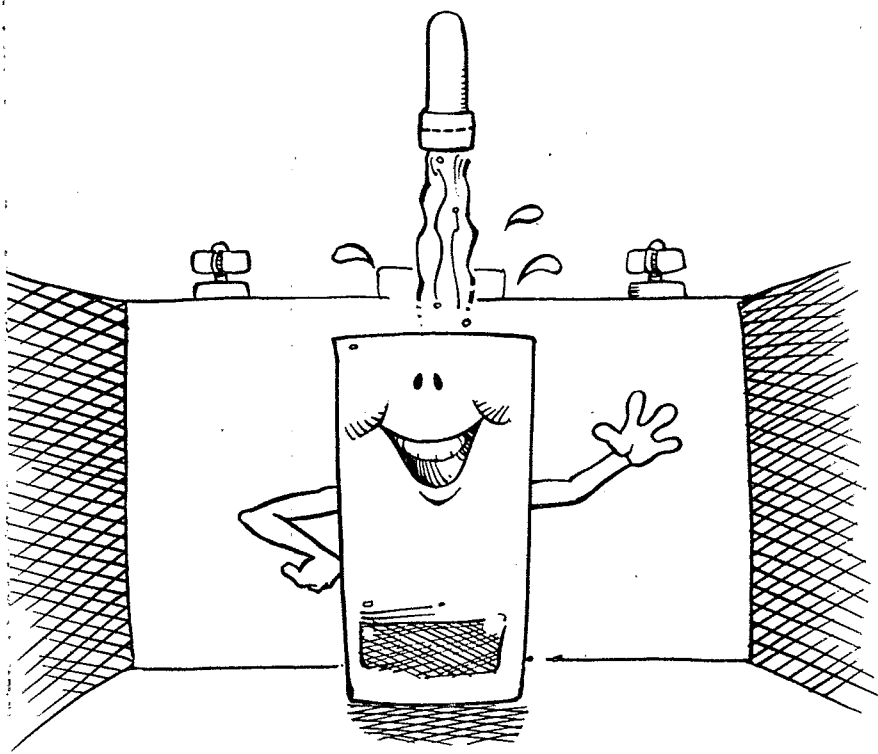


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The Safe Drinking Water Act

A pocket guide to the requirements
for the operators of small water systems



June 1993

This is the third edition of a booklet prepared by the Environmental Protection Agency (EPA), Region 9. It is designed specifically for the owners and operators of small water systems. Its purpose is to make the Federal Safe Drinking Water Act and the Drinking Water Regulations more clear and understandable. The Act is complex, and some simplifications have been made in this publication. Generally, those items which apply only to larger water systems have been left out. For complete information, consult the actual text of the Act and Regulations. These can be obtained by calling your local EPA Regional Office or The Safe Drinking Water Hotline at (800) 426-4791.

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Drinking water is a precious resource, but most people take it for granted. Many people assume that water will always come out of their kitchen tap and that it will always be wholesome. It is the job of the water system operator to get the water from the source to the consumer's tap. This may involve pumping water out of the ground or diverting a stream, removing harmful contaminants, and pumping the water through miles of pipes. All of this costs money. Water in the ground may be free, but getting the water from the source to the people's homes and making sure that it is safe costs money. An important part of the operator's job is to help people understand why piped water to their homes is not free. If the operator can gain the support of the community, then his job will be much easier, and he can better protect the precious resource that is drinking water.

Introduction



The Safe Drinking Water Act

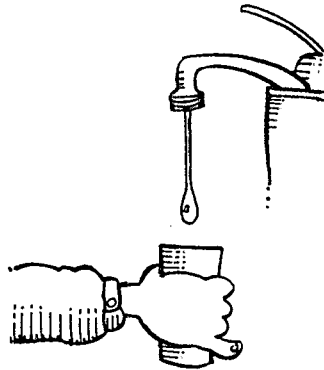
The Safe Drinking Water Act was passed by Congress in 1974, and has been amended several times since then. The purpose of the Act is to make sure that the drinking water supplied to the public is safe and wholesome. The Environmental Protection Agency (EPA) is the federal agency which has the responsibility of writing the regulations to carry out the provisions of the Act. EPA sets national drinking water standards which all water supplied to the public must meet. The people who supply the water are responsible for making sure that the water meets the standards. It is important to note that the Safe Drinking Water Act does not provide funds for construction of water systems, improvements to water systems, or for ongoing operation and maintenance.

The Act was amended most recently in 1986. The amendments require the development of more drinking water standards and more technical requirements. As you read through this booklet, keep in mind that EPA is in the process of revising many of the regulations.

How the Program Works

The Federal drinking water program was designed to be delegated, which means that approved government agencies (usually states) carry out the program on a day-to-day basis. EPA provides guidance, technical assistance, and some financing to these agencies. Most states have been delegated "Primacy", or the authority to run the program. In the states and on Indian Lands which do not have primacy, EPA runs the program directly. In these cases, EPA is the "state" mentioned in the regulations. Some Primacy States have, in turn, delegated their authority to counties. Throughout this booklet, the term "regulatory agency" is used. This refers to the state health department, county health department, EPA regional office, or whatever agency has Primacy. Regulatory agencies keep track of sample results, conduct detailed inspections called sanitary surveys, and take enforcement actions such as imposing fines and penalties when necessary. They also provide technical assistance to owners and operators of public water systems.

Requirements of the Safe Drinking Water Act



The requirements of the Safe Drinking Water Act apply to all public water systems. A public water system is one which serves piped water to at least 15 service connections or regularly serves an average of at least 25 people each day at least 60 days per year.

Public Water Systems are divided into three categories: community systems, non-community systems, and non-transient noncommunity systems. A community water system serves people year round, (a small town, for example) whereas a noncommunity system serves people only for a portion of the time (a hotel, restaurant or campground, for example). A non-transient non-community system is a mixture of the two. This type of system serves the same people nearly every day but the people do not actually live at the facility being served (schools or factories, for example). Different requirements apply to each type of system, although non-transient non-community systems generally have to meet the same requirements as community systems.

Before you read through the rest of this booklet, you should know the following things about your water system. The

requirements that apply to your system depend on these three factors:

- 1) whether it is a community system, a non-transient non-community system, or a noncommunity system,
- 2) the number of people served by your system, and
- 3) whether it uses surface water or ground water.

There are three major types of requirements in the Safe Drinking Water Act:

- 1) Sampling and Reporting,
- 2) Record Keeping, and
- 3) Public Notification.

These are described below. Keep in mind that the owner or operator of the water system is responsible for meeting these requirements.

Sampling and Reporting: Each supplier of water must collect samples from the water system, take them to a certified laboratory for analysis, and send the results to the regulatory agency (usually the state or county health department). The type of analysis performed, the sampling frequency, and the location of the sampling point vary from system to system, and chemical to chemical. Some states perform the sampling for the systems in their state.

**Requirements of
the Safe Drinking
Water Act (cont.)**

Record Keeping: The laboratory results, name of the person who collected the samples, dates and locations of sampling points, steps taken to correct problems, sanitary survey reports, and other information must be kept on file by the water supplier.

Public Notification: Any time there is a violation of a requirement, the public must be notified. Violations are divided into two categories, Tier 1 and Tier 2, depending on the seriousness of the violation. For example, a violation of a standard indicating contamination in the system is more serious than a failure to meet a compliance schedule imposed by the regulatory agency. Therefore, the violation of the standard would be considered Tier 1, and more extensive public notification would be required. The public notice must meet certain minimum requirements concerning the way that it is issued and its contents.

In addition to notification when there is a violation, a special one-time notification is required concerning lead. This notification must be done even if the system did not violate the standard for lead. Again, there are minimum requirements about the content of the notice and the way that it is issued. The lead notification should have been

done by June 19, 1988. If you have not done the notification yet, contact your regulatory agency for assistance.

