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LEAD AND COPPER MONITORING GUIDANCE for WATER SYSTEMS SERVING

501 to 3,300 PERSONS

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Lead and Copper Monitoring Guidance

for

Water Systems Serving 501 to 3,300 Persons



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Definitions Applicable to the Lead and Copper Rules

- **ACTION LEVEL (AL)** is the concentration of lead or copper in water which determines the treatment requirements contained in Subpart I of this part that a water system is required to complete. The lead action level is 15 ppb measured in the 90th percentile. The copper action level is 1.3 ppm measured in the 90th percentile. See page 13 for calculation.
- **BLDGs** means public or commercial buildings served by the PWS.
- **BLDG>82** means a public or commercial building constructed after 1982 with copper plumbing using lead-based solder.
- **BLDG<82** means a public or commercial building constructed before or in 1982 with copper plumbing using lead-based solder.
- **BLDG-LSL** means a public or commercial building served by a lead service line connection.
- **BLDG-Pb** means a public or commercial building which has lead interior plumbing.
- **CORROSION INHIBITOR** means a substance capable of reducing the corrosivity of water toward metal plumbing materials, especially lead and copper, by forming a protective film on the interior surface of those materials.
- **Cu** is the symbol for copper.
- **EFFECTIVE CORROSION INHIBITOR RESIDUAL** means a concentration sufficient to form a passivating film on the interior walls of a pipe.
- **FIRST DRAW SAMPLE** means a one-liter sample of tap water, collected in accordance with §141.86(b)(2), that has been standing in plumbing pipes at least 6 hours and is collected without flushing the tap.
- **LARGE WATER SYSTEM** means a water system that serves more than 50,000 persons.
- **LEAD SERVICE LINE (LSL)** means a service line made of lead which connects the water main to the building inlet and any lead pigtail, gooseneck or other fitting which is connected to such lead line.
- **MAXIMUM CONTAMINANT LEVEL (MCL)** means the maximum permissible level of a contaminant in water which is delivered to any user of a public water system.
- **MEDIUM-SIZE WATER SYSTEM** means a water system that serves greater than 3,300 and less than or equal to 50,000 persons.
- **MFR>82** is the acronym for a multi-family residence constructed after 1982 with copper plumbing using lead-based solder.
- **MFR<82** is the acronym for multi-family residences constructed before or in 1982 with copper plumbing using lead-based solder.
- **MFR-LSL** is the acronym for multi-family residences served by a lead service line connection.
- **MFR-Pb** is the acronym for multi-family residences which have lead interior plumbing.
- **MFRs** is the acronym for multi-family residences.

- **NRs** is the acronym for non-residential structures constructed as single-family residence.
- **OPTIMAL CORROSION CONTROL TREATMENT** means the corrosion control treatment that minimizes the lead and copper concentrations at users' taps while insuring that the treatment does not cause the water system to violate any national primary drinking water regulations.
- **NTNCWS** is the acronym for a Non-Transient, Non-Community Water Supply
- **Pb** is the symbol for lead.
- **Pb/Cu-POE** means lead and copper samples collected at the points of entry to the distribution system representative of each source of supply after treatment.
- **Pb/Cu-TAP** means lead and copper samples collected as first-draw tap samples from targeted sample sites.
- **POE** is the acronym for points of entry to the distribution system representative of each source of supply after treatment.
- **PQL** is the acronym for the Practical Quantitation Level
- **PWS** is the acronym for a Public Water Supplier
- **SERVICE LINE SAMPLE** means a one-liter sample of water, collected in accordance with §141.86(b)(3), that has been standing for at least 6 hours in a service line.
- **SFRs** is the acronym for single family residences, which can include for purposes of identifying targeted sampling locations: (1) Non-Residential structures (NRs); and (2) Multi-Family Residences (MFRs) if they constitute more than 20% of the service connections within the PWS's service area.
- **SFR>82** is the acronym for a single-family residence constructed after 1982 with copper plumbing using lead-based solder.
- **SFR<82** is the acronym for a single-family residence constructed before or in 1982 with copper plumbing using lead-based solder.
- **SFR-LSL** is the acronym for a single-family residence served by a lead service line connection.
- **SFR-Pb** is the acronym for a single-family residence which have lead interior plumbing.
- **SINGLE FAMILY STRUCTURE** means a building constructed as a single-family residence that is currently used as either a residence or a place of business.
- **SMALL WATER SYSTEM** means a water system that serves 3,300 persons or fewer.
- **90%TL** means the 90% lead and/or copper level.
- **90%TL-POE** means the difference between the 90% lead level for first-draw tap samples collected at targeted sample sites and the highest respective lead level measured at the points of entry to the distribution system.
- **WQP** means a water quality parameter, which includes pH, temperature, conductivity, alkalinity, calcium, orthophosphate, or silica.
- **WQP-POE** means water quality parameters measured at the points of entry to the distribution system representative of each source of supply after treatment.
- **WQP-DIS** means lead and copper measured at representative locations throughout the distribution system.

Monitoring Requirements

The U.S. Environmental Protection Agency promulgated National Primary Drinking Water Regulations (NPDWRs) for lead and copper on June 7, 1991 (56 FR 26460).

Three monitoring protocols are included in the final rule: (1) tap water monitoring for lead and copper; (2) water quality parameter (WQP) monitoring; and (3) source water monitoring for lead and copper.

The monitoring requirements for non-transient, non-community water systems (NTNCWSs) are essentially the same as those for community water systems (CWS). Please refer to 40 CFR §141.86 (a)(6) and (7) for the different targeting requirements for NTNCWSs.

The term "state" is used throughout the guidance document to refer to the primacy authority.

Monitoring Protocols

Lead and Copper Tap Water Samples

The tap water monitoring protocol for lead and copper is designed to identify the contributions of different sources of lead and copper corrosion by-products to drinking water. These sources include: lead service lines, lead and copper interior piping, lead solder, and fixtures and faucets. Tap water monitoring for lead and copper allows a water system to determine the lead and copper concentrations in drinking water to which its customers may be exposed, as well as the effectiveness of corrosion control treatment for reducing concentrations of those contaminants in water. Tap water samples for lead and copper are collected biannually. A small PWS that installs

and properly operates optimal corrosion control treatment can collect lead and copper tap water samples annually and ultimately triennially.

Water Quality Parameter Samples

A small PWS that exceeds the lead or copper action level during any monitoring period must collect WQP samples during the same monitoring period in which it exceeds an action level. The WQP monitoring protocol is designed to assist each system develop optimal corrosion control treatment and help them determine whether treatment is properly operated and maintained over time. Water quality parameter samples must be collected at each entry point to the distribution system (WQP-POE) and at sites in the distribution system (WQP-DIS) that are representative of water quality throughout the distribution system.

Initially, a small PWS that exceeds an action level must collect samples for pH, alkalinity, calcium, conductivity, water temperature, and, if a corrosion inhibitor is being used, orthophosphate or silica, depending upon the inhibitor in use. These WQP samples must be collected biannually at each entry point to the distribution system and at representative sites throughout the distribution system.

