CALIFORNIA Water Boards

Frequently Asked Questions

Frequently Asked Questions (FAQs):

Manganese in Drinking Water

Concern over potential health effects associated with manganese prompted the State Water Resources Control Board (State Water Board), Division of Drinking Water (DDW) to lower the notification and response levels for manganese in drinking water. Scientific studies indicate that ingestion of manganese can lead to developmental health impacts in formula-fed infants.

The notification level is a non-regulatory, health-based advisory level established as a precautionary measure which, based on available scientific information, does not pose a significant health risk but warrants notification. Concentrations above the response level require additional steps, beyond governing body notification, as required to reduce public exposure.

In June 2026 DDW revised its health-based notification and response levels for manganese per Health and Safety Code sections 116455 and 116456.
https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/NotificationLevels.html
https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/docs/2026/manganese-nl-issuance-2026.pdf

Information for manganese can be found at:
https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/Manganese.html

State Water Board created this resource to assist public water systems in developing communication plans in manganese-impacted communities:
MANGANESE IN CALIFORNIA'S DRINKING WATER COMMUNICATION PLAN
https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/docs/2026/mn-communication-plan.pdf

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1. What is manganese and its associated health risks?

Manganese is an essential trace nutrient and enzyme cofactor that is naturally found in many foods,[1] the earth's crust, and in both surface and groundwater sources. It is present in many foods and available as a dietary supplement. Despite its nutritional benefits, adverse health effects can be caused by over-exposure. *There is evidence demonstrating exposure to drinking water with manganese above the response level of 0.20 milligrams per liter (mg/L) may pose a risk for neurological impacts in formula-fed infants. Since formula-fed infants absorb and retain more manganese than adults, their developing neurological systems may be particularly susceptible to impacts of manganese over-exposure*.

The U.S. Food and Drug Administration requires a minimum level of manganese to be included in infant formula, but no maximum.[2] Studies have shown that manganese concentrations in infant formula vary and tend to exceed that of breast milk.[3] DDW's response level calculation assumes 20 percent contribution of dietary manganese comes from drinking water and the other 80 percent contribution comes from formula.[4] Accordingly, consumers of infant formulas should consider the total manganese exposure to formula-fed infants based on variable contributions from drinking water and formula. Maternal intake of manganese in pregnancy and lactation is not likely to be of significant concern, as transfer of manganese to the fetus and into breast milk is limited.[5]

Public health notification and related mitigation can protect formula-fed infants by notifying parents and caregivers to use an alternative water supply (bottled water) when preparing formula for infants since short periods of manganese exposure above the response level in formula-fed infants may lead to developmental impacts.

If you have other health issues concerning the consumption of manganese in your drinking water, you may wish to consult your doctor.

2. What public water systems are required to conduct water quality monitoring for manganese?

Article 16 of title 22, division 4, chapter 15 of the California Code of Regulations section 64449, requires community water systems to comply with the aesthetic-based secondary maximum contaminant level (MCL) for manganese, which stipulates monitoring of groundwater

[1] National Institutes of Health - Manganese Fact Sheet for Health Professionals: https://ods.od.nih.gov/factsheets/Manganese-HealthProfessional/
[2] eCFR :: 21 CFR 107.100 -- Nutrient specifications: https://www.ecfr.gov/current/title-21/chapter-I/subchapter-B/part-107/subpart-D/section-107.100
[3] Manganese levels in infant formula and young child nutritional beverages in the United States and France: Comparison to breast milk and regulations: https://pmc.ncbi.nlm.nih.gov/articles/PMC6830775/
[4] DDW's Technical Support Document for Revised Notification and Response Levels: https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/documents/manganese-nl-rl-technical-memo-20220406.pdf
[5] Manganese in pregnancy and breastfeeding: https://doi.org/10.1093/med/9780198722700.003.0026

sources every three years and surface water sources annually, while quarterly monitoring is required for community water systems that exceed the secondary MCL of 0.05 mg/L. Non-transient non-community and transient non-community water systems are required to monitor each source for manganese once but are not subject to the secondary MCL requirement.

Some water systems may be required to conduct manganese water quality monitoring based on specific treatment plant or domestic water supply permit conditions.

Due to the potential for fluctuating manganese source concentrations, DDW recommends monthly sampling of public water system sources for as long as manganese exceeds the response level, and quarterly sampling should the concentration drop below the response level.

