Section 3: Water Quality Requirements

This section discusses the water quality regulations relevant to CCSD's water supply. The section presents the current and proposed drinking water regulations, as well as the emerging contaminants for which regulations in the future could be developed. Those contaminants that may be present in CCSD's groundwater supply are discussed in greater detail. Issues related to treated wastewater discharges that are significantly affected by drinking water quality are also discussed.

3.1 Drinking Water Regulations

The Safe Drinking Water Act (SDWA) of 1974 (PL 93-523), as amended, is the primary federal law that ensures drinking water quality. Under SDWA, the United States Environmental Protection Agency (USEPA) sets standards for drinking water quality and oversees the states, localities, and water suppliers who implement these standards. In the State of California, the Department of Health Services (DHS) has primary enforcement responsibility (primacy) for the federal drinking water regulations and guidelines in addition to certain state regulations that are more stringent than federal regulations.

For the purpose of this discussion, it is noted that CCSD's population is currently 6,000 to 8,000, with approximately 4,000 service connections, and as such is considered a medium-sized water system (i.e., serving 3,301 to 10,000 people).

3.1.1 Current Drinking Water Regulations

Drinking water regulations in the U.S. and in California, have undergone significant revisions due to increasing contamination of water sources, improved analytical methods used in monitoring water sources and more definitive knowledge of health risks associated with waterborne contaminants. The revisions are being driven by:

- Federally enacted SDWA Amendments of 1986 (PL 99-339) and 1996 (PL 104-182).
- Local concerns in the State of California, where the DHS has primacy in implementation of the SDWA and subsequent amendments.
- Regulatory negotiation process of health, environmental and economic issues involving USEPA and other stakeholders.

This section presents federal and state regulations covering current and proposed drinking water regulations governing the treatment requirements for utilization of the groundwater source as potable water. Drinking water regulation is extremely complex and is constantly under revision. Only those regulations that are most relevant to CCSD's water supply are discussed in detail.

Generally, water quality in California is governed by the following types of standards:

- Primary Maximum Contaminant Levels (MCLs): Primary MCLs are established by USEPA as well as DHS for a number of chemical and radioactive contaminants found in drinking water. An MCL is the maximum permissible level of a contaminant in water that is delivered to any user of a public water system. They are enforceable standards. MCLs are set as close to Maximum Contaminant Level Goals (MCLGs) as feasible using the best available treatment technology and taking cost into consideration. Primary MCLs may be established by DHS as long as they are more stringent than those set by USEPA. Primary MCLs can be found in Title 22 California Code of Regulations (CCR) for inorganic chemicals, trihalomethanes, radioactivity and organic chemicals. Current primary MCLs are listed in Appendix A.

- Secondary Maximum Contaminant Levels: Secondary MCLs are established for a number of chemicals, characteristics, and constituents and address aesthetic qualities such as taste, odor, or appearance of drinking water. Secondary MCLs may be established by DHS as long as they are more stringent than those set by USEPA. Contaminants with primary MCLs may also have Secondary MCLs. Current Secondary MCLs and Secondary MCL ranges are presented in Appendix A.

- Maximum Contaminant Level Goals: MCLGs are set at or below the MCLs for specific contaminants. They are health effect-based goals for chemicals in drinking water, developed by USEPA. MCLGs provide one basis for revising MCLs, along with estimated cost and technological feasibility. Current MCLGs are presented in Appendix A.

- Public Health Goals (PHGs): State PHGs, similar to the federal MCLGs, are health effect-based goals for chemicals in drinking water, developed by the Office of Environmental Health Hazard Assessment (OEHHA). PHGs are only established for contaminants for which MCLs have or will be established. PHGs for noncarcinogenic chemicals in drinking water are set at a concentration "at which no known or anticipated adverse health effects will occur, with an adequate margin of safety." For carcinogens, PHGs are set at a concentration that "does not pose any significant risk to health." PHGs provide a basis for revising MCLs, along with cost and technological feasibility. They are not enforceable standards. Current PHGs are presented in Appendix A.

- Action Levels (ALs): ALs are intended as guidance and are set for some emerging contaminants that are not otherwise regulated.

As a result of the 1996 SDWA Amendments, water purveyors are required to publish consumer confidence reports each year. These reports inform the public on the quality of the drinking water with respect to primary drinking water standards, secondary drinking water standards, any detection of coliform bacteria, lead and copper measurements, as well as sodium and hardness levels. A copy of the CCSD's 2002 Consumer Confidence Report is contained in Appendix B. Key rules that pertain to potable water supplies in CCSD are discussed in the following sections.

