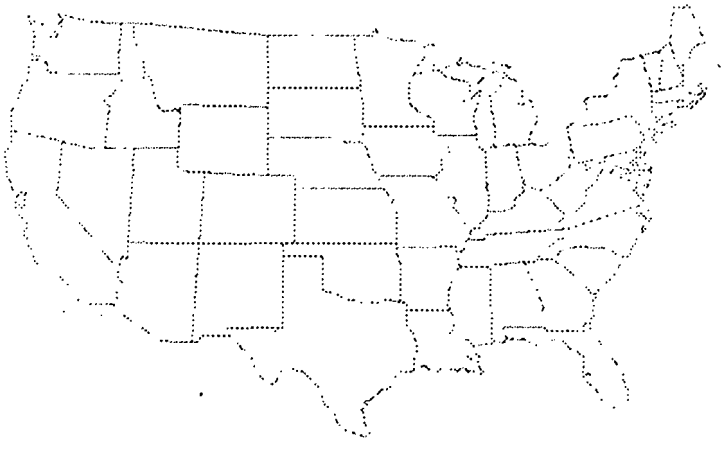
Fact Sheet:

National Primary Drinking Water Regulations for Lead and Copper



May 1991

Office of Ground Water and Drinking Water
U.S. Environmental Protection Agency
Washington, DC

Summary

	MCLG (mg/L)	Action Level (mg/L)*
Lead	0	0.015
Copper	1.3	1.3

*Measured in 90th percentile at consumers' taps

These regulations will:

- Establish Maximum Contaminant Level Goals (MCLGs) of zero for lead and 1.3 milligrams per liter (mg/L) for copper.
- Establish a treatment technique requirement for lead that includes:
    1) optimal corrosion control treatment,
    2) source water treatment,
    3) public education, and
    4) lead service line replacement.
- Establish a treatment technique requirement for copper that includes:
    1) optimal corrosion control treatment, and
    2) source water treatment.
- The treatment technique requirements are triggered by exceedances of the lead action level of 0.015 mg/L or the copper action level of 1.3 mg/L measured in the 90th percentile.

These final rulemakings establish:

- Two additional National Primary Drinking Water Regulations (NPDWRs), bringing the total to 58.
- Two additional inorganic standards, bringing the total to 13.

