policy matters
california senate OFFICE OF RESEARCH
FEBRUARY
2015

THE WATER WE DRINK, PART I:

WHAT IS CALIFORNIA DOING TO ENSURE ITS WATER IS SAFE?

In 2012, the Human Right to Water Law, Assembly Bill 685 (Eng), Chapter 524, Statutes of 2012, was adopted, making California the first state to affirm the right of every person to safe, clean, affordable, and accessible drinking water. The most recent statistics indicate that in 2013, more than 98 percent of Californians who received their drinking water from a public water system received water that met drinking water quality standards, compared with the national state average of 93 percent.[1]

Californians receive their water from many different types of water systems, ranging from private wells and small systems with as little as two connections to systems as large as the Los Angeles Department of Water and Power, which has 690,547 connections providing water to almost 3.9 million people. The Legislature and the Governor have asserted that all Californians should be provided water that meets water standards and is affordable. Achieving that goal will require innovative solutions and difficult decisions.

This is the first of two installments prepared by the Senate Office of Research (SOR) on drinking water. This installment updates a 2011 SOR report written by Michelle Baass and includes new sections on the transition of the state's Drinking Water Program from the California Department of Public Health to the State Water Resources Control Board's Division of Drinking Water and on the process for establishing Maximum Contaminant Levels (MCLs). The second installment focuses on the challenges to providing safe and clean drinking water that is affordable to disadvantaged communities.

How the State Regulates Drinking Water: An Overview

California's drinking water program was created in 1915, when the Bureau of Sanitary Engineering was established by the State Board of Health. The bureau's primary duty at that time was to prevent and eliminate water-borne diseases. In 1974, the federal Safe Drinking Water Act was passed to protect public health by regulating the nation's public drinking water supply, which requires the United States Environmental Protection Agency (U.S. EPA) to establish mandatory nationwide drinking water standards. It also requires water systems to monitor public water supplies to ensure drinking water standards are met and report to consumers if the standards are not met.

Two years after the federal act was passed, California adopted its own Safe Drinking Water Act. The state's act has two main goals: to continue the state's drinking water program, and to be the delegated authority (referred to as the "primacy") by the U.S. EPA for enforcement of the federal act. And, as required by the federal act, the state's drinking water program must set drinking water standards that are at least as stringent as the U.S. EPA's standards. Each community water system also must monitor for a specified list of contaminants, and the findings must be reported to the State Water Resources Control Board (SWRCB).

In 1989, Assembly Bill 21 (Sher), Chapter 823, Statutes of 1989, amended California's Safe Drinking Water Act. This law requires the development of a comprehensive safe drinking water plan, sets forth requirements for adopting primary drinking water standards, requires large water systems to identify all reasonable measures to reduce contaminant levels in their water, and requires operators of public water systems to notify the department and the public whenever the system is not in compliance with drinking water standards.

In 2012, the California Legislature passed the Human Right to Water Law,[2] adding to the Water Code the declaration that it be the "established policy of the state that every human being has the right to safe, clean, affordable and accessible water adequate for human consumption, cooking and sanitary purposes."

Until mid-2014, the responsibility for ensuring that California's drinking water is healthy and clean rested with the Department of Public Health's Drinking Water Program. Senate Bill 861 (Committee on Budget and Fiscal Review), Chapter 35, Statutes of 2014, transferred the program to the SWRCB and its newly created Division of Drinking Water (see Appendix A for details). References in the related Health and Safety Codes and Water Code to the Department of Public Health have been replaced with the SWRCB.

TABLE 1
California's Water Quality Responsibilities: Who's In Charge of What?

Department	Key Water Quality Responsibilities
Department of Pesticide Regulation	• Develops mitigation measures to prevent pesticide contamination of groundwater and surface water
Department of Public Health	• Safe drinking water regulatory role transferred to State Water Resources Control Board effective July 1, 2014
Department of Toxic Substances Control	• Ensures that groundwater at toxic sites is monitored and remediated
Office of Environmental Health Hazard Assessment	• Performs health-risk assessments related to setting drinking water standards
Public Utilities Commission	• Ensures that customers of regulated water utilities receive reliable service
State Water Resources Control Board and Regional Water Quality Control Boards	• Enforces the federal and state safe drinking water acts • Ensures the quality of the state's drinking water from the point where water is pumped from a drinking water well or surface water intake point • Protects the quality of surface water and groundwater to the point where the water enters a drinking water well or surface water intake point
Delta Stewardship Council	• Improves Sacramento–San Joaquin Delta water quality for drinking, agriculture, the environment, and Delta species

With the adoption of Assembly Bill 21 in 1989, the Legislature intended to enact a law that would be more protective of public health than the federal drinking water act.

