

# Drinking Water Notification Levels and Response Levels: An Overview

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**Table 1. Drinking Water Notification Levels**

<b>Notes*</b>	<b>Chemical</b>	<b>Notification Level (milligrams per liter)</b>
1	Boron	1
2	n-Butylbenzene	0.26
3	sec-Butylbenzene	0.26
4	tert-Butylbenzene	0.26
5	Carbon disulfide	0.16
6	Chlorate	0.8
7	2-Chlorotoluene	0.14
8	4-Chlorotoluene	0.14
9	Diazinon	0.0012
10	Dichlorodifluoromethane (Freon 12)	1
11	1,4-Dioxane	0.001
12	Ethylene glycol	14
13	Formaldehyde	0.1
14	HMX	0.35
15	Isopropylbenzene	0.77
16	Manganese	0.5
17	Methyl isobutyl ketone (MIBK)	0.12
18	Naphthalene	0.017
19	N-Nitrosodiethylamine (NDEA)	0.00001
20	N-Nitrosodimethylamine (NDMA)	0.00001
21	N-Nitrosodi-n-propylamine (NDPA)	0.00001
22	Perfluorobutanesulfonic acid (PFBS)	0.0005
23	Perfluorohexanesulfonic acid (PFHxS)	0.000003
24	Perfluorooctanoic acid (PFOA)	0.0000051
25	Perfluorooctanesulfonic acid (PFOS)	0.0000065
26	Propachlor	0.09
27	n-Propylbenzene	0.26
28	RDX	0.0003
29	Tertiary butyl alcohol (TBA)	0.012
30	1,2,4-Trimethylbenzene	0.33
31	1,3,5-Trimethylbenzene	0.33
32	2,4,6-Trinitrotoluene (TNT)	0.001
33	Vanadium	0.05

\* Notes include toxicological endpoint, references, history, and other information (see page 7)

## Table 2. Response Levels

(at which removal of a source from service is recommended; additional notification is recommended if the source is not removed from service, as described below)

Chemical	Toxicological Endpoint	Response Level (Multiples of Notification Level)
RDX	Cancer risk	100 times the NL
TBA	Cancer risk	100 times the NL
TNT	Cancer risk	100 times the NL
NDPA	Cancer risk	50 times the NL
1,4-Dioxane	Cancer risk	35 times the NL
NDMA	Cancer risk	30 times the NL
NDEA	Cancer risk	10 times the NL
PFOS and PFOA	Cancer risk	100 times Cancer risk*
PFHxS	Non-cancer	10 times Toxicological endpoint**
All others	Non-cancer	10 times the NL

\* Theoretical *de minimis* cancer risk level ( $10^{-6}$ ) is less than the established notification level (NL).

\*\* For toxicological endpoint, references, history, and other information (see page 7)

## History of Notification Levels

The Division of Drinking Water's precursor, the Drinking Water Program of the California Department of Public Health (CDPH), and earlier, the California Department of Health Services, CDHS, established health-based advisory levels, called "notification levels" (referred to as "action levels" through 2004), as needed since the early 1980s. These have been used to provide information to public water systems and others about certain non-regulated chemicals in drinking water that lack maximum contaminant levels (MCLs).

When chemicals are found at concentrations greater than these levels, certain requirement and recommendations apply.

Generally, notification levels have been established in response to actual contamination of drinking water supplies, e.g., perchlorate, which now has an MCL. However, notification levels for a number of chemicals were established in anticipation of possible contamination, such as from a hazardous waste site containing many pesticides (in the 1980s), or from a Superfund site (in the 2000s).

Chemicals for which notification levels are established may eventually be regulated by MCLs (through a formal regulatory process), depending on the extent of contamination, the levels observed, and the risk to human health. Most, however, have not proceeded to MCLs.

