Regulations and Monitoring

Chapter 9

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Key Words

- MCL
- MCLG
- Coliform
- Primacy
- Sample Siting Plan

Introduction

As a small water system operator, you are busy operating and managing your system. Complying with current regulations gives you plenty to do, and you may feel overwhelmed by the thought of having to comply with new regulations. You want to do what is best for your customers, but new regulations may mean costly improvements - and higher water rates.

As the operator of a small drinking water system, only you can take the necessary steps to comply with safe drinking water regulations and protect your customers' health. Compliance takes planning and preparation!

Please note that this chapter contains only a general introduction to the United States Environmental Protection Agency (EPA) regulations governing public water systems. The EPA regulations described in this document contain legally binding requirements. The general description provided here does not substitute for those regulations, nor is this text a regulation itself. It does not impose legally binding requirements on anyone, but rather is intended to provide general information only. As a result, you will need to be familiar with the details of the rules that are relevant for your system; you cannot rely solely on this text for compliance information. Additionally, Alaska may have different or more stringent requirements than the EPA's, so you will need to learn what state laws and regulations apply to your system in addition to the ones described here. And like everything else, regulations change! Be sure to contact your local ADEC office for the most current information. They can assist and advise you about what regulations apply to your system.

Why Compliance is Important

Drinking water systems have an enormous impact on public health, and the public health benefits of a well-run system cannot be overstated. Millions of Americans receive high-quality drinking water every day from their public water systems (which may be publicly or privately owned). Nonetheless, drinking water safety cannot be taken for granted. There are a number of threats to drinking water: improperly disposed chemicals, animal wastes, pesticides, human wastes, wastes injected deep underground, and naturally occurring substances all can contaminate drinking water. Likewise, drinking water that is not properly treated or disinfected or that travels through an improperly maintained distribution system may also pose a health risk. Customers rely on their water systems to provide safe water for drinking, bathing, cleaning, and cooking. High-quality drinking water is a major contributor to the high standard of living and health enjoyed by Americans.

Yet since 1971, more than 600 waterborne disease outbreaks have been recorded in the United States. In most cases, these outbreaks result in nausea, diarrhea, and cramps. In some cases, they result in very serious illness and even death. These outbreaks serve as a constant reminder of the critical importance of ensuring safe drinking water.

The Multiple Barrier Approach

Drinking water professionals have long known that the most effective way to protect consumers from the risk of contamination and waterborne disease is through a mul-

tiple barrier approach. This approach sets up a series of technical and managerial barriers that ensure a safe drinking water supply and guard against waterborne disease outbreaks. These barriers include the following:

- Source water protection
- Treatment
- Distribution system integrity
- Public information

For each of these barriers, you can choose from a number of options to improve your system and further protect the health of your customers. Your best option will depend on the unique challenges and opportunities facing your system.

Small Systems and the Multiple Barrier Approach

Small systems face many challenges in providing safe, reliable, and affordable drinking water. Implementation of effective multiple barriers of protection requires technical, financial, and managerial resources that some systems may lack. Such systems benefit from State "Capacity Development" programs. Through these programs, systems have access to assistance in developing the financial capabilities and the institutional knowledge and structures to reliably and consistently apply multiple barriers of protection. Contact your local ADEC office for more information.

The Safe Drinking Water Act

The Safe Drinking Water Act (SDWA) applies to every public water system (PWS) in the United States. There are currently more than 160,000 public water systems providing water to almost all Americans at some time in their lives. The responsibility for making sure these public water systems provide safe drinking water is divided among the EPA, states, tribes, water systems, and the public. The SDWA provides a framework in which these parties work together to protect this valuable resource.

The SDWA was originally passed by Congress in 1974 to protect public health by regulating the nation's public drinking water supply. The law was amended in 1986 and 1996 and requires many actions to protect drinking water and its sources: rivers, lakes, reservoirs, springs, and ground water wells. The SDWA does not regulate private wells or any water system that serves fewer than 25 individuals.

The SDWA authorizes EPA to set national health-based standards for drinking water to protect against both naturally occurring and man-made contaminants that may be found in drinking water. The EPA, states, and water systems then work together to make sure that these standards are met.

Originally, the SDWA focused primarily on treatment as the means of providing safe drinking water at the tap. The 1996 amendments greatly enhanced the existing law by recognizing source water protection, operator training, funding for water system improvements, and public information as important components of safe drinking water. This approach ensures the quality of drinking water by protecting it from source to tap.

The most direct oversight of water systems is conducted by state drinking water programs. States and Native Tribes can apply to the EPA for **primacy**[1], the authority to implement the SDWA within their jurisdictions, if they can show that they will adopt

[1] Primacy – The primary responsibility for administering and enforcing regulations.

standards at least as stringent as the EPA's and make sure water systems meet these standards.

States, or the EPA acting as a primacy agent, make sure water systems test for contaminants, review plans for water system improvements, conduct on-site inspections and sanitary surveys, provide training and technical assistance, and take action against water systems not meeting standards. The EPA has granted the ADEC full primacy for 10 federal drinking water rules.

The ADEC has, in recent years, adopted federal SDWA regulations by reference. When federal regulations are adopted by reference, ADEC requires compliance with regulations already issued by the EPA. The federal regulations are frequently amended, and the State must adopt the federal regulations or develop its own set of equivalent regulations to maintain primacy for administering the program within Alaska.

National Drinking Water Standards

Drinking water standards apply to public water systems, which provide water to at least 15 connections or 25 persons at least 60 days out of the year. Most cities, towns, schools, businesses, campgrounds, and shopping malls are served by public water systems.

EPA sets national standards for drinking water based on sound science to ensure consistent quality and protect against health risks, with consideration of available technology and costs. These National Primary Drinking Water Regulations (NPDWRs or primary standards) set enforceable maximum contaminant levels (**MCLs**[2]) for particular contaminants in drinking water or required ways to treat water to remove contaminants. Each standard also includes requirements for water systems to test for contaminants in the water to make sure standards are achieved.

[2] MCLs (maximum contaminant levels) – The maximum level of certain contaminants permitted in drinking water supplied by a public water system as set by the EPA under the federal Safe Drinking Water Act.

The EPA prioritizes contaminants for potential regulation based on risk and how often they occur in water supplies. The EPA sets a health goal based on risk, including risks to the most sensitive people such as infants, children, pregnant women, the elderly, and the immuno-compromised. The EPA then sets a legal limit for the contaminant in drinking water or a required treatment technique. This limit or treatment technique is set to be as close to the health goal as feasible. The EPA also performs a cost-benefit analysis and obtains input from interested parties when setting standards.

National drinking water standards are legally enforceable, which means that both the EPA and states can take enforcement actions against water systems not meeting safety standards. The EPA and states may issue administrative orders, take legal actions, or fine utilities. The EPA and states also work to increase the owners and operators of water systems' understanding of, and compliance with, standards.

The EPA also sets Secondary Drinking Water Regulations (secondary standards), which are non-enforceable guidelines for contaminants that may cause cosmetic effects (such as skin and tooth discoloration) or aesthetic effects (such as taste or odor). Water systems are not required by the EPA to adopt these secondary standards; however, states may choose to adopt and enforce them. The ADEC requires a public water system to meet the secondary MCLs if the Department determines that public health is threatened or that exceeding a secondary MCL is not in the public interest.

Drinking Water Standards and Health Effects

Adverse health effects from contaminants that may occur in drinking water include acute effects that may immediately impact health and chronic effects that may occur if contaminants are ingested at unsafe levels over many years.

- Acute effects – People can suffer acute health effects from almost any contaminant if they are exposed to extraordinarily high levels, such as in the case of a contamination event like a cross connection or oil spill. In drinking water, microbes, such as bacteria and viruses, are the contaminants with the greatest chance of reaching levels high enough to cause acute health effects. Drinking water that meets EPA health-based standards is generally safe. People who are not healthy as a result of illness, age, or weakened immune systems are more likely to be at risk from certain contaminants that may be found in drinking water.
- Chronic effects – Chronic effects occur after people consume a contaminant at levels over EPA's safety standards for many years. The drinking water contaminants that can have chronic effects are chemicals (such as disinfection by-products, solvents, and pesticides), radionuclides (such as radium), and minerals (such as arsenic). Examples of these chronic effects include cancer, liver or kidney problems, or reproductive difficulties.

For a list of current drinking water standards, information on potential health effects of specific contaminants, and guidance to persons with severely compromised immune systems, see the EPA web site (www.epa.gov/safewater/dwhealth.html) or call the Safe Drinking Water Hotline at 1-800-426-4791.

The Contaminant Candidate List

The 1996 Amendments to the SDWA require that every five years the EPA establish a list of contaminants that are known to or anticipated to occur in public water systems and that may require future regulations under the SDWA. The list is developed with significant input from the scientific community and other interested parties. After establishing this contaminant candidate list, the EPA identifies contaminants that are priorities for additional research and data gathering. The EPA then uses this information to determine whether a regulation is appropriate. This process is repeated every five years for each list.

Drinking Water Contaminants

There are two basic groups of contaminants: primary and secondary. The EPA has set standards for 90 chemical, microbiological, radiological, and physical contaminants in drinking water. The EPA's web site (http://www.epa.gov/safewater/contaminants/index.html) provides a complete table of the currently regulated contaminants, potential health effects, and sources. The site lists the legally enforceable standards that apply to public water systems as well as the non-enforceable guidelines for secondary standards.

Primary Contaminants

The primary contaminants have known health effects and are divided into the following groups:

- Microorganisms
- Disinfectants
- Disinfection Byproducts
- Inorganic Chemicals
- Organic Chemicals
- Radioactive Contaminants (Radionuclides)

Microorganisms

Coliform bacteria are common in the environment and are generally not harmful. This type of bacteria is not a health threat in itself. Rather, it is used to indicate whether other potentially harmful bacteria may be present. Coliforms are naturally present in the environment as well as in feces.

Fecal coliforms and *E. coli* come only from human and animal fecal waste. Fecal coliform and *E. coli* are bacteria whose presence indicates that the water may be contaminated with human or animal wastes. Disease-causing microbes (pathogens) in these wastes can cause diarrhea, cramps, nausea, headaches, or other symptoms. These pathogens may pose a special health risk for infants, young children, and people with severely compromised immune systems. The presence of fecal coliform or *E. coli* is a danger alarm that a system is likely contaminated with human or animal fecal waste.

Cryptosporidium is a parasite commonly found in lakes and rivers, especially when the water is contaminated with sewage and animal wastes. Cryptosporidium is very resistant to disinfection, and even a well-operated water treatment system cannot ensure that drinking water will be completely free of this parasite. Cryptosporidium has caused several large waterborne disease outbreaks of gastrointestinal illness, with symptoms that include diarrhea, nausea, and/or stomach cramps.

Giardia lamblia is a microorganism frequently found in rivers and lakes and if not treated properly may cause diarrhea, fatigue, and cramps after ingestion.

Turbidity is a measure of the cloudiness of water. It is used to indicate water quality and filtration effectiveness (for example, whether disease-causing organisms are present). Turbidity has no health effect; however, it can interfere with disinfection and provide a medium for microbial growth. Turbidity may indicate the presence of disease-causing organisms. These organisms include bacteria, viruses, and parasites that can cause symptoms such as nausea, cramps, diarrhea, and associated headaches.

Disinfectants and Disinfection Byproducts

Chemicals such as chlorine, chloramines, and chlorine dioxide are disinfectants commonly added to a water supply to kill microorganisms such as Giardia and *E. coli* and have a maximum allowable residual level. Disinfection byproducts (DBPs) form when the disinfectants added to drinking water react with naturally occurring organic and inorganic matter in water. Regulated disinfection byproducts include trihalomethanes (TTHM), haloacetic acids (HAA5), bromate, and chlorite.