3.1.1.1 Total Chromium

Chromium is a naturally occurring element. It is found in igneous rock, usually as Cr_2O_3. Chromium also enters surface and ground waters from human industrial activities such as electroplating factories, stainless steel production and welding facilities, leather tanneries and textile manufacturing facilities. Chromium also enters groundwater by leaching from soil.

Forms of chromium found in drinking water include chromium III and chromium VI. Chromium VI in water will eventually be reduced to chromium III by organic matter. The rate at which this occurs depends on the amount of organic matter present in the water, and on the pH and redox potential of the water.[8]

Chromium III is considered an essential nutrient, with 50 to 200 μg/day recommended for adults. Chromium VI is considered to pose risks to people, primarily since exposures to certain airborne chromium VI compounds in occupations such as chromate production, chromate pigment production and chromium plating industries have resulted in cancer.[9]

Because of the controversy surrounding the health effects of chromium VI in drinking water, chromium in drinking water is regulated as total chromium by DHS, in Title 22, CCR. DHS was expected to establish a chromium VI specific MCL by January 2004, however, to date no MCL has yet been established. Chromium VI is currently regulated under California's total chromium MCL of 50 μg/l, which is lower than the federal MCL of 100 μg/l, established by USEPA. The World Health Organization uses 50 μg/l as a guideline for total chromium.[10] As part of its program to establish PHGs for contaminants with drinking water MCLs, OEHHA established a 2.5 μg/l Total chromium PHG in March 1999. The PHG was subsequently withdrawn because the study, which the PHG was based, was found to be unsuitable for use. OEHHA was expected to determine a new PHG in 2003. To date no new PHG has been determined.

According to the Consumer Confidence Report 2002, CCSD has a total chromium concentration of approximately 3 μg/l in its wells. This level is well below regulatory requirements. Although not currently required, sampling for chromium VI is anticipated to be required in the near future.

3.1.1.2 Lead and Copper

Lead and copper are both naturally occurring metals. Both have been used to make household plumbing fixtures and pipes for many years, though Congress banned the installation of lead solder, pipes, and fittings in 1986. The two contaminants enter drinking water when water reacts with the metals in the pipes. This is more likely to happen when water sits in a pipe for more than a few hours.

The two contaminants have different health effects. Lead is particularly dangerous to fetuses and young children because it can slow neurological and physical development. Lead may also affect the kidneys, brain, nervous system, and red blood cells, and is considered a possible cause of cancer.

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8 Clifford, D., Man Chau, J. 1988. The fate of chromium III in chlorinated water. U.S. EPA, EPA/600/S2-87/100.

9 IARC. 1990. Chromium, Nickel and Welding, Volume 49, IARC Monographs on the Evaluation of Carcinogenic Risks to Humans, Volume 49, International Agency for Research on Cancer, World Health Organization, Lyon. US EPA. 1998a. Chromium (VI) Integrated Risk Information System (IRIS). US EPA. 1998b. Toxicological Review of Hexavalent Chromium, in Support of Summary Information on the Integrated Risk Information System (IRIS), August 1998; NTP. 2000. Chromium Hexavalent Compounds, National Toxicology Program, Department of Health and Human Services. ATSDR. September 2000. Toxicological Profile for Chromium, Agency for Toxic Substances Disease Registry, Public Health Service, US Department of Health and Human Services.

10 WHO. 1996. Guidelines for drinking water quality, 2nd ed. Vol. 2. Health criteria and other supporting information (pp. 940-949), and Addendum to Vol. 2, 1998 (pp. 281-283), World Health Organization, Geneva.

Copper is an essential nutrient, required by the body in very low concentrations. In the short-term, consumption of drinking water containing copper well above the action level can cause nausea, vomiting, and diarrhea. Exposure to drinking water containing copper above the action level over many years could increase the risk of liver and kidney damage. To prevent these effects, USEPA set health goals (MCLGs) and action levels for lead and copper.

The Lead and Copper Rule (published 7 June 1991 and effective 7 December 1992) is a substantially different drinking water regulation. While most drinking water regulations require water systems to treat water so that it is clean and safe to drink when it leaves their facilities, this rule regulates two contaminants that nearly always taint drinking water after it leaves the treatment plant.

Lead and copper have specific regulations in 22 CCR, Chapter 17.5 §64670, et seq. The lead and copper regulations use the term "action level" for each substance, for purposes of regulatory compliance. These action levels should not be confused with DHS's advisory action levels for unregulated chemical contaminants.

Action levels for copper and lead, which are to be met at the customer's tap, are used to determine the treatment requirements that a water system is required to meet. The action level for copper is exceeded if the concentration of copper in more than 10 percent of tap water samples collected, during any monitoring period conducted, is greater than 1.3 mg/l. Similarly, the action level for lead is exceeded if the concentration of lead in more than 10 percent of tap water samples collected is greater than 0.015 mg/l. Failure to comply with the applicable requirements for lead and copper is a violation of primary drinking water standards for these substances.