Once established, a notification level generally stays in place, unless it is replaced by an MCL. On occasion, though, we have revised the numeric value of an individual notification level to reflect new risk assessment information on the particular chemical. For some of the chemicals that had advisory levels established early on, if no MCL was adopted and the need for the notification level had passed, the advisory level was archived. Archived advisory levels may nevertheless be updated to reflect any new risk information that may become available and may be used as notification levels if needed.

In total, notification levels have been established for 97 chemicals, for which, 33 chemicals have notification levels, 40 chemicals now have MCLs and 24 are chemicals with archived advisory levels (AALs).

Note that following adoption of an MCL, the notification level is no longer used. For more about AALs and notification levels, go to [http://www.waterboards.ca.gov/drinking\\_water/certlic/drinkingwater/NotificationLevels.shtml](http://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/NotificationLevels.shtml).

<b>Decade Established</b>	<b>Notification Levels</b>	<b>Now with MCLs</b>	<b>Archived</b>	<b>Current</b>
1980s	60	37	21	2
1990s	12	2	3	7
2000s	21	0	0	21
2010s	2	1	0	1
2020s	2	0	0	2
<b>TOTAL</b>	<b>97</b>	<b>40</b>	<b>24</b>	<b>33</b>

### **Determination of Notification Levels**

Notification levels are calculated using standard risk assessment methods (see Appendix 1) for non-cancer and cancer endpoints, and typical exposure assumptions, including a 2-liter per day ingestion rate, a 70-kilogram adult body weight, and a 70-year lifetime.

- For chemicals that are not considered carcinogens, the notification level is derived from the no observed adverse effect level (NOAEL), adjusted by appropriate factors to take into account uncertainties in the available data. An estimate of drinking water's contribution to total exposure to the contaminant is also included, referred to as the relative source contribution.
- For those that are considered carcinogens, the notification level is considered to pose "*de minimis*" risk, *i.e.*, a theoretical lifetime risk of up to one excess case of cancer in a population of 1,000,000 people—the  $10^{-6}$  risk level. (In that population, approximately 250,000-300,000 cases of cancer would be anticipated to occur naturally.) In several instances, we established notification levels above the  $10^{-6}$  risk level.

On occasion, the chemical may not be detectable as low as the notification level by usual laboratory analytical methods. In this case, detectability prevails, and our approach is to consider a detectable quantity as over the notification level until a more sensitive method is available.

### **Monitoring for Chemicals with Notification Levels**

Monitoring by public water systems for chemicals with notification levels is not required, except for unregulated contaminants for which monitoring is required ([UCMR](#)). Projects for groundwater replenishment using [recycled water](#) and systems proposing to use extremely impaired sources may need to monitor for certain chemicals with notification levels.

Should a chemical be detected over its notification level, we recommend a confirmation sample as soon as possible, with the average value compared to the notification level.

We recommend tracking the presence of the chemical by follow-up sampling at a reasonable frequency.

### **Notification Levels (see Table 1, page 2)**

Notification levels are advisory in nature and not enforceable standards. However, if a chemical is present over its notification level, the following apply:

- **Required by Statute: Local Government Notification**—Health and Safety Code §116455 requires a drinking water system to notify the governing body of the local agency in which users of the drinking water reside (*i.e.*, city council and/or county board of supervisors) when a chemical in excess of a notification level is discovered in a drinking water source. See Appendix 2.

- **Consumer Notice (Recommendation)**—If a chemical is over its notification level in drinking water that is provided to consumers, we recommend that the utility inform its customers and consumers about the presence of the contaminant, and about the health concerns associated with exposure to it. If the utility decides to provide consumer notice, it may want to consider using its annual Consumer Confidence Report, a separate mailing, or other method.

### **Response Levels (see Table 2, page 3)**

DDW recommends that the drinking water system take the source out of service if a chemical is present at levels considerably higher than its notification level. The level at which the recommendation occurs is called the “Response Level.” The specific recommendation depends on the toxicological endpoint that provided the basis for the notification level.

