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Drinking Water Program, Oregon Health Division

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OREGON DRINKING WATER QUALITY STANDARDS

(Including the 1996 Safe Drinking Water Act Amendments)

Fall, 1998

YOU GOT OUR NUMBER!

Contract counties are responsible for all community water systems with groundwater sources serving less than 3,300 people as well as all nontransient noncommunity and transient noncomunnity water systems. Operators and managers of these systems should call their county health department first for assistance with drinking water issues.
State staff are responsible for all community water systems using surface water sources and those community systems serving 3,300 or more people. In those counties without a local health department contact please call the state program at (503) 731-4317.

Contract Counties
The Drinking Water Program contracts with the following counties to perform much of the program work at the local level.

Baker/Malheur	Ray Huff/Susan Fuller	(541) 473-5186
		Email: envhealth@malheurco.org
Benton	Bob Wilson/Ron Smith	(541) 757-6841
		Email: ronald.e.smith@co.benton.or.us
Clackamas	Jim Buckley/Steve Dahl	(503) 655-8384
		Email: jamesb@co.clackamas.or.us
		Email: steved@co.clackamas.or.us
Columbia	Mark Edington	(503) 366-3828
Coos	Frances Smith	(541) 756-2020
		Email: frances_h._smith@class.orednet.org
Crook	Russell Hanson/Ann McSheery	(541) 447-8155
		Email: DIRRUS@mailexcite.com
Curry	Mike Meszaros	(541) 247-5501
Douglas	Dave Bussen/Gerry Meyer	(541) 440-3571
		Email: gvmeyer@co.douglas.or.us
Hood River	Scott Fitch	(541) 386-1115
		Email: healthdept@gorge.net
Jackson	John Manwaring	(541) 776-7316
		Email: manwarjs@hhs.co.jackson.or.us
Jefferson	Lee Cloninger	(541) 475-4456
		Email: lcloninger@fc.orednet.org
Josephine	Bruce Cunningham	(541) 474-5325
		Email: johlth@magick.net
Klamath	Leisa Cook/Susan Burch	(541) 883-1122
Lincoln	Elizabeth Fox	(503) 265-4179
		Email: lfox@co.lincoln.or.us
Linn	John McEvoy	(541) 967-3821
		Email: envhlth@co.linn.or.us
Malheur/Baker	Ray Huff/Susan Fuller	(541) 473-5186
		Email: envhealth@malheurco.org
Marion	Rick Sherman	(503) 588-5346
		Email: rsherman@cyberis.net
Multnomah	Darryl Flasphaler	(503) 248-3400
		Email: ervin.kauffman@co.multnomah.or.us
Polk	John Callicrate	(503) 623-9237
		Email: John.Callicrate@bbs.chemek.cc.or.us
Sherman/Wasco	Glenn Pierce	(541) 296-4636
		Email: wascophd@gorge.net
Tillamook	Annette Pampush	(503) 842-3902
		Email: apampush@co.tillamook.or.us
Wasco/Sherman	Glenn Pierce	(541) 296-4636
		Email: wascophd@gorge.net
Washington	Toby Harris/Mark Hanson	(503) 648-8722
		Email: tobyharris@washington.co.or.us

State Program
Technical staff members are frequently in the field assisting water systems. Each day, however, one staff member serves as *phone duty person* in the Portland office and is available to answer questions at (503) 731-4317. Please make use of this person unless you feel you must speak with a specific staff member.

Another option is to contact a staff person's voice mail directly. To do this, call our auto-attendant number (503) 731-4821 and when directed by the recording, dial the person's extension listed below.

Web site	www.ohd.hr.state.or.us/cehs/dwp
General Inquiries	(503) 731-4317
Portland office fax	(503) 731-4077
Voice mail	(503) 731-4821 + ext.

Drinking Water Administration: (503) 731-4010	
Dave Leland, Program Manager	ext. 757
Diane Weis	ext. 751
Technical Services: (503) 731-4317	
Western Region	
Tom Charbonneau, Manager	ext. 749
Scott Curry	ext. 739
Carrie Gentry	ext. 742
Bonnie Waybright	ext. 752
Eastern Region	
Pendleton office fax	(541) 276-4778
Gary Burnett, Manager (Pendleton)	(541) 276-8006
Leslie Bensching (Pendleton)	(541) 276-8006
John Potts (Corvallis)	(541) 757-4281
Kari Salis (Portland)	ext. 764
Bart Stepp (Pendleton)	(541) 276-8006
Monitoring and Compliance: (503) 731-4381	
Mary Alvey, Manager	ext. 748
Cheri Law	ext. 747
Roberta Lindgren	ext. 741
Patrick Meyer	ext. 753
Mike Patterson	ext. 746
Georgine Proctor	ext. 761
Brian Rigwood	ext. 743
Nancy Stellmach	ext. 760
George Waun	ext. 758
Protection and Development: (503) 731-4317	
Chris Hughes, Manager	ext. 750
Jeff Frederick (Springfield)	(541) 726-2594
Mike Grimm	ext. 765
Dennis Nelson (Springfield)	(541) 726-2587
Springfield office fax	(541) 726-2596
Tom Pattee (Springfield)	(541) 726-2588
Dave Phelps	ext. 759
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Dr. Irene Ronning, Coordinator **(503) 229-5505**

OREGON DRINKING WATER QUALITY STANDARDS

(Including the 1996 Safe Drinking Water Act Amendments)

This summary provides a broad overview of current and future drinking water quality standards which public water systems in Oregon must meet through the year 2005. It is organized in two major sections - Section I: Current Standards, and Section II. Future Standards. This summary is for reference only, and is not a substitute for the actual statutes and regulations that govern public water supply in Oregon. Future standards described here are still under development at the national level, and are subject to change.

Types of Drinking Water Contaminants

The sources of drinking water, both tap and bottled water, include rivers, lakes, ponds, reservoirs, springs,and wells. As water travels over the surface of the land or through the ground, it dissolves naturally-occurring minerals, and in some cases radioactive materials, and can pick up substances resulting from the presence of animals or from human activities.

Drinking water contaminants are any substances present in drinking water that could adversely affect human health. Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. They can be grouped into the following general categories:

- Microbial Contaminants - such as viruses and bacteria which can come from sewage treatment plants, septic systems, agricultural and livestock operations, and wildlife.
- Inorganic Chemicals - such as salts or metals, which can be naturally-occurring or result from urban stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining, or farming. Includes lead and copper leached into the water from household plumbing and fixtures.
- Organic Chemicals - Pesticides and herbicides which may come from a variety of sources, such as agriculture, urban stormwater runoff, and residential uses. Also includes synthetic and volatile chemicals which are by-products of industrial processes and petroleum production, and can also come from gas stations, urban stormwater runoff, and septic system.
- Radiologic Contaminants - which can be naturally-occurring or result from oil and gas production and mining operations.