Because lead and copper contamination generally occur from corrosion of household lead pipes, it cannot be directly detected or removed by the water system. Under this rule, water systems are required to control the corrosiveness of their water if the level of lead at home taps exceeds an action level. The action levels, MCLGs and detection levels for the purposes of reporting (DLRs) for lead and copper are listed in Table 3-1.

TABLE 3-1
LEAD AND COPPER STANDARDS

Chemical	Action Level (mg/l)	MCLG (mg/l)	PHG (mg/l)	DLR[a] (mg/l)
Lead	0.015	0	0.002	0.005
Copper	1.3	1.3	0.17	0.050

Note: (a) DLR refers to the detection levels for purposes of reporting.

Water systems are required to evaluate not only the pipes in their distribution systems, but also the age and types of housing that they serve. Based upon this information, the systems must collect water samples at points throughout the distribution system which are vulnerable to lead contamination, including regularly used bathroom or kitchen taps.

When the level of lead or copper reaches the action level in 10 percent of the tap water samples, the water system must begin certain water treatment steps. At a minimum, systems must maintain optimal corrosion control. Corrosion control does not reduce the contaminant level, but helps prevent the water from being contaminated in the first place. By increasing the water's pH or hardness, water systems can make their water less corrosive, and therefore less likely to eat into pipes and absorb the lead or copper. Consumers can further reduce the potential for elevated lead levels at the tap by ensuring that all plumbing and fixtures meet local plumbing codes.

When a water system exceeds either action level, it must also assess its source water. When there are high levels in the source water, treatment of that water, in conjunction with corrosion control is required.

The rule also requires systems that exceed the lead action level to educate the affected public about reducing its lead intake. Finally, a system that continues to exceed the lead action level after completing corrosion control and source water treatments may have to replace some of its lead water mains.

CCSD routinely monitors the level of lead and copper in the water system by testing water samples taken at the customer's tap. Based on the CCSD's 2001 sampling results, the 90^{th} percentile value was 0.0065 mg/l for lead and 0.270 mg/l for copper, both of which are below the action levels. CCSD conducted its first round of consumer tap sampling during July of 1993. The results of these tests indicated that copper exceeded its action level. An October 1994 report[11] on the CCSD's lead and copper rule compliance found that copper corrosion was due to corrosion of household plumbing as opposed to the source water or corrosion of the distribution system. The report also concluded that Santa Rosa water would assist in preventing corrosion when mixed with San Simeon water. Alternatives suggested in the 1994 report included raising the source water pH, and the addition of corrosion inhibitors. Currently, CCSD is in compliance with the lead and copper rule without the further addition of chemicals to its source water.

3.1.1.3 Total Coliform Rule

The Total Coliform Rule (TCR) intends to protect drinking water from microbial contamination. Coliforms are a group of bacteria that are common in both the environment and the digestive tracts of humans and animals. Coliforms present in water contaminated with human or animal waste indicate other pathogenic microbes may be also be present. Coliform levels are used to indicate whether a water system may be vulnerable to pathogens in the water.

In the TCR, USEPA set a health goal (MCLG) of zero for total coliforms. USEPA also set an MCL for total coliforms based on the number of samples collected per month. CCSD may not find coliforms in more than one sample per month. If more than one sample contains coliforms, water system operators must report this violation to the state and the public. The TCR is currently under review, but a revised regulation is years away.

A minimum of seven water samples must be taken per month for bacterial analysis. CCSD has consistently complied with the TCR.

3.1.1.4 Methyl Tert-Butyl Ether

MtBE is a volatile organic compound (VOC) that is added to gasoline seasonally to increase the octane level and to reduce carbon monoxide and ozone levels in the air. The chemical properties

[11] John Carollo Engineers. October 1994. Cambria Community Services District Lead and Copper Rule Compliance Evaluation.

and widespread use of MtBE have resulted in contamination of drinking water sources. MtBE contamination is a concern in drinking water because of the compound's low taste and odor threshold, potential human health effects, as well as the formation of degradation by-products with qualities that may pose more of a hazard than the original MtBE constituent. MtBE is highly soluble in water and will transfer readily to groundwater from gasoline leaking from underground storage tanks, pipelines and other components of the gasoline distribution system.

MtBE's primary MCL, effective May 2000, is 13 μg/l. It is derived from the PHG for MtBE, 13 μg/l, set in March 1999. MtBE's Secondary MCL of 5 μg/l, based on customer acceptance (i.e., taste and odor concerns), was effective January 1999. In accordance with recommendations of the RWQCB, CCSD has shut down wells SR-1 and SR-3 to prevent further migration of the MtBE plume found in Cambria.