Perfluoroalkyl substances and polyfluoroalkyl substances with notification levels have additional requirements per state law. When a confirmed detection exceeds the response level, a community water system or a nontransient noncommunity public water system is required to:

- Report that detection in the water system’s annual consumer confidence report (CCR).
- Take a water source where detected levels exceed the response level out of use or provide public notification (as specified in Health and Safety §116378) within 30 days of the confirmed detection.

DDW recommends source removal when the chemical's concentration is:

- 10 times the notification level, if it is based on non-cancer endpoints. A level greater than 10 times the notification level reduces the margin of safety provided.
- 100 times the notification level, if it is based on cancer risk and established at the  $10^{-6}$  risk level. A level 100 times the notification level corresponds to a theoretical lifetime risk of up to one excess case of cancer in 10,000 people, the upper value of the  $10^{-6}$  to  $10^{-4}$  risk range typically allowed by regulatory agencies.
- If the notification level is established at a risk greater than  $10^{-6}$ , as it is for 1,4-dioxane, NDEA, NDMA and NDPA, the response level for this recommendation is adjusted downward accordingly, so that it corresponds to the  $10^{-4}$  risk level, as discussed in the second bullet.

## **Additional Notification When Water Is Served above the Response Level:**

When a drinking water system does not take a source out of service despite the presence of a contaminant in drinking water at a level confirmed to be greater than the response level, DDW recommends the following:

- Notification of the local governing body (i.e., city council or board of supervisors, or both) that indicates water is being provided that exceeds the chemical's response level, and the reason for the continued use of the source.
- Notification of the water system's customers and other water consumers that the contaminant is present in their drinking water at a concentration greater than its response level, the level at which source removal is recommended, and the reason for the continued use of the source.
- Whenever such a public "right-to-know" notice occurs, it should be provided to customers and to the water-consuming population in the affected area that would not directly receive such information, including renters, workers and students.
- Notification should be provided directly to consumers, for example by posted notices, hand-delivered notices, and water bill inserts.
- A press release from the water system should also be issued to the local media.

Thereafter, DDW recommends the following:

- Monthly sampling and analysis of the drinking water supply for as long as the contaminant exceeds its response level, and quarterly sampling for 12 months, should the concentration drop below the response level.
- Quarterly notification of the water system's customers and other water consumers for as long as the contaminant is present at a concentration greater than its response level, using the methods described above.

Should the water system refuse to provide additional consumer notification, DDW may provide that notification.

## **Notes for Chemicals with Notification Levels**

1. Boron: ENDPOINT: Noncancer—decreased fetal weight (developmental) in rats. REFERENCE: US EPA Integrated Risk Information System (IRIS), 2004. [Date refers to latest date in revision history.] Boron and Compounds. The last revision

for the oral RfD was August 5, 2004. HISTORY: Notification level first established at 1 mg/L at an uncertain date but thought to be early to mid-1990s.

ADDITIONAL INFORMATION: The relatively large number of sources with boron detections reflects its natural occurrence.