Each regulatory agency has the option to make its own requirements stricter than EPA's. For example, some states have operator certification requirements, permitting requirements, and additional sampling requirements. Contact your primacy agency (usually the state or county health department) to find out if any additional requirements apply to your system.

The Safe Drinking Water Act allows regulatory agencies to issue variances and exemptions from some of the requirements for systems that are having major technical or financial problems in meeting the requirements. These are legal means by which a system can supply water to the public for a limited time which does not meet the requirements. Variances and exemptions are generally difficult to obtain and are rather uncommon. The supplier of water must prove to the authorities that there is no undue risk to health by allowing the variance or exemption. Contact your regulatory agency for more specific information.

Types of Drinking Water Standards

EPA sets drinking water standards which apply to all public water systems across the country. There are two types of standards: primary and secondary. Primary standards are health based and are enforceable. Secondary standards are based on the aesthetic quality of the water and are non-enforceable guidelines. Remember that states have the option to set standards which are more strict than those set by EPA.

Primary Standards may be either Maximum Contaminant Levels or Treatment Technique Requirements. These are described below.

Maximum Contaminant Level Goal (MCLG): This is a number which is associated with no adverse health effects. If someone drinks water for a lifetime containing the contaminant at this level, there should be no ill effects. As implied by the name, this number is a goal, not an enforceable standard. For chemicals which are believed to cause cancer, the MCLG is set at zero because there is no known safe level for this type of chemical.

Maximum Contaminant Level (MCL): This is the enforceable standard. EPA sets the MCL as close to the MCLG as possible, taking costs and technology into consideration. The MCL is the

number against which the water samples from your system are judged for compliance with the regulations.

Treatment Technique Requirements are set for contaminants which are difficult or costly to measure. For these contaminants, EPA may choose to require specific water treatment practices (such as filtration or corrosion control) to remove these contaminants and prevent health problems. This is done instead of setting an MCL for these contaminants.

Secondary Standards: The Secondary Maximum Contaminant Level (SMCL) is a number associated with the aesthetic quality of the water, such as taste, odor, or color. Water with contaminants above the SMCL may not be pleasant to drink, but it will not cause health problems. According to EPA, these numbers are guidelines, not enforceable standards. However, some states choose to enforce these secondary standards. Contact your regulatory agency to find out if these standards apply to your system.



Contaminant Groups

There are several groups of contaminants, described in this section, for which standards have been set.

Microorganisms: This group includes bacteria, viruses, and protozoa; some of which cause disease.

The *total coliform* group of bacteria has been used for most of the twentieth century as an indicator of the possible presence of disease-causing microorganisms. These bacteria are used because the analytical methods available to detect them are inexpensive, and they are present in large numbers in fecal matter of humans and other warm-blooded animals. Revised standards for coliform in drinking water went into effect on December 31, 1990. The revised standards are described in this pocket guide. Some states may not have yet adopted these new standards. If this is the case in your state, your regulatory agency will notify you of the changes.

Other types of bacteria regulated by EPA include *Legionella*, which causes an upper respiratory disease, and *heterotrophic bacteria*, which are used to assess the overall bacteriological purity of the water. In addition to bac-

teria, there are regulations covering *enteric viruses* (intestinal viruses) and *Giardia lamblia*, which is a protozoan cyst causing gastrointestinal illness.

Legionella, heterotrophic bacteria, enteric viruses, and *Giardia lamblia*, are regulated under the Surface Water Treatment Rule. This is a set of treatment technique requirements for systems using surface water such as rivers, streams, or lakes; or systems using groundwater which is influenced by surface water. Ground water from properly constructed wells is generally free of microbiological contamination. Refer to Appendix A for a description of the Surface Water Treatment Rule, which went into effect on December 31, 1990.

Turbidity, a measure of the cloudiness of water, is caused by suspended material. Turbidity is not a microorganism, but it is included in this group because it interferes with disinfection by shielding the microorganisms. Excessive turbidity can allow live pathogens to enter the system.

Contaminant Groups (cont.)

Inorganic Chemicals: This group includes naturally occurring metals and minerals. The list of regulated inorganics was recently revised under three different regulatory packages. Inorganics for which there are new or revised MCLs include antimony, asbestos, barium, beryllium, cyanide, nickel, cadmium, fluoride, mercury, nitrate, nitrite, selenium, and thallium. A separate rule establishing treatment technique requirements for two other inorganic contaminants, lead and copper, was also recently passed.

Synthetic Organic Chemicals: These are man-made carbon containing chemicals including pesticides, herbicides, and polychlorinated bi-phenyls (PCBs). The list of regulated SOC was recently revised. The new regulations added MCLs for 27 new SOC and revised the existing MCLs for five SOC.

Volatile Organic Chemicals: These are volatile organic chemicals which readily volatilize, or travel from the water into the air. Most of them are industrial chemicals and solvents. Currently, there are MCLs for 21 VOCs.

Radionuclides: These are radioactive chemicals that are usually naturally occurring. The ones that are regulated for small systems are gross alpha particle activity, radium 226, and radium 228. Larger systems also have to sample for beta particle activity.

Disinfection by-Products: These are chemicals which are formed when a disinfectant such as chlorine is added to water that contains organic matter, usually from decaying plant or animal material. The by-products that are currently regulated are Total Trihalomethanes or TTHMs. The MCL for TTHMs applies to systems that serve 10,000 or more people and apply a disinfectant, such as chlorine, to the water. This standard also applies to all surface water systems, regardless of size, that meet the criteria for avoiding filtration.

The Standards

The tables on the following pages list the MCLs or treatment techniques for each of the contaminants. Keep in mind that these tables will be changing over the years as EPA continues to revise the standards and create new ones. These tables include the standards for which regulations have been made final as of the date of this publication. See the section on Upcoming Changes in Regulations for more information about proposed changes.

Turbidity

Not more than 1 NTU as a monthly average, or not more than 5 NTU as an average of two consecutive days

NOTE: NTU is nephelometric turbidity unit, a measure of the amount of light that is reflected off the water. The turbidity standard applies only to systems using surface water. This standard remains in effect until June 29, 1993 for systems which must filter. See Appendix D for the changes to the turbidity standard as a result of the Surface Water Treatment Rule.

Legionella,
Heterotrophic
Bacteria, Enteric
Viruses, and
Giardia lamblia

Treatment technique: Filtration
and Disinfection (Surface Water
Treatment Rule)

The Surface Water Treatment Rule lists four different filtration technologies that are acceptable for removal of these microorganisms, and specifies minimum disinfection requirements.

Each filtration technology has a specific set of requirements for sampling frequency and turbidity levels. If the sampling is performed as required and the turbidity standards are met, then the filtration is assumed to be adequate to remove the microorganisms. There are very limited provisions for allowing other methods of filtration. There are also some very strict criteria that systems must meet in order to avoid filtration. Appendix D provides a full description of the Surface Water Treatment Rule requirements.

Total Coliform

for systems collecting less than 40 samples per month: no more than one sample (including routine and repeat samples) per month can be positive* for total coliform

for systems collecting more than 40 routine samples per month: no more than 5.0% of samples per month can be positive* for total coliform

* Any positive sample triggers a repeat sampling requirement (see section on Repeat Sampling Requirements)

Lead and Copper

Treatment Technique: Corrosion control, source water treatment, lead service line replacement, public education (this is the Lead and Copper Rule)

NOTE: The treatment technique requirements specified in the Lead and Copper Rule are triggered if the system exceeds the action level of either 0.015 mg/l for lead or 1.3 mg/l for copper.

