



**Contaminant
Information Sheets
(CISs) for the Draft
Fourth Preliminary
Contaminant
Candidate List
(PCCL 4) Nominated
Contaminants**

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Abbreviations and Acronyms

CASRN	Chemical Abstract Services Registry Number
CCL	Contaminant Candidate List
CCL 3	EPA's Third Contaminant Candidate List
CCL 4	EPA's Fourth Contaminant Candidate List
CIS	Contaminant Information Sheet
DWEL	Drinking Water Equivalent Level
EEC	Estimated Environmental Concentration
EPA	United States Environmental Protection Agency
HA	Health Advisory
FR	Federal Register
HRL	Health Reference Level
IARC	International Agency for Research on Cancer
IRIS	Integrated Risk Information System
L	List
L?	List?
LD ₅₀	Lethal dose 50; an estimate of a single dose that is expected to cause the death of 50 percent of the exposed animals; it is derived from experimental data.
lbs	Pounds
LOAEL	Lowest Observed Adverse Effect Level
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
MMWR	<u>Morbidity and Mortality Weekly Report</u>
NL	Not List
NL?	Not List?
NOAEL	No Observed Adverse Effect Level
NTP	National Toxicology Program
OEHHA	Office of Environmental Health Hazard Assessment (California)
OPP	Office of Pesticide Programs
PCCL	Preliminary-CCL
PCCL 4	EPA's Fourth Preliminary-CCL
PWS	Public Water System
RfD	Reference Dose
SRS	Substance Registry System/Substance Registry Services
SDWA	Safe Drinking Water Act
WBDO	Waterborne Disease Outbreak
WHO	World Health Organization

1.0 Introduction

Section 1412(b)(1) of the Safe Drinking Water Act (SDWA), as amended in 1996, requires EPA to publish the Contaminant Candidate List (CCL) every five years. The SDWA specifies that the list must include contaminants that are not subject to any proposed or promulgated National Primary Drinking Water Regulations (NPDWRs), are known or anticipated to occur in public water systems (PWSs) and may require regulation under the SDWA. EPA uses this list of unregulated contaminants to help the agency identify priority contaminants for regulatory decision making and to prioritize research and data collection efforts. SDWA also requires the agency to consult with the scientific community, including the Science Advisory Board, and provide notice and opportunity for public comment prior to the publication of the Final CCL. In addition, SDWA directs the agency to consider the health effects and occurrence information for unregulated contaminants to identify those contaminants that present the greatest public health concern related to exposure from drinking water.

EPA published the third CCL (CCL 3), which listed 116 contaminants on October 8, 2009 (74 FR 51850 (USEPA, 2009a)). In developing the CCL 3, EPA implemented a multi-step process to select contaminants for the final CCL 3, which included the following key steps:

- (1) The identification of a broad universe of potential drinking water contaminants (CCL 3 Universe);
- (2) Screening the CCL 3 Universe to a Preliminary CCL (PCCL) using screening criteria based on the potential to occur in PWSs and the potential for public health concern;
- (3) Evaluation of the PCCL contaminants based on a more detailed review of the occurrence and health effects data using a scoring and classification system to identify a final list of 116 CCL 3 contaminants; and
- (4) Incorporating public input and expert review in the CCL 3 process.

Steps 1, 2 and 3 in the process are described in detail in the CCL 3 support documents:

- *Final CCL 3 Chemicals: Identifying the Universe* (USEPA, 2009b);
- *Final CCL 3 Chemicals: Screening to a PCCL* (USEPA, 2009c);
- *Final Contaminant Candidate List 3 Chemicals: Classification of the PCCL to the CCL* (USEPA, 2009d);
- *Final CCL 3 Microbes: Identifying the Universe* (USEPA, 2009e);
- *Final CCL 3 Microbes: Screening to the PCCL* (USEPA, 2009f); and
- *Final CCL 3 Microbes: PCCL to CCL Process* (USEPA, 2009g).

These documents can be found on the EPA web site at: <http://www2.epa.gov/ccl/contaminant-candidate-list-3-ccl-3> or at <http://www.regulations.gov> (docket ID: EPA-HQ-OW-2007-1189).

After a Final CCL is published, SDWA section 1412(b)(1)(B)(ii) as amended in 1996, requires EPA at five year intervals to make determinations of whether to regulate or not to regulate no fewer than five contaminants from the CCL in a process called regulatory determinations. This is

a separate process from the listing of contaminants on the CCL. The 1996 SDWA Amendments specify three criteria to determine whether a contaminant may require regulation:

- the contaminant may have an adverse effect on the health of persons;
- the contaminant is known to occur or there is a substantial likelihood that the contaminant will occur in PWSs with a frequency and at levels of public health concern; and
- in the sole judgment of the Administrator, regulation of such contaminant presents a meaningful opportunity for health risk reduction for persons served by PWSs.

If EPA determines that these three statutory criteria are met and makes a final determination to regulate a contaminant, the agency has 24 months to publish a proposed Maximum Contaminant Level Goal¹ (MCLG) and NPDWR². After the proposal, the agency has 18 months to publish and promulgate a final MCLG and NPDWR (SDWA section 1412(b)(1)(E))³.

On February 11, 2011, as a separate action, the agency issued a positive regulatory determination for perchlorate, a chemical listed in CCL 1, CCL 2 and CCL 3 (76 FR 7762 (USEPA, 2011)). Recently, EPA has published preliminary regulatory determinations for five unregulated contaminants on the CCL 3 (79 FR 62716 (USEPA, 2014a)). The five contaminants include: dimethoate; 1,3-dinitrobenzene; strontium; terbufos and terbufos sulfone. The agency is making preliminary determinations to regulate one contaminant (strontium) and to not regulate four contaminants (dimethoate; 1,3-dinitrobenzene; terbufos; and terbufos sulfone). Therefore, the agency is removing perchlorate and these five contaminants from the Draft Fourth CCL (CCL 4), pending the result of the final regulatory determinations for CCL 3.

EPA conducted an abbreviated evaluation and selection process for the CCL 4. This abbreviated CCL 4 process includes a three pronged approach: (1) carrying forward CCL 3 contaminants (minus those with regulatory determinations), (2) seeking and evaluating nominations from the public for additional contaminants to consider and (3) evaluating any new data for those contaminants with previous negative regulatory determinations from CCL 1 or CCL 2 for potential inclusion on the CCL 4.

As part of the process to develop the CCL 4, EPA published a *Federal Register* notice (77 FR 27057 (USEPA, 2012)) requesting that the public submit nominations for chemical and microbial contaminants to be considered for inclusion on the CCL 4. EPA also requested supporting information that has been made available since the development of the CCL 3 or existing information that was not considered in the development of the CCL 3, which shows that the nominated contaminant may have an adverse health effect on people and occurs or is likely to

¹ The MCLG is the "maximum level of a contaminant in drinking water at which no known or anticipated adverse effect on the health of persons would occur, and which allows an adequate margin of safety. Maximum contaminant level goals are non-enforceable health goals." (40 C.F.R. 141.2; 42 U.S.C. 300g-1)

² An NPDWR is a legally enforceable standard that applies to public water systems. An NPDWR sets a legal limit (called a maximum contaminant level or MCL) or specifies a certain treatment technique (TT) for public water systems for a specific contaminant or group of contaminants. The MCL is the highest level of a contaminant that is allowed in drinking water and is set as close to the MCLG as feasible using the best available treatment technology and analytical methods and taking cost into consideration.

³ The statute authorizes a nine month extension of this promulgation date.

occur in public water systems. EPA reviewed the nominations and supporting information provided by nominators to determine if any new data were provided that had not been previously evaluated for CCL 3. The agency also collected additional data for the nominated contaminants, when it was available, from both CCL 3 data sources that had been updated and from new data sources that were not available at the time of CCL 3. A complete list of references provided by nominators can be found in the support document *Summary of Nominations for the Fourth CCL* (USEPA, 2015a). A more detailed description of the CCL data sources collected by EPA may be found in the support document *Data Sources for the CCL 4* (USEPA, 2015b). EPA evaluated the nominated contaminants utilizing the best available health effects and occurrence data and the same process for screening and scoring contaminants that was used for CCL 3.

A summary of the process and data used to screen the contaminants nominated for CCL 4 from the CCL 4 Universe to the PCCL 4 is included in the *Screening Document for the Draft PCCL 4 Nominated Contaminants* (USEPA, 2015c). This document summarizes the process used to select contaminants from the PCCL for the CCL. This document also presents the Contaminant Information Sheets (CISs) for the nominated contaminants qualified for inclusion on the PCCL 4. The purpose of the CISs is to summarize the data used to evaluate the nominated contaminants and to select contaminants for the Draft CCL 4.

For CCL 3, EPA published CISs for the 561 chemicals (USEPA, 2009h) and the 29 microbial contaminants (USEPA, 2009g) on the PCCL 3 (these documents include the CISs for the 116 contaminants on the Final CCL 3 as well). In addition, Appendix E of the *Protocol for the Regulatory Determinations 3 Including Appendices A-F* (USEPA, 2014b) includes a summary of updated health and occurrence data used to evaluate 35 CCL 3 contaminants in the regulatory determinations process. This document presents 20 chemical CISs for the nominated chemicals listed on the PCCL 4 (including CISs for the seven nominated chemicals that made the Draft CCL 4) and four microbial CISs for the nominated microbes that are listed on the PCCL 4 (including CISs for the two nominated microbes that made the Draft CCL 4).

2.0 Summary of the Chemicals Classification Process from the PCCL to CCL

This section briefly summarizes the process developed under CCL 3 to evaluate contaminants from the PCCL to assess if they should move forward to the CCL. EPA used this same process to evaluate the nominated contaminants for listing on the Draft CCL 4. A detailed explanation of this step in the process is provided in the *Final Contaminant Candidate List 3 Chemicals: Classification of the PCCL to CCL* (USEPA, 2009d) and its appendices.

To identify chemicals from the PCCL to include on the CCL, EPA used classification models and a scoring system as tools. The classification models were used to process complex data in a consistent and reproducible manner. An overarching premise in using classification models to prioritize contaminants is that different contaminants can be compared on the basis of similar attributes. The attributes are properties used to categorize contaminants for their potential to occur in drinking water and for their potential to cause adverse health effects. Four attributes were selected including two attributes describing health effects (Potency and Severity) and two

attributes describing occurrence (Prevalence and Magnitude); these are discussed in more detail in Section 3.0 of this document. Scoring protocols were developed for each of the four attributes and these scores were used as input for the classification models. The scores for each attribute increase with increasing potential to cause adverse health effects or potential to occur in drinking water (e.g., a score of 10 indicates greater concern for adverse health effects or greater potential to occur in drinking water, whereas a score of 1 indicates lesser concern). If a chemical had more than one data element available for scoring, EPA used a hierarchy to establish which data element should be used in scoring the potency attribute, the prevalence attribute and the magnitude attribute. For the potency and severity attributes, if data were available for both the cancer and noncancer endpoints, the higher of the cancer or noncancer potency scores was selected to score the potency and the critical effect associated with the data used to score the potency was used to score the severity. The attribute scoring protocols and data hierarchies are discussed in more detail in the *Final Contaminant Candidate List 3 Chemicals: Classification of the PCCL to CCL* (USEPA, 2009d) (see Appendix A for the Attribute Scoring Protocols).

The classification models were calibrated using a training data set so that they mimicked an expert panel's decisions to list or not list a contaminant on the CCL. The training data set consisted of 202 sets of attribute scores for contaminants and the consensus category (list/not list decisions) made by a team of EPA subject matter experts based on evaluating the data and the attribute scores for those contaminants. The classification models developed a relationship between the contaminant attribute scores (input variables) and the classification of the contaminants into list and not list categories (output). The list and not list decisions were placed into four primary categories: List (L), List? (L?), Not List? (NL?) or Not List (NL). The L? and NL? categories were developed because the expert panel recognized that clear decisions on listing contaminants could be made easily for some contaminants, but there was some uncertainty associated with the decision for other contaminants. The L? category signifies that the decision is leaning towards listing with some uncertainty, and NL? signifies that the decision is leading towards not listing, but with some uncertainty. EPA used three classification models and each model produced a prediction for each PCCL contaminant. EPA used an additive process to combine the results of all three models. If all three models were in 100% agreement on the categorical prediction, one of the four primary categorical predictions (L, L?, NL? or NL) was assigned to that contaminant. If all three models did not agree, then the contaminant was assigned to a category in between the four primary categorical predictions. None of the models categorized a contaminant more than one category higher or lower than the other models (i.e., no contaminants were categorized by an "L" by one model and by an "NL?" by another model). There are three "in between" categories including: L?-L, NL?-L? or NL-NL?. An example of a contaminant that would be placed in an "in between" category is if one model placed the contaminant into the "L" category and the other two models placed it into the "L?" category, then it would be placed in the "L?-L" category.

As part of the last stage in the CCL 3 classification process, the model output was reviewed by internal EPA experts and based upon issues identified by the reviewers, several post-model refinements were added by EPA to the CCL 3 process. One important refinement that was added to the process was that for contaminants with water data, EPA calculated the ratio between the health reference level (HRL) and the 90th percentile concentration level in water. If a 90th percentile (of detections) concentration level was not available, the agency used the maximum or

next highest percentile reported value. This HRL to concentration ratio was calculated for all contaminants with water data and serves as a benchmark that suggests a greater concern if the ratio is low (concentration close to the HRL) and a lesser concern when the ratio is high (concentration well below the HRL). If the ratio was less than 10, the contaminant was typically selected for listing on the CCL 3. If the ratio was greater than 10, the contaminant was typically not listed on the CCL and remained on the PCCL. For contaminants that had limited finished water data, but more robust ambient water monitoring data, the ambient water concentration was used to develop the ratio. If no measured water data were available EPA used modeled water data for pesticides (Estimated Environmental Concentrations (EECs) developed by EPA's Office of Pesticide Programs (OPP)), when available, to calculate the HRL to concentration ratios.

For contaminants with no water data (either measured or modeled) HRL to concentration ratios could not be calculated. For these contaminants (e.g., contaminants that only had release data for occurrence), if the three-model categorical prediction was L, L?-L or L?, the contaminant was typically listed on the CCL.

Another important post-model refinement included in the CCL 3 process considered the nature of the best available data. Some chemicals on the PCCL were represented by only an LD₅₀ value for health effects data and/or only production volume data for occurrence. These data are not typically sufficient for a contaminant to be included on the CCL. In such cases, the chemical was not included on the CCL and remained on the PCCL.