2. n-Butylbenzene: ENDPOINT: Noncancer—increased kidney weight in rats, using cumene (isopropylbenzene) as a surrogate. REFERENCES: (1) National Center for Environmental Assessment (NCEA), 1997, Risk Assessment Issue Paper for: Derivation of Provisional Chronic RfDs for n-Butylbenzene, sec-Butylbenzene, tert-Butylbenzene, and n-Propylbenzene. NCEA, US EPA (97-009/6-5-97) and (2) Memorandum from R. Howd, Office of Environmental Health Hazard Assessment (OEHHA), to D. Spath, CDHS, "Proposed Action Level for n-Propylbenzene," October 27, 2000. HISTORY: Notification level was first established as 0.045 mg/L (date uncertain), and revised to 0.07 mg/L in 2000, and to current level in 2003.
3. sec-Butylbenzene: ENDPOINT: Noncancer—increased kidney weight in rats, using cumene (isopropylbenzene) as a surrogate. REFERENCE: OEHHA, 2000. Memorandum from R. Howd, OEHHA, to D. Spath, CDHS, "Proposed Action Levels for sec-Butylbenzene and tert-Butylbenzene," October 27, 2000.
4. tert-Butylbenzene: ENDPOINT: Noncancer—increased kidney weight in rats, using cumene (isopropylbenzene) as a surrogate. REFERENCE: OEHHA, 2000. Memorandum from R. Howd, OEHHA, to D. Spath, CDHS, "Proposed Action Levels for sec-Butylbenzene and tert-Butylbenzene," October 27, 2000.
5. Carbon disulfide: ENDPOINT: Noncancer—decreased motor conduction velocity in people. REFERENCE: OEHHA, 2001. Memorandum from R. Howd, OEHHA, to D. Spath, CDHS, "Proposed Action Level for Carbon Disulfide," July 5, 2001.
6. Chlorate: ENDPOINT: Noncancer—pituitary gland vacuolization & thyroid gland depletion in rats. REFERENCE: OEHHA, 2002. Memorandum from R. Howd, OEHHA, to D. Spath, CDHS, "Proposed Action Level for Chlorate," January 7, 2002. HISTORY: Notification level was established in 2002. ADDITIONAL INFORMATION: Notification level is derived from standard risk assessment methods with RSC = 0.8.
7. 2-Chlorotoluene: ENDPOINT: Noncancer—decrease in body weight gain in rats. REFERENCE: IRIS, 2003. 2-Chlorotoluene. The last revision for oral RfD was

February 1, 1990. OEHHA concurred with the notification level via a June 7, 2000 memorandum.

8. 4-Chlorotoluene: See notification level for 2-chlorotoluene, which is used as a surrogate.
9. Diazinon: ENDPOINT: Noncancer—neurotoxicity. REFERENCE: ATSDR toxicological profile update (ATSDR, 2008) and Health Effects Advisory Summary Tables (HEAST), FY 1997 Update, US Environmental Protection Agency (US EPA), Solid Waste and Emergency Response, 9200.6-303 (97-1), EPA-540-R-97-036, July 1997. HISTORY: NL for was first established in 1982 as 14 µg/L, revised to 0.006 mg/L in 2000, and updated to current level in 2010. NL uses standard risk assessment methods and these assumptions: adult: Body Weight (BW) = 70 kg, Drinking Water Consumption (DWC) = 2 L/day, Relative Source Contribution (RSC) = 0.2, Uncertainty Factor (UF) = 1,000, No Observable Adverse Effect Level (NOAEL) = 0.6 mg/kg/day.
10. Dichlorodifluoromethane: ENDPOINT: Noncancer—reduced body weight in rats. REFERENCE: IRIS, 2005. Dichlorodifluoromethane. The last revision for the oral RfD was January 31, 1987. HISTORY: Notification level was initially established at 1 mg/L (exact date uncertain, but likely mid-1990s).
11. 1,4-Dioxane: ENDPOINT: Cancer in laboratory rodents. REFERENCE: IRIS, 2013. The  $10^{-6}$  cancer risk level is 0.00035 mg/L. The last revision for oral slope factor for cancer risk was September 20, 2013. HISTORY: Notification level first established in 1998 at a 0.003-mg/L concentration, based on 1990 IRIS documentation, and revised to the current level on November 22, 2010. ADDITIONAL INFORMATION: The notification level's cancer risk is  $3 \times 10^{-6}$ , rather than the usual  $1 \times 10^{-6}$ , because it is difficult to detect 1,4-dioxane at very low levels. Source removal is recommended at (response level=) 0.035 mg/L. [More about 1,4-dioxane.](#)
12. Ethylene glycol: ENDPOINT: Noncancer—kidney toxicity in rats. REFERENCE: IRIS, 2003, Ethylene glycol. The last revision for the oral RfD was September 30, 1987. HISTORY: Notification level was first established in May 2002.
13. Formaldehyde: ENDPOINT: Noncancer by ingestion—reduced weight gain, histopathology in rats. REFERENCE: IRIS, 1990. Formaldehyde. The last revision for the oral RfD was September 1, 1990. HISTORY: Notification level