Today, the SWRCB's Division of Drinking Water is the state party responsible for enforcing both the federal and state safe drinking water acts. The SWRCB's Division of Financial Assistance is responsible for grants and loans to assist in correcting public water system deficiencies.

The SWRCB's main responsibilities are:

- issuing permits to drinking water systems
- inspecting water systems
- reviewing and approving proposed treatment facilities
- monitoring water quality
- setting and enforcing drinking water standards and requirements
- administering and awarding infrastructure grants and loans

Six state governmental departments now have responsibility over the quality of the state's water; however, the SWRCB is the only state agency responsible for the quality of the state's *drinking* water. (See Table 1 on page 3 for a description of agency responsibilities.)

How Does California Ensure the Quality of Its Drinking Water?

The SWRCB's Division of Drinking Water (DDW) is responsible for the enforcement of the federal and state safe drinking water acts and the regulatory oversight of about 7,600 public water systems throughout the state.

In 2013, an estimated 37.7 million (more than 98 percent) of the state's 38.3 million residents received their water from public water systems.

- The remaining population received water either from private wells or very small water systems not regulated by the state.

- About half of California's drinking water is drawn from surface water, and the other half comes from groundwater. (Surface water is from lakes, rivers, streams, reservoirs, and the ocean; groundwater is found below the earth's surface.)

The DDW's responsibility for the quality of these drinking water sources begins at the point where water is pumped from a drinking water well or surface water intake point. Before the water is pumped, the SWRCB's Division of Water Quality and the Regional Water Quality Control Boards maintain responsibility for the quality of these drinking water sources.

The DDW directly regulates:

- 730 large public water systems
- 3,232 small public water systems (fewer than 1,000 connections)

The DDW has a budget of about $ 37.8 million annually. Of this amount, approximately $3.9 million is from the state's General Fund, where approximately $1.1 million is used for lab services. The staff of the DDW consists of about 221 people working in 13 locations statewide. These public water systems serve as few as 25 to more than 3 million people.

California has delegated the drinking water program regulatory authority for small water systems with fewer than 200 service connections in 30 California counties to local primacy agencies (counties).

- Local primacy agencies regulate approximately 3,742 small public water systems statewide.

Small water system owners may be churches, schools, restaurants, and hotels. About 36 employees work on these county programs statewide.

> Drinking Water System Permits

The Safe Drinking Water Act requires any operating public water system to have a water supply permit from the department or local primacy agency. A public water system is one that serves drinking water to at least 25 people for at least 60 days throughout the year, or one that serves potable water to 15 or more service connections. The public water system can be privately or publicly owned.

The U.S. EPA requires any new public water system to demonstrate it has, or will have, adequate technical, managerial, and financial capability to reliably operate a public water system in compliance with all drinking water requirements for the foreseeable

future. Additionally, permit holders are required to submit a water quality monitoring plan, water systems operations plan, and an emergency response plan.

The Department of Public Health (DPH) and the SWRCB issued 18 new water system permits in fiscal year 2013–14, none of which are community water systems (systems that serve water to homes or residents). The DDW will start reporting how many water systems were permitted by local primacy agencies in 2015.

Is California's Drinking Water Quality Improving?

Evaluating how the state's drinking water quality has changed over the years is difficult, as drinking water standards have become tougher, technology to measure contaminant levels has improved, and the number of water systems being monitored and evaluated has increased.

One of the California's Safe Drinking Water Act's provisions requires the submission to the Legislature of a comprehensive Safe Drinking Water Plan every five years. This plan was required to include the Department of Public Health's—now the State Water Resources Control Board's—assessment of the overall quality of the state's drinking water, the identification of specific water quality problems, an analysis of the known and potential health risks that may be associated with drinking water contamination in California, and specific recommendations to improve drinking water quality.

The last (and only) plan was submitted in 1993. As a result, the Department of Public Health was sued for not preparing a Safe Drinking Water Plan, as required by Health and Safety Code Section 116355 (*Gonzalez et al. v. Horton and California Department of Public Health*, Court of Appeal, Fifth Appellate District No. F060147).

