DRINKING WATER STANDARD SETTING

QUESTION-AND-ANSWER PRIMER

U.S. ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF WATER's
OFFICE OF GROUND WATER AND DRINKING WATER
401 M STREET, S.W.
WASHINGTON, D.C. 20460

November 1994

INTRODUCTION

This primer was developed to answer questions posed by various segments of the public, from students to public utilities to Congress, about EPA's drinking water regulations under the Safe Drinking Water Act. The primary audience, however, for this publication is State and local government officials. Because of the wide range of audiences, each question has a short answer in the first paragraph, followed by a lengthier, more detailed, answer.

This publication follows a question and answer format. It is organized thematically in four segments:

- Section I: Authorization/Applicability/Coverage of Drinking Water Standards,
- Section II: Drinking Water Standard Components/Definitions,
- Section III: Maximum Contaminant Level Goals (MCLGs) and Maximum Contaminant Levels (MCLs) and
- Section IV: Requirements Established by NPDWRs other than MCLGs and MCLs/TTs.

Section I answers questions concerning who has authority to set and enforce drinking water regulations, who has to follow these regulations and the extent of their coverage. Section II discusses the definition and background on components of drinking water regulations, such as Maximum Contaminant Level and Treatment Technique. Section III is further divided into two sections: Section A discusses MCLGs and how EPA derives them, and Section B discusses MCLs and how EPA establishes them. Section IV discusses other enforceable requirements, such as monitoring, recordkeeping, reporting and public notification.

There are four appendices to this primer: (1) Appendix A - Applicability/Coverage for each regulated contaminant; (2) Appendix B - MCLGs, MCLs, Health Effects and final and effective dates for each regulated contaminant; (3) Appendix C - the most current Drinking Water Priority List and (4) Appendix D - Secondary Drinking Water Regulations. A list of acronyms used in this primer appears just after the table of contents.

Each question/answer has been designed so that it may be taken out of this publication and still be comprehensible. However, they are also intended to fit together with the questions/answers in the same section, so that each question/answer builds on information from the last question/answer. The margins have been set so that this publication can be placed in a looseleaf binder. As information changes, the primer will be updated, and the updated pages will be available to replace those superseded. When the SDWA is reauthorized by Congress, this primer will be updated.

Table of Contents

I. Authorization/Applicability/Coverage of Drinking Water Standards

I.1. By what authority does EPA promulgate (i.e., publish as a final rule in the *Federal Register*) drinking water standards? . . . 1

I.2. Who is subject to EPA's regulations? . . . 2

I.3. What is a Public Water System (PWS), and how many types of systems are there? . . . 2

I.4. What is a Community Water System (CWS)? . . . 3

I.5. What is a Non-Community System (NCS)? . . . 3

I.6. What is a Transient, Non-Community Water System (TNC)? . . . 4

I.7. What is a Non-Transient, Non-Community Water System (NTNC)? . . . 5

I.8. What is a Consecutive Water System? . . . 5

I.9. Does every EPA drinking water regulation apply to all types of Public Water Systems? 6

I.10. What about household or "private" wells? . . . 6

I.11. How does EPA enforce its drinking water regulations? . . . 7

I.12. Who ensures the safety of materials and contact surfaces used by drinking water systems? . . . 8

Sources cited in Section I . . . 10

II. Drinking Water Standard Components/Definitions

II.1. What is a National Primary Drinking Water Regulation (NPDWR)? . . . 11

II.2. What is a Maximum Contaminant Level Goal (MCLG)? . . . 11

II.3. What is a Maximum Contaminant Level (MCL)? . . . 12

II.4. How is a Maximum Contaminant Level Goal (MCLG) different from a Maximum Contaminant Level (MCL)? . . . 12

II.5. What is a Treatment Technique (TT)? . . . 13

II.6. How do an MCL and a Treatment Technique differ? . . . 14

II.7. How many National Primary Drinking Water Regulations (NPDWRs) have been promulgated? . . . 14

Table of Contents (Continued)

II.8. How many of these standards are now effective? 16

II.9. When would there be fewer standards effective than final? 16

II.10. How many NPDWRs are currently proposed but are not yet final? 17

II.11. Will any primary drinking water regulations be proposed or finalized in the future? 17

II.12. Does EPA have a list of what contaminants will be proposed or finalized in the future? 18

II.13. Do the contaminants on the Drinking Water Priority List (DWPL) have MCLGs and MCLs? 19

II.14. How does EPA choose which contaminants to place on the Drinking Water Priority List (DWPL)? 19

II.15. Is the DWPL ever revised? 20

II.16. Are promulgated standards ever revised? 20

II.17. What is a Secondary Drinking Water Regulation (SDWR)? 20

II.18. How is a National Primary Drinking Water Regulation (NPDWR) different from a Secondary Drinking Water Regulation (SDWR)? 21

Sources Cited in Section II 22

III. Maximum Contaminant Level Goals (MCLGs) and Maximum Contaminant Levels (MCLs)

A. MCLGs

III.A.1. How does EPA set a Maximum Contaminant Level Goal (MCLG)? 23

III.A.2. What is EPA's reasoning for setting MCLGs of zero? 23

III.A.3. When setting the MCLG, what are Categories I, II and III, and how do these categories affect the MCLG setting process? 24

III.A.4. What is a cancer classification? 25

III.A.5. How many cancer classifications exist, and what does each classification mean? 26

III.A.6. How does EPA determine which cancer classification to assign to a contaminant? 27

III.A.7. What is a cancer risk range, and how is it derived? 27

Table of Contents (Continued)

III.A.8. What are the NOAEL/LOAEL levels, and how are the levels derived? 28

III.A.9. What is an uncertainty factor, and how is it derived? 28

III.A.10. What is a Reference Dose (RfD), and how does EPA determine it? 29

III.A.11. What is a Drinking Water Equivalent Level (DWEL), and how is it derived? . . 30

III.A.12. What is the Relative Source Contribution? 31

Sources cited in Section III.A. 32

B. MCLs

III.B.1. How does EPA set National Primary Drinking Water Regulations (NPDWRs)? 33

III.B.2. What technological concerns are factored into this determination? 34

III.B.3. What are BATs, and how are they involved in setting MCLs? 34

III.B.4. How are BATs chosen? 35

III.B.5. Do water systems have to install BATs? 36

III.B.6. What cost concerns are factored into the MCL determination? 37

III.B.7. Does EPA factor in nationwide costs when setting NPDWRs? 37

III.B.8. Are health risks also factored into the determination of MCLs? 38

III.B.9. What are analytical methods, and how are they involved with MCLs? 38

III.B.10. What is an MDL? 39

III.B.11. How is an MDL derived? 39

III.B.12. What is a PQL? 40

III.B.13. How is a PQL derived? 40

III.B.14. How do the MDL and PQL differ? 41

Sources Cited in Section III.B. 42

Table of Contents (Continued)

IV. Requirements Established by NPDWRs Other Than MCLGs and MCLs/TTs

IV.1. What other requirements are established by NPDWRs? 43

IV.2. How frequently do Public Water Systems (PWSs) have to monitor for regulated contaminants? 44

IV.3. Where must Public Water Systems (PWSs) monitor for contaminants? 44

IV.4. Does the source of water (i.e., surface water or ground water or a mixture of the two) affect the way systems monitor? 45

IV.5. What other factors can affect monitoring? 45

IV.6. What is "unregulated" contaminant monitoring? 46

IV.7. What are the reporting requirements to the State and/or EPA? 46

IV.8. What records do the Public Water Systems (PWSs) have to maintain? 47

IV.9. Are these records available to the public? 48

IV.10. How long must PWSs keep their records? 48

IV.11. What is public notification, and when do PWSs have to do it? 48

IV.12. What is mandatory health effects language, and when would systems use it for public notification? 49

IV.13. Do all regulated contaminants have mandatory health effects language? 50

Sources Cited in Section IV 51

APPENDIX A:

Table 1: Applicability/Coverage by Contaminant
Table 2: Applicability/Coverage by Rule

APPENDIX B:

Table 1: Contaminants Regulated under the Safe Drinking Water Act
Table 2: Final and Effective Dates by Rule

APPENDIX C: Drinking Water Priority List

APPENDIX D: Secondary Drinking Water Regulations

List of Acronyms

Acronym:	Term Spelled Out:
BAT	Best Available Technology
BTGA	Best Technology Generally Available
CERCLA	Comprehensive, Environmental Response, Compensation and Liability Act
CRAVE	Cancer Risk Assessment Verification Endeavor
CFR	Code of Federal Regulations
CWS	Community Water System
D/DBPs	Disinfectants/Disinfection Byproducts
DWEL	Drinking Water Equivalent Level
DWPL	Drinking Water Priority List
EPA	Environmental Protection Agency
FR	Federal Register
FY	Fiscal Year
GAC	Granular Activated Carbon
IOC	Inorganic Compound
LOAEL	Lowest-Observed-Adverse-Effect-Level
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
MDL	Method Detection Limit
mg/l	Milligrams per Liter
MFL	Million Fibers per Liter
NCS	Non-Community System
NPDWR	National Primary Drinking Water Regulation
NOAEL	No-Observed-Adverse-Effect-Level
NTNC	Non-Transient, Non-Community
OST	Office of Science & Technology
PE	Performance Evaluation
PQL	Practical Quantitation Level
PWS	Public Water System
PWSS	Public Water Supply Supervision
RfD	Reference Dose
RIA	Regulatory Impact Analysis
RSC	Relative Source Contribution
SDWA	Safe Drinking Water Act
SDWR	Secondary Drinking Water Regulation
SMF	Standardized Monitoring Framework
SOC	Synthetic Organic Compound
TNC	Transient, Non-Community
TT	Treatment Technique
URTH	Unreasonable Risk to Health
VOC	Volatile Organic Compound

I. Authorization/Applicability/Coverage of Drinking Water Standards

I.1. By what authority does EPA promulgate (i.e., publish as a final rule in the *Federal Register*) drinking water standards?

The Safe Drinking Water Act (SDWA) requires EPA to establish Maximum Contaminant Level Goals (MCLGs) and National Primary Drinking Water Regulations (NPDWRs) for 83 contaminants listed by Congress and for other contaminants that, in the judgment of the Administrator, may have adverse effects on the health of persons and that are known or anticipated to occur in Public Water Systems (SDWA, Section 1412(b)(3)(A)). Therefore, EPA's Office of Water develops drinking water regulations by the authority granted to EPA under the SDWA. Using this authority, EPA develops MCLGs and NPDWRs to ensure that the nation's public drinking water systems provide drinking water that protects public health (40 CFR 141.2).

Congress enacted the SDWA on December 16, 1974, and amended it on June 19, 1986. The 1986 Amendments strengthened the original Act by setting up a timetable for EPA to promulgate NPDWRs. The 1986 Amendments also required EPA to establish programs for sole source aquifers, wellhead protection and underground injection control.

The Act authorizes EPA to regulate contaminants in two ways. EPA may establish Maximum Contaminant Levels (MCLs) or EPA may require use of a Treatment Technique (TT) if the Agency finds that it is not economically or technologically feasible to ascertain the level of a contaminant (SDWA, Section 1412(b)(7)(A)). The Act, in addition, required EPA to promulgate a regulation specifying criteria under which filtration is required for surface water sources (SDWA, Section 1412(b)(7)(C)) and a regulation requiring disinfection for all Public Water Systems.

For more information about these topics:	Refer to these questions:
NPDWRs	II.1, II.3, II.5 - II.12, II.18, III.B.1, IV.1, IV.7 - IV.8 and IV.11.
DWPL	II.12 - II.15.

I.2. Who is subject to EPA's regulations?

Public Water Systems (PWSs) are subject to EPA's drinking water regulations. These regulations apply to individuals, industries, businesses, private water systems or schools only if such entities fall under the SDWA definition of a PWS.

These requirements do not apply, however, to a system that meets all of the criteria specified in Section 1411 of the SDWA. This section states that federal drinking water regulations will not "apply to a public water system --

(1) which consists only of distribution and storage facilities (and does not have any collection and treatment facilities);

(2) which obtains all of its water from, but is not owned or operated by, a public water system to which such regulations apply;

(3) which does not sell water to any person; and

(4) which is not a carrier which conveys passengers in interstate commerce" (SDWA, Section 1411).

For more information about these topics:	Refer to these questions:
Applicability	I.1 and I.9 - I.10.
PWSs	I.3 - I.8.

I.3. What is a Public Water System (PWS), and how many types of systems are there?

A PWS is a system that provides piped water for human consumption and regularly serves at least 25 persons or has at least 15 service connections. A PWS may receive its water from ground water sources, surface water sources or a combination of the two sources; in some cases, one PWS may purchase all or part of its water from another PWS.

The SDWA defines a PWS as a "system for the provision to the public of piped water for human consumption, if such system has at least fifteen service connections or regularly serves at least twenty-five individuals. Such term includes (A) any collection, treatment, storage and distribution facilities under control of the operator of such system and used primarily in connection with such system, and (B) any collection or pre-treatment storage facilities not under such control which are used primarily in connection with such system" (SDWA, Section 1401(4)). EPA interprets 'regularly serves' to mean the system serves at least 25 persons on a daily basis for at least 60 days. Service connections are pipes between the distribution system mains and any building or structure.

Although PWSs can be operated by municipalities or other government organizations, PWSs can also be owned and operated by an individual or by a company. PWSs come in a variety of sizes, as well, ranging from 25 individuals served (or fewer as long as a PWS has at least 15 service connections) to several million served. As long as a system meets the criteria listed in the above paragraph, it is considered a PWS, regardless of its size or whether it is operated by a public or private entity.

There are two types of PWSs: Community Water Systems (CWSs) and Non-Community Water Systems (NCSs). NCSs can be further divided into Transient Non-Community Water Systems (TNCs) and Non-Transient Non-Community Water Systems (NTNCs). These classifications are also not based on size; they are based on the type of user population a system serves (for more information on types and sizes of PWSs, as well as the requirements each has to follow, see Appendix A). A special type of water system is called a consecutive water system. Each type of water system is discussed at length below.

For more information about these topics:	Refer to these questions:
PWSs	I.2 and I.4 - I.8.

I.4. What is a Community Water System (CWS)?

A CWS is a PWS that serves at least 15 service connections used by year-round residents or regularly serves at least 25 year-round residents, e.g., homes, apartments and condominiums that are occupied year-round as primary residences (40 CFR 141.2).

According to EPA's *FY 1993 National Compliance Report*, there are approximately 57,561 CWSs in the United States, providing water to approximately 242,679,000 persons (Compliance Report, p. 11). CWSs serve more users than any other type of PWS even though there are more Non-Community Systems (NCSs) operating in the United States.

For more information about these topics:	Refer to these questions:
PWSs	I.2 - I.3 and I.5 - I.9.

I.5. What is a Non-Community System (NCS)?

A Non-Community System (NCS) is a PWS that is not a CWS, i.e., a system that does not serve at least 15 service connections used by year-round residents or regularly serve at least 25 year-round residents (40 CFR 141.2). NCSs can be classified as either Non-Transient or Transient systems and exclusively serve users in one or more of a variety of non-residential settings including schools, office buildings, campgrounds, restaurants and highway rest areas.

Approximately 21,273,000 persons get their water from 133,706 NCSs (Compliance Report, p. 11). Although there are more Non-Community Water Systems than Community Water Systems (133,706 Non-Community compared to 57,561 Community Water Systems), Non-Community Water Systems supply drinking water to fewer customers than Community Water Systems. NCSs tend to be small to medium in size (serving up to 10,000 individuals) rather than large (serving more than 10,000 individuals).

There are two types of NCSs: Transient Non-Community Systems and Non-Transient Non-Community Systems. A system is classified as either Transient or Non-Transient by the length of time its users drink water from that system. In other words, systems that serve the same individuals daily for at least 6 months per year are classified as Non-Transient and systems that serve the same individuals less than 6 months per year are classified as Transient Water Systems. These types of water systems are discussed in further detail below.

For more information about these topics:	Refer to these questions:
NCSs	I.6 - I.7.
PWSs (other than NCSs)	I.2 - I.4 and I.8 - I.9.

I.6. What is a Transient, Non-Community Water System (TNC)?