Every drinking water system is vulnerable to microbial or chemical contaminants of one type or another from a variety of sources. Disease-causing microorganisms (bacteria, viruses, protozoans) can be present in surface water (lakes and streams) or from groundwater (wells or springs) from human or animal feces. Microorganisms can also enter the water system through pipe breaks or cross connections. Organic chemicals (industrial solvents, pesticides) are mainly man-made and can enter drinking water supplies as a consequence of chemical production, storage, use, or disposal in the water source area. Inorganic chemicals can be introduced by human activities (nitrate from fertilizer) but more often result from natural occurrence in rocks, soils, and mineral deposits (radon, arsenic). Drinking water treatment which is essential to remove microbes and chemicals can also add or form contaminants in drinking water, such as disinfectant chemicals themselves, byproducts of disinfectants with other materials in the water, and treatment chemicals used in filtering water. Finally, water storage tanks, pipes, and household plumbing that are in direct contact with water can contribute contaminants from either the material used in the tanks and pipes or from internal coatings used to protect the materials from contact with the water (lead and copper, organics).

Drinking Water Standards and Health Protection

In order to ensure that tap water is safe to drink, national regulations set by the US Environmental Protection Agency limit the amount of certain contaminants in water provided by public water systems. Other national regulations set by the Food and Drug Administration, establish limits for contaminants in bottled water which must provide the same level of protection of public health. Drinking water quality standards are established to protect human health by limiting the exposure of people to drinking water contaminants. There are now national drinking water quality standards for 79 different contaminants. These standards may be in several forms:

- Maximum Contaminant Level Goal (MCLG) - The level of a contaminant in drinking water below which there is no known or expected risk to health, allowing for a margin of safety. All regulated contaminants have an MCLG.
- Maximum Contaminant Level (MCL) - The highest level of a contaminant that is allowed in drinking water, set a close to the MCLG as feasible using the best available treatment technology. Most MCLs are expressed in concentration units called "milligrams per liter" (mg/L), which for drinking water is the

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same as “parts per million”, or ppm. MCLs can be expressed in a variety of other measurement units.
- Treatment Technique (TT) - A required process intended to reduce the level of a contaminant in drinking water. For any contaminant that can not be detected or measured effectively in water, the standard may be a treatment technique requirement, which means that all water systems at risk of the contaminant are required to provide continuous water treatment to remove the contaminant at all times.
- Action Level (AL) - The concentration of a contaminant, which when exceeded, triggers treatment or other requirement which a water system must follow.

Public water systems and bottled water producers must sample water for contaminants routinely to ensure that standards are met, and report the results of that sampling to the regulatory agency. Sampling frequencies vary by the type of drinking water contaminant. Contaminants that are associated with immediate health impacts, like bacteria and nitrates, must be sampled often, such as every month, quarter, or year. Contaminants associated with health effects that could develop from very long-term exposures, like arsenic, are tested less frequently, such as every 3 or 4 years.

Some people may be more vulnerable to contaminants than the general population. Immune-compromised persons, such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice from their health care providers. USEPA and Centers for Disease Control and Prevention (CDC) guidelines on appropriate measures to lessen the risk of infection by *Cryptosporidium* and other microbial contaminants are available from the national Safe Drinking Water Hotline (800-426-4791).

Drinking Water Regulatory Program

A brief overview of the public drinking water regulatory program is useful. The first national drinking water standards, called the National Interim Primary Drinking Water Regulations (NIPDWR), were adopted on December 24, 1975, by the US Environmental Protection Agency (USEPA) under the 1974 Safe Drinking Water Act. By 1986, drinking water quality standards were in place for 23 different contaminants. The 1986 Safe Drinking Water Act mandated USEPA to set standards for 83 contaminants within 3 years, and 25 more contaminants every three years thereafter. Today, there are national standards for 79 contaminants.

In Oregon, public drinking water systems are subject to the Oregon Drinking Water Quality Act (ORS 448 - Water Systems). The primary purpose of the 1981Oregon Act is to “assure all Oregonians safe drinking water.” According to the Oregon Act, safe drinking water means water which is sufficiently free from biological, chemical, radiological, or physical impurities such that individuals will not be exposed to disease or harmful physiological effects.” Under the Oregon Act,the Health Division has broad authority to set water quality standards necessary to protect public health through insuring safe drinking water within a public water system. To accomplish this, the Division is directed under the Act to require regular water sampling by water suppliers. These samples must be analyzed in laboratories approved by the Division, and the results of laboratory tests on those samples must be reported by the water supplier to the Division. The Division must investigate water systems that fail to submit samples,or whose sample results indicate levels of contaminants that are above maximum allowable levels. Water suppliers who fail to sample the water or report the results, or whose water contains contaminants in excess of allowable levels must take corrective action and notify water users.

Since 1986, the Division has exercised primary responsibility for administering the federal Safe Drinking Water Act in Oregon, an arrangement called Primacy. The Health Division adopts and enforces standards that are no less stringent than the federal standards, and in return, the USEPA gives the Division the regulatory responsibility for public drinking water systems and partial financial support for the Oregon program operation.

In practice, the Oregon drinking water standards match the national standards established under the Safe Drinking Water Act by the USEPA. This is because setting maximum levels for drinking water contaminants to protect human health involves considerable development of health effects information and other scientific research that is best carried out at the national level. The Health Division concentrates its efforts on implementing the national standards at Oregon public water systems.

Oregon Public Water Systems

Today, there are 2,719 public water systems in Oregon subject to regulation under the federal Safe Drinking Water Act. They serve 25 or more people at least 60 days per year. Of these, 889 are community water systems, which means the systems serve at least 15 connections used by year-round residents. These systems perform the most frequent water sampling for the greatest number of contaminants, because the people served have the most ongoing exposure to the drinking water. **Community water systems** in Oregon serve a total of about 2.7 million people and range in size from 15-home subdivisions and mobile home parks up to and including the City of Portland. **Nontransient noncommunity water systems** serve nonresidential populations consisting of the same people every day, such as a school or workplace with its own independent water supply system. There are 340 of these in Oregon. **Transient noncommunity water systems** serve transient populations. Examples are campgrounds, parks, or restaurants with their own independent water supply systems, and there are 1,490 of these in Oregon.

Oregon public water systems get their water either from wells or springs (called groundwater) or from rivers, lakes, or streams (called surface water). Of the 2,719 public water systems in Oregon, 2,472 get their water exclusively from groundwater. 247 water systems get their water in whole or in part from surface water supplies. Generally speaking, surface water requires much more treatment and processing to ensure safety for drinking than does groundwater.

There are many small water systems in Oregon. Almost 87% of the public water systems in Oregon serve 500 or fewer people each.

An additional 900 very small systems, serving 10-24 people each, are subject only to the Oregon Act. About 500,000 Oregonians get their drinking water from individual home wells, which are not subject to either state or federal public water system standards.

Measuring Progress

The Oregon Safe Drinking Water Benchmark, stated below, is intended to measure progress of public water suppliers toward meeting safe drinking water standards in Oregon:

"The percentage of Oregonians served by public drinking water systems that meet all health-based standards continuously during the year"

Meeting all health-based standards at all times during the year is an important indicator of drinking water safety. The benchmark includes the following health-based standards, listed from highest to lowest health risk:

- *E. Coli* (or fecal coliform) bacteria maximum level
- Surface water treatment technique performance levels (filtration and disinfection)
- Nitrate/Nitrite maximum levels
- Chemical/Radiological maximum levels
- Lead action level
- Total coliform bacteria maximum level
- Copper action level

Included in the benchmark are about 1,300 public water systems that serve the majority of the state's population, including all community systems, all nontransient noncommunity systems, and the larger transient noncommunity systems (serving over 500 people per day).

