

C3. CHAPTER 3

DRINKING WATER

C3.1. Scope

This Chapter contains criteria for providing potable water.

C3.2. Definitions

- C3.2.1. Action Level. The concentration of a substance in water that establishes appropriate treatment for a water system.
- C3.2.2. Appropriate DoD Medical Authority. The medical professional designated by the in-theater component commander to be responsible for resolving medical issues necessary to provide safe drinking water at the component's installations.
- C3.2.3. Community Water System (CWS). A public water system having at least 15 service connections used by year-round residents or which regularly serves at least 25 year-round residents.
- C3.2.4. Concentration/Time (CT). The product of residual disinfectant concentration, C, in mg/L determined before or at the first customer, and the corresponding disinfectant contact time, T, in minutes. CT values appear in Tables C3.T11. through C3.T24.
- C3.2.5. Conventional Treatment. Water treatment including chemical coagulation, flocculation, sedimentation, and filtration.
- C3.2.6. Diatomaceous Earth Filtration. A water treatment process of passing water through a precoat of diatomaceous earth deposited on a support membrane while additional diatomaceous earth is continuously added to the feed water to maintain the permeability of the precoat, resulting in substantial particulate removal from the water.
- C3.2.7. Direct Filtration. Water treatment including chemical coagulation, possibly flocculation, and filtration, but not sedimentation.
- C3.2.8. Disinfectant. Any oxidant, including but not limited to, chlorine, chlorine dioxide, chloramines, and ozone, intended to kill or inactivate pathogenic microorganisms in water.
- C3.2.9. DoD Water System. A public water system or non-public water system.

- C3.2.10. Emergency Assessment. An evaluation of the susceptibility of the water source, treatment, storage and distribution system(s) to disruption of service from natural disasters, accidents, and sabotage.
- C3.2.11. First Draw Sample. A one-liter sample of tap water that has been standing in plumbing at least six hours and is collected without flushing the tap.
- C3.2.12. Groundwater Under the Direct Influence of Surface Water (GWUDISW). Any water below the surface of the ground with significant occurrence of insects or other microorganisms, algae, or large diameter pathogens such as *Giardia lamblia*; or significant and relatively rapid shifts in water characteristics, such as turbidity, temperature, conductivity, or pH, which closely correlate to climatological or surface water conditions.
- C3.2.13. Lead-free. A maximum lead content of 0.2% for solder and flux, and 8.0% for pipes and fittings.
- C3.2.14. Lead Service Line. A service line made of lead that connects the water main to the building inlet, and any lead pigtail, gooseneck, or other fitting that is connected to such line.
- C3.2.15. Maximum Contaminant Level (MCL). The maximum permissible level of a contaminant in water that is delivered to the free-flowing outlet of the ultimate user of a public water system except for turbidity for which the maximum permissible level is measured after filtration. Contaminants added to the water under circumstances controlled by the user, except those resulting from the corrosion of piping and plumbing caused by water quality, are excluded.
- C3.2.16. Non-Public Water System (NPWS). A system that does not meet the definition of a public water system; for example, a well serving a building with less than 25 people.
- C3.2.17. Point-of-Entry (POE) Treatment Device. A treatment device applied to the drinking water entering a facility to reduce contaminants in drinking water throughout the facility.
- C3.2.18. Point-of-Use (POU) Treatment Device. A treatment device applied to a tap to reduce contaminants in drinking water at that tap.
- C3.2.19. Potable Water. Water that has been examined and treated to meet the standards in this Chapter, and has been approved as potable by the appropriate DoD medical authority.