3.0 CCL 4 Chemical CISs Explanation

This section presents a walk-through of the CISs with a brief explanatory discussion of the data elements on the CIS and how they are used in the CCL process. The CIS for each contaminant is a concise, two-page profile with the first page including the attribute scores, three model categorical predictions, HRL/concentration ratios, use information, status of the contaminant in the CCL process and health effects data. The second page includes occurrence data. (The derivation and use of these data are explained in detail in *Final Contaminant Candidate List 3 Chemicals: Classification of the PCCL to CCL* (USEPA, 2009d).) For the chemical CISs for the nominated contaminants that made the PCCL 4, please see Appendix A.

General and Summary Information

The top section of the first page of each chemical CIS contains seven sets of information that includes contaminant identifiers, use and how the chemical was scored and ranked in the CCL process. From left to right, the upper rows include:

- 1) **Contaminant Identification** – the contaminant name, a unique CCL-specific identification number referred to as a Substance Key (many of which were obtained from EPA's Substance Registry System, now known as Substance Registry Services (SRS); others were assigned during the CCL process if a contaminant was not listed in SRS), and the contaminant's Chemical Abstract Services Registry Number (CASRN).

- 2) **Attribute Scores** – assigned scores for each of the four CCL attributes (which are derived from the health effects and occurrence data presented on the CISs), which are defined as follows:
- a. **Potency** – Potency reflects the lowest dose of a chemical that causes an adverse health effect. Potency for chemicals is reflected in several standard toxicological parameters, including the Reference Dose (RfD) or its equivalent; cancer potency, expressed as the concentration in water equivalent to a 10^{-4} cancer risk; No Observed Adverse Effect Level (NOAEL); or Lowest Observed Adverse Effect Level (LOAEL).
 - b. **Severity** – Severity is the adverse health effect associated with the dose that is used as the measure of Potency and is calibrated based on the health-related significance of the adverse effect (e.g., dermatitis versus cancer).
 - c. **Prevalence** – Prevalence is a measure of how widespread the contaminant's occurrence is in the environment (specifically in the United States). The data used to score the prevalence attribute may include the percent of public water systems or monitoring sites with detections of the contaminants, the number of States where pesticides are applied or where releases to the environment are reported or chemical production data in pounds per year (lbs/year).
 - d. **Magnitude** – Magnitude relates to the quantity of a contaminant that may be found in the environment. This may be measured through the use of the median value concentration of detections in drinking water or ambient water or the total pounds of a chemical released to the environment. In cases where Magnitude data are not available, persistence and mobility data (i.e., chemical property/environmental fate parameters) were used as surrogates for water occurrence or release data (see USEPA, 2009d for discussion).
- 3) **Health Reference Level (HRL)** – Separate HRLs are calculated for non-cancer and carcinogenic effects. The HRLs are expressed as a concentration of a contaminant in drinking water (expressed in micrograms per liter, $\mu\text{g/L}$).

If potency is scored on cancer data, that data is used to calculate the cancer HRL. If the potency attribute is scored on non-cancer data, the highest ranking cancer data element is used to calculate the cancer HRL. For cancer, an HRL can be derived either from a slope factor or from a 10^{-4} cancer risk. For carcinogens, the HRL is the one-in-a-million (10^{-6}) cancer risk expressed as a drinking water concentration (in $\mu\text{g/L}$).

If potency is scored on non-cancer data, that data is used to calculate the non-cancer HRL. If the potency attribute is scored on cancer data, then the non-cancer HRL is calculated using the highest ranking non-cancer data element. For non-cancer effects the HRL can be derived from an RfD (or its equivalent), a LOAEL, or a NOAEL. For non-carcinogens, the HRL is obtained by multiplying the RfD times 70 kg (default body weight), dividing by a water intake of 2 L/day and multiplying by a 20% relative source contribution. If a NOAEL or a LOAEL was used for the HRL calculation the equation is the same as with an RfD, but default uncertainty factors are applied to the NOAEL or LOAEL to develop an RfD-like value (1,000 for a NOAEL and 3,000 for a LOAEL).

- 4) **HRL/Concentration Ratios** – The HRL/concentration ratios are presented using the 90th percentile concentration occurrence value, if available, or the next highest percentile value or the maximum concentration of detections. Both the non-cancer HRL/concentration ratio and the cancer HRL/concentration ratio were calculated (if applicable). The data used to develop the ratio is noted on the CIS.

Moving down the CIS to the next set of three data elements; from left to right are presented:

- 5) **Use** – Use information for the contaminant.
- 6) **Three-Model Categorical Prediction** – As noted in Section 2.0 above, three calibrated classification models were used to generate Categorical Predictions based on the contaminant's attribute scores. There are four primary Categorical Predictions: L, L?, NL? and NL. One of these four primary Categorical Predictions was assigned to a contaminant if all three models were in agreement on the categorical prediction. If the three models were not in agreement, the contaminant was assigned to a category in between the four primary categories. There are three "in-between" categories including: L?-L, NL?-L? or NL-NL?.
- 7) **Status** – Presents the status of the contaminant with respect to having been listed on CCL 3 and its status within the CCL 4 process (i.e., was it included in the CCL 4 Universe, PCCL 4 or Draft CCL 4).

Health Effects Data

The remainder of the first page of the CISs presents the available health effects data for each contaminant. Non-cancer data elements are presented first followed by cancer data elements. Both the non-cancer and cancer data elements are generally presented in order according to the data hierarchy developed for scoring the potency attribute (with the highest ranking data elements used for scoring generally being presented closer to the top of the page and the lower ranking elements closer to the bottom of the page). The non-cancer data are presented before the cancer data. The column headings summarize the data element, the data source acronym, the numerical value (or qualitative, for cancer classification), units and the year associated with the data element. Typically the year is the date of publication of the data, although given the variability of the data sources' formatting it may represent a toxicological study date or the date when the data source website was last updated. If available, the critical effect is noted and a notes field is filled in if toxicological study data or other pertinent information for a particular data element is available.

For non-cancer data elements the highest data element in the hierarchy for scoring Potency is the RfD, NOAEL or LOAEL from various sources, with EPA's Office of Pesticide Programs and Integrated Risk Information System (IRIS) values taking precedence over values from other agencies or the best available NOAEL or LOAEL from a published study.

Below the non-cancer values are the cancer values, if applicable. As with the non-cancer values, they are presented in hierarchical fashion. For cancer the 10⁻⁴ cancer risk, typically from EPA's Health Advisory Tables (HAs) or IRIS, is the highest-ranking cancer data element followed by the slope factor. The 10⁻⁴ cancer risk or the slope factor is used for Potency scoring, where

applicable. In addition, qualitative cancer data, including cancer classifications from EPA, the International Agency for Research on Cancer (IARC), the U.S. National Toxicology Program (NTP) and/or California's Office of Environmental Health Hazard Assessment (OEHHA) are presented, although not quantitative, such values were incorporated into the PCCL screening process.

The row for the data element used for scoring the Potency and Severity attributes is shaded grey on the CIS.

At the bottom right of the health effects data section of the CIS are other supporting qualitative and quantitative data. These data represent the listing of contaminants as carcinogens and/or reproductive toxins or values that are protective of public health via the ingestion of drinking water (e.g., EPA Drinking Water Exposure Levels (DWELs), EPA HAs, World Health Organization (WHO) Guideline Values, and Health Canada Guideline Values).

Occurrence Data

The second page of the CISs is focused on occurrence data. The occurrence data are generally presented in order of the hierarchy established for scoring Prevalence and Magnitude (i.e., finished water data are at the top of the page, followed by ambient water data, supplemental water data (often studies from individual States or the primary literature), and application/release data, with production data and environmental fate parameters at the bottom of the page). Finished water occurrence data is the highest ranking data element in the hierarchy used to score the prevalence and magnitude attributes since it represents the best estimation of the potential for human exposure.

The row for the occurrence data element used for scoring Prevalence and Magnitude is shaded grey on the CIS.

The column headers for the water occurrence data include the data source; the number of total public water systems (PWS)/sites/samples; the number of positive results (referred to as "detects"), an indication as to whether the preceding values correspond to the number of PWSs, sampling sites or samples; the percent of detects, and where available; the minimum, maximum, median, 90th percentile, 99th percentile of detects; units; sampling year(s) and a notes field.

Following the water data are data that are used to estimate potential occurrence in water in the absence of water data. These include application rate data for pesticides in lbs/year, environmental release data to surface water and total environmental releases in lbs/year. Following the application/release data are production data ranges for the most recent year for which data were available at the time of CCL 4 data collection.

The final section of the CISs includes available environmental fate parameters with persistence metrics of half-life and a degradation code that is either based on structural modeling or the half-life. The remaining properties relate to environmental mobility.

4.0 Summary of the Microbes Classification Process from the PCCL to CCL and CISs Explanation

This section briefly describes the process developed under CCL 3 to select microbial contaminants from the PCCL for the CCL 3 and explains the elements included in the microbial CISs. The same process developed for CCL 3 was used to evaluate the nominated contaminants for the Draft CCL 4. A detailed description of the process developed to select microbial contaminants for the CCL 3 is provided in *Final Contaminant Candidate List 3 Microbes: PCCL to CCL Process* (USEPA, 2009g).

Microbes are evaluated for their occurrence in water and their ability to cause adverse health effects in humans. Pathogens on the PCCL were scored for placement on the CCL using a scoring system to assign a numerical value to each pathogen and rank the pathogens based upon their occurrence, health effects and waterborne disease outbreaks (WBDO). Those microbes receiving high scores were considered for placement on the CCL.

Each microbe was scored using three scoring protocols, one protocol each for WBDO, occurrence in water and health effects. The highest of the individual WBDO score or occurrence score is added to the normalized health effects score to produce a composite pathogen score. Although the composite score is not shown on the CISs, the scoring summary table at the top left corner of each CIS shows the values used to calculate the composite score. The formula for calculating the final score is: highest score between the WBDO and occurrence score + [(general population health effects score + highest sensitive population health effects score) x 5/14].

EPA developed three scoring protocols for CCL 3 to define a hierarchy of the relevance that each of these types of data (e.g. occurrence in water, WBDO and health effects) provide in evaluating microbes for the CCL. WBDOs are scored on a five-level hierarchy ranging from never caused a WBDO (score of 1) to two or more documented WBDOs in the U.S. (score of 5). Occurrence is scored on a three-level hierarchy ranging from not detected in the U.S. (score of 1) to detected in drinking water in the U.S. (score of 3). Combining WBDO information and occurrence information allowed EPA to consider: 1) pathogens that are tracked by public health surveillance programs (i.e., CDC's Morbidity and Mortality Weekly Report) and 2) pathogens that are not yet tracked by public health surveillance programs but for which occurrence information is available (e.g., emerging pathogens).

The health effects scoring protocol evaluates the extent of illness produced in humans from drinking water. These scores reflect the most common clinical presentation and are based on data from recent clinical microbiology manuals. The severity of disease manifestations produced by a pathogen is evaluated across a range of potential endpoints. The seven-level hierarchy developed for this protocol begins with mild, self-limiting illness (score of 1) and progresses to death (score of 7). For more information on the microbes scoring process, please see *Final Contaminant Candidate List 3 Microbes: PCCL to CCL Process* (USEPA, 2009g).

The scoring tables developed for CCL 3 were updated for each nominated contaminant. Since no new relevant data/information was found by EPA, nor provided by the nominators, the data supporting the respective scores for CCL 3 remain the same. The references in the scoring tables

were updated to reflect references that became available after EPA published the final CCL3. The table presents the final scores for each of the data types under consideration and a brief description of the data used to assign those scores with their respective references. For the microbial CISs, please see Appendix B.

Elements of each scoring table include:

- 1) **Scoring Summary** – shows the scores used to calculate the final composite score for each microbial contaminant which include: highest score between the WBDO and occurrence, health effects score for the general population and highest health effects score of the sensitive subpopulations.
- 2) **Data Table** – shows the categories for each potential score, the scoring data, if applicable, and reference(s) used to support a particular score. The highest ranking score for each of the three scoring categories is bolded. The WBDOs scoring results is presented first, followed by the occurrence results and the health effects.
- 3) **References** – presents the full references for the data presented in the table.

5.0 References

USEPA. 2009a. Drinking Water Contaminant Candidate List 3–Final. Federal Register. Vol. 74, No. 194, p. 51850, October 8, 2009.

USEPA. 2009b. Final Contaminant Candidate List 3 Chemicals: Identifying the Universe. EPA 815-R-09-006. August 2009.

USEPA. 2009c. Final Contaminant Candidate List 3 Chemicals: Screening to a PCCL. EPA 815-R-09-007. August 2009.

USEPA. 2009d. Final Contaminant Candidate List 3 Chemicals: Classification of PCCL to the CCL. EPA 815-R-09-008. August 2009.

USEPA. 2009e. Final Contaminant Candidate List 3 Microbes: Identifying the Universe. EPA 815-R-09-004. August 2009.

USEPA. 2009f. Final Contaminant Candidate List 3 Microbes: Screening to the PCCL. EPA 815-R-09-0005. August 2009.

USEPA. 2009g. Final Contaminant Candidate List 3 Microbes: PCCL to CCL Process. EPA 815-R-09-009. August 2009.

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USEPA. 2014a. Announcement of Preliminary Regulatory Determination for Contaminants on the Third Drinking Water Contaminant Candidate List. Federal Register. Vol. 79, No. 202, p. 62716, October 20, 2014.

USEPA. 2014b. Protocol for the Regulatory Determinations 3 Including Appendices A-F. EPA 815-R-14-005. April, 2014.

USEPA. 2015a. Summary of Nominations for the Fourth Contaminant Candidate List. EPA 815-R-15-001. January, 2015.

USEPA. 2015b. Data Sources for the CCL 4. EPA 815-R-15-004. January, 2015.

USEPA. 2015c. Screening Document for the Draft PCCL 4 Nominated Contaminants. EPA 815-R-15-002. January, 2015.

Appendix 1: Chemical Contaminant Information Sheets

The following 40 pages contain tables with health effects and occurrence information for the 20 chemical contaminants nominated by the public that were included on PCCL 4 or CCL 4. Due to the technical limitations of this document Appendix, for further assistance with reasonable accommodation please contact Meredith Russell at Russell.meredith@epa.gov or 202-564-0814.