3.1.1.5 Iron and Manganese

USEPA established Secondary MCLs for iron and manganese based on aesthetic considerations, namely taste, odor, and discoloration of fixtures and laundry. The Secondary MCLs for iron and manganese are 0.3 mg/l and 0.05 mg/l, respectively. DHS established a policy effective 1 May 1994 that defines treatment requirements and conditions where water systems can avoid iron and manganese treatment. The policy states that iron and manganese treatments are required for all new sources that come into existence after 1 May 1994 if the Secondary MCL is exceeded. DHS's guideline allows sequestering if the combined iron and manganese concentrations are no more than 1.0 mg/l and the manganese concentrations is no more than 0.1 mg/l.

CCSD has detected iron and manganese in the groundwater from Santa Rosa Basin. Accordingly, wellhead treatment for these two constituents has been incorporated and although it achieves the necessary requirements, the water is only used to supplement the San Simeon supply.

3.1.1.6 Total Dissolved Solids, Hardness, and Sodium

Total dissolved solids (TDS), hardness and sodium are aesthetic qualities that affect the taste of drinking water. The recommended level for TDS is based mainly on taste threshold and not on physiological effects. The DHS set a Secondary MCL of 500 mg/l, with an upper limit of 1,000 mg/l, and a short-term limit of 1,500 mg/l. There is no specific standard (in terms of an MCL or Secondary MCL) for hardness, but recommended levels are often in the 80 mg/l to 120 mg/l range. USEPA may issue a guidance rather than a regulation for sodium. Seawater intrusion in a drinking water aquifer is one possible source of sodium. High levels of salt intake may be associated with hypertension in some individuals. Generally, sodium levels in drinking water are low and unlikely to be a significant contribution to adverse health effects. This low level of concern is compounded by the legitimate criticisms of USEPA's 20 mg/l for sodium. USEPA believes this guidance level for sodium needs updating, and is probably low. Levels of sodium in CCSD drinking water fall below 20 mg/l, however, levels in the wastewater effluent have raised concerns. Section 3.2 provides a more detailed discussion of sodium levels in the wastewater.

TDS has not presented challenges to CCSD for purposes of meeting drinking water quality criteria. However, TDS in the wastewater effluent has been close to limits set by the RWQCB in CCSD's waste discharge order. The use of water softeners to reduce hardness adds to the sodium and TDS levels in CCSD's treated wastewater effluent. For this reason, CCSD has been investigating means for eliminating regenerative water softeners. The main reason for the proliferation of water softeners in the services area is due to hardness levels averaging 279 mg/l, which are well over the recommended levels. Because SR-4 consistently has hardness levels nearing 500 mg/l, CCSD uses Santa Rosa groundwater for supplementary purposes. As a result of the high hardness levels and high sodium and chloride levels in the wastewater, CCSD should consider centralized water softening. Possible water softening options are discussed in Section 6. Further discussion on lowering the wastewater effluent TDS through the elimination of regenerative water softeners is contained in subsection 3.2.

3.1.1.7 Surface Water Treatment Rule

On June 5, 1991 the California Department of Health Services (DHS) promulgated its regulation on surface water treatment. At that time, DHS required compliance with its new rule by June 29, 1993. DHS regulations defined "groundwater under the direct influence of surface water" and further sited influence to be suspected when wells were within 150 ft of a surface water source, shallow in depth (less than 150 ft deep), and constructed through alluvial deposits that would not prevent vertical migration of water into an underlying aquifer. During April of 1992, DHS advised CCSD that all five of its wells were suspected as being under the influence of surface water. In response to this finding, CCSD completed a study in October 1992[12] outlining recommendations to achieve compliance with DHS promulgated surface water treatment rule. As the result of the study, CCSD upgraded its Santa Rosa treatment facility by adding a coagulant feed system ahead of the pressure filter, continuous turbidity monitoring, and an alarm system. The San Simeon wells were raised to a level of 5 ft above the 100-year flood plain elevation, and additional levee provisions were added around the well field for flood protection. Additional turbidity monitoring was also added to the San Simeon wells, and operating strategies were adopted to ensure future compliance.

3.1.2 Anticipated Drinking Water Regulations

The following sections discuss the upcoming regulations that have been proposed, are under development, and have not yet been finalized.