- C3.2.20. Public Water System (PWS). A system for providing piped water to the public for human consumption, if such system has at least 15 service connections or regularly serves at least 25 year round residents. This term includes both "community water systems" that serve year-round residents and "non-community systems" along with any collection, treatment, storage, and distribution facilities under control of the operator of such systems, and any collection or pretreatment storage facilities not under such control that are used primarily in connection with such systems. A non-community system is used by intermittent users or travelers and is sub-classified into a non-transient, non-community or NTNC system and a transient, non-community or TNC system. A NTNC system could be a school or factory with its own water supply where the same people drink the water throughout the year, but not 24-hours a day. A TNC system example is a motel with its own well.
- C3.2.21. Sanitary Survey. An on-site review of the water source, facilities, equipment, operation and maintenance of a public water system to evaluate the adequacy of such elements for producing and distributing potable water.
- C3.2.22. Slow Sand Filtration. Water treatment process where raw water passes through a bed of sand at a low velocity (1.2 ft/hr), resulting in particulate removal by physical and biological mechanisms.
- C3.2.23. Total Trihalomethanes. The sum of the concentration in mg/L of chloroform, bromoform, dibromochloromethane, and bromodichloromethane.
- C3.2.24. Underground Injection. A subsurface emplacement through a bored, drilled, driven or dug well where the depth is greater than the largest surface dimension, whenever a principle function of the well is the emplacement of any fluid.
- C3.2.25. Vulnerability Assessment. An evaluation by DoD that shows contaminants of concern either have not been used in a watershed area or the source of water for the system is not susceptible to contamination. Susceptibility is based on prior occurrence, vulnerability assessment results, environmental persistence and transport of the contaminants, and any wellhead protection program results.

C3.3. Criteria

- C3.3.1. DoD water systems, regardless of whether they produce or purchase water, will:
- C3.3.1.1. Maintain a map/drawing of the complete potable water system.
 - C3.3.1.2. Update the potable water system master plan at least every 5 years.

- C3.3.1.3. Protect all water supply aquifers (groundwater) and surface water sources from contamination by suitable placement and construction of wells, by suitable placing of the new intake (heading) to all water treatment facilities, by siting and maintenance of septic systems and on-site treatment units, and by appropriate land use management on DoD installations.
- C3.3.1.4. Conduct sanitary surveys of the water system at least every 3 years, for systems using surface water, and every 5 years, for systems using groundwater, or as warranted, including review of required water quality analyses. Off-installation surveys will be coordinated with host nation authorities.
- C3.3.1.5. Provide proper treatment for all water sources. Surface water supplies, including GWUDISW, must conform to the surface water treatment requirements set forth in Table C3.T1. Groundwater supplies, as a minimum, must be disinfected.
- C3.3.1.6. Maintain a continuous positive pressure of at least 20 psi in the water distribution system.
- C3.3.1.7. Perform water distribution system operation and maintenance practices consisting of:
 - C3.3.1.7.1. Maintenance of a disinfectant residual throughout the water distribution system (except where determined unnecessary by the appropriate DoD medical authority),
 - C3.3.1.7.2. Proper procedures for repair and replacement of mains (including disinfection and bacteriological testing),
 - C3.3.1.7.3. An effective annual water main flushing program,
 - C3.3.1.7.4. Proper operation and maintenance of storage tanks and reservoirs, and
 - C3.3.1.7.5. Maintenance of distribution system appurtenances (including hydrants and valves).
- C3.3.1.8. Establish an effective cross connection control and backflow prevention program.

C3.3.1.9. Manage underground injection on DoD installations to protect underground water supply sources. At a minimum, conduct monitoring to determine the effects of any underground injection wells on nearby groundwater supplies.

C3.3.1.10. Develop and update as necessary an emergency contingency plan to ensure the provision of potable water despite interruptions from natural disasters and service interruptions. At a minimum, the plan will include:

C3.3.1.10.1. Identification of key personnel;

C3.3.1.10.2. Procedures to restore service;

C3.3.1.10.3. Procedures to isolate damaged lines;

C3.3.1.10.4. Identification of alternative water supplies;

C3.3.1.10.5. Installation public notification procedures; and

C3.3.1.10.6. Emergency assessment.

C3.3.1.11. Use only lead-free pipe, solder, flux, and fittings in the installation or repair of water systems and plumbing systems for drinking water. Provide installation public notification concerning the lead content of materials used in distribution or plumbing systems, or the corrosivity of water that has caused leaching, which indicates a potential health threat if exposed to leaded water, and remedial actions which may be taken.

C3.3.1.12. Maintain records showing monthly operating reports for at least 3 years, and records of bacteriological results for not less than 5 years, and chemical results for not less than 10 years.

C3.3.1.13. Document corrective actions taken to correct breaches of criteria and maintain such records for at least three years. Cross connection and backflow prevention testing and repair records should be kept for at least 10 years.

C3.3.1.14. Conduct vulnerability assessments.