Contaminant:	alpha-Hexachlorocyclohexane
Substance Key:	6535
Contaminant ID (CASRN):	319846

Attribute Scores			
Potency	Severity	Prevalence	Magnitude
7	8	4	3

Health Reference Level (HRL) ¹ : 56 ug/L			
Health Reference Level (HRL) ¹ cancer: 0.006 ug/L			
HRL/Concentration Ratio(s)			
NC HRL/NAWQA 90%: 949 CAR HRL/NAWQA 90%: 0.102			
Status			
CCL 3: Yes	CCL 4 Unverse: Yes	PCCL 4: Yes	Draft CCL 4: Yes

Source	Use
HSDB	Component of benzene hexachloride (BHC) former insecticide

3-Model Categorical Prediction	
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HEALTH EFFECTS DATA

Non-Cancer Data	Source	Value	Units	Date	Critical Effect	Notes
Reference Dose (RfD)	EPA OPP		mg/kg-d			
Reference Dose (RfD)	IRIS		mg/kg-d			
Reference Dose (RfD)	EPA HA		mg/kg-d			
Reference Dose (RfD)	RAIS HE		mg/kg-d			
Minimal Risk Level	ATSDR	0.008	mg/kg-d	9/2003	Hepatic	Basis NOAEL 0.8 mg/kg-d; UF = 100.
Acceptable Daily Intake (ADI)	JMPR		mg/kg-d			
Acceptable Daily Intake (ADI)	CEDI ADI		mg/kg-d			
Tolerable Daily Intake (TDI)	ITER		mg/kg-d			
No Observed Effect Level (NOEL)	CTD JPN		mg/kg-d			
Lowest Observed Adverse Effect Level (LOAEL)	RTECS	1.2	mg/kg-d	1991	Biochemical - Enzyme inhibition, induction, or change in blood or tissue levels - hepatic microsomal mixed oxidase (dealkylation, hydroxylation, etc.), Biochemical - Enzyme inhibition, induction, or change in blood or tissue levels - catalases, Biochemical - Enzyme inhibition, induction, or change in blood or tissue levels - other oxidoreductases	30-day study in rat; TOLED5 Toxicology Letters. (Elsevier Science Pub. B.V., POB 211, 1000 AE Amsterdam, Netherlands) V.1- 1977- Volume(issue)/page/year 56,137,1991
Lethal Dose 50 (LD50)	HSDB		mg/kg			
Lethal Dose 50 (LD50)	CTD JPN		mg/kg			
Lethal Dose 50 (LD50)	RTECS		mg/kg			

Cancer Data	Source	Value	Units	Date	Notes
Lifetime Cancer Risk (10 ⁻⁴)	EPA IRIS	0.0006	mg/L	1986	
Slope Factor (Oral)	OEHHA	2.7	(mg/kg-d) ⁻¹	2005	
Slope Factor (Oral)	RAIS HE	6.3	(mg/kg-d) ⁻¹	1986	Slope factor taken from IRIS.
Cancer Classification ²	EPA IRIS	B2		1986	
Cancer Classification ²	IARC	2B			

Other Supporting Data	Source	Value	Units	Notes
Is contaminant on list of carcinogens?	EPA; RAIS; OEHHA; IARC	Yes		
Is the contaminant on a list of reproductive toxins?				
Drinking Water Equivalent Level (DWEL)	EPA HA		mg/L	

	Source	Male Rat	Female Rat	Male Mouse	Female Mouse
Cancer Classification ²	NTP				

Note: Highlighted data indicate value was used in attribute scoring. Blank fields indicate there were no data available.

¹ For the CCL process HRLs were calculated by converting the RfD or other dose to ug/L, assuming 2 L/day of water consumed by a 70 Kg adult, and a Relative Source Contribution of 20%. For carcinogens, the concentration at the 10⁻⁶ cancer risk was used.

² Cancer classifications were only used for screening. For potency scoring quantitative cancer risk data were used.

OCCURRENCE DATA

	Number of PWSs/Sites/Samples	Number of Detects	PWSs/Sites/Samples	Percent with Detects	Minimum Conc. (Detects)	Maximum Conc. (Detects)	Median Conc. (Detects)	90th Percentile (Detects)	99th Percentile (Detects)	Conc. Units	Date	Notes
Finished Water Data												
Unregulated Contaminant Monitoring Rule (UCMR 1)			PWS							ug/L	2001-2003	
Unregulated Contaminant Monitoring (UCM) Round 1			PWS							ug/L	1988-1992	
Unregulated Contaminant Monitoring (UCM) Round 2			PWS							ug/L	1993-1997	
National Inorganics and Radionuclide Survey (NIRS)			PWS							ug/L	1984-1986	

Ambient Water Data												
National Water-Quality Assessment Program (NAWQA)	7,119	21	Sites	0.30%	0.0004	0.21	0.011	0.059	0.21	ug/L	1992-2001	
National Reconnaissance of Emerging Contaminants (NREC)			Sites							ug/L	1999-2004	

Supplemental Water Data												
Toccalino et al., 2010	512	1	Samples	0.2%	0.0327	0.0327	0.0327	0.0327	0.0327	ug/L	1993-2007	Ground water; Source Water; Toccalino et al., 2010, Quality of source water from public-supply wells in the United States, 1993–2007: USGS Sci. Investigations Report 2010-5024, p. 206
STOrage and RETrieval (STORET)	2,785	448	Sites	16.09%	0	0.617	0	0.0038	0.0656	ug/L	Updated 2013	

Application/Release Data	Amount Released	Units	Number of States	Units	Date
National Center for Food and Agricultural Policy (NCFAP) – Application		lbs/yr		States	1997
Toxics Release Inventory (TRI) – Surface Water		lbs/yr		States	2010
Toxics Release Inventory (TRI) – Total		lbs/yr		States	2010

Production	Amount Range	Units	Date
Chemical Update System/Inventory Update Reporting (CUS/IUR)	No Reports	lbs/yr	2002

Note: Highlighted data indicate value was used in attribute scoring. Blank fields indicate there were no data available.

Other Supporting Data	Source	Value	Date
Estimated Environmental Concentration (EEC)	OPP		
Environmental Fate Parameters		Value	Units
Half Life	1.2	years	
Degradation Code	DST		DST = Degrades sometimes/recalcitrant; hydrolysis only, pH = 7 (HSDB)
Organic Carbon Partitioning Coefficient (Koc)	641-1,995	L/kg	
Log Octanol-water Partitioning Coefficient (Kow)	3.8	dimensionless	
Distribution Coefficient (Kd)		L/kg	
Henry's Law Coefficient	6.7E-06	atm-m ³ /mol	
Solubility in Water	2	mg/L	
Modeled Percent in Water	7	%	

Contaminant:	Manganese
Substance Key:	18823
Contaminant ID (CASRN):	7439965

Attribute Scores			
Potency	Severity	Prevalence	Magnitude
4	1	10	9

Health Reference Level (HRL)¹: 300 ug/L			
Health Reference Level (HRL)¹ cancer: N/A			
HRL/Concentration Ratio(s)			
NC HRL/NIRS 90%: 2.4			
Status			
CCL 3: No	CCL 4 Universe: Yes	PCCL 4: Yes	Draft CCL 4: Yes

Source	Use
HSDB	Manufacturing of steel alloys, in dry-cell batteries, electrical coils, ceramics, matches, glass, dyes, fertilizers, welding rods, as oxidizing agents, and as animal food additives.

3-Model Categorical Prediction
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HEALTH EFFECTS DATA

Non-Cancer Data	Source	Value	Units	Date	Critical Effect	Notes
Reference Dose (RfD)	EPA OPP		mg/kg-d			
Reference Dose (RfD)	IRIS	0.047	mg/kg-d	1995		Reflects a modifying factor of 3 to adjust from increased bioavailability when in drinking water
Reference Dose (RfD)	EPA HA	0.14	mg/kg-d	2004		The 3-fold modifying factor for bioavailability from drinking water was applied when calculating HA rather than in determining the RfD
Reference Dose (RfD)	RAIS HE		mg/kg-d			
Reference Dose (RfD)	IOM	0.16	mg/kg-d	2001	11 mg/day = Upper Limit, amount of manganese in typical Western diet for adults (NOAEL) 15 mg/kg-day LOAEL increased serum manganese and manganese dependant lymphocyte SOD activity – Concern for neurotoxicity	Not adjusted for the increased bioavailability from drinking water
Minimal Risk Level	ATSDR		mg/kg-d			
Acceptable Daily Intake (ADI)	JMPR		mg/kg-d			
Acceptable Daily Intake (ADI)	CEDI ADI		mg/kg-d			
Tolerable Daily Intake (TDI)	ITER		mg/kg-d			
No Observed Effect Level (NOEL)	CTD JPN		mg/kg-d			
Lowest Observed Adverse Effect Level (LOAEL)	RTECS		mg/kg-d			
Lowest Observed Adverse Effect Level (LOAEL)	Supplemental	10	mg/kg-d	2009	Neurodevelopmental effects in mice (Moreno et al, 2009a). Significant increase in Nitric Oxide Synthase 2 expression in brain of animals exposed as juveniles and adults (Moreno et al, 2009b).	Moreno et al, 2009a. Aged-Dependent Susceptibility to Manganese-Induced Neurological Dysfunction. Toxicological Sciences 112(2): 394-404. Moreno et al, 2009b. Developmental Exposure to Manganese Increases Adult Susceptibility to Inflammatory Activation of Glia and Neuronal Protein Nitration. Toxicological Sciences. 112: 405-415.
Lowest Observed Adverse Effect Level (LOAEL)	Supplemental	7	mg/kg-d	2010	Impaired spontaneous motor activity in rats	Kern et al, 2010. Prewaning Manganese Exposure Causes Hyperactivity, Disinhibition, and Spatial Learning and Memory Deficits Associated with Altered Dopamine Receptor and Transporter Levels. Synapse. 64: 363-378.
Lethal Dose 50 (LD50)	HSDB		mg/kg			
Lethal Dose 50 (LD50)	CTD JPN		mg/kg			
Lethal Dose 50 (LD50)	RTECS		mg/kg			

Cancer Data	Source	Value	Units	Date	Notes
Lifetime Cancer Risk (10 ⁻⁴)	EPA		mg/L		
Slope Factor (Oral)	OEHHA		(mg/kg-d) ⁻¹		
Slope Factor (Oral)	RAIS HE		(mg/kg-d) ⁻¹		
Cancer Classification ²	EPA IRIS	D		1988	
Cancer Classification ²	IARC				
	Source	Male Rat	Female Rat	Male Mouse	Female Mouse
Cancer Classification ²	NTP				

Other Supporting Data	Source	Value	Units	Notes
Is contaminant on list of carcinogens?				
Is the contaminant on a list of reproductive toxins?				
Drinking Water Equivalent Level (DWEL)	EPA HA	1.6	mg/L	
Guideline Value (GV)	WHODWQ	0.4	mg/L	2011
Health Advisory (HA)	EPA HA	0.3	mg/L	The 3-fold modifying factor for bioavailability from drinking water was applied when calculating HA rather than in determining the RfD

Note: Highlighted data indicate value was used in attribute scoring. Blank fields indicate there were no data available.

¹ For the CCL process HRLs were calculated by converting the RfD or other dose to ug/L, assuming 2 L/day of water consumed by a 70 Kg adult, and a Relative Source Contribution of 20%. For carcinogens, the concentration at the 10⁻⁶ cancer risk was used.

² Cancer classifications were only used for screening. For potency scoring quantitative cancer risk data were used.

OCCURRENCE DATA

	Number of PWSs/Sites/Samples	Number of Detects	PWSs/Sites/Samples	Percent with Detects	Minimum Conc. (Detects)	Maximum Conc. (Detects)	Median Conc. (Detects)	90th Percentile (Detects)	99th Percentile (Detects)	Conc. Units	Date	Notes
Finished Water Data												
Unregulated Contaminant Monitoring Rule (UCMR 1)			PWS							ug/L	2001-2003	
Unregulated Contaminant Monitoring (UCM) Round 1			PWS							ug/L	1988-1992	
Unregulated Contaminant Monitoring (UCM) Round 2			PWS							ug/L	1993-1997	
National Inorganics and Radionuclide Survey (NIRS)	989	672	PWS	67.95%	1	1,341	11.96	126	673	ug/L	1984-1986	

Ambient Water Data												
National Water-Quality Assessment Program (NAWQA)	8,002	6,447	Sites	80.57%	0.051	70,000	19	180	1,300	ug/L	1992-2001	
National Reconnaissance of Emerging Contaminants (NREC)			Sites							ug/L	1999-2004	

Supplemental Water Data												
Toccalino et al., 2010	808	543	Samples	67.2%	0.053	1,923	8.99	186	732	ug/L	1993-2007	Ground water; Source Water; Toccalino et al., 2010. Quality of source water from public-supply wells in the United States, 1993–2007: USGS Sci. Investigations Report 2010-5024, p. 206
California Drinking Water Monitoring Data	4,969	2,229	PWS	44.9%	0.001	35,000	70	380	1,455	ug/L	1995-2007	
Illinois Drinking Water Monitoring Data	1,223	685	PWS	56%	1	2,700	31	190	378	ug/L	1998-2005	
North Carolina Drinking Water Monitoring Data	2,382	1,265	PWS	53.1%	0.7	239,000	28	175	779	ug/L	1998-2005	
Ohio Drinking Water Monitoring Data	775	641	PWS	82.7%	0.113	216,000	33	246	1964	ug/L	1998-2005	
Region 9 Tribes Drinking Water Monitoring Data	154	63	PWS	40.9%	0.85	320,000	80	592	239,860	ug/L	1998-2005	
Texas Drinking Water Monitoring Data	6,713	3,898	PWS	58.1%	1	25,910	10	70	290	ug/L	1998-2005	
Wisconsin Drinking Water Monitoring Data	1,946	1,571	PWS	80.7%	0.006	400,000	28	358	7,000	ug/L	1980-2012	
USGS/California Groundwater Ambient Monitoring and Assessment (GAMA) Program	1,158	917	Sites	79.2%	0.1	37,000	2	220	2,386	ug/L	2004-2011	
STOrage and RETrieval (STORET)	47,550	42,222	Sites	88.79%	0	18,604,000	51	393	7,490	ug/L	Updated 2013	
Massachusetts Nominations Data	4,976		Samples			28,000	7	360		ug/L		Ground Water; Mixed Public and Private Water Supplies; Received from Massachusetts for the CCL 4 nominations; Ayotte, J. D., J. M. Gronberg, et al. (2011). Trace Elements and Radon in Groundwater Across the United States. U.S. Geological Survey Scientific Investigations Report 2011-5059: 115. (Source water for public supply wells from the Ayotte et al., 2011 overlaps with Toccalino et al., 2010.)
Minnesota Nominations Data	1,630	1,589	Samples	97.48%	0.1	3,000	110	500		ug/L		Ground Water; Mixed Public and Private Water Supplies; Received from Minnesota for the CCL 4 nominations

Application/Release Data	Amount Released	Units	Number of States	Units	Date
National Center for Food and Agricultural Policy (NCFAP) – Application		lbs/yr		States	1997
Toxics Release Inventory (TRI) – Surface Water	84,545	lbs/yr	31	States	2010
Toxics Release Inventory (TRI) – Total	15,872,968	lbs/yr	48	States	2010

Production	Amount Range	Units	Date
Chemical Update System/Inventory Update Reporting (CUS/IUR)	500M - < 1B	lbs/yr	2006

Note: Highlighted data indicate value was used in attribute scoring. Blank fields indicate there were no data available.