After optimal corrosion control treatment has been installed, the WQP samples a PWS must collect depends upon the corrosion control treatment installed. A PWS may have to collect samples for pH, alkalinity (if adjusted), calcium (if calcium carbonate stabilization is used) and an inhibitor

residual (if inhibitors are used). Samples collected after treatment is installed are used to monitor the effectiveness of treatment and determine whether the PWS is operating in compliance with the rule. After treatment has been installed WQP samples must be collected biweekly at each entry point to the distribution system and biannually at representative sites in the distribution system. Once a system reduces monitoring, WQP samples are collected biannually, annually, and ultimately triennially, at representative sites in the distribution system. A PWS may not reduce the frequency with which it collects WQP samples at entry points to the distribution system.

Lead and Copper Source Water Samples

Source water monitoring for lead and copper is only required if a PWS exceeds the lead or copper action level in tap water samples. The purpose of requiring lead and copper sampling at the entry points to the distribution system is to: (1) determine the contribution from source water to total tap water lead and copper levels; (2) assist systems in designing an overall treatment plan for reducing lead and copper levels at the tap; and (3) assist the state in determining whether source water treatment is necessary to minimize lead and copper levels at the tap. Source water samples for lead and copper are collected biannually. A small system that maintains maximum permissible lead and/or copper levels in source water can collect lead and copper source water samples annually, triennially, and ultimately every nine years.

Additional Monitoring Data

Any system that collects tap water or source water samples for lead, copper or any of the WQPs, in addition to the samples explicitly required in the rule, must report the results to the state by the end of the monitoring period during which the samples are collected.

Demonstrating Optimal Control Treatment with Tap Water and Source Water Samples

A small PWS can demonstrate optimal corrosion control treatment has been installed with monitoring data in one of two ways.

First, a small PWS that meets the lead and copper action levels has installed optimal corrosion control treatment.

Second, a small PWS that demonstrates the difference between the 90th percentile tap water lead level and the highest source water lead level is less than 0.005 mg/L has installed optimal corrosion control treatment. To make this demonstration the system must collect tap water samples for lead at the required number of sites, and source water samples for lead at each entry point to the distribution system during each of two consecutive 6-month monitoring periods. Once a small PWS makes this demonstration, the state will establish water quality parameter values (WQP-POE and WQP-DIS) for the system. The PWS must continue to operate in accordance with the state-specified WQPs to remain in compliance with the rules.

Conduct a Materials Evaluation to Identify Lead and Copper Sampling Sites

The Environmental Protection Agency's lead and copper regulations require all public water systems to collect tap water samples to determine lead and copper levels to which customers may be exposed. Sampling periods are 6-months in length. For systems serving between 501 and 3,300 people the first sampling period begins July 1, 1993 and ends January 1, 1994. Collect 20 tap samples.

Questions about the lead and copper rule, or other drinking water rules, can be answered by the EPA Drinking Water Hotline at 800-426-4791 or your State Drinking Water Program.

When Should My Materials Evaluation Be Completed?

July 1, 1993

What Type of Material Am I Looking for at Sampling Sites?

If you are a community water system, lead and copper tap water samples must be collected from sampling locations that meet one of the following criteria:

- Tier 1. single family structures that contain lead pipes, or copper pipes with lead solder installed after 1982, and/or are served by lead service lines.*
- Tier 2. buildings and multiple-family residences that contain lead pipes, or copper pipes with lead solder installed after 1982, and/or are served by lead service lines.*
- Tier 3. single family structures that contain copper pipes with lead solder installed before 1983.*

If you are a non-transient non-community water system, lead and copper tap water samples must be collected from sampling locations that meet one of the following criteria:

- Tier 1. buildings that contain copper pipes with lead solder installed after 1982, and/or are served by lead service lines.*
- Tier 2. buildings that contain copper pipes with lead solder installed before 1983.*

If you have a community or non-transient non-community water system and it contains lead service lines, at least 50% of your sites should be served by a lead service line (see page 5).

If you have no lead service lines, but you have lead goosenecks or pigtails, collect tap water samples at the sites with the goosenecks and/or pigtails.

Conduct a Materials Evaluation to Identify Lead and Copper Sampling Sites

What Sources of Information Should I Review to Identify High Risk Materials?

To identify enough sites that meet the targeting criteria you should survey all records documenting the materials used to construct and repair your distribution system, and buildings connected to your distribution system.

- *Plumbing Codes*
- *Plumbing Permits*
- *Distribution Maps and Drawings*
- *Inspection and Maintenance Records*
- *Meter Installation Records*
- *Capital Improvement and Master Plans*
- *Standard Operating Procedures*
- *Operation and Maintenance Manuals*
- *Permit Files*
- *Existing Water Quality Data*
- *Interviews with Senior Personnel, Building Inspectors, and Retirees*
- *Community Survey*

It is recommended that you identify more sampling sites than the number of samples you are required to collect during each monitoring period in case volunteers drop out.

- *For example, since you are required to collect 20 tap water samples during each 6-month monitoring period you probably want to maintain a list of about 40 sampling sites that meet the Tier 1 targeting criteria. If you cannot identify 40 sites meeting the Tier 1 targeting criteria, then you should complete your list with sites meeting the Tier 2 or Tier 3 criteria.*
- *If your system contains lead service lines, then 10 of your sites must be served by a lead service line. You probably want to maintain a list of about 20 sampling sites served by lead service lines to insure access to enough sites.*

Several worksheets for organizing the information collected during the materials evaluation are included in your package. These worksheets should be useful when you determine the sites that contain the highest priority materials. You do not have to send them to the state, unless requested. You may want to conduct some site surveys to be sure you have identified sites with lead.

Conduct a Materials Evaluation to Identify Lead and Copper Sampling Sites

What Should I Do if I Cannot Find Enough Sampling Sites with High Risk Materials?

PLUMBING MATERIALS

- When a sufficient number of Tier 1 sites do not exist or are inaccessible you must complete your sampling pool with Tier 2 sites.
- When a sufficient number of Tier 1 and 2 sites do not exist or are inaccessible, you must complete your sampling pool with Tier 3 sites.
- If you plan on collecting tap water samples from Tier 2 or 3 sites you must explain why you could not identify a sufficient number of Tier 1 sites, and notify the state by July 1, 1993. You will need supporting documentation (see Form 141-A on page 27).
- You are not required to target buildings with lead solder installed after the effective date the lead ban was adopted in your state. All states were required to ban the use of lead solder in all public water systems and all homes and buildings connected to such systems by June 1988 (most states adopted the ban in 1987 or 1988). Contact the Drinking Water Program in your state to find out the effective date.

LEAD SERVICE LINES

- When a sufficient number of lead service line sites do not exist or are inaccessible you must collect a tap water sample from each site served by a lead service line.
For example, the rule requires that you collect tap water samples from 10 sites served by a lead service line. If, after reviewing all of the records listed above, you can identify only 6 sites served by a lead service line, you must collect a tap water sample from each of those sites.
- If you collect tap water samples from less than 10 sites served by a lead service line, you must explain why you could not identify a sufficient number of lead service line sites, and notify the state by July 1, 1993 (see Form 141-A on page 27).