The Oregon benchmark goal is to reach 95% by 2005. Results for the last four years are 1994-49%, 1995-50%, 1996-56%, 1997-89%. Note that progress toward the benchmark goal is likely to be affected by revisions to existing standards and establishment of standards for additional contaminants that are scheduled for the coming years, described in Section II.

For More Information

The chart on page 1 lists both state and county drinking water staff members, along with their telephone numbers. County staffs are responsible for community water systems serving fewer than 3,300 people and using groundwater sources as well as all nontransient noncommunity and transient noncommunity systems. Operators of those systems should contact their county health department directly for assistance on drinking water issues.

State staff are responsible for all community water systems serving more than 3,300 people and all smaller community systems that use surface water sources. In counties without drinking water programs, state staff are responsible for all public water systems. State staff also serve as a technical resource for county drinking water programs as needed.

Also, visit the Oregon Drinking Water Web Page (http://www.ohd.hr.state.or.us/cehs/dwp) for drinking water information and publications. In addition, you can contact the national Safe Drinking Water Hotline at 800-426-4791.

I. Current Standards

There are now drinking water quality standards in Oregon for 84 contaminants. These standards are summarized in this Section.

Microbial Contaminants - Coliform Bacteria

Purpose: Coliform bacteria is the primary measure of the microbial quality of drinking water. They are used as indicators of the possible presence of pathogenic, or disease-causing, microorganisms. Routine samples collected by Oregon public water suppliers are analyzed for total coliform bacteria. Samples that show the presence of total coliforms are further examined for fecal coliforms or *E. coli.*, which are more specific indicators of fecal contamination.

Health effects: Coliforms are bacteria that are naturally present in the environment and are used as an indicator that other, potentially harmful, bacteria may be present. Coliforms present in more samples than allowed is a warning of potential problems. Fecal coliforms and *E. Coli* are bacteria whose presence indicates that the water may be contaminated with human or animal wastes. Microbes in these wastes can cause short-term health effects, such as diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a special health risk for infants, young children, and people with severely compromised immune systems.

Application: All public water systems must regularly test for coliform bacteria from locations in the distribution system, identified in a coliform sampling plan.

Monitoring: All community systems, and noncommunity systems using surface water sources or serving over 1,000 people, must sample monthly:

Population	Number of Monthly Samples
up to 1,000	1
1,001-2,500	2
2,501-3,300	3
3,301-4,100	4
4,101-4,900	5
>4,900	see rules

All other systems must test for coliform bacteria once per calendar quarter.

Compliance: All coliform sample results are reported as "coliform absent" (negative) or "coliform present" (positive). A set of 3-4 repeat samples is required for each positive coliform sample (so that a total of at least five samples is collected during the month). Repeat sampling continues until the maximum contaminant level is exceeded or a set of repeat samples with negative results is obtained. Small systems (fewer than 40 samples/month) are allowed no more than one positive sample per month, larger systems are allowed no more than 5% positive samples in any month. Confirmed presence of fecal coliform or *E. coli* is considered an acute health risk and requires immediate notification of the public.

Water Treatment/control measures: Disinfection processes for source waters, such as chlorination, ozonation, and ultraviolet light. Other control measures include maintaining a disinfectant residual in the distribution system, protection of the source water area, proper well construction, maintaining distribution system pressure, and cross connection control.

Rule history:
- Federal rule - 6/29/89
- Oregon rule - 1/1/91

Microbial Contaminants - Surface Water Treatment

Purpose: Control pathogenic microorganisms and indicators in surface water sources, including *Giardia lamblia,* enteric viruses, heterotrophic plate count bacteria (HPC) and *Legionella.* Control level of particulate matter from soil runoff (turbidity).

Health effects: Inadequately treated water from surface water supplies may contain sufficient numbers of disease-producing organisms to cause illness. These organisms include bacteria, viruses, and parasites that can cause symptoms such as nausea, cramps, diarrhea, and associated headaches. Turbidity has no health effects. However, turbidity can interfere with disinfection and provide a medium for microbial growth. Turbidity may indicate the presence of disease-causing organisms.

Application: All public water systems using surface water sources, and all public water systems using groundwater sources determined by the Division to be under the direct influence of surface water.

Compliance: Water systems must provide a total level of treatment to remove/inactivate 99.9% (3-log) of *Giardia lamblia,* and to remove/inactivate 99.99% (4-log) of viruses, as follows:
- Filtration plus disinfection treatment meeting performance standards, or
- Disinfection treatment plus meet criteria to remain unfiltered, or
- Disinfection plus natural filtration plus wellhead/ source water protection.

Filtration performance standards:
- Continuous turbidity recording, report results every four hours
- 95% of turbidity readings less than 0.5 ntu (1 ntu for alternative technologies)
- All turbidity readings less than 5 ntu
- Minimum 2-log removal/inactivation, based on comprehensive performance evaluation

Disinfection performance standards:
- Daily calculation of CxT (disinfectant concentration x time) at highest flow
- CxT sufficient to meet needed removal/inactivation levels
- Continuous 0.2 mg/L disinfectant residual at entry point
- Minimum detectable disinfectant residual in 95% of distribution system samples

Implementation dates:
- 12/91 Unfiltered systems meet requirements to remain unfiltered
- 6/93 Filtration or alternate water source in place. Filtered systems meet performance requirements
- 6/94 State determines which community groundwater systems are under direct influence of surface water
- 12/95 Surface-influenced community systems meet treatment performance requirements
- 6/99 State determines which noncommunity groundwater systems are under direct influence of surface water
- 12/01 Surface-influenced noncommunity systems meet treatment performance requirements

Rule history:
- Federal rule - 6/29/89
- Oregon rule - 1/1/91

Microbial Contaminants - Disinfection By-products

Purpose: Trihalomethanes are organic contaminants that are called disinfection byproducts, because they result from disinfectants (chlorine used to kill harmful microbes in the drinking water) reacting with natural organic matter in the source water. Total Trihalomethanes (TTHMs) represents the sum of four by-products; chloroform, bromoform, dichlorobromomethane, and dibromochloromethane. The challenge is to maintain adequate levels of disinfection to kill microorganisms while at the same time minimizing the levels of TTHMs produced.

Table 1 - Microbial Contaminants

Contaminant	MCL, mg/L	Health Effects	Source of Drinking Water Contamination
Giardia lamblia	TT[1]	Gastrointestinal disease	Human and animal fecal wastes
Legionella	TT	Legionnaire's disease	Natural waters, can grow in water heating systems
Heterotrophic plate count (HPC)	TT	Indicates water quality, effectiveness of disinfection treatment	Naturally occurring bacteria
Total coliforms	<5% positive[2]	General indicator of pathogens	Environmental bacteria
Fecal coliforms and E. Coli	Confirmed presence	More specific indicator of pathogens	Human and animal fecal wastes
Turbidity	TT	Interferes with disinfection, indicator of filtration treatment efficiency	Particulate matter from soil runoff
Viruses	TT	Gastrointestinal disease	Human and animal fecal wastes
Trihalomethanes (total)	0.10	Liver, kidney, central nervous system effects, possible cancer	Drinking water chlorination by-product

[1] Treatment technique, filtration plus disinfection, or equivalent
[2] No more than 1 positive sample per month for systems collecting <40 samples per month

Health Effects: Some people who drink water containing TTHMs in excess of the MCL over many years could experience problems with their liver, kidneys, or central nervous systems, and may have an increased risk of getting cancer.