Other Supporting Data	Source	Value	Date
Estimated Environmental Concentration (EEC)	OPP		

Environmental Fate Parameters	Value	Units	Notes
Half Life		days	
Degradation Code	persistent		As elemental Mn
Organic Carbon Partitioning Coefficient (Koc)		L/kg	
Log Octanol-water Partitioning Coefficient (Kow)		dimensionless	
Distribution Coefficient (Kd)		L/kg	
Henry's Law Coefficient		atm-m ³ /mol	
Solubility in Water		mg/L	
Modeled Percent in Water		%	

Contaminant:	Methyl tert-butyl ether
Substance Key:	11918
Contaminant ID (CASRN):	1634044

Attribute Scores			
Potency	Severity	Prevalence	Magnitude
4	8	5	8

Health Reference Level (HRL): 2,100 ug/L
Health Reference Level (HRL) cancer: 19.4 ug/L
HRL/Concentration Ratio(s)
NC HRL/UCMR 90%: 58.3 CAR HRL/UCMR 90%: 0.539

Source	Use
	Octane booster in gasoline; manufacture of isobutene; extraction solvent

3-Model Categorical Prediction
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Status			
CCL 3: Yes	CCL 4 Universe: Yes	PCCL 4: Yes	Draft CCL 4: Yes

HEALTH EFFECTS DATA

Non-Cancer Data	Source	Value	Units	Date	Critical Effect	Notes
Reference Dose (RfD)	EPA OPP		mg/kg-d			
Reference Dose (RfD)	IRIS		mg/kg-d			
Reference Dose (RfD)	EPA HA		mg/kg-d			
Reference Dose (RfD)	RAIS HE		mg/kg-d			
Minimal Risk Level	ATSDR	0.3	mg/kg-d	8/1996	Hepatic: Decreased blood urea nitrogen levels.	
Acceptable Daily Intake (ADI)	JMPR		mg/kg-d			
Acceptable Daily Intake (ADI)	CEDI ADI		mg/kg-d			
Tolerable Daily Intake (TDI)	ITER	0.01	mg/kg-d	1991		
No Observed Effect Level (NOEL)	CTD JPN		mg/kg-d			
Lowest Observed Adverse Effect Level (LOAEL)	RTECS	300	mg/kg-d	1990	Kidney, Ureter, Bladder - changes in bladder weight, Blood - changes in serum composition (e.g. TP, bilirubin, cholesterol), Nutritional and Gross Metabolic - changes in calcium	1
Lethal Dose 50 (LD50)	HSDB		mg/kg			
Lethal Dose 50 (LD50)	CTD JPN		mg/kg			
Lethal Dose 50 (LD50)	RTECS		mg/kg			

Cancer Data	Source	Value	Units	Date	Notes
Lifetime Cancer Risk (10 ⁻⁴)	EPA		mg/L		
Slope Factor (Oral)	OEHHA	0.0018	(mg/kg-d) ⁻¹	2005	
Slope Factor (Oral)	RAIS HE		(mg/kg-d) ⁻¹		
Cancer Classification ²	EPA				
Cancer Classification ²	IARC	3		1999	

Other Supporting Data	Source	Value	Units	Notes
Is contaminant on list of carcinogens?	OEHHA	Yes		
Is the contaminant on a list of reproductive toxins?				
Drinking Water Equivalent Level (DWEL)	EPA HA		mg/L	

	Source	Male Rat	Female Rat	Male Mouse	Female Mouse
Cancer Classification ²	NTP				

Note: Highlighted data indicate value was used in attribute scoring. Blank fields indicate there were no data available.

¹ For the CCL process HRLs were calculated by converting the RfD or other dose to ug/L, assuming 2 L/day of water consumed by a 70 Kg adult, and a Relative Source Contribution of 20%. For carcinogens, the concentration at the 10⁻⁶ cancer risk was used.

² Cancer classifications were only used for screening. For potency scoring quantitative cancer risk data were used.

OCCURRENCE DATA

	Number of PWSs/Sites/Samples	Number of Detects	PWSs/Sites/Samples	Percent with Detects	Minimum Conc. (Detects)	Maximum Conc. (Detects)	Median Conc. (Detects)	90th Percentile (Detects)	99th Percentile (Detects)	Conc. Units	Date	Notes
Finished Water Data												
Unregulated Contaminant Monitoring Rule (UCMR 1)	3,871	19	PWS	0.49%	5	49	9.2	34.6	48.75	ug/L	2001-2003	
Unregulated Contaminant Monitoring (UCM) Round 1			PWS							ug/L	1988-1992	
Unregulated Contaminant Monitoring (UCM) Round 2			PWS							ug/L	1993-1997	
National Inorganics and Radionuclide Survey (NIRS)			PWS							ug/L	1984-1986	

Ambient Water Data												
National Water-Quality Assessment Program (NAWQA)	4,328	424	Sites	9.80%	0.01	23,000	0.3	7.85	1,800	ug/L	1992-2001	
National Reconnaissance of Emerging Contaminants (NREC)			Sites							ug/L	1999-2004	

Supplemental Water Data												
Toccalino et al., 2010	832	115	Samples	13.8%	0.031	12.03	0.173	1.07	7.76	ug/L	1993-2007	Ground water; Source Water; Toccalino et al., 2010. Quality of source water from public-supply wells in the United States, 1993–2007: USGS Sci. Investigations Report 2010-5024, p. 206
California Drinking Water Monitoring Data	4,419	150	PWS	3.4%	0.15	610	5.96	33	214	ug/L	1995-2007	
Florida Drinking Water Monitoring Data	31	7	PWS	22.6%	0.09	67.18	0.755	4.56	51.2	ug/L	2004-2007	
Illinois Drinking Water Monitoring Data	1,161	26	PWS	2.2%	0.5	16	1.3	7	16	ug/L	1998-2005	
Ohio Drinking Water Monitoring Data	1,306	6	PWS	0.5%	0.5	9.51	1.21	5.36	8.55	ug/L	1998-2005	
Region 9 Tribes Drinking Water Monitoring Data	219	1	PWS	0.5%	9.8	9.8	9.8	9.8	9.8	ug/L	1998-2005	
Texas Drinking Water Monitoring Data	5,660	41	PWS	0.7%	0.5	48	2.8	10.2	25.6	ug/L	1998-2005	
Wisconsin Drinking Water Monitoring Data	1,142	38	PWS	3.3%	0.104	64.9	2.2	16.6	45.9	ug/L	1980-2012	
USGS/California Groundwater Ambient Monitoring and Assessment (GAMA) Program	1,855	101	Sites	5.4%	0.03	28.3	0.12	0.554	2.17	ug/L	2004-2011	
STorage and RETrieval (STORET)	1,210	154	Sites	12.73%	0.046	13,000	1.5	14.5	1,600	ug/L	Updated 2013	

Application/Release Data	Amount Released	Units	Number of States	Units	Date
National Center for Food and Agricultural Policy (NCFAP) – Application		lbs/yr		States	1997
Toxics Release Inventory (TRI) – Surface Water	800	lbs/yr	6	States	2010
Toxics Release Inventory (TRI) – Total	1,471,221	lbs/yr	35	States	2010

Production	Amount Range	Units	Date
Chemical Update System/Inventory Update Reporting (CUS/IUR)	≥ 1B	lbs/yr	2006

Note: Highlighted data indicate value was used in attribute scoring. Blank fields indicate there were no data available.

Other Supporting Data	Source	Value	Date
Estimated Environmental Concentration (EEC)	OPP		

Environmental Fate Parameters	Value	Units	Notes
Half Life	15	days	
Degradation Code	BS		BS = Biodegrades slow (PBT)
Organic Carbon Partitioning Coefficient (Koc)	6	L/kg	
Log Octanol-water Partitioning Coefficient (Kow)	0.94	dimensionless	
Distribution Coefficient (Kd)		L/kg	
Henry's Law Coefficient	5.87E-04	atm-m ³ /mol	
Solubility in Water	51,000	mg/L	
Modeled Percent in Water	42	%	

Contaminant:	Microcystin-LR
Substance Key:	76859
Contaminant ID (CASRN):	101043372

Attribute Scores			
Potency	Severity	Prevalence	Magnitude
9	3	10	4

Health Reference Level (HRL): 0.021 ug/L
Health Reference Level (HRL)¹ cancer: N/A

HRL/Concentration Ratio(s)
NC HRL/AWWARF Typical Range MAX: 0.21

Source	Use
Use	Naturally-occurring cyanobacterial toxin

3-Model Categorical Prediction
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Status			
CCL 3: Yes	CCL 4 Universe: Yes	PCCL 4: Yes	Draft CCL 4: Yes

HEALTH EFFECTS DATA

Non-Cancer Data	Source	Value	Units	Date	Critical Effect	Notes
Reference Dose (RfD)	EPA OPP		mg/kg-d			
Reference Dose (RfD)	IRIS		mg/kg-d			
Reference Dose (RfD)	EPA HA		mg/kg-d			
Reference Dose (RfD)	RAIS HE		mg/kg-d			
Minimal Risk Level	ATSDR		mg/kg-d			
Acceptable Daily Intake (ADI)	JMPR		mg/kg-d			
Acceptable Daily Intake (ADI)	CEDI ADI		mg/kg-d			
Tolerable Daily Intake (TDI)	ITER		mg/kg-d			
Reference Dose (RfD)-like value	Primary Literature	0.000003	mg/kg-d	2006	Liver effects	Draft RfD; Basis NOAEL 3 ug/kg-d. Ueno, Y., Y. Makita, S. Nagata et al., 1999. No chronic oral toxicity of a low-dose of microcystin-LR, a cyanobacterial hepatotoxin, in female Balb/C mice. Environ. Toxicol. 14(1):45-55.
No Observed Effect Level (NOEL)	CTD JPN		mg/kg-d			
Lowest Observed Adverse Effect Level (LOAEL)	RTECS		mg/kg-d			
Lethal Dose 50 (LD50)	HSDB		mg/kg			
Lethal Dose 50 (LD50)	CTD JPN		mg/kg			
Lethal Dose 50 (LD50)	RTECS		mg/kg			

Cancer Data	Source	Value	Units	Date	Notes
Lifetime Cancer Risk (10 ⁻⁴)	EPA		mg/L		
Slope Factor (Oral)	OEHHA		(mg/kg-d) ⁻¹		
Slope Factor (Oral)	RAIS HE		(mg/kg-d) ⁻¹		
Cancer Classification ²	EPA				
Cancer Classification ²	IARC				

Other Supporting Data	Source	Value	Units	Notes
Is contaminant on list of carcinogens?				
Is the contaminant on a list of reproductive toxins?				
Drinking Water Equivalent Level (DWEL)	EPA HA		mg/L	

	Source	Male Rat	Female Rat	Male Mouse	Female Mouse
Cancer Classification ²	NTP				

Note: Highlighted data indicate value was used in attribute scoring. Blank fields indicate there were no data available.

¹ For the CCL process HRLs were calculated by converting the RfD or other dose to ug/L, assuming 2 L/day of water consumed by a 70 Kg adult, and a Relative Source Contribution of 20%. For carcinogens, the concentration at the 10⁻⁶ cancer risk was used.

² Cancer classifications were only used for screening. For potency scoring quantitative cancer risk data were used.

OCCURRENCE DATA

	Number of PWSs/Sites/Samples	Number of Detects	PWSs/Sites/Samples	Percent with Detects	Minimum Conc. (Detects)	Maximum Conc. (Detects)	Median Conc. (Detects)	90th Percentile (Detects)	99th Percentile (Detects)	Conc. Units	Date	Notes
Finished Water Data												
Unregulated Contaminant Monitoring Rule (UCMR 1)			PWS							ug/L	2001-2003	
Unregulated Contaminant Monitoring (UCM) Round 1			PWS							ug/L	1988-1992	
Unregulated Contaminant Monitoring (UCM) Round 2			PWS							ug/L	1993-1997	
National Inorganics and Radionuclide Survey (NIRS)			PWS							ug/L	1984-1986	

Ambient Water Data												
National Water-Quality Assessment Program (NAWQA)			Sites							ug/L	1992-2001	
National Reconnaissance of Emerging Contaminants (NREC)			Sites							ug/L	1999-2004	

Supplemental Water Data												
STorage and REtrieval (STORET)	30	30	Sites	100%	0	4.26	0.25	1.22	3.32	ug/L	Updated 2013	
US and Canadian drinking water (bloom area, source, finished water)	677	542	Sites	80%	0.002	1,200				ug/L		Maximum and minimum of detects (AWWARF, Carmichael). Includes possible outliers.
US and Canadian drinking water (bloom area, source, finished water)	677	542	Sites	80%		0.1				ug/L		Maximum of typical range of detects (AWWARF, Carmichael). Excludes possible outliers.

Application/Release Data	Amount Released	Units	Number of States	Units	Date
National Center for Food and Agricultural Policy (NCFAP) – Application		lbs/yr		States	1997
Toxics Release Inventory (TRI) – Surface Water		lbs/yr		States	2010
Toxics Release Inventory (TRI) – Total		lbs/yr		States	2010

Production	Amount Range	Units	Date
Chemical Update System/Inventory Update Reporting (CUS/IUR)		lbs/yr	2006

Note: Highlighted data indicate value was used in attribute scoring. Blank fields indicate there were no data available.

