

Lead and Copper Rule: Overview

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History of Lead and Copper Rule (LCR)

- LCR is a United States federal regulation which sets action levels for lead and copper in public drinking water at the consumer's tap.
- U.S. Environmental Protection Agency (EPA) first issued the rule in 1991.
- EPA regulations following studies showing that lead and copper have health effects on individuals.
- LCR aims to reduce the levels of lead and copper through optimization of corrosion control treatment and eliminating the water source as a source for lead and copper.
- If the 90 percentile for lead levels exceed the **action level (15 parts per billion)**, water suppliers are required to educate their consumers on how to reduce exposure to lead.

Action Levels

Lead
15 ug/L or 0.015 mg/L

Copper
1,300 ug/L or 1.3 mg/L

If 90% of samples are not below the Action Level for Lead and/or Copper, the system is required to take additional actions

Health Effects of Lead and Copper

- Exposure to Lead can cause damage to brain, red blood cells, and kidneys, especially for young children and pregnant women.
- Exposure to Copper can cause stomach and intestinal distress, liver or kidney damage, and complications of Wilson's disease in genetically predisposed people.

Pb

Cu

Sources of Lead and Copper

- Lead and copper enters drinking water mainly from corrosion of plumbing materials
- Lead was widely used in plumbing materials until 1987
 - Prohibition on use of lead pipes, solder, and flux
- Effective January 2014 "lead free" is defined:
 - A weighted average of 0.25% lead across wetted surfaces of a pipe, pipe fitting, plumbing fitting, and fixture
 - 0.2% lead for solder and flux

<https://www.epa.gov/dwstandardsregulations/section-1417-safe-drinking-water-act-prohibition-use-lead-pipes-solder-and>

Who is affected by the LCR?

- All water system operators and managers of community water systems (CWSs) and non-transient non-community water systems (NTNCWSs) are potentially affected.
- State staff who are responsible for implementing the LCR in their state.

What size system am I under the Lead and Copper Rule?

Size Category	Population Served*
Large	> 50,000
Medium	3,301 – 50,000
Small	≤ 3,300

* Transient populations served are not factored in to the population served

Federal Citations

- Corrosion Control Treatment: 40 CFR 141.81 – 141.82
- Source Water Treatment: 40 CFR 141.83
- Lead Service Line Replacement: 40 CFR 141.84
- Public Education: 40 CFR 141.85
- Lead & Copper Tap Monitoring: 40 CFR 141.86
- Water Quality Parameter Monitoring: 40 CFR 141.87
- Lead & Copper Source Water Monitoring: 40 CFR 141.88
- Analytical Methods: 40 CFR 141.89
- Reporting: 40 CFR 141.90
- Recordkeeping: 40 CFR 141.91

Lead and Copper Tap Monitoring

40 CFR 141.86

Material Evaluation

- “...each water system shall complete a materials evaluation of its distribution system in order to identify a pool of targeted sampling sites that meets the requirements of this section, and which is sufficiently large to ensure that the water system can collect the number of lead and copper tap samples required...”
- Identify piping materials within the distribution system
 - Distribution mains
 - Service lines
 - Interior plumbing

Materials Evaluation Resources

- **Distribution System Materials:**
 - Distribution system maps and record drawings
 - Capital improvement plans and/or master plans for distribution system development
 - Utility records
 - Results from community survey
- Inventory of Lead Service Lines (LSLs)
 - Including replacements and whether they were whole or partial
 - Indication of which portion of the LSL is owned by the water system/homeowner
 - Results from service line sampling where lead service lines are suspected to exist but their presence is not confirmed

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Materials Evaluation

- **Interior Plumbing Materials:**
 - County appraisal district records
 - Contacts within the water system, municipal office or other local officials
 - Survey results from area plumbers who are asked about when and where copper pipe with lead solder was used
 - Documented interviews of residents- letters, phone survey, personal contact, etc.
 - Documented interviews of local contractors, developers, and builders

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Required Number of Sample Sites

Population Served*	Minimum Number of Standard Sites	Minimum Number of Reduced Sites	Recommended Minimum Number of Sites in Sampling Pool
> 100,000	100	50	150
10,001 – 100,000	50	30	90
3,301 – 10,000	40	20	60
501 – 3,300	20	10	30
101 – 500	10	5	20
≤ 100	5	5	10

*Population served only accounts for residential and non-transient population types.

