CALIFORNIA Water Boards

Frequently Asked Questions

Maximum Contaminant Level (MCL) for Hexavalent Chromium

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General Information

What is hexavalent chromium, and how can it affect a person's health?

Chromium is an odorless and tasteless heavy metal that occurs throughout the environment and is commonly found in either a trivalent or hexavalent form. The "valent form" of chromium refers to the state of the electrons in a chromium atom in terms of the number of electrons involved in or available for chemical bond formation. Atoms can convert between valence states.

Chronic or long-term exposure to water contaminated with hexavalent chromium may result in liver toxicity, gastrointestinal tumors, and liver cancer.

Where does hexavalent chromium come from?

Much of the hexavalent chromium found in drinking water occurs naturally throughout California from the erosion of chromium deposits. Contamination also can arise from a variety of industrial activities, including the manufacturing of textile dyes, wood preservation, leather tanning, and anticorrosion coatings, where hexavalent chromium contaminated waste has migrated into the groundwater. Hexavalent chromium pollution can occur when an industrial site fails to follow safe waste disposal methods. Counties with the highest number of water sources that currently exceed the maximum contaminant level (MCL) are San Bernardino, Los Angeles, and Fresno counties.

What is the State Water Board doing to help smaller, disadvantaged communities comply with the new MCL?

The State Water Board has several programs that help smaller, disadvantaged communities achieve compliance with MCLs. These programs include the Drinking Water State Revolving Fund (DWSRF), principal forgiveness programs, state grants, and the Safe and Affordable Funding for Equity and Resilience (SAFER), which is designed to ensure Californians who lack safe, adequate, and affordable drinking water receive it as quickly as possible, and that the water systems serving them establish sustainable solutions.

What treatment technologies have been identified as best available technology for addressing hexavalent chromium?

Three treatment technologies have been identified as best available technology (BAT): ion exchange, reduction-coagulation-filtration (RCF), and reverse osmosis. A technology being identified as BAT means that it is a technology that is generally expected to be able to reliably remove the chemical (in this case, hexavalent chromium) from the water to levels below the MCL. Public water systems are not limited to using only those technologies identified as BAT, but they will have to pilot or demonstrate the effectiveness of the treatment.

Current and Future Regulation

How is hexavalent chromium regulated in California drinking water?

In California, hexavalent chromium in drinking water is regulated under the total chromium state MCL of 50 parts per billion (ppb) and the newly-adopted hexavalent chromium MCL of 10 ppb. A maximum contaminant level (MCL) is the highest concentration of chemicals permitted in drinking water systems. The total chromium MCL was established in 1977 and regulates both the less-toxic trivalent form and the hexavalent form. California is the only state to have set its own total chromium MCL; other states use the total chromium federal MCL of 100 ppb to regulate chromium. The newly-adopted MCL regulates hexavalent chromium separately.

Is there a point at which MCLs are re-evaluated?

Yes. Each chemical with an MCL above the corresponding PHG is reviewed every five years in a comprehensive MCL review, which is required under Health and Safety Code section 116365(g). The MCL review helps determine which chemicals need MCL or DLR revisions. Once it is determined that greater protection of public health is technologically and economically feasible for a specific chemical, the chemical is added to the regulation priority list for an MCL revision.

Details of 2023-24 Regulation

Who does this regulation apply to?

This regulation applies to public water systems (PWS), not private or domestic wells. Private or domestic well owners can also find more information on testing at the Groundwater Ambient Monitoring and Assessment (GAMA) Program, and information on how to reduce exposure to hexavalent chromium in the answer to *"How can a person decrease exposure to any hexavalent chromium in their household water?"*

What is the hexavalent chromium MCL and DLR?

The hexavalent chromium MCL is 10 ppb, and the DLR (detection limit for purposes of reporting) is 0.1 ppb. The DLR is the designated minimum levels at or above which any analytical finding of a contaminant in drinking water from monitoring must be reported to the State Water Board.

How did State Water Board staff arrive at the hexavalent chromium MCL?

The State Water Board is required to set MCLs as close to the public health goal (PHG) as is technologically and economically feasible, while primarily considering public health. It is not always feasible to treat or even measure at the very low concentrations that PHGs can be set at. Currently, only a few laboratories have confirmed that they are able to test hexavalent chromium in water as low as the PHG (0.02 ppb), and treatment technologies have not been studied below levels of about 1 ppb. This means that an MCL set at the PHG would not be feasible. In addition, the State Water Board considers the economic impacts of an MCL. The economic analysis for the hexavalent chromium MCL included monthly household costs, unit cost analysis, cost-effectiveness, and considered future regulations that may also have a widespread cost impact.