Other Supporting Data	Source	Value	Date
Estimated Environmental Concentration (EEC)	OPP		

Environmental Fate Parameters	Value	Units	Notes
Half Life		length of time	
Degradation Code			Degradation Code Not Available
Organic Carbon Partitioning Coefficient (Koc)		L/kg	
Log Octanol-water Partitioning Coefficient (Kow)		dimensionless	
Distribution Coefficient (Kd)		L/kg	
Henry's Law Coefficient		atm-m ³ /mol	
Solubility in Water		mg/L	
Modeled Percent in Water		%	

Contaminant:	Nonylphenol
Substance Key:	28410
Contaminant ID (CASRN):	25154523

Attribute Scores			
Potency	Severity	Prevalence	Magnitude
5	7	10	6

Health Reference Level (HRL)¹: 105 ug/L
Health Reference Level (HRL)¹ cancer: N/A

HRL/Concentration Ratio(s)
NC HRL/Kolpin Max: 2.6

Source	Use
HSDB	In the preparation of lubricating oil additives, resins, plasticizers, surface active agents; antioxidants for plastics and rubber

3-Model Categorical Prediction
L? - L

Status			
CCL 3: No	CCL 4 Universe: Yes	PCCL 4: Yes	Draft CCL 4: Yes

HEALTH EFFECTS DATA

Non-Cancer Data	Source	Value	Units	Date	Critical Effect	Notes
Reference Dose (RfD)	EPA OPP		mg/kg-d			
Reference Dose (RfD)	IRIS		mg/kg-d			
Reference Dose (RfD)	EPA HA		mg/kg-d			
Reference Dose (RfD)	RAIS HE		mg/kg-d			
Minimal Risk Level	ATSDR		mg/kg-d			
Acceptable Daily Intake (ADI)	JMPR		mg/kg-d			
Acceptable Daily Intake (ADI)	CEDI ADI		mg/kg-d			
Tolerable Daily Intake (TDI)	ITER		mg/kg-d			
No Observed Effect Level (NOEL)	CTD JPN	60	mg/kg-d			
No Observed Adverse Effect Level (NOAEL)	Supplemental	15	mg/kg-d	2004	Reproductive effects	World Health Organization (WHO)
Lowest Observed Adverse Effect Level (LOAEL)	RTECS	2	mg/kg-d	2001	Endocrine - androgenic, Reproductive - Paternal Effects - testes, epididymis, sperm duct	REPTED Reproductive Toxicology. (Pergamon Press Inc., Maxwell House, Fairview Park, Elmsford, NY 10523) V.1- 1987- Volume(issue)/page/year 15,293,2001
Lethal Dose 50 (LD50)	HSDB		mg/kg			
Lethal Dose 50 (LD50)	CTD JPN		mg/kg			
Lethal Dose 50 (LD50)	RTECS	580	mg/kg		Details of toxic effects not reported other than lethal dose value	NTIS National Technical Information Service. (Springfield, VA 22161) Formerly U.S. Clearinghouse for Scientific & Technical Information. Volume(issue)/page/year OTS0573098

Cancer Data	Source	Value	Units	Date	Notes
Lifetime Cancer Risk (10 ⁻⁴)	EPA		mg/L		
Slope Factor (Oral)	OEHHA		(mg/kg-d) ⁻¹		
Slope Factor (Oral)	RAIS HE		(mg/kg-d) ⁻¹		
Cancer Classification ²	EPA				
Cancer Classification ²	IARC				

Other Supporting Data	Source	Value	Units	Notes
Is contaminant on list of carcinogens?				
Is the contaminant on a list of reproductive toxins?				
Drinking Water Equivalent Level (DWEL)	EPA HA		mg/L	

	Source	Male Rat	Female Rat	Male Mouse	Female Mouse
Cancer Classification ²	NTP				

Note: Highlighted data indicate value was used in attribute scoring. Blank fields indicate there were no data available.

¹ For the CCL process HRLs were calculated by converting the RfD or other dose to ug/L, assuming 2 L/day of water consumed by a 70 Kg adult, and a Relative Source Contribution of 20%. For carcinogens, the concentration at the 10⁻⁶ cancer risk was used.

² Cancer classifications were only used for screening. For potency scoring quantitative cancer risk data were used.

OCCURRENCE DATA

	Number of PWSs/Sites/Samples	Number of Detects	PWSs/Sites/Samples	Percent with Detects	Minimum Conc. (Detects)	Maximum Conc. (Detects)	Median Conc. (Detects)	90th Percentile (Detects)	99th Percentile (Detects)	Conc. Units	Date	Notes
Finished Water Data												
Unregulated Contaminant Monitoring Rule (UCMR 1)			PWS							ug/L	2001-2003	
Unregulated Contaminant Monitoring (UCM) Round 1			PWS							ug/L	1988-1992	
Unregulated Contaminant Monitoring (UCM) Round 2			PWS							ug/L	1993-1997	
National Inorganics and Radionuclide Survey (NIRS)			PWS							ug/L	1984-1986	

Ambient Water Data												
National Water-Quality Assessment Program (NAWQA)			Sites							ug/L	1992-2001	
National Reconnaissance of Emerging Contaminants (NREC)			Sites							ug/L	1999-2004	

Supplemental Water Data												
Kolpin et al., 2002	85	43	Sites	50.6%		40	0.8			ug/L	1999-2000	National Surface Water Reconnaissance; Kolpin, et al., 2002. Env. Sci. & Technol., 36(6), pp. 1202-1211.
STORage and RETrieval (STORET)	15	5	Sites	33.33%	3.26	5.17	3.74	4.52	5.11	ug/L	Updated 2013	
Snyder, 2008	20		Samples	17%		0.104	0.084			ug/L		Finished Drinking Water Monitoring; Snyder, Shane A. 2008. Ozone: Science and Engineering, 30(1): 65-69.

Application/Release Data	Amount Released	Units	Number of States	Units	Date
National Center for Food and Agricultural Policy (NCFAP) – Application		lbs/yr		States	1997
Toxics Release Inventory (TRI) – Surface Water		lbs/yr		States	2010
Toxics Release Inventory (TRI) – Total		lbs/yr		States	2010

Production	Amount Range	Units	Date
Chemical Update System/Inventory Update Reporting (CUS/IUR)	< 500K	lbs/yr	2006

Note: Highlighted data indicate value was used in attribute scoring. Blank fields indicate there were no data available.

Other Supporting Data	Source	Value	Date
Estimated Environmental Concentration (EEC)	OPP		

Environmental Fate Parameters	Value	Units	Notes
Half Life		days	
Degradation Code	BST		BST = biodegrades sometimes/recalcitrant; aerobic only
Organic Carbon Partitioning Coefficient (Koc)	31,000	L/kg	
Log Octanol-water Partitioning Coefficient (Kow)	5.71	dimensionless	At 20 degrees Celsius
Distribution Coefficient (Kd)		L/kg	
Henry's Law Coefficient	1.1E-06	atm-m ³ /mol	
Solubility in Water	6.35	mg/L	At 25 degrees Celsius
Modeled Percent in Water	18	%	

Contaminant:	Perfluorooctanoic acid (PFOA)
Substance Key:	6614
Contaminant ID (CASRN):	335671

EPA-OGWDW

Attribute Scores			
Potency	Severity	Prevalence	Magnitude
6	3	10	6

Health Reference Level (HRL)¹: 1.1 ug/L
Health Reference Level (HRL)¹ cancer: N/A

HRL/Concentration Ratio(s)
NC HRL/MN MW MAX: 1.22

Source	Use
HSDB	Production of fluoropolymers (e.g., Teflon) and fluoroelastomers; in fire-fighting applications, cosmetics, greases and lubricants, paints, polishes and adhesives

3-Model Categorical Prediction
L?

Status			
CCL 3: Yes	CCL 4 Universe: Yes	PCCL 4: Yes	Draft CCL 4: Yes

HEALTH EFFECTS DATA

Non-Cancer Data	Source	Value	Units	Date	Critical Effect	Notes
Reference Dose (RfD)	EPA OPP		mg/kg-d			
Reference Dose (RfD)	IRIS		mg/kg-d			
Reference Dose (RfD)	EPA HA		mg/kg-d			
Reference Dose (RfD)	RAIS HE		mg/kg-d			
Minimal Risk Level	ATSDR		mg/kg-d			
Acceptable Daily Intake (ADI)	JMPR		mg/kg-d			
Acceptable Daily Intake (ADI)	CEDI ADI		mg/kg-d			
Tolerable Daily Intake (TDI)	ITER		mg/kg-d			
No Observed Effect Level (NOEL)	CTD JPN		mg/kg-d			
Lowest Observed Adverse Effect Level (LOAEL)	RTECS		mg/kg-d			
Lowest Observed Adverse Effect Level (LOAEL)	Supplemental	0.46	mg/kg-d	2006	Increased maternal liver weight at term	BMDL10, Lau, 2006. Tox. Sci., 90, 2, pp. 510-518. EPA Provisional HA: http://www.epa.gov/waterscience/criteria/drinking/pha-PFOA_PFOS.pdf
Lethal Dose 50 (LD50)	HSDB		mg/kg			
Lethal Dose 50 (LD50)	CTD JPN		mg/kg			
Lethal Dose 50 (LD50)	RTECS		mg/kg			

Cancer Data	Source	Value	Units	Date	Notes
Lifetime Cancer Risk (10 ⁻⁴)	EPA		mg/L		
Slope Factor (Oral)	OEHHA		(mg/kg-d) ⁻¹		
Slope Factor (Oral)	RAIS HE		(mg/kg-d) ⁻¹		
Cancer Classification ²	EPA				
Cancer Classification ²	IARC				

Other Supporting Data	Source	Value	Units	Notes
Is contaminant on list of carcinogens?				
Is the contaminant on a list of reproductive toxins?				
Drinking Water Equivalent Level (DWEL)	EPA HA		mg/L	
Health Advisory (HA)	EPA HA	0.4	ug/L	January 2008; Provisional Health Advisory: http://www.epa.gov/waterscience/criteria/drinking/pha-PFOA_PFOS.pdf

	Source	Male Rat	Female Rat	Male Mouse	Female Mouse
Cancer Classification ²	NTP				

Note: Highlighted data indicate value was used in attribute scoring. Blank fields indicate there were no data available.

¹ For the CCL process HRLs were calculated by converting the RfD or other dose to ug/L, assuming 2 L/day of water consumed by a 70 Kg adult, and a Relative Source Contribution of 20%. For carcinogens, the concentration at the 10⁻⁶ cancer risk was used.

² Cancer classifications were only used for screening. For potency scoring quantitative cancer risk data were used.

OCCURRENCE DATA

	Number of PWSs/Sites/Samples	Number of Detects	PWSs/Sites/Samples	Percent with Detects	Minimum Conc. (Detects)	Maximum Conc. (Detects)	Median Conc. (Detects)	90th Percentile (Detects)	99th Percentile (Detects)	Conc. Units	Date	Notes
Finished Water Data												
Unregulated Contaminant Monitoring Rule (UCMR 1)			PWS							ug/L	2001-2003	
Unregulated Contaminant Monitoring (UCM) Round 1			PWS							ug/L	1988-1992	
Unregulated Contaminant Monitoring (UCM) Round 2			PWS							ug/L	1993-1997	
National Inorganics and Radionuclide Survey (NIRS)			PWS							ug/L	1984-1986	

Ambient Water Data												
National Water-Quality Assessment Program (NAWQA)			Sites							ug/L	1992-2001	
National Reconnaissance of Emerging Contaminants (NREC)			Sites							ug/L	1999-2004	

Supplemental Water Data												
STorage and RETrieval (STORET)	318	232	Sites	72.96%	0.000988	48,500	0.144	47.7	1,304	ug/L	Updated 2013	
Minnesota (MN) Department of Health (DOH) – Aggregate of MN Wells	85	7	Sites	8.2%		0.9				ug/L		Targeted Sampling 2004-2005 - H. Goeden and J. Kelly. Perfluorochemicals in Minnesota, MN DOH, 2/27/06.
Minnesota (MN) Department of Health (DOH) – Select MN Municipal Wells	37	6	Sites	16.2%		0.9				ug/L		Targeted Sampling 2004-2005 - H. Goeden and J. Kelly. Perfluorochemicals in Minnesota, MN DOH, 2/27/06.
Minnesota (MN) Department of Health (DOH) – Select MN Non-Community Wells	22	0	Sites	0%						ug/L		Targeted Sampling 2004-2005 - H. Goeden and J. Kelly. Perfluorochemicals in Minnesota, MN DOH, 2/27/06.
Minnesota (MN) Department of Health (DOH) – Select MN Private Wells	26	1	Sites	3.9%		0.67				ug/L		Targeted Sampling 2004-2005 - H. Goeden and J. Kelly. Perfluorochemicals in Minnesota, MN DOH, 2/27/06.
Little Hocking, OH Municipal Wells (FW)			N/A		1.5	7.2				ug/L		Emmett, et al., 2006. J. Occ. Env. Med. Little Hocking, OH; data from 2002-2005; no data on # PWSs/sites sampled
NJDEP	23	18	Sites	78.3%	<0.004	0.039				ug/L		Targeted study "Determination of Perfluorooctanoic Acid (PFOA) in Aqueous Samples, Final Report." Jan 2007, NJDEP, Division of Water Supply.
Cape Fear Drainage Basin	80		Sites	82.3%		0.287	0.0126			ug/L	2006	Nakayama et al. 2007. Perfluorinated Compounds in the Cape Fear Drainage Basin in N.C. Env. Sci. & Tech., 41, 5271–5276.
Upper Mississippi Drainage Basin	175	168	Sites	97.1%		0.125	0.00207			ug/L	2008	Nakayama et al. 2010. Determination of Perfluorinated Compounds in the Upper Mississippi River Basin. Env. Sci. & Tech., 44, pp. 4103–4109.
Tennessee River, Alabama	40	18	Sites	45%	0.14	0.598	0.379			ug/L		Targeted sampling - 35 river miles downstream of PFC manufacturing facility. Hansen et al. 2002. Quantitative Characterization of Trace Levels of PFOS and PFOA in the Tennessee River. Env. Sci. & Tech., 36, pp. 1681-1685
U.S. PWS Study	6		Sites		<0.005	0.12				ug/L		Quinones, O. and S.A. Snyder. 2009. Occurrence of perfluoroalkyl carboxylates and sulfonates in drinking water utilities and related waters from the United States. Env. Sci. & Tech., 43, pp. 9089-9095.
Lake Erie and Lake Ontario	16	16	Sites	100%	0.015	0.07	0.04			ug/L	2003	Boulangier et al. 2004. Detection of Perfluorooctane Surfactants in Great Lakes Water. Env. Sci. & Tech., 38, pp. 4064-4070.

Application/Release Data	Amount Released	Units	Number of States	Units	Date
National Center for Food and Agricultural Policy (NCFAP) – Application		lbs/yr		States	1997
Toxics Release Inventory (TRI) – Surface Water		lbs/yr		States	2010
Toxics Release Inventory (TRI) – Total		lbs/yr		States	2010

Production	Amount Range	Units	Date
Chemical Update System/Inventory Update Reporting (CUS/IUR)	< 500K	lbs/yr	2006

Note: Highlighted data indicate value was used in attribute scoring. Blank fields indicate there were no data available.