<http://www.nj.gov/dep/watersupply/dwc-lead-public.html>

Sample Site Tier Criteria

Community Water Systems	
Tier 1	Single-Family Structures: <ul style="list-style-type: none"> Served by a lead service line; and/or Contain copper pipes with lead solder installed after 1982 or contain lead pipes. *When multiple-family residences comprise at least 20% of the structures served by a water system, the system may include these types of structures as Tier 1.
Tier 2	Buildings, including multiple-family residents: <ul style="list-style-type: none"> Are served by a lead service line; and/or Contain copper pipes with lead solder installed after 1982 or contain lead pipes.
Tier 3	Single family structures that contain copper pipes with lead solder installed before 1983
Other	Structures with other plumbing materials

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Sample Site Tier Criteria

Non-Transient Non-Community	
Tier 1	Buildings: <ul style="list-style-type: none"> Served by a lead service line; and/or Contain copper pipes with lead solder installed after 1982 or contain lead pipes.
Tier 2	Buildings that contain copper pipes with lead solder installed before 1983
Other	Structures with other plumbing materials

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Sample Site Tier Category

Sample Category	Description
i	Single family residence with lead service line
ii	Single family residence with lead solder copper piping constructed after 1982
iii	Single family residence with lead plumbing after 1982
iv	Multi-family residence with lead service line
v	Multi-family residence with lead solder copper piping constructed after 1982
vi	Multi-family residence with lead plumbing
vii	Single family home with lead solder copper piping constructed before 1983
viii	Single family home that does not meet Tier 1, 2, or 3 criteria
ix	Multi-family home that does not meet Tier 1, 2, or 3 criteria
x	Non-residential building with lead service line
xi	Non-residential building with lead solder copper piping constructed after 1982
xii	Non-residential building with lead plumbing
xiii	Non-residential building with lead solder copper piping constructed before 1983
xiv	Non-residential building that does not meet Tier 1, 2, or 3 criteria

Lead and Copper Rule Sample Sites

- If a water system contains lead service lines, at least 50 percent of the sampling sites shall be those served by a lead service line
- If a water system has no lead service lines, but it does have lead goosenecks, at least 50 percent the sampling sites shall be those served by a lead gooseneck
- Samples may not be taken from taps that have point of use or point of entry treatment devices designed to remove inorganic contaminants
- Do not sample a location not in use or has not been used for a significant period of time
- Only kitchen and bathroom taps shall be sampled from residential buildings
- Only taps typically used for human consumption shall be sampled from non-residential buildings

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Monitoring Schedule

- Standard:**
 - Standard # of sites every 6-months
- Reduced:**
 - Annual – Reduced # of sites between June to September each year
 - Triennial – Reduced # of sites between June to September every 3 years

Systems serving more than 50,000 persons and small/medium systems with state-defined optimal water quality parameters, must receive written approval to return to reduced monitoring

If an ALE occurs:

- Notification to NJDEP and bulk purchasers
- Return to standard lead and copper monitoring
- Corrosion Control Treatment Steps
- Conduct WQP monitoring
- Source Water Monitoring and Treatment Steps
- Public Education (for Lead ALE only)
- Lead Service Line Replacement

Water Quality Parameter Monitoring

40 CFR 141.87

Water Quality Parameter (WQP) Monitoring

Objectives

- Determine water corrosivity
- Identify appropriate corrosion control treatment
- Determine whether corrosion control treatment is being properly maintained

Schedule Types

- Initial
- Follow-Up
- Optimal

Source Water Treatment

40 CFR 141.83

Source Water Monitoring



- Within 6 months after the end of the monitoring period
- Samples should be collected from each entry point to the distribution system
- Source Water Treatment (SWT) may be required if results indicated elevated levels from the source