C3.3.2. DoD water systems, regardless of whether they produce or purchase water, will, by independent testing or by validated supplier testing, ensure conformance with the following:

C3.3.2.1. Total Coliform Bacteria Requirements.

- C3.3.2.1.1. An installation responsible for a PWS will conduct a bacteriological monitoring program to ensure the safety of water provided for human consumption and allow evaluation with the total coliform-related MCL. The MCL is based only on the presence or absence of total coliforms. The MCL is no more than 5% positive samples per month for a system examining 40 or more samples a month, and no more than one positive sample per month when a system analyzes less than 40 samples per month. Further, the MCL is exceeded whenever a routine sample is positive for fecal coliforms or *E. coli* or any repeat sample is positive for total coliforms.
- C3.3.2.1.2. Each system must develop a written, site-specific monitoring plan and collect routine samples according to Table C3.T2., "Total Coliform Monitoring Frequency."
- C3.3.2.1.3. Systems with initial samples testing positive for total coliforms will collect repeat samples as soon as possible, preferably the same day. Repeat sample locations are required at the same tap as the original sample plus an upstream and a downstream sample, each within five service connections of the original tap. Any additional repeat sampling which may be required will be performed according to the appropriate DoD medical authority. Monitoring will continue until total coliforms are no longer detected.
- C3.3.2.1.4. When any routine or repeat sample tests positive for total coliforms, it will be tested for fecal coliform or *E. coli*. Fecal-type testing can be foregone on a total coliform positive sample if fecal or *E. coli* is assumed to be present.
- C3.3.2.1.5. If a system has exceeded the MCL for total coliforms, the installation will complete the notification in subsection C3.3.3. to:
 - C3.3.2.1.5.1. The appropriate DoD medical authority, as soon as possible, but in no case later than the end of the same day the command responsible for operating the PWS is notified of the result.

C3.3.2.1.5.2. The installation public as soon as possible, but not later than 72 hours after the system is notified of the test result that an acute risk to public health may exist.

C3.3.2.2. Inorganic Chemical Requirements.

C3.3.2.2.1. An installation responsible for a PWS will ensure that the water distributed to end-users does not exceed applicable limitations set out in Table C3.T3. Except for Nitrate, Nitrite, and Total Nitrate/Nitrite, for systems monitored quarterly or more frequently, a system is out of compliance if the annual running average concentration of an inorganic chemical exceeds the MCL. For systems monitored annually or less frequently, a system is out of compliance if a single sample exceeds the MCL. For Nitrate, Nitrite, and Total Nitrate/Nitrite, system compliance is determined by averaging the single sample that exceeds the MCL with its confirmation sample; if this average exceeds the MCL, the system is out of compliance.

C3.3.2.2.2. Systems will be monitored for inorganic chemicals at the frequency set in Table C3.T4., "Inorganics Monitoring Requirements."

C3.3.2.2.3. If a system is out of compliance, the installation will complete the notification in subsection C3.3.3. as soon as possible. If the Nitrate, Nitrite, or Total Nitrate and Nitrite MCLs are exceeded, then this is considered an acute health risk and the installation will complete the notification to:

C3.3.2.2.3.1. The appropriate DoD medical authority as soon as possible, but in no case later than the end of the same day the command responsible for operating the PWS is notified of the result.

C3.3.2.2.3.2. The installation public as soon as possible, but not later than 72 hours after the system is notified of the test result. If the installation is only monitoring annually on the basis of direction from the appropriate DoD medical authority, it will immediately increase monitoring in accordance with Table C3.T4., "Inorganics Monitoring Requirements," until authorities determine the system is reliable and consistent and remedial actions completed.

C3.3.2.2.4. The MCL for Arsenic applies only to Community Water Systems (CWS).

C3.3.2.3. Fluoride Requirements.

C3.3.2.3.1. An installation commander responsible for a PWS will ensure that the fluoride content of drinking water does not exceed the MCL of 4 mg/L stated in Table C3.T3., "Inorganic Chemical MCLs."

C3.3.2.3.2. Systems will be monitored for fluoride by collecting one treated water sample at the entry point to the distribution system annually for surface water systems and one every three years for groundwater systems. Daily monitoring is recommended for systems practicing fluoridation using the criteria in Table C3.T5., "Recommended Fluoride Concentrations at Different Temperatures."