The plaintiffs petitioned the Fresno Superior Court for an order compelling the Department of Public Health to submit a plan. The Superior Court denied the petition. The Court of Appeal, Fifth Appellate District, disagreed and reversed the judgment. The matter was remanded to the Superior Court. A stipulated settlement agreement required the State Water Resources Control Board (which has since taken over responsibility for the state's drinking water from the Department of Public Health) to submit a Safe Drinking Water Plan by October 2014 and for the plan to be submitted to the Legislature no later than June 15, 2015.

In October 2014, the State Water Resources Control Board issued a draft Safe Drinking Water Plan for California.

> *Water System Inspections*

The DDW and local primacy agencies inspect water systems to detect potential problems and eliminate them before the problem results in a water quality failure. For water systems under the DDW's jurisdiction, state law establishes minimum inspection frequencies of one, two, or three years, depending on the source of the water and/or the treatment provided. Required inspection frequencies for water systems under local primacy agencies are two or five years, which also depends on the source of the water and/or the treatment provided.

During the last five years, 6,327 sanitary surveys have been conducted. These include complete reviews of the physical structures of water systems; evaluation of treatment facilities, operation and maintenance activities of the system; and compliance with all monitoring requirements placed on the systems. In addition, 1,651 other water system inspections occurred over the last five years.

> *Water Quality Monitoring*

The DDW monitors water quality to ensure compliance with all drinking water standards. These monitoring requirements vary depending on the type of public water system, the water source, and how vulnerable the source and system are to potential sources of contamination.

California requires routine and follow-up monitoring: routine monitoring is conducted at prescribed frequencies to assess the quality and changes in water delivered to consumers over time; follow-up monitoring is conducted to confirm results of routine monitoring when a drinking water standard has been exceeded or an organic chemical or microbial agent has been detected. Since 2001, electronic submissions of the water quality analyses have been required.

> *Enforcement*

The DDW may take various types of enforcement actions for drinking water law violations, such as the failure to meet drinking water standards, failure to notify the public of drinking water standard violations, and failure to meet monitoring requirements. In the past, if a water system was likely to correct the violation, DPH's Drinking Water Program usually sent a corrective action letter specifying the violation, the corrective actions required, and a target date by which the problem should be corrected. In 2012–13, the former Drinking Water Program issued 979 corrective action letters.

If a water system violated monitoring or notification requirements, the Drinking Water Program would notify the public about the system's failure and had the authority to issue citations, compliance orders, and fines. Citations and compliance orders specified the violation, the violation history, any actions taken by the water system to make corrections (or lack thereof), and a schedule of actions to be taken by the water system to bring it into compliance.

Citations generally were given to water systems to make low-cost and short-term corrective actions and could be issued with or without fines; compliance orders usually were issued for long-term and expensive corrective measures. In rare circumstances, the Drinking Water Program initiated court action against a public water system. During 2012–13, the Drinking Water Program issued 750 citations and compliance orders, $1,376 in fines, and one court action. (See Table 2 and Table 3 on page 9 for data on enforcement actions.)

The DDW retains all of the authority DPH's Drinking Water Program had for enforcement, but data on its enforcement actions are not yet available.

Enforcement of Drinking Water Standards Protects the Health of the Public
The Division of Drinking Water within the State Water Resources Control Board is responsible for enforcing drinking water standards to increase compliance among water systems.

TABLE 2
Enforcement Actions

	2005–06	2006–07	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13
Corrective Action Letters	1,018	1,438	1,127	1,108	803	1596	1336	979
Public Notifications	83	131	135	75	36	98	56	44
Citations	325	396	598	577	585	631*	616*	750*
Compliance Orders	13	20	40	128	35	-	-	-
Court Actions	1	0	1	0	2	1	0	1
TOTALS	1,440	1,985	1,901	1,888	1,461	2,326	2,008	1,774

*These values contain both citations and compliance orders.

TABLE 3
Fines and Penalties

	2005–06	2006–07	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13
Small Water Systems	$3,200	$2,550	$1,750	$3,850	$6,400	$3,550	$4,272	$1,200
Large Water Systems	$22,430	$8,310	$4,127	$4,487	$0	$4,438	$7,811	$176

> *Water System Violations*

The SWRCB is required to report drinking water system violations to the U.S. EPA and the public. Each quarter, the SWRCB submits water system inventory information, violation incidents, public and consumer notification violations, and information on enforcement activities to the U.S. EPA's Safe Drinking Water Information System. Additionally, the SWRCB is required by federal law to submit an annual compliance report of violations of the primary drinking water standards and requirements to the U.S. EPA.

