

NOTIFICATION LEVEL ISSUANCE

Contaminant(s):	Manganese
Notification Level:	20 micrograms per liter (µg/L)
Response Level:	200 micrograms per liter (µg/L)
Analytical Method:	EPA Methods 200.5, 200.7, and 200.8 Standard Methods 3111B and 3113B
Toxicological Endpoint:	Neurotoxicity in rats

FINDINGS:

1. Health and Safety Code section 116455 provides the State Water Resources Control Board (State Water Board) with the authority to issue notification and response levels for contaminants in drinking water delivered for human consumption before a maximum contaminant level has been set. Pursuant to subdivision (k)(2) of section 116271 of the Health and Safety Code, the Deputy Director of the Division of Drinking Water (DDW) is delegated the State Water Board's authority to issue notification and response levels.
2. Notification levels are nonregulatory, health-based advisory levels for contaminants that are established as precautionary measures for contaminants.
3. Response levels are established in conjunction with notification levels and represent the concentration of a drinking water contaminant at which additional steps, beyond notification, are recommended to reduce public exposure. For contaminants with non-cancer health risks, a level up to 10 times the toxicological endpoint is consistent with an acceptable margin of safety.
4. Information on notification and response levels and their development is available at https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/NotificationLevels.html.
5. Manganese is an essential nutrient and enzyme cofactor that is naturally present in many foods and available as a dietary supplement, but despite its nutritional benefits, adverse health effects can be caused by over-exposure. There is evidence that demonstrates that exposure to manganese at high levels can pose a neurotoxic risk. Young children can be particularly susceptible to adverse effects from manganese exposure because they absorb and retain more manganese than adults.

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6. The establishment of notification and response levels does not require public water systems (PWS) to monitor for the contaminant, except when water systems are subject to the recycled water regulations at Title 22, California Code of Regulations, division 4, chapter 3. Some water systems, however, will sample for constituents in addition to those contaminants for which there are MCLs, and if those monitoring results indicate that a notification level has been exceeded, the water system must comply with Health and Safety Code section 116455.
7. In addition to the requirements for notification in section 116455, DDW recommends that a PWS inform its customers and consumers about the presence of the contaminant and any associated health concerns.
8. DDW scientific staff conducted a literature search for human and animal research that studied adverse health effects from manganese exposures specifically by route of ingestion. Based on the potential risk for manganese-induced neurotoxicological effects to bottle-fed infants, the current notification level of 500 µg/L and response level of 5,000 µg/L should be revised downward.
9. DDW scientific staff developed a technical memorandum that derived a health protective concentration (HPC) of 20 µg/L, equivalent to 20 parts per billion (ppb), to serve as the basis for future recommended revisions to the current manganese notification and response levels.
10. On April 7, 2022, DDW made formal request to the Office of Environmental Health Hazard Assessment (OEHHA) to review the technical memorandum and provide comments.
11. On May 3, 2022, OEHHA provided their review, supporting the intermediate approach used to derive the HPC and agreeing with the parameters used in the calculation of the HPC, including use of the Kern et al. (2010) study, the composite uncertainty factor of 1,000, the relative source contribution of 0.2, and the drinking water intake based on infants 0–6 months.
12. In accordance with Health and Safety Code section 116456, DDW posted on its website the proposed manganese notification and response levels, the technical memorandum, and OEHHA's comments on the technical memorandum.
13. On January 27, 2023, DDW provided public notice of proposed revisions to the manganese notification and response levels to 20 µg/L and 200 µg/L, respectively.
14. On March 21, 2023, DDW presented an informational item on the proposed manganese notification and response level revisions during the regularly noticed meeting of the State Water Board.

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15. DDW recommends that water systems monitor quarterly any source in which manganese has been detected above the NL.
16. Because manganese may adversely affect infant and/or child development, DDW recommends that a field duplicate be collected for potential sample confirmation (at the time of the original sample collection).
17. When a manganese water quality result in excess of the response level occurs, DDW recommends that the laboratory notify the supplier within 48 hours of receiving the result and analyze the field duplicate or collect and analyze a confirmation sample.
 - A. If the average of the two manganese sample results (original sample result and the subsequent sample result) exceeds the RL, report the result to the State Water Board within 48 hours. If the average does not exceed the RL, inform the State Water Board of the results within seven days from the receipt of the original analytical result.
 - B. If a system is unable to resample within 48 hours, it should issue a public notice to the consumers in order to avoid exposures to young children and should collect and analyze a confirmation sample within two weeks of notification of the results of the first sample.

Therefore, the Deputy Director of DDW establishes a notification level of 20 µg/L and response level of 200 µg/L for manganese.

Approved:

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Deputy Director, Division of Drinking Water
State Water Resources Control Board

Date