C3.3.2.3.3. If any sample exceeds the MCL, the installation will complete the notification in subsection C3.3.3. as soon as possible, but in no case later than 14 days after the violation.

C3.3.2.4. Lead and Copper Requirements.

- C3.3.2.4.1. DoD CWS and NTNC water systems will comply with action levels (distinguished from the MCL) of 0.015 mg/L for lead and 1.3 mg/L for copper to determine if corrosion control treatment, public education, and removal of lead service lines, if appropriate, are required. Actions are triggered if the respective lead and copper levels are exceeded in more than 10% of all sampled taps.
- C3.3.2.4.2. Affected DoD systems will conduct monitoring in accordance with Table C3.T6., "Monitoring Requirements for Lead and Copper Water Quality Parameters." High risk sampling sites will be targeted by conducting a materials evaluation of the distribution system. Sampling sites will be selected as stated in Table C3.T6.
- C3.3.2.4.3. If an action level is exceeded, the installation will collect additional water quality samples specified in Table C3.T6. Optimal corrosion control treatment will be pursued. If action levels are exceeded after implementation of applicable corrosion control and source water treatment, lead service lines will be replaced if the lead service lines cause the lead action level to be exceeded. The installation commander will implement an education program for installation personnel (including U.S. and host nation) within 60 days and will complete the notification in subsection C3.3.3. as soon as possible, but in no case later than 14 days after the violation.

C3.3.2.5. Synthetic Organics Requirements.

- C3.3.2.5.1. An installation responsible for CWS and NTNC will ensure that synthetic organic chemicals in water distributed to people do not exceed the limitations delineated in Table C3.T7., "Synthetic Organic Chemical MCLs." For systems monitored quarterly or more frequently, a system is out of compliance if the annual running average concentration of an organic chemical exceeds the MCL. For systems monitored annually or less frequently, a system is out of compliance if a single sample exceeds the MCL.
- C3.3.2.5.2. Systems will be monitored for synthetic organic chemicals according to the schedule stated in Table C3.T8., "Synthetic Organic Chemical Monitoring Requirements."

C3.3.2.5.3. If a system is out of compliance, complete the notification in subsection C3.3.3. as soon as possible, but in no case later than 14 days after the violation. The installation immediately will begin quarterly monitoring and will increase quarterly monitoring if the level of any contaminant is at its detection limit but less than its MCL as noted in Table C3.T8., and will continue until the installation commander determines the system is back in compliance, and any necessary remedial measures are implemented.

C3.3.2.6. Total Trihalomethanes Requirements.

C3.3.2.6.1. An installation responsible for a CWS and NTNC systems that adds a disinfectant (oxidant, such as chlorine, chlorine dioxide, chloramines, or ozone) to any part of its treatment process (to include the addition of disinfectant by a local water supplier) will ensure that the MCL of 0.10 mg/L for total trihalomethanes is met in drinking water.

C3.3.2.6.2. Such systems that add a disinfectant will monitor total trihalomethanes in accordance with Table C3.T9., "Total Trihalomethane Monitoring Requirements."

C3.3.2.6.3. If a system is out of compliance, the installation will complete the notification in subsection C3.3.3. as soon as possible, but in no case later than 14 days after the violation, and undertake remedial measures.

C3.3.2.7. Radionuclide Requirements.

C3.3.2.7.1. An installation responsible for a CWS and NTNC systems will test the system for conformance with the applicable radionuclide limits contained in Table C3.T10., "Radionuclide MCLs and Monitoring Requirements."

C3.3.2.7.2. Systems will perform radionuclide monitoring as stated in Table C3.T10.