Application: TTHM requirements apply to community systems serving over 10,000 people and applying a disinfectant to the drinking water.

Monitoring: TTHMs must be monitored throughout the distribution system at frequencies varying from quarterly to once per year.

Compliance: Compliance is determined on meeting the maximum level for TTHMs over a running 12-month average of the sample results.

Water treatment/control measures: TTHMs can be reduced by moving the point of chlorine application from prior to filtration to after filtration, where many of the natural organic compounds in the water have been reduced. Alternative disinfectants such as chlorine combined with ammonia or ozone disinfection are available.

Rule history:
  Federal rule - 11/29/79
  Oregon rule - 9/24/82

Lead and Copper

Purpose: Set treatment technique requirements to control lead and copper in drinking water at the customer tap. Although lead and copper are naturally present in geologic deposits, they are rarely present in Oregon at significant levels in surface water or groundwater sources. They are primarily from corrosion of plumbing and plumbing fixtures in homes and buildings. Lead comes from lead solder and brass fixtures, and copper comes from copper tubing and brass fixtures.

Health effects:

Lead: Infants and young children are typically more vulnerable to lead in drinking water than the general population. Infants and children who drink water containing lead in excess of the action level could experience delays in their physical or mental development. Children could show slight deficits in attention span and learning abilities. Adults who drink this water over many years could develop kidney problems or high blood pressure.

Copper: Copper is an essential nutrient, but some people who drink water containing copper in excess of the action level over a relatively short period of time could experience gastrointestinal distress. Some people who drink water containing copper in excess of the action level over many years could suffer liver or kidney damage. People with Wilson's Disease should consult their personal doctor.

Application: All community and nontransient noncommunity systems

Monitoring: Samples are collected from "high-risk" homes; those with lead-soldered plumbing built prior to the July 1985 prohibition of lead solder in Oregon. One-liter samples of standing water (first draw after 6 hours of non-use) are collected at homes identified in the water system sampling plan. The number of samples required for initial and subsequent monitoring is summarized below:

Water System Population	Initial Sample Sites	Reduced Sample Sites
>100,000	100	50
10,001-100,000	60	30
3,301-10,000	40	20
501-3,300	20	10
101-500	10	5
<101	5	5

Two rounds of initial sampling were required during 1992-94, collected at six-month intervals. Subsequent annual sampling from the reduced number of sites is required after demonstration that lead and copper action levels are met. After three rounds of annual sampling, samples are required every three years. Water systems practicing corrosion control treatment must also monitor for water quality parameters (such as pH, temperature, alkalinity) and comply with target levels as specified by the Division.

Compliance: In each sampling round, 90% of samples from homes must have lead levels less than or equal to 0.015 mg/L, and copper levels less than or equal to 1.3 mg/L.

Water Treatment/Control Measures: Water systems that can not meet these levels must either implement a corrosion control program or develop alternate sources of water by January, 1998. If levels are not met even after treatment installation and optimization, then continuing public education efforts are required. It is possible that lead levels in a particular home may be higher than at other homes in the community as a result of the materials used in that home's plumbing. People who are concerned about elevated lead levels can arrange to test their water and if the results are high, can flush taps for 30 seconds to 2 minutes before using tap water, especially after periods of non-use.

Rule History:
  Federal rule - 6/7/91
  State rule - 12/7/92
  Technical corrections to federal rule - 6/30/94

Inorganic Contaminants

Purpose: Control levels of fifteen metals and minerals in drinking water, both naturally-occurring and resulting from agricultural or industrial use. Inorganic contaminants most often come from the source of water supply, but can also enter water from contact with materials used for pipes and storage tanks. See Table 2.

Health effects: For most inorganic contaminants, health concerns are related to long-term or even lifetime exposures (see Table 2). Nitrate and nitrite, however,can seriously affect infants in short-term exposures by interfering with the transfer of oxygen from the lungs to the bloodstream. Infants below the age of six months who drink water containing nitrate or nitrite in excess of the MCLs could become seriously ill and, if untreated, may die. Symptoms include shortness of breath and blue-baby syndrome. USEPA is reviewing the drinking water standard for arsenic because of special concerns that it may not be stringent enough. Arsenic is a naturally-occurring mineral known to cause cancer in humans at high concentrations.

Application: All public water systems. The exception is the asbestos standard which applies to community and nontransient noncommunity systems.

Monitoring: Nitrate - community and nontransient noncommunity systems must sample quarterly for surface water sources and annually for groundwater sources. All noncommunity and state-regulated water systems must sample annually. Asbestos - community and nontransient noncommunity systems with asbestos-cement water pipes or with water sources in geologic asbestos deposit areas must sample every nine years. All other inorganics - community and nontransient noncommunity systems must sample surface water sources annually and groundwater sources every three years. All transient noncommunity and state-regulated water systems must sample once.

Compliance: Water systems must meet the established maximum contaminant levels (Table 2). Systems that can not meet one or more MCLs must either install water treatment systems or develop alternate sources of water.

Water Treatment: A variety of water treatment processes are available for reducing levels of specific inorganic contaminants in drinking water, including ion exchange and reverse osmosis.

Rule history:

Federal rules - 12/24/75 (NIPDWR), 1/30/91 and 7/1/91 (Phase II), and 7/19/92 (Phase V)

State rule - 9/24/82 (arsenic), 12/7/92 (Phase II), and 1/14/92 (Phase V)

Table 2 - Inorganic Contaminants

Contaminant	MCL, mg/L (or as noted)	Potential Health Effects	Sources of Drinking Water Contamination
Antimony	0.006	Blood cholesterol increases, blood sugar decreases	Discharge from petroleum refineries, fire retardants, ceramics, electronics, solder
Arsenic	0.05	Skin damage, circulatory system effects, increased cancer risk	Erosion of natural deposits of volcanic rocks, runoff from orchards, runoff from glass and electronics production wastes
Asbestos	7 million fibers per liter (>10 um fiber size)	Benign intestinal polyps	Erosion of natural geologic deposits, decay of asbestos-cement water pipes
Barium	2	Increase in blood pressure	Discharge of drilling wastes, discharge from metal refineries, erosion of natural deposits
Beryllium	0.004	Intestinal lesions	Discharge from metal refineries and coal-burning factories, discharge from electrical, aerospace, and defense industries
Cadmium	0.005	Kidney damage	Corrosion of galvanized pipes, erosion of natural deposits, discharge from metal refineries, runoff from waste batteries and paints
Chromium (total)	0.1	Allergic dermatitis	Discharge from steel and pulp mills, erosion of natural deposits
Cyanide	0.2	Thyroid, nervous system damage	Discharge from steel/metal factories, discharge from plastic and fertilizer factories
Fluoride	4.0[1]	Bone disease, mottled teeth	Erosion of natural deposits, discharge from fertilizer and aluminum industries, drinking water additive promoting strong teeth
Mercury (total inorganic)	0.002	Kidney damage	Erosion of natural deposits, discharges from refineries and factories, runoff from landfills, runoff from cropland
Nickel	None[2]	Heart and liver damage	Electroplating, stainless steel, alloys
Nitrate (as N)	10	Methemoglobinemia ("blue baby syndrome") in infants below the age of six months	Runoff from fertilizer use, leaching from septic tank/drain fields, erosion of natural deposits
Nitrite	1	Methemoglobinemia ("blue baby syndrome") in infants below the age of six months	Runoff from fertilizer use, leaching from septic tank/drain fields, erosion of natural deposits (rapidly converted to nitrate)
Selenium	0.05	An essential nutrient, excessive levels associated with hair and nail loss, numbness in fingers and toes, circulatory problems	Discharge from petroleum and metal refineries, erosion of natural deposits, discharge from mines
Thallium	0.002	Hair loss, blood changes, and kidney, liver, intestinal effects	Leaching from ore processing sites, discharge from electronics, drugs, and glass factories

[1]Note: a secondary standard for fluoride is set a 2.0 mg/L to control tooth discoloration

[2]Federal standard withdrawn 2/23/95 Monitoring is required

Organic Chemicals

Purpose: Control levels of 53 different organic contaminants (see Table 3). Organic contaminants are most often associated with industrial or agricultural activities that affect sources of drinking water supply. Major types of organic contaminants include industrial and commercial solvents and chemicals, and pesticides used in agriculture and landscaping. Organic contaminants can also enter drinking water from materials in contact with the water such as pipes and internal paints and coatings.