Other Supporting Data	Source	Value	Date
Estimated Environmental Concentration (EEC)	OPP		

Environmental Fate Parameters	Value	Units	Notes
Half Life		length of time	
Degradation Code	BST		BST = Biodegrades sometimes/recalcitrant (PBT); BST is the highest category available to be awarded to a recalcitrant contaminant
Organic Carbon Partitioning Coefficient (Koc)	631 ± 7.9	L/kg	Zareitalabad, et al., 2013
Log Octanol-water Partitioning Coefficient (Kow)		dimensionless	
Distribution Coefficient (Kd)		L/kg	
Henry's Law Coefficient	0.091	atm·m ³ /mol	
Solubility in Water		mg/L	
Modeled Percent in Water	10	%	

Contaminant:	Permethrin
Substance Key:	35815
Contaminant ID (CASRN):	52645531

Attribute Scores			
Potency	Severity	Prevalence	Magnitude
4	8	10	7

Health Reference Level (HRL): 1,750 ug/L			
Health Reference Level (HRL)¹ cancer: 3.65 ug/L			
HRL/Concentration Ratio(s)			
NC HRL/SWC EEC: 1,944			
CAR HRL/SWC EEC: 4.05			
Status			
CCL 3: Yes	CCL 4 Universe: Yes	PCCL 4: Yes	Draft CCL 4: Yes

Source	Use
HSDB	Insecticide

3-Model Categorical Prediction
L? - L

HEALTH EFFECTS DATA

Non-Cancer Data	Source	Value	Units	Date	Critical Effect	Notes
Reference Dose (RfD)	EPA OPP	0.25	mg/kg-d	2009	Neurotox/Clinical signs (i.e., aggression, abnormal and/or decreased movement) and increased body temperature. Q1* 0.0096 (mg/kg-d)-1. See CAR	Basis NOAEL = 25 mg/kg-d, UF = 100 (rat study)
Reference Dose (RfD)	IRIS	0.05	mg/kg-d	1986	Increased liver weight	Basis = NOEL 5 mg/kg-d; UF = 100.
Reference Dose (RfD)	EPA HA		mg/kg-d			
Reference Dose (RfD)	RAIS HE	0.05	mg/kg-d	1986		
Minimal Risk Level	ATSDR	0.2	mg/kg-d	2003	Neurol.	Minimal Risk Level - Intermediate Exposure Duration
Acceptable Daily Intake (ADI)	JMPR	0.05	mg/kg-d	1999		
Acceptable Daily Intake (ADI)	CEDI ADI		mg/kg-d			
Tolerable Daily Intake (TDI)	ITER		mg/kg-d			
No Observed Effect Level (NOEL)	CTD JPN		mg/kg-d			
Lowest Observed Adverse Effect Level (LOAEL)	RTECS		mg/kg-d			
Lethal Dose 50 (LD50)	HSDB		mg/kg			
Lethal Dose 50 (LD50)	CTD JPN		mg/kg			
Lethal Dose 50 (LD50)	RTECS		mg/kg			

Cancer Data	Source	Value	Units	Date	Notes
Lifetime Cancer Risk (10 ⁻⁴)	EPA		mg/L		
Slope Factor (Oral)	EPA OPP	0.0096	(mg/kg-d) ⁻¹	2009	
Slope Factor (Oral)	OEHHA		(mg/kg-d) ⁻¹		
Slope Factor (Oral)	RAIS HE		(mg/kg-d) ⁻¹		
Cancer Classification ²	EPA OPP	Likely		2009	
Cancer Classification ²	IARC	3		1991	

Other Supporting Data	Source	Value	Units	Notes
Is contaminant on list of carcinogens?	EPA; IARC	Yes		
Is the contaminant on a list of reproductive toxins?				
Drinking Water Equivalent Level (DWEL)	EPA HA		mg/L	

	Source	Male Rat	Female Rat	Male Mouse	Female Mouse
Cancer Classification ²	NTP				

Note: Highlighted data indicate value was used in attribute scoring. Blank fields indicate there were no data available.

¹ For the CCL process HRLs were calculated by converting the RfD or other dose to ug/L, assuming 2 L/day of water consumed by a 70 Kg adult, and a Relative Source Contribution of 20%. For carcinogens, the concentration at the 10⁻⁶ cancer risk was used.

² Cancer classifications were only used for screening. For potency scoring quantitative cancer risk data were used.

OCCURRENCE DATA

	Number of PWSs/Sites/Samples	Number of Detects	PWSs/Sites/Samples	Percent with Detects	Minimum Conc. (Detects)	Maximum Conc. (Detects)	Median Conc. (Detects)	90th Percentile (Detects)	99th Percentile (Detects)	Conc. Units	Date	Notes
Finished Water Data												
Unregulated Contaminant Monitoring Rule (UCMR 1)			PWS							ug/L	2001-2003	
Unregulated Contaminant Monitoring (UCM) Round 1			PWS							ug/L	1988-1992	
Unregulated Contaminant Monitoring (UCM) Round 2			PWS							ug/L	1993-1997	
National Inorganics and Radionuclide Survey (NIRS)			PWS							ug/L	1984-1986	

Ambient Water Data												
National Water-Quality Assessment Program (NAWQA)			Sites							ug/L	1992-2001	
National Reconnaissance of Emerging Contaminants (NREC)			Sites							ug/L	1999-2004	

Supplemental Water Data												
California Drinking Water Monitoring Data	35	0	PWS	0%						ug/L	1995-2007	
USGS/California Groundwater Ambient Monitoring and Assessment (GAMA) Program	1,828	0	Sites	0%						ug/L	2004-2011	
STORage and RETrieval (STORET)	722	1	Sites	0.14%	0.348	0.348	0.348	0.348	0.348	ug/L	Updated 2013	

Application/Release Data	Amount Released	Units	Number of States	Units	Date
National Center for Food and Agricultural Policy (NCFAP) – Application	1,066,056	lbs/yr	48	States	1997
Toxics Release Inventory (TRI) – Surface Water	0	lbs/yr	0	States	2010
Toxics Release Inventory (TRI) – Total	2,116	lbs/yr	5	States	2010

Production	Amount Range	Units	Date
Chemical Update System/Inventory Update Reporting (CUS/IUR)		lbs/yr	2006

Note: Highlighted data indicate value was used in attribute scoring. Blank fields indicate there were no data available.

Other Supporting Data	Source	Value	Date
Estimated Environmental Concentration (EEC)	OPP	SW Chronic = 0.9 ug/L; GW Chronic = 0 ug/L	
Environmental Fate Parameters		Value	Units
Half Life		length of time	
Degradation Code	BF/BST		BF = Biodegrades fast; BST = Biodegrades sometimes/recalcitrant
Organic Carbon Partitioning Coefficient (Koc)	178,000	L/kg	
Log Octanol-water Partitioning Coefficient (Kow)	6.5	dimensionless	
Distribution Coefficient (Kd)		L/kg	
Henry's Law Coefficient	1.87E-06	atm-m ³ /mol	
Solubility in Water	0.006	mg/L	
Modeled Percent in Water	6	%	

Contaminant:	Azinphos-methyl
Substance Key:	3200
Contaminant ID (CASRN):	86500

Attribute Scores			
Potency	Severity	Prevalence	Magnitude
6	3	8	3

Health Reference Level (HRL)¹: 10.5 ug/L			
Health Reference Level (HRL)¹ cancer: N/A			
HRL/Concentration Ratio(s)			
NC HRL/NAWQA 90%: 69.5			
Status			
CCL 3: No	CCL 4 Universe: Yes	PCCL 4: Yes	Draft CCL 4: No

Source	Use
HSDB	Insecticide

3-Model Categorical Prediction
NL?

HEALTH EFFECTS DATA

Non-Cancer Data	Source	Value	Units	Date	Critical Effect	Notes
Reference Dose (RfD)	EPA OPP	0.0015	mg/kg-d	2006	Red blood cell cholinesterase inhibition; increased incidence of diarrhea	Basis NOAEL = 0.149 mg/kg-d; UF = 100 (dog study)
Reference Dose (RfD)	IRIS		mg/kg-d			
Reference Dose (RfD)	EPA HA		mg/kg-d			
Reference Dose (RfD)	RAIS HE		mg/kg-d			
Minimal Risk Level	ATSDR		mg/kg-d			
Acceptable Daily Intake (ADI)	JMPR	0.005	mg/kg-d	1991		
Acceptable Daily Intake (ADI)	CEDI ADI		mg/kg-d			
Tolerable Daily Intake (TDI)	ITER		mg/kg-d			
No Observed Effect Level (NOEL)	CTD JPN		mg/kg-d			
Lowest Observed Adverse Effect Level (LOAEL)	RTECS	0.91	mg/kg-d	1997	Brain and Coverings - other degenerative changes, Blood - other changes, Biochemical - Enzyme inhibition, induction, or change in blood or tissue levels - true cholinesterase	FAATDF Fundamental and Applied Toxicology. (Academic Press, Inc., 1 E. First St., Duluth, MN 55802) V.1-40, 1981-97. For publisher information, see TOSCF2 Volume(issue)/page/year 35,101,1997; 13-wk rat study
Lethal Dose 50 (LD50)	HSDB		mg/kg			
Lethal Dose 50 (LD50)	CTD JPN		mg/kg			
Lethal Dose 50 (LD50)	RTECS		mg/kg			

Cancer Data	Source	Value	Units	Date	Notes
Lifetime Cancer Risk (10 ⁻⁴)	EPA		mg/L		
Slope Factor (Oral)	OEHHA		(mg/kg-d) ⁻¹		
Slope Factor (Oral)	RAIS HE		(mg/kg-d) ⁻¹		
Cancer Classification ²	EPA OPP	Not likely		2006	
Cancer Classification ²	IARC				

Other Supporting Data	Source	Value	Units	Notes
Is contaminant on list of carcinogens?				
Is the contaminant on a list of reproductive toxins?	UMD	Yes		
Drinking Water Equivalent Level (DWEL)	EPA HA		mg/L	
Maximum Acceptable Concentration (MAC)	CADW	0.2	mg/L	Canadian Drinking Water Maximum Acceptable Concentration

	Source	Male Rat	Female Rat	Male Mouse	Female Mouse
Cancer Classification ²	NTP	Equivocal	Negative	Negative	Negative

Note: Highlighted data indicate value was used in attribute scoring. Blank fields indicate there were no data available.

¹ For the CCL process HRLs were calculated by converting the RfD or other dose to ug/L, assuming 2 L/day of water consumed by a 70 Kg adult, and a Relative Source Contribution of 20%. For carcinogens, the concentration at the 10⁻⁶ cancer risk was used.

² Cancer classifications were only used for screening. For potency scoring quantitative cancer risk data were used.

OCCURRENCE DATA

	Number of PWSs/Sites/Samples	Number of Detects	PWSs/Sites/Samples	Percent with Detects	Minimum Conc. (Detects)	Maximum Conc. (Detects)	Median Conc. (Detects)	90th Percentile (Detects)	99th Percentile (Detects)	Conc. Units	Date	Notes
Finished Water Data												
Unregulated Contaminant Monitoring Rule (UCMR 1)			PWS							ug/L	2001-2003	
Unregulated Contaminant Monitoring (UCM) Round 1			PWS							ug/L	1988-1992	
Unregulated Contaminant Monitoring (UCM) Round 2			PWS							ug/L	1993-1997	
National Inorganics and Radionuclide Survey (NIRS)			PWS							ug/L	1984-1986	

Ambient Water Data												
National Water-Quality Assessment Program (NAWQA)	7,103	145	Sites	2.04%	0.002	3.37	0.027	0.151	0.932	ug/L	1992-2001	
National Reconnaissance of Emerging Contaminants (NREC)			Sites							ug/L	1999-2004	

Supplemental Water Data												
California Department of Health Services	12	0	PWS	0%						ug/L		Drinking water monitoring
Pesticide Data Program (PDP)	11	2	Sites	18.2%	0.017	0.017	0.017	0.017	0.017	ug/L	2003-2009	Finished
Pesticide Data Program (PDP)	5	0	Sites	0%						ug/L	2003-2009	Raw
Pesticide Pilot Monitoring Program (PMP)	323	8	Samples	2.5%		0.144				ug/L	1999	Ambient Water; Method 2001 (GC/MS)
Pesticide Pilot Monitoring Program (PMP)	228	5	Samples	2.2%		0.114				ug/L	1999	Finished Water; Method 2001 (GC/MS)
Toccalino et al., 2010	894	0	Samples	0%						ug/L	1993-2007	Ground water; Source Water; Toccalino et al., 2010, Quality of source water from public-supply wells in the United States, 1993-2007: USGS Sci. Investigations Report 2010-5024, p. 206
California Drinking Water Monitoring Data	5	0	PWS	0%						ug/L	1995-2007	
USGS/California Groundwater Ambient Monitoring and Assessment (GAMA) Program	1,828	0	Sites	0%						ug/L	2004-2011	
STORage and RETrieval (STORET)	831	24	Sites	2.9%	0	0.864	0.048	0.196	0.649	ug/L	Updated 2013	

Application/Release Data	Amount Released	Units	Number of States	Units	Date
National Center for Food and Agricultural Policy (NCFAP) – Application	2,091,014	lbs/yr	42	States	1997
Toxics Release Inventory (TRI) – Surface Water		lbs/yr		States	2010
Toxics Release Inventory (TRI) – Total		lbs/yr		States	2010

Production	Amount Range	Units	Date
Chemical Update System/Inventory Update Reporting (CUS/IUR)		lbs/yr	2006

Note: Highlighted data indicate value was used in attribute scoring. Blank fields indicate there were no data available.

Other Supporting Data	Source	Value	Date
Estimated Environmental Concentration (EEC)	OPP		
Environmental Fate Parameters		Value	Units
Half Life	27.9	days	
Degradation Code	DS		DS = Degrades slow (HSDB)
Organic Carbon Partitioning Coefficient (Koc)	487-4,644	L/kg	
Log Octanol-water Partitioning Coefficient (Kow)	2.75	dimensionless	
Distribution Coefficient (Kd)		L/kg	
Henry's Law Coefficient	2.4E-08	atm-m ³ /mol	
Solubility in Water	20.9	mg/L	
Modeled Percent in Water	27	%	

Contaminant:	Bentazon
Substance Key:	28242
Contaminant ID (CASRN):	25057890

Attribute Scores			
Potency	Severity	Prevalence	Magnitude
5	6	9	4

Health Reference Level (HRL)¹: 210 ug/L
Health Reference Level (HRL)¹ cancer: N/A

HRL/Concentration Ratio(s)
NC HRL/NAWQA 90%: 276

Source	Use
HSDB	Former herbicide

3-Model Categorical Prediction
L?