- C3.3.2.7.3. If the average annual MCL for gross alpha activity, total radium (or gross beta in systems serving over 100,000) is exceeded, the installation will complete the notification according to the procedures in subsection C3.3.3. within 14 days. Monitoring will continue until remedial actions are completed and the average annual concentration no longer exceeds the respective MCL. Continued monitoring for gross alpha-related contamination will occur quarterly, while gross beta-related monitoring will be monthly. If any gross beta MCL is exceeded, the major radioactive components will be identified.
- C3.3.2.8. Surface Water Treatment Requirements. DoD water systems employing surface water sources or GWUDISW will meet the surface water treatment requirements delineated in Table C3.T1.
- C3.3.2.9. Turbidity Requirements. DoD PWS filtered waters will be tested at least once every four hours. If the turbidity readings in Table C3.T1. are exceeded, the installation will complete the notification in subsection C3.3.3. as soon as possible, but in no case later than 14 days after the violation and undertake remedial action.
- C3.3.2.10. Non-Public Water Systems. DoD NPWSs will be monitored as a minimum for total coliforms and disinfectant residuals periodically.
- C3.3.2.11. Alternative Water Supplies. DoD installations will, if necessary, only utilize alternative water sources including POE/POU treatment devices and bottled water supplies, which are approved by the installation commander.
- C3.3.3. Notification Requirements. When a DoD water system is out of compliance as set forth in the preceding criteria, the appropriate DoD medical authority and installation personnel (U.S. and host nation) will be notified. The notice will provide a clear and readily understandable explanation of the violation, any potential adverse health effects, the population at risk, the steps that the system is taking to correct the violation, the necessity for seeking alternative water supply, if any, and any preventive measures the consumer should take until the violation is corrected. The appropriate DoD medical authority will coordinate notification of host authorities in cases where off-installation populations are at risk.
- C3.3.4. System Operator Requirements. DoD installations will ensure that personnel are appropriately trained to operate DoD water systems.

Table C3.T1. Surface Water Treatment Requirements

1. Unfiltered Systems

- a. Systems which use unfiltered surface water or groundwater sources under the direct influence of surface water will analyze the raw water for total coliforms or fecal coliforms at least weekly and for turbidity at least daily for a minimum of one year. If the total coliforms and/or fecal coliforms exceed 100/100 mL and 20/100 mL, respectively, appropriate filtration must be applied. Appropriate filtration must also be applied if turbidity exceeds 1 Nephelometric Turbidity Unit (NTU).
- b. Disinfection must achieve at least 99.9% (3-log) inactivation of *Giardia lamblia* cysts and 99.99% (4-log) inactivation of viruses by meeting applicable CT values, as shown in Tables C3.T11. through C3.T24.
- c. Disinfection systems must have redundant components to ensure uninterrupted disinfection during operational periods.
- d. Disinfectant residual monitoring immediately after disinfection is required once every four hours that the system is in operation. Disinfectant residual measurements in the distribution system will be made weekly.
- e. Disinfectant residual of water entering the distribution system must be maintained at a minimum of 0.2 mg/L.
- f. Water in a distribution system with a heterotrophic bacteria concentration less than or equal to 500/ml measured as heterotrophic plate count is considered to have a detectable disinfectant residual for the purpose of determining compliance with the Surface Water Treatment Requirements.
- g. If disinfectant residuals in the distribution system are undetected in more than 5% of monthly samples for 2 consecutive months, appropriate filtration must be implemented.

2. Filtered Systems

- a. Filtered water systems will provide a combination of disinfection and filtration that achieves a total of 99.9% (3-log) removal of *Giardia lamblia* cysts and 99.99% (4-log) removal of viruses.
- b. The turbidity of filtered water will be monitored at least once every four hours. (USACHPPM/ USAEC). The turbidity of filtered water will not exceed 0.5 NTU (1 NTU for slow sand and diatomaceous earth filters) in 95% of the analyses in a month, with a maximum of 5 NTU.
- c. Disinfection must provide the remaining log-removal of *Giardia lamblia* cysts and viruses not obtained by the filtration technology applied.*

- d. Disinfection residual maintenance and monitoring requirements are the same as those for unfiltered systems.

*Proper conventional treatment typically removes 2.5 log Giardia/ 2.0 log viruses. Proper direct filtration and diatomaceous earth filtration remove 2.0 log Giardia/ 1.0 log viruses. Slow sand filtration removes typically removes 2.0 log Giardia/ 2.0 log viruses. Less log-removal may be assumed if treatment is not properly applied.