Health effects: For organic contaminants, health concerns are related to long-term or even lifetime exposures to low levels of contaminant (see Table 3).

Table 3 - Organic Contaminants

Contaminant	MCL, mg/L	Potential Health Effects	Sources of Drinking Water Contamination
Acrylamide	TT[1]	Central nervous system effects, increased risk of cancer	Polymers used in water and sewage treatment
Alachlor	0.002	Eye, liver, kidney, spleen effects, increased risk of cancer	Runoff from herbicides used on row crops
Atrazine	0.003	Cardiovascular and reproductive effects	Runoff from herbicides used on row crops
Benzene	0.005	Decreased blood platelets, increased risk of cancer	Discharge from factories, leaching from landfills and gas storage tanks
Benzo(a)-pyrene (Polyaromatic hydrocarbons)	0.0002	Reproductive difficulties and increased risk of cancer	Leaching from linings of water storage tanks and water pipes
Carbofuran	0.04	Blood, nervous system and reproductive system effects	Leaching of soil fumigant used on rice and alfalfa
Carbon tetrachloride	0.005	Liver effects and increased risk of cancer	Discharge from chemical plants and other industrial activities
Chlordane	0.002	Blood and nervous system effects, increased risk of cancer	Residue of banned termiticide
Chloro-benzene	0.1	Kidney and liver effects	Discharge from chemical and agricultural chemical factories
2,4-D	0.07	Liver, adrenal gland, and kidney damage	Runoff from herbicides used on row crops
Dalapon	0.2	Kidney effects	Runoff from herbicides used on rights of way
1,2 Dibromo-3-chloropropane (DBCP)	0.0002	Reproductive difficulties and increased risk of cancer	Runoff from soil fumigant used on soybeans, cotton, pineapples, orchards
o-Dichloro-benzene	0.6	Liver, kidney, circulatory system damage	Discharge from industrial chemical factories
p-Dichloro-benzene	0.075	Liver, kidney, spleen damage, blood effects	Discharge from industrial chemical factories
1,2-Dichloroethane	0.005	Increased risk of cancer	Discharge from industrial chemical factories
1,1-Dichloro-ethylene	0.007	Liver damage	Discharge from industrial chemical factories
cis 1,2-Dichloro-ethylene	0.07	Immune system problems	Discharge from industrial chemical factories
trans 1,2-Dichloro-ethylene	0.1	Liver damage and immune system problems	Discharge from industrial chemical factories
Dichloro-methane	0.005	Liver damage and increased risk of cancer	Discharge from pharmaceutical and chemical factories
1,2-Dichloropropane	0.005	Increased risk of cancer	Discharge from industrial chemical factories
Di(2-ethylhexyl) adipate	0.4	General toxic and reproductive effects	Discharge from chemical factories
Di(2-ethylhexyl) phathalate	0.006	Liver effects, reproductive difficulties, increased risk of cancer	Discharge from chemical and rubber factories
Dinoseb	0.007	Reproductive difficulties	Runoff from herbicide used on soybeans and vegetables
Dioxin (2,3,7,8-TCDD)	3 x10^{-8}	Reproductive difficulties and increased risk of cancer	Emissions from waste incineration and other combustion, discharge from chemical factories
Diquat	0.02	Cataracts	Runoff from herbicide use
Endothall	0.1	Stomach, intestine effects	Runoff from herbicide use
Endrin	0.002	Nervous system effects	Residue of banned insecticide
Epichloro-hydrin	TT[1]	Stomach effects and increased risk of cancer	Discharge from industrial chemical factories, impurity in some water treatment chemicals
Ethyl-benzene	0.7	Liver, kidney damage	Discharge from petroleum refineries
Ethylene dibromide	0.00005	Stomach, kidney, reproductive system effects, and increased risk of cancer	Discharge from petroleum refineries
Glyphosate	0.7	Kidney, reproductive system effects	Runoff from herbicide use
Heptachlor	0.0004	Liver damage, increased risk of cancer	Residue of banned termiticide
Heptachlor epoxide	0.0002	Liver damage, increased risk of cancer	Breakdown of heptachlor
Hexachloro-benzene	0.001	Liver, kidney, reproductive system effects, and increased risk of cancer	Discharge from metal refineries and agricultural chemical factories
Hexachloro-cyclopentadiene	0.05	Kidney damage	Discharge from chemical factories
Lindane	0.0002	Liver, kidney effects, increased risk of cancer	Runoff/leaching from insecticide used on lumber, gardens, cattle; restricted in 1983
Methoxy-chlor	0.04	Reproductive difficulties	Runoff/leaching from insecticide used on fruits, vegetable, alfalfa, livestock

Contaminant	MCL, mg/L	Potential Health Effects	Sources of Drinking Water Contamination
Oxamyl (Vydate)	0.2	Nervous system effects	Runoff/leaching from insecticide used on apples, potatoes, tomatoes
Pentachloro-phenol	0.001	Liver and kidney effects, increased risk of cancer	Discharge from wood preserving operations
Picloram	0.5	Liver damage	Herbicide runoff
Polychlori-nated biphenyls (PCBs)	0.0005	Skin, thymus gland, reproduc-tive system nervous system effects, immune deficiencies, in-creased risk of cancer	Runoff from landfills, discharge of waste chemicals
Simazene	0.004	Blood effects	Herbicide runoff
Styrene	0.1	Liver, kidney, blood effects	Discharge from rubber and plastic factories, leaching from landfills
Tetrachloro-ethylene	0.005	Liver damage and increased risk of cancer	Leaching from PVC pipes, discharge from factories and dry cleaning
Toluene	1	Liver, kidney, nervous system effects	Discharge from petro-leum refineries
Toxaphene	0.003	Kidney, liver, nervous system effects, increased cancer risk	Runoff/leaching from insecticide used on cattle, cotton, canceled in 1982
2,4,5-TP (Silvex)	0.05	Liver damage	Residue of banned herb-icide, canceled in 1983
1,2,4-Tri-chloro-benzene	0.07	Adrenal gland changes	Discharge from textile finishing factories
1,1,1-Tri-chloro-ethane	0.2	Liver, nervous system, circula-tory system effects	Discharge from metal degreasing sites and other factories
1,1,2-Tri-chloro-ethane	0.005	Kidney, liver, immune system damage	Discharge from indus-trial chemical factories
Trichloro-ethylene	0.005	Liver damage and increased risk of cancer	Discharge from metal degreasing sites and other factories
Vinyl chloride	0.002	Increased risk of cancer	Leaching from PVC pipe, discharge from plastics factories
Xylenes (total)	10	Nervous system damage	Discharge from petro-leum factories, dis-charge from chemical factories

[1]Treatment technique requirement (limit dosage of polymer treatment chemicals)

Application: Community and nontransient noncommunity water systems.