Inorganic Contaminants (IOCs)

IOCs are mineral-based compounds such as metals, nitrates, and asbestos. These contaminants are naturally occurring in some water, but can also get into water through farming, chemical manufacturing, and other human activities. The EPA has set legal limits on 15 inorganic contaminants.

Organic Chemicals

Organic chemicals are carbon-based chemicals, such as solvents and pesticides that can get into water through runoff from cropland or discharge from factories. The EPA has set legal limits on 56 organic contaminants.

- Volatile Organic Compounds (VOCs) – Sources of VOCs entering a water supply can include discharge from factories, leakage from gas storage tanks, and leaching from landfills. VOCs include industrial and chemical solvents, such as benzene and toluene.
- Synthetic Organic Chemicals (SOCs) are carbon-based compounds of man-made origin that can get into water through runoff from croplands or discharge from factories. SOCs include, among other compounds, pesticides and herbicides, such as atrazine, alachlor, endrin, and lindane. Some SOCs are volatile; others tend to stay dissolved in water instead of evaporating.

Radionuclides

Most drinking water sources have very low levels of radioactive contaminants ("radionuclides") that are not considered to be a public health concern. Of the small percentage of drinking water systems with radioactive contaminant levels high enough to be of concern, most of the radioactivity is naturally occurring. Certain rock types have naturally occurring trace amounts of "mildly radioactive" elements (radioactive elements with very long half-lives) that serve as the "parent" of other radioactive contaminants ("daughter products"). These radioactive contaminants, depending on their chemical properties, may accumulate in drinking water sources at levels of concern. The EPA has set legal limits on four radionuclide contaminants.

Secondary Contaminants

The secondary contaminants have associated impacts that are not directly related to health, such as taste and staining. The EPA recommends secondary standards to water systems but does not require systems to comply. However, states may choose to adopt them as enforceable standards.

Secondary Contaminants	
• Aluminum • Chloride • Color • Copper • Corrosivity • Fluoride • Foaming Agents • Iron	• Manganese • Odor • pH • Silver • Sulfate • Total Dissolved Solids • Zinc

Knowing Which Regulations Apply to You

When faced with the full set of SDWA regulations, the responsibility of keeping your system in compliance can seem overwhelming. However, the task can be made much easier if you understand a few basics about how EPA and SDWA regulations categorize drinking water systems. Certain rules apply only to certain kinds of systems. This means that your system will be regulated according to its size, PWS category, source water, and treatment steps. Once you understand how your system is categorized within a regulation, you will be better equipped to talk to regulators and get the information you need in order to keep your system in compliance.

Classification of Public Water Systems

Water systems are defined by EPA/ADEC regulations. As stated earlier in the chapter, drinking water standards apply only to PWSs that provide water to at least 15 connections or 25 persons at least 60 days out of the year. The EPA classifies PWSs according to the number of people they serve, the source of their water, and whether they serve the same customers year-round or on an occasional basis. Each system has a unique Public Water System Identification Number (PWSID), history, and record with ADEC.

The EPA has defined three types of public water systems:

- Community Water System (CWS) – A public water system that supplies water to the same population year-round. Examples are communities like Anchorage and Nulato.
- Non-Transient Non-Community Water System (NTNCWS) – A public water system that regularly supplies water to at least 25 of the same people at least six months per year, but not year-round. Some examples are schools, factories, office buildings, and hospitals that have their own water systems.
- Transient Non-Community Water System (TNCWS) – A public water system that provides water in a place such as a gas station or campground where people do not remain for long periods of time.

The EPA also classifies water systems according to the number of people they serve:

- Very Small water systems serve 25-500 people.
- Small water systems serve 501-3,300 people.
- Medium water systems serve 3,301-10,000 people.
- Large water systems serve 10,001-100,000 people.
- Very Large water systems serve 100,001+ people.

ADEC Class C

A Class C system is a PWS that serves fewer than 25 people. It is a unique ADEC designation. There is no comparable EPA term; this class system is an ADEC-defined and regulated entity. The EPA does not regulate systems this small.

Drinking Water Watch

The ADEC Drinking Water Program has developed a tool whereby owners, operators, and consumers can access specific information about a water system. The program is called Drinking Water Watch and can be queried for sampling information, monitoring summaries, violation information, water systems contact, and general information.

To find information on your system, visit the Drinking Water Watch web site (http://map.dec.state.ak.us/eh/dww/index.jsp).

This site is very important to the PWS operator and system owner for understanding their PWS status and current and future drinking water sampling and reporting. Operators must familiarize themselves with this site and the PWS they are working with. Be sure to explore all the screens and understand how the information applies to your system. Check this data record for accuracy. The ADEC uses this site for determining compliance using operator and laboratory reporting. If you do not have Internet access, contact ADEC staff, and they may send this information to you by mail or fax or simply give you results as they are listed.

Monitoring, Sampling, and Reporting

It is the responsibility of each water system to test for possible contaminants in its water supply.

Although each regulation has its own, sometimes complex, set of requirements, every regulation affects your system in the same basic way. In general, you will have to the following:

- Monitor for a contaminant and report the results to the State.
- Make compliance decisions based on your monitoring results and the outcome of any State review.
- Take action to reduce any health risks that have been identified through monitoring.
- Provide the public information about water quality and public health risks.

System Monitoring

Typically, the first thing you will need to do to comply with a regulation is monitor for the contaminant of concern to determine whether it is present in your water and, if so, at what level. Sometimes, you may be able to use previously collected monitoring data to comply with the monitoring requirements of new regulations.

System Decision-Making

After your monitoring data has been collected, you will be able to better assess your situation. ADEC will also review the data to determine where your system stands in regards to compliance and will be able to direct you on what to do if your system appears to have a compliance problem.

System Actions

Possible system actions may involve installing a new treatment process, modifying an existing process, replacing failing pumps or pipes, or using a new source of water. After exploring a variety of options, you should choose an option that is viable for your system and put that option into action. Extensive technical and financial resources are available to help you along in these tasks.

General Monitoring Requirements

Two monitoring requirement summaries are provided on the following pages. These do not replace the current drinking water regulations. ADEC drinking water regulations Article 3 and 4 contain most of the standards and monitoring requirements that apply to PWS. In some instances, you must refer to the EPA Quick Reference Guides and Code of Federal Regulations (CFR) to obtain the complete documentation.

System-Specific Monitoring Summary

The ADEC Drinking Water Watch web site tells you what (the contaminants), when (the frequency), and where (the location) to sample. The ADEC uses certain criteria to assign water-sampling requirements for a PWS:

- Population served
- Hours/seasonal/full time water delivery service operation
- Water source type: groundwater, surface water, GUDISW, purchased water
- Disinfection practiced or use of oxidants
- Rule (which SDWA Rule: TCR, SWTR, etc.)
- Piped system or community haul, watering point, washeteria source
- Water storage tanks in use
- Historic sample results
- Type of treatment
- Level of regulated contaminants in raw or treated water
- Whether MCLs are being met in the treated water
- History or special circumstances and whether you are special

Sample Locations

Sample location is an important part of taking a water sample. The major categories are listed below

During Treatment

Certain rules and/or the ADEC may require water to be sampled during treatment to document the performance of the treatment process. Data is recorded, properly documented, and/or reported to the ADEC/EPA. Archiving and storing this data is a significant responsibility of the operator. Some of the required sampling/testing/recording include turbidity, disinfectant residual, contaminant value for process controls, or other chemical injection. This list may vary due to system layout or other unusual conditions. The ADEC Drinking Water Watch site will identify the regulatory values/frequency data your system must collect and record.

After Treatment

MCLs apply to the water being served to the public so samples are taken after treatment. Almost all samples come from the entry point to the distribution systems. The PWS may also be required to take disinfection residual values of the water entering the distribution system and other ADEC-established parameters (fluoride, corrosion chemicals, pH, etc.). These samples are taken before the first customer. Samples for inorganic chemicals, VOCs, pesticides, turbidity, and radioactivity are usually collected after treatment at the entry point to the distribution system, but each system is unique, so you should consult the appropriate references.

Each rule has a specific sample requirement. Consult the EPA Quick Reference Guides, ADEC staff, and the Drinking Water Watch for assistance.

Distribution System

TTHM/HAA5s and coliform bacteria samples are taken in the distribution system at specific locations. If the system chlorinates or chloraminates, a chlorine residual test is required at the same place and time as a coliform sample.

Customer/Consumer Home

Lead and copper tests are taken from customer faucets, and there are many specific procedures to take this sample. Follow the “sample protocol” carefully.

The following Alaska public drinking water supply sampling and testing schedules for surface water, GUDISW and groundwater depend on your type of system and monitoring summary.

Surface Water and GUDISW
- **Community Water Systems (CWS)**
- **Non-Transient Non-Community Water Systems (NTNCWS)**
- **Transient Non-Community Water System (TNCWS)**

This summary does not replace the current drinking water regulations.

TCR/ Nitrate/Nitrite		CWS	NTNCWS	TNCWS
Sanitary Survey		Every 3 years	Every 5 years	Every 5 years
Total Coliform Bacteria[1]		Every month	Every month	Every month
Nitrate (NO_3)		Every quarter[2]	Every quarter[2]	Annually
Nitrite (NO_2)		1 sample record	1 sample record	1 sample record
Reporting		CWS	NTNCWS	TNCWS
Turbidity		Continuous or grab samples	Continuous or grab samples	Continuous or grab samples
		(Frequency determined by population and filtration type.)		
Fluoride – if added		Daily	Daily	
Entry Point Chlorine – if chlorine is added		Continuous or grab samples	Continuous or grab samples	Continuous or grab samples
		(Pop determines how many times a day chlorine is measured.)		
Distribution System Chlorine[3]		Monthly	Monthly	Monthly
Consumer Confidence Report		Annually	Annual	
Disinfection/Disinfectant Byproducts		CWS	NTNCWS	TNCWS
Total Trihalomethanes[1] (TTHM/HAA5)	Pop < 500	Annually	Annually	Annually
	Pop 500 - 9,999	Quarterly[2]	Quarterly[2]	Quarterly[2]
	Pop ≥10,000	Quarterly[2]	Quarterly	Quarterly
TOC and Alkalinity		Every month[2]	Every month[2]	
Bromate (Ozone plants only)		Monthly	Monthly	
Inorganic Chemicals		CWS	NTNCWS	TNCWS
All Primary		Annually	Annually	
Arsenic		Annually	Annually	
Asbestos		Once per period	Once per period	
Lead and Copper[1]		Every 6 months[2]	Every 6 months[2]	
Organic Chemicals		CWS	NTNCWS	TNCWS
Pesticides (SOCs) and Other Organics		Every quarter[2]	Every quarter[2]	
Volatile Organic Chemicals (VOCs)		Every quarter	Every quarter	
		Annually	Annually	
Radionuclides		CWS	NTNCWS	TNCWS
Gross Alpha Radioactivity		Every quarter		
Radium 226, Radium 228, Uranium		Every quarter		

[1] Number of samples is based on population.

[2] May be reduced if certain criteria are met.

[3] Distribution point chlorine test is required at the same time and location as total coliform samples are collected.
Cycle – 3 years; Period – 9 years

Alaska Public Drinking Water Supply Sampling and Testing Schedules

Groundwater
- **Community Water Systems (CWS)**
- **Non-Transient Non-Community Water Systems (NTNCWS)**
- **Transient Non-Community Water System (TNCWS)**

This summary does not replace the current drinking water regulations.