Source Water Treatment

- SWT recommendation would be required to be submitted within 180 days after the end of the monitoring period
- After approval, treatment would be required to be installed within 24 months
- Treatment option include ion exchange, reverse osmosis, lime softening, or coagulation and filtration
- This is rarely the case as most sources of lead and copper are in the distribution system

Corrosion Control Treatment (CCT) Steps

40 CFR 141.81 – 141.82

Requirement	Timetable for Completing Corrosion Control Treatment Steps ¹	Section Where Technical Recommendations Can Be Found
STEP 1: System exceeds the lead or copper action level (AL).		
STEP 2: System recommends OCCT.	Within 6 months ²	Section 4.1.1
STEP 3: Primary agency decides whether system must perform a corrosion control study. If system must conduct a corrosion control study, go to Step 5. If not, go to Step 4.	Within 12 months ²	Section 4.1.2
STEP 4: Primary agency designates OCCT for systems that were not required to conduct a study. Go to Step 7.	<ul style="list-style-type: none"> • Within 18 months² for systems serving 3,301-50,000 people • Within 24 months² for systems serving ≤ 3,300 people 	Section 4.1.3
STEP 5: System completes corrosion control study. ³	Within 18 months after primary agency requires that such a study be conducted	Section 4.1.4
STEP 6: Primary agency designates OCCT. ³	Within 6 months after completion of Step 5	Section 4.1.5
STEP 7: System installs OCCT.	Within 24 months after the primary agency designates such treatment	Section 5.1
STEP 8: System conducts follow-up sampling for 2 consecutive 6-month periods.	Within 36 months after the primary agency designates OCCT	Section 5.2
STEP 9: Primary agency designates OWRPs. ⁴	Within 6 months after completion of Step 8	Section 5.3
STEP 10: System conducts continued WQP and lead and copper tap sampling.	The schedule for required monitoring is based on whether the system exceeds an AL and/or complies with OWRP ranges or minimum.	Section 5.4

CCT Steps

Exhibit 4.1 in EPA's Optimal Corrosion Control Treatment (OCCT) Evaluation Technical Recommendations for Primary Agencies and Public Water Systems

Step 2: CCT Recommendation

- Required to be submitted within six months after the end of the monitoring period
- The corrosion control treatment recommendation must be accompanied by the appropriate OCCT Evaluation Template for your system's population. The OCCT Evaluation Recommendations and Templates are available at: <https://www.epa.gov/dwreginfo/optimal-corrosion-control-treatment-evaluation-technical-recommendations>



Objectives & Methods

- Objective:
 - To reduce the corrosivity of water and therefore reduce the risk of lead leaching from the pipes and plumbing components
- Methods to achieve:
 - Alkalinity and pH adjustment
 - Corrosion Inhibitor
 - Orthophosphate/Silicate
 - Calcium Hardness adjustment



Factors to Consider

- Source Water Quality
- Existing Treatment/Licensing
- Available Space for Treatment Components
- System Size
- Cost

Step 3 & 5: CCT Study

OCCT Study

Exhibit 4.3 in EPA's Optimal Corrosion Control Treatment (OCCT) Evaluation Technical Recommendations for Primary Agencies and Public Water Systems