first established in 1983 as 30 µg/L, and revised to current level in 2000.  
ADDITIONAL INFORMATION: Notification level is derived from standard risk assessment methods, with MF = 10 (because of formaldehyde's cancer risk associated with inhalation exposures, as shown in a variety of animals studies). Though rarely detected in drinking water sources, formaldehyde is of interest because of its possible production as a disinfection byproduct from the use of ozone and/or hydrogen peroxide.

14. HMX (Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine): ENDPOINT: Noncancer—liver lesions in rats. REFERENCE: IRIS, 2003. The last revision for the oral RfD was September 26, 1988. HISTORY: Notification level was first established September 30, 2005.
15. Isopropylbenzene: ENDPOINT: Noncancer—increased kidney weight in rats. REFERENCE: IRIS, 1997. Cumene (also known as Isopropylbenzene). The last revision for the oral RfD was August 1, 1997. OEHHA concurred with the notification level via a November 1, 2000 memorandum. HISTORY: Notification level was first established in 2000.
16. Manganese: ENDPOINT: Noncancer—neurotoxicity, based on human data. REFERENCE: IRIS, 2002. Manganese. The last revision for the oral RfD was November 1, 1995. HISTORY: AL was established on March 20, 2003. ADDITIONAL INFORMATION: Notification level is derived from standard risk assessment methods with RSC = 0.3. Manganese has an enforceable secondary MCL of 0.05 mg/L that is based upon aesthetics. Secondary MCLs apply only to community water systems. The relatively large number of sources with manganese detections reflects its natural occurrence. [More about manganese.](#)
17. MIBK: ENDPOINT: Noncancer—increased kidney and liver weight, kidney pathology in rats. REFERENCE: OEHHA, 1999. Memorandum from G. Alexeeff, OEHHA, to D. Spath, CDHS, "Proposed Action Level for Methyl Isobutyl Ketone," December 29, 1999. HISTORY: Notification level established in 2000.
18. Naphthalene: ENDPOINT: Noncancer—decreased body weight in rats. REFERENCE: IRIS, 1998. Naphthalene. The last revision for the oral RfD was September 17, 1998. OEHHA concurred with the notification level via an April 20, 2000 memorandum. HISTORY: Notification level was first established in 2000 at a concentration of 0.17 mg/L, and revised to current level in April 2005. ADDITIONAL INFORMATION: Subsequent to the establishment of the

notification level, naphthalene was identified by OEHHA in 2002 as a chemical known to the state to cause cancer for purposes of Proposition 65, and was identified by OEHHA in 2004 as a toxic air contaminant and potential carcinogen when inhaled. Notification level is derived from standard risk assessment methods, with MF = 10 (because of naphthalene's cancer risk associated with inhalation exposures, as shown in animal studies).