A Transient, Non-Community Water System (TNC) is a PWS that serves at least 25 people daily; however, it serves the same individuals for less than 6 months, e.g., campgrounds, parks and gas stations (40 CFR 141.2).

EPA considers 98 percent of the 109,714 TNC water systems to be very small, i.e., they serve between 25 and 500 persons on any given day (Compliance Report, p. 17). The population estimated to use these systems at one time or another during the year is 15,428,000.

TNC water systems do not usually serve the same individuals on a daily basis. They cannot serve 25 or more of the same individuals longer than six months a year and keep their status as a Transient, Non-Community Water System. Examples of such a system include campgrounds, restaurants or rest stops that have their own water supply source.

For more information about these topics:	Refer to these questions:
NCSs	I.5 and I.7
PWSs (other than NCSs)	I.2 - I.4 and I.8 - I.9.

I.7. What is a Non-Transient, Non-Community Water System (NTNC)?

An NTNC is a PWS that serves at least 25 of the same persons for over 6 months per year (40 CFR 141.2). A typical example of an NTNC is a school or an office building that has its own water source, such as a drinking water well.

Although there are more TNCs, NTNCs serve more people than Transient ones. According to EPA's *FY 1993 National Compliance Report*, approximately 23,992 NTNC water systems serve 6,315,000 persons. As with Transient systems, EPA deems most of the NTNC systems to be very small systems, serving between 25 and 500 persons (Compliance Report, p. 15).

To be an NTNC, a system must have its own water source and serve at least 25 of the same persons over 6 months per year. Businesses that get their water from a Community Water System and do nothing to modify it are not considered to be NTNC systems and thus, are not subject to EPA's drinking water regulations.

For more information about these topics:	Refer to these questions:
NCSs	I.5 - I.6.
PWSs (Other than NCSs)	I.2 - I.4 and I.8 - I.9.

I.8. What is a Consecutive Water System?

A Consecutive Water System exists when one PWS supplies water to one or more other PWSs (40 CFR 141.29). This type of water system may be either a CWS, an NTNC or a TNC water system. A common situation involving Consecutive Water Systems is when one system, called a bulk water supplier, supplies water to other PWSs. For consecutive systems, EPA allows the States to decide how each system will conduct monitoring. In some cases, monitoring may be done by only one of the systems "to the extent that the interconnection of the systems justifies treating them as a single system for monitoring purposes" (40 CFR 141.29).

In many cases, States may require the bulk supplier to be responsible for monitoring/treating the source water and the system(s) that receives the water to be responsible for monitoring/maintaining the distribution system that carries the water to the customers. However, monitoring requirements for a Consecutive Water System may vary rule-by-rule, if the State so decides. If a State modifies monitoring for these water systems, the State must provide a schedule detailing the modified monitoring requirements, and EPA must concur with the schedule (40 CFR 141.29).

For more information about these topics:	Refer to these questions:
PWSs	I.2 - I.7 and I.9.

I.9. Does every EPA drinking water regulation apply to all types of Public Water Systems?

No, each EPA drinking water regulation does not apply universally to all PWSs. Each regulation specifies which type(s) of water systems must follow it.

CWSs are subject to all of EPA's drinking water regulations, with the possible exception of the Surface Water Treatment Rule, which only applies to systems using surface water sources or ground water under the direct influence of surface water. The Surface Water Treatment Rule protects consumers from the adverse health effects of microbiological contaminants in drinking water by requiring affected systems to disinfect and/or filter their source water. CWSs need to comply with all other federal drinking water regulations since these systems serve residences where people consume water from the same water supply over a long period of time, thus making them more vulnerable to long-term and short-term health effects from contaminants occurring in that drinking water.

In general, the regulations applying to CWSs apply to NTNCs as well. Water from NTNCs is not consumed by people as regularly over the long term as is water supplied by CWSs. Therefore, NTNCs do not have to follow all of the regulations that CWSs do. TNCs only have to follow a few regulations because people may only consume water from these systems over a very short period of time. Thus, Transient systems only have to comply with contaminants such as coliform bacteria, nitrates and nitrites, all of which can cause acute health effects. See Appendix A for more information on which types and sizes of PWSs must follow each regulation.

For more information about these topics:	Refer to these questions:
PWSs	I.2 - I.8, III.B.5, IV.2 - IV.3 and IV.7 - IV.12.

I.10. What about household or "private" wells?

Household wells are not regulated under EPA's drinking water program and are generally regulated on a limited basis by the States.

Household wells that serve individual households, and not the general public, are not regulated by EPA. To be a PWS, a minimum of 25 persons or 15 service connections must be served by a drinking water source. Household wells are private property, and the owners are responsible for the quality of the water taken from their individual wells. In rural areas, it is not uncommon to have wells provide drinking water to restaurants, gift shops, etc. In this situation, depending on the number of persons served, these wells may be considered to be PWSs. Local health departments may provide assistance to well owners whose wells are not regulated as PWSs by EPA, e.g., testing for bacteria and nitrates, but the "well owner is primarily responsible for the safety of water that is drawn from his/her well" (Drinking Water from Household Wells, p. 6).

As stated previously, however, States may regulate household wells. For instance, some States may test or require well owners to test for certain compounds. Others may establish standards for the size, structure and/or maintenance of private wells. Some States may even regulate any well that has at least two service connections as a PWS. The decision to regulate private wells, as well as the extent of those regulations, lies solely with the State. Therefore, regulations on private or household wells will vary State-by-State.

For more information about these topics:	Refer to these questions:
EPA Enforcement/Authority	I.1 and I.11.

I.11. How does EPA enforce its drinking water regulations?

EPA enforces its drinking water regulations by using the authority provided to the Agency in Section 1414 of the SDWA. EPA may issue administrative orders or file civil actions against violators. In addition, EPA may take action under Section 1431 of the SDWA when there is or may be an "imminent and substantial" endangerment to health (SDWA, Section 1431). The Agency can also authorize States, Indian Tribes and U.S. Territories to enforce drinking water regulations by awarding them primary enforcement responsibility (primacy).

The SDWA provided States, U.S. Territories and Indian Tribes the ability to apply for and receive primary enforcement responsibility (primacy) for the drinking water program. When primacy is granted, the States generally have the first opportunity to enforce the regulations. EPA, then, acts when the State cannot or does not act. However, EPA retains the right to take action against any violator at any time.

Currently, 55 States and U.S. Territories have primacy. In the continental United States, only Wyoming and Washington, D.C. do not have primacy. No Indian Tribes have attained primacy at this time. To obtain primacy, States or Indian Tribes must adopt drinking water regulations at least as stringent as EPA's requirements and demonstrate to the Agency that they have the capability to enforce drinking water regulations (SDWA, Section 1413). Specifically, States and Indian Tribes must do the following:

- Adopt and implement adequate procedures for enforcement;
- Keep records and make reports as required by EPA;
- Issue variances and exemptions (if at all) which are no less stringent than required by EPA and finally;
- Adopt and be able to implement an adequate emergency plan to provide drinking water in the event of an emergency such as a flood, earthquake, hurricane, etc. (Primacy Fact Sheet, p. 2).

To maintain primacy, States must continue to adopt or enact regulations at least as stringent as each newly-promulgated federal regulation within 18 months after EPA promulgates it, although a two-year extension may be granted by EPA to a State on a case-by-case basis. Once States enact drinking water regulations, they must implement and enforce them, or EPA can withdraw primacy. In some cases, a State may have primacy for most drinking water regulations but may still be in the process of attaining it for new federal regulations. In that case, EPA would retain enforcement responsibility for the new regulations until that State attained primacy for them.

A State that has primacy generally takes the first enforcement action against a PWS that fails to comply with all or part of a drinking water regulation. Once EPA learns of a violation, it informs the water system and the State of the violation(s) and provides advice or technical assistance. If the State has not begun an appropriate enforcement action within 30 days of EPA's notice, the Agency may step in and issue an administrative order to the system. If the system does not comply with the administrative order, EPA may assess a penalty administratively of up to $5,000; if EPA proceeded directly with a civil action for a violation (i.e., skipped the administrative order), the Agency may assess a penalty up to $25,000 per day every day that the PWS fails to comply (SDWA, Section 1414).

The SDWA also gives EPA authority to act in the event of an "imminent and substantial endangerment to the health of person" due to contaminated drinking water (SDWA, Section 1431). For example, if a water supply becomes contaminated with fecal coliform bacteria (or if there was a threat of potential future contamination), EPA can step in and require the PWS to supply its users with bottled water until the system removes the bacteria from its water.

For more information about these topics:	Refer to these questions:
EPA Enforcement/Authority	I.1
NPDWRs	II.1, II.3, II.5 -II.10, II.17, III.B.1 and IV.1

I.12. Who ensures the safety of materials and contact surfaces used by drinking water systems?

Public Water Systems use a broad range of chemical products to treat water supplies and maintain storage and distribution systems. These products are commonly referred to as drinking water additives, and they include coagulant aids, corrosion inhibitors, disinfectants, protective paints and coatings, pipes and others. These products and associated impurities require scrutiny because they are a potentially significant source of contamination that may adversely affect drinking water quality and public health.

In the past, EPA assisted the States and PWSs on the use of additives by issuing advisory opinions on the acceptability of many of these products. The federal advisory program, however, ended on October 4, 1988. At that time, EPA assisted NSF International in establishing voluntary product standards. This change in program is described in a *Federal Register* notice (53 FR 25586, dated July 7, 1988).

EPA recommends that all PWSs utilize NSF International Standards 60 and 61 when evaluating the acceptability of drinking water additives. For further information on these standards, contact NSF International by writing to them at P.O. Box 1468, 3475 Plymouth Road, Ann Arbor, Michigan 48106 or by calling them at (313) 769-8010. For more information about private sector additives programs, contact the American Water Works Association by writing to them at 6666 West Quincy Avenue, Denver, Colorado 80235, or by calling them at (303) 794-7711.

Sources Cited in Section I

Code of Federal Regulations, Title 40 CFR 141. Government Printing Office. July 1992. [40 CFR 141]

Federal Register. Vol. 53, No. 130. Drinking Water Technical Assistance; Termination of the Federal Drinking Water Additives Program. July 7, 1988. [53 FR].

U.S. Congress. Safe Drinking Water Act. 42 U.S.C. Section 300f et seq. June 1986. [SDWA, Section].

U.S. Environmental Protection Agency. Drinking Water from Household Wells (EPA 570/9-90-013). September 1990. [Drinking Water from Household Wells].

U.S. Environmental Protection Agency. Fact Sheet: Revision to State Primacy Regulations for the Public Water Supply Supervision (PWSS) Program (No EPA Number). December 1989. [Primacy Fact Sheet].

U.S. Environmental Protection Agency. FY 1993 National Compliance Report (EPA 812/R-94-001). March 1994. [Compliance Report].

II. Drinking Water Standard Components/Definitions

II.1. What is a National Primary Drinking Water Regulation (NPDWR)?

An NPDWR is an enforceable standard that protects the quality of the nation's drinking water. These standards apply to PWSs and protect drinking water quality by controlling the levels of specific contaminants that can adversely affect public health and are known or anticipated to occur in water. EPA may establish a Maximum Contaminant Level (MCL) or a Treatment Technique (TT) as an NPDWR for a contaminant. Both are discussed in more detail in this section.

When developing NPDWRs for contaminants beyond the 83 listed by Congress in the SDWA, EPA's Office of Water selects contaminants that are judged to be threats to the nation's drinking water supplies in either raw or finished water. EPA derives a Maximum Contaminant Level Goal (MCLG) and an MCL or a TT for each drinking water contaminant the Agency has deemed to be a potential threat (SDWA, Section 1401). TTs are established in lieu of MCLs when a contaminant cannot be measured accurately at levels of public health concern. As part of each NPDWR, EPA also develops requirements for monitoring, treatment technologies and analytical methods for each contaminant (SDWA, Section 1412).

For more information about these topics:	Refer to these questions:
MCLs	II.3 - II.4, II.6, III.B.1, III.B.3 and III.B.6 - III.B.9.
MCLGs	II.2, II.4 and III.A.1 - III.A.3.
TTs	II.5 - II.6.

II.2. What is a Maximum Contaminant Level Goal (MCLG)?

An MCLG is the level of a contaminant in drinking water at which there is no known or anticipated health threat from that contaminant to a person who consumes the water. This nonenforceable health goal is defined as the "maximum level of a contaminant in drinking water at which no known or anticipated adverse effect on the health of persons would occur, and which allows an adequate margin of safety" (SDWA, Section 1412(b)(4)). Although non-enforceable, EPA publishes contaminants' MCLGs and associated health effects in the *Federal Register* and *Code of Federal Regulations* so that the public can easily note this information.

For each contaminant selected for regulation, EPA first sets an MCLG that is based on that contaminant's health effects and exposure, both known or anticipated. EPA determines each MCLG with an adequate margin of safety to ensure that the contaminant can have no adverse health effect on individuals (SDWA, Section 1412(b)(4)). To determine this health-based goal, EPA conducts a risk assessment, examining data for cancer and/or non-cancer causing health effects. Under current EPA policy, when a contaminant is considered to have strong evidence of carcinogenicity from human and animal studies, the MCLG for that contaminant is usually set at zero since scientists do not know if any level of exposure, no matter how small, might cause cancer. MCLGs are also set at zero for other contaminants where exposure at any level may cause adverse health effects, e.g., for coliform bacteria.

For more information about these topics:	Refer to these questions:
MCLGs	II.4 and III.A.1 - III.A.12.

II.3. What is a Maximum Contaminant Level (MCL)?

An MCL is the maximum level of a contaminant that is allowable in public drinking water supplies. Congress defined this term in the SDWA as the "maximum permissible level of a contaminant in water which is delivered to any user of a public water system" (SDWA, Section 1401(3)). When EPA sets an MCL for a contaminant, the PWS must ensure that the level of this contaminant is maintained at or below its MCL.

MCLs are enforceable numerical limits that restrict the concentration of specific contaminants in the nation's drinking water. By law, EPA must set MCLs and MCLGs simultaneously. The SDWA also requires EPA to set each MCL as close to that contaminant's MCLG as is achievable for large PWSs, taking costs and feasibility of treatment into consideration (SDWA, Section 1401(1)(C)(ii)). For many noncarcinogenic contaminants, the MCL and MCLG are the same, since it is technologically and economically feasible to maintain the levels of those contaminants at the health-based level.

For more information about these topics:	Refer to these questions:
MCLs	II.1, II.4, II.6, III.B.1 - III.B.4, III.B.6 - III.B.10 and IV.1.

II.4. How is a Maximum Contaminant Level Goal (MCLG) different from a Maximum Contaminant Level (MCL)?

An MCLG is a non-enforceable goal derived solely from health effects data. An MCL is the enforceable level set as closely as possible to the MCLG, taking technological and cost data into account.

As discussed previously, when EPA establishes an NPDWR, the Agency sets the MCL and the MCLG at the same time, and it must ensure that the MCL is as close to the MCLG as is technologically feasible, taking costs and the feasibility of treatment into consideration (SDWA, Section 1412(a)(3)). Consistent with legislative history, the Agency traditionally considers feasibility for large metropolitan and regional water systems in setting standards.

If an MCL is exceeded by a PWS, then that system is in violation and must report to the State, notify the public and take action to bring the level of that contaminant at or below its MCL. EPA and the States take actions on violations of regulations. If a water system exceeds an MCLG of a contaminant without also exceeding its MCL, the water system will not be required to treat its water to lower the level of that contaminant.

For more information about these topics:	Refer to these questions:
MCLs	II.1, II.3, II.6 - II.7, III.B.1 - III.B.2 and III.B.6 - III.B.10.
MCLGs	II.1 - II.2 and III.A.1 - III.A.3.

II.5. What is a Treatment Technique (TT)?

A TT is an enforceable procedure or set of procedures which PWSs must follow to ensure that a contaminant is controlled in their drinking water supplies. EPA is authorized to develop a TT for a contaminant when "it is not economically or technologically feasible to ascertain the level of the contaminant" (SDWA, Section 1412(b)(7)(A)). Under a TT requirement, a PWS treats its water according to EPA specifications (SDWA, Section 1412 (b)(7)(A)).