Monitoring: One test for each contaminant from each water source is required during every 3-year compliance period, beginning in the 1993-95 period. The exceptions are dioxin and acrylamide/ epichlorohydrin. Only those systems determined by the Division to be at risk of contamination must monitor for dioxin. Water systems using polymers containing acrylamide or epichlorohydrin in their water treatment processes must keep their dosages below specified levels.

Compliance: Water systems must meet the established maximum contaminant levels (Table 3). Systems that can not meet one or more MCLs must either install or modify water treatment systems or develop alternate sources of water.

Water Treatment: A variety of water treatment processes are available for reducing levels of specific organic contaminants in drinking water, including activated carbon and aeration.

Rule history:

Federal rules - 1/30/91 and 7/1/91(Phase II); and 7/19/92 (Phase V)

State rule - 12/7/92 (Phase II) and 1/14/92 (Phase V)

Radiologic Contaminants

Purpose: Limit exposure to six radioactive contaminants in drinking water (see Table 4). These contaminants are both natural and man-made.

Health effects: Primarily increased cancer risk from long-term exposure.

Application: All community water systems.

Monitoring: One sample from each source for gross alpha every four years. Only communities serving over 100,000 people or with sources potentially impacted by man-made radiation sources designated by the Division must sample for other radiologic contaminants.

Compliance: Community water systems that can not meet MCLs must install treatment or develop alternate water sources.

Water treatment: Variety of treatment processes will reduce radiologic contaminants, including ion exchange and reverse osmosis.

Rule history:

Federal rule - 7/9/76

State rule - 9/24/82

Table 4 - Radiologic Contaminants

Contaminant	MCL, pCi/L (picocuries per liter), unless otherwise noted	Potential health effects	Sources of Drinking Water Contamination
Gross alpha	15	Cancer	Erosion of natural deposits
Gross beta[1]	50	Cancer	Decay of natural and man-made deposits
Iodine-131[2]	3	Cancer	Power production
Radium 226+228[3]	5	Cancer	Erosion of natural deposits
Strontium 90[2]	8	Cancer	Power and weapons production
Tritium[2]	20,000	Cancer	Power and weapons production

[1]Sampling required only if designated by the Division - Gross beta + photon emitters not to exceed 4 millirems per year

[2]Sampling required only if designated by the Division

[3]Sampling only if gross alpha result exceeds 5 pCi/L

Review and Update of Current Standards

USEPA is required to review existing drinking water standards by the year 2000. It is likely that 5-6 standards will undergo detailed review and possible revision.

II. Future Standards

New and revised drinking water quality standards are mandated under the federal 1996 Safe Drinking Water Act. These include:

- Disinfectants/Disinfection by-products
- Enhanced surface water treatment
- Radon/Radionuclides
- Arsenic
- Groundwater
- Next five contaminants

The Health Division, under the Primacy Agreement with USEPA, will have up to two years to adopt each federal rule after it is finalized. This Section is intended to summarize and preview these standards, currently under development by USEPA and not yet final.

Microbial Standards - Disinfectants/Disinfection By-products, Enhanced Surface Water Treatment, Groundwater Disinfection

Purpose: Increase protection of people from disease-producing (pathogenic) organisms in water supplies while at the same time limiting the exposure of people to chemical disinfectants and various chemical by-products of disinfection treatment present as a result of disinfection treatment practices.

The primary additional organism of concern in surface water supplies is *Cryptosporidium*. 100% of surface water supplies are considered at some risk of containing microorganisms at any given time.

Human enteric viruses from human fecal matter is of concern in groundwater supplies. Available data suggests that 8-10% of public wells may be at risk of virus contamination, so requirements will focus on identification of at-risk wells and either reducing the risk or providing adequate levels of disinfection treatment to kill viruses.

Finally, disinfection treatment used to kill microorganisms in drinking water can react with naturally occurring organic and inorganic matter in water to form disinfection by-products. The challenge is to apply levels of disinfection treatment needed to kill microorganisms while limiting the levels of disinfection by-products produced.

Occurrence data in US public water systems is currently lacking, therefore, larger utilities are now collecting microbiological and disinfection by-product data under the Information Collection Rule (ICR). ICR data will be complete, validated, and available by January, 2000, and will be used to design future microbial drinking water standards. Therefore, the new microbial standards will be introduced in stages, with early stages focusing on improvements in health protection that can be achieved by optimizing existing water system facilities without major capital costs, and final stages requiring major capital investments if public health needs are demonstrated by the ICR data. The regulatory stages are summarized below:

Stage 1 Disinfectants/Disinfection By-products (Stage 1 D/DBP) - Reduced MCLs and new MCLs

Interim Enhanced Surface Water Treatment (IESWTR) - Increased filtration and disinfection performance standards for large systems (serving over 10,000 people)

Filter Backwash Recycling Rule (FBR) - Regulation of filter backwash recycling to limit accumulation of microorganisms

Groundwater Rule (GWR) - New disinfection treatment performance standards or alternative practices for all systems with groundwater at risk of virus contamination

Long-term Stage 1 Enhanced Surface Water Treatment (LT1ESWTR)- Increased filtration and disinfection performance standards for smaller systems

Stage 2 Disinfectants/Disinfection By-products (Stage 2 D/DBP)- Further reduced MCLs and new MCLs

Long-term Stage 2 Enhanced Surface Water Treatment (LT2ESWTR) - Further increased filtration and disinfection performance standards for all systems

Revisions to current coliform bacteria standards - If needed

Health effects: See Table 5.

Table 5 - Future Microbial Contaminants, Disinfectant Residuals, and Disinfection By-products

Contaminant	MCL, mg/L	Potential Health Effects	Source of Drinking Water Contamination
Bromate	0.010	Cancer	Drinking water ozonation by-product
Bromodichloromethane	(see total trihalomethanes (TTHMs)	Cancer; liver, kidney, and reproductive effects	Drinking water chlorination by-product
Bromoform	(see TTHMs)	Cancer; nervous system, liver and kidney effects	Drinking water chlorination by-product
Chloral hydrate	TT	Liver effects	Drinking water chlorination by-product
Chloramines (residual total chlorine)	4 (as CL_2)		Drinking water chlorination residual
Chlorine (residual free chlorine)	4 (as CL_2)		Drinking water chlorination residual
Chlorine dioxide	0.8 (as CLO_2)		Drinking water residual from disinfection using chlorine dioxide
Chlorite	1.0	Oxidative effects to red blood cells	By-product of disinfection using chlorine dioxide
Chloroform	(see TTHMs)	Cancer; liver, kidney, reproductive effects	Drinking water chlorination by-product
Cryptosporidium	TT (filtration)	Severe gastrointestinal illness, especially for people with compromised immune systems	Fecal matter from humans and animals, especially cattle
Dichlorobromomethane	(see TTHMs)	Nervous system, liver, kidney, reproductive effects	Drinking water chlorination by-product
Dichloroacetic acid	(see HAA5)	Cancer; reproductive, developmental effects	Drinking water chlorination by-products
Haloacetic acids (HAA5) [1]	0.060 (Stage 1) 0.030 (Stage 2)	Cancer and other effects	Drinking water chlorination by-products
Trichloroacetic acid	(see HAA5)	Liver, kidney, spleen developmental effects	Drinking water chlorination by-product

Contaminant	MCL. ms/L	Potential Health Effects	Source of Drinking Water Contamination
Total Trihalo- methanes (TTHMs)	0.10 (current) 0.080 (Stage 1) 0.040 (Stage 2)	Cancer and other effects	Drinking water chlor- ination by-products
Viruses	TT (disinfection)	Severe gastro- intestinal illness	Human fecal matter

[1] Sum of the concentrations of mono-, di-, and trichloroacetic acids and mono- and dibromoacetic acids

Application: Microbial standards apply to all public water systems using groundwater or surface water sources of supply. D/DBP standards apply to community and nontransient noncommunity systems that apply disinfectants.