When and how often will water systems be required to test for hexavalent chromium?

Water systems are required to take an initial sample for hexavalent chromium by April 1, 2025. How often systems are required to test for hexavalent chromium after that depends on whether the water source is surface water or groundwater and whether the source

exceeds the MCL. Water that is being treated to comply with the MCL must be tested monthly.

Why do small water systems have a later timeline for complying with the hexavalent chromium MCL?

Many small public water systems already have numerous challenges, from compliance to routine maintenance, and more than half of California's water systems have fewer than 100 households over which to spread the costs of any improvements to comply with new standards. Larger water systems usually have more resources (money, staff, etc.) with which to comply with the MCL, and may be able to mobilize and implement treatment more quickly than smaller water systems. An additional benefit of larger systems implementing treatment first is that technologies can be refined and savings discovered before smaller systems are required to comply, which could reduce costs to water systems with the smallest ratepayer bases over which to distribute costs and least able to realize any economies of scale. In addition to considerations of system size, the overall compliance schedule was also designed to allow for lengthier timelines for design and pilot studies, and to allow time for any supply chain delays for treatment equipment.

Therefore, the State Water Board is using the following phased approach for complying with the MCL to give water systems more time:

- Systems with more than 10,000 service connections are required to comply with the MCL by October 1, 2026 (within two years).
- Systems with 1,000 to 10,000 service connections are required to comply with the MCL by October 1, 2027 (within three years).
- Systems with less than 1,000 service connections are required to comply with the MCL by October 1, 2028 (within four years).

What environmental review did the State Water Board conduct in connection with this rulemaking?

When adopting a rule or regulation requiring installation of pollution control equipment, establishing a performance standard, or establishing a treatment requirement, the State Water Board must perform an environmental analysis of the reasonably foreseeable methods by which compliance with that regulation will be achieved (Pub. Resources Code, § 21159; Cal. Code Regs., tit. 14, § 15187). To meet this requirement, the State Water Board prepared a programmatic Environmental Impact Report (EIR) pursuant to the California Environmental Quality Act. Environmental impacts may occur from infrastructure projects that public water systems undertake locally to comply with an MCL for hexavalent chromium, such as the installation of centralized treatment or obtaining new sources of supply. Because the location and technical nature of these local compliance projects are not yet known, the EIR takes a conservative approach to evaluating environmental impacts and finds potentially significant impacts related to a number of environmental resources, and identifies possible mitigation measures for those agencies to consider to reduce environmental impacts to less than significant. It is likely that many of the local projects

implemented to comply with the MCL will not have significant environmental impacts; however, if there are potentially significant impacts, the agencies undertaking or approving the site-specific projects are able to prepare a focused analysis of the project-specific, potentially significant effects that were not discussed in the State Water Board's EIR on the regulation (See Cal. Code Regs., tit., § 15188). The EIR and appendices are available on the State Water Board's website.

Health Concerns

What are the anticipated health benefits of the hexavalent chromium MCL?

At an MCL of 10 ppb, the health risk from hexavalent chromium in drinking water is limited to a one-in-two-thousand chance of developing cancer during a lifetime (70 years) of exposure.

How can a person go about testing their water for hexavalent chromium?

Persons wishing to test their household water for hexavalent chromium may find information about laboratories accredited by the State Water Board's Environmental Laboratory Accreditation Program (ELAP) to test for hexavalent chromium on the ELAP website. More information regarding domestic well testing can also be found at the Groundwater Ambient Monitoring and Assessment (GAMA) Program.

How can a person decrease exposure to any hexavalent chromium in their household water?

Residential point-of-use (POU) and point-of-entry (POE) devices can be purchased by individuals to reduce exposure to contaminants in their household water. POU devices (often pitcher filters) are much more common than POE devices for hexavalent chromium treatment. A list of certified residential POU and POE devices capable of treating hexavalent chromium is available on the State Water Board's website. Check with the manufacturer and the POU device's hexavalent chromium reduction claims as percent removal may vary by device. Because bottled water is not tested for hexavalent chromium, it is not a recommended means of decreasing exposure to hexavalent chromium.