For example, in the Lead and Copper Rule (56 FR 26460, dated June 7, 1991), EPA employs a TT to control the amount of lead and copper in public water supplies. Since the majority of lead and copper contamination results from the corrosion of household plumbing fixtures containing these metals, EPA requires PWSs to monitor at selected taps rather than at the entry point to the distribution system. However, the Agency did not set an enforceable MCL for samples at the tap because the composition of household plumbing is not in the control of PWSs. Therefore, EPA established a TT, which among other things, requires PWSs to control the corrosivity of their water. Corrosion is defined as a dissolving and wearing away of metal caused by a chemical reaction between the water and the lead/copper in the pipes. Corrosivity, then, is the measure of how much metal is likely to dissolve or wear away into the water. Corrosion control treatment will inhibit the leaching of lead and copper from household plumbing and lead distribution lines caused by corrosive water.

The Surface Water Treatment Rule is another example of a TT. This rule applies to all PWSs that use surface water or ground water under the direct influence of surface water. These systems must disinfect and either filter their water or meet EPA's requirements for avoiding filtration in order to protect their water "against the potential adverse health effects of exposure to *Giardia lamblia*, viruses, *Legionella* and heterotrophic bacteria, as well as many other pathogenic organisms that are removed by [the Surface Water Treatment Rule requirements]" (54 FR 27487).

For more information about these topics:	Refer to these questions:
TTs	II.1 and II.6 - II.7.

II.6. How do an MCL and a Treatment Technique differ?

An MCL establishes a level that a PWS must maintain for a contaminant, while still allowing the PWS flexibility in determining how to meet the numerical standard. A TT specifies procedures a PWS must do to treat a contaminant in its water.

While both MCLs and TTs are enforceable standards, an MCL is a numerical limit that a PWS must remain at or below in order to comply with EPA's regulations. Although EPA designates treatment technologies, called Best Available Technologies (BATs), that can lower the level of a contaminant at or below its MCL, the Agency does not require PWSs to use BATs to treat their water. Instead, a water system may use any means to lower a contaminant level as long as it allows the system to comply with an MCL.

On the other hand, a TT is a treatment procedure, or series of procedures, that a PWS must follow to comply with a drinking water regulation. EPA establishes a TT to regulate a contaminant (instead of setting an MCL for it) only when it is not feasible to ascertain the level of a contaminant (SDWA, Section 1401(1)(C)(ii)).

For more information about these topics:	Refer to these questions:
MCLs	II.1, II.3 - II.4, III.B.1 - III.B.3, III.B.6 - III.B.10 and IV.1.
TTs	II.1, II.5 and II.7.

II.7. How many National Primary Drinking Water Regulations (NPDWRs) have been promulgated?

Currently, EPA has promulgated NPDWRs for 84 contaminants. The Agency has proposed regulations for additional contaminants, and it has scheduled several other contaminants for proposal in the future. A list of the 84 currently regulated contaminants, with each one's MCLG, MCL/TT and potential health effects, is included in Appendix B, Table 1.

In 1986, when the SDWA was reauthorized, Congress mandated 83 contaminants for EPA to regulate, allowing EPA to replace compounds from the mandated list with other contaminants if necessary. Out of that list of 83, EPA regulated 76 contaminants including 7 contaminants that had replaced compounds on the list. The Agency also regulated one contaminant (dibromochloropropane) independant of the 1986 mandate. Seven contaminants (out of the 84 that are currently promulgated) were promulgated before the 1986 amendments to the SDWA. EPA still has to regulate radon, uranium and sulfate from the list as well as revise its regulations for radium, gross alpha emitters, beta/photon emitters and arsenic.

When developing NPDWRs for contaminants beyond the 83 listed by Congress in the SDWA, EPA goes through a rulemaking process, which begins by choosing contaminants for the Drinking Water Priority List (DWPL) based on preliminary occurrence and health effects data. Some contaminants "are placed on the list because they clearly present a health risk; others will require further investigation before the need for regulation is clear" (56 FR 1471). Once EPA has developed the DWPL, the Agency then further examines the health effects and occurrence data for those chosen contaminants, proposes to regulate the contaminants that occur or have the potential to occur in drinking water at levels that may cause health effects, takes and reviews public comments on the proposed regulations and finally, promulgates or finalizes the proposed contaminants.

Except for some of the 83 contaminants specified in the SDWA, EPA has promulgated regulations for contaminants that have been found to be prevalent in many or most drinking water supplies nationally and that may have an adverse health effect on persons. Currently, EPA has developed NPDWRs for synthetic organic compounds (SOCs), volatile organic compounds (VOCs), inorganic compounds (IOCs), some radionuclides and microorganisms. SOCs are man-made chemicals such as pesticides and industrial chemicals. VOCs are naturally-occurring or man-made volatile chemicals that can move easily from water to air. Most VOCs are industrial chemicals. IOCs are metals and minerals that can occur naturally or be introduced by human activity into drinking water supplies. Radionuclides are radioactive contaminants that can also occur naturally or as a result of human activity. These contaminants can pose either a short-term or a long-term health risk. EPA also regulates disease-causing microorganisms in drinking water. Microorganisms regulated by EPA include bacteria, viruses and protozoa, all of which can pose short-term or acute health risks to a PWS's users.

For more information about these topics:	Refer to these questions:
Number of NPDWRs	II.8 - II.12 and II.17.

II.8. How many of these standards are now effective?

All 84 are currently effective. Regulations for the contaminants currently in effect are presented in Appendix B, Table 1. Table 2 lists the dates they became effective.

The SDWA normally establishes an 18-month period between the time an MCL or TT is promulgated and the time that the regulation becomes effective. This means that when EPA regulates a contaminant, PWSs normally have 18 months from that promulgation date before they must begin controlling its level in the drinking water they supply consumers. Due to the lag between the effective date of a final rule and the date that a State with primary enforcement responsibility adopts a final rule, enforcement of a new final rule may be the responsibility of the EPA until a State attains primacy for it.

For more information about these topics:	Refer to these questions:
Number of NPDWRs	II.7, II.9 - II.12 and II.17.

II.9. When would there be fewer standards effective than final?

As discussed above, under the SDWA there is a period of 18 months before a final rule becomes effective. For 18 months after a rule has been finalized, those contaminants regulated under that rule will be final but not yet effective. Systems may choose to or may be required to monitor for the contaminant before an MCL becomes effective. If the results of that monitoring show that a system exceeds an MCL, the PWS has time to come into compliance before the rule is effective and a violation would be incurred. Appendix B, Table 1 presents a listing of regulated contaminants by rule while Appendix B, Table 2 lists the effective date for each rule.

When EPA promulgates an NPDWR, States with primacy have 18 months from that promulgation date to revise their primacy programs and adopt the new rule (SDWA, Section 1412(b)(10)). Some States have been granted extension agreements for up to two years to adopt final regulations promulgated by EPA. States must adopt regulations no less stringent than the federal regulations, and they must be able to demonstrate to EPA that they have the capability to enforce such regulations (SDWA, Section 1413(a)). This 18-month period serves three purposes: (1) It allows the States to adopt the regulation so that they can maintain primacy; (2) It allows EPA and/or the States to certify laboratories to test for that contaminant; and (3) It allows time for PWSs to comply with the regulation.

For more information about these topics:	Refer to these questions:
Number of NPDWRs	II.7 - II.8, II.10 - II.12 and II.17.

II.10. How many NPDWRs are currently proposed but are not yet final?

At this time, EPA has proposed NPDWRs for 20 contaminants either singly or as a contaminant group (such as haloacetic acids) that have not yet been promulgated. Six of these contaminants are radionuclides, which were proposed on July 18, 1991 (56 FR 33050). Twelve of these contaminants are disinfectants or disinfection byproducts (D/DBPs), which were proposed on July 29, 1994 (59 FR 38668). The Enhanced Surface Water Treatment Rule, which regulates *Cryptosporidium*, was also proposed on July 29, 1994 (59 FR 38832). The Sulfate Rule was proposed in December 1994.

When EPA proposes a regulation, the Agency lists the contaminants that it plans to regulate along with the proposed MCL or TT requirement for each contaminant. EPA also lists monitoring, reporting and any special State primacy requirements in the proposed rule. EPA has proposed regulations for six radionuclides: adjusted gross alpha emitters, beta particle and photon emitters, radium-226, radium-228, radon-222 and uranium. Some of these compounds, such as radon-222 and uranium, have never been regulated in drinking water by EPA. Some compounds, such as radium-226 and radium-228, are already regulated, and EPA is proposing to revise their levels. EPA has also proposed regulations for 12 D/DBPs, including chlorine, chlorine dioxide, chloramines, chlorite, bromate, haloacetic acids (a group of five) and total trihalomethanes (a group of four). The Enhanced Surface Water Treatment Rule will revise/update some of the Surface Water Treatment Rule requirements as well as regulate *Cryptosporidium.* Last, EPA proposed to regulate sulfate as a National Primary Drinking Water Regulation (NPDWR)

In a proposed regulation, EPA may specify the date that it expects to promulgate the proposed rule. However, there is no guarantee that the Agency will finalize a rule exactly as it was proposed. In some instances, EPA may promulgate a contaminant at a different level than it was proposed, or the Agency may decide to not promulgate it at all.

For more information about these topics:	Refer to these questions:
Number of NPDWRs	II.7 - II.9, II.11 - II.12 and II.17.

II.11. Will any primary drinking water regulations be proposed or finalized in the future?

Yes, EPA plans to propose regulations for several contaminants, such as arsenic and aldicarbs. EPA also plans to propose the Phase VI-b Rule, which would promulgate MCLs for multiple contaminants. In addition, the Agency plans to propose additional TT requirements for pathogens (the Ground Water Disinfection Rule).

At this time, EPA is subject to court-ordered deadlines to propose regulations for the disinfection of ground water by August 1995, with the final regulations expected in August 1997. The Agency also plans to repropose the

standards for aldicarb, aldicarb sulfone and aldicarb sulfoxide in Fiscal Year 1995. EPA is under a court-ordered deadline to propose a revised rule for arsenic in November 1995 and finalize it two years later. The Agency is also under a court-ordered deadline for the Phase VI-b Rule, which will set standards for selected organic and inorganic contaminants in drinking water. Under this court-ordered deadline, EPA has to propose the Phase VI-b Rule in February 1995 and promulgate it in February 1997.

For more information about these topics:	Refer to these questions:
Number of NPDWRs	II.7 - II.10, II.12 and II.17.

II.12. Does EPA have a list of what contaminants will be proposed or finalized in the future?

Yes, as required by the SDWA, EPA prepares the Drinking Water Priority List (DWPL) every three years. This list names the contaminants that EPA is considering for future regulation. However, EPA will not necessarily regulate every contaminant on the DWPL.

The DWPL is a list of contaminants that may occur in drinking water supplies and that may require regulation under the SDWA, as amended in 1986 (SDWA, Section 1412(b)(3)(A)). As discussed previously, the SDWA requires EPA to propose and promulgate standards for at least 25 contaminants every three years. EPA uses the DWPL as a source for identifying new contaminants to regulate. EPA published the first list of 53 contaminants on January 22, 1988 (53 FR 1892), fulfilling the requirements in the SDWA Amendments of 1986 (56 FR 1470). EPA published the latest edition of the DWPL on January 14, 1991 (56 FR 1470) (See Appendix C). At this time, only the D/DBPs and *Cryptosporidium* has been proposed from the most recent DWPL. No other contaminants listed on the most current DWPL have been proposed or promulgated; however, EPA is under a court-ordered deadline to propose the Phase VI-b Rule, which includes contaminants from the most recent DWPL, by February 28, 1995.

EPA is under a court-ordered deadline to propose regulations for disinfecting ground water by August 30, 1995. The Phase VI-b Rule, which will be comprised of contaminants that the Agency judges to cause potential health concerns in drinking water, has been scheduled for proposal by February 28, 1995.

For more information about these topics:	Refer to these questions:
DWPL	II.13 - II.15.

II.13. Do the contaminants on the Drinking Water Priority List (DWPL) have MCLGs and MCLs?

No, the DWPL does not include MCLs or MCLGs. It is merely a list of compounds that may be regulated by EPA in the future.

EPA places contaminants on the DWPL based on preliminary occurrence and health effects information. No MCLs or MCLGs are established for contaminants on the basis of such preliminary information. However, from the DWPL, EPA is required to propose regulations for at least 25 contaminants (SDWA, Section 1412(b)(3)(C)). EPA is also required to promulgate regulations for at least 25 contaminants; each promulgated compound would then have a final MCLG and MCL or TT. (SDWA, Section 1412(b)(3)(D)).

For more information about these topics:	Refer to these questions:
DWPL	II.12 and II.14 - II.15.
MCLGs	II.2, II.4, III.A.1 - III.A.3 and IV.1.
MCLs	II.3 - II.4, II.6, II.19, III.B.1 -III.B.3, III.B.6 - III.B.7 and III.B.9 - III.B.10.

II.14. How does EPA choose which contaminants to place on the Drinking Water Priority List (DWPL)?

EPA chooses contaminants for inclusion on the DWPL from a variety of sources based on preliminary data focusing on occurrence and health effects of each contaminant.

To make this determination, EPA forms a workgroup composed of members from the National Toxicology Program and members of EPA from the Office of Science and Technology and the Office of Ground Water and Drinking Water (both are in the Office of Water); as well as from the Offices of Prevention, Pesticides and Toxic Substances; Solid Waste and Emergency Response and other appropriate offices. In addition to other sources, the SDWA requires EPA to consider contaminants listed in Section 101(14) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980, and substances in the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) when selecting candidates for inclusion in the DWPL (SDWA, Section 1412(b)(3)(B)). EPA identifies contaminants for inclusion based on some level of potential health concern and some likelihood of occurrence in public drinking water supplies.

For more information about these topics:	Refer to these questions:
DWPL	II.12 - II.13 and II.15.

II.15. Is the DWPL ever revised?

Yes, as discussed in Questions II.12 through II.14, EPA must revise the DWPL every three years as required by the SDWA Amendments of 1986.

The latest DWPL, published in the *Federal Register* on January 14, 1991, contains 77 contaminants (56 FR 1470). In this revised list, EPA carried over 50 contaminants from the previous DWPL of 1988 (53 FR 1892) and added 27 new contaminants (56 FR 1470).

For more information about these topics:	Refer to these questions:
DWPL	II.12 - II.14.

II.16. Are promulgated standards ever revised?

Yes, EPA revises promulgated standards. If EPA determines that changes to a regulation will provide greater protection to human health, then EPA will propose and then promulgate a revised regulation.

EPA has revised several of its standards, including those for barium, cadmium, lead, nitrate, selenium, silver, lindane, mercury and chromium, among others. The Total Coliform Rule was revised in June of 1989, and the Surface Water Treatment Rule may be revised/updated in the future if the proposed Enhanced Surface Water Treatment Rule (which was proposed July 29, 1994) is promulgated. EPA is under a court-ordered deadline to propose revisions to the Arsenic Rule by November 1995.

For more information about these topics:	Refer to these questions:
NPDWRs	II.1, II.3, II.5 - II.12, III.B.1, IV.1, IV.7 - IV.8 and IV.11.

II.17. What is a Secondary Drinking Water Regulation (SDWR)?

An SDWR is a non-enforceable guideline regarding cosmetic effects (such as skin or tooth discoloration) and aesthetic effects (such as its taste, odor or color) of drinking water. EPA recommends them to water systems but does not require systems to comply with these secondary, or aesthetic-based, levels.

EPA recommends SDWRs for contaminants that do not cause adverse health affects, but instead, adversely affect the cosmetic or aesthetic qualities of drinking water. However, States may choose to adopt SDWRs as enforceable standards. In some cases, a contaminant may have a primary and a secondary drinking water standard. This simply means that at certain levels a contaminant may adversely affect the cosmetic or aesthetic quality of drinking water while at higher levels the same contaminant may adversely affect the public health. An example of this is fluoride, which at levels above 4 mg/l may cause skeletal

damage. However, at levels between 4 mg/l and 2 mg/l, fluoride may only cause a brownish discoloration of the teeth, called dental fluorosis, which EPA currently considers to be an aesthetic concern. Therefore, EPA set a primary, health based, MCL of 4 mg/l and a secondary, cosmetic based, SMCL of 2 mg/l for fluoride.

For more information about these topics:	Refer to these questions:
SDWRs	II.18.