3.1.2.1 Groundwater Rule

Currently, only surface water systems and systems using groundwater under the direct influence of surface water are required to disinfect their water supplies. The 1996 SDWA amendments require USEPA to promulgate National Primary Drinking Water Regulations (NPDWRs) requiring disinfection as a treatment technique for all Public Water Systems including groundwater systems as necessary. Because CCSD is already complying with the State DHS, Surface Water Treatment Rule, the pending Federal rule is not expected to impact CCSD. Approximately one-half of the waterborne disease outbreaks and more than 85 percent of the TCR acute violations for community systems occur in groundwater systems.[13] A groundwater pathogen occurrence study supported by the American Water Works Association Research Foundation and USEPA found that approximately one-half of the wells initially not considered vulnerable have tested

[12] John Carollo Engineers. October 1992. Cambria Community Services District, Surface Water Treatment Rule Evaluation.

[13] Macler, B.A., and Pontius, F.W. 1997. Update on the ground water disinfection rule, Journal of American Water Works Association, v. 89, p. 16-21.

positive for indicators of fecal contamination, and fecal viruses were detected 10 times more frequently than fecal bacteria.[14] This has led USEPA to question the usefulness of the TCR for monitoring fecal contamination of groundwater. On 10 May 2000, USEPA proposed the Groundwater Rule. Promulgation of the final rule was expected around Spring 2003. Compliance for groundwater systems will be required three years after promulgation of the rule. To date, the Rule has not been promulgated.

This rule applies to public groundwater systems (systems that have at least 15 service connections, or regularly serve at least 25 individuals daily at least 60 days out of the year). Also, this rule applies to any system that mixes surface water and groundwater, if the groundwater is added directly to the distribution system and provided to consumers without treatment. The Groundwater Rule proposes a targeted risk-based regulatory strategy for all groundwater systems. The proposed rule addresses exposure risk through a multiple-barrier approach.

Universal disinfection of all wells is not expected; however, USEPA is expected to require all vulnerable water systems to disinfect. Treatment will require 4-log (99.99 percent) virus removal/inactivation. In order to obtain a 4-log virus removal/inactivation, USEPA is expected to list ultraviolet light, ozone, and ultrafiltration as alternative best available technology.

As CCSD already disinfects its groundwater using either free chlorine or sodium hypochlorite, it is not anticipated that CCSD will need to modify its disinfection processes in response to the proposed regulation.

3.1.2.2 Disinfectants/Disinfection Byproducts Rule - Stage 1

The Disinfectants/Disinfection Byproducts Rule (D/DBP) regulates the concentration of disinfectants such as chlorine, chlorine dioxide and chloramines, which are oxidants used to control waterborne disease. The D/DBP Rule also regulates DBPs such as trihalomethanes (THMs), haloacetic acid (HAAs), bromate, and chlorite. DBPs are formed when disinfectants used to control microorganisms react with natural organic matter (NOM) in water. Some DBPs present public health risks in that they can cause adverse brain effects, cancer, nervous system effects, and other organ and circulatory system effects. The goal of the D/DBP Rule is to balance the acute risk of waterborne disease due to microorganisms with the risk of chronic exposure to DBPs and disinfectant residuals. The D/DBP Rule applies to sources of surface water and groundwater under the direct influence of surface water. Thus compliance may become necessary if such a source is selected to meet projected water demand.

In 1994, following a negotiation process that addressed the health risk balance between waterborne disease and DBP exposure, USEPA proposed a D/DBP Rule for implementation in two stages. The proposal included the disinfectants and DBPs listed in Table 3-2 along with respective maximum disinfectant residual limits (MDRLs) and MCLs. The proposed D/DBP Rule also established enhanced coagulation requirements for precursor removal, which is not addressed by current THM standards. USEPA promulgated the Stage 1 D/DBP Rule in December 1998. The Stage 1 standards listed in Table 3-2 were finalized as shown.

Also, under the Stage 1 D/DBP Rule, MCLGs were set, as shown in Table 3-3. USEPA subsequently removed the zero MCLG for chloroform from its National Primary Drinking Water

[14] Ibid.

Regulations, effective 30 May 2000, in accordance with an order of the U.S. Court of Appeals for the District of Columbia Circuit. Smaller surface water systems and groundwater systems are required to comply with the Stage 1 D/DBP Rule by 2003.

The Stage 1 D/DBP Rule established enhanced coagulation requirements for control/removal of disinfection by-product precursors (using total organic carbon (TOC) as the basis) removal. This is not addressed by current THM standards.

Data reported under the Information Collection Rule (ICR) were used by the USEPA to develop the Stage 2 D/DBP Rule. A tentative Stage 2 D/DBP Rule was developed along with the Stage 1 Rule in case the parties could not negotiate a revised rule after the ICR data became available. The proposed rule for Stage 2 was proposed August 2003.