TCR/ Nitrate/Nitrite		CWS	NTNCWS	TNCWS
Sanitary Survey		Every 5 years	Every 5 years	Every 5 years
Total Coliform Bacteria[1]		Every month	Every month	Every quarter
Nitrate (NO_3)		Annually	Annually	Annually
Nitrite (NO_2)		1 sample record	1 sample record	1 sample record
Reporting		**CWS**	**NTNCWS**	**TNCWS**
Fluoride – if added		Daily	Daily	Daily
Entry Point Chlorine – if chlorine is added		Continuous or grab samples	Continuous or grab samples	Continuous or grab samples
		(Pop determines how many times a day chlorine is measured.)		
Distribution Chlorine[2] – if chlorine is added		Monthly	Monthly	
Consumer Confidence Report		Annually		
Disinfection/Disinfectant By-products		**CWS**	**NTNCWS**	**TNCWS**
Total Trihalomethanes[1] (TTHM/HAA5)	Pop < 500 – 9,999	Annually	Annually	
	Pop ≥10,000	Quarterly	Quarterly	
Bromate (Ozone plants only)		Monthly	Monthly	
Inorganic Chemicals		**CWS**	**NTNCWS**	**TNCWS**
All Primary		Once per period	Once per period	
Arsenic		Once per period	Once per period	
Asbestos		Once per cycle	Once per cycle	
Lead and Copper[1]		Every 6 months[3]	Every 6 months[3]	
Organic Chemicals		**CWS**	**NTNCWS**	**TNCWS**
Pesticides (SOCs) and Other Organics		Every quarter[3]	Every quarter[3]	
Volatile Organic Chemicals (VOCs)		Every quarter	Every quarter	
		Annually	Annually	
Radionuclides		**CWS**	**NTNCWS**	**TNCWS**
Gross Alpha Radioactivity		Every quarter		
Radium 226, Radium 228, Uranium		Every quarter		

[1] Number of samples is based on population.
[2] Distribution point chlorine test is required at the same time and location as total coliform samples are collected.
[3] May be reduced if certain criteria are met.
Cycle – 3 years
Period – 9 years

Alaska Public Drinking Water Supply Sampling and Testing Schedules

Current Regulations To Control Microbial Contaminants

In drinking water, microbes are the contaminants with the greatest chance of reaching levels high enough to cause acute health effects. The following major rules are intended to control this risk:

- Total Coliform Rule
- Surface Water Treatment Rule
- Interim Enhanced Surface Water Treatment Rule
- Long Term 1 Enhanced Surface Water Treatment Rule
- Long Term 2 Enhanced Surface Water Treatment Rule
- Filter Backwash Recycling Rule
- Ground Water Rule

Total Coliform Rule (TCR)

The TCR applies to all public water systems and serves to improve public health protection by reducing fecal pathogens to minimal levels through control of total coliform bacteria, including fecal coliform and Escherichia coli (*E. coli*). This rule establishes a maximum contaminant level (MCL) based on the presence or absence of total coliforms, modifies monitoring requirements including testing for fecal coliforms or *E. coli*, requires use of a sampling plan, and requires sanitary surveys for systems.

Important Elements of This Rule

The number of routine samples required each month depends on system size. Samples must be collected at sites representative of water quality throughout the distribution system according to an approved **Sample Siting Plan**[3]. Depending on the results (not present, positive, too old to analyze, fecal coliform present, etc.), there are procedures the operator must follow.

[3] Sample Siting Plan – A plan that specifies where in the distribution system routine samples will be drawn in order to ensure that they are "representative" of the water supplied to every customer.

As mentioned previously, the presence of total coliforms is a warning sign that your system is vulnerable to contamination. It does not necessarily mean that your system is contaminated. If any of your routine samples test positive for the presence of total coliforms, you must do both of the following:

- Immediately collect a set of repeat samples per positive routine sample to assess the extent of the problem.
- Collect five routine samples the next month.

For every total coliform-positive sample, a set of repeat samples must be collected **within 24 hours** of the system being notified of the positive result. The minimum number of repeat samples required is based on the number of routine samples collected.

TCR Major Provisions

ROUTINE Sampling Requirements

- Total coliform samples must be collected at sites which are representative of water quality throughout the distribution system according to a written sample siting plan subject to state review and revision.
- Samples must be collected at regular time intervals throughout the month except groundwater systems serving 4,900 persons or fewer may collect them on the same day.
- Monthly sampling requirements are based on population served.
- A reduced monitoring frequency may be available for systems serving 1,000 persons or fewer and using only ground water if a sanitary survey within the past 5 years shows the system is free of sanitary defects. (The frequency may be no fewer than 1 sample/quarter for community and 1 sample/year for non-community systems.)
- Each total coliform-positive routine sample must be tested for the presence of fecal coliforms or E. coli.
- If any routine sample is total coliform-positive, repeat samples are required.

REPEAT Sampling Requirements

Within 24 hours of learning of a total coliform-positive ROUTINE sample result, at least 3 REPEAT samples must be collected and analyzed for total coliforms:

- One REPEAT sample must be collected from the same tap as the original sample.
- One REPEAT sample must be collected within five service connections upstream.
- One REPEAT sample must be collected within five service connections downstream.
- Systems that collect 1 ROUTINE sample per month or fewer must collect a fourth REPEAT sample.

If any REPEAT sample is total coliform-positive:

- The system must analyze that total coliform-positive culture for fecal coliforms or E. coli.
- The system must collect another set of REPEAT samples, as before, unless the MCL has been violated and the system has notified the State.

Additional ROUTINE Sampling Requirements

A positive ROUTINE or REPEAT total coliform result requires a minimum of five ROUTINE samples be collected the following month the system provides water to the public, unless waived by the State.

Public Water System ROUTINE Monitoring Frequencies

Population	Minimum Samples/ Month	Population	Minimum Samples/ Month	Population	Minimum Samples/Month
25-1,000*	1	21,501-25,000	25	450,001-600,000	210
1,001-2,500	2	25,001-33,000	30	600,001-780,000	240
2,501-3,300	3	33,001-41,000	40	780,001-970,000	270
3,301-4,100	4	41,001-50,000	50	970,001-1,230,000	300
4,101-4,900	5	50,001-59,000	60	1,230,001-1,520,000	330
4,901-5,800	6	59,001-70,000	70	1,520,001-1,850,000	360
5,801-6,700	7	70,001-83,000	80	1,850,001-2,270,000	390
6,701-7,600	8	83,001-96,000	90	2,270,001-3,020,000	420
7,601-8,500	9	96,001-130,000	100	3,020,001-3,960,000	450
8,501-12,900	10	130,001-220,000	120	≥ 3,960,001	480
12,901-17,200	15	220,001-320,000	150		
17,201-21,500	20	320,001-450,000	180		

* Includes PWSs that have at least 15 service connections, but serve < 25 people.

Other Provisions

Systems collecting fewer than five ROUTINE samples per month . . .	Must have a sanitary survey every five years (or every 10 years if it is a non-community water system using protected and disinfected ground water).**

TCR Major Provisions	
Other Provisions Continued	
Systems using surface water or groundwater under the direct influence of surface water (GWUDI) and meeting filtration avoidance criteria . . .	Must collect and have analyzed one coliform sample each day the turbidity of the source water exceeds one NTU. This sample must be collected from a tap near the first service connection.
** As per the IESWTR, states must conduct sanitary surveys for community surface water and GWUDI systems in this category every three years (unless reduced by the State based on outstanding performance).	
How is Compliance Determined	
• Compliance is based on the presence or absence of total coliforms. • Compliance is determined each calendar month the system serves water to the public (or each calendar month that sampling occurs for systems on reduced monitoring). • The results of ROUTINE and REPEAT samples are used to calculate compliance.	
A Monthly MCL Violation is Triggered if:	
A system collecting fewer than 40 samples per month . . .	Has greater than 1 ROUTINE/REPEAT sample per month that is total coliform-positive.
A system collecting at least 40 samples per month . . .	Has greater than 5.0 percent of the ROUTINE/REPEAT samples in a month total coliform-positive.
An Acute MCL Violation is Triggered if:	
Any public water system . . .	Has any fecal coliform- or E. coli-positive REPEAT sample or has a fecal coliform- or E. coli-positive ROUTINE sample followed by a total coliform-positive REPEAT sample.
Public Notification and Reporting Requirements	
For a Monthly MCL Violation	• The violation must be reported to the State no later than the end of the next business day after the system learns of the violation. • The public must be notified within 14 days. [2]
For an Acute MCL Violation	• The violation must be reported to the State no later than the end of the next business day after the system learns of the violation. • The public must be notified within 72 hours. [2]
Systems with ROUTINE or REPEAT samples that are fecal coliform- or E. coli-positive . . .	Must notify the State by the end of the day they are notified of the result or by the end of the next business day if the State office is already closed.
[2] The revised Public Notification Rule will extend the period allowed for public notice of monthly violations to 30 days and shorten the period for acute violations to 24 hours. These revisions are effective for all systems by May 6, 2002, and are detailed in 40 CFR Subpart Q.	

Developing a Sample Siting Plan

The TCR requires each PWS to sample for coliform according to a written plan, which must be made available to the Primacy Agency. Having a written sample collection protocol helps ensure that all sampling is done correctly, even when assignments of water system personnel change.

The plan specifies where in the distribution system routine samples will be drawn to ensure that they are "representative" of the water supplied to every customer. Representative samples that accurately reflect the quality of the finished water are crucial because if coliforms are in the water supply, they may not be found uniformly throughout the distribution system. The sampling plan also designates repeat sampling sites to be used if a sample drawn from a routine sampling point tests positive for coliforms. Remember, the purpose of sampling is not to draw "clean" samples, but to identify any coliform contamination so that it can be dealt with promptly. Because of this, it is important to identify dead ends and trouble spots in the distribution system for sampling locations.

Sampling sites specified in the sampling plan should be selected carefully throughout the distribution system to represent the varying conditions that occur there. It is especially important to identify and include in the sampling plan areas that may adversely affect the microbiological quality of the water. The details of a sampling plan depend on the characteristics of the system for which it is developed and on the requirements of the Primacy Agency. Contact the ADEC for complete requirements. Factors to consider when preparing a site-sampling plan include the following:

- The location and type of water sources, treatment facilities, storage tanks, pressure stations, and service connections
- The location of dead-end pipes, main and branch lines, loops, and other aspects of the piping system's configuration
- Cross-connection hazards and shared connections
- Areas of low water pressure and slow water movement
- Varying population densities
- Hydrants (for flushing schedule)

A basic site-sampling plan may have three components: a map of the distribution system, a narrative description of the plan, and a maintenance program.

Sampling Sites

Customers' faucets and specially installed sampling taps are the two most common types of sampling sites. Customer faucets may not always be conveniently accessible. In addition, samples from a customer's faucet may not accurately reflect distribution system conditions for reasons that have to do with the customer's plumbing that are not under the water supplier's control. If customers' faucets are to be used, each faucet should be examined carefully to ensure its suitability. Some examples of undesirable conditions include the following:

- Swivel-type faucets that have a single valve for hot and cold water
- Faucets that have leaky packing material around the stem
- Faucets that supply areas, such as janitorial or commercial sinks, where bacterial contamination is likely
- Faucets close to or below ground level
- Faucets that point upward
- Faucets that have threads on the inside of their spouts

- Faucets that have aerators (If such faucets are to be used, the aerators must be removed before a sample is collected.)
- Outside hose bibs

To avoid the problems inherent with customer faucets, many water suppliers collect water samples for coliform analysis from special taps connected directly to distribution pipes. These special taps can simply be a faucet at the end of a riser pipe connected to the distribution line or a more sophisticated manufactured sampling station installed at the water meter or into the distribution main.