Exceptions

- If your system contains only plastic plumbing, but the faucets and fittings contain lead, you should collect tap samples at single family structures with such faucets and fittings (kitchen or bathroom tap).
- If all of your available sampling sites have water softeners, you should identify the highest risk sites (Tier 1) and monitor at those locations (kitchen or bathroom tap).

MATERIALS SURVEY INVESTIGATION RESULTS

PWS ID NUMBER

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POPULATION SERVED BY PWS

— 2 —

[illegible]

WORKSHEET #2

MATERIALS SURVEY RESULTS BY NUMBER OF SERVICE CONNECTIONS
FOR EACH PLUMBING MATERIALS TYPE

PWS ID NUMBER

POPULATION SERVED BY PWS

Type of Structure	Type of Plumbing Material				
	Interior Plumbing			Distribution System Piping	
	Lead Pipe	Copper with Lead Solder >1982	Copper with Lead Solder <1983	LSLs	
		Number of Service Connections		Entire Line	Partial Line
		Number of Service Connections		Number of Service Connections	
SFRs					
MFRs					
BLDGs					
TOTAL					

WORKSHEET #3

SUMMARY OF MATERIALS SURVEY RESULTS

PWS ID NUMBER

POPULATION SERVED BY PWS

Plumbing Material	Type of Structure		
	SFR	MFR	BLDG
	Number of Service Connections		
Interior Plumbing			
Lead Pipe			
Copper Pipe With Lead Solder >1982			
Copper Pipe With Lead Solder <1983			
Service Lines			
LSLs			
Entire Line			
Partial Line			
Total Available Sites			

How and When You Should Collect Lead and Copper Tap Water Samples

When Do I Collect Lead and Copper Tap Water Samples?

- Lead and copper tap water samples must be collected every 6-months. The first monitoring period begins on July 1, 1993 and ends on January 1, 1994.
- You must submit the results of all tap water samples collected during each monitoring period to the State. All of these samples collected during each monitoring period must always be used to calculate the 90th percentile lead and copper levels.

How Do I Collect Lead and Copper Tap Water Samples?

- Always collect a one-liter sample in one container only.
- Always collect the first draw.
- Always allow the water to stand at least 6-hours (i.e., no flushing, showering, etc.).
- First draw samples collected at single-family residences should always be drawn from the cold-water kitchen tap or the bathroom tap.
- First draw samples collected from buildings other than single-family residences should always be drawn from an interior tap from which water is typically taken for consumption.
- We encourage residents to collect samples. See the instruction form on page 14 which you should distribute to residents.
- As a general rule, you should collect your lead and copper tap water samples early in the monitoring period--during the first 3 months--to insure you have time to collect water quality parameter samples during the same monitoring period (see page 15).
- During all repeat sampling, when you cannot gain access to an original sampling site you should collect a tap water sample from another site meeting the same targeting criteria as the original site. The replacement site should be located within reasonable proximity of the original site (see Form 141-A on page 27).

How and When You Should Collect Lead and Copper Tap Water Samples

How Many Tap Water Samples Should I Collect During Initial Monitoring?

- You must collect at least 1 tap water sample at a minimum of 20 sites every 6 months.
 - *All sites must meet Tier 1 targeting criteria.*
 - *10 sites must be served by a lead service line.*
- If you exceed the lead or copper action level you must complete the treatment technique requirements (see pages 11 and 12).
- If you meet the lead and copper action levels you may reduce samples (see Box 1 on page 11).

How Many Tap Water Samples Should I Collect After Installing Optimal Corrosion Control Treatment?

- You must collect 1 tap water sample at a minimum of 20 sites during each of 2 consecutive 6-month monitoring periods.
 - *All sites must meet Tier 1 targeting criteria.*
 - *10 sites must be served by a lead service line.*
- If you meet both action levels during each of 2 consecutive 6-month monitoring periods you can reduce monitoring to 1 tap water sample at a minimum of 10 sites annually.
- If you exceed an action level in any 6-month monitoring period after installing optimal corrosion control treatment, you should continue to collect WQP samples. The state will set water quality parameter values (see page 19).

How Many Tap Water Samples Should I Collect After the State Sets Water Quality Parameters?

- You must collect 1 tap water sample at a minimum of 20 sites every 6 months.
 - *All sites must meet Tier 1 targeting criteria.*
 - *10 sites must be served by a lead service line.*

How and When You Should Collect Lead and Copper Tap Water Samples

How Many Tap Water Samples Should I Collect When I Reduce Monitoring?

- Any time you meet both action levels during 2 consecutive 6-month monitoring periods you may reduce monitoring and collect 1 sample at a minimum of 10 sites annually.
- Any time you exceed an action level, but operate in accordance with water quality parameters during 2 consecutive 6-month monitoring periods, you may request the state to reduce the number of lead and copper samples from 20 to 10, and reduce the frequency for collection from biannual to annual.
- Any time you meet both action levels for 3 consecutive years you may reduce monitoring and collect 1 sample at a minimum of 10 sites every 3 years.
- Any time you exceed an action level, but operate in accordance with water quality parameters during 6 consecutive 6-month monitoring periods, you may request the state to reduce the frequency for collecting 10 lead and copper samples from annual to triennial.
- All tap samples collected during reduced monitoring must be collected between June and September.

How Do I Calculate 90th Percentile Lead and Copper Levels During Initial, Follow-up and Routine Monitoring?

- When 20 samples are collected, the 3rd highest sample value recorded during a 6-month monitoring period is the 90th percentile.
- If the 3rd highest lead level exceeds 15 ppb you must:
 - *Collect water quality parameter samples (during the 6-month monitoring period when the exceedance occurred).*
 - *Deliver the public education program described in U.S. EPA's Public Education Primer (within 60 days of the exceedance).*
 - *Collect lead source water samples and submit a source water treatment recommendation to the state, if you have not already done so (within 6 months of the exceedance).*
 - *Submit an optimal corrosion control treatment recommendation to the state, if you have not already done so (within 6 months of exceedance).*
- If the 3rd highest copper level exceeds 1.3 ppm you must:
 - *Collect water quality parameter samples (during the 6-month monitoring period when the exceedance occurred).*
 - *Collect copper source water samples and submit a source water treatment recommendation to the state, if you have not already done so (within 6 months of the exceedance).*
 - *Submit an optimal corrosion control treatment recommendation to the state, if you have not already done so (within 6 months of the exceedance).*

How and When You Should Collect Lead and Copper Tap Water Samples

How Do I Calculate 90th Percentile Lead and Copper Levels During Reduced Monitoring?