Table C3.T2. Total Coliform Monitoring Frequency

Population Served	Number of Samples ¹	Population Served	Number of Samples ¹
25 to 1,000 ²	1	59,001 to 70,000	70
1,001 to 2,500	2	70,001 to 83,000	80
2,501 to 3,300	3	83,001 to 96,000	90
3,301 to 4,100	4	96,001 to 130,000	100
4,101 to 4,900	5	130,001 to 220,000	120
4,901 to 5,800	6	220,001 to 320,000	150
5,801 to 6,700	7	320,001 to 450,000	180
6,701 to 7,600	8	450,001 to 600,000	210
7,601 to 8,500	9	600,001 to 780,000	240
8,501 to 12,900	10	780,001 to 970,000	270
12,901 to 17,200	15	970,001 to 1,230,000	300
17,201 to 21,500	20	1,230,001 to 1,520,000	330
21,501 to 25,000	25	1,520,001 to 1,850,000	360
25,001 to 33,000	30	1,850,001 to 2,270,000	390

33,001 to 41,000	40	2,270,001 to 3,020,000	420
41,001 to 50,000	50	3,020,001 to 3,960,000	450
50,001 to 59,000	60	3,960,001 or more	480

Notes

1. Minimum Number of Routine Samples Per Month
2. A non-community water system using groundwater and serving 1,000 or less people may monitor once in each calendar quarter during which the system provides water provided a sanitary survey conducted within the last 5 years shows the system is supplied solely by a protected groundwater source and free of sanitary defects.

Systems serving less than 4,900 people who use groundwater and collect samples from different sites may collect all samples on a single day. All other systems must collect samples at regular intervals throughout the month.

Table C3.T3. Inorganic Chemical MCLs

Contaminant	MCL	
Arsenic (CWS only)	0.05	mg/L
Antimony ¹	0.006	mg/L
Asbestos ¹	7 million	fibers/L (longer than 10 um)
Barium	2.0	mg/L
Beryllium ¹	0.004	mg/L
Cadmium ¹	0.005	mg/L
Chromium ¹	0.1	mg/L
Cyanide ¹	0.2	mg/L (as free cyanide)
Fluoride ²	4.0	mg/L
Mercury ¹	0.002	mg/L
Nickel ¹	0.1	mg/L
Nitrate ³	10	mg/L (as N)

Nitrite ³	1	mg/L (as N)
Total Nitrite and Nitrate ³	10	mg/L (as N)
Selenium ¹	0.05	mg/L
Sodium ⁴		
Thallium	0.002	mg/L

Notes

1. MCLs apply to CWS and NTNC systems.
2. Fluoride also has a secondary MCL at 2.0 mg/L. MCL applies only to CWS.
3. MCLs apply to CWS, NTNC, and TNC systems.
4. No MCL established. Monitoring is required so concentration levels can be made available on request. Sodium levels shall be reported to the DoD medical authority upon receipt of analysis.

Table C3.T4. Inorganics Monitoring Requirements

Contaminant	Groundwater Baseline Requirement 1	Surface Water Baseline Requirement	Trigger That Increases Monitoring 2	Reduced Monitoring
Arsenic	1 sample / 3 yr	Annual sample	>MCL	---
Antimony	1 sample / 3 yr	Annual sample	>MCL	---
Barium	1 sample / 3 yr	Annual sample	>MCL	---
Beryllium	1 sample / 3 yr	Annual sample	>MCL	---
Cadmium	1 sample / 3 yr	Annual sample	>MCL	---
Chromium	1 sample / 3 yr	Annual sample	>MCL	---
Cyanide	1 sample / 3 yr	Annual sample	>MCL	---

Fluoride	1 sample / 3 yr	Annual sample	>MCL	
Mercury	1 sample / 3 yr	Annual sample	>MCL	---
Nickel	1 sample / 3 yr	Annual sample	>MCL	---
Selenium	1 sample / 3 yr	Annual sample	>MCL	---
Thallium	1 sample / 3 yr	Annual sample	>MCL	---
Sodium	1 sample / 3 yr	Annual sample	---	---
Asbestos	1 sample every 9 years	1 sample every 9 years	>MCL	Yes ³
Total Nitrate/ Nitrite	Annual sample	Quarterly	>50% Nitrite MCL	---
Nitrate	Annual sample ⁴	Quarterly ⁴	>50% MCL ⁵	Yes ⁶
Nitrite	Annual sample ⁴	Quarterly ⁴	>50% MCL ⁵	Yes ⁷
Corrosivity ⁸	Once	Once	---	---

Notes

1. Samples shall be taken as follows: groundwater systems shall take a minimum of one sample at every entry point to the distribution system which is representative of each well after treatment; surface water systems shall take at least one sample at every entry point to the distribution system after any application of treatment or in the distribution system at a point which is representative of each source after the treatment.
2. Increased quarterly monitoring requires a minimum of 2 samples per quarter for groundwater systems and at least 4 samples per quarter for surface water systems.
3. Necessity for analysis is predicated upon a vulnerability assessment conducted by the PWS.
4. Any sampling point with an analytical value greater than or equal to 0.5 mg/L as N, (50% of the Nitrite MCL) must begin sampling for nitrate and nitrite separately. Since nitrite readily converts to nitrate, a system can conclude that if the total nitrate/nitrite value of a sample is less than half of the nitrite MCL, then the value of nitrite in the sample would also be below half of its MCL.