How can I find out how much hexavalent chromium is in my water?

Hexavalent chromium detections are required to be reported to consumers in annual Consumer Confidence Reports (CCRs). Water system CCRs and any hexavalent chromium testing information may also be available on California's Drinking Water Watch.

Details for Water Systems

When and how should initial sampling for the hexavalent chromium MCL occur?

Consistent with existing monitoring requirements for inorganic chemicals, each community and non-transient non-community (NTNC) water system, such as schools, must sample their sources for hexavalent chromium by April 1, 2025, unless they are using previously obtained data to satisfy initial monitoring requirements (see next question for details) [22 CCR 64432(b)].

If the initial sample is above 10 ppb, the water system must inform DDW within 48 hours. If a water system wants to confirm that the original result is over the MCL, the water system must inform DDW within 7 days and may take a confirmation sample within 14 days of laboratory notification. The initial sample and the confirmation sample are then averaged to determine whether the source exceeds 10 ppb.

How can previously obtained data be used to satisfy initial monitoring requirements?

A groundwater sample taken within two years of the effective date (after October 1, 2022) of the regulation may be able to be used to satisfy initial monitoring requirements. Previously obtained data cannot be used to satisfy initial monitoring requirements for surface water sources.

What ongoing monitoring is required?

Sources with an initial (or previous qualifying) sample at or below the MCL will be required to sample once every three years (groundwater) or once every year (surface water) [22 CCR 64432(c)].

Sources with an initial sample above the MCL will be required to sample quarterly [22 CCR 64432(g)(1)]. Sources monitoring quarterly may request a decrease in sampling frequency after systems have completed two (for groundwater) or four (for surface water) consecutive quarters of sampling showing results below the MCL [22 CCR 64432(j)].

Any treated water must be sampled monthly [22 CCR 64432.8(a)].

What monitoring is required for standby sources?

Standby sources are required to monitor once per compliance cycle [22 CCR 64414]. All standby sources must sample once by December 31, 2028 (the end of the current compliance cycle), and once in each following nine-year compliance cycle.

According to the compliance schedule, when would PWS first be required to comply with (supply water with hexavalent chromium levels below) the MCL?

PWS will be required to comply with the MCL based on the schedule below, such that the first sample used to determine compliance (based on quarterly sampling) would be taken in the first quarter after the applicable date below. For example, since the effective date is October 1, 2024, a system with 15,000 connections would calculate the first annual average for purposes of compliance using sampling from the last quarter of 2026 and the first three quarters of 2027, and a system with 5,000 connections would use the last quarter of 2027 and the first three quarters of 2028. However, if any one sample would cause the annual average to exceed the MCL, the system would immediately be in violation.

Table 1. Compliance Schedule for the Hexavalent Chromium MCL

System Size (as of regulation's effective date)	Compliance Schedule	Compliance Monitoring Begins
10,000 service connections or more	2 years from regulation's effective date	October 1, 2026
1,000 to 9,999 service connections	3 years from regulation's effective date	October 1, 2027
Less than 1,000 service connections	4 years from regulation's effective date	October 1, 2028

How is compliance with the hexavalent chromium MCL assessed after the compliance deadlines?

Compliance with the hexavalent chromium MCL is assessed the same way as the MCLs of other inorganic chemicals: using "a running annual average; if any one sample would cause the annual average to exceed the MCL, the system is immediately in violation. If a system takes more than one sample in a quarter, the average of all the results for that quarter shall be used when calculating the running annual average. If a system fails to complete four consecutive quarters of monitoring, the running annual average shall be based on an average of the available data" [22 CCR 64432(i)].

If a system exceeds the MCL before their applicable compliance date, they will not be in violation of the MCL, but they will be required to submit a Hexavalent Chromium Compliance Plan. If a system exceeds the MCL after the applicable compliance date, they would be in violation of the MCL, but do not have to submit a Hexavalent Chromium Compliance Plan [22 CCR 64432(q)].

What is the Hexavalent Chromium Compliance Plan?