Monitoring: Monitoring is likely to be required both for pathogenic organisms and for disinfectants and disinfection by-products. Monitoring of treatment processes is also likely.

Compliance: Compliance is demonstrated by either meeting the MCLs or meeting treatment technique requirements or best management practices for applicable contaminants. See Table 5.

Federal regulation dates:
- Information collection rule - 5/14/96
- Notice of data availability - 11/3/97
- Final Stage 1 D/DBP and IESWTR - 11/98
- Final Filter Backwash Recycling Rule - 8/00
- Final LT1ESWTR and GWR - 11/00
- Final Stage 2 D/DBP, LT2ESWTR - 5/02
- Coliform bacteria rule revision - 2002 or later

Arsenic

Purpose: Revise existing standard for arsenic based on health effects research suggesting that arsenic may present an internal organ cancer risk at low levels of exposure. EPA has finalized a comprehensive arsenic health research plan to reduce uncertainties in assessing health risks of arsenic, but the results are not expected to be available before the scheduled adoption of the new standard.

Health effects: Current standard of 0.050 mg/L is based on health effects including skin thickening and possible skin cancer. Revised standard to take into account risk of internal organ cancer.

Application: Community and nontransient noncommunity systems, surface water and groundwater sources.

Monitoring: To be determined in rule.

Compliance: Based on meeting revised Maximum Contaminant Level. EPA suggests a health target level of 0.002 mg/L for discussion of the revised MCL. National annual costs of meeting a range of possible MCLs are: 0.0005 mg/L, $120B; 0.002 mg/L, $4.2B; 0.010 mg/L, $710M; 0.020 mg/L, $330M; 0.050 mg/L, $120M. Many utilities provide water with arsenic levels greater than 0.002 mg/L.

Federal regulation dates:
- EPA proposed rule - January, 2000
- EPA final rule - January, 2001

Radionuclides

Purpose: Set new standards for radon and uranium. The radon MCL is to be based on a revised risk assessment by the National Academy of Sciences. Finalize standards for currently regulated contaminants, including radium-226, radium-228, alpha emitters, and beta and photon emitters.

Health effects: Primarily cancer for all contaminants. Radon is a radioactive gas which is naturally-occurring in some groundwater. It poses a health risk when the gas is released from water into air, as occurs during showering, bathing, or washing clothes or dishes. Radon in drinking water is a relatively small part of the total radon in air. Other sources are radon gas from soil which enters homes through foundations, and radon inhaled directly while smoking cigarettes. Radon which is inhaled has been linked to lung cancer, however, it is not clear what level of radon in drinking water contributes to this effect. People concerned about radon in their homes can have their homes tested to determine total exposure level. For information on how to conduct home tests, contact Radiation Protection Services at (503) 731-4272.

Application: Community and nontransient noncommunity systems, surface water and groundwater sources.

Monitoring: To be determined in rule.

Compliance: Based primarily on meeting MCLs. Existing MCLs for radium-226 and 228 are unlikely to be raised, as was earlier expected, from 5 pCi/L to 20 pCi/L. Uranium MCL proposed in 1991 at 0.02 mg/L. Radon MCL proposed in 1991 at 300 pCi/L. A multi-media approach to radon regulation is under discussion, in which an Alternative MCL could be set by states with effective indoor air radon reduction programs in place and operating. The Alternative MCL would be in the range of 3,000-4,000 pCi/L. Oregon radon data from 65 deep community wells collected in 1983 showed 23 with radon greater than 300 pCi/L. Cost data from 1990 suggests the following national annual costs of various alternate radon MCLs: 200 pCi/l, $3.3B; 300 pCi/L, $2.5B; 1,000 pCi/L,$816M; 4,000 pCi/L, $178M.

Regulation dates (Contaminants other than radon):
- EPA proposed rule - 7/18/91
- EPA final rule - November, 2000

Regulation dates (Radon):
- NAS studies complete - June, 1998
- EPA draft rule - December, 1998
- Guidelines for multi-media programs - August, 1999
- EPA final rule - August, 2000

Drinking Water Contaminant Candidate List (DWCCL)

Purpose. Identify chemical and microbiological contaminants known or anticipated to occur in public water systems, for possible future regulation. The first DWCCL was published in February, 1998. In Tables 6 and 7, the list is broken into two groups. The first group includes twenty contaminants that are priorities for regulation, and will be the source for regulatory decisions in 2001. The second group includes forty additional contaminants which require further research on health, treatment, and/or analytical methods, or need further occurrence data collection. For each contaminant, its classification is shown along with the Chemical Abstract System Number (CASN), if applicable, for use in locating additional information on the contaminant. The list must be updated every five years.

In addition, the tables indicate the contaminants on the DWCCL for which EPA Health Advisories have been published. These advisories contain known information on health risks, and specify ranges of concentrations that are acceptable for drinking over different lengths of time. Advisories are generally used to evaluate specific contaminant exposures at specific sites, such as chemical spills.

Table 6 - Contaminant Candidate List - Regulatory Determination Priorities (20)

Contaminant	Classification	Chemical Abstract Number	Health Advisory Published
Acanthamoeba	microbiological	—————	
1,1,2,2-tetrachloro-ethane	organic	630-20-6	
1,1-dichloroethane	organic	75-34-3	
1,2,4-trimethylbenzene	organic	95-63-6	
1,3-dichloropropene	pesticide	542-75-6	
2,2-dichloropropane	organic	594-20-7	
Aldrin	pesticide	309-00-2	X
Boron	inorganic	7440-42-8	
Bromobenzene	organic	108-86-1	
Dieldrin	pesticide	60-57-1	X
Hexachlorobutadiene	organic	87-68-3	
p-Isopropyltoluene	organic	99-87-6	
Manganese	inorganic	7439-96-5	
Metolachlor	pesticide	51218-45-2	
Metribuzin	pesticide	21087-64-9	
Naphthalene	organic	91-20-3	
Organotins	organic	—————	
Triazines & degradation products (including Cyanazine, Atrazindesethyl)	pesticide	—————	
Sulfate	inorganic	—————	
Vanadium	inorganic	7440-62-2	

Table 7 - Contaminant Candidate List - Research and Occurrence Priorities (40)