The annual compliance report includes violations for: (1) maximum contaminant levels (MCLs), (2) treatment techniques (methods to control unacceptable levels of certain contaminants), (3) variances and exemptions, and (4) monitoring and reporting requirements. (See Table 4 below for a summary of violations.) California also is required, as part of the SWRCB's annual compliance report, to make available to the public violations of the state's more stringent drinking water standards. (See Table 5 on the next page for a summary of these state-only violations.)

TABLE 4
California's Drinking Water Standard Violations Reported to the U.S. EPA (2002–2012)

Violation Category	Violations										
	Maximum Contaminant Levels/Treatment Techniques										
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Inorganic Contaminants	86	159	89	101	120	273	598	737	825	936	926
Organic Contaminants	4	8	2	4	5	4	9	17	10	14	7
Radionuclide Contaminants	1	2	6	3	7	10	38	45	41	55	91
Total Coliform Rule	579	732	563	643	723	456	550	656	635	569	443
Disinfectant and Disinfectant By-Products Rule	2	3	18	100	74	31	112	219	188	162	115
Surface Water Treatment Rule and Enhanced Surface Water Treatment Rule	94	87	39	70	50	26	0	72	150	128	103
Filter Backwash Recycle Rule	-	-	-	-	0	0	-	-	-	-	-
Lead and Copper Rule	-	-	-	0	1	4	0	1	6	5	5

TABLE 5
California's Monitoring and Reporting Violations (2002–2012)

Violation Category	Violations										
	Monitoring and Reporting										
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Inorganic Contaminants	90	119	76	106	330	334	387	252	175	178	256
Organic Contaminants	32	60	116	31	3	18	177	179	43	40	18
Radionuclide Contaminants	1	0	12	5	9	22	64	25	14	8	6
Total Coliform Rule	922	1,107	799	725	790	680	940	818	575	644	513
Disinfectant and Disinfectant By-Product Rule	0	2	74	170	80	113	44	75	26	35	27
Surface Water Treatment Rule and Enhanced Surface Water Treatment Rule	4	30	15	17	11	18	44	21	13	4	4
Filter Backwash Recycle Rule	-	-	-	-	0	0	-	-	-	-	-
Lead and Copper Rule	-	-	-	17	29	21	12	26	0	0	119
Public Notification Requirements	-	-	-	1	5	0	0	9	20	22	19
Consumer Confidence Report Notification Requirements	-	-	168	213	122	106	57	77	56	129	140
Variances and Exemptions	-	-	-	0	0	0	0	0	0	0	0

WHAT IS CONSIDERED SAFE DRINKING WATER?

The SWRCB protects drinking water quality by setting drinking water standards (known as maximum contaminant levels) and advisories. There are two types of maximum contaminant levels: primary and secondary. Prior to the establishment of a drinking water standard, the SWRCB sets notification levels, which are intended to provide the public with an advance warning of the potential health effects that could occur from drinking the water.

> *Setting Maximum Contaminant Levels (MCLs) in California*

California protects its drinking water by regulating its quality through the use of maximum contaminant levels (MCLs), which are set both by the U.S. EPA and the DDW. Primary MCLs are set to limit the amounts of contaminants that pose health threats to drinking water consumers, while secondary MCLs are set to maintain good drinking water aesthetics (color, odor, taste) and not for public health concerns. A primary MCL must take into account not only a contaminant's health risk but also the technological ability to detect and treat it, as well as treatment costs. The process for setting a primary MCL for a contaminant involves a number of steps and players.

- **First, a public health goal (PHG) must be established for the contaminant.** The California Environmental Protection Agency's Office of Environmental Health Hazard Assessment (OEHHA) investigates the health effects of potential contaminants to determine the concentration at which there is no health risk, based on a literature review of studies on the contaminant's impacts on human and animal subjects' health. Based on the results of these studies, OEHHA proposes a PHG that must go through a public comment period (as outlined in Health and Safety Code § 116365(c)). The PHG takes into account only the protection of public health, not the technological or economic feasibility of treating the contaminant.