19. N-Nitrosodiethylamine (NDEA): ENDPOINT: Cancer in a variety of laboratory animals. REFERENCE: the  $10^{-6}$  cancer risk level is 0.000001 mg/L, derived from the  $10^{-5}$  lifetime cancer risk level in 27 CCR §12705. HISTORY: Notification level first established September 2004. ADDITIONAL INFORMATION: The notification level's cancer risk is  $1 \times 10^{-5}$ , rather than the usual  $1 \times 10^{-6}$ , because it is difficult to detect NDEA at very low levels, and because it may be produced in drinking water treatment. Source removal is recommended at (response level=) 0.0001 mg/L. [More about NDEA](#).
20. N-Nitrosodimethylamine (NDMA): ENDPOINT: Cancer in a variety of laboratory animals. REFERENCE: the  $10^{-6}$  cancer risk level is 0.000003 mg/L, according to OEHHA's public health goal for NDMA. HISTORY: Notification level first established in 1998, and revised to current level in 2002. ADDITIONAL INFORMATION: The notification level's cancer risk is  $3.3 \times 10^{-6}$ , rather than the usual  $1 \times 10^{-6}$ , because it is difficult to detect NDMA at very low levels, and because it may be produced in drinking water treatment. Source removal is recommended at (response level=) 0.0003 mg/L. [More about NDMA](#).
21. N-Nitrosodi-n-propylamine (NDPA): ENDPOINT: Cancer in a variety of laboratory animals. REFERENCE: the  $10^{-6}$  cancer risk level is 0.000005 mg/L, derived from the  $10^{-5}$  lifetime cancer risk level in 27 CCR §12705. HISTORY: Notification level first established in May 2005. ADDITIONAL INFORMATION: The notification level's cancer risk is  $2 \times 10^{-6}$ , rather than the usual  $1 \times 10^{-6}$ , because it is difficult to detect NDPA at very low levels, and because it may be produced in drinking water treatment. Source removal is recommended at (response level=) 0.0005 mg/L. [More about NDPA](#).
22. Perfluorobutanesulfonic acid (PFBS): ENDPOINT: Noncancer – decreased thyroid hormone in lab animals, REFERENCES: [Notification Level Recommendation - Perfluorobutane Sulfonic Acid in Drinking Water, OEHHA \(January 14, 2021\)](#), [National Toxicology Program \(2019\)](#), [Lieder et al., 2009a](#), [Lieder et al., 2009b](#) and [Feng et al., 2017](#))

23. Perfluorohexanesulfonic acid (PFHxS): ENDPOINT: Noncancer – decreased thyroid hormone in lab animals, REFERENCES: [Notification Level Recommendation - Perfluorohexane Sulfonic Acid in Drinking Water, OEHHA \(March 2022\)](#), [NTP \(2019\)](#), [Chang et al. \(2018\)](#) and [Butenhoff et al. \(2009\)](#).
24. Perfluorooctanoic acid (PFOA): ENDPOINT: Cancer – pancreatic and liver tumors in male rats, theoretical *de minimis* cancer risk level ( $10^{-6}$ ) at 0.1 ng/L (nanogram/liter), REFERENCES: [Notification Level Recommendations - Perfluorooctanoic Acid and Perfluorooctane Sulfonate in Drinking Water, OEHHA \(August 2019\)](#). HISTORY: Notification level first established in 2018 as 14 ng/L, and revised to current level in 2019. The current level is set to the lowest level of detection.
25. Perfluorooctanesulfonic acid (PFOS): ENDPOINT: Cancer –liver tumors in male rats and the structural and biological similarity of PFOS to PFOA, theoretical *de minimis* cancer risk level ( $10^{-6}$ ) at 0.4 ng/L (nanogram/liter), REFERENCES: [Notification Level Recommendations - Perfluorooctanoic Acid and Perfluorooctane Sulfonate in Drinking Water, OEHHA \(August 2019\)](#), HISTORY: Notification level first established in 2018 as 13 ng/L, and revised to current level in 2019. The current level is set to the lowest level of detection.
26. Propachlor: ENDPOINT: Noncancer—decrease in weight gain, decrease in food intake, relative liver weight increase in rats. REFERENCE: IRIS, 1987. The last revision for the oral RfD was January 1, 1987. HISTORY: Notification level was first established September 30, 2005.
27. n-Propylbenzene: ENDPOINT: Noncancer—increased kidney weight in rats, using cumene (isopropylbenzene) as a surrogate. REFERENCE: OEHHA, 2000. Memorandum from R. Howd, OEHHA, to D. Spath, CDHS, "Proposed Action Level for n-Propylbenzene," October 27, 2000. HISTORY: Notification level established in 2000.
28. RDX (Hexahydro-1,3,5-trinitro-1-3-5-triazine): ENDPOINT: Cancer—liver carcinomas and adenomas in female mice. REFERENCE: IRIS, 1990. The oral carcinogenicity assessment is dated August 1, 1990. HISTORY: Notification level was first established September 30, 2005.
29. Tertiary butyl alcohol: ENDPOINT: Cancer—renal adenomas and carcinomas in male rats, thyroid adenomas in female mice. REFERENCE: OEHHA, 1999.