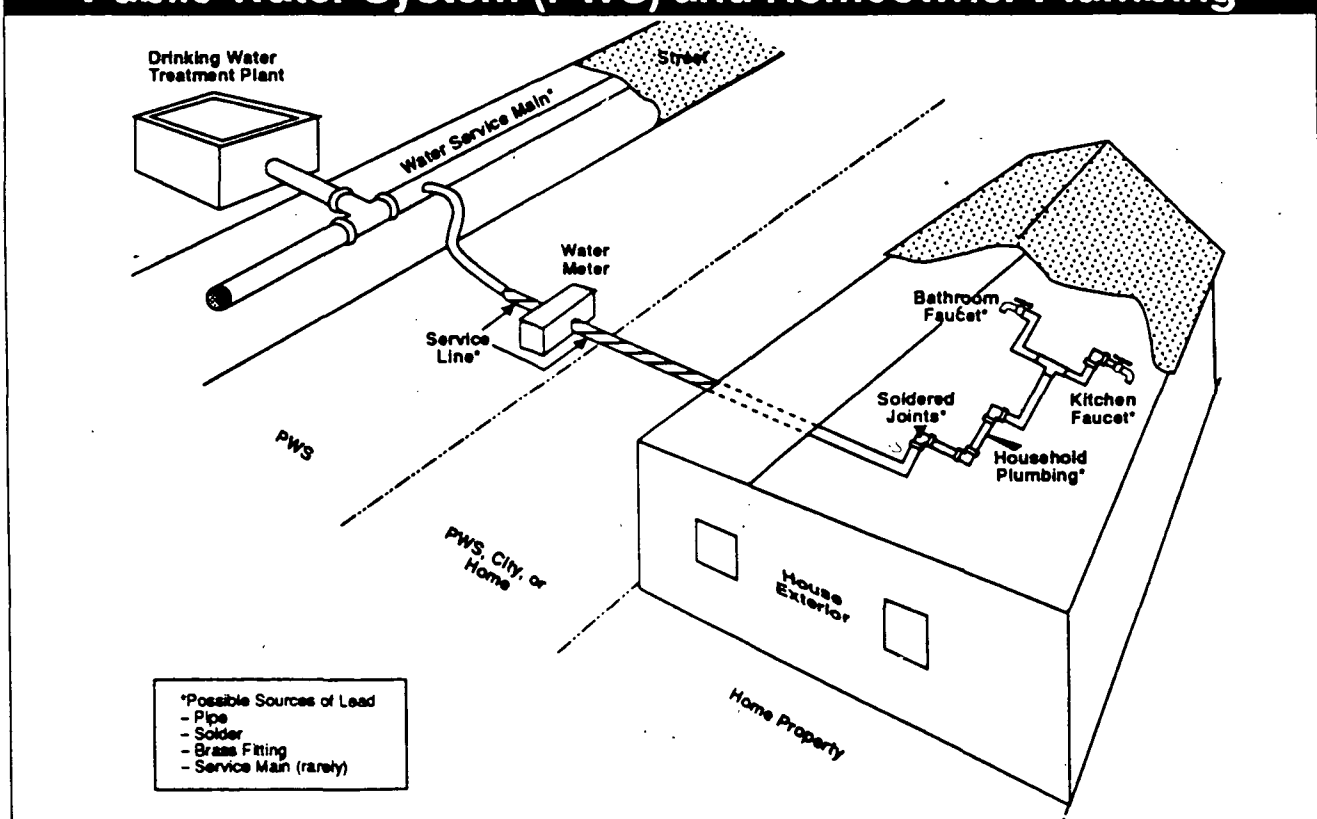
These rules also include provisions for:

- Analytical methods and laboratory performance requirements;
- Best Available Technologies (BAT) for complying with the treatment technique requirements;
- Mandatory health effects language to be used by systems when notifying the public of violations;
- System recordkeeping and reporting requirements; and
- State recordkeeping, reporting and primacy requirements.

Health Effects and Sources of Lead and Copper

Contaminant	Low Level Health Effects	Sources in Drinking Water
Lead	**Children:** Altered physical and mental development; interference with growth; deficits in IQ, attention span, and hearing; interference with heme synthesis **Women:** Increased blood pressure; shorter gestational period **Men:** Increased blood pressure	**Corrosion of:** Lead solder and brass faucets and fixtures Lead service lines (20% of public water sytems) **Source water** (1% of systems)
Copper	Stomach and intestinal distress; Wilson's Disease	**Corrosion of:** Interior household and building pipes **Source water** (1% of systems)

Public Water System (PWS) and Homeowner Plumbing



Regulatory Impact

Benefits

- These regulations will:
  - reduce the exposure of approximately 130 million people to lead in drinking water.
  - result in an additional 570,000 children having their blood lead level reduced to below 10 micrograms per deciliter (µg/dl).
- Nationwide health benefits when translated into avoided medical costs are estimated to be:
  - between $2.8 and $4.3 billion per year for corrosion control and source water treatment.
  - between $70 and $240 million per year for lead service line replacement.
- Nationwide material benefits attributable to reduced corrosion of water distribution systems and household plumbing systems are estimated to be $500 million per year.

Costs

- Capital costs are estimated to be between $2.9 and $7.6 billion.
- Operation and maintenance costs are estimated to be $240 million per year.
- Total annualized costs are estimated to be between $500 and $790 million per year.
- For large systems (serving >50,000 persons), corrosion control treatment required by this rule is estimated to cost $1 per household per year.
- For smaller systems (serving $\leq$ 50,000 persons), corrosion control treatment is estimated to cost $2 to $20 per household per year.
- Total annualized costs for lead service line replacement are estimated to be $80 to $370 million per year.
- Tap water monitoring will be required for 79,000 community and nontransient non-community water systems.
- Monitoring costs are estimated to be:
  - $40 million per year nationwide.
  - $0.10 per household per year for large systems and less than $3 per household per year for smaller systems.
- State implementation costs are estimated to be $40 million per year.