	<u>Contaminant</u>	<u>MCL (mg/l)</u>
Inorganic Chemicals	antimony	0.006
	asbestos	7 million fibers/liter (longer than 10 µm)
	arsenic	0.05
	barium	2
	beryllium	0.004
	cadmium	0.005
	chromium	0.1
	cyanide	0.2
	fluoride	4
	mercury	0.002
	nickel	0.1
	nitrate	10
	nitrite	1
	nitrate/nitrite	10
	selenium	0.05
	thallium	0.002
Synthetic Organic Chemicals	alachlor	0.002
	aldicarb	0.003
	aldicarb sulfoxide	0.004
	aldicarb sulfone	0.002
	atrazine	0.003
	benzo(a)pyrene	0.0002
	carbofuran	0.04
	chlordane	0.002
	Dalapon	0.2
	Di(2-ethylhexyl)adipate	0.4
	Di(2-ethylhexyl)phthalate	0.006
	Dibromochloropropane	0.0002
	Dinoseb	0.007
	Dioxin	3x10 ⁻⁸

<u>Contaminant</u>	<u>MCL (mg/l)</u>	
Diquat	0.02	Synthetic Organic Chemicals (cont.)
2,4-D	0.07	
endothall	0.1	
endrin	0.002	
ethylene dibromide	0.00005	
glyphosate	0.7	
heptachlor	0.0004	
heptachlor epoxide	0.0002	
Hexachlorobenzene	0.001	
Hexachlorocyclopentadiene	0.05	
lindane	0.0002	
methoxychlor	0.04	
oxamyl	0.2	
picloram	0.5	
polychlorinatedbiphenyls	0.0005	
pentachlorophenol	0.001	
simazine	0.004	
toxaphene	0.003	
2,4,5-TP	0.05	

These are flocculents used in some treatment plants. The treatment technique is a dosage requirement of 0.05% dosed at 1 mg/l for acrylamide and 0.01% dosed at 20 mg/l for epichlorohydrin.

**Acrylamide and
Epichlorohydrin
Treatment
Technique**

	<u>Contaminant</u>	<u>MCL (mg/l)</u>
Volatile Organic Chemicals	Vinyl chloride	0.002
	benzene	0.005
	carbon tetrachloride	0.005
	1,2-dichloroethane	0.005
	trichloroethylene	0.005
	para-dichlorobenzene	0.075
	1,1-dichloroethylene	0.007
	1,1,1-trichloroethane	0.2
	cis-1,2-dichloroethylene	0.07
	dichloromethane	0.005
	1,2-dichloropropane	0.005
	ethylbenzene	0.7
	monochlorobenzene	0.1
	o-dichlorobenzene	0.6
	styrene	0.1
	1,2,4-Trichlorobenzene	0.07
	1,1,2-Trichloroethane	0.005
	tetrachloroethylene	0.005
	toluene	1
	trans- 1,2-dichloroethylene	0.1
	xylene	10
Chlorinated Organic Chemicals	Endrin	0.0002
	TTHMs	0.10

<u>Contaminant</u>	<u>MCL (mg/l)</u>	
gross alpha	15.0 pCi/l	Radionuclides
combined radium-226 and radium-228	5.0 pCi/l	
aluminum	0.05 to 0.2 mg/l	Secondary MCLs (guidelines)
chloride	250 mg/l	
color	15 color units	
fluoride	2.0 mg/l	
foaming agents	0.5 mg/l	
iron	0.3 mg/l	
manganese	0.05 mg/l	
odor	3 threshold odor number	
pH	6.5 - 8.5	
silver	0.1 mg/l	
sulfate	250 mg/l	
total dissolved solids	500 mg/l	
zinc	5 mg/l	

Sampling Frequencies



There are different monitoring requirements for each contaminant group. In addition, there may be different monitoring requirements for the individual contaminants within a group. The requirements also depend on whether the system uses groundwater or surface water and on the number of people served. Also, in some cases, detecting the contaminant above a certain level triggers increased monitoring requirements even when the MCL is not exceeded.

The requirements in the following table apply to all community water systems, and to all non-transient non-community water systems. (See section on Requirements of the Safe Drinking Water Act for explanation of system types.) These are the minimum, or base sampling requirements.

<u>Contaminant</u>	<u>Surface Water</u>	<u>Ground Water</u>
Nitrate	Quarterly	once per year
Nitrite	every three years	every three years
Asbestos	every nine years	every nine years
Arsenic, Barium, Cadmium, Mercury, Chromium, Fluoride, Selenium	once per year	every three years
Lead and Copper	see Appendix C	see Appendix C
Synthetic Organics	every three years	every three years
Volatile organics	every three years	every three years
Radionuclides	every four years	every four years
Turbidity	see Appendix D	not required
Total coliform	once per month	once per month

NOTE: Non-community water systems are only required to monitor for coliform bacteria, turbidity, nitrate, and nitrite. The frequencies are the same as listed above, except that coliform samples are only required quarterly. All non-community systems must sample annually for nitrate regardless of whether they use surface water or groundwater.

**Sampling
Frequencies
(cont.)**

Additional Requirements for Coliform:
Systems serving more than 1000 people must take more than one sample per month. The number of monthly samples is based on the population served, as shown below:

<u>Population served</u>	<u>Number of Samples Per Month</u>
25 to 1,000	1
1,001 to 2,500	2
2,501 to 3,300	3
3,301 to 4,100	4

Contact your regulatory agency to determine the required number of samples for your size of system. There are additional sampling requirements that apply if any of the routine samples are positive for coliform bacteria. These are explained in the Repeat Sampling Section.

Non-community water systems which serve fewer than 1,000 people and use only groundwater are required to collect one routine sample per quarter. Non-community groundwater systems which serve more than 1,000 people and all non-community surface water systems, regardless of how many people they serve, must sample at the same frequency and collect the same number of samples as a community water system of the same size.

Special Monitoring for Inorganic and Organic Chemicals: These are SOC's and inorganic chemicals for which there are currently no standards, but information about their occurrence in drinking water is needed for future standard setting. Your regulatory agency will notify you of when this monitoring must be conducted and the frequency with which you have to sample.

You may not have to conduct the special SOC monitoring if the regulatory agency determines that your system's source water is not vulnerable to contamination by these chemicals. You do not have to conduct the special inorganic monitoring if you have already sampled for these contaminants after January 1, 1990.

Decreased Monitoring Frequency

There are provisions in the federal regulations to allow systems to reduce the repeat monitoring from the frequencies specified above. In order to be granted a waiver, two elements are considered by the regulatory agency: 1) whether the system is vulnerable to contamination, and 2) the results of the baseline or initial round of sampling.

**Sampling
Frequencies
(cont.)**

Repeat Sampling Requirements

When a routine sample shows the presence of a contaminant that is above the allowable level, then further sampling is required to confirm the presence of contaminants. The repeat sampling requirements differ for the various groups of contaminants as explained below:

Coliform Bacteria: A set of repeat samples is required for each routine sample that indicates the presence of coliforms. If one or more of the repeat samples in the set is positive, an additional set of repeat samples is required.

The following table lists the number of repeat samples in the set:

Number of routine monthly <u>samples</u>	Number of repeat samples <u>in set</u>
One or less	4
Two or more	3

The repeat samples must be collected within 24 hours of the time that the lab notifies the system of the positive result. At least one of the repeat samples must be taken from the same location as the original sample which was positive for coliform bacteria. The rest of the samples should be taken at nearby locations upstream and downstream of

the original location. Contact your regulatory agency if you are not sure where to collect the repeat samples.

Repeat samples must continue to be taken until no coliforms are detected or until the MCL has been exceeded. For systems that sample only once per month, any repeat sample that is coliform positive is a violation of the standard since there can be no more than one positive sample per month. All repeat samples are counted in determining compliance with the MCL.

In addition to the repeat samples, whenever coliforms are found in a system which serves fewer than 5,000 people, five routine samples must be collected the following month, even if the MCL has not been exceeded.

