP3b	WQP3c
Phosphate inhibitor used	Ca carbonate stabilization used	Silicate inhibitor used
pH alkalinity sulfate chloride orthophosphate	pH alkalinity sulfate chloride calcium	pH alkalinity sulfate chloride silica

WQP monitoring - Field kit vs lab

- Field tests at the time of sample collection
 - pH and temperature
- All other parameters can be either done in the field with a test kit (Hach multi-test DR-900 or equivalent test kits) or sent to a lab.
 - Alkalinity, calcium, conductivity, orthophosphate, chloride* and sulfate

*Field test kit not currently available

WQP monitoring – Test Codes

- WQP monitoring is a combination of tests
- EGLE lab
 - Multiple bottles
 - 32 and 33 bottles
 - Multiple test codes
 - R, CORR
- Other labs
 - Take your monitoring schedule to your lab to help get the correct parameters tested.

WQP Monitoring - Reduction

Point of entry monitoring

Every 2wks – no eligibility for reduction

Distribution system monitoring

Gathering information to designate OWQP

- 6m / 6m
- State designates OWQP (within 6m)
- Demonstrate compliance with OWQP
 - 6m / 6m – 1st year
 - 6m / 6m – 2nd year – Eligible for reduced sampling sites
 - 6m / 6m – 3rd year
- Eligible for annual monitoring

WQP Monitoring - Compliance

Possible violations

- Monitoring violations
 - Failure to sample timely
 - Failure to sample for one or more parameters
- Treatment Technique violation
 - Failure to meet OWQP ranges for any nine days within six months.
 - Excursion
- Reporting violations
 - Failure to report timely

WQP Common Result Interpretation Errors

- Are your results out of range or in range?
 - Use correct units
 - As phosphate vs. phosphorous
 - Make sure what type of phosphate you're measuring for your ranges
 - Orthophosphate
 - Polyphosphate
 - Total Phosphate
- Excursion days for OWQP ranges
 - Excursion days continue until the next set of samples that are within range

Common Monitoring Errors

Lead and Copper Tap Sampling

- Site selection
 - Not the highest tier
- Sample collection methodology
 - Not a kitchen or bathroom tap
 - Stagnation time
 - Vacant
- Hold time issues
 - Sample not received by lab within 14 days
- Incomplete request for analysis paperwork

WQP Sampling

- Incorrect WQP analytes
- Failure to collect POE samples every timely (2wks, 6-months, etc.)
- Failure to collect second set of WQP samples
- Thermal preservation
- Incomplete request for analysis paperwork