3. How do the notification and response level revisions impact water quality monitoring requirements?

The June 2026 revision lowers the notification and response levels for manganese at which health effects may be present, which can occur separately from the aesthetic marker for manganese (discoloration) addressed by the secondary MCL. With these revisions, DDW will enforce monitoring requirements for manganese pursuant to section 64449 of Article 16 title 22, division 4, chapter 15 of the California Code of Regulations.

Public water systems or water agencies subject to recycled water regulations (Cal. Code Regs., tit. 22, div. 4, ch. 3) or direct potable reuse project monitoring requirements (Cal. Code Regs., tit. 22, section 64669.65) have additional requirements related to MCLs and notification levels. Though these systems should already be monitoring for manganese, the revised notification level may result in additional monitoring or mitigation for some systems.

4. What are the analytical and reporting requirements related to manganese?

Water samples must be analyzed using a laboratory accredited by the California Environmental Laboratory Accreditation Program (ELAP) for analysis of manganese using either EPA Method 200.7, or 200.8, or Standard Methods 3113B or 3120B. To improve data accuracy, water systems should request total manganese analysis using the lowest available laboratory quantification limit (no greater than 0.010 mg/L), provided there are no extra costs or time delays.

Due to health concerns associated with manganese, samples should be analyzed and results reported electronically to the public water system and DDW as soon as practicable but no later than 30 days from the date of sample collection.

Additional details regarding timely sample collection, analysis, reporting, and response level confirmation samples can be found in the Notification and Response Level Issuance Document[6] and are summarized under FAQs 7, and 11-14.

[6] Manganese Notification and Response Level Issuance Document
https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/docs/2026/manganese-nl-issuance-2026.pdf

5. Does a laboratory need to have ELAP accreditation to conduct the testing required DDW?

Yes. Accreditation under the approved methodology is required in accordance with California Code of Regulations, title 22, section 64415. Users can locate nearby accredited laboratories by using the interactive map on the right side of the following link: https://www.waterboards.ca.gov/drinking_water/certlic/labs/index.html

6. Are instructions available for collecting manganese samples?

Since obtaining representative samples and maintaining their integrity are critical elements of any monitoring program, the water system should use or consult their certified operator for assistance. Reducing or preventing contamination during sampling is very important.

The certified operator should carefully read the laboratory instructions prior to sampling. If your laboratory does not have special instructions, minimum recommendations may include:

- Source must be in operation and active prior to sample collection:
    - The well should be allowed to flow either to the system or to waste (if it has not been in operation recently) for at least 15 minutes prior to sample collection; alternatively,
    - Purge between three to six well volumes or access location of stable surface water flow.
    - If applicable, the sample tap should be flushed for at least 5 minutes before sample collection.
- Sample collection should be based on the stabilization of three successive readings of at least one of the following water quality indicator parameters including: pH, oxidation-reduction potential (ORP), specific electrical conductance (SEC), dissolved oxygen (DO), or turbidity.

7. What is a "confirmed detection"?

To confirm a detection following an initial sample exceedance, a second "confirmation" sample is collected and analyzed, and the two values averaged. If a second sample is not collected or analyzed, the original sample is considered a confirmed detection.

If a manganese result is above the response level, the water system should collect and complete analyses of a confirmation sample within 30 days of being notified by the laboratory of the initial result and average the two sample results:

- If the water system collects and analyzes a confirmation sample, the two sample results will be averaged to determine the confirmed result. A result below the laboratory method reporting limit (no greater than 0.010 mg/L) will be assigned a value of zero when averaging.
- Additional details regarding timely sample collection, analysis, reporting, and follow-up

regarding response level confirmation samples can be found in the Notification and Response Level Issuance Document.[7]

8. How is compliance with the secondary MCL and notification level running annual average calculated?

Manganese secondary MCL and notification level exceedances are based on the running annual average of four quarterly samples. All sample results within a quarter will be averaged to determine the quarterly value. A result below the laboratory method reporting limit will be assigned a value of zero when averaging. A high quarterly sample (such as greater than four times the secondary MCL or notification level) can also automatically exceed the running annual average if the future results are assumed to be zero and the resulting average exceeds the secondary MCL or notification level. Whether additional samples are collected to confirm the notification level exceedance is at the discretion of the water system.