Status			
CCL 3: No	CCL 4 Universe: Yes	PCCL 4: Yes	Draft CCL 4: No

HEALTH EFFECTS DATA

Non-Cancer Data	Source	Value	Units	Date	Critical Effect	Notes
Reference Dose (RfD)	EPA OPP	0.03	mg/kg-d	1994	Hematological changes suggestive of anemia, decreased weight gain, intestinal inflammation, and congestion of the small intestine and spleen (dog study)	UF = 100; Basis NOAEL = 3.2 mg/kg-day
Reference Dose (RfD)	IRIS	0.03	mg/kg-d	1998	Blood loss into the gastrointestinal tract; Coagulation defect in male & female dogs. Circulatory system.	Allen et al., 1989. Dog study; UF = 100, Basis NOAEL 3.2 mg/kg-d
Reference Dose (RfD)	EPA HA	0.03	mg/kg-d	1999		
Reference Dose (RfD)	RAIS HE	0.03	mg/kg-d	1989	blood loss in gastrointestinal tract; coagulation defect	UF = 100; dog study
Minimal Risk Level	ATSDR		mg/kg-d			
Acceptable Daily Intake (ADI)	JMPR	0.1	mg/kg-d	1998		
Acceptable Daily Intake (ADI)	CEDI ADI		mg/kg-d			
Tolerable Daily Intake (TDI)	ITER		mg/kg-d			
No Observed Effect Level (NOEL)	CTD JPN		mg/kg-d			
Lowest Observed Adverse Effect Level (LOAEL)	RTECS		mg/kg-d			
Lethal Dose 50 (LD50)	HSDB		mg/kg			
Lethal Dose 50 (LD50)	CTD JPN		mg/kg			
Lethal Dose 50 (LD50)	RTECS		mg/kg			

Cancer Data	Source	Value	Units	Date	Notes
Lifetime Cancer Risk (10 ⁻⁴)	EPA		mg/L		
Slope Factor (Oral)	OEHHA		(mg/kg-d) ⁻¹		
Slope Factor (Oral)	RAIS HE		(mg/kg-d) ⁻¹		
Cancer Classification ²	EPA IRIS	E		1998	
Cancer Classification ²	EPA OPP	E		1994	
Cancer Classification ²	IARC				
	Source	Male Rat	Female Rat	Male Mouse	Female Mouse
Cancer Classification ²	NTP				

Other Supporting Data	Source	Value	Units	Notes
Is contaminant on list of carcinogens?				
Is the contaminant on a list of reproductive toxins?				
Drinking Water Equivalent Level (DWEL)	EPA HA		mg/L	
Guideline Value (GV)	WHODWQ	300	ug/L	World Health Organization Drinking Water Guideline Value

Note: Highlighted data indicate value was used in attribute scoring. Blank fields indicate there were no data available.

¹ For the CCL process HRLs were calculated by converting the RfD or other dose to ug/L, assuming 2 L/day of water consumed by a 70 Kg adult, and a Relative Source Contribution of 20%. For carcinogens, the concentration at the 10⁻⁶ cancer risk was used.

² Cancer classifications were only used for screening. For potency scoring quantitative cancer risk data were used.

OCCURRENCE DATA

	Number of PWSs/Sites/Samples	Number of Detects	PWSs/Sites/Samples	Percent with Detects	Minimum Conc. (Detects)	Maximum Conc. (Detects)	Median Conc. (Detects)	90th Percentile (Detects)	99th Percentile (Detects)	Conc. Units	Date	Notes
Finished Water Data												
Unregulated Contaminant Monitoring Rule (UCMR 1)			PWS							ug/L	2001-2003	
Unregulated Contaminant Monitoring (UCM) Round 1			PWS							ug/L	1988-1992	
Unregulated Contaminant Monitoring (UCM) Round 2			PWS							ug/L	1993-1997	
National Inorganics and Radionuclide Survey (NIRS)			PWS							ug/L	1984-1986	
Ambient Water Data												
National Water-Quality Assessment Program (NAWQA)	4,540	197	Sites	4.34%	0.002	11.46	0.1	0.76	4.79	ug/L	1992-2001	
National Reconnaissance of Emerging Contaminants (NREC)			Sites							ug/L	1999-2004	
Supplemental Water Data												
California Department of Health Services	5,583	2	PWS	0.04%	0.23	6.2	3.11	5.58		ug/L		Drinking water monitoring
Pesticide Data Program (PDP)	13	7	Sites	53.8%	0.0003	0.031	0.0016	0.00712	0.016	ug/L	2003-2009	Finished
Pesticide Data Program (PDP)	7	5	Sites	71.4%	0.0003	0.194	0.0017	0.012	0.061	ug/L	2003-2009	Raw
Toccalino et al., 2010	589	16	Samples	2.7%	0.0046	0.491	0.00995	0.0711	0.434	ug/L	1993-2007	Ground water; Source Water; Toccalino et al., 2010, Quality of source water from public-supply wells in the United States, 1993-2007: USGS Sci. Investigations Report 2010-5024, p. 206
California Drinking Water Monitoring Data	1,807	6	PWS	0.3%	0.023	6.2	2.9	5.24	6.1	ug/L	1995-2007	
Illinois Drinking Water Monitoring Data	1	0	PWS	0%						ug/L	1998-2005	
STORage and RETrieval (STORET)	694	75	Sites	10.81%	0	16	0.191	2.13	12.4	ug/L	Updated 2013	
	Number	Number of Detects	PWSs/Sites/Samples	Percent with Detects	Minimum Conc. (Detects)	Maximum Conc. (Detects)	Median Conc. (Detects)	75th Percentile (Detects)	95th Percentile (Detects)	Conc. Units	Date	Notes
Pesticide Pilot Monitoring Program (PMP)	225	21	Samples	9.3%		0.019			0.019	ug/L	1999	Finished Water; Method 9060 (HPLC/MS)
Pesticide Pilot Monitoring Program (PMP)	312	80	Samples	25.6%		0.344			0.021	ug/L	1999	Ambient Water; Method 9060 (HPLC/MS)

Application/Release Data	Amount Released	Units	Number of States	Units	Date
National Center for Food and Agricultural Policy (NCFAP) – Application	7,749,130	lbs/yr	45	States	1997
Toxics Release Inventory (TRI) – Surface Water		lbs/yr		States	2010
Toxics Release Inventory (TRI) – Total		lbs/yr		States	2010

Production	Amount Range	Units	Date
Chemical Update System/Inventory Update Reporting (CUS/IUR)		lbs/yr	2006

Note: Highlighted data indicate value was used in attribute scoring. Blank fields indicate there were no data available.

Other Supporting Data	Source	Value	Date
Estimated Environmental Concentration (EEC)	OPP		
Environmental Fate Parameters		Value	Units
Half Life	6.7-50	days	
Degradation Code	BS		BS = Biodegrades slow (HSDB)
Organic Carbon Partitioning Coefficient (Koc)	37.5	L/kg	
Log Octanol-water Partitioning Coefficient (Kow)	2.34	dimensionless	
Distribution Coefficient (Kd)		L/kg	
Henry's Law Coefficient	2.18E-09	atm-m ³ /mol	
Solubility in Water	500	mg/L	
Modeled Percent in Water	36	%	

Contaminant:	Bisphenol A
Substance Key:	2918
Contaminant ID (CASRN):	80057

Attribute Scores			
Potency	Severity	Prevalence	Magnitude
4	3	10	5

Health Reference Level (HRL)¹: 350 ug/L
Health Reference Level (HRL)¹ cancer: N/A

HRL/Concentration Ratio(s)
NC HRL/NREC NA SW MED: 1,750

Source	Use
HSDB	Production of polycarbonate and epoxy resins. Formerly used as fungicide.

3-Model Categorical Prediction
NL?

Status			
CCL 3: No	CCL 4 Universe: Yes	PCCL 4: Yes	Draft CCL 4: No

HEALTH EFFECTS DATA

Non-Cancer Data	Source	Value	Units	Date	Critical Effect	Notes
Reference Dose (RfD)	EPA OPP		mg/kg-d			
Reference Dose (RfD)	IRIS	0.05	mg/kg-d	1988	Reduced body weight	Basis = LOAEL 50 mg/kg-d; UF = 1,000
Reference Dose (RfD)	EPA HA		mg/kg-d			
Reference Dose (RfD)	RAIS HE	0.05	mg/kg-d	1988		
Minimal Risk Level	ATSDR		mg/kg-d			
Acceptable Daily Intake (ADI)	JMPR		mg/kg-d			
Acceptable Daily Intake (ADI)	CEDI ADI		mg/kg-d			
Tolerable Daily Intake (TDI)	ITER		mg/kg-d			
No Observed Effect Level (NOEL)	CTD JPN		mg/kg-d			
No Observed Adverse Effect Level (NOAEL)	Supplemental	0.0006	mg/kg-d	2011	Increase in adjusted terminal end bud (TEB) numbers in the offspring of mice for LOAEL related to NOAEL	LOAEL = 0.003 mg/kg-d. Ayyanan, A., Laribi, O., Schuepbach-Mallepell, S. et al. 2011. Perinatal exposure to bisphenol A increases adult mammary gland progesterone response and cell number. Mol. Endocrinol. 25(11): 1915-1923.
Lowest Observed Adverse Effect Level (LOAEL)	RTECS	2.5	mg/kg-d			26-week oral study in rat. GISAAA Gigena i Sanitariya. For English translation, see HYSAAV. (V/O Mezhdunarodnaya Kniga, 113095 Moscow, USSR) V.1- 1936 - Volume(issue)/page/year 33(7), 25, 1968.
Lethal Dose 50 (LD50)	HSDB		mg/kg			
Lethal Dose 50 (LD50)	CTD JPN		mg/kg			
Lethal Dose 50 (LD50)	RTECS		mg/kg			

Cancer Data	Source	Value	Units	Date	Notes
Lifetime Cancer Risk (10 ⁻⁴)	EPA		mg/L		
Slope Factor (Oral)	OEHHA		(mg/kg-d) ⁻¹		
Slope Factor (Oral)	RAIS HE		(mg/kg-d) ⁻¹		
Cancer Classification ²	EPA				
Cancer Classification ²	IARC				

Other Supporting Data	Source	Value	Units	Notes
Is contaminant on list of carcinogens?				
Is the contaminant on a list of reproductive toxins?	UMD	Yes		
Drinking Water Equivalent Level (DWEL)	EPA HA		mg/L	

	Source	Male Rat	Female Rat	Male Mouse	Female Mouse
Cancer Classification ²	NTP	Equivocal	Equivocal	Equivocal	Negative

Note: Highlighted data indicate value was used in attribute scoring. Blank fields indicate there were no data available.

¹ For the CCL process HRLs were calculated by converting the RfD or other dose to ug/L, assuming 2 L/day of water consumed by a 70 Kg adult, and a Relative Source Contribution of 20%. For carcinogens, the concentration at the 10⁻⁶ cancer risk was used.

² Cancer classifications were only used for screening. For potency scoring quantitative cancer risk data were used.

OCCURRENCE DATA

	Number of PWSs/Sites/Samples	Number of Detects	PWSs/Sites/Samples	Percent with Detects	Minimum Conc. (Detects)	Maximum Conc. (Detects)	Median Conc. (Detects)	90th Percentile (Detects)	99th Percentile (Detects)	Conc. Units	Date	Notes
Finished Water Data												
Unregulated Contaminant Monitoring Rule (UCMR 1)			PWS							ug/L	2001-2003	
Unregulated Contaminant Monitoring (UCM) Round 1			PWS							ug/L	1988-1992	
Unregulated Contaminant Monitoring (UCM) Round 2			PWS							ug/L	1993-1997	
National Inorganics and Radionuclide Survey (NIRS)			PWS							ug/L	1984-1986	

Ambient Water Data												
National Water-Quality Assessment Program (NAWQA)			Sites							ug/L	1992-2001	
National Reconnaissance of Emerging Contaminants (NREC)	85	35	Sites	41.20%			0.14			ug/L	1999-2004	Surface water; National Reconnaissance
National Reconnaissance of Emerging Contaminants (NREC)			Sites	21.07%			0.2			ug/L	1999-2004	Surface water; National Aggregate. Size of dataset not reported.
National Reconnaissance of Emerging Contaminants (NREC)			Sites	10.78%			0.2			ug/L	1999-2004	Ground water; National Aggregate. Size of dataset not reported.
National Reconnaissance of Emerging Contaminants (NREC)			Sites							ug/L	1999-2004	

Supplemental Water Data												
Kolpin et al., 2002	85		Sites	41.2%		12	0.14			ug/L	1999-2000	National Surface Water Reconnaissance; Kolpin, et al., 2002. Env. Sci. & Technol., 36(6), pp. 1202-1211.
Focazio et al., 2008	73	7	Sites	9.6%		1.9				ug/L	2001	NREC II Raw Drinking Water; Focazio, et al., 2008. Sci.Tot. Env., 402(2-3), pp. 201-216.
Hopple et al., 2009	43		Samples	2.3%		2.5				ug/L	2002-2005	Ground water; Phase 2; Source water; Hopple et al., 2009. Anthropogenic organic compounds in source water of selected community water systems that use groundwater, 2002-05: USGS Sci. Investigations Report 2009-5200, p.74
Hopple et al., 2009	47		Samples	0%						ug/L	2002-2005	Ground water; Phase 2; Finished water; Hopple et al., 2009
Hopple et al., 2009	212		Samples	0.9%		6.4				ug/L	2002-2005	Ground water; Phase 1; Source water; Hopple et al., 2009
Kingsbury et al., 2008	145		Samples	0%						ug/L	2002-2005	Surface water; Phase 1; Source water; Kingsbury et al., 2008
Kingsbury et al., 2008	87		Samples	9.2%		0.44				ug/L	2002-2005	Surface water; Phase 2; Finished water; Kingsbury et al., 2008
Kingsbury et al., 2008	87		Samples	4.7%		0.67				ug/L	2002-2005	Surface water; Phase 2; Source water; Kingsbury et al., 2008. Anthropogenic organic compounds in source water of nine community water systems that withdraw from streams, 2002-05: USGS Sci. Investigations Report 2008-5208, p. 66
STORage and RETrieval (STORET)	33	1	Sites	3.03%	0.28	0.28	0.28	0.28	0.28	ug/L	Updated 2013	
Stackelberg, et al., 2007	12		Samples	17%		0.22				ug/L		New Jersey Finished Drinking Water; Stackelberg, et al., 2007. Sci. Tot. Environ., 377(2-3), pp. 255-272.
Stackelberg, et al., 2007	12		Samples	67%		0.36				ug/L		New Jersey Surface Water; Stackelberg, et al., 2007. Sci. Tot. Environ., 377(2-3), pp. 255-272.