TABLE 3-2
DISINFECTANTS/DISINFECTION BY-PRODUCTS RULE STANDARDS – STAGE 1

	Stage 1	
Compound	**MCL**	**MDRL**
THM	80 μg/l	–
HAA5	60 μg/l	–
Bromate[a]	10 μg/l	–
Chlorite[b]	1 mg/l	–
Chlorine Dioxide[c]	–	0.8 mg/l
Chlorine	–	4 mg/l
Chloramines	–	4 mg/l

Notes:
(a) Required only for systems using ozone.
(b) Required only for systems using chlorine dioxide.
(c) Required only for systems using the identified disinfectant.

TABLE 3-3
STAGE 1 D/DBP MCLGs

Chemical	MCLG
Trihalomethanes	
Bromodichloromethane	0 mg/l
Dibromochloromethane	0.06 mg/l
Bromoform	0 mg/l
Haloacetic Acids	
Dichloroacetic acid	0 mg/l
Trichloroacetic acid	0.3 mg/l
Bromate	0 mg/l
Chlorite	0.8 mg/l

CCSD currently has non-detectable levels of THM's and HAA's in all of their wells. Thus, recent changes to the D/DBP rule are not expected to impact current operation. Increased sampling activities, however, may be required.

3.1.2.3 Disinfectants/Disinfection Byproducts Rule – Stage 2

Under the Stage 2 D/DBP Rule, the basis of DBP compliance will shift from a system-wide running annual average (RAA) to a local running annual average (LRAA). The Stage 2 D/DBPR also requires that the LRAA compliance monitoring sites be selected based on system sample locations determined through a disinfectant-specific initial evaluation of the most likely types of locations within each distribution system – the Initial Distribution System Evaluation (IDSE) sites. The Stage 2 D/DBP Rule monitoring sites used to verify LRAA for the regulated DBPs will be selected based on the IDSE study. The Stage 2 D/DBP Rule indicates that the LRAA THM and HAA5 MCLs will be initially set at 120 and 100 μg/l, respectively. The Stage 2 D/DBP Rule also indicates that the LRAA THM and HAA5 MCLs will decrease to 80 and 60 μg/l, respectively, approximately 6 years after the Stage 2 D/DBP Rule is promulgated. Stage 1 regulations will still apply until that time. Table 3-4 summarizes the MCL and MDRL for Stage 2.

TABLE 3-4
DISINFECTANTS/DISINFECTION BY-PRODUCTS RULE STANDARDS - STAGE 2

	Stage 2	
Compound	**MCL**	**MDRL**
THM	120 & 80 μg/l[d]	–
HAA5	100 & 60 μg/l[d]	–
Bromate[a]	10 μg/l	–
Chlorite[b]	1 mg/l	–
Chlorine Dioxide[c]	–	0.8 mg/l
Chlorine	–	4.0 mg/l (as $Cl_{2(g)}$)
Chloramines	–	4.0 mg/l (as $Cl_{2(g)}$)

Notes:
(a) Required only for systems using ozone.
(b) Required only for systems using chlorine dioxide.
(c) Required only for systems using the identified disinfectant.
(d) Initial and final MCLs, respectively.

Because CCSD does not have detectable levels of THM's or HAA's, it is not anticipated that implementation of Stage 2 requirements would involve a change in current operation. However, CCSD could be required to complete an IDSE studies within 7.5 years of promulgation.

3.1.3 Emerging Contaminants of Concern

Newly emerging drinking water contaminants enter the regulatory arena through review and selection processes that start out with local and/or national concerns about contaminants in drinking water that have aroused such concerns as health effects, taste or odor caused by contaminated water. The federal process begins with the Drinking Water Contaminant Candidate List and the Unregulated Contaminants Monitoring Rule.

3.1.3.1 Drinking Water Contaminant Candidate List

The Contaminant Candidate List (CCL) is a list of contaminants which are not subject to any proposed or promulgated NPDWR, are known or anticipated to occur in public water systems, and may require regulation under SDWA. The SDWA requires USEPA to establish a list of contaminants to aid in priority setting for the drinking water program. The list was developed with input from the scientific community and other interested parties. Every 5 years a new list will be proposed. The first CCL was finalized and published in 2 March 1998.

The list is the primary source of priority contaminants for USEPA's drinking water program. Contaminants for priority drinking water research, occurrence monitoring, and guidance development, including health advisories, will be drawn from the CCL. Certain contaminants on the list have also been designated as those from which USEPA will determine whether to regulate specific contaminants by 2001. The current CCL is presented in Appendix A.

3.1.3.2 Unregulated Chemical Contaminants

The 1996 amendments to the SDWA required development of a list on contaminants that USEPA would consider for possible new drinking water standards. As part of the process of developing, evaluating and prioritizing possible candidates for that list, USEPA promulgated the Unregulated Contaminant Monitoring Rule (UCMR) on 17 September 1999. The rule was supplemented on 2 March 2000 and 11 January 2001. The UCMR is a multi-tiered rule that includes assessment monitoring for List 1 of chemical contaminants, a screening survey for List 2 chemical contaminants and *Aeromona*, and the Pre-Screen Testing for List 3 contaminants (mostly microbiological contaminants). Like the ICR, only selected utilities are required to do this monitoring and reporting. The UCMR list is presented in Appendix A.