Contaminant	Classification	Chemical Abstract Number	Health Advisory Published
Adenoviruses	microbiological	—————	
Aeromonas hydrophilia	microbiological	—————	
Cyanobacteria (Blue-green algae) and their toxins	microbiological	—————	
Caliciviruses	microbiological	—————	
Coxsackieviruses	microbiological	—————	
Echoviruses	microbiological	—————	
Helicobacter pylon	microbiological	—————	
Microsporidia	microbiological	—————	
1,1-dichloropropene	organic	563-58-6	
1,2-diphenylhydrazine	organic	122-66-7	
1,3-dichloropropane	organic	142-28-9	
2,4,6-trichlorophenol	organic	88-06-2	
2,4-dichlorophenol	organic	120-83-2	
2,4-dinitrophenol	organic	51-28-5	
2,4-dinitrotoluene	organic	121-14-2	
2,6-dinitrotoluene	organic	606-20-2	
2-methyl-phenol	organic	95-48-7	
Alachlor ESA	pesticide	—————	
Aluminum	inorganic	7429-90-5	
Acetochlor	pesticide	34256-82-1	
DCPA (Dacthal) monoacid & degradates	pesticide	887-54-7	
DCPA (Dacthal) di-acid degradates	pesticide	2136-79-0	
DDE	pesticide	72-55-9	
Diazinon	pesticide	333-41-5	X
Disulfoton	pesticide	298-04-4	X
Diuron	pesticide	330-54-1	X
EPTC (s-Ethyl-dipropylthiocarbonate)	pesticide	759-94-4	
Fonofos	pesticide	944-22-9	X
Linuron	pesticide	330-55-2	
Methyl bromide	organic	74-83-9	
Molinate	pesticide	2212-67-1	
Mycobacterium avium intercellulare (MAC)	microbiological	—————	
MTBE	organic	1634-04-4	X
Nitrobenzene	organic	98-95-3	
Perchlorate	inorganic	—————	
Prometon	pesticide	1610-18-0	
RDX	organic	121-82-4	X
Sodium	inorganic	7440-23-5	
Terbacil	pesticide	5902-51-2	X
Terbufos	pesticide	13071-79-9	X

Monitoring: To support identification of contaminants, the EPA must establish the National Contaminant Occurrence Database (NCOD) by August, 1999. Monitoring and reporting may be required for public water systems for up to 30 unregulated contaminants for inclusion in the database.

Regulating contaminants: EPA must publish a decision on whether or not to regulate at least five contaminants (including sulfate) from the DWCCL by August, 2001, and from each updated DWCCL every five years. For any contaminants from the first DWCCL for which a decision is made to regulate, the final rule is due by February, 2005, with compliance required by water systems by February, 2008.

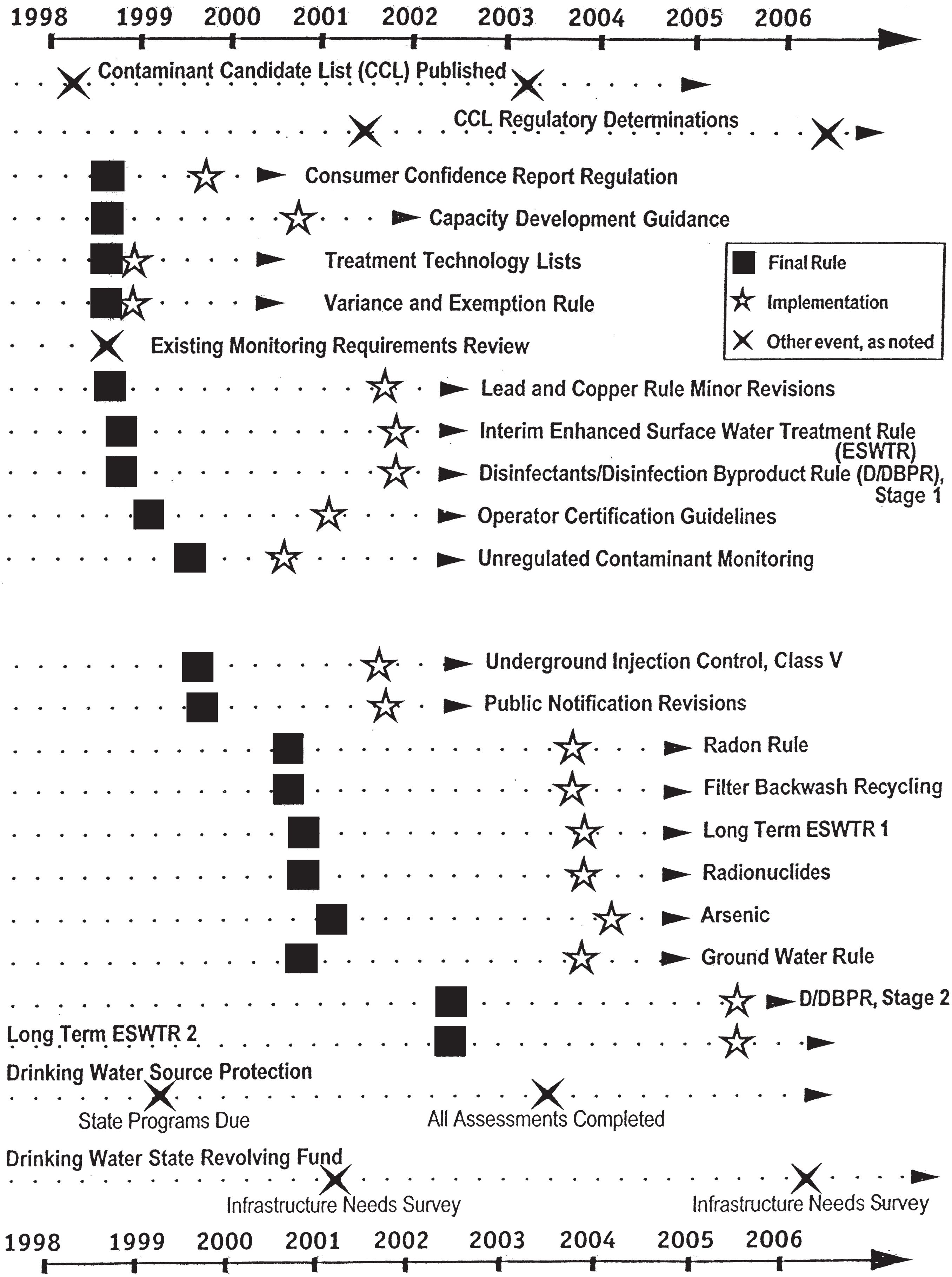
Safe Drinking Water Act Timeline

The chart on page 13 shows a simplified implementation timeline for major provisions of the 1996 Safe Drinking Water Act, prepared and published by the USEPA [1]. These will take effect from now until 2005 and beyond. These provisions include the new drinking water standards described above as well as many new program initiatives such as consumer confidence reports, technical/financial/managerial capacity development, operator certification, drinking water source protection, and the drinking water state revolving loan fund. Watch for information on these program initiatives in future regular editions of the PIPELINE.

Other useful sources of information include:
Journal American Water Works Association (and related publications)
Rural Water Magazine, National Rural Water Association (and related publications)
USEPA, AWWA, and other organization web pages (access through Oregon Drinking Water web page)

[1] "Safe Drinking Water Is In Our Hands - Existing Standards and Future Priorities" EPA 815-F-98-007 (June, 1998)

Timeline of SDWA Activities



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