II.18. How is a National Primary Drinking Water Regulation (NPDWR) different from a Secondary Drinking Water Regulation (SDWR)?

EPA sets NPDWRs for contaminants at levels that can adversely affect public health. EPA sets SDWRs for contaminants at levels that can adversely affect the aesthetic quality of drinking water. NPDWRs are federally enforceable; SDWRs are not.

NPDWRs are enforceable standards to which PWSs must adhere to stay in compliance with the Safe Drinking Water Act. SDWRs are non-enforceable standards on the federal level. A PWS would not have to follow these standards unless its State had adopted them as enforceable State regulations. In addition, NPDWRs are uniform for the nation, while SDWRs may have ranges or vary according to geographic or source water characteristics (such as aluminum and pH).

For more information about these topics:	Refer to these questions:
NPDWRs	II.1, II.3, II.5 - II.12, III.B.1, IV.1, IV.7 - IV.8 and IV.11.
SDWRs	II.17.

Sources Cited in Section II.

Code of Federal Regulations, Title 40 CFR 141. Government Printing Office. July 1993. [40 CFR 141]

Federal Register. Vol. 53, No. 14. Drinking Water; Substitution of Contaminants and Drinking Water Priority List of Additional Substances Which May Require Regulation Under the Safe Drinking Water Act. January 22, 1988. [53 FR].

Federal Register. Vol. 56, No. 9. Priority List of Substances Which May Require Regulation Under the Safe Drinking Water Act; Notice. January 14, 1991. [56 FR].

Federal Register. Vol. 56, No. 20. National Primary Drinking Water Regulations; Final Rule. January 30, 1991. [56 FR].

Federal Register. Vol. 56, No. 110. Maximum Contaminant Level Goals and National Primary Drinking Water Regulations for Lead and Copper; Final Rule. June 7, 1991. [56 FR].

Federal Register. Vol. 56, No. 138. National Primary Drinking Water Regulations; Radionuclides; Proposed Rule. July 18, 1991. [56 FR].

Federal Register. Vol. 58, No. 78. National Primary Drinking Water Regulations; Notice of Proposed Rulemaking. April 26, 1993. [58 FR].

Federal Register. Vol. 59, No. 145. National Primary Drinking Water Regulations: Enhanced Surface Water Treatment Requirements; Proposed Rule. July 29, 1994. [59 FR].

Federal Register. Vol. 59, No. 145. National Primary Drinking Water Regulations; Disinfectants and Disinfection Byproducts; Proposed Rule. July 29, 1994. [59 FR].

U.S. Congress. Safe Drinking Water Act. 42 U.S.C. Section 300f et seq. June 1986. [SDWA].

U.S. Environmental Protection Agency. EPA Fact Sheet: Fluoride in Drinking Water (EPA 822/F-93-010). December 1993. [Fluoride Fact Sheet].

III. Maximum Contaminant Level Goals (MCLGs) and Maximum Contaminant Levels (MCLs)
III.A. MCLGs

III.A.1. How does EPA set a Maximum Contaminant Level Goal (MCLG)?

EPA sets an MCLG for each regulated contaminant at a level where no known or anticipated health risk will occur and which allows an adequate margin of safety (SDWA, Section 1412(b)(4)). EPA's Office of Science and Technology (OST) (in the Office of Water) places each contaminant (with the exception of microorganisms and indicator bacteria, which are examined for waterborne disease potential) into one of three categories: Category I - indicating strong evidence of carcinogenicity, Category II - indicating limited evidence of carcinogenicity and Category III - indicating inadequate or no evidence of carcinogenicity based on toxicity studies.

The specific procedure for setting an MCLG varies, depending on the category to which a contaminant is assigned. For contaminants placed in Category I, indicating strong evidence of carcinogenicity, EPA sets an MCLG of zero since EPA assumes that any exposure, regardless of how small, will increase the risk of cancer (i.e., any dose will increase the risk of cancer). For each contaminant placed in Category II, EPA sets the MCLG by deriving its reference dose (i.e., the lowest daily level of a contaminant that will not produce non-cancer adverse health effects) with an additional margin of safety (57 FR 31781-31782). For each contaminant placed in Category III, EPA sets the MCLG solely from the reference dose. For all microorganisms, viruses, and coliform bacteria, which are not assigned to a category, EPA sets an MCLG of zero.

For more information about these topics:	Refer to these questions:
Cancer groups	III.A.5 - III.A.6.
Categories	III.A.3 - III.A.4 and III.A.6 -III.A.7.
MCLGs	II.2, II.4, III.A.7 - III.A.12.

III.A.2. What is EPA's reasoning for setting MCLGs of zero?

EPA sets MCLGs of zero for contaminants that are known or probable carcinogens since scientists do not know if any level of exposure, no matter how small, might cause cancer.

The SDWA requires EPA to set an MCLG for each contaminant at a level where there is no known or anticipated public health risk from ingesting that contaminant in drinking water. As stated above, there is no known level for carcinogens that is protective of human health over a lifetime. Therefore, EPA sets MCLGs of zero for substances considered to be known or probable human

carcinogens (i.e., for Category I chemicals). For pathogens and coliforms the health risks are acute; therefore, these organisms are also given an MCLG of zero and the MCL (or TT requirements) are established to be protective of acute human health risks.

For more information about these topics:	Refer to these questions:
Categories	III.A.3 and III.A.6.
MCLGs	II.2, II.4, III.A.1 - III.A.3.

III.A.3. When setting the MCLG, what are Categories I, II and III, and how do these categories affect the MCLG setting process?

Using data from long-term animal and human epidemiological studies, EPA has established an approach for setting MCLGs that involves placing each regulated contaminant (except microorganisms, which currently are given an MCLG of zero) into one of three categories: Category I, Category II or Category III. Factors such as weight of evidence for carcinogenicity, cancer potency, exposure, pharmacokinetics and mechanism of action influence the category in which a contaminant is placed (57 FR 31782).

Each category reflects a contaminant's potential level of carcinogenicity for humans who ingest it via their drinking water. Category I reflects strong evidence of carcinogenicity, while Category II reflects limited evidence, and Category III has inadequate or no evidence of carcinogenicity. As discussed previously, EPA will derive an MCLG depending on the category in which a contaminant has been placed. These categories and MCLG setting approaches are summarized below:

EPA's Three-Category Approach
for Establishing MCLGs

Category	Evidence of Carcinogenicity via Ingestion	MCLG Setting Approach
I	Strong human or animal evidence considering the weight of evidence, pharmacokinetics, and exposure	Zero
II	Limited animal evidence considering weight of evidence, pharmaco-kinetics, and exposure	Reference Dose (RfD) approach with added safety margin or 10^{-5} to 10^{-6} cancer risk range
III	Inadequate or no animal evidence	RfD approach

In general, EPA has determined that for Category I contaminants, there is strong evidence of carcinogenicity from human or animal studies. It is current EPA policy that MCLGs for these contaminants be set at zero because it is assumed, in the absence of other data, that there is no known exposure threshold for carcinogenicity via ingestion in drinking water for these contaminants.

EPA places contaminants for which there is limited information of carcinogenicity from the weight of evidence, pharmacokinetics and exposure in Category II. To establish an MCLG for a Category II chemical, EPA can use one of two approaches. In the first, the Agency determines a contaminant's Reference Dose (RfD) by examining noncarcinogenic health effects and then dividing that number by an additional margin of safety of 1 to 10. In the absence of valid noncarcinogenic health effect information, however, EPA can set the MCLG based on a theoretical lifetime excess cancer risk range of 10^{-5} to 10^{-6} using a conservative mathematical extrapolation model (57 FR 31783). Typically, EPA uses the first approach.

The last category, Category III, includes contaminants for which EPA has inadequate or no animal evidence of carcinogenicity via ingestion. For these contaminants, EPA sets the MCLG by deriving the RfD using data on noncarcinogenic health effects. However, the Agency does not apply a safety margin for carcinogenicity of 1 to 10 to these contaminant levels as it does for compounds in Category II.

For more information about these topics:	Refer to these questions:
Cancer Groups	III.A.4 - III.A.6.
Categories	III.A.1 and III.A.6 - III.A.7.
RfDs	III.A.8 - III.A.11.

III.A.4. What is a cancer classification?

EPA has developed cancer classifications for chemicals according to their possible carcinogenicity in humans. The objective of this classification system is to assess each contaminant in order to determine the level or strength of evidence that the substance is a human or animal carcinogen (57 FR 31782).

EPA's cancer classification is a system for evaluating the potential carcinogenicity of a regulated contaminant. There are 5 groups under this approach (Groups A, B, C, D and E), with Groups A and B generally placed in Category I, Group C placed in Category II and Groups D and E placed in Category

III. While not intended to be applied rigidly or mechanically, this classification system establishes guidelines for categorizing the weight of human and animal evidence to determine the potential public health risks from cancer causing contaminants.

For more information about these topics:	Refer to these questions:
Cancer Classifications	III.A.5 - III.A.6.

III.A.5. How many cancer classifications exist, and what does each classification mean?

There are five cancer classifications. EPA evaluates each regulated contaminant using data from human epidemiological or laboratory animal studies and classifies each according to its potential carcinogenicity. EPA is currently revising this approach and has issued draft guidelines, but the current scheme will be in effect until the revised guidelines have been finalized. The classification scheme is included as follows:

Group A:	Known human carcinogen based on sufficient evidence from epidemiological or other human evidence studies.
Group B1:	Probable human carcinogen based on limited evidence of carcinogenicity in humans.
Group B2:	Probable human carcinogen based on sufficient evidence in animals and inadequate or no data in humans.
Group C:	Possible human carcinogen based on limited evidence of carcinogenicity in animals in the absence of human data.
Group D:	Not classifiable as to human carcinogenicity based on lack of data or inadequate evidence of carcinogenicity from animal data.
Group E:	No evidence of carcinogenicity from at least two reliable tests in different species of laboratory animals (51 FR 34000).

For more information about these topics:	Refer to these questions:
Cancer Classifications	III.A.4 and III.A.6.

III.A.6. How does EPA determine which cancer classification to assign to a contaminant?

EPA assigns a cancer classification to each contaminant by using data from human and laboratory animal studies.

EPA's Office of Science and Technology (OST) (in the Office of Water) evaluates each chemical contaminant's potential carcinogenicity via ingestion in drinking water using data from human and laboratory animal studies and places each compound into its appropriate cancer classification group. The Cancer Risk Assessment Verification Endeavor (CRAVE), a workgroup made up of representatives from various EPA programs, then reviews OST's decisions regarding these cancer classifications (56 FR 3531).

For more information about these topics:	Refer to these questions:
Cancer Groups	III.A.4 - III.A.5.
Categories	III.A.1. and III.A.3.

III.A.7. What is a cancer risk range, and how is it derived?

The cancer risk range is an estimate of the probability that a person will develop cancer after a lifetime of ingesting water containing the regulated contaminant. There are several mathematical models that EPA can use to derive this risk range using data from human epidemiological or laboratory animals studies.

The cancer risk range is a numeric criterion that the Agency derives in order to identify the level of exposure to a carcinogenic contaminant that will result in a lifetime risk of no greater than 10^{-5} to 10^{-6}. This means that it is a way to arrive at a numeric level that would be protective of the public so that no more than 1 in every 100,000 to 1 in every 1 million people would be at risk of developing cancer after ingesting that contaminant in their drinking water over their lifetimes.

As discussed above, there are several mathematical models that EPA can use to determine this risk range. According to the Agency's *Final Guidelines for Determining Carcinogen Risk Assessment*, which appeared in the *Federal Register* on September 24, 1986, "No single mathematical procedure is recognized as the most appropriate for low-dose extrapolation in carcinogenesis" (51 FR 33997). However, in most cases, EPA will use a procedure which incorporates low-dose linearity to calculate the cancer risk range (51 FR 33997).

For more information about these topics:	Refer to these questions:
Categories	III.A.1 and III.A.3.
RfDs	III.A.8 - III.A.11.

III.A.8. What are the NOAEL/LOAEL levels, and how are the levels derived?

NOAEL stands for no-observed-adverse-effect-level and LOAEL stands for the lowest-observed-adverse-effect-level. The EPA RfD Workgroup identifies both of these levels from human and laboratory animal studies and uses either the NOAEL or the LOAEL to derive an RfD.

The NOAEL is a dose in a toxicity test that does not produce an observable adverse effect. The LOAEL is the lowest dose in a toxicity test that produces an observable adverse effect. EPA derives the NOAEL and the LOAEL from studies in humans or laboratory animals (57 FR 31783). In order to calculate a contaminant's RfD, EPA divides the NOAEL or LOAEL by an appropriate uncertainty factor.

For more information about these topics:	Refer to these questions:
NOAEL/LOAEL	III.A.9.
RfDs	III.A.9 - III.A.11.

III.A.9. What is an uncertainty factor, and how is it derived?

Uncertainty factors account for intraspecies and interspecies variations, for limited or incomplete data, for evaluating the significance of adverse effects and for pharmacokinetic factors (56 FR 3532). In other words, the uncertainty factor takes into account the differences in response to toxicity for a given contaminant within human and animal populations and between humans and animals, as well as the quality of the data base and the type of toxicological effects (56 FR 3532).

EPA has established the following criteria for determining the magnitude of the uncertainty factor (56 FR 3532).

Uncertainty Factor	Criteria
1 - 10	When a NOAEL from a human study is used to account for intraspecies diversity.
100	When a LOAEL from a human study is used, incorporating a factor of 10 to account for lack of a NOAEL and a factor of 10 for intraspecies diversity.
100	When a NOAEL from an animal study is used, incorporating a factor of 10 to account for interspecies diversity and a factor of 10 for intraspecies diversity.

1,000	When a LOAEL from an animal study is used, incorporating factors of 10 each for lack of NOAEL, interspecies diversity and intraspecies diversity.
1-10	Additional uncertainty factors, ranging from 1 to 10, may be incorporated on a case-by-case basis to account for deficiencies in the database.
other	Other uncertainty factors may be used according to scientific judgment when justified.

For more information about these topics:	Refer to these questions:
NOAEL/LOAEL	III.A.8 and III.A.10.
RfDs	III.A.8 and III.A.10 - III.A.11.

III.A.10. What is a Reference Dose (RfD), and how does EPA determine it?

An RfD is a numeric level that estimates the lowest daily level of a contaminant that will not produce adverse health effects. This dose incorporates a margin of safety and protects sensitive members of the population. Although Category I contaminants (which are given an MCLG of zero) may have RfDs, EPA does not use the RfD to set the MCLG for these contaminants. The Agency uses the RfD to calculate the MCLG for Category II and III contaminants. The EPA RfD Workgroup derives an RfD level by determining either the no-observed-adverse-effect-level (NOAEL) or the lowest-observed-adverse-effect-level (LOAEL) for a contaminant and dividing that level by an uncertainty factor.

The RfD is defined as an estimate "of a daily exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious health effects during a lifetime" (57 FR 31783). The first step EPA performs to derive this level is to identify a contaminant's NOAEL or LOAEL that has been elicited from an appropriate scientific study of humans or laboratory animals. Then, the Agency will divide the NOAEL or LOAEL by an uncertainty factor.

An uncertainty factor is used to account for differences in response to toxicity within the human population and between humans and laboratory animals, and to evaluate the significance of those different responses, as well as to account for limited or incomplete data. The Agency usually bases an RfD on a 70 kg

(approximately 154 pounds) adult who consumes an average of 2 liters of water per day over a lifetime of 70 years.

The mathematical formula for the calculation of the RfD is as follows (56 FR 3532):

$$\text{RfD (mg/kg/d)} = \frac{\text{NOAEL or LOAEL}}{\text{Uncertainty Factor}}$$

Once it derives an RfD for a contaminant, EPA uses that numerical level, expressed in milligrams per kilograms per day, to calculate a Drinking Water Equivalent Level (DWEL) for that contaminant. EPA uses the DWEL to determine an MCLG for a Category II or Category III contaminant.

For more information about these topics:	Refer to these questions:
Categories	III.A.1 and III.A.3.
NOAEL/LOAEL	III.A.9 - III.A.10.
RfDs	III.A.8 - III.A.9 and III.A.11.

III.A.11. What is a Drinking Water Equivalent Level (DWEL), and how is it derived?