When any routine or repeat sample is positive for total coliform, that sample must be further analyzed for fecal coliforms or *Escherichia coli* (*E. coli*). These bacteria indicate possible contamination by human or animal fecal matter.

If fecal coliforms or *E. coli* are found in the repeat sample, the system is immediately in violation of the MCL and the regulatory agency must be notified within 24 hours. Public notification is required at this point, and at any time

**Sampling
Frequencies
(cont.)**

that the total coliform MCL is exceeded. If either the routine or repeat sample indicates the presence of fecal coliforms or *E. coli*, the public notification must be given via radio or television. See the section on Public Notification Requirements.

Turbidity: If a routine sample is greater than the MCL, a check sample must be collected within one hour. If the check sample exceeds the MCL, the regulatory agency must be notified within 48 hours. If a two-day average of turbidity samples exceeds 5 NTU, the regulatory agency must be notified within 48 hours. If a check sample is collected, it is the check sample result, and not the routine result for that day, which is used to calculate the average turbidity level for the month. You should also refer to Appendix D, Surface Water Treatment Rule, for changes to the monitoring requirements for turbidity.

Inorganic Chemicals (except nitrate and nitrite): If any routine sample result is above the MCL, the system must begin quarterly monitoring in the quarter after the result exceeding the MCL was detected. The system is out of compliance if the running annual average of four consecutive quarters is above the MCL.

Quarterly monitoring must *continue* until the regulatory agency determines that the system is reliably and consistently below the MCL. For groundwater systems, the frequency cannot be reduced until at least two quarterly samples are taken. For surface water systems, at least four quarterly samples must be taken before the frequency can be reduced. If all the repeat samples are below the MCL, then the system can return to base monitoring.

Nitrate and Nitrite: Any system with a routine result above the MCL must take a confirmation sample within 24 hours after being notified. If samples cannot be collected, the public must be notified and the system is allowed a maximum of two weeks to collect the confirmation samples. If the average of the initial and the confirmation sample is greater than the MCL, then the system is in violation.

In addition, if any routine sample result is greater than 50% of the MCL for either nitrate or nitrite, the system must sample quarterly for a year. For groundwater systems, the frequency may be reduced to once per year if all repeat sample results are less than the MCL. For surface water water systems,

**Sampling
Frequencies
(cont.)**

annual monitoring can resume when each of four consecutive quarterly repeat monitoring results is less than 50% of the MCL.

VOCs, SOCs, and PCBs: If any routine sample result exceeds a specified level for a particular contaminant, the system must begin quarterly monitoring. The levels that trigger increased monitoring are explained in Appendix B. The system is out of compliance with the MCL if the running average of four quarters exceeds the MCL.

Radionuclides: Repeat samples are required whenever the gross alpha level in the routine sample is greater than 5 pCi/L. The first test to be run is radium 226. If this level is above 3 pCi/L, then a test must be run for radium 228. If the combination of radium 226 and radium 228 is greater than 5 pCi/L, the state must be notified within 48 hours. If the gross alpha level is greater than 15 pCi/L in the routine sample, the regulatory agency must be notified within 48 hours.

Most samples must be collected at points which represent the quality of water in the distribution system, but there are some variations. The table below lists the locations of the sampling points for each type of contaminant.

Location of Sampling Points

Generally, the samples must be "fully flushed", meaning that the water should run for a sufficient length of time to represent water in the main line, rather than in a service line or household plumbing. The exception to this is sampling for lead and copper for which a "first draw" sample is required. See Appendix C for details.

<u>Contaminant or Group</u>	<u>Location</u>
Inorganics	entry points to distribution system
Asbestos*	entry points to the distribution system representative of each source and/or consumer tap served by asbestos cement pipe
Lead and Copper*	consumer taps
Synthetic Organics	entry points to the distribution system
Radionuclides	distribution system
Turbidity	entry points to the distribution system
Coliform*	distribution system
Volatile Organics	entry points to the distribution system representative of each source

*see specific requirements on the following pages

**Location of
Sampling Points
(cont.)**

Asbestos: If the system is vulnerable to asbestos contamination in the source water, the sample must be collected from each source at the entry point to the distribution system. If the system is vulnerable to asbestos contamination due to the use of asbestos cement pipe, the sample must be collected at a tap served by asbestos cement pipe and under conditions where asbestos contamination is most likely to occur.

Lead and Copper: The samples must be collected from consumers taps where lead and/or copper contamination is most likely to occur. See Appendix C for details.

Coliform: Each system must develop and follow a written sampling plan. This plan must be submitted to the regulatory agency. Sample locations which are representative of the water throughout the distribution system must be identified in the plan. The plan must also include the locations where the repeat samples will be collected along with the locations where any additional required routine samples will be collected.

Sampling Procedures

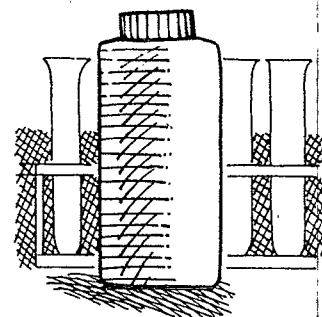
There are several things you should know before sampling. These are summarized below. Once you understand the sampling procedures, the process is not difficult. It is a good idea to contact the lab before you start and ask for a copy of the sampling procedures and instructions. Your regulatory agency should be able to provide a list of the labs in your area which are certified to run the tests.

Type of container: Some samples must be collected in glass containers, others must be collected in plastic. Contact the laboratory you intend to take the samples to for information about sample containers. Most labs will provide you with properly prepared containers.

Volume of water required: There are different volumes of water required for each type of analysis, ranging from 100 ml for a coliform sample to 1 liter for some radiochemical samples.

Preservation: Some samples must be kept cold, while others can be delivered to the lab at room temperature. Some must be acidified.

Filling Requirements: For some samples, such as those for VOCs, the sample bottle must be filled to the top with no air space. Other samples may be collected with an air space in the sample container.



**Sampling
Procedures
(cont.)**

Hold times: This is the maximum allowable time between sample collection and analysis. These times range from one day for coliform to up to one year for a radiochemical sample. Contact the laboratory to find out the hold times. Sample results are invalid if the hold time has been exceeded.

**Reporting
Requirements**

It is the responsibility of the water supplier to keep the regulatory agency informed about his or her water system. Certain information must be reported within specific deadlines. These are summarized below.

Sample Results: Test results for all required sampling must be sent to the regulatory agency within the first 10 days of the month following the month in which the results were received.

MCL Violations: Any time sample results indicate that there has been a violation of an MCL, the water supplier must notify the regulatory agency within 48 hours.

Failure to Monitor: Any time a water supplier fails to collect a sample as required, the regulatory agency must be notified within 48 hours. An invalid sample result is considered a failure to monitor.

Public Notification: Copies of notices issued by the water supplier must be sent to the regulatory agency within 10 days of the notification.

Water suppliers are required to keep certain information on file, as follows:

Bacteriological Results: These must be kept for five years.

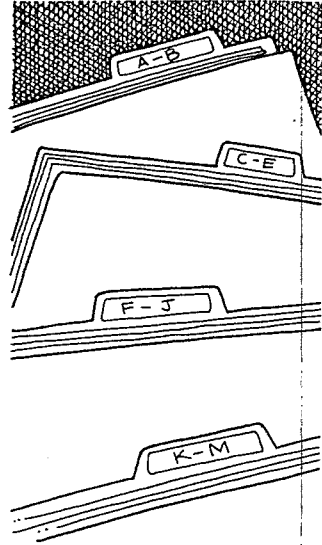
Chemical Results: These must be kept for twelve years.

Actions taken to correct violations: These must be kept for three years after the action was taken.

Sanitary Survey reports: These must be kept for ten years.