The Hexavalent Chromium MCL Compliance Plan is a description from any system with a source exceeding the MCL before their applicable compliance date in Table 1 explaining how they will come into compliance with the MCL [22 CCR 64432(q)]. These plans are required to include the proposed method for compliance with the MCL, the date by which the system plans to submit the final plans and specifications for any construction, the dates by which the system plans to start and complete any construction, and the date by which the system plans to complete a treatment operations plan. Dates do not need to be included if they are not applicable (for example, if no construction is planned).

While these plans can be amended as needed, the approved plans and the dates within are enforceable.

When is the Compliance Plan due?

The compliance plan must be submitted no later than 90 days after a system was notified of the laboratory result that caused a hexavalent chromium MCL exceedance (calculated as described in the above question: "According to the compliance schedule, when would PWS first be required to comply with (supply water with hexavalent chromium levels below) the MCL?") [22 CCR 64432(q)].

How is the Compliance Plan approved?

A compliance plan will be approved if it contains all applicable elements (detailed in the question above: "What is the Hexavalent Chromium Compliance Plan?") and is sufficient to demonstrate how the system will comply with the hexavalent chromium MCL.

What is the Hexavalent Chromium Operations Plan?

The Hexavalent Chromium Operations Plan is a treatment operations plan to help ensure that hexavalent chromium treatment is operating as intended. These plans are required to include the following elements [22 CCR 64432(r)]:

- A performance monitoring program that sets out how and when treatment will be monitored to ensure compliance with the MCL.
- A program for maintenance of treatment process equipment that describes how and when equipment will be maintained and when equipment replacement is needed to ensure treatment is operating as designed.
- How and when each treatment unit process is operated.
- Procedures to determine chemical dose rates sufficient to ensure the treatment process is operating as designed.
- Information on reliability features incorporated into the treatment process to ensure operation as designed.

- A treatment media inspection program sufficient to ensure the media is inspected at intervals and for conditions necessary to ensure compliance with the MCL.

If any of these elements do not apply to specific treatment, those elements do not need to be included in the operations plan (for example, a media inspection program is not needed if media is not used).

When is the Operations Plan due?

The operations plan must be submitted and approved by the date in the approved Compliance Plan and before treated water may be served to the public [22 CCR 64432(r) and 22 CCR 64556].

How is the Operations Plan approved?

An operations plan will be approved if it contains the applicable elements listed above and is sufficient to ensure that treated water reliably and continuously meets the hexavalent chromium MCL.

Are there any public notification requirements for exceeding the MCL, even during the initial compliance period?

Yes. Any system with a source that exceeds the hexavalent chromium MCL will be required to provide Tier 2 Public Notice, even for exceedances that occur before the applicable compliance date in Table 1 [22 CCR 64463.4(a)].

In addition, the notification requirements for Consumer Confidence Reports are below.

What are the Consumer Confidence Report requirements for the hexavalent chromium MCL?

As with other chemicals subject to an MCL, detections of hexavalent chromium and the associated typical origins language must be included in annual Consumer Confidence Reports, even if the detections occur before the applicable compliance date in Table 1 [22 CCR 64481(c)].

If a system exceeds the MCL before the applicable compliance date in **Table 1**, the following language must be included in the Consumer Confidence Report [22 CCR 64481(p)]:

> Chromium (hexavalent) was detected at levels that exceed the chromium (hexavalent) MCL. While a water system of our size is not considered in violation of the chromium (hexavalent) MCL until after [INSERT APPLICABLE TABLE 64432-B COMPLIANCE DATE], we are working to address this exceedance and comply with

the MCL. Specifically, we are [INSERT ACTIONS TAKEN AND PLAN TO COMPLY WITH THE APPLICABLE COMPLIANCE DATE IN TABLE 64432-B].

If a system exceeds the MCL after the applicable date in Table 1, the above language would not be required. Instead, the Consumer Confidence Report shall clearly identify any data indicating MCL violations and "give information on each violation including the length of the violation, potential adverse health effects, and actions taken by the system to address the violation. To describe the potential health effects, the system shall use the relevant language pursuant to appendices 64465-A through H…." [22 CCR 64481(d)(3)].

Additional Resources

Public Health Goal:
https://oehha.ca.gov/water/chemicals/chromium-hexavalent (bit.ly/oehha-phg)

Rulemaking Status and Information:
https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/SWRCBDDW-21-003_hexavalent_chromium.html (bit.ly/cr6-rulemaking)

DDW Announcements and Information on Hexavalent Chromium:
https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/Chromium6.html (bit.ly/cr6-regs)