A DWEL is a lifetime exposure concentration of a contaminant in drinking water that will not cause adverse, non-cancer health effects. This concentration level assumes that all of a person's possible exposure to a contaminant comes from a drinking water source. EPA derives the DWEL for a contaminant by multiplying the RfD by the weight of an adult (usually assumed to be 70 kilograms or 154 pounds), and then dividing that number by the amount of water consumed each day (usually assumed to be one liter per day for VOCs and two liters per day for all other contaminants).

EPA defines the DWEL as the estimated exposure (measured in mg/l) which is protective for noncarcinogenic endpoints of toxicity over a lifetime of exposure. The DWEL assumes that the total daily exposure comes from drinking water. EPA calculates this level as follows:

$$\text{DWEL} = \frac{\text{RfD (mg/kg/day) x body weight (kg)}}{\text{water consumed (l/day*)}}$$

* The average daily water consumption is assumed to be two liters per day (56 FR 3532).

For more information about these topics:	Refer to these questions:
DWELs	III.A.12.
RfDs	III.A.8 - III.A.10.

III.A.12. What is the Relative Source Contribution?

The Relative Source Contribution (RSC) is another component EPA uses to calculate an MCLG. As discussed previously, the DWEL represents the protective level of exposure assuming that 100 percent of a person's exposure to a contaminant comes from drinking water. However, a person can be exposed to contaminants from various sources in addition to drinking water. The RSC is used to adjust the MCLG to account for the portion of a person's daily exposure to a contaminant that comes from sources other than drinking water.

Generally, EPA assumes that the RSC from drinking water is 20 percent of the total exposure, unless other exposure data for the chemical are available. The RSC may be as high as 80 percent (57 FR 31782).

For more information about these topics:	Refer to these questions:
DWELs	III.A.11.
MCLGs	II.2, II.4, and III.A.1 - III.A.3.

Sources Cited in Section III.A.

Federal Register. Vol. 51, No. 185. Guidelines for Carcinogen Risk Assessment. September 24, 1986. [51 FR].

Federal Register. Vol. 54, No. 97. National Primary and Secondary Drinking Water Regulations; Proposed Rule. May 22, 1989. [54 FR].

Federal Register. Vol. 56, No. 20. National Primary Drinking Water Regulations; Final Rule. January 30, 1991. [56 FR].

Federal Register. Vol. 57, No. 138. National Primary Drinking Water Regulations; Synthetic Organic Chemicals and Inorganic Chemicals; Final Rule. July 17, 1992. [57 FR].

III. Maximum Contaminant Level Goals (MCLGs) and Maximum Contaminant Levels (MCLs)

III.B. MCLs

III.B.1. How does EPA set National Primary Drinking Water Regulations (NPDWRs)?

EPA sets each NPDWR, which includes either MCLs or TTs, on a contaminant-by-contaminant basis. For each contaminant to be regulated, EPA first sets an MCLG at a level that protects against health risks (see Section III.A.). EPA must then set each contaminant's MCL as close to its MCLG as is feasible, taking costs into consideration. In some cases, when it is not feasible to set an MCL, EPA will develop a TT that establishes procedures a PWS must follow to protect public health, taking into account data concerning economics and technology.

EPA may set a TT only if the Agency's Administrator determines that it is not economically or technologically feasible to ascertain the level of a regulated contaminant (SDWA, Section 1412(b)(7)(A)). However, even though a TT does not set a numerical limit for a contaminant, EPA identifies those TTs which would prevent known or anticipated adverse health effects on the public, including sensitive members of the public, to the extent feasible (SDWA, Section 1412(b)(7)(A)). In all other cases, EPA sets an MCL for each regulated contaminant.

The SDWA states that EPA must set each MCL as close to its MCLG as is feasible (SDWA, Section 1412(b)(4)). The Act then defines feasibility as "feasible with the use of the best technology [BAT], treatment techniques and other means which the Administrator finds, after examination for efficacy under field conditions and not solely under laboratory conditions, are available (taking cost into consideration)" (SDWA, Section 1412(b)(5)). Based on the legislative history associated with the Safe Drinking Water Act, EPA interprets this statutory language to mean setting numerical standards, or limits, at the smallest possible number that is feasible for large systems that have relatively clean source water (D/DBP Status Report, Overview Section, p 2).

For more information about these topics:	Refer to these questions:
MCLs	II.1, II.3 - II.4, II.6 and II.19.
NPDWRs	III.B.2 - III.B.3 and III.B.6 - III.B.9.
TTs	II.1, and II.5 - II.6.

III.B.2. What technological concerns are factored into this determination?

EPA weighs several technological components when determining NPDWRs. Each NPDWR lists technologies, treatment steps and other means that are feasible for meeting the MCL (57 FR 31797). EPA evaluates all of these components separately and together to measure their influence on each MCL and/or TT.

In deriving MCLs or TTs, EPA evaluates the availability and performance of various technologies for removing the contaminant, the ability of laboratories to measure accurately and consistently the level of the contaminant with available analytical methods and health risks associated with various contaminant levels to ensure that the MCL will adequately protect public health (57 FR 31797-31798).

In addition, EPA must take into account PWSs' ability to comply with the MCL. While the SDWA requires EPA to set MCLs and TTs as close to their MCLGs as is feasible, EPA does not consider it technologically feasible to set MCLs so stringent that most systems could not possibly meet them. "While the legislative history indicates that Congress intended that MCLs be set based upon the better performing systems (i.e., large systems applying BAT to 'relatively clean source water'), there is no indication that Congress envisioned establishment of MCLs that would result in widespread noncompliance among water systems" (56 FR 26476).

For more information about these topics:	Refer to these questions:
BATs	III.B.3 - III.B.5.
MCLs	II.1, II.3 - II.4, II.6 and II.19.
TTs	II.1 and II.5 - II.6.

III.B.3. What are BATs, and how are they involved in setting MCLs?

BAT stands for Best Available Technology, which is defined as any or all technologies that after field and laboratory testing are judged to be the most effective technologies for achieving the MCL. For synthetic organic compounds (SOCs), the SDWA states that any BAT identified must be at least as effective as granular activated carbon (GAC). Formerly this term was called BTGA, Best Technology Generally Available. However, the 1986 Amendments to the SDWA changed the name to BAT, and established a broader standard that allowed EPA to choose a BAT that may not necessarily be in widespread use, as long as its performance has been demonstrated in a reliable way (57 FR 31797).

Although the SDWA states that a BAT's performance must be tested under broader conditions than laboratory conditions, EPA does not believe that the Act requires field testing for each technology operating on each contaminant as a prerequisite for specifying a BAT for a specific contaminant (56 FR 26498).

Instead, EPA interprets the SDWA directive to permit a technology to be identified as a BAT for a contaminant where there has been successful field application of the technology for treatment of other compounds, coupled with laboratory or pilot-scale data on the contaminant to be regulated to verify that technology as BAT for the contaminant to be regulated.

In some cases, EPA uses data on the capabilities of BATs as they are projected for large systems with relatively clean source water, along with data on the capabilities of the analytical devices used to measure a contaminant in drinking water when the Agency sets a numerical standard for a contaminant (57 FR 31797). BATs, then, are EPA's determination that available technology exists to remove or inactivate each regulated contaminant to its MCL. Indeed, a BAT indicates what amount of contaminant removal has been demonstrated through the use of a particular technology.

A BAT is not, however, a technology that must be used by a water system that exceeds an MCL. BATs need not be used by a system if the system can achieve the standard by using another approach. If, however, a system wants a variance (a waiver from having to comply with a regulation), it must first install the BAT and demonstrate that its source water is of such poor quality that even BAT does not enable the system to comply with the MCL (SDWA, Section 1415).

For more information about these topics:	Refer to these questions:
BATs	II.B.2 and III.B.4 - III.B.5.
MCLs	II.1, II.3 - II.4, II.6 and II.19.

III.B.4. How are BATs chosen?

The process of selecting a BAT incorporates several steps, ranging from conducting literature searches for information about various technologies to bench-scale or even field tests. Since in some cases the selection of BATs may affect the numerical level of an MCL, the Agency considers various criteria when adopting them for each regulated contaminant.

EPA's initial step is to identify all of the technologies that are capable of removing the contaminant from drinking water (57 FR 31797). Next, the Agency examines each one, using a process to determine which one or ones are 'best'. In order to be chosen as a BAT, EPA generally requires that a treatment technology meet certain conditions. Specifically, EPA evaluates whether the technology:

- Is demonstrated at field scale or projected from pilot studies or field data studies;
- Is compatible with other treatment technologies;

- Achieves effective contaminant removal;
- Is affordable to large drinking water utilities; and
- Performs as well as granular activated carbon filtration for synthetic organic compounds (SOCs).

As discussed in the previous question, EPA does not consider field testing to be essential for each specific contaminant. "The technology, however, must reasonably be expected to perform in a similar manner under field conditions regardless of aberrations due to scale-up factors" (57 FR 31809).

For more information about these topics:	Refer to these questions:
BATs	II.B.2, III.B.3 and III.B.5 - III.B.6.

III.B.5. Do water systems have to install BATs?

A PWS is not required to install the BATs in order to comply with the MCLs. A PWS is required to install BAT if it wishes to apply for a variance under Section 1415 of the SDWA.

According to *Framework for Decision-Making: An EPA Perspective*, "Systems are not required to use BAT in order to comply with the MCL but can use other technologies as long as they meet all drinking water standards and are approved by the State" (Framework, p 2). Indeed, application of a new technology may be the last resort for systems, coming after alternative strategies have been tried, such as mixing water from a variety of sources to dilute the contaminant's presence in tap water or shutting down one source of contaminated water in favor of using 'cleaner' sources.

EPA's list of BATs for each regulated contaminant serves as a way for systems to get a variance from meeting an MCL. A variance, where allowed by the State, permits a water system to continue supplying water to its users for a specified time period even though the water does not meet a drinking water standard (SDWA Pocket Guide, p. 7). To obtain a variance, a system must apply BAT first. Whenever a State issues a variance for a water system, the State must set a schedule for the system's future compliance. In some cases, the State will also set additional control measures, such as requiring the system to provide bottled water to its users (SDWA, Section 1415(a)(1)(A)(i-ii)). In some cases, the BATs identified by EPA for variances may be different from those listed for determination of the MCL.

For more information about these topics:	Refer to these questions:
BATs	III.B.2 - III.B.4 and III.B.6.
Variances/Exemptions	IV.8 - IV.11.

III.B.6. What cost concerns are factored into the MCL determination?

The SDWA directs EPA to take costs into consideration when setting MCLs. EPA considers the costs of installing, operating and maintaining the BAT in order to treat the water.

EPA considers the water treatment costs to PWSs when it sets MCL levels. In calculating these treatment costs, the Agency does not assume that every PWS will use the BATs. Some systems will not need to treat their water because they are at or below an MCL for a particular contaminant. Others may use alternatives other than BAT to treat their water effectively. In estimating costs, EPA considers varying source water quality, the potential difficulty a PWS may experience when operating and maintaining a BAT and the impact of using a BAT on other drinking water regulations, i.e., whether installing a BAT to remedy one contaminant may adversely affect the level of other compounds (Chafee Report, p.40).

For more information about these topics:	Refer to these questions:
BATs	III.B.2 - III.B.5.
Costs	III.B.7.

III.B.7. Does EPA factor in nationwide costs when setting NPDWRs?

The SDWA does not require EPA to calculate the nationwide costs associated with each regulation when setting an MCL. However, EPA does perform this analysis for many of its rules in the context of a Regulatory Impact Analysis (RIA).

For 'major' rules, those that are expected to generate significant costs, EPA must perform an RIA, a formal analysis that weighs the estimated economic costs against the perceived public health benefits of a regulation. When performing an economic analysis for an RIA, EPA must consider a variety of information, including

- Occurrence data, to determine the number of PWSs violating MCLs;
- Treatment and waste disposal cost data and corresponding probabilities that PWSs will select each of the various treatment and disposal options, to estimate the system level and aggregate costs of achieving the proposed MCLs; and
- Monitoring costs, to estimate aggregate costs of the monitoring requirements (57 FR 31831).

All of these costs are factored into RIAs although they do not directly affect the derivation of an MCL.

For more information about these topics:	Refer to these questions:
Costs	III.B.6.

III.B.8. Are health risks also factored into the determination of MCLs?

Yes, health risks dictate the MCLG, and the law requires EPA to set the MCL as close to the MCLG as is technologically and economically feasible.

For carcinogens, EPA's goal is to ensure that the maximum risk at the MCL falls within the annualized 10^{-4} to 10^{-6} risk range, which the Agency considers to be protective of human health. This risk range estimates the excess individual risk from a carcinogen over a person's lifetime (57 FR 31797-31798). Pathogens and coliforms regulated to date also have MCLGs of zero because even one protozoan pathogen or virus pathogen may cause an infection in some people; MCLs (or TT requirements) are set to be protective of these health risks.

For more information about these topics:	Refer to these questions:
Cancer Risk Range	III.A.6.
MCLGs	II.2, II.4 and III.A.1 - III.A.3.
MCLs	II.3 - II.4, II.6, III.B.1, III.B.3, III.B.6 - III.B.8 and III.B.10.

III.B.9. What are analytical methods, and how are they involved with MCLs?

Analytical methods are test methods that must be approved by EPA for measuring the presence and concentration of pollutants (Index to Test Methods, p.i). When EPA sets an MCL for a contaminant, it lists the approved method(s) that laboratories must use to measure the contaminant in drinking water.

Since approved analytical methods must be used to measure the level of contaminants, the laboratory's ability to use the approved methods to measure with precision and reliability is important to determine whether a PWS is in compliance with the MCLs. In most cases, the laboratory will have the ability to measure a contaminant well below its MCL. For contaminants that have an MCLG of zero, the precision of the analytical method and the treatment abilities of the BAT may be more significant since EPA must set an MCL as close to an MCLG as is feasible, and it would not be technologically feasible to set an MCL of zero.

EPA selects each analytical method carefully using a variety of criteria, both technical and economical. EPA evaluates methods "based on the following factors: (1) reliability (i.e., precision/accuracy) of the analytical results; (2) specificity in the presence of interferences; (3) availability of enough equipment and trained personnel to implement a national monitoring program (i.e., laboratory availability); (4) rapidity of analysis to permit routine use; and (5) cost of analysis to water supply systems" (57 FR 31798). Evaluation of the above criteria enables EPA to select analytical methods that are feasible for laboratories across the nation.

For more information about these topics:	Refer to these questions:
Analytical Methods	III.B.10 - III.B.13.

III.B.10. What is an MDL?

MDL stands for Method Detection Level, the minimum concentration of a chemical that can be measured and reported with 99-percent confidence that the true value is greater than zero (56 FR 26510).

"The MDL is a result of measurements made by an experienced laboratory under controlled research-type conditions" (56 FR 26510). An analyst derives these levels to serve as an indicator of the minimum concentration of a chemical that a laboratory can detect in a single sample, and MDLs may be used to evaluate the significance of a single measurement in future samples (40 CFR 136, Appendix B). MDLs may also be used to derive the Practical Quantitation Level (PQL) for a chemical. A PQL is the level that can be routinely monitored by laboratories under normal operating conditions. When deriving PQLs, EPA uses MDLs only when laboratory data, such as performance evaluation studies, are not available.

For more information about these topics:	Refer to these questions:
MDLs	III.B.11 and III.B.13.
PQLs	III.B.12 - III.B.14.

III.B.11. How is an MDL derived?

EPA derives MDL levels in a laboratory, using a method detailed in Part 136, Appendix B of the Code of Federal Regulations (40 CFR 136, Appendix B).

According to 40 CFR 136, Appendix B, the first procedure involves estimating the lowest detection limit. Then this estimate is tested by having a laboratory prepare two types of water samples: one that is as free as possible of the compound for which the MDL is being derived (called a blank) and another that contains this compound at a concentration as close to the estimated MDL as possible (called analyte spiked into reagent water). Seven specimens are generated from the analyte spiked into reagent water and processed. If the specimen results are in the correct range for determining the MDL, the laboratory would calculate the variance and standard deviation of the measurements. Then, the MDL is computed using a formula specified in 40 CFR 136, Appendix B.