- **Once a PHG is established, the DDW develops a primary MCL for the contaminant for consideration by the SWRCB.** The MCL, according to statute, must be as close to the PHG as feasible, be no less stringent than that set by the U.S. EPA, and take into account the technological and economic feasibility of compliance with the proposed MCL. Economic feasibility must incorporate the cost of compliance (to public water systems and customers) using the best technologies available. An MCL is developed by choosing a possible draft MCL concentration based on the PHG, evaluating occurrence data, estimating monitoring costs for various draft MCLs, estimating population exposure for the draft MCL, identifying the best technologies available for treatment of the contaminant, estimating

treatment costs to comply with the draft MCL, and reviewing the costs and associated reductions to health risks that would result from treatment at the draft concentration. The draft MCL also must be submitted for an external scientific review, pursuant to Health and Safety Code Section 57004, to ensure the scientific findings, conclusions, and assumptions leading to the proposed MCL are based upon sound scientific knowledge, methods, and practices.

- **Next, the proposed MCL moves through the formal regulatory process.** SWRCB staff draft the text of the regulations that would state the MCL and send the proposal to the Department of Finance and to the Office of Administrative Law (OAL) for review. After approval, the SWRCB publishes a notice in the California Regulatory Notice Register. The SWRCB conducts one or more public hearing(s) no sooner than 45 days after issuing the Notice of Proposed Rulemaking. The SWRCB reviews oral and written comments and staff members' responses to comments, then acts on the proposed regulations in a public meeting. After approval by the SWRCB, staff submit the rule-making package to the OAL for review and approval.

- **Finally, the MCL goes into effect within several months of OAL approval.**

As of 2014, there were 92 contaminants with MCLs; of those, 89 contaminants have or have had public health goals. In addition, there are 30 contaminants with notification levels. Section 115365 of the Health and Safety Code requires both the public health goals and MCLs to be reviewed every five years.

MCL violations occur when water sampled exceeds a level greater than the MCL and can result in enforcement actions. Table 6 on page 14 lists the 10 most common MCL violations.

TABLE 6
California's 10 Most Common MCL Violations

Contaminant	California MCL (µg/L Unless Specified)	Federal MCL (µg/L Unless Specified)	Source	Health Effects Above MCL
Arsenic	10	10	Naturally occurring: erosion of natural deposits, runoff from orchards, runoff from glass and electronics production wastes*	Skin damage or problems with circulatory systems; increased cancer risk
Nitrate	45,000 (as NO_3)	10,000 (as N) 1,000 (as NO_2)	Runoff from fertilizer use; leaking from septic tanks, sewage; erosion of natural deposits†	In infants younger than 6 months, can cause serious illness, which, if untreated, may result in death; symptoms include shortness of breath and blue-baby syndrome
Gross Alpha Activity	15 pCi/L	15 pCi/L	Naturally occurring: erosion of natural deposits of certain minerals that are radioactive and may emit a form of radiation known as alpha radiation	Increased risk of cancer
Perchlorate	6	(Unregulated)	Naturally occurring and man-made chemical used to produce rocket fuel, fireworks, flares and explosives; can also be present in bleach and in some fertilizers	Disruption of thyroid's ability to produce hormones needed for normal growth and development; impaired brain development in fetuses and infants
Tetrachloroethylene (PCE)	5	5	Discharge from factories and dry cleaners	Liver problems; increased risk of cancer
Trichloroethylene (TCE)	5	5	Discharge from factories and dry cleaners	Liver problems; increased risk of cancer

Contaminant	California MCL (µg/L Unless Specified)	Federal MCL (µg/L Unless Specified)	Source	Health Effects Above MCL
Uranium	30 pCi/L‡	30 pCi/L	Naturally occurring: erosion of natural deposits	Increased risk of cancer, kidney toxicity
1,2-dibromo-3-chloropropane (DBCP)	0.2	0.2	Runoff/leaching from soil fumigant used on soybeans, cotton, pineapples, and orchards	Reproductive difficulties; increased risk of cancer
Fluoride	2,000	2,000 §	Naturally occurring: erosion of natural deposits	Increased likelihood of bone fractures in adults; effects on bone leading to pain and tenderness; increased chance of developing pits in tooth enamel, cosmetic effects to teeth (in children 8 and younger)
Carbon Tetrachloride	0.5	5	Discharge from chemical plants and other industrial activities	Liver problems; increased risk of cancer

* While arsenic can be both naturally occurring and an anthropogenic contaminant, that found in concentrations higher than MCLs is typically naturally occurring.