Variance or Exemption records: These must be kept for five years.

Record Keeping Requirements



**Public
Notification
Requirements**

Any time there is a violation of the drinking water regulations, the public must be notified. The new notification requirements went into effect on April 28, 1989. For the purposes of notification, all violations of the drinking water regulations are divided into two categories: Tier 1 and Tier 2, with the Tier 1 violations being the more serious of the two. The following table summarizes the violation types:

Tier 1 Violations

Failure to comply
with an MCL

Failure to comply with
a treatment technique

Failure to comply with a
variance or exemption
schedule

Tier 2 Violations

Failure to comply
with monitoring requirements

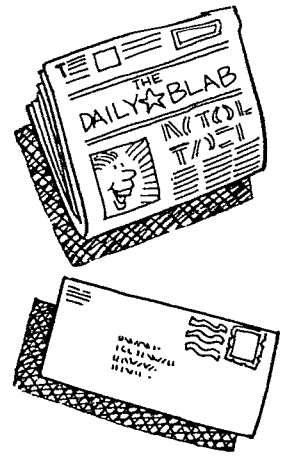
Failure to comply
with a testing procedure

Operating under a
variance or exemption

The notices will have to include some specific language about the health effects of each contaminant, which is called mandatory health effects language. This language must be included in the notices for all Tier 1 violations, and in notices for operating under a variance or exemption. As of the date of this publication, mandatory health effects language for asbestos, the inorganics, lead and copper, the SOCs, the VOCs, the Surface Water Treatment Rule, and the revised total colif-

orm rule have been established. Health effects language will be published with each new set of regulations. Contact your regulatory agency if you need to issue a public notification.

In general, if there is a Tier 1 violation, notice must be provided by newspaper and mail, and in some cases, by electronic media (radio and television). If there is no newspaper serving the area, the notice can be posted in a conspicuous place such as a post office, store, or community building. Newspaper notices and mail deliveries must be repeated every three months as long as the violation exists.



There are three acceptable ways to issue the notices:

<u>Method of notice</u>	<u>Time Period</u>
Newspaper	As soon as possible, no later than 14 days after violation
Hand or mail delivery	No later than 45 days after violation
Electronic media (radio/television)	No later than 72 hours after violation

Electronic media notice is only required when there is an "acute risk to health". Currently, the only violations which are defined as acute risks to health are confirmed fecal coliform samples and

**Public
Notification
Requirements
(cont.)**

violations of the nitrate and nitrite MCL. Regulatory agencies also have the option to include other violations on the list of acute risks to health. For Tier 2 violations, notification can be issued through newspapers or posting. Direct mail and electronic media notice is not required.

All notices must contain the following information:

- 1) explanation of the violation
- 2) potential adverse health risks
- 3) population at risk
- 4) steps system is taking to correct the problem,
- 5) need for alternative water supplies, if applicable, and
- 6) what consumers should do.

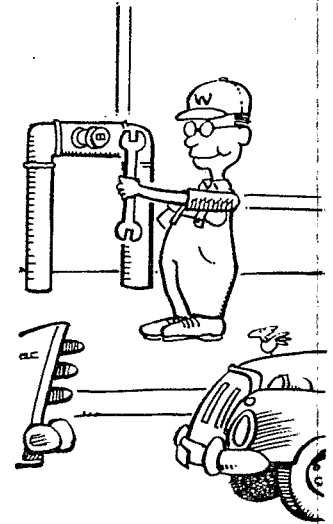
The notices must be conspicuous, and must not be too technical or contain unduly small print. Each notice must have the phone number of the water supplier that the consumer can contact for more information. Examples of acceptable public notices should be available from your regulatory agency.

In addition, there are special requirements for the system to conduct a public education program when the lead and/or copper action level is exceeded. These requirements are explained in Appendix C.

The Safe Drinking Water Act was amended in June 1986 to include many new requirements. EPA is in the process of developing new regulations in order to carry out all of the new requirements. As this happens, the things that the water suppliers are expected to do will change.

The best thing that you can do is stay informed. EPA has a toll free Safe Drinking Water Hotline at (800) 426-4791 which is a good source of information about changes in the requirements. Also, your regulatory agency, whether it is EPA, the state, or the county, should be consulted about new requirements. Trade associations such as the American Water Works Association and the National Rural Water Association are also good sources of information. Each of these national organizations has local chapters in every state. As EPA develops the regulations, comments from the public are requested. Contact your regulatory agency or the Hotline to find out how to comment on the proposed regulations.

Upcoming Changes in the Regulations



**Upcoming
Changes in
Regulations
(cont.)**

The following paragraphs summarize the new and upcoming requirements:

Filtration: On June 29, 1989, new regulations for public water systems using surface water were published. This rule consists of treatment technique requirements designed to control *Giardia lamblia*, enteric viruses, heterotrophic bacteria, *Legionella*, and turbidity. The rule applies not only to surface water systems, but also to systems using ground water under the influence of surface water. This rule requires all such systems to adequately filter the water unless they meet certain criteria. The criteria to avoid filtration are quite stringent, and it is unlikely that small water systems will be able to meet them. All surface water systems and ground water systems under the influence of surface water will be required to disinfect the water.

Surface water systems are those which obtain their water from sources open to the atmosphere, such as rivers, lakes, reservoirs, and streams. Ground water systems under the influence of surface water may include shallow wells, infiltration galleries, and springs which have water quality characteristics similar to surface waters. Rapid changes in tem-

perature, pH, or turbidity as the weather changes, for example, may indicate that a particular source is influenced by surface water.

See Appendix D for more information on the Surface Water Treatment Rule. It is being phased in over a period of years, and becomes effective for all systems in June 1993.

Disinfection: All systems, including ground water, will have to disinfect unless they meet certain criteria. The criteria will likely be very stringent, and it will be the responsibility of the system to demonstrate to the regulatory agency that disinfection is not required. As of the date of this publication, these rules have not been made final.

Coliform Bacteria: Effective December 31, 1990 the regulations for coliform bacteria changed. This edition of the pocket guide incorporates the new requirements. Some state agencies may not have adopted the new regulations yet. The following is a description of the changes that have been made in the requirements:

1. The new standard for total coliform is based on the number of samples which are coliform-positive in the month, not on the number of coliforms detected in the samples.

**Upcoming
Changes in
Regulations
(cont.)**

This is known as the presence/absence concept.

2. All coliform-positive samples have to be further tested for fecal coliform (or E. Coli). The previous regulations did not require this additional testing. The presence of fecal coliforms in a water supply is strong evidence of recent sewage contamination and indicates that an urgent health problem exists.
3. For each total coliform positive sample, a set of repeat samples is required within 24 hours of the time that the lab notifies the system of the positive results. This is different from the previous check sampling requirement.
4. If coliforms are detected, most systems will be required to collect at least 5 samples the following month to make sure that the contamination is no longer present. The previous regulations did not have this additional sampling requirement.
5. Each system must have a written sampling plan. This plan must include the frequencies and locations of samples to be collected to ensure that the water quality from the entire system is represented. The previous requirements did not

require such a plan. Many systems sample at the same locations every month, and may not detect contamination problems which exist in other parts of the system.

Phase II Regulations: On January 30, 1991 and July 1, 1991 new standards were published for 38 contaminants. Twenty-seven of these contaminants are newly regulated, and the remaining 11 are revisions of existing standards. The newly regulated contaminants include 13 Synthetic Organic Chemicals (SOCs such as pesticides and PCBs), two inorganic contaminants, and 10 volatile organics. Treatment techniques were also published for two new contaminants. One inorganic contaminant (silver) was dropped from the primary standards and moved to the secondary standards. The addition of these contaminants raised the number of final MCLs from 26 to 64. The MCLs for the Phase II contaminants in the January 30, 1991 rulemaking became effective in July, 1992, and the MCLs for the Phase II contaminants in the July 1, 1991 rulemaking become effective in January, 1993.