Sample Collection Techniques

It is essential that the proper techniques be used to eliminate the possibility of contamination of the sample while it is being collected. There are critical techniques and methods to this sampling event. If you get it right from the beginning, there will be fewer problems. Quality control must be practiced. The cost of sloppy samples is wasted money, wasted labor, and poor customer relations. It is the operator's responsibility to assure the customer that the water is safe.

1. Wash your hands thoroughly before handling supplies. Assemble all of the sampling supplies before you begin.
2. DO NOT RINSE OUT THE SAMPLE BOTTLE. The powder in the bottle is meant to be there and will not contaminate your sample. The powder is sodium thiosulfate which eliminates chlorine in the sample.
3. Remove any aerators, strainers, or hoses that are present because they may harbor bacteria. If possible, avoid using a faucet that swivels.
4. Disinfect the faucet by dipping the end in a cap full of bleach before running the water. This is optional but a good idea.
5. Open the cold water tap for about two to three minutes before collecting the sample. (You may want to time this step–three minutes is a long time.) This clears the service line.
6. While waiting, collect the required chlorine residual if your system disinfects, and record it on the lab form.
7. Adjust the flow to about the width of a pencil. Check for steady flow. Do not change the water flow once you have started sampling. It could dislodge microbial growth.
8. Remove the bottle cap (stopper, etc.). Be careful not to touch the inside with your fingers.
9. Position the bottle under the water flow. Hold the bottle in one hand and the cap in the other. Do not lay the cap down or put it in a pocket. Take care not to contaminate the sterile bottle or cap with your fingers or permit the faucet to touch the inside of the bottle.
10. Fill the bottle to at least the fill line (100 ml). Do not fill it all the way up to the top. Allow 1" head space.
11. Place the cap on the bottle, and screw it down tightly. Take special care not to touch the inside of the cap or bottle. If you do, start with a new bottle.

12. Turn the tap off. Replace the aerator, strainer, or hose.
13. Keep the sample cool, but do not freeze.
14. Fill out label, tag, and lab form in waterproof ink. Make sure the label is dry before writing on the label.
15. Check that the information on the label is correct, and keep a copy for your files. Pack the sample in a Styrofoam container or bubble wrap, so the bottle does not break, and put in the mail.
16. Ensure the samples reach the laboratory within 30 hours of collection.

The result of a coliform test is relied upon to be accurate and representative. There is great concern when a bacterial sample is positive; this indicates possible contamination, which is very serious because of possible health affects.

The TCR is complicated. When results are negative (no coliform detected), everyone is happy. When results are positive (coliform present), there will be a lot of action/reaction to analyze more water samples and to understand the cause and the possible public health impact. Consult with the ADEC during a response incident for a coliform positive result. There will be a lot to do on a strict timeline.

The Surface Water Treatment Rule (SWTR)

Surface water treatment plants are classified according to the type treatment process or treatment technique (TT) used. These include avoidance of filtration, conventional, direct, slow sand, alternative (cartridges, membrane, diatomaceous earth), bank filtration, and other variations as recognized by the EPA and ADEC. The type of water source and water source characteristics may also be used.

The Surface Water Treatment Rule, promulgated in June 1989, seeks to prevent waterborne diseases caused by viruses, Legionella, and Giardia lamblia. These disease-causing microbes are present at varying concentrations in most surface waters. The rule requires that water systems filter and disinfect water from surface water sources to reduce the occurrence of unsafe levels of these microbes.

The SWTR applies to all PWSs using surface water or GUDISW, otherwise known as "Subpart H systems." (Subpart H refers to the section of the Code of Federal Regulations (CRF) 141, National Primary Drinking Water Regulations that is the Surface Water Treatment Rule.) This water, which most of the country's large water systems use, is in rivers, lakes, and reservoirs. Surface water is particularly susceptible to microbial contamination from sewage treatment plant discharges and runoff from storm water and snow melt. These sources often contain high levels of fecal microbes that originated in wild animals, livestock waste, or septic systems.

Important Elements of This Rule

The rule sets non-enforceable health goals, or **Maximum Contaminant Level Goals (MCLGs)**[4], for Legionella, Giardia, and viruses at zero because any amount of exposure to these contaminants represents some health risk. In establishing legal limits for contaminants in drinking water, the EPA can set either a legal limit (MCL) and require monitoring for the contaminant in drinking water or for those contaminants that are difficult to measure, establish a treatment technique (TT) requirement. Since measuring disease-causing microbes in drinking water is not considered to be feasible, the EPA established a treatment technique in this rule.

[4] MCLGs (Maximum Contaminant Level Goals) – The maximum level of a contaminant that is associated with no adverse health effects from drinking water containing that contaminant over a lifetime.

All systems must filter (unless filter avoidance criteria are met) and disinfect their water to provide a minimum of 99.9 percent combined removal and inactivation of Giardia and 99.99 percent of viruses. The adequacy of the filtration process is established by measuring turbidity (a measure of the amount of particles) in the treated water and determining if it meets the EPA's performance standard.

To assure adequate microbial protection in the distribution system, water systems are also required to provide continuous disinfection of the drinking water entering the distribution system and to maintain a detectable disinfectant level within the distribution system.

SWTR Residual Disinfectant Monitoring and Reporting Requirements

Location	Concentration	Monitoring Frequency	Reporting (Reports due 10th of the following month)
Entry to distribution system	Residual disinfectant concentration cannot be < 0.2 mg/L for more than 4 hours.	Continuous, but state may allow systems serving 3,300 or fewer persons to take grab samples from one to 4 times per day, depending on system size.	Lowest daily value for each day, the date and duration when residual disinfectant was < 0.2 mg/L, and when state was notified of events where residual disinfectant was < 0.2 mg/L.
Distribution system – same location as total coliform sample location(s)	Residual disinfectant concentration cannot be undetectable in greater than 5 % of samples in a month, for any 2 consecutive months. Heterotrophic plate count (HPC) ≤ 500/mL is deemed to have detectable residual disinfectant.	Same time as total coliform samples.	Number of residual disinfectant or HPC measurements taken in the month resulting in no more than 5 % of the measurements as being undetectable in any 2 consecutive months.

Interim Enhanced Surface Water Treatment Rule (IESWTR)

The Interim Enhanced Surface Water Treatment Rule, promulgated in December 1998, amends the existing SWTR to improve control of microbial contaminants, particularly *Cryptosporidium*, including provisions specifically to address *Cryptosporidium*, and to address risk trade-offs with disinfection byproducts in systems using surface water or GUDISW that serve 10,000 or more persons. The rule builds upon the treatment technique requirements of the SWTR. In addition, systems must continue to meet existing requirements for *Giardia lamblia* and viruses.

Important Elements of This Rule

Specifically, the rule includes the following:

- Maximum contaminant level goal (MCLG) of zero for *Cryptosporidium*
- 2-log *Cryptosporidium* removal requirements for systems that filter
- Strengthened combined filter effluent turbidity performance standards
- Individual filter turbidity monitoring provisions
- Disinfection profiling and benchmarking provisions
- Systems using ground water under the direct influence of surface water now

subject to the new rules dealing with *Cryptosporidium*
- Inclusion of *Cryptosporidium* in the watershed control requirements for unfiltered public water systems
- Requirements for covers on new finished water reservoirs
- Sanitary surveys conducted by states for all surface water systems, regardless of size

The rule, with tightened turbidity performance criteria and individual filter monitoring requirements, is designed to optimize treatment reliability and to enhance physical removal efficiencies to minimize the Cryptosporidium levels in finished water. Turbidity requirements for combined filter effluent remains at least every four hours, but continuous monitoring is required for individual filters. In addition, the rule includes disinfection profiling and benchmarking provisions to assure continued levels of microbial protection while facilities take the necessary steps to comply with new DBP standards.

IESWTR Major Provisions	
Regulated Contaminants	
Cryptosporidium	• Maximum contaminant level goal (MCLG) of zero. • 99 percent (2-log) physical removal for systems that filter. • Include in watershed control program for unfiltered systems.
Turbidity Performance Standards	Conventional and direct filtration combined filter effluent: • ≤ 0.3 nephelometric turbidity units (NTU) in at least 95 percent of measurements taken each month. • Maximum level of 1 NTU.
Turbidity Monitoring Requirements (Conventional and Direct Filtration	
Combined Filter Effluent	Performed every 4 hours to ensure compliance with turbidity performance standards.
Individual Filter Effluent	Performed continuously (every 15 minutes) to assist treatment plant operators in understanding and assessing filter performance.
Additional Requirements	
• Disinfection profiling and benchmarking. • Construction of new uncovered finished water storage facilities prohibited. • Sanitary surveys, conducted by the State, for all surface water and ground water under the direct influence of surface water systems regardless of size (every 3 years for community water systems and every 5 years for non-community water systems).	
Profiling and Benchmarking	
Public water systems must evaluate impacts on microbial risk before changing disinfection practices to ensure adequate protection is maintained. The three major steps include the following: • Determine if a public water system needs to profile based on TTHM and HAA5 levels (applicability monitoring). • Develop a disinfection profile that reflects daily *Giardia lamblia* inactivation for at least a year. (Systems using ozone or chloramines must also calculate inactivation of viruses.) • Calculate a disinfection benchmark (lowest monthly inactivation) based on the profile and consult with the State prior to making a significant change to disinfection practices.	

Long Term 1 Enhanced Surface Water Treatment Rule

The Long Term 1 Enhanced Surface Water Treatment Rule (LT1), promulgated in January 2002, strengthens control of microbial contaminants, particularly *Cryptosporidium*, for small systems–those systems serving fewer than 10,000 people. This rule builds upon the framework established for larger systems in the IESWTR.

Important Elements of This Rule

The rule requires PWS that use surface water or GUDISW and serve fewer that 10,000 people to meet strengthened filtration requirements. It also requires systems to calculate levels of microbial inactivation to ensure that microbial protection is not jeopardized if systems make changes to comply with requirements of the Stage 1 Disinfectants and Disinfection Byproducts.

LT1 Major Provisions	
Control of Cryptosporidium	
• The maximum contaminant level goal (MCLG) is set at zero. • Filtered systems must physically remove 99% (2-log) of *Cryptosporidium*. • Unfiltered systems must update their watershed control programs to minimize the potential for contamination by *Cryptosporidium* oocysts. • *Cryptosporidium* is included as an indicator of GWUDI.	
Combined Filter Effluent (CFE) Turbidity Performance Standards	

Specific CFE turbidity requirements depend on the type of filtration used by the system.
 	
Conventional and direct filtration:
• ≤ 0.3 nephelometric turbidity units (NTU) in at least 95% of measurements taken each month.
• Maximum level of turbidity: 1 NTU.
 	
Slow sand and diatomaceous earth (DE) filtration:
• Continue to meet CFE turbidity limits specified in the SWTR:
  • 1 NTU in at least 95% of measurements taken each month.
  • Maximum level of turbidity: 5 NTU.
 	
Alternative technologies (other than conventional, direct, slow sand, or DE):
• Turbidity levels are established by the State based on filter demonstration data submitted by the system.
• State-set limits must not exceed 1 NTU (in at least 95 percent of measurements) or 5 NTU (maximum).	