† Nitrates are an important, naturally occurring nutrient. However, in the concentrations that exceed MCLs, nitrates are typically considered anthropogenic contaminants, the result of fertilizer application or leaking septic systems.

‡ This MCL is for inorganic uranium. The radionuclide form MCL is set at 20 pCi/L.

§ The U.S. EPA regulates fluoride as a secondary contaminant, while the California EPA regulates it as a primary contaminant.

> Notification Levels

Notification levels (previously called action levels) are health-based advisory levels for chemicals in drinking water based on potential health impacts; they are established prior to setting a drinking water standard.

Notification levels may be established by the SWRCB when a chemical is found in—or there is a threat that it may be found in—drinking water sources, and they are derived from risk assessments performed by the U.S. EPA or other federal or state agencies. For some chemicals, the DDW's toxicologist performs a risk-and-exposure assessment and may seek feedback from OEHHA. A notification level (NL) is then established by the SWRCB; the level is amended as necessary if conditions or risk-assessment methods change.

NLs are established as precautionary measures for contaminants that may be considered candidates for a maximum contaminant level, but have not yet undergone or completed the regulatory standard-setting process.

When NLs are exceeded, the drinking water system is required to notify the local governing body. Additionally, the SWRCB recommends that the utility inform its customers and consumers about the presence of the contaminant and about the health concerns associated with its exposure.

Whatever Happened to Chromium-6, the Carcinogen Made Famous by the Film *Erin Brockovich*?

The 2000 film "Erin Brockovich" is about the residents of Hinkley, California, who were exposed to chromium-6 in their drinking water. These residents alleged they suffered various health conditions as a result of this exposure, including cancer, and filed a class-action lawsuit. Ultimately, they made a $333 million settlement with Pacific Gas and Electric Co.

Chromium-6 (hexavalent chromium) is a metal widely used for industrial purposes and has the potential to contaminate drinking water. When the residents of Hinkley filed their lawsuit in the mid-1990s, chromium-6 was a known carcinogen when inhaled; however, public health agencies had not yet determined whether it was carcinogenic when ingested.

In response to the public's concern about chromium-6, the California Legislature passed Senate Bill 351 (Ortiz), Chapter 602, Statutes of 2001, which required the California Department of Health Services (now the California Department of Public Health, or DPH) to establish a primary drinking water standard for chromium-6 on or before January 1, 2004.

In May 2002, the California Office of Environmental Health Hazard Assessment (OEHHA) announced the beginning of the risk-assessment process for chromium-6. Seven years later, in August 2009, OEHHA released a draft public health goal for chromium-6, which underwent a peer review, public workshop, and public comment periods.

In response to the public comments and a scientific peer review, OEHHA released a revised draft public health goal for chromium-6 on December 31, 2010. Three and a half years later, on July 1, 2014, when the Drinking Water Program transferred from the DPH to the SWRCB, enforcement of the nation's first drinking water standard for chromium-6 began. The new standard—known as the maximum contaminant level, or MCL—is 10 parts per billion (ppb). California has enforced a drinking water standard for total chromium, which includes chromium-3 and chromium-6, since the 1970s. Even the previous standard of 50 ppb was more stringent than the federal standard for total chromium of 100 ppb.

Whatever Happened to Chromium-6, continued

No later than January 1, 2015, California's applicable public water systems must begin monitoring for chromium-6, if they haven't already. The SWRCB has been reviewing results as monitoring has been performed, and is actively working with the public water systems to ensure monitoring and follow-up actions are performed in a timely manner. The SWRCB notes that it is not currently able to provide a meaningful estimate of the number of systems that may be in violation of the standard because all water systems have not yet monitored for chromium-6, and compliance is seldom determined via a single sample. Currently, according to the SWRCB, 53 percent of the systems with fewer than 200 service connections have performed the chromium-6 screenings to date.

Contaminated Water Can Cause Health Hazards
Drinking water standards are developed to reduce the exposure to contaminants that could endanger the public through either prolonged exposure or acute effects.

Acute Health Hazards in Drinking Water

Contaminants in drinking water are categorized according to the health effects they cause. While chronic health effects result from prolonged exposure to or consumption of a contaminant over a long period (usually years), acute health hazards typically occur within hours or days of contact with a contaminant. Almost any contaminant can cause an acute effect if consumed in large enough quantities, but by and large, most contaminants found in drinking water rarely reach such extraordinarily high levels. There are, however, some contaminants that may be present in drinking water at levels sufficient to cause acute health effects, especially in younger children or those with weakened immune systems.