Treatment Technique Requirements

Corrosion Control Treatment

- Systems must collect tap water samples for lead and copper from high risk homes.

Corrosion Control Studies

- Systems triggered into the corrosion control treatment requirements may first have to conduct studies to compare the effectiveness of:
  - pH and alkalinity adjustment (reduces the acidity of the water);
  - calcium adjustment (promotes the formation of protective coatings inside pipes and plumbing); and
  - addition of phosphate or silica-based corrosion inhibitor (forms protective coating inside pipes and plumbing).
- All large water systems (serving >50,000 people) are required to conduct such studies.
- Small and medium-size water systems (serving ≤50,000 people) that exceed the lead or copper action level are required to first submit a recommendation for optimal corrosion control treatment to the State.
- The State will either approve the recommended treatment or require the installation of an alternative treatment. The State may, as an alternative, require small and medium-size water systems to conduct the corrosion control treatment studies described above.
- Any system that conducts corrosion control studies must recommend an optimal corrosion control treatment to the State on the basis of study results and monitoring data.
- States will either approve a system's recommendation or designate an alternative treatment as optimal.

Corrosion Control Treatment

- Once treatment is specified by the State, systems will have 24 months to install optimal corrosion control treatment and 12 months to collect follow-up samples.
- States will assign values for a set of water quality parameters that constitute optimal corrosion control treatment:
  - pH;
  - alkalinity;
  - calcium, when carbonate stabilization is used;
  - orthophoshate, when an inhibitor with a phosphate compound is used; and
  - silica, when an inhibitor with a silicate compound is used.
- A system must continue to operate within the water quality parameters established by the State.

Source Water Treatment

- All public water systems that exceed the tap water lead or copper action level must collect source water samples and submit the data with a treatment recommendation to the State.
- States may specify one of the following treatments, or an alternative treatment at least as effective, for the system to install: 1) ion exchange, 2) reverse osmosis, 3) lime softening or 4) coagulation/filtration.
- Once treatment is specified by the State, systems will have 24 months to install source water treatment and 12 months to collect follow-up source water samples.
- States will review follow-up source water monitoring results and assign maximum permissible lead and copper concentrations in source water entering the distribution system.
- Systems must continue to deliver water to all entry points in the distribution system that does not exceed the maximum permissible lead and copper concentrations established by the State.
- Source water monitoring will be standardized to 3/6/9 year cycles after treatment is installed or the State determines no treatment is necessary.

Treatment Technique Requirements

Public Education

- Informs the public about the adverse health effects of lead and explains the steps people can take in their homes to reduce their exposure to lead in drinking water (i.e., flushing the tap; cooking with cold water rather than hot; checking for lead solder in new plumbing; and testing their water for lead).
- All public water systems exceeding the lead action level must deliver the EPA-developed public education program to their customers within 60 days.
- Every 12 months, systems must deliver:
  - bill stuffers to their customers and brochures to all institutions in the community frequented by women and children (i.e., health departments, hospitals, clinics, etc.), and
  - the public education material to the editorial departments of major newspapers serving the community.
- Every 6 months, systems must submit a public service announcement on lead in drinking water to major television and radio stations serving the community.
- Every 12 months, non-transient non-community water systems must post information notices in each building served by the system and deliver brochures to all of the system's customers.
- The public education program must be delivered by a water system for as long as the system exceeds the lead action level.

Lead Service Line Replacement

- All public water systems that continue to exceed the lead action level after installing optimal corrosion control treatment and source water treatment must replace lead service lines that contribute in excess of 15 parts per billion (ppb) to total tap water lead levels.
- A system must replace seven percent of its lead lines each year or demonstrate that the lines not replaced contribute less than 15 ppb of lead to drinking water at the tap.
- A system must replace the entire lead service line unless it can demonstrate that it does not control the entire line. Water systems must offer to replace the owner's portion of the service line.
- A system that exceeds the lead action level after installing optimal corrosion control treatment and source water treatment has 15 years to replace all lead service lines.