Turbidity Monitoring Requirements	
Combined Filter Effluent	Performed at least every 4 hours to ensure compliance with CFE turbidity performance standards.[1]
Individual Filter Effluent (IFE) (for systems using conventional and direct filtration only)	Since the CFE may meet regulatory requirements, even though one filter is producing high turbidity water, the IFE is measured to assist conventional and direct filtration treatment plant operators in understanding and assessing individual filter performance. • Performed continuously (recorded at least every 15 minutes). • Systems with two or fewer filters may conduct continuous monitoring of CFE turbidity in place of individual filter effluent turbidity monitoring. • Certain follow-up actions are required if the IFE turbidity (or CFE for systems with two filters) exceeds 1.0 NTU in 2 consecutive readings or more (additional reporting, filter self-assessments, and/or comprehensive performance evaluations CPEs).
[1] This frequency may be reduced by the State to once per day for systems using slow sand/alternative filtration or for systems serving 500 persons or fewer, regardless of the type of filtration used.	

LT1 Major Provisions
Disinfection Profiling and Benchmarking Requirements
Community and non-transient non-community public water systems must evaluate impacts on microbial risk before changing disinfection practices to ensure adequate microbial protection is maintained. This is accomplished through a process called disinfection profiling and benchmarking. What are the disinfection profiling and benchmarking requirements? • Systems must develop a disinfection profile, which is a graphical compilation of weekly inactivation of *Giardia lamblia*, taken on the same calendar day each week over 12 consecutive months. (Systems using chloramines, ozone, or chlorine dioxide for primary disinfection must also calculate inactivation of viruses.) Results must be available for review by the State during sanitary surveys. • A state may deem a profile unnecessary if the system has sample data collected after January 1, 1998–during the month of warmest water temperature and at maximum residence time in the distribution system–indicating TTHM levels are below 0.064 mg/L and HAA5 levels are below 0.048 mg/L. • Prior to making a significant change to disinfection practices, systems required to develop a profile must calculate a disinfection benchmark and consult with the State. The benchmark is the calculation of the lowest monthly average of inactivation based on the disinfection profile.

SWTR – Requirements for Unfiltered Systems

- Requires all Subpart H systems to disinfect.
- Requires Subpart H systems to filter unless specific filter avoidance criteria are met.
- Requires unfiltered systems to perform source water monitoring and meet site specific conditions for control of microbials.

Some public water supplies that have pristine sources may be granted a waiver from the filtration requirement. These supplies must provide the same level of treatment as those that filter; however, their treatment is provided through disinfection alone. Systems must meet source water quality and site specific conditions to remain unfiltered. If any of the filtration avoidance criteria are not met, systems must install filtration treatment within 18 months of the failure.

System Reporting Requirements for Unfiltered Systems	
Within 10 days after the end of the month:	• Source water quality information (microbial quality and turbidity measurements). • In addition to the disinfection information above, systems must report the daily residual disinfectant concentration(s) and disinfectant contact times(s) used for calculating the CT value(s).
By October 10 each year:	• Report compliance with all watershed control program requirements. • Report on the on-site inspection unless conducted by the State, in which the State must provide the system a copy of the report.
Within 24 hours:	Turbidity exceedances of 5 NTU and waterborne disease outbreaks.
As soon as possible but no later that the end of the next business day:	Instance where the residual disinfectant level entering the distribution system was less than 0.2 mg/L.

SWTR – Requirements for Systems Using Conventional or Direct Filtration

- Requires all Subpart H systems to disinfect.
- Requires Subpart H systems to filter unless specific filter avoidance criteria are met.
- Requires individual filter monitoring and establishes combined filter effluent (CFE) limits.
- Applies a treatment technique requirement for control of microbials.

There are two ways turbidity is measured: Combined Filter Effluent (CFE) and Individual Filter Effluent (IFE).

Turbidity, Monitoring and Reporting Requirements for Systems Using Conventional or Direct Filtration

Turbidity Reporting Requirements Reports due by the 10th day of the following month the system serves water to the public.	**Monitoring/ Recording Frequency**	**SWTR As of June 29, 1993**	**IESWTR ≥ 10,000 people As of Jan 1, 2002**	**LT1ESWTR < 10,000 people As of Jan 1, 2005**
CFE 95 percent Value Report total number of CFE measurements and number and percentage of CFE measurements ≤ 95th % limit.	At least every 4 hours*	≤ 0.5 NTU	≤ 0.3 NTU	≤ 0.3 NTU
CFE Maximum Value Report date and value of any CFE measurement that exceeded CFE maximum limit.	At least every 4 hours*	5 NTU Contact state within 24 hours	1 NTU Contact state within 24 hours	1 NTU Contact state within 24 hours.
IFE Monitoring Report IFE monitoring conducted and any follow-up actions.	Continuously every 15 minutes	None	Monitor-exceedances require follow-up actions	Monitor-exceedances require follow-up actions. Systems with 2 or fewer filters may monitor CFE continuously in lieu of IFE.

*Monitoring frequency may be reduced by the state to once per day for systems serving 500 or fewer people.

IFE Follow-Up and Reporting Requirements

Condition	IESWTR (≥ 10,000)			LT1ESWTR (< 10,000) **		
	Action	Report	By	Action	Report	By
Two consecutive recordings > 0.5 NTU taken 15 minutes apart at the end of the first 4 hours of continuous filter operations after backwash/offline:	Produce filter profile within 7 days (if cause not known).	• Filter # • Turbidity value • Date • Cause (if known) or report profile was produced	10th of the following month			
Two consecutive recording > 1.0 NTU taken 15 minutes apart:	Produce filter profile within 7 days (if cause not known).	• Filter # • Turbidity value • Date • Cause (if known) or report profile was produced			• Filter # • Turbidity value • Date • Cause (if known)	10th of the following month
Two consecutive recordings > 1.0 NTU taken 15 minutes apart at the same filter for 3 months in a row:	Conduct filter self-assessment with in 14 days.	• Filter # • Turbidity value • Date • Report filter assessment produced	10th of the following month	Conduct a filter self-assessment within 14 days. Systems with 2 filters that monitor CFE in lieu of IFE must do both filters.	Date filter self-assessment triggered and completed	10th of the following month (or within 14 days of filter self-assessment being triggered if triggered in last four days of the month)
Two consecutive recordings > 2.0 NTU taken 15 minutes apart at the same filter for two months in a row:	Arrange for CPE within 30 days and submit report within 90 days.	• Filter # • Turbidity value • Date	10th of the following month	Arrange for a CPE within 60 days and submit CPE report within 120 days.	Date CPE triggered	10th of the following month
		Submit CPE report	90 days after exceedance		Submit CPE report	120 days after exceedance

** Systems serving fewer than 10,000 people must begin complying with these requirements beginning January 1, 2005.

IFE performance is measured in systems using conventional or direct filtration. The performance of each individual filter is critical to controlling pathogen breakthrough. The CFE turbidity results may mask the performance of an individual filter since the individual filter may have a turbidity spike of a short duration not detected by four-hour CFE readings.

The IESWTR and LT1ESWTR created more stringent CFE turbidity standards and established a new IFE turbidity monitoring requirement to address Cryptosporidium. These new turbidity standards assure conventional and direct filtration systems will be able to provide 2-log Cryptosporidium removal.

SWTR – Requirements for Systems Using Slow Sand, Diatomaceous Earth, or Alternative Filtration

- Requires all Subpart H systems to disinfect.
- Requires Subpart H systems to filter unless specific filter avoidance criteria are met.
- Applies a treatment technique requirement for control of microbials.

Turbidity

Turbidity is measured as Combined Filter Effluent (CFE) for slow sand, diatomaceous earth, and alternative filtration. The CFE 95th percent value and CFE maximum value for slow sand and diatomaceous earth were not lowered in the IESWTR and LT1ESWTR since these filtration technologies are assumed to provide 2-log Cryptosporidium removal with the turbidity limits established by SWTR. Alternative filtration technologies (defined as filtration technologies other than conventional, direct, slow sand, or diatomaceous earth) must demonstrate to the State that filtration and/or disinfection achieve 3-log Giardia and 4-log virus removal and/or inactivation. The IESWTR and LT1ESWTR also require alternative filtration technologies to demonstrate 2-log Cryptosporidium removal.

Turbidity, Monitoring and Reporting Requirements for Systems Using Slow Sand, Diatomaceous Earth or Alternative Filtration

Turbidity Reporting Requirements (Reports due by the 10th day of the following month the system serves water to the public)		**Monitoring/ Recording Frequency**	**SWTR As of June 29, 1993**	**IESWTR ≥ 10,000 people As of Jan 1, 2002**	**LT1ESWTR < 10,000 people As of Jan 1, 2005**
Slow Sand & Diatomaceous Earth	CFE 95%	At least every 4 hours*	≤ 1 NTU	Regulated under SWTR	Regulated under SWTR
	CFE Max	At least every 4 hours*	5 NTU	Regulated under SWTR	Regulated under SWTR
Alternative • **Membranes** • **Cartridges** • **Other**	CFE 95%	At least every 4 hours*	≤ 1 NTU	Established by the state	Established by the State (not to exceed 1 NTU)
	CFE Max	At least every 4 hours*	5 NTU	Established by the state	Established by the State (not to exceed 5 NTU)

* Monitoring frequency may be reduced by the State to once per day for systems using slow sand or alternative filtration. Monitoring frequency may be reduced by the State to once per day for systems serving 500 or fewer people, regardless of type of filtration used.

CFE Turbidity: Reporting Requirements			
Report to State:	**SWTR Measurements**	**IESWTR Measurements**	**LT1ESWTR Measurements****
Within 10 days after the end of the month:	Total number of monthly measurements	Total number of monthly measurements	Total number of monthly measurements
	Number and percent less than or equal to designated 95th percentile turbidity limits	Number an percent less than or equal to designated 95th percentile turbidity limits	Number an percent less than or equal to designated 95th percentile turbidity limits
	Date and value exceeding 5 NTU	Date and value exceeding 5 NTU for slow sand and diatomaceous earth or maximum level set by state for alternative filtration	Date and value exceeding 5 NTU for slow sand and diatomaceous earth or maximum level set by the State for alternative filtration
Within 24 hours:	Exceedances of 5 NTU for CFE	Exceedances of 5 NTU for slow sand and diatomaceous earth or maximum CFE level set by state for alternative filtration	Exceedances of 5 NTU for slow sand and diatomaceous earth or maximum CFE level set by the state for alternative filtration
** Systems serving fewer than 10,000 people must begin complying with these requirements beginning January 1, 2005.			

Disinfection Profiling and Benchmarking Requirements

A disinfection profile is the graphical representation of a system's microbial inactivation over 12 consecutive months. A disinfection benchmark is the lowest monthly average microbial inactivation value. The disinfection benchmark is used as a baseline of inactivation when considering changes in the disinfection process.

The purpose of disinfection profiling and benchmarking is to allow systems and states to assess whether a change in disinfection practices creates a microbial risk. Systems should develop a disinfection profile that reflects Giardia lamblia inactivation (systems using ozone or chloramines must also calculate inactivation of viruses), calculate a benchmark (lowest monthly inactivation) based on the profile, and consult with the State prior to making a significant change to disinfection practices.

This rule is large, complex, prescriptive, wide-ranging and inherently challenging. It describes treatment plant performance, monitoring, record keeping, reporting, archiving of data, and much more. The ADEC drinking water regulations has a good section on this subject, but EPA literature must be consulted for recently adopted SDWA regulations and to complement ADEC regulations. Literally hundreds of pages of regulation are written to describe the rules and how it is applied.