Microorganisms
Although most microorganisms in water are harmless, some can cause ill health effects. A few of these are certain types of bacteria, protozoa, and toxic algae.

Bacteria
Drinking water is tested for the total presence of coliform bacteria, a common group of bacteria that are themselves mostly harmless. Their presence in drinking water, however, may indicate conditions favorable for the growth of other, more harmful organisms. One such organism is *E. coli*, a member of the fecal coliform group of bacteria, which can cause infection resulting in fever, stomach cramps, diarrhea, vomiting, and in some cases complications that can include kidney failure. The presence of fecal coliform indicates that the water is contaminated by human or animal waste.

Protozoan Parasites
Cryptosporidium is another microorganism that enters water via sewage or animal waste. This protozoan causes cryptosporidiosis, a mild gastrointestinal disease. Though mild in the general population, the disease can be severe or fatal for people with severely weakened immune systems.

Giardia lamblia is another protozoan introduced to drinking water through lakes and rivers contaminated with human or animal wastes. It causes gastrointestinal illness: stomach cramps, diarrhea, and vomiting.

Acute Health Hazards in Drinking Water, continued

Toxic Algae
Some species of blue-green algae produce toxins that can cause illness in those who consume them. These toxins are categorized based on their health effects. Some are known to attack the liver (hepatotoxins) or the nervous system (neurotoxins); others simply irritate the skin.

Nitrates
While microorganisms that may have health impacts are generally introduced into drinking water via surface water, nitrates can be introduced both in surface waters and in groundwater. Nitrate contamination can come from many sources, including fertilizers to increase lawn growth and crop production, animal waste runoff from feedlots, or leaky septic systems.

Infants are extremely susceptible to acute nitrate poisoning (methemoglobinemia, or "blue-baby syndrome") because of certain bacteria present in their gastrointestinal tracts after birth. These bacteria convert nitrates to nitrites, which hamper hemoglobin production and impede the blood's ability to carry sufficient oxygen through the body. This serious condition also is a risk for people with gastrointestinal or enzyme system disorders.

Working With California's Water Systems: A Balanced Approach

Because California's approximately 7,600 public water systems vary in size, location, and fiscal condition, the SWRCB's Division of Drinking Water faces the difficult task of ensuring that all Californians receive safe drinking water. Through its enforcement activities, the SWRCB works with these public water systems to address violations of drinking water standards and monitoring requirements.

Although the vast majority of Californians who receive drinking water from a public water system receive water that met quality standards in recent years, there are still many who may have consumed unsafe water. The SWRCB must continue its efforts to ensure that Californians have access to drinking water that is pure and safe for all.

The second and final installment in this series discusses the accessibility and affordability of safe and clean drinking water.

APPENDIX A
Drinking Water Program Transfer

The responsibility for ensuring clean drinking water for Californians rested with the California Department of Public Health's (DPH's) Drinking Water Program until 2014. Senate Bill 861 (Committee on Budget and Fiscal Review), Chapter 35, Statutes of 2014 transferred the program to the State Water Resources Control Board (SWRCB) and its newly created Division of Drinking Water.

A pivotal event prompting consideration of the transfer of the DPH's Drinking Water Program to the SWRCB was an April 2013 U.S. EPA notice to DPH for noncompliance with the requirements of the federal Safe Drinking Water Act (SWDA), its implementing regulations, and the terms and conditions of the Safe Drinking Water State Revolving Fund (SDWSRF) grant agreements funded by the U.S. EPA for fiscal years 2009–11. (Since 1997, the U.S. EPA had provided DPH an annual grant from the SDWSRF to use for low-interest loans and principal forgiveness to assist public water systems in achieving and maintaining compliance with safe drinking water standards.)

The letter of noncompliance from the U.S. EPA was the result of DPH's failure to meet federal SDWA requirements regarding the administration of the SDWSRF. This included not disbursing federal funds in a timely mater. At one point in 2012, DPH's drinking water fund had an unspent balance of $455 million, which was the largest unspent balance of any state in the United States.

The letter of noncompliance turned the Legislature's and the Administration's attention to the administration of the SDWSRF under DPH.