For more information about these topics:	Refer to these questions:
MDLs	III.B.10 and III.B.13.

III.B.12. What is a PQL?

PQL stands for Practical Quantitation Level; this term is defined as a level that can be measured by good laboratories under normal operating conditions with specified limits of precision and accuracy (57 FR 31797).

These levels should be routinely attained by certified laboratories within a specified acceptance range, but laboratories are not required to do this in order to be certified. Using data from EPA and State laboratories, the Agency sets acceptance limits for required accuracy and precision on a contaminant-by-contaminant basis. For each regulated contaminant, EPA tries to establish the lowest PQL with the tightest acceptance levels consistent with available health effects information.

For more information about these topics:	Refer to these questions:
PQLs	III.B.13 - III.B.14.

III.B.13. How is a PQL derived?

In general, EPA can derive a PQL, or Practical Quantitation Level, in either of two ways. The Agency may determine this level through performance evaluation (PE) studies or it may estimate the PQL from the MDL if adequate data are not available from the PE studies (56 FR 26511).

EPA can estimate a PQL for a contaminant by multiplying the MDL by 5 to 10. Five is used when the ten times multiplier would cause the MCL to be higher than the MCLG or greater than a 10^{-4} lifetime cancer risk. "In cases where PE studies are unavailable or inadequate, EPA believes that a PQL set at '5 to 10 times' the MDL achieved by good laboratories is generally a fair expectation for routine operation of most qualified State and commercial laboratories" (56 FR 26511). This estimation is generally done, though, only if there is insufficient information from laboratory studies, particularly PE studies. If data from PE studies are available, EPA generally sets PQLs at a concentration where at least 75% of the laboratories involved in the PE studies are able to measure within a specified acceptance limit of the contaminant's true value (56 FR 26511).

For more information about these topics:	Refer to these questions:
MDLs	III.B.10 - III.B.11 and III.B.13 - III.B.14.
PQLs	III.B.12 and III.B.14.

III.B.14. How do the MDL and PQL differ?

These terms differ in definition, measurement practices and by use, and they should not be used interchangeably. MDLs may have been met once by an EPA or State laboratory, but PQLs should be routinely met by all certified laboratories.

While these levels of measurement are both used in the context of analytical methodology, they differ from each other in various respects. First, these levels refer to different types of measurement practices. Unlike PQLs, MDLs derived by EPA are not designed to be met by routine laboratory analysis--they may not be necessarily reproducible over time in a given laboratory (56 FR 26510). PQLs, on the other hand, are levels that certified laboratories should routinely measure with a specified degree of reliability and precision.

PQLs and MDLs are used differently by EPA. PQLs may be used in some cases as one of the factors examined by EPA when deriving MCLs. MDLs, conversely, are used for (1) deriving PQLs if no PE study data exist and/or (2) as an indicator of the minimum concentration of a chemical that a laboratory can detect in a single sample, which may be used to evaluate the significance of a single measurement in future samples. Under current regulations, MDLs are also used to trigger additional monitoring for SOCs. As such, MDLs, which are generally 5 to 10 times lower than PQLs, are not used directly in the derivation of MCLs or as a standard that a certified laboratory should meet.

For more information about these topics:	Refer to these questions:
MDLs	III.B.10 - III.B.11.
PQLs	III.B.12 - III.B.13.

Sources Cited in Section III.B.

Code of Federal Regulations, Title 40 CFR 136, Appendix B. Definition and Procedure for the Determination of the Method Detection Limit. Government Printing Office. July 1993. [40 CFR 136, Appendix B].

Federal Register. Vol. 56, No. 20. National Primary Drinking Water Regulations; Final Rule. January 30, 1991. [56 FR].

Federal Register. Vol. 56, No. 110. Maximum Contaminant Level Goals and National Primary Drinking Water Regulations for Lead and Copper; Final Rule. June 7, 1991. [56 FR].

Federal Register. Vol. 57, No. 138. National Primary Drinking Water Regulations; Synthetic Organic Chemicals and Inorganic Chemicals; Final Rule. July 17, 1992. [57 FR].

Nelson, Margaret. Index to EPA Test Methods. EPA Region I (EPA/901/3-88/001). 1988. [Index to Test Methods].

Regli, Stig, et al. Framework for Decision Making: An EPA Perspective (EPA/811/R-92/005). EPA Office of Water. August 1992. [Framework].

U.S. Congress. Safe Drinking Water Act. 42 U.S.C. Section 300f et seq. June 1986. [SDWA].

U.S. Environmental Protection Agency. Evaluation of Demonstration Technologies: Quail Creek Water Supply System (EPA/812/R-93/001). October 1992. [Quail Creek Demonstration Project].

U.S. Environmental Protection Agency. Technical and Economic Capacity of States and Public Water Systems to Implement Drinking Water Regulations: Report to Congress (EPA 810/R-93-001). September 1993. [Chafee Report].

U.S. Environmental Protection Agency. The Safe Drinking Water Act: A Pocket Guide to the Requirements for the Operators of Small Water Systems (EPA 570/9-90-600). September 1990. [SDWA Pocket Guide].

U.S. Environmental Protection Agency. Status Report on Development of Regulations for Disinfectants and Disinfection By-Products (No EPA Number). EPA Office of Groundwater and Drinking Water. June 1991. [D/DBP Status Report, Overview Section].

IV. Requirements Established by NPDWRs Other Than MCLGs and MCLs/TTs

IV.1. What other requirements are established by NPDWRs?

EPA establishes other requirements concerning drinking water contaminants in addition to setting MCLGs and either MCLs or TTs. For each regulated contaminant, EPA establishes monitoring, reporting, recordkeeping and public notification requirements as well as specifying the approved analytical methods and BATs. Along with NPDWRs, EPA sets requirements States must meet in order to obtain and retain primacy.

MCLGs and MCL/TTs are not the only requirements established by EPA for each regulated contaminant. EPA regulations establish requirements on when, where and how often PWSs must monitor their water for each regulated contaminant as well as what data to report and to whom they have to report it. The Agency also specifies recordkeeping and public notification requirements, approved analytical methodology and BATs for each regulated contaminant.

For more information about these topics:	Refer to these questions:
Analytical Methods	III.B.6 and III.B.10.
BATs	III.B.2 - III.B.6.
MCLGs	II.2, II.4 and III.A.1 - III.A.3.
MCLs	II.3 - II.4, II.6, III.B.1, III.B.3, III.B.6 - III.B.7 and III.B.9 -III.B.10.
Monitoring	IV.2 - IV.6.
NPDWRs	II.8 - II.12 and II.17.
Public Notification	IV.11 - IV.13.
Recordkeeping	IV.8 - IV.10.
Reporting	IV.7.
TTs	II.1, and II.5 - II.6.

IV.2. How frequently do Public Water Systems (PWSs) have to monitor for regulated contaminants?

There is no universal monitoring schedule that applies to all NPDWRs. EPA requires PWSs to monitor for some contaminants monthly (up to 480 times a month for coliforms, depending on a PWS's size, etc.), some quarterly and others annually, triennially and even once every nine years. EPA sets a monitoring schedule for each contaminant on a case-by-case basis. The Agency has, however, developed a nine-year framework, called the Standardized Monitoring Framework (SMF), that attempts to simplify/unify monitoring for many chemicals, although not all chemicals nor other contaminants such as microorganisms will be monitored under the SMF. For a more detailed description of the monitoring requirements under the SMF, see the *Consolidated Rule Summary for the Chemical Phases*, a document that is available from EPA's Safe Drinking Water Hotline (1-800-426-4791).

When developing monitoring requirements, the Agency treats each contaminant individually, considering factors such as each one's health effects, seasonality of occurrence in water, volatility, etc. For most contaminants, EPA specifies criteria that could trigger systems into reduced or increased monitoring for particular contaminants. Monitoring varies by system size, by source(s) of water supply and by contaminant. Monitoring for contaminants with acute health effects (such as coliforms) is also more frequent.

For more information about these topics:	Refer to these questions:
Monitoring	IV.1 - IV.6.

IV.3. Where must Public Water Systems (PWSs) monitor for contaminants?

It depends on the contaminant for which the systems are monitoring. For each regulated compound, EPA specifies where systems must monitor and any conditions that could lead to variations in monitoring sites.

Just as EPA establishes monitoring schedules for each contaminant on a contaminant-by-contaminant basis, the location or locations systems must monitor also may vary by contaminant. In most cases, PWSs will take samples at the entry point(s) to their distribution systems. However, in some cases, such as for lead and copper, systems will have to take tap water samples. In other cases, such as measuring turbidity under the Surface Water Treatment Rule, a system may have to take a sample at a location before the water is disinfected. Another example from the Surface Water Treatment Rule is the requirement that unfiltered systems monitor their source water.

For more information about these topics:	Refer to these questions:
Monitoring	IV.1 - IV.2 and IV.4 - IV.6.

IV.4. Does the source of water (i.e., surface water or ground water or a mixture of the two) affect the way systems monitor?

In some cases, the source of water that a PWS uses may affect its monitoring requirements.

Depending on the contaminant under regulation, monitoring requirements such as sampling frequency, number of samples, locations of sampling sites or even whether the PWS has to monitor for that contaminant at all may be affected by a system's type of source water. Some contaminants, such as *Giardia lamblia*, are associated with surface water. Therefore, the Agency requires only PWSs using surface water sources or ground water under the direct influence of surface water to treat their water to inactivate *Giardia lamblia*. Other contaminants may have different sampling frequencies depending on whether a water system uses surface water or ground water. As stated above, when EPA regulates a contaminant, the Agency will specify variations in monitoring for ground water and for surface water, if any apply.

For more information about these topics:	Refer to these questions:
Monitoring	IV.1 - IV.3 and IV.5 - IV.6.

IV.5. What other factors can affect monitoring?

There are several factors that can affect monitoring for a contaminant other than a PWS's source water or contaminant-specific considerations. These factors include type and size of a PWS, past monitoring history for a compound and a State's discretionary power.

The Agency sets monitoring requirements for each contaminant on an individual basis. When EPA establishes these requirements, the Agency evaluates a variety of factors in addition to characteristics of the contaminant under regulation. One such factor is the type of PWS that will be required to conduct monitoring. CWSs, NTNC water systems and TNC water systems serve different populations. In general, TNCs monitor for fewer contaminants (those with acute health effects) compared to CWSs and NTNCs.

Another factor influencing monitoring is the size of a PWS. For some regulations, such as the Lead and Copper Rule, EPA requires larger systems to begin monitoring for a contaminant before smaller ones. Under the SMF, all systems must monitor within a three-year period regardless of size, but many States require larger systems to monitor first. For some contaminants, EPA requires only systems that are of a certain size to monitor or larger systems to take more samples than smaller ones. This is the case with the Total Trihalomethanes Rule, which (among other things) requires only PWSs serving more than 10,000 persons to monitor for these contaminants. For coliforms, the more people a PWS serves, the more samples it must collect.

A State sometimes uses a PWS's past history as a condition for reduced monitoring. For instance, under the SMF, if a system does not detect the presence of a chemical, they may go to reduced monitoring. Conversely, if the system violates an MCL or detects a contaminant at a prescribed detection limit, the PWS must increase its monitoring for that contaminant. A State may also set monitoring requirements for certain compounds, as long as the requirements are at least as stringent as EPA's.

For more information about these topics:	Refer to these questions:
Monitoring	IV.1 - IV.4 and IV.6.
PWSs	I.2 - I.9.

IV.6. What is "unregulated" contaminant monitoring?

Unregulated contaminants are chemicals for which EPA has set enforceable monitoring requirements but which do not have MCLGs, MCLs or TTs (56 FR 3569). EPA uses the data collected by this monitoring to determine whether these contaminants should be regulated in the future.

Since these contaminants do not have a regulatory MCL or TT, the Agency considers them to be unregulated contaminants even though EPA requires water systems to monitor for them. This requirement is called unregulated contaminant monitoring. Like monitoring requirements for regulated contaminants, EPA may vary unregulated contaminant monitoring requirements according to system size and type as well as at the State's discretion. The SDWA requires PWSs to provide the results of any unregulated contaminants to their users upon their request (SDWA, Section 1445(a)(5)).

For more information about these topics:	Refer to these questions:
MCLs	II.1, II.3 - II.4, II.6, III.B.1, III.B.3, III.B.6 - III.B.7 and III.B.9 - III.B.10.
Monitoring	IV.1 - IV.5.
PWSs	I.2 - I.9.
TTs	II.1 and II.5 - II.6.

IV.7. What are the reporting requirements to the State and/or EPA?

A PWS must report several types of information to the State and/or to EPA. There are both general reporting requirements in 40 CFR 141.31 and specific reporting requirements contained with each regulation.

Under 40 CFR 141.31, PWSs must report the results from all tests or analyses required by the regulations. These are to be reported within the first 10 days following the month in which the results were received or within 10 days following the end of the monitoring period, whichever is shorter. This time period applies unless the supplier of water fails to comply with any NPDWR in which case reporting is required within 48 hours. PWSs are also required to report the following under 40 CFR 141.31: (1) a representative copy of any public notification material sent to customers or to the media within 10 days of completion of public notice and (2) any copies of any records requested by the State (40 CFR 141.31). In addition, certain regulations (e.g., the Lead and Copper Rule and the Surface Water Treatment Rule) require PWSs to report other information. These requirements are specified in the rules.

For more information about these topics:	Refer to these questions:
Monitoring	IV.2 - IV.6.
Public Notification	IV.11 - IV.13.
Recordkeeping	IV.8 - IV.10.
Reporting	IV.1.

IV.8. What records do Public Water Systems (PWSs) have to maintain?

Again, there are both general recordkeeping requirements and regulation-specific requirements. Generally, PWSs have to maintain monitoring results, accounts of actions taken by the system to correct any violations, reports concerning sanitary surveys and records concerning any variances or exemptions that the State has granted (40 CFR 141.33).

EPA requires all PWSs to maintain these types of records at or near their premises. For monitoring results, EPA also requires that these records include certain information such as (1) the date, place and time of sampling as well as the name of the person doing the sampling; (2) explanation of the type of sampling, e.g., whether the sample is a distribution sample, check sample, raw or processed water sample, etc.; (3) date of the laboratory analyses of samples; (4) the name of the laboratory and the person who performed the analyses; (5) the test method used and (6) the sampling results (40 CFR 141.33(a)(1)-(6)). In addition, EPA requires PWSs to keep additional records for certain regulations, especially the Lead and Copper Rule and the Surface Water Treatment Rule. See 40 CFR 141.91 for Lead and Copper Rule requirements and 40 CFR 141.75 for the Surface Water Treatment Rule requirements.

For more information about these topics:	Refer to these questions:
Analytical Methods	III.B.6 and III.B.10.
Monitoring	IV.2 - IV.6.
Recordkeeping	IV.7 and IV.9 - IV.10.

IV.9. Are these records available to the public?

The SDWA does not require PWSs to make all monitoring records available to the public, although the public may request this information of PWSs, and PWSs may chose to provide it. Section 1445(a)(5) of the SDWA requires PWSs to notify the persons served by the system of the availability of the results of its monitoring program for unregulated contaminants only. The SDWA does not require PWSs to make available to the public the monitoring results for regulated contaminants.

PWSs are required to notify consumers when they have violated an NPDWR or the requirements of any schedule prescribed pursuant to a variance or exemption [40 CFR 141.32]. The primary purpose of public notification is to inform consumers of any potential adverse health effects related to the drinking water being supplied to them, and to identify the steps consumers can take to minimize the health impact.

For more information about these topics:	Refer to these questions:
Public notification	IV.11 - IV.13.

IV.10. How long must PWSs keep their records?

The time period that a PWS is required to keep its records varies depending on the type of record. For each type of record that a PWS is required to maintain, EPA establishes a time period that the record must be kept.

For bacteriological sampling results, the records must be kept for at least 5 years, and chemical sampling results must be kept for at least 10 years. For the Lead and Copper Rule, records must be maintained for 10 years, as well. PWSs must retain records that detail any actions taken to correct violations for at least 3 years after the last action was taken, while they must keep records concerning sanitary surveys for at least 10 years. PWSs must retain records of variances and/or exemptions for at least 5 years (40 CFR 141.33 (a)-(d)).

For more information about these topics:	Refer to these questions:
Recordkeeping	IV.7 - IV.8.