Disinfection Profiling and Benchmarking Requirements Under IESWTR and LT1ESWTR		
Requirement	**IESWTR**	**LT1ESWTR**
Affected Systems:	Community, non-transient non-community, and transient systems	Community and non-transient non-community systems only.
Begin Profiling By:	April 1, 2000	• July 1, 2003 for systems serving 500-9,999 people • January 1, 2004 for systems serving fewer than 500 people.
Frequency & Duration:	Daily monitoring for 12 consecutive calendar months to determine the total logs of Giardia lamblia inactivation (and viruses, if necessary) for each day in operation.	Weekly inactivation of Giardia lamblia (and viruses, if necessary) on the same calendar day each week over 12 consecutive months.
Disinfection Benchmark Must Be Calculated If:	Systems required to develop a disinfection profile and are considering any of the following: • Changes to the point of disinfection. • Changes to the disinfectant(s) used. • Changes to the disinfection process. • Any other modification identified by the State. Systems must consult the State prior to making any modifications to disinfection practices.	Same as IESWTR, and systems must obtain state approval prior to making any modifications to disinfection practices.
State may waive disinfection profiling requirements if certain criteria are met.		

Long Term 2 Enhanced Surface Water Treatment Rule

Important Note: As of June 2007, the ADEC is not adopting the LT2 rule until 2009, so until that time, the EPA has the primary role of implementing the LT2 Rule.

The purpose of the Long Term 2 Enhanced Surface Water Treatment Rule (LT2), promulgated in December 2005, is to reduce illness linked with the contaminant *Cryptosporidium* and other disease-causing microorganisms in drinking water.

Important Elements of This Rule

The LT2 applies to all PWSs that use surface water or GUDISW and will supplement the existing regulations by targeting additional *Cryptosporidium* treatment requirements to higher risk systems. This rule also contains provisions to reduce risks from uncovered finished water reservoirs and to ensure that systems maintain microbial protection when they take steps to decrease the formation of disinfection byproducts that result from chemical water treatment.

Critical Deadlines

Monitoring starting dates are staggered by system size. The largest systems (serving at least 100,000 people) began monitoring in October 2006, and the smallest systems (serving fewer than 10,000 people) began monitoring in October 2008. After completing monitoring and determining their treatment bin, systems generally have three years to comply with any additional treatment requirements. Systems must conduct a second round of monitoring six years after completing the initial round to determine

if source water conditions have changed significantly. Systems may use (grandfather) previously collected data in lieu of conducting new monitoring, and systems are not required to monitor if they provide the maximum level of treatment required under the rule. Contact the ADEC to determine deadlines and requirements for your system.

LT2 Major Provisions

Control of *Cryptosporidium*

Source Water Monitoring	Filtered and unfiltered systems must conduct 24 months of source water monitoring for *Cryptosporidium*. Filtered systems must also record source water *E. coli* and turbidity levels. Filtered systems will be classified into one of four "Bins," based on the results of their source water monitoring. Unfiltered systems will calculate a mean *Cryptosporidium* level to determine treatment requirements. Systems may also use previously collected date (Grandfathered data). Filtered systems providing at least 5.5 log of treatment for *Cryptosporidium* and unfiltered systems providing at least 3-log of treatment for *Cryptosporidium* and those systems that intend to install this level of treatment are not required to conduct source water monitoring.
Installation of Additional Treatment	Filtered systems must provide additional treatment for *Cryptosporidium* based on their bin classification (average source water *Cryptosporidium* concentration), using treatment options from the "microbial toolbox." Unfiltered systems must provide additional treatment for Cryptosporidium using chlorine dioxide, ozone, or UV.
Uncovered Finished Water Storage Facility	Systems with an uncovered finished water storage facility must either: • Cover the uncovered finished water storage facility. • Treat the discharge to achieve inactivation and/or removal of at least 4-log viruses, 3-log for *Giardia lamblia*, and 2-log for *Cryptosporidium*.

Disinfection Profiling and Benchmarking

After completing the initial round of source water monitoring, any system that plans on making a significant change to their disinfection practices must do the following:

- Create disinfection profiles for *Giardia lamblia* and viruses.
- Calculate a disinfection benchmark.
- Consult with the state prior to making a significant change in disinfection practice.

Bin Classification for Filtered Systems

***Cryptosporidium* Concentration (oocysts/L)**	**Bin Classification**	**Additional *Cryptosporidium* Treatment Required**			**Alternative Filtration**
		Conventional Filtration	**Direct Filtration**	**Slow Sand or Diatomaceous Earth Filtration**	
< 0.075	Bin 1	No additional treatment required	No additional treatment required	No additional treatment required	No additional treatment required
0.075 to < 1.0	Bin 2	1 log	1.5 log	1 log	(1)
1.0 to < 3.0	Bin 3	2 log	2.5 log	2 log	(2)
≥ 3.0	Bin 4	2.5 log	3 log	2.5 log	(3)

(1) As determined by the State (or other primacy agency) such that the total removal/inactivation > 4.0-log.
(2) As determined by the State (or other primacy agency) such that the total removal/inactivation > 5.0-log.
(3) As determined by the State (or other primacy agency) such that the total removal/inactivation > 5.5-log.

Inactivation Requirements for Unfiltered Systems

Cryptosporidium Concentration (oocysts/L)	Required Cryptosporidium Inactivation
≤ 0.01	2-log
> 0.01	3-log

Filter Backwash Recycling Rule (FBRR)

The Filter Backwash Recycling Rule was developed to improve public health protection by assessing and changing, where needed, recycle practices for improved contaminant control, particularly microbial contaminants.

The FBRR applies to PWSs that use surface water or GUDISW; practice conventional or direct filtration; and recycle spent filter backwash, thickener supernatant, or liquids from dewatering processes. The FBRR requires systems that recycle to return specific recycle flows through all processes of the system's existing conventional or direct filtration system or at an alternate location approved by the State. This is typically to a backwash lagoon or sewer lagoon.

The Ground Water Rule (GWR)

The EPA published the Ground Water Rule in November 2006 to improve your drinking water quality and provide increased protection against microbial pathogens, while minimizing public health risks of disinfectants and disinfection byproducts (DBPs). The GWR builds upon the Total Coliform Rule by addressing the health risks of fecal contamination. The rule establishes a risk-based approach to target ground water systems that are vulnerable to fecal contamination. Ground water systems that are identified as being at risk of fecal contamination must take corrective action to reduce potential illness from exposure to microbial pathogens. The rule applies to all systems that use ground water as a source of drinking water. The rule includes provisions for monitoring for systems with sources at risk and actions to remove or inactivate contaminants, if found, to prevent them from reaching drinking water consumers.

Important Elements of This Rule

The rule addresses risks through a risk-targeting approach that relies on four major components:

1. Periodic sanitary surveys of ground water systems that require the evaluation of eight critical elements and the identification of significant deficiencies (for example, a well located near a leaking septic system). States must complete the initial survey by December 31, 2012, for most community water systems (CWSs) and by December 31, 2014, for CWSs with outstanding performance and for all non-community water systems.

2. Source water monitoring to test for the presence of E. coli, enterococci, or coliphage in the sample. There are two monitoring provisions:

    - Triggered monitoring for systems that do not already provide treatment that achieves at least 99.99 percent (4-log) inactivation or removal of viruses and that have a total coliform-positive routine sample under Total Coliform Rule sampling in the distribution system.

    - Assessment monitoring – As a complement to triggered monitoring, a state has the option to require systems, at any time, to conduct source water assessment monitoring to help identify high-risk systems.

3. Corrective actions required for any system with a significant deficiency or source water fecal contamination. The system must implement one or more of the following correction action options:
    - Correct all significant deficiencies.

- Eliminate the source of contamination.
- Provide an alternate source of water.
- Provide treatment that reliably achieves 99.99 percent (4-log) inactivation or removal of viruses.

4. Compliance monitoring to ensure that treatment technology installed to treat drinking water reliably achieves at least 99.99 percent (4-log) inactivation or removal of viruses.

GWR Compliance Dates

The GWR is scheduled for implementation over several years. Most of the GWR requirements take effect December 1, 2009, and states have two years from promulgation and up to two years under and extension to adopt the rule. The compliance date for triggered monitoring (and associated corrective actions) and compliance monitoring is December 1, 2009. There are no timeframes associated with the assessment monitoring because it is at the option of the State. States must complete their initial round of sanitary surveys by December 31, 2012, for most community water systems. States will have until December 31, 2014, to complete the initial sanitary survey for community water systems identified by the State as outstanding performers and non-community water systems.

Please consult the ADEC or EPA for how the GWR may impact you. The role of sanitary surveys is greatly emphasized in this rule; expect increased scrutiny of the condition of your system, records, and performance. The sanitary conditions of your system and type of water source will be relevant to the impact of this rule.

Current Regulations To Control Chemical Contaminants

The following major rules are intended to control this risk:

- Arsenic Rule
- Lead and Copper Rule (LCR)
- Stage 1 Disinfectants/Disinfection By-products Rule (Stage 1 D/DBPR)
- Stage 2 Disinfectants/Disinfection By-products Rule (Stage 2 D/DBPR)
- Radionuclides
- Radon Rule

The Arsenic Rule

Arsenic is a semi-metal element in the periodic table. It is odorless and tasteless. It enters drinking water supplies from natural deposits in the earth or from agricultural and industrial practices. Arsenic has been linked to cancer of the bladder, lungs, skin, kidney, nasal passages, liver, and prostate. Non-cancer effects can include thickening and discoloration of the skin, stomach pain, nausea, vomiting, diarrhea, numbness in hands and feet, partial paralysis, and blindness.

Important Elements of This Rule

The EPA has set the arsenic standard for drinking water at 0.010 parts per million (10 parts per billion) to protect consumers served by public water systems from the effects of long-term, chronic exposure to arsenic.

The PWS must sample for arsenic to record current values and have a sufficient number of sample results on hand to understand the systems compliance with the new arsenic MCL of 10 parts per billion. After sufficient samples are on record, the PWS sampling interval for arsenic is placed into the Standardized Monitoring Framework. Surface water and groundwater systems have different sampling timelines.

Monitoring Requirements for Total Arsenic (1)	
Compliance Determination (IOCs, VOCs, and SOCs)	
1. Calculate compliance based on a running annual average at each sampling point. 2. Systems will not be in violation until one year of quarterly samples have been collected (unless fewer samples would cause the running annual average to be exceeded). 3. If a system does not collect all required samples, compliance will be based on the running annual average of the samples collected.	
Initial Monitoring	
One sample after the effective date of the MCL (January 23, 2006). Surface water systems must take annual samples. Ground water systems must take one sample between 2005 and 2007.	
Reduced Monitoring	
If the initial monitoring result for arsenic is less than the MCL . . .	• Ground water systems must collect one sample every three years. • Surface water systems must collect annual samples.
Increased Monitoring	
A system with a sampling point result above the MCL must collect quarterly samples at that sampling point, until the system is reliably and consistently below the MCL.	
(1) All samples must be collected at each entry point to the distribution system, unless otherwise specified by the State	

Standardized Monitoring Framework for Inorganic, VOCs, SOC, Arsenic

EPA literature is the primary source for details on this rule. This rule applies to all regulated PWS. It addresses sampling for inorganic contaminants, VOCs, synthetic organics (pesticides), radionuclide's, nitrate, nitrite, asbestos. It describes required sample history and reduced monitoring provisions for regulated chemicals after sufficient data is recorded. This reduced monitoring schedule can save PWSs a lot of money. This rule, and the availability of waivers for certain chemicals, is reasonable and worthy of operator attention.