9. If a water system detects manganese in the source water, what is required to be done?

- All public water systems:
  - Complete governing body notification when exceeding an MCL, notification level, or response level (see FAQ 11)
  - Above the response level, public notification may be required to inform customers to use bottled water when preparing infant formula, as directed by DDW (see FAQ 13)
  - DDW recommends notification level exceedance and related health language be included in consumer confidence reports
- Community water systems must comply with the aesthetic-based secondary MCL (see FAQ 10)

10. What are the requirements for community water systems exceeding the secondary MCL?

- Quarterly monitoring
- Governing body notification
- Public notification and inclusion in consumer confidence reports
- Source mitigation

Community water systems in violation of the secondary MCL (same value as the revised notification level) will be required to conduct ongoing monitoring as described in FAQ 2, complete ongoing Tier 2 public notification within 30 days pursuant to Article 18 of title 22, division 4, chapter 15 of the California Code of Regulations, and to achieve compliance with the secondary MCL by installing treatment such as blending or filtration or removing the source from service. The system must include manganese levels within consumer confidence reports, and DDW recommends inclusion of the manganese health effects language.

[7] Manganese Notification and Response Level Issuance Document
https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/docs/2026/manganese-nl-issuance-2026.pdf

A community water system may be permitted to continue use of a source if it takes corrective measures, provides public notification pursuant to section 64449.4 or designates and operates the source as standby pursuant to §64414.

The revised notification level for manganese cancels applicability of manganese secondary MCL waivers in accordance with California Code of Regulations 64449.2, which prohibits waivers for source water quality above the notification level. These community water systems will be required to comply with the secondary MCL monitoring, public notice, and treatment requirements.

Sequestering is not an allowable treatment method for systems exceeding the secondary MCL.

DDW recommends non-transient non-community water systems exceeding the notification level follow the monitoring and public notice requirements in FAQ 2 even though they are not required to comply with the secondary MCL.

11. How does a water system conduct governing body notification?

Within 30 days after a public water system learns of a confirmed detection exceeding an MCL, notification and/or response level, the public water system must notify its governing body of the exceedance(s) and any relevant governing bodies of the areas it serves (Health and Safety Code section 116455).

All public water systems are required to complete governing body notification, pursuant to Health and Safety Code section 116455(b) which can be completed by letter to the local agencies/governing bodies. Notification requirements are linked to each detection and should be repeated until source mitigation occurs or exceedances cease. When a public water system exceeds the notification level but not the response level DDW recommends at least annual notification of the local agencies and governing body. DDW recommends at least quarterly notification of the local agencies/governing bodies served by public water systems for as long as manganese is present at a concentration above the response level.

If the water system is regulated by the California Public Utilities Commission, the water system shall also notify the Commission. The Commission, in the exercise of its general and specific powers to ensure the health, safety, and availability of drinking water served by the utilities subject to its jurisdiction, may order further action that is not inconsistent with the standards and regulations of the department to ensure a potable water supply.

The notification requirements also apply to:

- Wholesale water systems, who must notify their governing bodies and the water systems that are directly supplied with that drinking water.
- Retail water systems, who must notify their governing bodies and the governing bodies of any local agencies (i.e., city or county, or a city and county) whose jurisdictions include areas supplied with their drinking water.
- Wholesale and retail water systems regulated by the California Public Utilities Commission, who must also notify the commission.

12. How does a community water system conduct public notification following a secondary MCL / notification level exceedance?

See response to FAQ 10

13. How does a water system conduct public notification following a response level exceedance?

- Community water systems are required to provide public notice and support secondary notice to all users including schools, childcare centers, hospitals, rental buildings, and businesses to notify the consumers (see FAQ 14)
- Provide at least quarterly public notification (or source mitigation)
- Continuously post public notice in places of consumption

Pursuant to Health & Safety Code section 116450, community water systems that exceed the response level of 0.20 mg/L *must provide public notification to customers to use an alternative water supply (bottled water) when preparing formula for infants*, as specified by DDW.

- Alternatively, the public water system may provide source mitigation (such as taking the affected water source out of service, utilizing treatment or blending, or providing alternative water) within 30 days of the notification of the initial sample exceeding the response level.
- DDW may require the same notice pursuant to Health & Safety Code section 116450 for non-community water systems that serve a vulnerable population (formula-fed infants), as determined on a case-by-case basis.

As noted in FAQ 10 above, community water systems in violation of the secondary MCL will be required to provide Tier 2 public notification and must also mitigate source exceedances. Inclusion of manganese above the secondary MCL is required within consumer confidence reports.