IV.11. What is public notification, and when do PWSs have to do it?

Public notification is the process used by a PWS to inform its users that the system has violated a drinking water regulation. The notice must be clear, understandable, not unduly technical, multilingual if appropriate and include the name and telephone number of the operator or contact person for additional information. Each time a PWS fails to comply with a regulation, it must announce the violation, warn of potential adverse health effects using the mandatory language in EPA's regulations, describe the steps it is taking to remedy the problem and, in some cases, direct users to alternative sources of drinking water. The timing of this notification varies, depending on the type of

violation that has occurred. Also, the type of notification may vary based on the type of PWS which must provide it.

There are two categories of violations that require public notification: Tier 1 and Tier 2. Each tier has its own notification schedule. Tier 1 includes MCL, TT and variance/exemption violations. If the violation is a Tier 1 violation, then the PWS will have to publish notification in a newspaper as soon as possible but no later than 14 days after the violation and provide written notification on or with the water bills within 45 days of the violation. For acute Tier 1 violations, that is, violations of the MCLs that may pose an acute risk to public health (e.g., violations for nitrate, nitrite, fecal coliforms or *E. coli*, waterborne disease outbreaks and any other compound deemed to be acute by the State), PWSs must notify area radio and television stations as soon as possible but no later than 72 hours after the violation occurs. Notice of Tier 1 violations must be repeated at least once every 3 months for as long as the violation exists.

For Tier 2 violations, however, systems must publish notification in a local newspaper within 3 months of the violation. Tier 2 violations include failure to comply with monitoring requirements and announcement that the State has granted a variance or exemption from complying with a regulation to the PWS. As with Tier 1 violations, PWSs must repeat this notification every three months for as long as the system is experiencing a Tier 2 violation.

If the PWS is a Non-Community System, it may give notice by hand delivery or by continuous posting in conspicuous places within the area served by the system. Hand delivery notice must be delivered as soon as possible but no later than 72 hours for acute violations and no later than 14 days after the violation occurs for non-acute violations. It must be repeated every 3 months for as long as the violation exists. Posting must be continuous for as long as the violation exists.

For more information about these topics:	Refer to these questions:
MCLs	II.1, II.3 - II.4, II.6, III.B.1, III.B.3, III.B.6 - III.B.7 and III.B.9 - III.B.10.
Public Notification	IV.12 - IV.13.
TTs	II.1 and II.5 - II.6.

IV.12. What is mandatory health effects language, and when would systems use it for public notification?

Mandatory health effects language provides information on the potential adverse health effects of contaminants. It is the language, specified by EPA, that PWSs must copy word-for-word when notifying the public of violating an MCL or TT requirement for a contaminant. Public notice may also include additional information.

A PWS must include mandatory health effects language in its public notification whenever the system violates an MCL, TT, exemption or variance schedule, or even when a water system is granted an exemption or variance for a contaminant, unless EPA has not specified language for a particular contaminant (40 CFR 141.32(e)). In that case, a PWS would still have to inform its users of potential adverse health effects in such a way that the language used in the notification can be clearly understood by its users, without using highly technical language, small print or any other device likely to frustrate the reader (40 CFR 141.32(d)).

For more information about these topics:	Refer to these questions:
Mandatory Health Effects Language	IV.13.
Public Notification	IV.11 and IV.13.

IV.13. Do all regulated contaminants have mandatory health effects language?

No. Currently only 76 out of the 84 regulated contaminants have mandatory health effects language.

EPA has developed mandatory health effects language for most drinking water contaminants. However, the Agency has not yet developed mandatory language for some contaminants, including arsenic, the radionuclides, endrin and total trihalomethanes. When EPA promulgates regulations (either MCLs or TTs) for these contaminants, the Agency may also specify the mandatory health effects language to be used in public notification.

For more information about these topics:	Refer to these questions:
Mandatory Health Effects Language	IV.12.
Public Notification	IV.11 - IV.12.

Sources Cited in Section IV

Code of Federal Regulations, Title 40 CFR 141. Government Printing Office. July 1993. [40 CFR 141].

Federal Register. Vol. 56, No. 20. National Primary Drinking Water Regulations; Final Rule. January 30, 1991. [56 FR].

U.S. Congress. Safe Drinking Water Act. 42 U.S.C. Section 300f et seq. June 1986. [SDWA, Section].

APPENDIX A:

TABLE 1: Applicability/Coverage by Contaminant

TABLE 2: Applicability/Coverage by Rule

APPENDIX A
Table 1: Applicability/Coverage by Contaminant

CONTAMINANT	REGS[1]	TYPE[2]	SYSTEM[3]	SIZE
Acrylamide	II	SOC	CWS,NTNC,TNC	All sizes
Alachlor (Lasso)	II	SOC	CWS,NTNC	All sizes
Aldicarb*	IIb	SOC	CWS,NTNC	All sizes
Aldicarb sulfoxide*	IIb	SOC	CWS,NTNC	All sizes
Aldicarb sulfone*	IIb	SOC	CWS,NTNC	All sizes
Antimony	V	IOC	CWS,NTNC	All sizes
Arsenic	Interim	IOC	CWS	All Sizes
Asbestos	II	IOC	CWS,NTNC	All sizes
Atrazine	II	SOC	CWS,NTNC	All sizes
Barium	IIb	IOC	CWS,NTNC	All sizes
Benzene	I	VOC	CWS,NTNC	All sizes
Benzo[a]pyrene	V	SOC	CWS,NTNC	All sizes
Beryllium	V	IOC	CWS,NTNC	All sizes
Beta particles & photon emitters	Interim	Rad	CWS	• >100,000 persons • using surface water • deemed to be vulnerable by the state
Cadmium	II	IOC	CWS,NTNC	All sizes
Carbofuran	II	SOC	CWS,NTNC	All sizes
Carbon tetrachloride	I	VOC	CWS,NTNC	All sizes
Chlordane	II	SOC	CWS,NTNC	All sizes
Chromium	II	IOC	CWS,NTNC	All sizes
Copper	LC	IOC	CWS,NTNC	All sizes
Cyanide	V	IOC	CWS,NTNC	All sizes
2,4-D (Formula 40, Weeder 64)	II	SOC	CWS,NTNC	All sizes
Dalapon	V	SOC	CWS,NTNC	All sizes
Di(2-ethylhexyl)adipate	V	SOC	CWS,NTNC	All sizes
Di(2-ethylhexyl) phthalate	V	SOC	CWS,NTNC	All sizes

* Indicates the regulation is not currently in effect.

CONTAMINANT	REGS	TYPE	SYSTEM	SIZE
Dibromochloropropane	II	SOC	CWS,NTNC	All sizes
o-Dichlorobenzene	II	VOC	CWS,NTNC	All sizes
p-Dichlorobenzene	I	VOC	CWS,NTNC	All sizes
1,2-Dichloroethane	I	VOC	CWS,NTNC	All sizes
1,1-Dichloroethylene	I	VOC	CWS,NTNC	All sizes
cis-1,2-Dichloroethylene	II	VOC	CWS,NTNC	All sizes
trans-1,2-Dichloroethylene	II	VOC	CWS,NTNC	All sizes
Dichloromethane	V	VOC	CWS,NTNC	All sizes
1,2-Dichloropropane	II	VOC	CWS,NTNC	All sizes
Dinoseb	V	SOC	CWS,NTNC	All sizes
Diquat	V	SOC	CWS,NTNC	All sizes
Endothall	V	SOC	CWS,NTNC	All sizes
Endrin	V	SOC	CWS,NTNC	All sizes
Epichlorohydrin	II	SOC	CWS,NTNC,TNC	All sizes
Ethylbenzene	II	VOC	CWS,NTNC	All sizes
Ethylene dibromide	II	SOC	CWS,NTNC	All sizes
Fluoride	FL	IOC	CWS	All sizes
Giardia lamblia	SWTR	Bact	CWS,NTNC,TNC	All sizes
Glyphosate	V	SOC	CWS,NTNC	All sizes
Gross alpha particle activity	Interim	Rad	CWS	All sizes
Heptachlor	II	SOC	CWS,NTNC	All sizes
Heptachlor epoxide	II	SOC	CWS,NTNC	All sizes
Heterotrophic plate count	SWTR	Bact	CWS,NTNC,TNC	All sizes
Hexachlorobenzene	V	SOC	CWS,NTNC	All sizes
Hexachlorocyclo-pentadiene	V	SOC	CWS,NTNC	All sizes
Lead	LC	IOC	CWS,NTNC	All sizes

CONTAMINANT	REGS	TYPE	SYSTEM	SIZE
Legionella	SWTR	Bact	CWS,NTNC,TNC	All sizes
Lindane	II	SOC	CWS,NTNC	All sizes
Methoxychlor	II	SOC	CWS,NTNC	All sizes
Mercury	II	IOC	CWS,NTNC	All sizes
Monochlorobenzene	II	VOC	CWS,NTNC	All sizes
Nickel	V	IOC	CWS,NTNC	All sizes
Nitrate (as nitrogen)	II	IOC	CWS,NTNC,TNC	All sizes
Nitrite (as nitrogen)	II	IOC	CWS,NTNC,TNC	All sizes
Total Nitrate/Nitrite	II	IOC	CWS,NTNC,TNC	All sizes
Oxamyl (Vydate)	V	SOC	CWS,NTNC	All sizes
Pentachlorophenol	IIb	SOC	CWS,NTNC	All sizes
Picloram	V	SOC	CWS,NTNC	All sizes
Polychlorinated biphenyls (PCBs)	II	SOC	CWS,NTNC	All sizes
Radium 226 & Radium 228 combined	Interim	Rad	CWS	All sizes
Selenium	II	IOC	CWS,NTNC	All sizes
Simazine	V	SOC	CWS,NTNC	All sizes
Styrene	II	VOC	CWS,NTNC	All sizes
2,3,7,8-TCDD (Dioxin)	V	SOC	CWS,NTNC	All sizes
Tetrachloroethylene	II	VOC	CWS,NTNC	All sizes
Thallium	V	IOC	CWS,NTNC	All sizes
Toluene	II	VOC	CWS,NTNC	All sizes
Total Coliforms (including fecal coliforms & *E. coli*	TC	Bact	CWS,NTNC,TNC	All sizes
Total Trihalomethanes	Interim	DBP	CWS	• >10,000 persons • Add a disinfectant (oxidant)
Toxaphene	II	SOC	CWS,NTNC	All sizes
2,4,5-TP (Silvex)	II	SOC	CWS,NTNC	All sizes

CONTAMINANT	REGS	TYPE	SYSTEM	SIZE
1,2,4-Trichlorobenzene	V	VOC	CWS,NTNC	All sizes
1,1,1-Trichloroethane	I	VOC	CWS,NTNC	All sizes
1,1,2-Trichloroethane	V	VOC	CWS,NTNC	All sizes
Trichloroethylene	I	VOC	CWS,NTNC	All sizes
Turbidity	SWTR	Ind	CWS,NTNC,TNC	All Sizes
Vinyl chloride	I	VOC	CWS,NTNC	All sizes
Viruses	SWTR	Micro	CWS,NTNC,TNC	All sizes
Xylenes	II	VOC	CWS,NTNC	All sizes

1) **I** means Phase I Final Rule (52 FR 25690, dated July 8, 1987).
II means Phase II Final Rule (56 FR 3526, dated January 30, 1991).
IIb means Phase IIb Final Rule (57 FR 30266, dated July 1, 1991).
V means Phase V Final Rule (57 FR 31776, dated July 17, 1992).
FL means Flouride Final Rule (51 FR 11396, dated April 2, 1986).
LC means Lead and Copper Final Rule (56 FR 26460, dated June 7, 1991).
Interim means National Interim Primary Drinking Water Regulations (dated before 1986).
SWTR means Surface Water Treatment Final Rule (54 FR 27486, dated June 29, 1989).
TC means Total Coliform Final Rule (54 FR 27544, dated June 29, 1989).

2) **Bact** means bacteria.
DBP means Disinfection Byproduct.
Ind means indicator.
IOC means Inorganic Contaminant.
Micro means microbiological contaminant.
Rad means radionuclide.
SOC means Synthetic Organic Contaminant.
VOC means Volatile Organic Contaminant.

3) **CWS** means Community Water System.
NTNC means Non-Transient, Non-Community water system.
TNC means Transient, Non-Community water system.

APPENDIX A

Table 2: Applicability/Coverage by Rule

CONTAMINANT	TYPE[1]	SYSTEM[2]	SIZE
Arsenic Rule[3]	IOC	CWS	All sizes
Fluoride Rule	IOC	CWS	All sizes
Lead and Copper Rule			
Copper	IOC	CWS,NTNC	All sizes
Lead	IOC	CWS,NTNC	All sizes
Phase I Rule (VOCs)			
Benzene	VOC	CWS,NTNC	All sizes
Carbon tetrachloride	VOC	CWS,NTNC	All sizes
p-Dichlorobenzene	VOC	CWS,NTNC	All sizes
1,2-Dichloroethane	VOC	CWS,NTNC	All sizes
1,1-Dichloroethylene	VOC	CWS,NTNC	All sizes
1,1,1-Trichloroethane	VOC	CWS,NTNC	All sizes
Trichloroethylene	VOC	CWS,NTNC	All sizes
Vinyl Chloride	VOC	CWS,NTNC	All sizes
Phase II Rule			
Acrylamide	SOC	CWS,NTNC,TNC	All sizes
Alachlor	SOC	CWS,NTNC	All sizes
Asbestos (fiber >10 microns)	IOC	CWS,NTNC	All sizes
Atrazine	SOC	CWS,NTNC	All sizes
Carbofuran	SOC	CWS,NTNC	All sizes
Cadmium	IOC	CWS,NTNC	All sizes
Chlordane	SOC	CWS,NTNC	All sizes
Chromium (total)	IOC	CWS,NTNC	All sizes
Dibromochloropropane (DBCP)	SOC	CWS,NTNC	All sizes
o-Dichlorobenzene	VOC	CWS,NTNC	All sizes
cis-1,2-Dichloroethylene	VOC	CWS,NTNC	All sizes

CONTAMINANT	TYPE	SYSTEM	SIZE
trans-1,2-Dichloroethylene	VOC	CWS,NTNC	All sizes
1,2-Dichloropropane	VOC	CWS,NTNC	All sizes
2,4-D	SOC	CWS,NTNC	All sizes
Ethylbenzene	VOC	CWS,NTNC	All sizes
Ethylene dibromide (EDB)	SOC	CWS,NTNC	All sizes
Epichlorohydrin	SOC	CWS,NTNC,TNC	All sizes
Heptachlor	SOC	CWS,NTNC	All sizes
Heptachlor epoxide	SOC	CWS,NTNC	All sizes
Lindane	SOC	CWS,NTNC	All sizes
Mercury	IOC	CWS,NTNC	All sizes
Methoxychlor	SOC	CWS,NTNC	All sizes
Monochlorobenzene	VOC	CWS,NTNC	All sizes
Nitrate	IOC	CWS,NTNC,TNC	All sizes
Nitrite	IOC	CWS,NTNC,TNC	All sizes
Polychlorinated biphenyls (PCB)	SOC	CWS,NTNC	All sizes
Selenium	IOC	CWS,NTNC	All sizes
Styrene	VOC	CWS,NTNC	All sizes
Tetrachloroethylene	VOC	CWS,NTNC	All sizes
Toluene	VOC	CWS,NTNC	All sizes
Total Nitrate/Nitrite	IOC	CWS,NTNC,TNC	All sizes
Toxaphene	SOC	CWS,NTNC	All sizes
2,4,5-TP (Silvex)	SOC	CWS,NTNC	All sizes
Xylenes (total)	VOC	CWS,NTNC	All sizes
Phase II-b Rule			
Aldicarb[4]	SOC	CWS,NTNC	All sizes
Aldicarb sulfone[4]	SOC	CWS,NTNC	All sizes
Aldicarb sulfoxide[4]	SOC	CWS,NTNC	All sizes
Barium	IOC	CWS,NTNC	All sizes