Tap Water Monitoring

Lead and Copper

Start Dates for Monitoring		Monitoring Period
January 1992	Large Systems (>50,000)	1 monitoring period is equivalent to 6 months (2 per calendar year, i.e., January to June and July to December)
July 1992	Medium-size Systems (3,300 to ≤ 50,000)	
July 1993	Small Systems (≤ 3,300)	

Sample Site Location

- Tap water samples must be collected at high risk locations:
  - homes with lead solder installed after 1982,
  - homes with lead pipes,
  - homes with lead service lines.

Sample Collection Methods

- First flush tap water samples must stand motionless for at least six hours before the samples are collected.
- One liter of water must be drawn from the cold water kitchen or bathroom tap.
- Systems may collect samples or enlist residents to collect samples. Residents fill the container supplied by the water system according to directions and leave the container for the system to pick up.

Tap Water Monitoring

Lead and Copper

Number and Frequency

Base Monitoring:

- All public water systems are required to collect one sample for lead and copper analysis from the following number of sites during each six month monitoring period.

Table 1. Tap Sampling for Lead and Copper

System Size (Population)	No. of Sampling Sites (Initial Base Monitoring)	No. of Sampling Sites (Reduced Monitoring)
>100,000	100	50
10,001 to 100,000	60	30
3,301 to 10,000	40	20
501 to 3,300	20	10
101 to 500	10	5
≤100	5	5

Reduced Monitoring:

- All public water systems that meet the lead and copper action levels or maintain optimal corrosion control treatment for two consecutive six month monitoring periods may reduce the number of tap water sampling sites (see Table 1) and their collection frequency to once per year.

- All public water systems that meet the lead and copper action level, or maintain optimal corrosion control treatment, for three consecutive years may reduce the tap water sampling sites (see Table 1) and their collection frequency to once every three years.

Monitoring

Water Quality Parameters (other than lead and copper)

- In addition to lead and copper, all large water systems, and those small and medium-size systems that exceed the lead or copper action level, will be required to monitor for the following water quality parameters:
  - pH,
  - alkalinity,
  - calcium,
  - conductivity,
  - orthophosphate,
  - silica, and
  - water temperature.
- These parameters are used to identify optimal treatment, and once treatment is installed, to determine whether a system remains in compliance with the rule.
- Systems are required to maintain water quality parameters within State specifed ranges.
- Systems will have to monitor water quality parameters at two separate locations:
  - representative taps throughout the distribution system (systems can use total coliform sampling sites), and
  - entry points to the distribution system.

Base Monitoring:

- All large water systems (>50,000) and those small and medium-size water systems (≤50,000) that exceed the lead or copper action level must collect two tap samples for each applicable water quality parameter from the following number of sites during each six month monitoring period.

Table 2. Tap Sampling for Water Quality Parameters

System Size (Population)	No. of Tap Sampling Sites (Initial Base Monitoring)	No. of Tap Sampling Sites (Reduced Monitoring)
>100,000	25	10
10,001 to 100,000	10	7
3,301 to 10,000	3	3
501 to 3,300	2	2
101 to 500	1	1
≤100	1	1

Monitoring

Water Quality Parameters (other than lead and copper)

- All large water systems, and those small and medium-size water systems that exceed the lead or copper action level, must collect one sample for each applicable water quality parameter at each entry point to the distribution system every two weeks.

- All large water systems, and those small and medium-size systems that exceed the lead or copper action level, after installing optimal corrosion control treatment must continue to collect:

    - two samples for each applicable water quality parameter at each of the sampling sites specified above every six months, and

    - one sample for each applicable water quality parameter at each entry point to the distribution system every two weeks.

Reduced Monitoring:

- All water systems that maintain State-specified water quality parameters reflecting optimal corrosion control for two consecutive six month monitoring periods may reduce the number of tap samples collected (see Table 2) during each six month monitoring period.

- All water systems that maintain State-specified water quality parameters reflecting optimal corrosion control for three consecutive years may reduce the number of tap samples collected (see Table 2) and the frequency with which they are collected to once per year.