In California, there is a program for Unregulated Chemicals Requiring Monitoring (UCRM) overseen by DHS. The 3 January 2001 revision to this regulation redefined the unregulated chemicals that require monitoring (Article 17 Special Monitoring Requirements for Unregulated Chemicals, Section 64450).

All vulnerable community and nontransient-noncommunity water systems are required to conduct and complete one round of monitoring for chromium (VI) by 31 December 2002, and for the other unregulated chemicals on the list by 31 December 2003. Groundwater systems, such as CCSD, are required to collect two samples in a single year, 5 to 7 months apart. The water system must collect each sample at the same sampling site. At least one of the samples must be collected during the period from 1 May to 31 July (considered vulnerable time), unless DHS specifies a different vulnerable time for the water system due to seasonal conditions related to use, manufacture and/or weather.

Monitoring requirements for chemicals that have been carried over from the previous list (perchlorate, trichloropropane [TCP], dichlorodifluoromethane, ethyl tert-butyl ether [ETBE], and tert-amyl methyl ether [TAME]) can generally be satisfied by grandparenting data, as allowed under the new regulations. Monitoring data collected after 1 January 1998 that meets other compliance criteria may be used to comply with the monitoring requirements of the revised UCRM (Section 64450 [e]). However, new sources that are vulnerable, and sources that are newly designated as vulnerable to any of these must monitor. It may be possible to grandparent data for the new chemicals as well, if the samples were collected since 1 January 1998. Note that compositing for UCMR chemicals is no longer allowed.

It is expected that CCSD would also be considered vulnerable to chromium VI and boron, which are ubiquitous, and naturally-occurring elements. Chromium VI is not tested for by CCSD, however total chromium levels are around 3 μg/l and boron levels for the San Simeon Wells averaged near 150 μg/l for the year 2001. This boron level is also below the World Health Organization (WHO) level of 0.3 mg/l (300 μg/l).

Although boron levels in CCSD's current groundwater supply meet with regulations, if the seawater desalination alternative is selected, boron removal from the seawater may be required. Currently new technically is being developed to address boron removal in seawater. Treatment generally consists of improved membrane filtration.

3.2 Relationship Between Groundwater and Wastewater Quality

Drinking water quality must be consistent throughout the system and all Primary and Secondary MCLs must be met. Also, water quality must meet or exceed the current quality in the system or customer complaints are likely to result. Existing source water quality for key constituents is summarized in Table 3-5. The water quality constituents that CCSD has the most difficulty addressing are hardness, iron and manganese. In addition to the drinking water quality issues, high concentrations of sodium, chloride, and TDS in the wastewater effluent have also raised concerns due to increasing levels of these constituents in downstream monitoring wells. The high hardness levels in the drinking water has resulted in an increased use of individual water softeners. Because individual softeners dispose of brine discharge directly to the wastewater system, high levels of sodium and chloride are found in the wastewater effluent. High levels of sodium and chloride have also been found in down-gradient monitoring wells.

TABLE 3-5
COMPARISON OF GROUNDWATER AND WASTEWATER QUALITY

Parameter	Extraction Wells[c]				Wastewater Effluent[d]	Downgradient Well[d,e]
	SS-1	SS-2	SS-3	SR-4		
Hardness[a] (mg/l)	292	292	283	517	–-	–-
TDS (mg/l)	360	360	370	670	860	767
Sodium (mg/l)	18	19	17	36	180	120
Chloride (mg/l)	17	18	15	25	253	173
Iron (μg/l)	ND[b]	ND	ND	50	–-	–-
Manganese (μg/l)	ND	ND	ND	430	–-	–-

Notes:
(a) As $CaCO_3$.
(b) ND = not detected
(c) Source: Monthly Water Quality Reports
(d) Source: Waste Discharge Requirements, Order No. 01-100
(e) Periodically under tidal influence, increases not solely from effluent discharge.

Recent changes to CCSD's Waste Discharge Requirements require CCSD to provide a salt management plan to reduce the impacts of the salt loadings to the down gradient wells. Currently, CCSD is not restricted to any specific sodium and chloride water quality objective levels. Furthermore, the down gradient wells are subject to salt-water intrusion and thus the increased salt loadings are not necessarily a result of CCSD discharge. With the addition of a new water supply source, overall water quality may be affected. It is possible that the new source will be lower in hardness and thus eliminate the need for individual softeners through the service area, significantly reducing salt loadings. Two possible approaches for salt reduction include a public education program and centralized water softening.