CONTAMINANT	TYPE	SYSTEM	SIZE
Pentachlorophenol	SOC	CWS,NTNC	All sizes
Phase V Rule			
Antimony	IOC	CWS,NTNC	All sizes
Benzo(a)pyrene (PAH)	SOC	CWS,NTNC	All sizes
Beryllium	IOC	CWS,NTNC	All sizes
Cyanide	IOC	CWS,NTNC	All sizes
Dalapon	SOC	CWS,NTNC	All sizes
Dichloromethane	VOC	CWS,NTNC	All sizes
Di(2-ethylhexyl)adipate	SOC	CWS,NTNC	All sizes
Di(2-ethylhexyl)phthalate	SOC	CWS,NTNC	All sizes
Dinoseb	SOC	CWS,NTNC	All sizes
Diquat	SOC	CWS,NTNC	All sizes
Endothall	SOC	CWS,NTNC	All sizes
Endrin	SOC	CWS,NTNC	All sizes
Glyphosate	SOC	CWS,NTNC	All sizes
Hexachlorobenzene	SOC	CWS,NTNC	All sizes
Hexachlorocyclipentadiene	SOC	CWS,NTNC	All sizes
Nickel	IOC	CWS,NTNC	All sizes
Oxamyl (Vydate)	SOC	CWS,NTNC	All sizes
Picloram	SOC	CWS,NTNC	All sizes
Simazine	SOC	CWS,NTNC	All sizes
2,3,7,8-TCDD (Dioxin)	SOC	CWS,NTNC	All sizes
Thallium	IOC	CWS,NTNC	All sizes
1,2,4-Trichlorobenzene	VOC	CWS,NTNC	All sizes
1,1,2-Trichloroethane	VOC	CWS,NTNC	All sizes
Radionuclides Rule[5]			
Beta particles and photon emitters	Rad	CWS	• > 100,000 persons • using surface water • deemed to be vulnerable by the State
Gross alpha particle activity	Rad	CWS	All sizes

CONTAMINANT	TYPE	SYSTEM	SIZE
Radium 226 & Radium 228 (combined)	Rad	CWS	All sizes
Surface Water Treatment Rule			
Giardia Lamblia	Bact	CWS,NTNC,TNC	All sizes
Heterotrophic plate count	Bact	CWS,NTNC,TNC	All sizes
Legionella	Bact	CWS,NTNC,TNC	All sizes
Turbidity	Ind	CWS,NTNC,TNC	All sizes
Viruses (enteric)	Micro	CWS,NTNC,TNC	All sizes
Total Coliform Rule	Bact	CWS,NTNC,TNC	All sizes
Total Trihalomethanes Rule (TTHM)	DBP	CWS	• >10,000 • add disinfectant (oxidant)

1) **Bact** means bacteria.
DBP means Disinfection Byproduct.
Ind means indicator.
IOC means Inorganic Contaminant.
Micro means microbiological contaminant.
Rad means radionuclide.
SOC means Synthetic Organic Contaminant.
VOC means Volatile Organic Contaminant.

2) **CWS** means Community Water System.
NTNC means Non-Transient, Non-Community water system.
TNC means Transient, Non-Community water system.

3) A revised version of the Arsenic Rule will be proposed November 1995 and promulgated November 1997.

4) Regulation currently not in effect for aldicarb, aldicarb sulfone and aldicarb sulfoxide.

5) There is a proposed Radionuclides Rule that could change these levels.

APPENDIX B:

TABLE 1: Contaminants Regulated Under the Safe Drinking Water Act

TABLE 2: Final and Effective Dates by Rule

Appendix B
Table 1: Contaminants Regulated Under the Safe Drinking Water Act[1]
Alphabetical by Rule

CONTAMINANT	MCLG (mg/l)	MCL (mg/l)	POTENTIAL HEALTH EFFECTS
Arsenic Rule[2]	none[3]	0.05	Dermal and nervous system effects
Fluoride Rule	4.0	4.0	Skeletal fluorosis
Lead and Copper Rule			
Copper	1.3	TT	Gastrointestinal effects
Lead	zero	TT	Cancer (Group B2), kidney, central & peripheral nervous system effects
Phase I Rule (VOCs)			
Benzene	zero	0.005	Cancer (Group A)
Carbon tetrachloride	zero	0.005	Cancer (Group B2)
p-Dichlorobenzene	0.075	0.075	Kidney effects, possible carcinogen
1,2-Dichloroethane	zero	0.005	Cancer (Group B2)
1,1-Dichloroethylene	0.007	0.007	Liver, kidney effects, possible carcinogen (Group C)
1,1,1-Trichloroethane	0.2	0.2	Liver, nervous system effects
Trichloroethylene	zero	0.005	Cancer (Group B2)
Vinyl chloride	zero	0.002	Cancer (Group A)
Phase II Rule			
Acrylamide	zero	TT	Cancer (Group B2), nervous system effects
Alachlor	zero	0.002	Cancer (Group B2)
Asbestos (fiber >10 microns)	7 MFL[4]	7 MFL	Possible carcinogen by ingestion
Atrazine	0.003	0.003	Liver, kidney, lung, cardiovascular effects, possible carcinogen (Group C)
Carbofuran	0.04	0.04	Nervous system, reproductive system effects
Cadmium	0.005	0.005	Kidney effects
Chlorobenzene	0.1	0.1	Nervous system, liver effects
Chlordane	zero	0.002	Cancer (Group B2)
Chromium (total)	0.1	0.1	Liver, kidney, circulatory system effects
Dibromochloropropane (DBCP)	zero	0.0002	Cancer (Group B2)
o-Dichlorobenzene	0.6	0.6	Liver, kidney, blood cell effects

CONTAMINANT	MCLG	MCL	POTENTIAL HEALTH EFFECTS
cis-1,2-Dichloroethylene	0.07	0.07	Liver, kidney, nervous system, circulatory system effects
trans-1,2-Dichloroethylene	0.1	0.1	Liver, kidney, nervous system, circulatory system effects
1,2-Dichloropropane	zero	0.005	Cancer (Group B2)
2,4-D	0.07	0.07	Liver, kidney effects
Ethylbenzene	0.7	0.7	Liver, kidney, nervous system effects
Ethylene dibromide (EDB)	zero	0.00005	Cancer (Group B2)
Epichlorohydrin	zero	TT	Cancer (Group B2)
Heptachlor	zero	0.0004	Cancer (Group B2)
Heptachlor epoxide	zero	0.0002	Cancer (Group B2)
Lindane	0.0002	0.0002	Liver, kidney, nervous system, immune system, circulatory system effects
Mercury	0.002	0.002	Kidney, central nervous system effects
Methoxychlor	0.04	0.04	Developmental, liver, kidney, nervous system effects
Nitrate	10	10	Methemoglobinemia (Blue Baby Syndrome)
Nitrite	1	1	Methemoglobinemia (Blue Baby Syndrome)
Nitrate/Nitrite Combined	10	10	Methomoglobinemia (Blue Baby Syndrome)
PCBs	zero	0.0005	Cancer (Group B2)
Selenium	0.05	0.05	Nervous System Effects
Styrene	0.1	0.1	Liver, nervous system effects, possible carcinogen
Tetrachloroethylene	zero	0.005	Cancer
Toluene	1	1	Liver, kidney, nervous system, circulatory system effects
Toxaphene	zero	0.003	Cancer (Group B2)
2,4,5-TP	0.05	0.05	Liver, kidney effects
Xylenes (total)	10	10	Liver, kidney, nervous system effects
Phase II-b Rule			
Aldicarb[5]	0.001	0.003	Nervous system effects
Aldicarb sulfone[5]	0.001	0.002	Nervous system effects
Aldicarb sulfoxide[5]	0.001	0.004	Nervous system effects
Barium	2	2	Blood pressure effects
Pentachlorophenol	zero	0.001	Cancer (Group B2)

CONTAMINANT	MCLG	MCL	POTENTIAL HEALTH EFFECTS
Phase V Rule			
Antimony	0.006	0.006	Decreased longevity, blood effects
Benzo(a)pyrene (PAH)	zero	0.0002	Cancer (Group B2)
Beryllium	0.004	0.004	Cancer (Group B2); bone and lung effects
Cyanide	0.2	0.2	Thyroid, central nervous system effects
Dalapon	0.2	0.2	Kidney, liver effects
Dichloromethane	zero	0.005	Cancer (Group B2)
Di(2-ethylhexyl)adipate	0.4	0.4	Developmental effects
Di(2-ethylhexyl)phthalate	zero	0.006	Cancer (Group B2)
Dinoseb	0.007	0.007	Thyroid, reproductive effects
Diquat	0.02	0.02	Ocular, liver, kidney effects
Endothall	0.1	0.1	Liver, kidney, gastrointestinal effects
Endrin	0.002	0.002	Liver, kidney, heart effects
Glyphosate	0.7	0.7	Liver, kidney effects
Hexachlorobenzene	zero	0.001	Cancer (Group B2)
Hexachlorocyclipentadiene	0.05	0.05	Kidney, stomach effects
Nickel	0.1	0.1	Liver effects
Oxamyl (Vydate)	0.2	0.2	Kidney effects
Picloram	0.5	0.5	Liver, kidney effects
Simazine	0.004	0.004	Body weight and blood effects, possible carcinogen (Group C)
2,3,7,8-TCDD (Dioxin)	zero	3×10^{-8}	Cancer (Group B2)
Thallium	0.0005	0.002	Liver, kidney, brain, intestine effects
1,2,4-Trichlorobenzene	0.07	0.07	Liver, kidney effects
1,1,2-Trichloroethane	0.003	0.005	Liver, kidney effects, possible carcinogen (Group C)
Radionuclides Rule[6]			
Beta particles and photon emitters	none[3]	4 mrem/yr	Cancer (Group A)
Gross alpha particle activity	none[3]	15 pCi/l	Cancer (Group A)
Radium 226 & Radium 228 (combined)	none[3]	5 pCi/l	Cancer (Group A)

CONTAMINANT	MCLG	MCL	POTENTIAL HEALTH EFFECTS
Surface Water Treatment Rule			
Giardia lamblia	zero	TT	Gastro-enteric disease
Heterotrophic Plate Count	N/A	TT	Indicator of treatment effectiveness and water quality
Legionella	N/A	TT	Pneumonia-like effects
Turbidity	N/A	TT	Interferes with disinfection, indicator of filtration performance
Viruses (enteric)	zero	TT	Gastro-enteric effects, respiratory disease and other diseases (e.g., hepatitis, myocarditis)
Total Coliform Rule	zero	5.0%[7]	Indicator of gastro-enteric infections
Total Trihalomethanes Rule (TTHM)	none[3]	0.10	Cancer (Group B2)

1) Source: U.S. Environmental Protection Agency. *Technical and Economic Capacity of States and Public Water Systems to Implement Drinking Water Regulations: Report to Congress* (EPA 810/R-93-001). September 1993. pp. 34-37.

2) A revised version of the Arsenic Rule will be proposed November 1995 and promulgated November 1997 (a court-ordered deadline).

3) The MCLG for this contaminant was withdrawn and is currently under review.

4) MFL = Million fibers per liter.

5) Regulation currently not in effect for aldicarb, aldicarb sulfone and aldicarb sulfoxide. EPA plans to repropose these levels in 1994.

6) There is a proposed Radionuclides Rule that could change these levels. The court-ordered promulgation date is April 1995.

7) No more than 5.0% samples total coliform-positive during month. (For PWSs that collect <40 samples/month, no more than one sample total coliform-positive).

APPENDIX B

Table 2: Final and Effective Dates by Rule

RULE[1]	FINAL DATE	EFFECTIVE DATE
Arsenic Rule[2]	December 24, 1975	June 24, 1977
Fluoride Rule	April 2, 1986	October 2, 1987
Lead and Copper Rule	June 7, 1991	December 7, 1992
Phase I Rule	July 8, 1987	January 9, 1989
Phase II Rule	January 30, 1991	July 30, 1992
Phase II-b Rule	July 1, 1991	January 1, 1993
Phase V Rule	July 17, 1992	January 17, 1994
Radionuclides Rule[3]	July 9, 1976	June 24, 1977
Surface Water Treatment Rule	June 29, 1989	December 31, 1990
Total Coliform Rule	June 29, 1989	December 31, 1990
Total Trihalomethanes Rule	November 29, 1979	November 29, 1981 for systems serving >75,000; November 29, 1983 for systems serving 10,001 - 74,999

1) Final Rules only. Proposed Rules and Rules scheduled for proposal are not included in this table.

2) A revised version of the Arsenic Rule is expected to be proposed November 1995 and promulgated November 1997 (a court-ordered deadline).

3) There is a proposed Radionuclides Rule that could revise this rule. The court-ordered deadline for promulgation is April 1995.

APPENDIX C: DRINKING WATER PRIORITY LIST

Appendix C

Drinking Water Priority List Contaminants
Published January 14, 1991 (56 FR 1470)

Acrylonitrile
Aluminum
Asulam
Bentazon
Boron
Bromacil
Bromobenzene
Bromochloroacetonitrile
Bromodichloromethane
Bromoform
Bromomethane
Chloramines
Chlorate
Chlorination/Chloramination by-products
(Misc.), e.g., Haloacetic acids, Haloketones, Chloral hydrate, MX-2 [3-chloro-4-(dichloromethyl)-5-hydroxy-2 (5H)-furanone], N-Organochloramines
Chlorine
Chorine dioxide
Chlorite
Chloroethane
Chloroform
Chloromethane
Chloropicrin
o-Chlorotoluene
p-Chlorotoluene
Cryptosporidium
Cyanazine
Cyanogen chloride
Cyromazine
DCPA (and its acid metabolites)
Dibromoacetonitrile
Dibromochloromethane
Dibromomethane
Dicamba
Dichloroacetonitrile
1,3-Dichlorobenzene
Dichlorodifluoromethane
1,1-Dichloroethane
2,2-Dichloropropane
1,3-Dichloropropane
1,1-Dichloropropene
1,3-Dichloropropene
2,4-Dinitrophenol
2,4-Dinitrotoluene
2,6-Dinitrotoluene
1,2-Diphenylhydrazine
Ethylenethiourea
Fluorotrichloromethane
Fomesafen
Hexachlorobutadiene
Hexachloroethane
Hypochlorite ion
Isophorone
Lactofen/Acifluorfen
Manganese
Metalaxyl
Methomyl
Methyl ethyl ketone
Methyl isobutyl ketone
Methyl t-butyl ether
Metolachlor
Metribuzin
Molybdenum
Naphthalene
Nitrobenzene
Ozone by-products,
e.g., Aldehydes, Epoxides, Peroxides, Nitrosamines, Bromate, Iodate
Parathion degradation product
(4-Nitrophenol)
Prometon
Strontium
2,4,5-T
1,1,1,2-Tetrachloroethane
1,1,2,2-Tetrachloroethane
Tetrahydrofuran
Thiodicarb
Trichloroacetonitrile
1,2,3-Trichloropropane
Trifluralin
Vanadium
Zinc

APPENDIX D: SECONDARY DRINKING WATER REGULATIONS

Appendix D

Secondary Drinking Water Regulations[1]

CONTAMINANT	SMCL (mg/l)	CONTAMINANT EFFECTS
Aluminum	0.05-0.2	Discoloration of water
Chloride	250	Taste, corrosion of pipes
Color	15 color units	Discoloration of water
Copper	1	Taste, staining of porcelain
Corrosivity	non-corrosive	Aesthetic and health related (corrosive water can leach pipe materials, such as lead, into drinking water).
Fluoride	2.0	Dental fluorosis (a brownish discoloration of the teeth)
Foaming Agents	0.5	Aesthetic
Iron	0.3	Taste, staining of laundry
Manganese	0.05	Taste, staining of laundry
Odor	3 threshold odor number	Aesthetic
pH	<6.5 - >8.5 pH	Water is too corrosive
Silver	0.1	Argyria (discoloration of the skin)
Sulfate	250	Taste, laxative effects
Total dissolved solids (TDS)	500	Taste and possible relation between low hardness and cardiovascular disease, also an indicator of corrosivity (related to lead levels in water). Can damage plumbing and limit effectiveness of soaps and detergents.
Zinc	5	Taste

1) Source: U.S. Environmental Protection Agency. *Fact Sheet: National Secondary Drinking Water Standards* (EPA 570/9-91-019FS). September 1991.

☆U.S. GOVERNMENT PRINTING OFFICE: 1995 - 615-003/01094