The EPA understands that most water sources and treatment plants have consistent (historic) values on record of regulated contaminants. The values for a great number of the regulated contaminants do not change much over time; this condition is acknowledged in this rule. It lays out the sampling criteria for a whole series of regulated contaminants by system size, source type, measured values, etc. It is a very important rule to be familiar with. The ADEC and the PWS should be using this rule as appropriate to minimize unnecessary sampling and concentrating available resources on contaminants of real concern.

The Lead and Copper Rule (LCR)

The Lead and Copper Rule was published in June 1991 to protect public health by minimizing lead and copper levels in drinking water. The health effects of lead are most severe for infants and children. For infants and children, exposure to high levels of lead in drinking water can result in delays in physical or mental development. For adults, it can result in kidney problems or high blood pressure.

Most regulations require sampling at entry points to the distribution system. Because lead and copper in drinking water is due primarily to the corrosion of distribution and household plumbing materials, tap water samples are collected at kitchen or bathroom taps of residences and other buildings. This requirement significantly complicates sample collection, requiring you, the water system operator, to coordinate with the people you serve.

Tap monitoring results are the primary factor for determining your ongoing monitoring requirements and whether you need to undertake any of the following treatment technique requirements:

- Corrosion control treatment
- Source water treatment
- Public education
- Lead service line replacement

Important Elements of This Rule

Lead and copper tap monitoring applies to all CWSs and NTNCWSs. The regulations divide these systems into three broad size categories: large, medium, and small. System size is a factor in determining the number of samples that must be collected, as well as the applicability and timing of some of the provisions.

There is no MCL for lead or copper. The LCR establishes an action level (AL) of 0.015 mg/L for Lead (Pb) and 1.3 mg/L for Copper (Cu) based on 90th percentile level of tap water samples. An AL exceedance is not a violation but can trigger other requirements that include water quality parameter (WQP) monitoring, corrosion control treatment, source water monitoring/treatment, public education, and lead service line replacement.

Lead and Copper Rule

Tap Sampling Requirements

- First draw samples must be collected by all CWSs and NTNCWSs at cold water taps in homes/buildings that are at high risk of Pb/Cu contamination as identified in 40 CFR 141.86(a).
- Number of sample sites is based on system size (Table 1).
- Systems must conduct monitoring every six months unless they qualify for reduced monitoring (Table 2).

Table 1: Pb and Cu Tap and WQP Tap Monitoring

Size Category	System Size	# of Pb/Cu Tap Sample Sites		# of WQP Tap Sampling Sites	
		Standard	Reduced	Standard	Reduced
Large	> 100K	100	50	25	10
	50,001 – 100K	60	30	10	7
Medium	10,001 – 50K	60	30	10	7
	3,301 – 10K	40	20	3	3
Small	501 – 3,300	20	10	2	2
	101 – 500	10	5	1	1
	≤ 100	5	5	1	1

Table 2: Criteria for Reduced Pb/Cu Tap Monitoring*

Can Monitor. ...	If the System ...
Annually	1. Serves ≤ 50,000 and is ≤ both ALs for 2 consecutive six-month monitoring periods; or 2. Meets Optimal Water Quality parameter (OWQP) specification for 2 consecutive 6-month monitoring periods.
Triennially	1. Serves ≤ 50,000 and is ≤ both ALs for 3 consecutive years of monitoring, or 2. Meets OWQP specifications for 3 consecutive years of monitoring; or 3. Has 90th percentile Pb levels ≤ 0.005 mg/L and 90th percentile Cu level ≤ 0.65 mg/L for 2 consecutive 6-month periods (accelerated reduced Pb/Cu tap monitoring), or 4. Meets the 40 CFR 141.81(b)(3) criteria.
Once Every 9 Years	Serves ≤ 3,300 and meets monitoring waiver criteria found at 40 CFR 141.86(g).

* Samples are collected at reduced number of sites. (See Table 1 above.)

Treatment Technique and Sampling Requirements if AL is Exceeded

5. Water Quality Parameter (WQP) Monitoring
6. Public Education (PE)
7. Source Water Monitoring and Treatment
8. Source Water Monitoring and Treatment

If the system continues to exceed the AL after installing CCT and/or SOWT...

9. Lead Service Line (LSL) Monitoring
10. Lead Service Line Replacement

The Stage 1 Disinfectants and Disinfection Byproducts Rule (Stage 1 DBPR)

The Stage 1 Disinfectants and Disinfection Byproducts Rule, published in December 1998, reduces exposure to disinfection byproducts for customers of CWSs and NT-NCWSs that add a disinfectant to the drinking water during any part of the treatment process and TNCWSs that use chlorine dioxide.

Important Elements of This Rule

The Stage 1 DBPR was the first of a staged set of rules that reduced the allowable levels of DBPs in drinking water. The rule established seven new standards and a treatment technique of enhanced coagulation or enhanced softening to further reduce DBP exposure. The rule establishes maximum residual disinfectant level goals (MRDLGs) and maximum residual disinfectant levels (MRDLs) for three chemical disinfectants: chlorine, chloramines, and chlorine dioxide. It also establishes MCLGs and MCLs for total trihalomethanes, haloacetic acids, chlorite, and bromate.

Stage 1 Disinfectants and Disinfection Byproducts Rule

Stage 1 Regulated Contaminants/Disinfectants

Regulated Contaminants	MCL (mg/L)	MCLG (mg/L)	Regulated Disinfectants	MRDL* (mg/L)	MRDLG* (mg/L)
Total Trihalomethanes (TTHM)	0.080		Chlorine	4.0 as Cl_2	4
Chloroform Bromodichloromethane Dibromochloromethane Bromoform		zero 0.06 zero			
Five Haloacetic Acids (HAA5)	0.060		Chloramines	4.0 as Cl_2	4
Monochloroacetic acid Dichloroacetic acid Trichloroacetic acid Bromoacetic acid Dibromoacetic acid		zero 0.3	Chlorine dioxide	0.8	0.8
Bromate (plants that use ozone)	0.010	zero	*Stage 1 DBPR includes maximum residual disinfectant levels (MRDLs) and maximum residual disinfectant level goals (MRDLGs), which are similar to MCLs and MCLGs, but for disinfectants.		
Chlorite (plants that use chlorine dioxide)	1.0	0.8			

Treatment Technique

Enhanced coagulation/enhanced softening to improve removal of DBP precursors for systems using conventional filtration treatment.

Routine Monitoring Requirements

	Coverage	Monitoring Frequency	Compliance
TTHM/HAA5	Surface and GUDISW serving ≥ 10,000	4/plant/quarter	Running annual average
	Surface and GUDISW serving 500 – 9,999	1/plant/quarter	Running annual average
	Surface and GUDISW serving < 500	1/plant/year in month of warmest water temp **	Running annual average of increased monitoring
	Ground water serving ≥ 10,000	1/plant/quarter	Running annual average
	Ground water serving < 10,000	1/plant/year in month of warmest water temp **	Running annual average of increased monitoring
	Ozone plants	Monthly	Running annual average
Bromate	Ozone plants	Monthly	Running annual average
Chlorite	Chlorine dioxide plants	Daily at entrance to distribution system; monthly in distribution system	Daily/follow-up monitoring
Chlorine dioxide	Chlorine dioxide plants	Daily at entrance to distribution system	Daily/follow-up monitoring
Chlorine/ Chloramines	All systems	Same location and frequency as TCR sampling	Running annual average
DBP Precursors	Conventional filtration	Monthly for total organic carbon and alkalinity	Running annual average

** Systems must increase monitoring to one sample per plant per quarter if an MCL is exceeded.

The Stage 2 Disinfectants and Disinfection Byproducts Rule (Stage 2 DBPR)

The Stage 2 Disinfectants and Disinfection Byproducts Rule, published in December 2005, is an extension of the Stage 1 DBPR. Systems must also continue to comply with the other requirements of the Stage 1 DBPR in addition to meeting the requirements of the Stage 2 DBPR. This includes compliance with the MCLs for bromate (for systems using ozone) and chlorite (for systems using chlorine dioxide), the MRDLs for chlorine or chloramine (depending on the residual disinfectant used), as well as TOC removal requirements.

Important Elements of This Rule

This final rule strengthens public health protection for customers by tightening compliance monitoring requirements for two groups of DBPs: TTHM and HAA5. The rule targets systems with the greatest risk and reduces potential health risks related to DBP exposure and provides more equitable public health protection. The rule also requires some systems to complete and Initial Distribution System Evaluation (IDSE) to characterize DBP levels in their distribution systems and identify locations to monitor DBPs for Stage 2 DBPR compliance. The Stage 2 DBPR is being released simultaneously with the LT2 ESWTR to address concerns about risk trade-offs between pathogens and DBPs.

This rule applies to CWSs and NTNCWSs that add and/or deliver water that is treated with a primary or residual disinfectant other than ultraviolet light. NTNCWSs serving < 10,000 people do not need to complete and of the IDSE options, but must conduct Stage 2 DBPR compliance monitoring.

Stage 2 DBPR Compliance Dates

The EPA or the State should supply the system operator with a compliance schedule. If the system owner or operator did not receive a schedule, they should contact the local ADEC office.

The Stage 2 DBP rule builds incrementally on existing DBP rules. Many systems have already made significant progress in lowering their DBP levels. The Stage 2 DBP rule takes a risk-based targeted approach to require treatment changes by only those public water systems that are identified as having the greatest remaining risk. The first step is a multi-year process for systems to determine where higher levels of DBPs are likely to occur in their distribution system. These locations will become the system's new DBP monitoring sites.

If the DBP levels at these locations are too high (above the MCL), the system will start to take corrective actions. These actions could range from simple, quickly implemented management or operational changes to major construction. Any changes made by systems must be well studied and planned before execution. This planning, obtaining funding and permits for construction, designing, and finally constructing new facilities take time. The time to completion will vary depending on what they need to do. Depending on system size and the extent of needed construction, systems will begin the first year of compliance monitoring between 2012 and 2016 and must be in compliance with the Stage 2 DBP rule MCLs at the end of a full year of monitoring.

Stage 2 Disinfectants and Disinfection Byproducts Rule		
Stage 2 Regulated Contaminants		
Regulated Contaminants	**MCLG (mg/L)**	**MCL (mg/L)**
Total Trihalomethanes (TTHM)		0.080 LRAA
Chloroform Bromodichloromethane Dibromochloromethane Bromoform	0.07 zero 0.06 zero	
Five Haloacetic Acids (HAA5)		0.060 LRAA
Monochloroacetic acid Dichloroacetic acid Trichloroacetic acid Bromoacetic acid Dibromoacetic acid	0.07 zero 0.02	
IDSE Requirements**		
IDSE Option	**Description**	
Standard Monitoring	Standard monitoring is one year of increased monitoring for TTHM and HAA5 in addition to the date being collected under Stage 1 DBPR. These data will be used with Stage 1 DBPR data to select Stage 2 DBPR TTHM and HAA5 compliance monitoring locations. Any system may conduct standard monitoring to meet the IDSE requirements of the Stage 2 DBPR.	
System Specific Study (SSS)	Systems that have extensive TTHM and HAA5 data (including Stage 1 DBPR compliance data) or technical expertise to prepare a hydraulic model may choose to conduct a system specific study to select Stage 2 DBPR compliance monitoring locations.	
40-30 Certification+	The term "40/30" refers to a system that during a specific time period has all individual State 1 DBPR compliance samples less than or equal to 0.040 mg/L for TTHM and 0.030 mg/L for HAA5 and has no monitoring violations during the same time period. These systems have no IDSE monitoring requirements, but will still need to conduct Stage 2 DBPR compliance monitoring.	
Very Small System (VSS) Waiver+	Systems that serve fewer than 500 people and have eligible TTHM and HAA5 data can qualify for a VSS Waiver and would not be required to conduct IDSE monitoring. These systems have no IDSE monitoring requirements, but will still need to conduct Stage 2 DBPR compliance monitoring.	
** NTNCWSs serving < 10,000 people do not need to complete any of the IDSE options. + Systems that are notified by the EPA or the State that their VSS Waiver or 40/30 certification has not been approved will need to complete Standard Monitoring or SSS.		