- When 10 samples are collected, the 2nd highest sample value recorded during a reduced monitoring period is the 90th percentile.
- If the 2nd highest lead level exceeds 15 ppb you must:
 - Stop monitoring at a reduced number and frequency, and recommence collecting 20 tap water samples every 6 months, immediately.
 - If you have not installed optimal corrosion control treatment, start collecting 2 WQP samples every 6 months at 2 sites in the distribution system and at each entry point. Submit a treatment recommendation to the state within 6 months of exceedance.
 - If you have installed optimal corrosion control treatment, recommence collecting 2 WQP samples every 6 months at 2 sites in the distribution system, and 1 WQP sample at each entry point every 2 weeks, immediately.
 - If you have installed optimal corrosion control treatment, start or recommence replacing lead service lines (7% of your LSLs must be replaced within 12 months of the exceedance, and an additional 7% every 12 months thereafter).
 - If you have not collected lead source water samples and submitted a source water treatment recommendation to the state, do so within 6 months of the exceedance.
 - Recommence delivering the public education program within 60 days of exceedance.
- If the 2nd highest copper level exceeds 1.3 ppm you must:
 - Stop monitoring at a reduced number and frequency, and recommence collecting 20 tap water samples every 6 months, immediately.
 - If you have not installed optimal corrosion control treatment, start collecting 2 WQP samples every 6 months at 2 sites in the distribution system and at each entry point. Submit a treatment recommendation to the state within 6 months of exceedance.
 - If you have installed optimal corrosion control treatment, recommence collecting 2 WQP samples every 6 months at 2 sites in the distribution system, and 1 WQP sample at each entry point every 2 weeks, immediately.
 - If you have not collected copper source water samples and submitted a source water treatment recommendation to the state, do so within 6 months of the exceedance.

**Calculating the 90th Percentile During
Initial, Follow-up and Routine Monitoring**

Sample Number	Sample Value	Sample Number	Sample Value
1	0	11	1
2	0	12	1
3	0	13	2
4	0	14	5
5	0	15	8
6	0	16	8
7	0	17	10
8	0	18 (90th %)	12
9	0	19	12
10	0	20	18

Calculating the 90th Percentile During Reduced Monitoring

Sample Number	Sample Value	Sample Number	Sample Value
1	0	6	1
2	0	7	5
3	0	8	6
4	0	9 (90th %)	8
5	0	10	10

Suggested Directions for Homeowner Tap Sample Collection Procedures

These samples are being collected to determine the lead and copper levels in your tap water. This sampling effort is required by the U.S. Environmental Protection Agency and your state, and is being accomplished through the cooperation of homeowners and residents.

A sample is to be collected after water has been sitting in the pipes for an extended period of time (i.e., no water use during this period). Due to this requirement, either early mornings or evenings upon returning from work are the best times for collecting samples. The collection procedure is described in more detail below.

1. Prior arrangements will be made with the customer to coordinate the sample collection event. Dates will be set for sample kit delivery and pick-up by water department staff.
2. A minimum 6-hour period during which there is no water use throughout the house must be achieved prior to sampling. The water department recommends that either early mornings or evenings upon returning home are the best sampling times to ensure that the necessary stagnant water conditions exist.
3. A kitchen or bathroom cold-water faucet is to be used for sampling. Place the sample bottle (open) below the faucet and gently open the cold water tap. Fill the sample bottle to the line marked "1000-mL" and turn off the water.
4. Tightly cap the sample bottle and place in the sample kit provided. Please review the sample kit label at this time to ensure that all information contained on the label is correct.
5. IF ANY PLUMBING REPAIRS OR REPLACEMENT HAS BEEN DONE IN THE HOME SINCE THE PREVIOUS SAMPLING EVENT, NOTE THIS INFORMATION ON THE LABEL AS PROVIDED.
6. Place the sample kit outside of the residence in the location of the kit's delivery so that department staff may pick up the sample kit.
7. Results from this monitoring effort will be provided to participating customers when reports are generated for the State unless excessive lead and/or copper levels are found. In those cases, immediate notification will be provided (usually 10 working days from the time of sample collection).

Call _____ at _____ if you have any questions regarding these instructions.

TO BE COMPLETED BY RESIDENT

Water was last used: Time _____ Date _____

Sample was collected: Time _____ Date _____

I have read the above directions and have taken a tap sample in accordance with these directions.

Signature _____

Date _____

How and When You Should Collect Water Quality Parameter Samples

Exceeding an Action Level Triggers Water Quality Parameter Sampling

- If you exceed the lead or copper action level you must collect water quality parameter (WQP) samples from each entry point to the distribution system and from a set of representative sites located throughout the distribution system.
- Because the results of all WQP samples must be submitted to the state in the same monitoring period in which you exceeded an action level, you should collect lead and copper tap water samples early in the monitoring period.

For example, if you exceed an action level in the first monitoring period (from July 1, 1993 to January 1, 1994) you must collect WQP samples and submit the results to the state by January 1, 1994.

How Do I Select Representative Sampling Sites for Water Quality Parameters?

- You must identify 2 sampling sites in your distribution system representative of the water quality throughout the distribution system. For ease, you may want to use sites used to sample for coliforms.
- When you identify representative sampling sites in the distribution system you should consider the following:
 - *size of the population you serve and where the population is located.*
 - *different sources of water you currently use.*
 - *different treatments installed and operating.*
 - *effect of seasonal variability on treatment and water quality.*
 - *proximity of WQP sites to lead and copper tap water sampling sites.*
 - *proximity of WQP sites to supplemental chlorination feed points.*
 - *proximity of WQP sites to ground or elevated storage locations.*
 - *WQP sites' representativeness of typical detention times of water in the distribution system.*
 - *WQP sites' representativeness of distinct pressure zones located throughout the distribution system.*
 - *WQP sites' representativeness of distribution system materials.*
- Avoid areas in the distribution system where maintenance or flushing is conducted because water quality upsets are more likely to occur in these places. Remember, you are trying to collect data that is representative of typical water quality conditions in the distribution system.

How and When You Should Collect Water Quality Parameter Samples

How Do I Collect Water Quality Parameter Samples?

- Samples should be fully flushed.
- Samples collected at entry points to the distribution system must be collected at locations representative of each source of water after treatment.
- If your system draws water from more than one source, and the sources are combined before distribution, you must collect samples at sites in the distribution system where the water is representative of all sources being used.
- If you collect the WQP samples in the distribution system from the same location as coliform and disinfectant residual samples you should collect the WQP samples in the following manner:
 - *Fully flush the tap and collect the coliform sample.*
 - *Collect a sample to measure disinfectant residual.*
 - *Collect and analyze sample for temperature and pH.*
 - *Collect the samples for the other WQPs.*
- If fire hydrants or other types of distribution system fixtures are in the vicinity of a sampling site, fully flush the sample before collecting.
- When you collect WQP samples you should always record your observations about color, suspended solids, and the flushing time required prior to achieving acceptable sampling conditions.
- When you collect WQP samples for alkalinity, calcium, conductivity, orthophosphate, and silica you should take two 500-ml samples.
- Temperature analyses must be conducted in the field to insure accuracy. Measure temperature using either a hand-held thermometer or a combined temperature/pH electrode and meter.

How and When You Should Collect Water Quality Parameter Samples

How Do I Collect Water Quality Parameter Samples?