Upcoming Changes in Regulations (cont.)

The Phase II rule also established a new monitoring schedule called a "standardized monitoring framework". Under this new framework, the first round of monitoring for the Phase II contaminants will be required sometime in the three year period from January 1, 1993 to December 31, 1995. The standardized monitoring framework is described in Appendix B.

Phase V Regulations: These regulations were proposed on July 25, 1990, and became final in May, 1992. The rule includes requirements for 23 new contaminants. These include 15 SOCs, 3 Volatile Organic Chemicals (VOCs), 4 inorganic chemicals, and cyanide. For systems with more than 150 service connections, monitoring for these contaminants will be required in the three year time period as noted above. For systems serving fewer than 150 service connections, monitoring is required in the three year period following.

Lead and Copper Rule: This rule became effective December 7, 1992. It significantly changes the way that lead and copper in drinking water are regulated. The rule is complex and you will need to work closely with your regulatory agency to make sure that you meet the requirements. Some of the major provisions of this rule are summarized below. A more

complete description of the rule is given in Appendix C.

- 1) Unlike all other EPA regulations, the Lead and Copper Rule addresses the level of contaminant inside the customers home, not in the source water or distribution system. For this reason, samples must be collected from customer's taps.
- 2) EPA established a treatment technique instead of an MCL. The technique includes optimum corrosion control, public education, source water treatment, and lead service line replacement. The new treatment technique requirements for lead and copper will be triggered when a system exceeds an action level. The action level for lead is 0.015 mg/l and for copper it is 1.3 mg/l, measured at the 90th percentile from samples collected at the customers taps (see Appendix C for an explanation of how to calculate the 90th percentile values). Lead was previously regulated as a primary contaminant with an MCL of 0.05 mg/l in the distribution system, and copper as a secondary contaminant with an MCL of 1.0 mg/l.
- 3) The number of customer taps to be sampled will vary depending on the system size. Initial samples will have to be collected every six months. This



Upcoming Changes in Regulations (cont.)

is different from the previous regulations which required one sample for lead be collected from the entry point into the distribution system every three years for groundwater systems and every year for surface water systems. Sampling for copper was not previously required under Federal regulations.

- 4) Not just any customers taps must be sampled. The homes selected must be those where lead and copper levels would likely be the highest, such as homes with lead service lines or with copper pipe joined by lead solder. This is a complete change from the previous regulations in which the sample could be collected anywhere in the distribution system.
- 5) When a system exceeds the action level, the treatment technique requirements are triggered. These are designed to reduce the corrosivity of the water and minimize the dissolution of lead and copper into the water from household plumbing. The treatment technique requirements for small systems include:
 - monitoring for water quality parameters to determine the corrosivity of the water. The water quality parameters include pH, alkalinity, calcium, conductivity,

temperature, and silica or ortho-phosphate if these inhibitors are used. This monitoring must be done in the distribution system and at entry points to the distribution system.

- source water sampling for lead and copper. Samples must be collected at entry points to the distribution system.
- making a recommendation to the state regarding the type of corrosion control treatment which best minimizes the corrosivity of the water. The regulatory agency may either accept this recommendation, require an alternative method, or require the system to conduct corrosion control studies. Treatment to remove lead at the source may also be required.
- conducting a public education program. This is the way of informing the customers about the hazards of lead and the things they can do to minimize their exposure. The mandatory language and method of delivery of this program is specified in the rule.
- replacing lead service lines in the distribution system if these are found to contribute to elevated lead levels in the homes.

See Appendix C for a detailed description of the Lead and Copper Rule.

**Upcoming
Changes in
Regulations
(cont.)**

New MCLs and Changing MCLs: The Safe Drinking Water Act required EPA to revise or to set 25 new MCLs every three years. Therefore, EPA is constantly in the process of setting MCLs for new contaminants along with re-evaluating the standards for currently regulated contaminants. If you have a problem with a certain chemical, you should contact EPA to find out if the standard for that chemical may change before installing treatment.

Some of the MCLs that are likely to be set within the next few years include the following:

Radionuclides: Revised regulations were proposed on June 18, 1991. The proposed rule introduces MCLs for two new radionuclides: uranium and radon-222. It also proposes revised standards for radium-226 and radium-228, and re-proposes the same standards for gross alpha and beta particle activity. This rule is expected to become final in March, 1994.

For most of the regulations, each regulatory agency has over a year from the time EPA finalizes the requirements to set their own requirements. The following is a schedule of dates that EPA expects the new requirements to be finalized:

<u>Regulation</u>	<u>Expected Date</u>
Radionuclides	March 1994
Disinfection by-products	June 1995
Disinfection (Ground Water Treatment)	June 1995

Appendix A

Table of health effects and common sources of contaminants

<u>Contaminant</u>	<u>Health Effects</u>	<u>Sources</u>
total coliform	Not necessarily disease-causing themselves, coliforms can be indicators of organisms that can cause gastroenteric infections, dysentery, hepatitis, typhoid fever, cholera, and others. Also, coliforms interfere with disinfection	human and animal fecal matter
turbidity	Interferes with disinfection	erosion, runoff, discharges
<i>Giardia lamblia</i>	Giardiasis (stomach cramps, intestinal distress)	human and animal fecal matter
enteric viruses	Gastroenteritis (intestinal distress)	human and animal fecal matter
<i>legionella</i>	Legionnaires' disease (pneumonia), Pontiac Fever	water aerosols such as vegetable misters
arsenic	Dermal and nervous system toxicity effects	geological, pesticide residues, industrial wastes, smelter operations

<u>Contaminant</u>	<u>Health Effects</u>	<u>Sources</u>
barium	Circulatory system effects	geological, pesticide residues, industrial wastes, smelter operations
cadmium	Kidney effects	geological, mining, and smelting
chromium	Liver and kidney effects	geological, mining, and smelting
fluoride	Skeletal damage	geological, additive to drinking water, toothpaste, foods processed with fluoridated water
lead	Central and peripheral nervous system damage; kidney effects; highly toxic to infants and pregnant women	leaches from lead pipe and lead-based solder pipe joints
mercury	Central nervous system disorders; kidney effects	used in manufacture of paint, paper, vinyl chloride, used in fungicides, geological
nitrate	Methemoglobinemia (blue baby syndrome)	fertilizer, sewage, feedlots, geological

<u>Contaminant</u>	<u>Health Effects</u>	<u>Sources</u>
selenium	Gastrointestinal effects	geological, mining
silver	Skin discoloration (argyria)	geological, mining
endrin	Nervous system/ kidney effects	insecticide used on cotton, small grains, orchards (cancelled)
lindane	Nervous system/ liver effects	insecticide used on seed and soil treatments, foliage application, wood protection
methoxychlor	Nervous system/ kidney effects	insecticide used on fruit trees, vegetables
toxaphene	Cancer risk	insecticide used on cotton, corn, grain
2,4-D	Liver/Kidney effects	herbicide used to control broad-leaf weeds in agriculture, used on forests, range, pastures, and aquatic environments

<u>Contaminant</u>	<u>Health Effects</u>	<u>Sources</u>
2,4,5-TP	Liver/Kidney effects	herbicide, cancelled in 1984
benzene	Cancer	fuel (leaking tanks), solvent commonly used in manufacture of industrial chemicals, pharmaceuticals, pesticides, paints, and plastics
carbon tetrachloride	Cancer risk	common in cleaning agents, industrial wastes from manufacture of coolants
1,2-dichloroethane	Cancer risk	used in manufacture of insecticides, gasoline
trichloroethylene	Cancer risk	waste from disposal of dry cleaning materials and manufacture of pesticides, paints, waxes and varnishes, paint stripper, metal degreaser

<u>Contaminant</u>	<u>Health Effects</u>	<u>Sources</u>
para-dichlorobenzene	Cancer risk	used in insecticides, moth balls, air deodorizers
1,1-dichloroethylene	Liver/kidney effects	used in manufacture of plastics, dyes, perfumes, paints, SOCs
1,1,1-trichloroethane	Nervous system effects	used in manufacture of food wrappings, synthetic fibers
vinyl chloride	Cancer	Industrial waste from manufacture of plastics and synthetic rubber
gross alpha	Cancer	radioactive waste, uranium deposits
radium 226 & radium 228	Bone cancer	radioactive waste, geological
gross beta	cancer	radioactive waste, uranium deposits

Appendix B

Standardized Monitoring Framework

Whenever a new regulation is passed, sampling frequencies must be established for each new or revised regulated contaminant. EPA developed the standardized monitoring framework to coordinate the monitoring requirements and synchronize the monitoring schedules for all existing and future regulations.