While affected public water systems develop a corrective action plan, when a source exceeds the response level and remains in service, DDW requires public notice informing customers use an alternate water supply (for example, bottled water) when preparing formula for infants.

Furthermore, the public water system must provide details to support secondary or subsequent public notification as described in FAQ 14 for response level exceedances. If the public water system has evidence of noncompliance with this requirement the public water system shall report this information to DDW and/or the local health department.

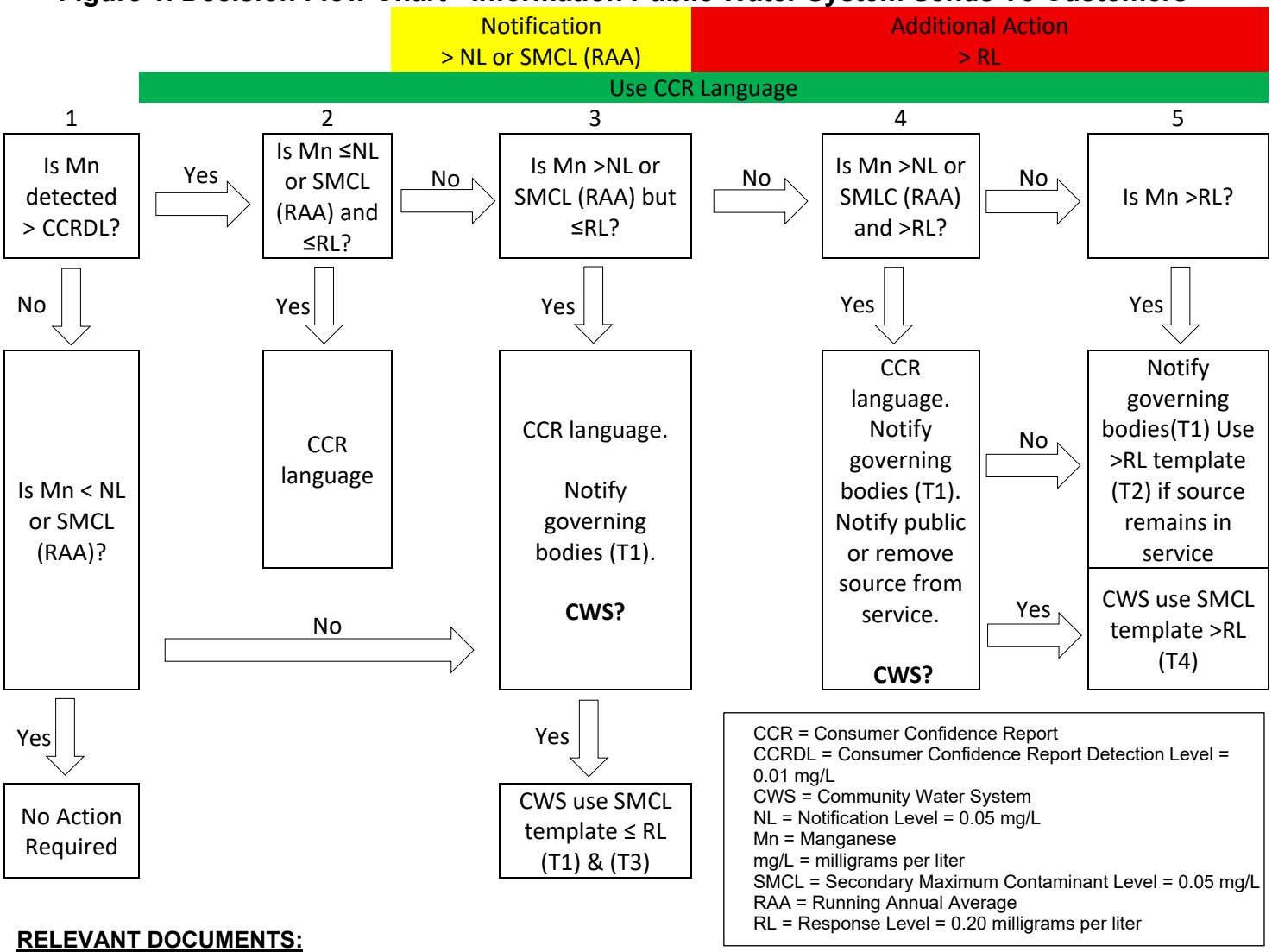
If a water system fails to conduct the necessary notifications DDW can provide the notice or direct the water system to comply with notification requirements.