5. Increased quarterly monitoring shall be undertaken for nitrate and nitrate if a sample is >50% of the MCL.
6. The appropriate DoD medical authority may reduce repeat sampling frequency for surface water systems to annually if after 1 year results are <50% of MCL.
7. The appropriate DoD medical authority may reduce repeat sampling frequency to 1 annual sample if results are 50% of MCL.
8. PWSs shall be analyzed within 1 year of the effective date of country specific final governing standards to determine the corrosivity entering the distribution system. Two samples (one mid-winter and one mid-summer) will be collected at the entry point of the distribution system for systems using surface water and GWUDISW. One sample will be collected for systems using only groundwater. Corrosivity characteristics of the water shall include measurements of pH, calcium, hardness, alkalinity, temperature, total dissolved solids, and calculation of the Langelier Index.

Table C3.T5. Recommended Fluoride Concentrations at Different Temperatures

Annual Average of Maximum Daily Air Temperatures (°F)	Control Limits (mg/L)		
	Lower	Optimum	Upper
50.0 - 53.7	0.9	1.2	1.7
53.8 - 58.3	0.8	1.1	1.5
58.4 - 63.8	0.8	1.0	1.3
63.9 - 70.6	0.7	0.9	1.2
70.7 - 79.2	0.7	0.8	1.0
79.3 - 90.5	0.6	0.7	0.8

Table C3.T6. Monitoring Requirements for Lead and Copper Water Quality Parameters

Population Served	No. of Sites for Standard Monitoring ^{1, 2}	No. of Sites for Reduced Monitoring ³	No. of Sites for Water Quality Parameters ⁴
>100,000	100	50	25

10,001 - 100,000	60	30	10
3,301 - 10,000	40	20	3
501 - 3,300	20	10	2
101 - 500	10	5	1
<100	5	5	1

Notes

1. Every 6 months for lead and copper.
2. Sampling sites shall be based on a hierarchical approach. For CWS, priority will be given to single family residences which contain copper pipe with lead solder installed after 1982, contain lead pipes, or are served by lead service lines; then, structures, including multifamily residences, with the foregoing characteristics; and finally, residences and structures with copper pipe with lead solder installed before 1983. For NTNC systems, sampling sites will consist of structures that contain copper pipe with lead solder installed after 1982, contain lead pipes, and/or are served by lead service lines. First draw samples will be collected from a cold water kitchen or bathroom tap; non-residential samples will be taken at an interior tap from which water is typically drawn for consumption.
3. Annually for lead and copper if action levels are met during each of 2 consecutive 6 month monitoring periods. Any small or medium-sized system (<50,000) that meets the lead and copper action levels during three consecutive years may reduce the monitoring for lead and copper from annually to once every three years. Annual or triennial sampling will be conducted during the four warmest months of the year.
4. This monitoring must be conducted by all large systems (>50,000). Small and medium sized systems must monitor water quality parameters when action levels are exceeded. Samples will be representative of water quality throughout the distribution system and include a sample from the entry to the distribution system. Samples will be taken in duplicate for pH, alkalinity, calcium, conductivity or total dissolved solids, and water temperatures to allow a corrosivity determination (via a Langelier saturation index or other appropriate saturation index); additional parameters are orthophosphate when a phosphate inhibitor is used and silica when a silicate inhibitor is used.