- Public Education Program: This program would be designed to inform CCSD residents and commercial industries of the impacts of water softeners on wastewater effluent quality. One effective way of promoting the program would involve the production of brochures that could be used as "bill stuffers." These brochures would explain the benefits of switching to the use potassium salt and of a hot water heater connection. The use of potassium salt instead of sodium salt would reduce the amount of sodium in the brine discharge and thus the overall levels of sodium at the wastewater treatment plant. Connecting the softener only to hot water heater instead of directly to the tap would provide better regeneration of salt, thus less salt is used and wasted. Both of these measures could significantly aid in the reduction of salt loading to the wastewater treatment plant.

- Centralized Water Softening: CCSD could provide centralized water softening that would reduce the need for the individual softeners by softening water prior to distribution and offer a better quality of water to its customers. In order to provide softened water to the entire distribution system, facilities would need to be located at both the San Simeon and Santa Rosa well fields. There are various softening alternatives available to CCSD. The technologies involved with each are discussed in Section 6. However, the feasibility of the various types may vary with the alternative water supply source chosen. Alternative water supply sources are discussed in Sections 4 and 5.

3.3 Emerging Recycled Water Quality Concerns

A recycled water distribution system was planned as part of Task 3 of the Water Master Plan Update and is discussed in more detail in Sections 4.6 and 8.5. This plan calls for the use of recycled water for outdoor irrigation of parks, schools, and certain commercial areas. The quality of recycled water and level of reliability of the treatment system will be required to comply with Title 22, Chapter 4, of the California Code of Regulations. These requirements are administered by the DHS. Because recycled water applications planned as part of Task 3 include those that would allow a high potential for public contact, the most stringent levels of treatment called for by the Title 22 regulations will apply.

In addition to the existing Title 22 regulations, there are some emerging developments within the water supply industry that are subject of recent discussion. Most noteworthy are the unregulated substances of N-Nitrosodimethylamine (NDMA), 1,4 Dioxane, and trace pharmaceuticals.

3.3.1 N-Nitrosodimethylamine (NDMA)

NDMA is a probable carcinogen and has been linked to various forms of liver cancer. It has a history of use as a research chemical as well as an intermediate compound formed in the production or burning of liquid rocket fuel. Currently, the DHS has set a very low action level of 0.01 μg/l for NDMA. In addition to the low action level, NDMA is also very difficult to measure in low concentrations. NDMA is also a disinfection byproduct under certain conditions. To date, research on NDMA and its potential formation is ongoing. As a result, regulations on NDMA are currently in a state of flux and are subject to change as more information becomes available.

During calendar year 2000, groundwater recharge wells using treated wastewater effluent were shutdown in Orange County after the discovery of minute levels of NDMA. To address NDMA concerns, alternative forms of disinfection are being considered due to concerns that chlorine disinfection may increase the potential for NDMA formation. For example, the use of ultra-violet radiation coupled with the addition of hydrogen peroxide has been found effective in reducing NDMA levels[15].

At this writing, the fate and transport of NDMA in the natural environment is unknown. It is also unknown whether any minute quantities of NDMA could be found in CCSD effluent. If found in treated effluent, alternative disinfection systems to ensure NDMA is not created, could be necessary.

3.3.2 1,4 Dioxane

1,4 Dioxane has attracted attention due to it being a known carcinogen, and its use in personal care products such as shampoos. It is also a solvent stabilizer and has been found in groundwater remediation efforts involving trichloroethane (TCA), a cleaning solvent. 1,4 Dioxane may eventually be regulated out of consumer products. However, until such time, wastewater treatment processes, such as advanced oxidation systems could be required.

3.3.3 Trace Pharmaceuticals

The discovery of trace pharmaceuticals in the water supplies of Europe and the United States has been drawing much interest among water professionals due to potential health concerns. Trace pharmaceuticals could be the result of outdated medicines being flushed down the toilet, and incompletely metabolized medicines passing as waste. Pharmaceuticals could include hormone supplements, antibiotics, anti-depressants, various stimulants, painkillers, etc. Scientists are at odds over the potential health effects of such minute quantities in water supplies. Concerns have also been raised over the potential impact trace pharmaceuticals could have in the aquatic environment. To date, there are no regulations governing trace pharmaceuticals. Additionally, little information exists on the removal efficiency of wastewater treatment processes. The United States Geological Survey is currently conducting a significant study effort on trace pharmaceuticals as part of its Toxic Substances Hydrology Program. Depending upon the outcome of scientific studies, future regulations could follow governing the treatment and reuse of wastewater as it relates to the removal of trace pharmaceuticals.

[15] May 9, 2002. Association of California Water Agencies Conference, Monterey, California.