Memorandum from G. Alexeeff, OEHHA, to D. Spath, CDHS, "Expedited Evaluation of Risk Assessment for Tertiary Butyl Alcohol in Drinking Water," June 2, 1999. HISTORY: Notification level established in 1999.

30. 1,2,4-Trimethylbenzene: ENDPOINT: Noncancer—increased serum phosphorus levels in rats. REFERENCE: OEHHA, 2001. Memorandum from R. Howd, OEHHA, to D. Spath, DHS, "Proposed Action Level for 1,2,4-Trimethylbenzene and 1,3,5-Trimethylbenzene," May 24, 2001. HISTORY: Notification level established in 2001.
31. 1,3,5-Trimethylbenzene: ENDPOINT: Noncancer—increased serum phosphorus levels in rats. REFERENCE: OEHHA, 2001. Memorandum from R. Howd, OEHHA, to D. Spath, DHS, "Proposed Action Level for 1,2,4-Trimethylbenzene and 1,3,5-Trimethylbenzene," May 24, 2001. HISTORY: Notification level established in 2001.
32. 2,4,6-Trinitrotoluene (TNT): ENDPOINT: Cancer—urinary bladder transitional cell papillomas and squamous cell carcinomas in female rats. REFERENCE: IRIS, 2002. The oral carcinogenicity assessment is dated June 1, 1989. HISTORY: Notification level was first established September 30, 2005.
33. Vanadium: ENDPOINT: Noncancer—developmental and reproductive effects in rats. REFERENCE: OEHHA, 2000. Memorandum from R. Howd, OEHHA, to D. Spath, CDHS, "Proposed Action Level for Vanadium," August 24, 2000. HISTORY: CDHS established the notification level in 2000 at 0.015 mg/L, and revised it in late 2000 or early 2001 to 0.05 mg/L, changing the RSC in standard risk assessment methods from the default value of 0.2 to 0.6, to take into account the high number of vanadium detections—reflecting its natural occurrence—and the likelihood that drinking water would contribute more to the total vanadium intake than the default value suggested.

## Appendix 1. Methods for Determination of Notification Levels

DDW's notification levels indicate concentrations of unregulated contaminants in drinking water that are considered to pose no adverse health risk.

When risk assessments have been done by other agencies for other purposes, we generally rely upon those assessments to establish notification levels. For example, theoretical *de minimis* cancer risk levels for certain contaminants can be determined from regulatory levels established by the Office of Environmental Health Hazard Assessment (OEHHA), or from the US EPA's Integrated Risk Information System (IRIS). Notification levels for non-carcinogens can be derived from no observed adverse effect level (NOAELs) and uncertainty factors (UFs) in IRIS. In some cases, US EPA Region 9's Preliminary Remediation Goals (PRGs) can be used to identify NOAELs and UFs in assessments done by other organizations within US EPA, such as the National Center for Environmental Assessment.

On occasion, we may ask OEHHA for its views on specific information from IRIS or PRG tables and the derivation of a notification level from them. When a risk assessment for a specific chemical of drinking water concern is lacking, we may request OEHHA to develop an assessment for use as a notification level.