- pH measurements must also be conducted in the field and must be made with a pH electrode and meter within 15 minutes of sample collection. The meter should be capable of measuring to 1/10 of a unit.
- The pH probe should be placed in a sample bottle and secured during transport. The probe's membranes are very delicate and should not come in contact with hard surfaces or be allowed to dry out. Pack a replacement probe just in case.
 - *Before collecting the pH sample, the pH electrode should be calibrated at pH 7.0 and a second pH level; either 4.0 or 10.0, depending on the pH range typically found within the distribution system.*
 - *When collecting WQP samples, care should be taken to avoid agitating the water sample (i.e., shaking, bouncing in transit, etc.).*
 - *Before collecting the sample, remove the faucet aerator and run the water gently to flush the line.*
 - *Fill the sample bottle to slightly overflowing.*
 - *Use a closed-system bottle—which allows you to insert the thermometer or pH probe—to reduce measurement error.*
 - *If you use a hand-held thermometer, insert it in the sample and record the reading when it stabilizes. Insert the pH electrode immediately after removing the thermometer.*
 - *If you use a combined electrode and meter, insert it in the sample immediately after filling the bottle and measure temperature. Change the meter to measure pH levels and gently rotate the bottle until the pH reading stabilizes (may take several minutes).*
 - *Record the pH measurement, rinse the electrode with deionized water and replace it in the holding bottle.*
- Plastic or glass containers can be used when collecting WQP samples except if silica analyses are required (plastic must be used).
- WQP samples should be stored separately from coliform samples to prevent contamination. All samples should be stored in a cool environment until analyzed.
- You may take a confirmation sample for any WQP sample within 3 days of receiving the results of the first sample. If you collect a confirmation sample, you must average the two results to determine compliance.

How and When You Should Collect Water Quality Parameter Samples

How Many Water Quality Parameter Samples Should I Collect in the Monitoring Period in Which an Action Level is Initially Exceeded?

- Collect WQP samples at representative sites in the distribution system and at each entry point to the distribution system for:
 - *pH*
 - *Alkalinity*
 - *Calcium*
 - *Conductivity*
 - *Temperature*
 - *Orthophosphate, when a phosphate-based inhibitor is used*
 - *Silica, when a silicate-based inhibitor is used*
- Collect 2 samples at each of 2 sites located throughout your distribution system during the first 6-month monitoring period in which you exceed an action level.
- Collect 2 samples at each entry-point to your distribution system during the first 6-month monitoring period in which you exceed an action level.
- Within 6 months of exceeding an action level you must submit an optimal corrosion control treatment recommendation to the state (see § 141.82 or the corrosion control treatment guidance for details).
- The 2 WQP samples should be collected at different times in the monitoring period to insure you have water quality data that is representative of seasonal changes that can take place during a monitoring period.

How and When You Should Collect Water Quality Parameter Samples

How Many Water Quality Parameter Samples Should I Collect After Installing Optimal Corrosion Control Treatment?

- If you continue to exceed an action level after installing optimal corrosion control treatment you must collect WQP samples during the 12 month period immediately after you have completed installing treatment.
- 2 samples must be collected at each of 2 sites in your distribution system during each of 2 consecutive 6-month monitoring periods for:
 - *pH*
 - *Alkalinity*
 - *Calcium, when calcium carbonate stabilization is used*
 - *Orthophosphate, when a phosphate-based inhibitor is used*
 - *Silica, when a silicate-based inhibitor is used*
- 1 sample must be collected at each entry point to your distribution system every 2 weeks for:
 - *pH*
 - *When alkalinity is adjusted, the concentration of alkalinity*
 - *When an inhibitor is used, the concentration of orthophosphate or silicate (whichever is used)*
- On the basis of WQP samples collected during this 12-month period the state will establish WQP values you must meet in all subsequent monitoring periods to remain in compliance with the regulation.

For example, the state might require you to maintain pH between 7.8 and 8.2 at each entry point and a pH of 7.0 to 8.0 at all sampling sites in the distribution system. Similarly, the state might require you to install sodium bicarbonate at a dosage rate of 10 mg/L (measured at each entry-point) to maintain alkalinity above 20 (measured at all distribution system sites).

How and When You Should Collect Water Quality Parameter Samples

How Many Water Quality Parameter Samples Should I Collect After the State Sets Water Quality Parameter Values?

- 2 samples must be collected at each of 2 sampling sites in your distribution system every 6 months for:
 - *pH*
 - *Alkalinity*
 - *Calcium, when calcium carbonate stabilization is used*
 - *Orthophosphate, when a phosphate-based inhibitor is used*
 - *Silica, when a silicate-based inhibitor is used*
- 1 sample must be collected at each entry point to your distribution system every 2 weeks for:
 - *pH*
 - *When alkalinity is adjusted, the concentration of alkalinity*
 - *When an inhibitor is used, the concentration of orthophosphate or silicate (whichever is used)*

How Many Water Quality Parameter Samples Should I Collect During Reduced Monitoring?

- If you maintain the state-specified values for WQPs at representative sites in the distribution system for 8 consecutive 6-month monitoring periods, you may reduce the frequency with which you collect 2 WQP samples at 2 sites in the distribution system from biannually to annually.
- If you maintain the state-specified values for WQPs at 2 sites in your distribution system for 3 consecutive years you may reduce the frequency with which you collect 2 WQP samples at 2 sites in the distribution system from annually to every 3 years.
- WQP samples must always be collected at each entry point to the distribution system every 2 weeks.
- WQP sampling may be discontinued any time you meet the lead and copper action levels.

How and When You Should Collect Lead and Copper Source Water Samples

Exceeding an Action Level Triggers Source Water Monitoring

- If you exceed the lead and/or copper action level you must collect one lead and/or copper source water sample from each entry point to the distribution system and submit the results to the state within 6 months of exceeding an action level.
- A water system can stop collecting lead and/or copper samples if the system meets the lead and copper action levels during the entire source water sampling period applicable to the system (i.e., 1 year or 3 years).

Where Do I Collect Lead and Copper Source Water Samples?

If You Are a Ground Water System

- Collect at least one sample at each entry point to the distribution system that is representative of each well.
- If there are separate entrances to your distribution system from either individual wells or wellfields, a sample must be collected from each discrete entrance point.
- If you use multiple wells that draw from the same aquifer, the state can identify an individual well for monitoring, as long as there is no treatment or blending.
- You must take each repeat sample at the same sampling site unless conditions make sampling at another site more representative of each source or treatment plant.

If You Are a Surface Water System (or Combination Ground Water/Surface Water System)

- Collect at least one sample at each entry point to the distribution system which is representative of each source of water. These samples may be collected after storage or at the high service pumps.
- You must take each repeat sample at the same sampling site unless conditions make sampling at another site more representative of each source or treatment plant.

How and When You Should Collect Lead and Copper Source Water Samples

How Many Lead and Copper Source Water Samples Should I Collect During Initial Monitoring?

- If you exceed the lead or copper action level you must collect 1 sample at each entry point to the distribution system and analyze it for the appropriate contaminant. You must submit the results of all source water samples to the state within 6 months of exceeding the lead or copper action level.