Figure 1 from the Manganese Communication Plan[8] is available to assist DDW staff and public

[8] Manganese Communication Plan:
https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/docs/2026/mn-communication-plan.pdf

water systems in determining which notice should be sent to public water system customers. Templates for governing body and public notification are also available here: https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/Notices.html

Figure 1. Decision Flow Chart - Information Public Water System Sends To Customers



RELEVANT DOCUMENTS:

Issuance (ID)	Manganese Notification and Response Level Document
Fact Sheet (FAQ)	Manganese Frequently Asked Questions
Template 1 (T1)	Governing Body Notification and Response Level Template (> 0.05 mg/L)
Template 2 (T2)	Public Notice > Response Level Template (> 0.20 mg/L for non-community systems when directed by DDW)
Template 3 (T3)	SMCL Public Notice ≤ Response Level Template (> 0.05 mg/L ≤ 0.20 mg/L for CWSs)
Template 4 (T4)	SMCL Public Notice > Response Level Template (>0.20 mg/L for CWSs)
CCR Language	Language available in CCR Reference Manual for Water Suppliers

14. If a primary customer (such as a school, business or apartment complex) receives notice of a manganese detection above the response level from its water system, what is required to be done?

Within 10 days of receiving public notice, primary customers (schools, residential rental property, or businesses) must notify employees, students and parents, tenants, or employees of businesses located on the property of the manganese response level exceedance along with recommendations to use an alternative source of water for preparing infant formula. Noncompliance with this requirement shall be reported to DDW and/or the local health department. [Health & Safety Code section 116450(g)].

15. How are results of manganese sampling made public?

All constituents required to be sampled by public water systems are to be included in the annual consumer confidence report in accordance with California Code of Regulations title 22, division 4, chapter 15 sections 64449.4, subdivision (c) and 64480. and as required by Health & Safety Code section 116470. The governing body notification, public notification requirements, and recommendations discussed in Health and Safety Code section 116450 and 116455 and herein are also opportunities for public water systems to share water quality analytical results.

The Public Drinking Water Watch website enables searching for public water system contact information and source water quality analytical results by public water system. Start by entering the 'Water System Name': https://sdwis.waterboards.ca.gov/PDWW/

Public water name, number, and contact information can also be found using the System Area Boundary Layer (SABL) Look-up Application. Map your location or enter an address: https://gispublic.waterboards.ca.gov/portal/apps/experiencebuilder/experience/?id=7f249a13de9f48e084167e1ed783278b

16. How can a public water system customer sample their water for manganese?

DDW recommends contacting your water system for assistance. If the water system cannot assist you, DDW recommends using an accredited laboratory, please visit: https://www.waterboards.ca.gov/drinking_water/certlic/labs/

17. Are there devices customers can use to reduce manganese in their home?

In addition to utilizing bottled and vended water which is regulated by the California Department of Public Health to comply with the secondary MCL and notification level values (0.05 mg/L) you can install a residential water treatment device to reduce the amount of manganese in water to an acceptable level. Make sure you install a system certified to NSF/ANSI 42 and follow the manufacturer's maintenance recommendations.

It is important to check the effectiveness of the treatment by having the treated water analyzed every year.

18. Does the State Water Board offer financial assistance to water systems with sources over the notification level for manganese?

Yes, the State Water Board's Division of Financial Assistance (DFA) has determined that water sources with elevated levels of manganese that exceed the notification level are eligible for funding through DFA.

See the following links for the Drinking Water State Revolving Fund Program and complimentary programs, including Bipartisan Infrastructure Law – Emerging Contaminants Funding and Emerging Contaminants in Small or Disadvantaged Communities Grant Funding:

https://www.waterboards.ca.gov/water_issues/programs/grants_loans/
https://www.waterboards.ca.gov/water_issues/programs/grants_loans/pfas.html
https://www.waterboards.ca.gov/water_issues/programs/grants_loans/docs/2025/ec-factsheet.pdf

The applicant will need to contact DFA for more specific information.

State Water Resources Control Board
Division of Financial Assistance – Drinking Water State Revolving Fund
P.O. Box 944212, Sacramento, CA 94244-2120
Tel No: 916-327-9978
Email: DrinkingWaterSRF@waterboards.ca.gov
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