Stage 2 Disinfectants and Disinfection Byproducts Rule			
Compliance with Stage 2 DBPR MCLs (Routine Monitoring)			
Source Water Type	**Population Size Category**	**Monitoring Frequency[1]**	**Total Distribution System Monitoring Locations Per Monitoring Period [2]**
Subpart H	< 500	per year	2
	500 – 3,300	per quarter	2
	3,301 – 9,999	per quarter	2
	10,000 – 49,999		4
	50,000 – 249,999		8
	250,000 – 999,999		12
	1,000,000 – 4,999,999		16
	≥ 5,000,000		20
Ground Water	< 500	per year	2
	500 – 9,999		2
	10,000 – 99,999	per quarter	4
	100,000 – 499,999		6
	≥ 5,000,000		8
Operational Evaluation			
System must begin complying with the operational evaluation provisions of the Stage 2 DBPR.			

[1] All systems must monitor during month of highest DBP concentrations.
[2] Systems on a quarterly monitoring must take dual sample sets every 90 days at each monitoring location, except for subpart H systems serving 500–3,300. Systems on annual monitoring and subpart H systems serving 500 – 3,300 are required to take individual TTHM and HAA5 samples (instead of a dual sample set) at the locations with the highest TTHM and HAA5 concentrations, respectively. If monitoring annually, only one location with a dual sample set per monitoring period is needed if highest TTHM and HAA5 concentrations occur at the same location and month.

Other Regulations

Variances and Exemptions Rule

States or the EPA may grant variances to allow public PWSs to use less costly technology. Exemptions can allow public water systems more time to comply with a new regulation. Variances under the SDWA allow a public water system to deviate from the maximum contaminant level of a national primary drinking water regulation (NPDWR) under certain conditions when exceptionally poor source water conditions prevent compliance with that NPDWR. *Exemptions* under the SDWA allow a PWS extra time to comply with a new NPDWR. When operating under variances or exemptions, water systems must still provide drinking water that protects public health.

There are two types of variances:

1. General variances are intended for systems that are not able to comply with a NPDWR due to their source water quality. General variances require compliance as expeditiously as practicable and in accordance with a compliance schedule determined by the State.
2. Small system variances are intended for systems serving 3,300 persons or fewer that cannot afford to comply with a NPDWR (but may be allowed for

systems serving up to 10,000 persons). Small system variances require compliance within three years (with a possible two-year extension period).

Systems with exemptions must achieve compliance as expeditiously as practicable and in accordance with the schedule determined by the State. In addition:

- Initial exemptions cannot exceed two years.
- Systems serving < 3,301 persons may be eligible for one or more additional two-year extension periods (not to exceed six years).

Excluded Contaminants

- General variances may generally not be granted for the maximum contaminant level (MCL) for total coliforms or any of the treatment technique (TT) requirements of Subpart H of 40 CFR 141.
- Small system variances may not be granted for NPDWRs promulgated prior to 1986 or MCLs, indicators, and TTs for microbial contaminants.
- Exemptions from the MCL for total coliforms may generally not be granted.

Exclusions

- Systems that have received a small system variance are not eligible for an exemption.
- Small system variances may not be granted for NPDWRs that do not list a small system variance technology (SSVT).
- Systems that have received an exemption are generally not eligible for a variance.

Water system owners and operators should familiarize themselves with the Variances and Exemptions Rule. There are many rule-related activities and responsibilities associated with this rule.

Public Notification Rule

Public notification is intended to ensure that consumers will always know if there is a problem with their drinking water. These notices immediately alert consumers if there is a serious problem with their drinking water that may pose a risk to public health. They also notify customers if their water does not meet drinking water standards, if the water system fails to test its water, or if the system has been granted a variance (use of less costly technology) or an exemption (more time to comply with a new regulation).

The Public Notification Rule (PNR), as revised in 2000, applies to all PWS and requires faster notice in emergencies and fewer notices overall. The notices provide better communication of potential health risks from drinking water violations and how to avoid such risks. Water systems are able to better target notices to the seriousness of the risk and make the existing notification process less burdensome for water suppliers and make notices easier for consumers to read.

Notices must be sent within 24 hours, 30 days, or one year, depending on the tier to which the violation is assigned. The clock for notification starts when the PWS learns of the violation. Notices must be provided to persons served, not just billing customers.

The Public Notification Rule
Tier 1 Public Notice – Required Within 24 Hours
• Fecal coliform maximum contaminant level (MCL) violation or failure to test for fecal contamination after total coliform test is positive • Nitrate/nitrite/or total nitrate and nitrite MCL violation or failure to take confirmation sample • Chlorine dioxide maximum residual distribution level (MRDL) violation in distribution system or failure to take repeat samples in distribution system • Exceedance of maximum allowable turbidity level resulting in an MCL or treatment technique (TT) violation, when the State or EPA determines a Tier 1 notice is warranted • Special public notice for non-community water systems with nitrate exceedances between 10 mg/L and 20 mg/L, when allowed to exceed MCL (10 mg/L) by the State • Waterborne disease outbreak or other waterborne emergency • Other situations as determined by the primacy agency
Tier 2 Public Notice – Required Within 30 Days (Unless extended to 90 days by State)
• All other MCL, MRDL, and TT violations not identified as a Tier 1 notice • Monitoring and testing procedure violations, when the primacy agency requires a Tier 2 (rather than Tier 3) notice • Failure to comply with variance and exemption (V&E) conditions
Tier 3 Public Notice – Required Within 30 Days (Unless extended to 90 days by State)
• All other monitoring or testing procedure violations not already requiring a Tier 1 or Tier 2 notice • Operation under a V&E • Special public notices (exceedance of the fluoride secondary maximum contaminant level (SMCL); announcing the availability of unregulated contaminant monitoring results)
Contents of a Notice
Unless otherwise specified in the regulations,* each notice must contain: 1. A description of the violation or situation, including contaminant levels, if applicable 2. When the violation or situation occurred 3. Any potential adverse health effects (Using standard health effects language from Appendix B of the public notification rule or the standard monitoring language. See below.) 4. The population at risk 5. Whether alternative water supplies should be used 6. What actions consumers should take 7. What the system is doing to correct the violation or situation 8. When the water system expects to return to compliance or resolve the situation 9. The name, business address, and phone number of the water system owner or operator 10. A statement (see below) encouraging distribution of the notice to others, where applicable
* These elements do not apply to notices for fluoride SMCL exceedances, availability of unregulated contaminant monitoring data, and operation under a variance or exemption. Content requirements for these notices are specified in the rule. **Standard Monitoring Language** – We are required to monitor your drinking water for specific contaminants on a regular basis. Results of regular monitoring are an indicator of whether or not our drinking water meets health standards. During [period] we [did not monitor or test/did not complete all monitoring or testing] for [contaminant(s)] and therefore cannot be sure of the quality of the drinking water during that time. **Standard Distribution Language** – Please share this information with all the people who drink this water, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools, and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail.

PNR Reporting and Record-keeping

- PWSs have 10 days to send a certification of compliance and a copy of the completed notice to the primacy agency.
- PWS and primacy agency must keep notices on file for three years.
- Primacy agencies must report public notification violations to the EPA on a quarterly basis.

The Consumer Confidence Report (CCR) Rule

The Consumer Confidence Report Rule requires all CWSs to prepare and distribute a brief annual water quality report summarizing information regarding water sources used, any detected contaminants, compliance, and educational information. The reports are due to customers by July 1 of each year for water quality data in the previous calendar year.

There are well-established templates to use for completing your CCR. This information is available by contacting your local ADEC office.

Summary

The drinking water regulations and monitoring requirements are subject to frequent changes in response to new federal requirements. It is important for the operator to establish contact with the ADEC drinking water specialist assigned to their PWS in order to remain up-to-date with new regulations and monitoring requirements. The ADEC drinking water specialist can provide the most current information and provide you with a monitoring summary of the water system you are working on/with.

Remember, it is your responsibility as the treatment plant operator to know what the regulations are and be in compliance with those regulations. Your customer's health depends on it. There are numerous resources available to you regarding drinking water regulations. If you have access to the Internet:

- http://www.epa.gov
- http://www.dec.state.ak.us/eh/dw/index.htm

If you do not have access to the Internet, contact your local ADEC office or the EPA's Safe Drinking Water Hotline at 1-800-426-4791.

Regulations and Monitoring Quiz

1. The most important responsibility of a water operator is to provide:
   A. Adequate water pressure
   B. Palatable drinking water
   C. Adequate amounts of water
   D. Safe drinking water

2. What information does a "public notification" supply?
   A. Notifies water consumers of a positive BacT sample
   B. Notifies water consumers of additional charges for water
   C. Notifies water consumers that water will be turned off for maintenance
   D. Notifies water consumers that the water tests were acceptable

3. What is the purpose of the bacteriological site sampling plan?
   A. To have a map showing where BacT samples are drawn
   B. In case of a positive Bac T sample, the operator will know where to take the four repeat samples
   C. The state will know where you are taking your repeat samples
   D. All of the above

4. To ensure that the water supplied by a public water system meets state requirements, the water system operator must regularly collect samples and:
   A. Have water analyzed at an approved water testing laboratory
   B. Determine a sampling schedule based on state requirements
   C. Send all analyses results to the state
   D. All of the above

5. Samples taken for routine bacteriological testing should be preserved by:
   A. Freezing
   B. Boiling
   C. DPD preservative
   D. Refrigeration

6. How many coliform samples are required per month for a water system serving a population between 25 and 100?
   A. 1
   B. 2
   C. 3
   D. 4

7. Before taking a bacteriological (BacT) water sample from a faucet, you should:
   A. Wash hands thoroughly
   B. Remove the faucet aerator
   C. Flush water until you're sure water is from the main, not the service line
   D. All of the above

8. Monthly BacT samples should be taken from:
   A. The well pump house
   B. The distribution system
   C. The treatment plant
   D. An outside hose spigot

9. If your Bac T sample test is positive, how long do you have to collect four repeat samples and deliver them to the lab?
   A. 12 hours
   B. 24 hours
   C. 48 hours
   D. 72 hours

10. A positive total coliform test indicates that:
   A. Disease-causing organisms may be present in the water supply
   B. The water is safe to consume
   C. The water supply has high iron levels
   D. There is nothing to be concerned about

11. Which two types of analysis must be done on all public water supplies?
   A. Bacteriological and chemical
   B. Chlorine residual and trihalomethanes
   C. Bacteriological and hardness
   D. Chemical and turbidity

12. A major source of error when obtaining water quality information is improper:
   A. Sampling
   B. Preservation
   C. Tests of samples
   D. Reporting of data

13. What is commonly used as an indicator of potential contamination in drinking water samples?
   A. Viruses
   B. Coliform bacteria
   C. Intestinal parasites
   D. Pathogenic organisms

14. If you have questions about when or where you need to take water samples, what organization should you contact?
   A. United States Environmental Protection Agency
   B. Alaska Department of Environmental Conservation
   C. State Department of Health
   D. Safe Drinking Water Act Agency

15. A sample siting plan describes:
    A. Where the well(s) are located
    B. Where coliform samples are to be taken
    C. Where future improvements will take place
    D. None of the above