Corrosion Control Study Component	LCR Requirements
Corrosion Control Study Tools	Systems must evaluate the effectiveness of each CCT specified in §141.82(c)(1) and, if appropriate, combinations of treatments using either pipe rig/loop tests, metal coupon tests, partial-system tests, or analyses based on documented analogous treatments with other systems of similar size, water chemistry, and distribution system configuration (§141.82(a) and (c)(2)).
Monitoring Requirements	Systems must measure the following water quality parameters in any tests before and after evaluating the CCT: Lead, copper, pH, alkalinity, calcium, conductivity, orthophosphate (when an inhibitor containing a phosphate compound is used), silicate (when an inhibitor containing a silicate compound is used), and water temperature (§141.82(c)(3)).
Identification of Constraints	Systems must identify all chemical or physical constraints that limit or prohibit the use of a particular CCT and document such constraints with at least one of the following (§141.82(c)(4)): <ul style="list-style-type: none"> • Data and documentation showing that a particular CCT has adversely affected other water treatment processes when used by another water system with comparable water quality characteristics; and/or • Data and documentation demonstrating that the water system has previously attempted to evaluate a particular CCT and has found that the treatment is ineffective or adversely affects other water quality treatment processes.
Effects on Other Treatment Processes	Systems must evaluate the effect of the chemicals used for CCT on other water quality treatment processes (§141.82(c)(5)).
Reporting	On the basis of an analysis of the data generated during each evaluation, the water system must recommend to the primary agency in writing the treatment option that the corrosion control studies indicate constitutes OCCT for that system. Systems must provide a rationale for their recommendation along with all supporting documentation (§141.82(c)(6)).

Step 7: Install CCT

- Following approval from the State, installation of treatment is required within 24 months
- Permits for installation of treatment are required from the State or county health department

Steps 8 & 9: Water Quality Parameters

- Step 8: Conduct Follow-Up WQP Monitoring within 36 months after State designates Optimal CCT
- Step 9: State designates optimal WQP control values

Public Education

40 CFR 141.85

When must you do PE?

Although the regulations say that all PE materials must be delivered within 60 days after the end of the monitoring period in which the exceedance occurred, NJDEP is asking that PE be completed IMMEDIATELY.

Frequency of PE Requirements

- **Every 12 months**
 - Delivering printed educational materials to all bill paying customers
 - Delivering PE to local public health agencies even if they're not located within the water system's service area
 - Contacting local public health agencies by phone or in person
 - Delivering PE & Informational notice to the 9 previously mentioned facilities within and around the service area
 - Implementing additional outreach activities

Frequency of PE Requirements

- **Quarterly**- Information on or in each water bill, which must be included in each billing cycle
- **Twice every 12 months**- 2 press releases
- **Continuously**- Post educational material on the water system's website if the system serves a population greater than 100,000

Non-Transient Non-Community Water System Requirements

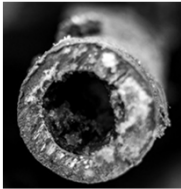
- Post PE material on informational bulletin boards in public spaces or common areas in each building served by the system
- Distribute PE material to each person served by the water system
- SCHOOLS/DAYCARES ONLY- Direct mailing of PE material to the parents/ legal guardians of all current students

Lead Service Line Replacement

40 CFR 141.84

Lead Service Line Replacement

- Systems failing to meet the lead AL after installing CCT or Source Water Treatment need to replace lead service lines



- Following a materials evaluation, the system will be required to replace 7% of the service lines annually
- The first year of LSLR begins on the first day following the end of the monitoring period

Analytical Methods

40 CFR 141.89

Sample Analysis

- Lead and Copper:
 - NJ Certified laboratory
- WQP Monitoring:
 - NJ Certified laboratory or an approved person

 New Jersey Department of Environmental Protection
Division of Water Supply & Geoscience

August 2016

[Guidance for Lead and Copper - Approved Analytical Methods and Reporting Requirements](#)

Moving Forward

What is New Jersey & EPA doing?

NJ DEP

- Currently working with Large Systems
- Requested submission of Lead and Copper Rule Sampling Plans for approximately 200 systems
- Follow-up with systems with existing lead ALEs.
- Compliance will be run on all requirements.
 - Violations will be issued.

EPA Long-Term Revisions

EPA is considering Long-Term revisions to improve public health protection by making substantive changes and to streamline the rule requirements.

EPA's primary goals in considering Long-Term revisions are to:

1. Improve the effectiveness of the corrosion control treatment in reducing exposure to lead and copper.
2. Trigger additional actions that equitably reduce the public's exposure to lead and copper when corrosion control treatment alone is not effective.

Long-Term revisions are expected to come out in 2017