The methods used to determine notification levels are consistent with those used for the determination of public health goals for contaminants in drinking water by OEHHA. These methods, used by a number of state and federal regulatory agencies, are as follows:

### Non-Carcinogens:

The notification level is the health protective concentration (C) for the contaminant in drinking water, and is determined by the equation:

$$C = (\text{NOAEL} \times \text{BW} \times \text{RSC}) / (\text{MF} \times \text{UF} \times \text{DWC}) \quad (\text{Equation 1})$$

Where:

NOAEL = the No Observed Adverse Effect Level, in milligrams per kilogram body weight per day (mg/kg-day)

BW = body weight, 70 kilograms (kg) as the default adult value

- RSC = the Relative Source Contribution. The default value = 0.2 (assumes that 20 percent of the exposure is from drinking water, 80 percent from other sources)
- UF = uncertainty factor, the product of several factors, often 10 for interspecies extrapolation, 10 for differences in individual human sensitivity, 10 for use of a less-than-chronic study, and 10 for inadequacy of data, so that the UF may be from 1 to 10,000, depending on available information
- MF = modifying factor, to take into account other factors that are appropriate. Unless specifically stated, MF = 1
- DWC = Drinking Water Consumption rate (2 liters per day, L/day)

### Carcinogens:

The notification level is the concentration (C) of the contaminant that poses a theoretical negligible (*de minimis*) cancer risk over a 70-year lifetime, and is determined by the equation:

$$C = (BW \times 10^{-6}) / (q_1^* \times DWC) \quad \text{(Equation 2)}$$

Where:

- C = concentration (mg/L) posing negligible cancer risk ( $10^{-6}$  risk)
- BW = 70 kg
- $q_1^*$  = upper 95% confidence limit on the cancer potency slope, the "Slope Factor," in  $(\text{mg}/\text{kg}\cdot\text{day})^{-1}$
- DWC = 2 L/day

**Appendix 2. Health and Safety Code §116455, (Chapter 679, Statutes of 2004, AB 2528, Lowenthal)**

(a) A public water system shall comply with the requirements of this section within 30 days after it is first informed of a confirmed detection of a contaminant found in drinking water delivered by the public water system for human consumption that is in excess of a maximum contaminant level, a notification level, or a response level established by the department.

(1) If the public water system is a wholesale water system, then the person operating the wholesale water system shall notify the wholesale water system's governing body and the water systems that are directly supplied with that drinking water. If the wholesale water system is a water company regulated by the California Public Utilities Commission, then the wholesale 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.

(2) If the public water system is a retail water system, then the person operating the retail water system shall notify the retail water system's governing body and the governing body of any local agency whose jurisdiction includes areas supplied with drinking water by the retail water system. If the retail water system is a water company regulated by the California Public Utilities Commission, then the retail 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.

(b) The notification required by subdivision (a) shall identify the drinking water source, the origin of the contaminant, if known, the maximum contaminant level, response level, or notification level, as appropriate, the concentration of the detected contaminant, and the operational status of the drinking water source, and shall provide a brief and plainly worded statement of health concerns.

(c) For purposes of this section, the following terms have the following meanings:

(1) "Drinking water source" means an individual groundwater well, an individual surface water intake, or in the case of water purchased from another water system, the water at the service connection.

(2) "Local agency" means a city or county, or a city and county.

(3) "Notification level" means the concentration level of a contaminant in drinking water delivered for human consumption that the department has determined, based on available scientific information, does not pose a significant health risk but warrants notification pursuant to this section. Notification levels are nonregulatory, health-based advisory levels established by the department for contaminants in drinking water for which maximum contaminant levels have not been established. Notification levels are established as precautionary measures for contaminants that may be considered candidates for establishment of maximum contaminant levels, but have not yet undergone or completed the regulatory standard setting process prescribed for the development of maximum contaminant levels and are not drinking water standards.

(4) "Response level" means the concentration of a contaminant in drinking water delivered for human consumption at which the department recommends that additional steps, beyond notification pursuant to this section, be taken to reduce public exposure to the contaminant. Response levels are established in conjunction with notification levels for contaminants that may be considered candidates for establishment of maximum contaminant levels, but have not yet undergone or completed the regulatory standard setting process prescribed for the development of maximum contaminant levels and are not drinking water standards.

(5) "Retail water system" means a public water system that supplies water directly to the end user.

(6) "Wholesale water system" means a public water system that supplies water to other public water systems for resale.