Early in 2013, Assemblymember Perea authored Assembly Bill 145, which proposed to transfer the Drinking Water Program to the SWRCB. Assembly Bill 145 failed to reach the Governor after being held in the Senate Appropriations Committee. A related hearing was held in May 2013 by the Senate Environmental Quality Committee at which the Legislative Analyst's Office stated that transferring the Drinking Water Program from DPH to the SWRCB could have several advantages, including greater policy integration of water issues and increased transparency and greater public participation under a board that meets publicly.

In March 2014 , the California Environmental Protection Agency and the Health and Human Services Agency published their Drinking Water Reorganization and Transition Plan stating that the Administration had evaluated the governance structure of the state's drinking water and water quality activities and concluded that "aligning the

state's drinking water and water quality programs in an integrated organizational structure would best position the state to both effectively protect water quality, while meeting current needs and future demands on water supplies." The Administration also stated in this plan that "with the Legislature's approval and appropriate legislation, this alignment [would] be achieved by moving the Drinking Water Program from DPH to the SWRCB on July 1, 2014." The Legislature approved the transfer in a budget trailer bill.

APPENDIX B
Glossary of Common Terms Related to Drinking Water

Disadvantaged Communities	Any community in which the median household income is below 80 percent of the statewide median household income
Groundwater	Water located underground in the cracks and spaces in soil, sand, and rock. Groundwater can be stored in and removed from geologic formations of soil, sand, and rocks called aquifers.
Local Agency Formation Commissions (LAFCOs)	Entity that sets cities' and special districts' boundaries for each county
Local Primacy Agency	Counties where the State Water Resources Control Board has delegated authority to regulate public water systems serving fewer than 200 service connections
Maximum Contaminant Level (MCL)	Maximum concentration of a contaminant permissible in public drinking water systems
Mutual water companies	Nonprofit mutual benefit corporations that are controlled by shareholders. Shareholders usually are the landowners who receive water service. (Neither LAFCOs nor the California Public Utilities Commission [CPUC] regulate mutual water companies.)
Private Water Systems	Water systems that meet the definition of a public utility but are not regulated by the CPUC and usually serve fewer than 20 connections
Public Water System	A system that provides water to the public for human consumption through pipes or other constructed conveyances, if such system has at least 15 service connections or regularly serves at least 25 individuals
Public Water Utilities	Privately owned water systems that provide water to the public, which are regulated by the CPUC. The CPUC controls the companies' service areas and their water rates.
Primary Drinking Water Standard	Legally enforceable standard that public water systems' water must meet. Primary standards protect public health by limiting the levels of contaminants.

Secondary Drinking Water Standard	Regulates the aesthetics of water, such as color and odor, which do not pose a risk to health. These secondary maximum contaminant levels (SMCLs) are guidelines, not enforceable limits.
Small Water Systems	Definition varies under federal and state law. The federal Safe Drinking Water Act and California Health and Safety Code define a small public water system as a community water system serving a population of 10,000 or fewer, which corresponds to 3,300 service connections or fewer. Another working definition of "small" is used to define what types of systems can be delegated to Local Primacy Agencies, meaning the system has fewer than 200 service connections. The drinking water fee structure is also used to differentiate small and large water systems. Community water systems with 1,000 or more service connections pay an hourly rate for their fees, whereas systems with fewer than 1,000 service connections pay an annual rate for their fees.
State Small Water System	Health and Safety Code 116275(n) defines a state small water system as a community water system that provides piped water to the public for human consumption that serves at least five and not more than 14 service connections. These systems are not regulated by the state and may be regulated by the county.
State Water Resources Control Board (SWRCB)	State agency responsible for administering the state's system of water rights and state and federal water quality laws
Surface Water	Water on the surface of our planet, such as in a stream, river, lake, wetland, or ocean
Treatment Facilities	Treats water through various methods to meet California's primary drinking water standards

ENDNOTES

1 State Water Resources Control Board, "Communities That Rely on a Contaminated Groundwater Source for Drinking Water," January 2013. Kevin Roland, U.S. EPA Office of Ground Water and Drinking Water Protection Division e-mail, Dec. 22, 2014.

2 Assembly Bill 685 (Eng), Chapter 524, Statutes of 2012.

NOTES

NOTES

Updated by Michael Jarred with contributions from Meg Svoboda and Brie Lindsey.
The California Senate Office of Research is a nonpartisan office charged with serving the research needs of the California State Senate and assisting Senate members and committees with the development of effective public policy. It was established by the Senate Rules Committee in 1969. For more information and copies of this report, please visit **www.sor.senate.ca.gov** or call **(916) 651-1500.**