Table C3.T7. Synthetic Organic Chemical MCLs

Synthetic Organic Chemical	mg/L	Detection limit, mg/L
Pesticides/PCBs		
Alachlor	0.002	0.0002
Aldicarb	0.003	0.0005
Aldicarb sulfone	0.003	0.0008
Aldicarb sulfoxide	0.004	0.0005
Atrazine	0.003	0.0001
Benzo[a]pyrene	0.0002	
Carbofuran	0.04	0.0009
Chlordane	0.002	0.0002
Dalapon	0.2	
2,4-D	0.07	0.0001
1,2-Dibromo-3-chloropropane (DBCP)	0.0002	0.00002
Di (2-ethylhexyl) adipate	0.4	
Di (2-ethylhexyl) phthalate	0.006	
Dinoseb	0.007	
Diquat	0.02	
Endrin	0.002	0.00002
Endothall	0.1	
Ethylene dibromide (EDB)	0.00005	0.00001
Glyphosphate	0.7	
Heptachlor	0.0004	0.00004
Heptachlorepoxyde	0.0002	0.00002
Hexachlorobenzene	0.001	
Hexachlorocyclopentadiene	0.05	
Lindane	0.0002	0.00002
Methoxychlor	0.04	0.0001
Oxamyl (Vydate)	0.2	
PCBs (as decachlorobiphenyls)	0.0005	0.0001
Pentachlorophenol	0.001	0.00004
Picloram	0.5	

Simazine	0.004	
2,3,7,8-TCDD (Dioxin)	0.00000003	
Toxaphene	0.003	0.001
2,4,5-TP (Silvex)	0.05	0.0002
Volatile Organic Chemicals		
Benzene	0.005	0.0005
Carbon tetrachloride	0.005	0.0005
o-Dichlorobenzene	0.6	0.0005
cis-1,2-Dichloroethylene	0.07	0.0005
trans-1,2-Dichloroethylene	0.1	0.0005
1,1-Dichloroethylene	0.007	0.0005
1,1,1-Trichloroethane	0.20	0.0005
1,2-Dichloroethane	0.005	0.0005
Dichloromethane	0.005	
1,1,2-Trichloroethane	0.005	
1,2,4-Trichloro-benzene	0.07	
1,2-Dichloropropane	0.005	0.0005
Ethylbenzene	0.7	0.0005
Monochlorobenzene	0.1	0.0005
para-Dichlorobenzene	0.075	0.0005
Styrene	0.1	0.0005
Tetrachloroethylene	0.005	0.0005
Trichloroethylene	0.005	0.0005
Toluene	1.0	0.0005
Vinyl chloride	0.002	0.0005
Xylene (total)	10	0.0005
Other Organics		
Acrylamide	0.05% dosed at 1 ppm ¹	
Epihydrochlorin	treatment technique 0.01% dosed at 20 ppm ¹	

Note

- ¹ Only applies when adding these polymer flocculants to the treatment process. No sampling is required, the system certifies that dosing is within specified limits.

Table C3.T8. Synthetic Organic Chemical Monitoring Requirements

Contaminant	Base Requirement 1		Trigger for more monitoring 2	Reduced monitoring
	Groundwater	Surface water		
VOCs	Quarterly	Quarterly	>0.0005 mg/L	Yes 3, 4
Pesticides/ PCBs	4 quarterly samples/3 years during most likely period for their presence		>Detection limit 5	Yes 4, 6

Notes

1. Groundwater systems shall take a minimum of one sample at every entry point which is representative of each well after treatment; surface water systems will take a minimum of one sample at every entry point to the distribution system at a point which is representative of each source after treatment. For CWS, monitoring compliance is to be met within 1 year of the publishing of the OEBGD (FGS); for NTNC, compliance is to be met within 2 years of the publishing of the OEBGD (FGS).
2. Increased monitoring requires a minimum of 2 samples per quarter for groundwater systems and at least 4 samples per quarter for surface water systems.
3. Repeat sampling frequency may be reduced to annually after 1 year of no detection and every 3 years after three rounds of no detection.
4. Monitoring frequency may be reduced if warranted based on a vulnerability assessment by the PWS.
5. Detection limits noted in Table C3.T7., or as determined by the best available testing methodology.
6. Repeat sampling frequency may be reduced to the following if after one round of no detection; systems >3,300 reduce to 2 samples/year every 3 years, or systems <3,300 reduce to 1 sample every 3 years.

Note: Compliance is based on an annual running average for each sample point for systems monitoring quarterly or more frequently; for systems monitoring annually or less frequently, compliance is based on a single sample, unless the appropriate DoD medical authority requests a confirmation sample. A system is out of compliance if any contaminant exceeds the MCL.

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