For example, if you exceed an action level in the first monitoring period (from July 1, 1993 to January 1, 1994) you must collect source water samples and submit the results to the state by July 1, 1994.

- In addition to submitting source water samples, you must also submit a source water treatment recommendation (which may include a recommendation that no source water treatment is needed) to the state for review and approval (see 40 CFR § 141.83 for details).

How Many Lead and Copper Source Water Samples Should I Collect After Installing Source Water Treatment?

- If you are required to install source water treatment, you must collect 1 sample at each entry point to the distribution system during each of 2 consecutive 6-month monitoring periods.
- The state will set maximum permissible levels (MPL) for source water lead and/or copper concentrations based on these results. See schedule on page 26.

How and When You Should Collect Lead and Copper Source Water Samples

How Many Lead and Copper Source Water Samples Should I Collect After the State Sets Maximum Permissible Levels?

If You Are a Groundwater System

- You must collect 1 sample at each entry point to the distribution system beginning in the 3-year compliance period in effect when the state specifies a maximum permissible level(s). See the schedule on page 26 for the compliance period in which you should begin monitoring.
- You must continue to collect 1 sample at each entry point to the distribution system during each subsequent 3-year compliance period.

If You Are a Surface Water System (or Combination Ground Water/Surface Water System)

- You must collect 1 sample at each entry point to the distribution system annually, beginning on the date the state specifies a maximum permissible level(s). See the schedule on page 26 for the year in which you should begin monitoring.

How Many Lead and Copper Source Water Samples Should I Collect During Reduced Monitoring?

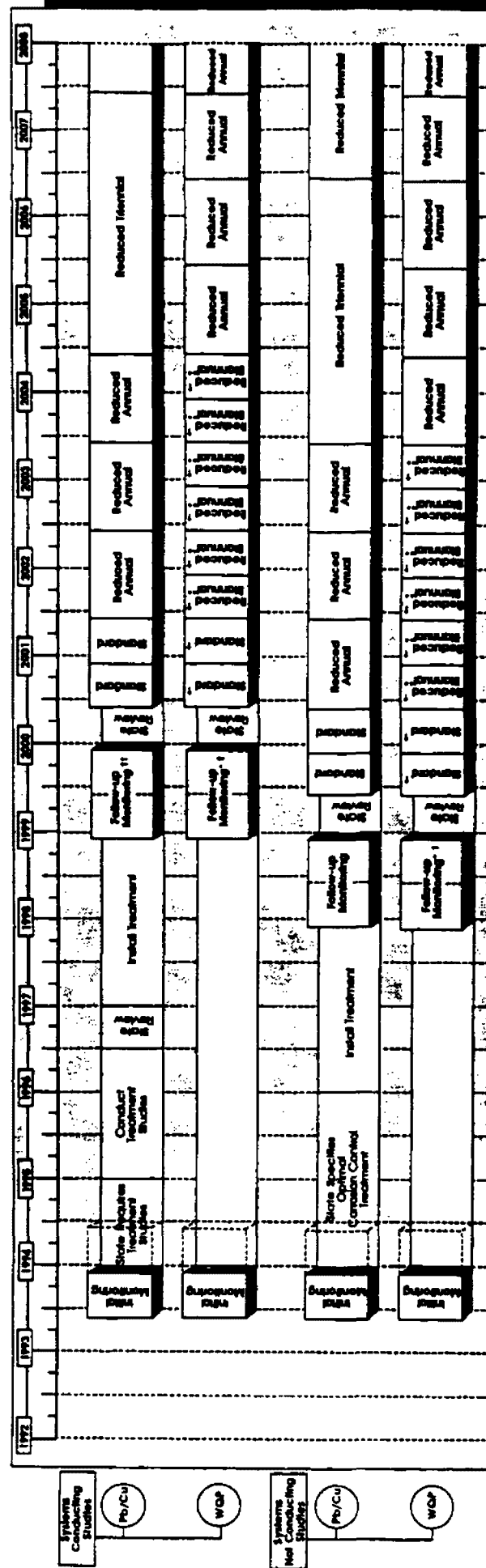
If You Are a Groundwater System

- If you meet the maximum permissible level(s) set by the state for 3 consecutive 3-year compliance periods you can reduce source water monitoring to once every 9-year compliance cycle.

If You Are a Surface Water System (or Combination Ground Water/Surface Water System)

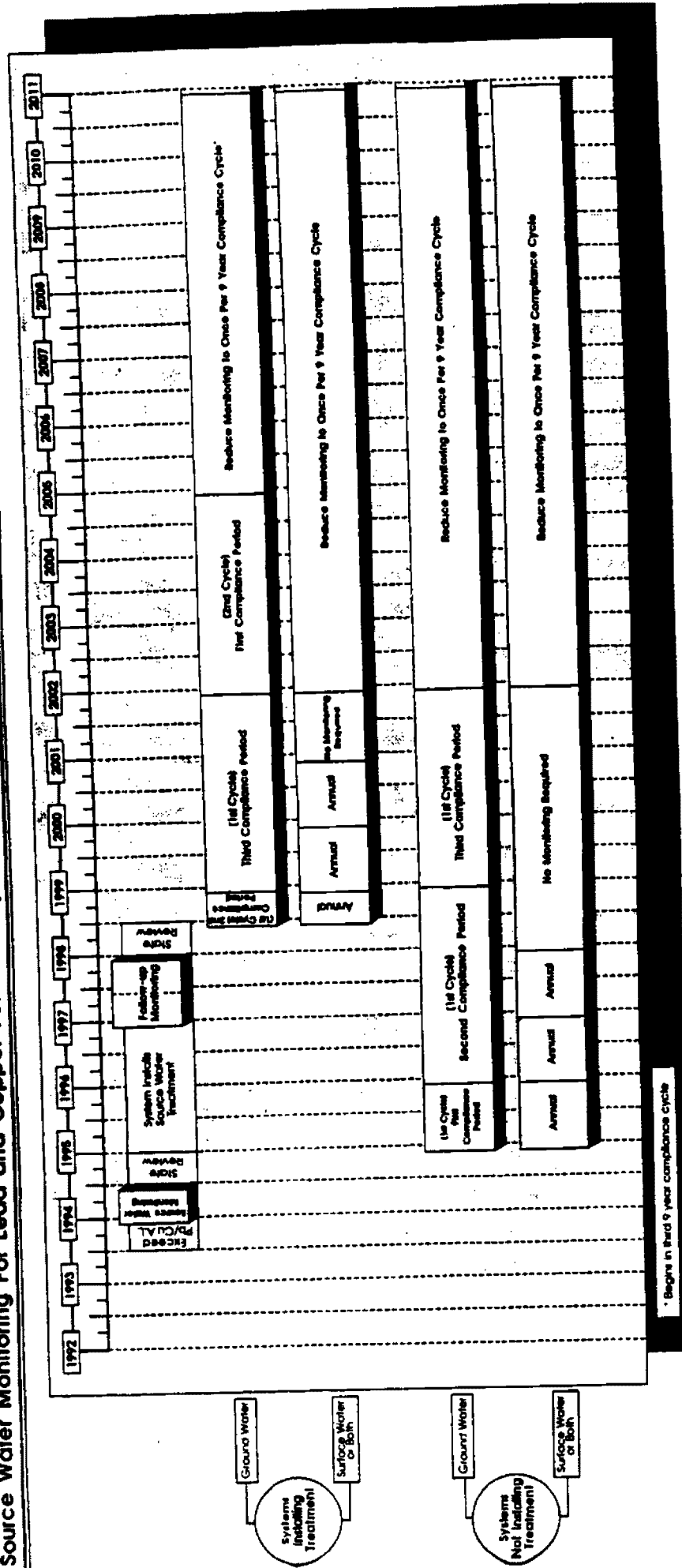
- If you meet the maximum permissible level(s) set by the state for 3 consecutive years you can reduce source water monitoring to once every 9-year compliance cycle.