The Standardized Monitoring Framework

The monitoring requirements for all new contaminants will be given in terms of compliance periods and cycles. A compliance period is three years, and a compliance cycle is made up of three compliance periods (nine years). The first compliance period begins January 1, 1993 and ends December 31, 1995. This is when the first samples for the Phase II contaminants will be required.

Compliance Cycles and Compliance Periods

If, for example, you are required to sample for asbestos, the regulations state that you must sample once during the first compliance period of every compliance cycle beginning in the compliance period starting January 1, 1993. This means that you must collect one sample during the period from January 1, 1993 to December 31, 1995 and every nine years after that. The regulatory agency will tell you when you should sample during the initial compliance period.

Base Monitoring Requirements

The regulations establish a minimum frequency of sampling for each contaminant. This minimum frequency is called the base monitoring requirement. In the example above, the base monitoring frequency is one sample every nine years. The base monitoring frequency applies to all community and non-transient noncommunity water systems. However, there are certain conditions under which the base monitoring frequency may be increased, decreased, or waived altogether. These conditions are based on whether the system is served by groundwater or surface water, the vulnerability of the system to contamination by specific contaminant groups, and whether or not the regulatory agency has chosen to allow waivers.

Increased Monitoring

The monitoring frequency must be increased whenever a sample result exceeds the trigger level, specified for each contaminant. The trigger levels are: 1) 0.5 mg/l for nitrite, 5 mg/l for nitrate, and 5 mg/l for nitrate/nitrite combined; 2) the MCLs for the inorganic chemicals, asbestos, and cyanide; 3) the analytical detection limits for volatile organic chemicals, PCBs, and synthetic organic chemicals (your regulatory agency can give you the values for these detection limits).

If a trigger level is exceeded, the system must immediately begin quarterly monitoring to establish a baseline of analytical results. The State may allow the system to return to base monitoring if: 1) the system is served by groundwater and the results of two consecutive quarterly samples are below the MCL, or 2) the system is served by surface water and the results of four consecutive quarterly samples are below the MCL.

There is one exception to this. If the trigger level for nitrate or nitrite, or combined nitrate/nitrite is exceeded, then all systems must take a minimum of four consecutive quarterly samples, with all results below the MCL, before they can return to base monitoring.

The frequency of monitoring may be reduced from the base requirements if the system receives a waiver from the State. The waiver may either eliminate a monitoring requirement (asbestos and the SOCs/PCBs), or reduce the frequency of monitoring (inorganics and PCBs). Waivers are granted on a contaminant by contaminant basis and must be periodically renewed. In all cases, the State must determine that the system is not vulnerable to contamination by a contaminant or a particular group of contaminants. This may

Decreased Monitoring

**Decreased
Monitoring
(cont.)**

involve conducting a field survey of the system and collecting a certain number of samples. You should contact your regulatory agency to find out what contaminants you may be eligible to receive a waiver for, and what you must do to apply for a waiver.

Appendix C

The Lead and Copper Rule

The Lead and Copper Rule is a set of treatment technique requirements which apply to all community and non-transient non-community water systems. Treatment techniques rather than MCLs were established for lead and copper because the occurrence of these contaminants in a drinking water supply is usually the result of corrosion of plumbing materials within both the household plumbing and the distribution system.

The Rule requires all systems which do not meet the specified lead and copper action levels at the tap to optimize corrosion control treatment in an effort to minimize the levels of these contaminants. The action level is 0.015 mg/l for lead and 1.3 mg/l for copper measured at the 90th percentile. The method of calculating the 90th percentile value is given in the following section.

The Rule has five major components: 1) monitoring, 2) distribution system corrosion control, 3) source water treatment, 4) public education, and 5) lead service line replacement. Each of these components can be considerably complex and you should work closely with your regulatory agency to determine the exact requirements that apply to your system. The following sections provide the general requirements for

small systems (those serving fewer than 3,300 people) for each component of the Rule.

Monitoring

The monitoring required under this rule covers two categories. Lead and copper monitoring is required of all systems. Monitoring for water quality parameters is required only when the system exceeds the action level for lead and/or copper.

Lead and Copper

Sampling will be phased-in over a 26 month period, with larger systems monitoring first. The initial monitoring consists of two 6-month monitoring periods. Small systems serving fewer than 3,301 people are required to begin monitoring in the six month period which begins July 1, 1993. The number of samples required in each sampling period depends on the size of the system as specified in Table 1.

Samples must be collected at household taps that meet specific criteria. The criteria for choosing these sites are given in the rule, and are designed to identify the sites where lead and/or copper contamination is most likely to occur. Systems must conduct a materials evaluation to locate these sites before monitoring begins. You can get assistance from your regulatory agency in conducting this evaluation.

Water must be sitting in the pipe for at least six hours before samples can be collected. First draw samples from the cold water tap in the kitchen or bathroom are required. The sample can be collected by the operator or by the resident. If the resident collects the sample, the utility must provide the resident with training and verify to the state that proper sampling procedures were demonstrated.

The 90th percentile value is calculated by first placing all sample results in order from the lowest concentration to the highest concentration. Next, assign each sample result a number, starting with the number 1 for the lowest result up to the highest concentration being given the number equal to the total number of samples collected from your system. Then multiply the total number of samples collected by 0.9. Check the sample result of the number which corresponds to this calculated value. This is the 90th percentile for your system. If your system serves fewer than 100 people, and you are taking the minimum number of samples, the 90th percentile value is calculated by averaging the highest and second highest concentrations.

Both the frequency of monitoring and the number of sample sites can be

Water Quality Monitoring

reduced if your system meets the action level for lead and copper for two consecutive monitoring periods. Your regulatory agency must be informed before the monitoring requirements may be reduced. The following table provides the reduced number of sites.

If your system does not meet the action level for either lead or copper, you will be required to conduct monitoring for pH, alkalinity, calcium, conductivity, and water temperature. You also have to monitor for orthophosphate and/or silica if you are adding these corrosion inhibitors to the water. The results of these samples are necessary in order to determine the best method of corrosion control.

Samples for water quality parameters must be collected from representative taps throughout the distribution system (you can use total coliform sites), and at each entry point to the distribution system. The number of tap sampling sites that must be sampled during each monitoring period is listed in Table 2. The entry point to the distribution system must be sampled every two weeks. Water quality sampling must continue at the frequency and number of locations specified by the state as necessary to show that optimal corrosion control is being maintained.

Corrosion Control

Within six months of notifying the state that your system exceeds the action level for lead and/or copper, you must submit a letter to the state in which you recommend a method of corrosion control treatment for your system. The regulatory agency can either approve your recommendation, require an alternative treatment, or require you to conduct studies to compare the effectiveness of different types of corrosion control treatment on your system. In any of these cases, once the method of optimal corrosion control treatment is defined, you have 24 months to install the treatment and 12 months to collect follow-up samples to determine if it is working. After this time, the regulatory agency will assign values for the water quality parameters discussed above, and you must operate your system to meet these values.