Monitoring Schedules

Lead and Copper Monitoring

Monitoring Period	Parameters [1]	Location	Frequency
Initial Monitoring	Lead and Copper	Targeted high risk Interior taps	Every six months[1,2]
After Installation of Corrosion Control	Lead and Copper	Targeted high risk Interior taps	Two consecutive six month monitoring periods
After State Specifies Parameter Values for Optimal Corrosion Control	Lead and Copper	Targeted high risk Interior taps	Two consecutive six month monitoring periods[3]
Reduced Monitoring	Lead and Copper	Targeted high risk Interior taps	Once every year[4]
	Lead and Copper	Targeted high risk Interior taps	Once every three years

[1] Large systems collect tap water samples for two-six month monitoring periods before conducting comparative corrosion control treatment studies.

[2] Small and medium-size systems collect tap water samples for lead and copper until they exceed the lead or copper action level and are triggered into the treatment technique requirement.

[3] Systems meeting the lead and copper action level, or maintaining optimal corrosion control treatment specified by the State, for two consecutive six month monitoring periods may reduce tap water sampling to once per year and collect the reduced number of samples indicated in Table 1 on page 7.

[4] Systems meeting the lead and copper action level, or maintaining optimal corrosion control treatment specified by the State, for three consecutive years may reduce tap water sampling to once every three years and collect the reduced number of samples indicated in Table 1 on page 7.

Monitoring Schedules

Water Quality Parameter Monitoring

Monitoring Period	Parameters [1]	Location	Frequency
Initial Monitoring	pH, alkalinity, orthophosphate or silica [2], calcium, conductivity, temperature	Taps and at entry point(s) to distribution system	Every six months
After Installation of Corrosion Control	pH, alkalinity, orthophosphate or silica [2], calcium [3]	Taps	Every six months
	pH, alkalinity dosage rate and concentration (if alkalinity adjusted as part of corrosion control), inhibitor dosage rate and inhibitor residual [4]	Entry point(s) to distribution system	Biweekly
After State Specifies Parameter Values for Optimal Corrosion Control	pH, alkalinity, orthophosphate or silica [2], calcium [3]	Taps	Every six months
	pH, alkalinity dosage rate and concentration (if alkalinity adjusted as part of corrosion control), inhibitor dosage rate and inhibitor residual [4]	Entry point(s) to distribution system	Biweekly
Reduced Monitoring	pH, alkalinity, orthophosphate or silica [2], calcium [3]	Taps[5,6]	Every six months
	pH, alkalinity dosage rate and concentration (if alkalinity adjusted as part of corrosion control), inhibitor dosage rate and inhibitor residual [4]	Entry point(s) to distribution system	Biweekly

[1] Small and medium-size systems have to monitor for water quality parameters only during monitoring periods in which the system exceeds the lead or copper action level. Large systems must monitor water quality parameters during each monitoring period.

[2] Orthophosphate must be measured only when an inhibitor containing a phosphate compound is used. Silica must be measured only when an inhibitor containing silicate compound is used.

[3] Calcium must be measured only when calcium carbonate stabilization is used as part of corrosion control.

[4] Inhibitor dosage rates and inhibitor residual concentrations (orthophosphate or silica) must be measured only when an inhibitor is used.

[5] Systems maintaining optimal corrosion control treatment specified by the State for two consecutive six-month monitoring periods may reduce tap water sampling of water quality parameters to once per year and collect the reduced number of samples indicated in Table 2 on page 8.

[6] Systems maintaining optimal corrosion control treatment specified by the State for three consecutive years may reduce tap water sampling of water parameters to once every three years and collect the reduced number of samples indicated in Table 2 on page 8.

Regulatory Schedule for Large Systems (>50,000 people)

Date	Activities (system activities denoted by ▶)
May 1991	National Primary Drinking Water Regulations (NPDWRs) for lead and copper promulgated
January 1992	▶ Begin tap water and distribution system monitoring
November 1992	▶ Treatment technique requirements take effect
January 1993	▶ Complete tap water and distribution system monitoring
July 1994	▶ Complete corrosion control studies and recommend treatment to State
January 1995	State designates optimal corrosion control treatment
January 1997	▶ Complete installation of corrosion control treatment
January 1998	▶ Complete follow-up monitoring and submit results to State[1]
July 1998	State designates water quality parameters

[1]Systems that continue to exceed action level begin 15-year lead service line replacement program.