Tap Water Monitoring Requirements For Small Water Systems (501 to 3,300)



* Assumes system continues to exceed Pb/Cu Action Level
 ** Reduced number of sampling sites
 † Systems exceeding Pb/Cu Action Level must monitor WQPs at each entry point to the distribution system every two (2) weeks for as long as they exceed.
 ‡ If system meets Pb/Cu Action Level, it may reduce tap water sampling.
 No State review required.

Source Water Monitoring For Lead and Copper For Small Systems (43,300)



Number and Frequency of Tap Water Monitoring For Systems Demonstrating Optimal Corrosion Control Treatment Installed

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Systems Serving: <div> <div>< 100</div> <div>101 to 500</div> <div>501 to 1,000</div> </div>			5	5	5	5	5	5	5	5	5
			10	10	5	5	5	5	5	5	5
			20	20	10	10	10	10	10	10	10
Systems Serving: <div> <div>2,001 to 10,000</div> <div>10,001 to 50,000</div> </div>	40	40	20	20	20	20	20	20	20	20	20
	60	60	30	30	30	30	30	30	30	30	30
Systems Serving: <div> <div>50,001 to 100,000</div> </div>	40	40	30	30	30	30	30	30	30	30	30
	10**	10**	7†	7†	7†	7†	7†	7†	7†	7†	7†
Systems Serving: <div> <div>> 100,000</div> </div>	100	100	60	60	60	60	60	60	60	60	60
	25**	25**	10†	10†	10†	10†	10†	10†	10†	10†	10†

* Number of sites in distribution system where PWS must collect two (2) samples for applicable WQPs.

** Systems collect two (2) samples of each site for: pH, alkalinity, calcium, conductivity, water temperature, orthophosphate (when phosphate inhibitor used), and silica (when silicate inhibitor used).

† State establishes discrete set of WQPs monitored in distribution system and at each entry point.

‡ Large water systems demonstrating OCT with samples showing that the difference between tap water and source water lead levels are < 5 ppb must collect WQP samples so the state can set values that reflect optimal corrosion control.

SAMPLE SITE IDENTIFICATION AND CERTIFICATION

System's Name: _____	Type: <input type="checkbox"/> CWS <input type="checkbox"/> NTNCWS
Address: _____ _____	Size: <input type="checkbox"/> >100,000 <input type="checkbox"/> 10,001 to 100,000 <input type="checkbox"/> 3,301 to 10,000 <input type="checkbox"/> 501 to 3,300 <input type="checkbox"/> 101 to 500 <input type="checkbox"/> ≤100
Telephone number: _____	
System ID #: _____	
Contact Person: _____	

CERTIFICATION OF SAMPLING SITES

LEAD SOLDER SITES

of single-family structures with copper pipes with lead solder installed after 1982 or lead pipes and/or lead service lines (Tier 1) _____

of multi-family structures with copper pipes with lead solder installed after 1982 or lead pipes and/or lead service lines (Tier 1) _____

of buildings containing copper pipes with lead solder installed after 1982 or lead pipes and/or lead service lines (Tier 2) _____

of sites that contain copper pipes with lead solder installed before 1983 (to be used only if other conditions have been exhausted) (Tier 3) _____

TOTAL _____

The following sources have been explored to determine the number of structures which have interior lead pipe or copper pipe with lead solder.

_____ Plumbing and/or building codes
 _____ Plumbing and/or building permits
 _____ Contacts within the building department, municipal clerk's office, or state regulatory agencies for historical documentation of the service area development
 _____ Water Quality Data

Other Resources Which PWS May Utilize

_____ Interviews with building inspectors
 _____ Survey of service area plumbers about when and where lead solder was used from 1982 to present
 _____ Survey residents in sections of the service area where lead pipe and/or copper pipe with lead solder is suspected to exist
 _____ Interviews with local contractors and developers

Explanation of Tier 2 and Tier 3 sites (attach additional pages if necessary)

SAMPLE SITE IDENTIFICATION AND CERTIFICATION

CERTIFICATION OF SAMPLING SITES

LEAD SERVICE LINE SITES

of samples required to be drawn from lead service line sites _____

of samples actually drawn from lead service line sites _____

Difference (explain differences other than zero) _____

The following sources have been explored to determine the number of lead service lines in the distribution system.

- _____ Distribution system maps and record drawings
- _____ Information collected for the presence of lead and copper as required under §141.42 of the Code of Federal Regulations
- _____ Capital improvement plans and/or master plans for distribution system development
- _____ Current and historical standard operating procedures and/or operation and maintenance (O&M) manuals for the type of materials used for service connections
- _____ Utility records including meter installation records, customer complaint investigations and all historical documentation which indicate and/or confirm the location of lead service connections
- _____ Existing water quality data for indications of 'troubled areas'

Other Sources Which PWS Utilized

- _____ Interviews with senior personnel
- _____ Conduct service line sampling where lead service lines are suspected to exist but their presence is not confirmed
- _____ Review of permit files
- _____ Community survey
- _____ Review of USGS maps and records
- _____ Interviews with pipe suppliers, contractors, and/or developers

Explanation of fewer than 50% LSL sites identified (attach additional pages if necessary):

CERTIFICATION OF COLLECTION METHODS

I certify that:

Each first draw tap sample for lead and copper is one liter in volume and has stood motionless in the plumbing system of each sampling site for at least six hours.

Each first draw sample collected from a single-family residence has been collected from the cold water kitchen tap or bathroom sink tap.

Each first draw sample collected from a non-residential building has been collected at an interior tap from which water is typically drawn for consumption.

Each first-draw sample collected during an annual or triennial monitoring period has been collected in the months of June, July, August or September.

Each resident who volunteered to collect tap water samples from his or her home has been properly instructed by [insert water system's name]

in the proper methods for collecting lead and copper samples. I do not challenge the accuracy of those sampling results. Enclosed is a copy of the material distributed to residents explaining the proper collection methods, and a list of the residents who performed sampling.