Source Water Treatment

You may also have to install treatment to remove lead from your source water. The regulations specify that the following treatment methods are acceptable for source water: 1) ion exchange, 2) reverse osmosis, 3) lime softening, and 4) coagulation with filtration. You will have 24 months after the state specifies the type of treatment required to install the treatment and 12 months to collect follow-up samples.

Public Education Program

All public water systems exceeding the lead action level must deliver the EPA-developed public education program to their customers within 60 days of exceeding the action level. The program is designed to inform the public about the adverse health effects of lead and provide information on steps that people can take to reduce their exposure. The specific language that you must include in your education program is given in the Rule.

The program must be delivered in the following manner for as long as the system exceeds the action level. Every 12 months, the system must deliver bill stuffers to their customers, provide public education language to the editorial departments of local newspapers, and distribute brochures to all institutions in the community frequented by women and children. Examples of these institutions include health departments, hospitals, and clinics. Every six months, systems must submit a public service announcement on lead in drinking water to major television and radio stations serving the community.

If you are a non-transient non-community system, you must post information notices in each building served by the system and deliver brochures to all of the system's customers.

Systems which continue to exceed the action level after installing optimal corrosion control treatment and source water treatment are required to replace lead service lines that contribute in excess of 15 ppb to total tap water lead levels. A system must replace seven percent of its lead lines each year, with a maximum allowable time of 15 years to replace all the lead service lines.

Lead Service Line Replacement

Table 1. The Sampling Requirements for Lead and Copper

System size (Population)	No. of Sample Sites (Initial)	No. of Sample Sites (Reduced)
3,301 to 10,000	40	20
501 to 3,300	20	10
101 to 500	10	5
<100	5	5

Table 2. Tap Sampling Requirements for Water Quality Parameters

System size (Population)	No. of Sample Sites
3,301 to 10,000	3
501 to 3,300	2
101 to 500	1
<100	1

Appendix D

Surface Water Treatment Rule

The Surface Water Treatment Rule (SWTR) is a set of treatment technique requirements which apply to all water systems using surface water and those using ground water which is under the influence of surface water. The rule requires that these systems properly filter the water, unless they can meet certain strict criteria. The rule also requires that these systems disinfect the water. There are no exceptions from the disinfection requirement.

The Surface Water Treatment Rule

Surface water systems are those using water exposed to the atmosphere, such as rivers, lakes, or streams. Ground water systems that are under the influence of surface water may include shallow wells, infiltration galleries, and springs which may contain the same disease-causing microorganisms of concern in surface water. The regulatory agency must determine on a case-by-case basis which ground water systems must meet the requirements of this rule. States have until June 1994 to make this determination for community water systems, and until June 1999 for non-community systems. Water quality characteristics such as pH, temperature, and turbidity; and the presence of certain macroorganisms such as *Giardia*, may be used in making this

Applicability

determination. If you are not sure about the classification of your water source, contact your regulatory agency.

Criteria to Avoid Filtration

In order to avoid filtration, systems must meet the following criteria:

High quality source water: Systems must demonstrate, through weekly sampling, that the raw water bacteria levels are low. No more than 20 fecal coliform per 100 mL or no more than 100 total coliform per 100 mL can be present in more than 10% of the samples taken over a six month period. Also, turbidity must be sampled at least every four hours. The turbidity can be no greater than 5 NTU at any time. For each day in which the turbidity exceeds 1 NTU, the system must also sample for coliform bacteria.

Site specific criteria: systems must meet the following requirements:

- 1) establish a watershed control program
- 2) provide adequate disinfection to inactivate *Giardia* and enteric viruses, which includes meeting certain operating parameters. Systems must follow guidelines to assure that there is adequate

contact time between the disinfectant and the water to inactivate the microorganisms.

- 3) have an annual on-site inspection of the system
- 4) have no occurrence of waterborne disease outbreaks
- 5) comply with the coliform rule and the trihalomethane (THM) rule
- 6) have backup disinfection capability, including emergency power, or automatic shutoff of water deliveries if the disinfection system fails
- 7) maintain at least 0.2 mg/L residual disinfectant entering the distribution system and maintain a disinfectant residual throughout the distribution system.

Failure to meet any of the above criteria will result in the system being required to install filtration.

Remember that each regulatory agency may make its own requirements more strict than EPA's and may require all systems using surface water to filter. Contact your regulatory agency for more specific information.

Systems which cannot meet all of the above criteria must install an appropriate filtration technology. Only certain types of filtration will be allowed, as follows:

Acceptable Filtration Technologies

**Acceptable
Filtration
Technologies
(cont.)**

Conventional filtration: This includes coagulation, flocculation, sedimentation, and filtration. Flows range from about 2 to 6 gallons per minute per square foot of filter surface area. This is a commonly-used technology for large systems, and it is fairly complex, with many operational and maintenance requirements.

Direct filtration: This is the same as conventional, except that sedimentation is not included. This category includes in-line filtration, which is the same as direct filtration without the flocculation. Generally, higher quality water is needed for this filtration technology than for conventional treatment.

Slow sand filtration: This process usually does not require chemical pretreatment for most surface waters. Flows are about 1/10 gallon per minute per square foot of filter surface area. This technology is well-suited to smaller systems because it has fairly simple operation and maintenance requirements.

Diatomaceous earth filtration: This technology uses a thin layer of diatomaceous earth (a fine, siliceous material) that is deposited on a porous

plate to serve as the filter. Chemical pretreatment is usually not necessary. This technology is good for smaller systems because of the relative simplicity of the units and their maintenance requirements.

Different turbidity monitoring and turbidity MCLs apply for each type of filtration, as follows:

<u>Type of filtration</u>	<u>Monitoring Frequency</u>	<u>Turbidity Level</u>
conventional	every 4 hours	<0.5 NTU
direct	every 4 hours	<0.5 NTU
diatomaceous earth	every 4 hours	<1.0 NTU
slow sand	once per day	<1.0 NTU

The turbidity levels must be achieved in 95% of the samples collected. Continuous turbidity reading may be substituted for the 4 hour sampling if the meter is periodically calibrated. The regulatory agency may reduce monitoring to once per day for systems serving fewer than 500 people.

The current turbidity rules (see page 14) remain in effect until December 31, 1991 for systems meeting the criteria to avoid filtration; and until June 29, 1993 for systems which must filter.

Disinfection Requirements

All surface water systems and ground water systems under the influence of surface water must provide disinfection. Systems will be required to monitor the disinfectant residual leaving the plant and at various points in the distribution system. The water leaving the plant must have at least 0.2 mg/L of the disinfectant, and the samples taken in the distribution system must have a detectable residual. Certain guidelines must be followed to ensure that there is enough contact time between the disinfectant and the water so that the microorganisms are inactivated.

If at any time the disinfectant residual leaving the plant is less than 0.2 mg/L, the system is allowed up to four hours to correct the problem. If the problem is corrected within this time, it is not considered a violation but the regulatory agency must be notified. The disinfectant residual must be measured continuously. For systems serving fewer than 3,300 people, this may be reduced to once per day.

The disinfectant in the distribution system must be measured at the same frequency and location as the total coliform samples under the revised

coliform standard (see Appendix C for an explanation of the coliform monitoring requirements). Measurements for heterotrophic plate count (HPC) bacteria may be substituted for disinfectant residual measurements. If the HPC is less than 500 colonies per mL, then the sample is considered equivalent to a detectable disinfectant residual. For systems serving fewer than 500 people, the regulatory agency may determine the adequacy of the disinfectant residual in lieu of monitoring.



United States Environmental Protection Agency
Region 9, W-6-1
75 Hawthorne Street
San Francisco, CA 94105