Regulatory Schedule for Medium-size Systems (3,300 to ≤50,000 people)

Date	Activities (system activities denoted by ▶)
May 1991	National Primary Drinking Water Regulations (NPDWRs) for lead and copper promulgated
July 1992	▶ Begin tap water monitoring
November 1992	Treatment technique requirements take effect
January 1993	▶ Recommend optimal corrosion control treatment[1]
January 1994	State requires system to conduct corrosion control studies[2]
July 1994	State designates optimal corrosion control treatment[3]
July 1995	▶ Complete corrosion control studies and recommend treatment to State[2]
January 1996	State designates optimal corrosion control treatment for system conducting treatment studies[2]
July 1996	▶ Complete installation of corrosion control treatment[3]
July 1997	▶ Complete follow-up monitoring and submit results to State[3,4]
January 1998	▶ Complete installation of corrosion control treatment[2]
	State designates water quality parameters[3]
January 1999	▶ Complete follow-up monitoring and submit results to State[2,4]
July 1999	State designates water quality parameters[2]

[1]Assumes system exceeds lead or copper action level during first monitoring period.
[2]Medium-size systems required to conduct comparative treatment studies.
[3]Medium-size systems which State specifies optimal treatment without studies.
[4]Systems that continue to exceed action level begin 15-year lead service line replacement program.

Regulatory Schedule for Small Systems (≤3,300 people)

Date	Activities (system activities denoted by ▶)
May 1991	National Primary Drinking Water Regulations (NPDWRs) for lead and copper promulgated
November 1992	Treatment technique requirements take effect
July 1993	▶ Begin tap water monitoring
January 1994	▶ Recommend optimal corrosion control treatment to State[1]
January 1995	State requires system to conduct corrosion control studies[2]
January 1996	State designates optimal corrosion control treatment[3]
July 1996	▶ Complete corrosion control studies and recommend treatment to State[2]
January 1997	State designates optimal corrosion control treatment [2]
January 1998	▶ Complete installation of corrosion control treatment[3]
January 1999	▶ Complete installation of corrosion control treatment[2]
	▶ Complete follow-up monitoring and submit results to State[3,4]
July 1999	State designates water quality parameters[3]
January 2000	▶ Complete follow-up monitoring and submits results to State[2,4]
July 2000	State designates water quality parameters[2]

[1]Assumes system exceeds lead or copper action level during first monitoring period.

[2]Small systems required to conduct comparative treatment studies.

[3]Small systems which State specifies optimal treatment without studies.

[4]Systems that continue to exceed action level begin 15-year lead service line replacement program.

For More Information

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EPA Region 2
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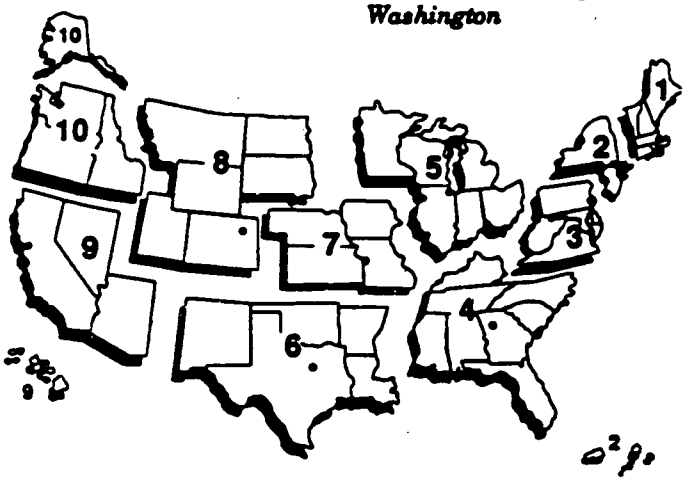

EPA Safe Drinking Water Hotline
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