SAMPLE SITE IDENTIFICATION AND CERTIFICATION**RESULTS OF MONITORING**

THE RESULTS OF LEAD AND COPPER TAP WATER SAMPLES MUST BE ATTACHED TO THIS DOCUMENT

of samples required _____ # of samples submitted _____ 90th Percentile Pb _____
90th Percentile Cu _____

THE RESULTS OF WATER QUALITY PARAMETER SAMPLES MUST BE ATTACHED TO THIS DOCUMENT

of samples required _____ # of tap samples submitted _____
of entry point samples required _____ # of entry point samples submitted _____

CHANGE OF SAMPLING SITES

Original site address:

New site address:

Distance between sites (approximately):

Targeting Criteria: NEW:

OLD:

Reason for change (attach additional pages if necessary):

SIGNATURE

NAME

TITLE

DATE

REQUEST FOR REDUCED LEAD AND COPPER TAP WATER MONITORING

System's Name: _____ Type: ☐ CWS ☐ NTNCWS

Address: _____ Size: ☐ >100,000

☐ 10,001 to 100,000
☐ 3,301 to 10,000
☐ 501 to 3,300
☐ 101 to 500
☐ ≤100

Telephone number: _____

System ID #: _____

Contact Person: _____

REQUEST FOR REDUCTION

The _____ water system has:

- ☐ maintained tap water levels below the lead/copper action level(s); or
- ☐ operated in accordance with the state-specified water quality parameters during each of the following six-month monitoring periods:

The above named water system hereby requests that the state permit the system to reduce lead and copper tap water monitoring from:

☐ Biannual to Annual

☐ Annual to Triennial

☐ 100 to 50

☐ 60 to 30

☐ 40 to 20

☐ 20 to 10

☐ 10 to 5

The results of all water quality parameter samples and lead and copper tap water samples collected during each of the monitoring periods are summarized and attached.

SIGNATURE

NAME**TITLE****DATE**

OPTIMAL CORROSION CONTROL TREATMENT/WATER QUALITY PARAMETER

System's Name: _____	Type: <input type="checkbox"/> CWS <input type="checkbox"/> NTNCWS
Address: _____ _____ _____	Size: <input type="checkbox"/> >100,000 <input type="checkbox"/> 10,001 to 100,000 <input type="checkbox"/> 3,301 to 10,000 <input type="checkbox"/> 501 to 3,300 <input type="checkbox"/> 101 to 500 <input type="checkbox"/> ≤100
Telephone number: _____	
System ID #: _____	
Contact Person: _____	

THE RESULTS OF SOURCE WATER AND TAP WATER SAMPLES MUST BE ATTACHED TO THIS DOCUMENT

of tap water samples required _____ # of tap water samples submitted _____

of source water samples required _____ # of source water samples submitted _____

RESULTS OF OPTIMAL CORROSION CONTROL TREATMENT STUDIES					
TEST 1 — ALKALINITY & pH ADJUSTMENT			TEST 2 — CALCIUM HARDNESS TREATMENT		
<u>Before</u>	<u>Parameters</u>	<u>After</u>	<u>Before</u>	<u>Parameters</u>	<u>After</u>
_____	Pb	_____	_____	Pb	_____
_____	Cu	_____	_____	Cu	_____
_____	pH	_____	_____	pH	_____
_____	alkalinity	_____	_____	alkalinity	_____
_____	calcium	_____	_____	calcium	_____
_____	conductivity	_____	_____	conductivity	_____
_____	orthophosphate	_____	_____	orthophosphate	_____
_____	silicate	_____	_____	silicate	_____
_____	water	_____	_____	water	_____
_____	temperature	_____	_____	temperature	_____
TEST 3 — ADDITION OF CORROSION INHIBITOR			TEST 4 —		
<u>Before</u>	<u>Parameters</u>	<u>After</u>	<u>Before</u>	<u>Parameters</u>	<u>After</u>
_____	Pb	_____	_____	Pb	_____
_____	Cu	_____	_____	Cu	_____
_____	pH	_____	_____	pH	_____
_____	alkalinity	_____	_____	alkalinity	_____
_____	calcium	_____	_____	calcium	_____
_____	conductivity	_____	_____	conductivity	_____
_____	orthophosphate	_____	_____	orthophosphate	_____
_____	silicate	_____	_____	silicate	_____
_____	water	_____	_____	water	_____
_____	temperature	_____	_____	temperature	_____

If the state requires the system to conduct additional treatment analyses, copy this form and attach the results as specified above.

OPTIMAL CORROSION CONTROL TREATMENT/WATER QUALITY PARAMETER**OPTIMAL CORROSION CONTROL TREATMENT RECOMMENDATION**

1. Treatment recommendation and rationale: _____
2. Test methodologies used to evaluate each treatment (e.g., pipe rig loop tests, metal coupon tests, etc.): _____
3. Identify any chemical or physical constraint that limits or prohibits the use of a particular corrosion control treatment (attach all data indicating that a particular treatment has adversely affected other water treatment processes or is ineffective for reducing corrosion): _____

CERTIFICATION THAT OPTIMAL CORROSION CONTROL TREATMENT HAS BEEN INSTALLED

The _____ water system certifies that optimal corrosion control treatment has been installed and is being properly operated as agreed to between the above named water system and the state of _____. Optimal corrosion control treatment was required to be installed by _____ (date). Optimal corrosion control treatment was installed on _____ (date).

MODIFICATION OF CURRENT CORROSION CONTROL TREATMENT AND/OR WATER QUALITY PARAMETERS

Reason for modification: _____

Attach all supporting studies, data, treatment specifications, etc. that substantiate this request for modification.

SIGNATURE**NAME****TITLE****DATE**

SOURCE WATER MONITORING AND TREATMENT

System's Name: _____	Type: <input type="checkbox"/> CWS <input type="checkbox"/> NTNCWS
Address: _____ _____ _____	Size: <input type="checkbox"/> >100,000 <input type="checkbox"/> 10,001 to 100,000 <input type="checkbox"/> 3,301 to 10,000 <input type="checkbox"/> 501 to 3,300 <input type="checkbox"/> 101 to 500 <input type="checkbox"/> ≤100
Telephone number: _____	
System ID #: _____	
Contact Person: _____	

SOURCE WATER DATA

Attach all data collected at all entry points to the distribution system. List the highest values obtained in sampling for this monitoring period and attach the results of all other samples collected at each entry point.

	Entry Point Location	Pb Values	Cu Values
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

SOURCE WATER MONITORING AND TREATMENT

SOURCE WATER TREATMENT RECOMMENDATION

Treatment recommendation: _____

Reason for treatment/no treatment recommendation: _____

Attach additional pages as necessary.

CERTIFICATION THAT SOURCE WATER TREATMENT HAS BEEN INSTALLED

The _____ water system certifies that source water treatment has been installed and is being properly operated as agreed to between the above named water system and the State of _____. Water treatment was required to be installed by _____ (date). Source water treatment was actually installed on _____ (date).

MODIFICATION OF STATE TREATMENT DECISION AND/OR MAXIMUM PERMISSIBLE LEAD AND COPPER LEVELS

Reason for modification: _____

Attach all supporting studies, data, treatment specifications, etc. that substantiate this request for modification.

SIGNATURE

NAME

TITLE

DATE