Application/Release Data	Amount Released	Units	Number of States	Units	Date
National Center for Food and Agricultural Policy (NCFAP) – Application		lbs/yr		States	1997
Toxics Release Inventory (TRI) – Surface Water	6,240	lbs/yr	5	States	2010
Toxics Release Inventory (TRI) – Total	3,296,213	lbs/yr	27	States	2010

Production	Amount Range	Units	Date
Chemical Update System/Inventory Update Reporting (CUS/IUR)	≥ 1B	lbs/yr	2006

Note: Highlighted data indicate value was used in attribute scoring. Blank fields indicate there were no data available.

Other Supporting Data	Source	Value	Date
Estimated Environmental Concentration (EEC)	OPP		

Environmental Fate Parameters	Value	Units	Notes
Half Life		length of time	
Degradation Code	BFA-BST		BFA = Biodegrades fast with acclimation; BST = Biodegrades sometimes/recalcitrant
Organic Carbon Partitioning Coefficient (Koc)	75,200	L/kg	
Log Octanol-water Partitioning Coefficient (Kow)	3.32	dimensionless	
Distribution Coefficient (Kd)		L/kg	
Henry's Law Coefficient	9.2E-12	atm-m ³ /mol	
Solubility in Water	120	mg/L	
Modeled Percent in Water	8	%	

Contaminant:	Butyl benzyl phthalate
Substance Key:	3168
Contaminant ID (CASRN):	85687

Attribute Scores			
Potency	Severity	Prevalence	Magnitude
4	3	8	8

Health Reference Level (HRL): 1,400 ug/L
Health Reference Level (HRL)¹ cancer: N/A

HRL/Concentration Ratio(s)
NC HRL/TX 90%: 63.1

Source	Use
HSDB	Chemical intermediate; plasticizer

3-Model Categorical Prediction
NL?

Status			
CCL 3: No	CCL 4 Universe: Yes	PCCL 4: Yes	Draft CCL 4: No

HEALTH EFFECTS DATA

Non-Cancer Data	Source	Value	Units	Date	Critical Effect	Notes
Reference Dose (RfD)	EPA OPP		mg/kg-d			
Reference Dose (RfD)	IRIS	0.2	mg/kg-d	1993	Significantly increased liver-to-body weight and liver-to-brain weight ratios	NTP, 1985. Basis NOAEL = 159 mg/kg-d; UF = 1,000 (rat study)
Reference Dose (RfD)	EPA HA	0.2	mg/kg-d	1989		
Reference Dose (RfD)	RAIS HE	0.2	mg/kg-d	1989	Significantly increased liver-to-body weight & liver-to-brain weight ratios	NTP, 1985; Basis NOAEL/LEL, rat, liver, brain, UF=1000
Minimal Risk Level	ATSDR		mg/kg-d			
Acceptable Daily Intake (ADI)	JMPR		mg/kg-d			
Acceptable Daily Intake (ADI)	CEDI ADI		mg/kg-d			
Tolerable Daily Intake (TDI)	ITER	1.3	mg/kg-d	1998		Hammond et al. 1987; Basis BMD 132 mg/kd/day, UF = 100, rat
No Observed Effect Level (NOEL)	CTD JPN		mg/kg-d			
Lowest Observed Adverse Effect Level (LOAEL)	RTECS	100	mg/kg-d	2000	Gastrointestinal - changes in structure or function of salivary glands, Kidney, Ureter, Bladder - changes in kidney weight; endocrine - other changes	oral study in rat; REPTED Reproductive Toxicology. (Pergamon Press Inc., Maxwell House, Fairview Park, Elmsford, NY 10523) V.1- 1987- Volume(issue)/page/year 14,513,2000
Lethal Dose 50 (LD50)	HSDB		mg/kg			
Lethal Dose 50 (LD50)	CTD JPN		mg/kg			
Lethal Dose 50 (LD50)	RTECS		mg/kg			

Cancer Data	Source	Value	Units	Date	Notes
Lifetime Cancer Risk (10 ⁻⁴)	EPA		mg/L		
Slope Factor (Oral)	EPA PPRTV	0.0019	(mg/kg-d) ⁻¹	2002	
Slope Factor (Oral)	OEHHA		(mg/kg-d) ⁻¹		
Slope Factor (Oral)	RAIS HE		(mg/kg-d) ⁻¹		
Cancer Classification ²	EPA IRIS	C		1988	
Cancer Classification ²	IARC	3		1999	Vol. 73, 1999

Other Supporting Data	Source	Value	Units	Notes
Is contaminant on list of carcinogens?				
Is the contaminant on a list of reproductive toxins?				
Drinking Water Equivalent Level (DWEL)	EPA HA	7	mg/L	Drinking Water Equivalent Level

	Source	Male Rat	Female Rat	Male Mouse	Female Mouse
Cancer Classification ²	NTP	Some Evidence	Equivocal Evidence	Not Tested	Not Tested

Note: Highlighted data indicate value was used in attribute scoring. Blank fields indicate there were no data available.

¹ For the CCL process HRLs were calculated by converting the RfD or other dose to ug/L, assuming 2 L/day of water consumed by a 70 Kg adult, and a Relative Source Contribution of 20%. For carcinogens, the concentration at the 10⁻⁶ cancer risk was used.

² Cancer classifications were only used for screening. For potency scoring quantitative cancer risk data were used.

OCCURRENCE DATA

	Number of PWSs/Sites/Samples	Number of Detects	PWSs/Sites/Samples	Percent with Detects	Minimum Conc. (Detects)	Maximum Conc. (Detects)	Median Conc. (Detects)	90th Percentile (Detects)	99th Percentile (Detects)	Conc. Units	Date	Notes
Finished Water Data												
Unregulated Contaminant Monitoring Rule (UCMR 1)			PWS							ug/L	2001-2003	
Unregulated Contaminant Monitoring (UCM) Round 1			PWS							ug/L	1988-1992	
Unregulated Contaminant Monitoring (UCM) Round 2			PWS							ug/L	1993-1997	
National Inorganics and Radionuclide Survey (NIRS)			PWS							ug/L	1984-1986	

Ambient Water Data												
National Water-Quality Assessment Program (NAWQA)			Sites							ug/L	1992-2001	
National Reconnaissance of Emerging Contaminants (NREC)			Sites							ug/L	1999-2004	

Supplemental Water Data												
California Department of Health Services	851	24	PWS	2.8%	0.004	124	0.2	59		ug/L		Drinking water monitoring
California Drinking Water Monitoring Data	264	16	PWS	6.1%	0.003	8.5	0.074	4.3	8.4	ug/L	1995-2007	
Florida Drinking Water Monitoring Data	5	0	PWS	0%						ug/L	2004-2007	
Illinois Drinking Water Monitoring Data	2	0	PWS	0%						ug/L	1998-2005	
Texas Drinking Water Monitoring Data	2,108	4	PWS	0.2%	3.97	26.4	8.99	22.2	26	ug/L	1998-2005	
STOrage and RETrieval (STORET)	1,221	248	Sites	20.31%	0	629.5	0.043	0.97	27.2	ug/L	Updated 2013	

Application/Release Data	Amount Released	Units	Number of States	Units	Date
National Center for Food and Agricultural Policy (NCFAP) – Application		lbs/yr		States	1997
Toxics Release Inventory (TRI) – Surface Water		lbs/yr		States	2010
Toxics Release Inventory (TRI) – Total		lbs/yr		States	2010

Production	Amount Range	Units	Date
Chemical Update System/Inventory Update Reporting (CUS/IUR)	50M - < 100M	lbs/yr	2006

Note: Highlighted data indicate value was used in attribute scoring. Blank fields indicate there were no data available.

Other Supporting Data	Source	Value	Date
Estimated Environmental Concentration (EEC)	OPP		

Environmental Fate Parameters	Value	Units	Notes
Half Life		length of time	
Degradation Code	BF		BF = Biodegrades fast (BIODEG)
Organic Carbon Partitioning Coefficient (Koc)	9,359	L/kg	
Log Octanol-water Partitioning Coefficient (Kow)	4.73	dimensionless	
Distribution Coefficient (Kd)		L/kg	
Henry's Law Coefficient	1.26E-06	atm-m ³ /mol	
Solubility in Water	2.69	mg/L	
Modeled Percent in Water	22	%	

Contaminant:	Carbaryl
Substance Key:	2448
Contaminant ID (CASRN):	63252

Attribute Scores			
Potency	Severity	Prevalence	Magnitude
5	5	1	5

Health Reference Level (HRL)¹: 70 ug/L			
Health Reference Level (HRL)¹ cancer: 40 ug/L			
HRL/Concentration Ratio(s)			
NC HRL/UCM R2 90%: 70			
CAR HRL/UCM R2 90%: 40			
Status			
CCL 3: No	CCL 4 Universe: Yes	PCCL 4: Yes	Draft CCL 4: No

Source	Use
HSDB	Insecticide; veterinary medication

3-Model Categorical Prediction
NL?

HEALTH EFFECTS DATA

Non-Cancer Data	Source	Value	Units	Date	Critical Effect	Notes
Reference Dose (RfD)	EPA OPP	0.01	mg/kg-d	2007	0.01 mg/kg-day is the acute RfD based on brain cholinesterase inhibition PND 11. Q1* 0.000875 (mg/kg-d) ⁻¹ - Likely; see CAR	Basis NOAEL = 1 mg/kg-d, UF = 100 (rat study)
Reference Dose (RfD)	IRIS	0.1	mg/kg-d	1985	Kidney; liver	Carpenter et al., 1961; Basis NOAEL 9.6 mg/kg/day, rat, UF=100, kidney & liver
Reference Dose (RfD)	EPA HA	0.01	mg/kg-d	2006		
Minimal Risk Level	ATSDR		mg/kg-d			
Acceptable Daily Intake (ADI)	JMPR	0.008	mg/kg-d	2001		
Acceptable Daily Intake (ADI)	CEDI ADI		mg/kg-d			
Tolerable Daily Intake (TDI)	ITER		mg/kg-d			
No Observed Effect Level (NOEL)	CTD JPN		mg/kg-d			
Lowest Observed Adverse Effect Level (LOAEL)	RTECS	0.23	mg/kg-d	1975	Immunological Including Allergic - decrease in humoral immune response	oral study in rabbit; TXAPA9 Toxicology and Applied Pharmacology. (Academic Press, Inc., 1 E. First St., Duluth, MN 55802) V.1- 1959- Volume(issue)/page/year 32,587,1975
Lethal Dose 50 (LD50)	HSDB		mg/kg			
Lethal Dose 50 (LD50)	CTD JPN		mg/kg			
Lethal Dose 50 (LD50)	RTECS		mg/kg			

Cancer Data	Source	Value	Units	Date	Notes
Lifetime Cancer Risk (10 ⁻⁴)	EPA		mg/L		
Slope Factor (Oral)	EPA OPP	0.000875	(mg/kg-d) ⁻¹	2002, updated 2008	Incidence of hemangiosarcomas in mice; 2002 and 2007 Carbaryl Occupational Risk Assessment in August 2008 Amended RED
Slope Factor (Oral)	OEHHA		(mg/kg-d) ⁻¹		
Slope Factor (Oral)	RAIS HE		(mg/kg-d) ⁻¹		
Cancer Classification ²	EPA OPP	Likely		2007	Likely to be carcinogenic in humans; 2003 and 2007 Carbaryl Occupational Risk Assessment in August 2008 Amended RED
Cancer Classification ²	IARC	3		1987	Vol. 12, Suppl. 7, 1987

Other Supporting Data	Source	Value	Units	Notes
Is contaminant on list of carcinogens?	EPA; IARC	Yes		
Is the contaminant on a list of reproductive toxins?	UMD	Yes		Teratogen
Drinking Water Equivalent Level (DWEL)	EPA HA	0.4	mg/L	2006; Drinking Water Equivalent Level
Maximum Acceptable Concentration (MAC)	CADW	0.09	mg/L	Canadian Drinking Water Maximum Acceptable Concentration

	Source	Male Rat	Female Rat	Male Mouse	Female Mouse
Cancer Classification ²	NTP				

Note: Highlighted data indicate value was used in attribute scoring. Blank fields indicate there were no data available.

¹ For the CCL process HRLs were calculated by converting the RfD or other dose to ug/L, assuming 2 L/day of water consumed by a 70 Kg adult, and a Relative Source Contribution of 20%. For carcinogens, the concentration at the 10⁻⁶ cancer risk was used.

² Cancer classifications were only used for screening. For potency scoring quantitative cancer risk data were used.

OCCURRENCE DATA

	Number of PWSs/Sites/Samples	Number of Detects	PWSs/Sites/Samples	Percent with Detects	Minimum Conc. (Detects)	Maximum Conc. (Detects)	Median Conc. (Detects)	90th Percentile (Detects)	99th Percentile (Detects)	Conc. Units	Date	Notes
Finished Water Data												
Unregulated Contaminant Monitoring Rule (UCMR 1)			PWS							ug/L	2001-2003	
Unregulated Contaminant Monitoring (UCM) Round 1			PWS							ug/L	1988-1992	
Unregulated Contaminant Monitoring (UCM) Round 2	12,679	13	PWS	0.10%	0.18	3	0.18	1	3	ug/L	1993-1997	
National Inorganics and Radionuclide Survey (NIRS)			PWS							ug/L	1984-1986	

Ambient Water Data												
National Water-Quality Assessment Program (NAWQA)	7,142	697	Sites	9.76%	0.0005	33.5	0.0167	0.138	1.2	ug/L	1992-2001	
National Reconnaissance of Emerging Contaminants (NREC)	85	14	Sites	16.50%			0.04			ug/L	1999-2004	Surface water; National Reconnaissance
National Reconnaissance of Emerging Contaminants (NREC)			Sites	5.05%			0.17			ug/L	1999-2004	Surface water; National Aggregate. Size of dataset not reported.
National Reconnaissance of Emerging Contaminants (NREC)			Sites	0.12%			0.9			ug/L	1999-2004	Ground water; National Aggregate. Size of dataset not reported.

Supplemental Water Data												
California Department of Health Services	4,671	1	PWS	0.02%	3.5	3.5	3.5	3.5		ug/L		Drinking water monitoring
Pesticide Data Program (PDP)	7	5	Sites	71.4%	0.0078	0.33	0.02	0.092	0.31	ug/L	2003-2009	Raw
Pesticide Data Program (PDP)	13	5	Sites	38.5%	0.005	0.3	0.02	0.16	0.29	ug/L	2003-2009	Finished
Pesticide Pilot Monitoring Program (PMP)	323	7	Samples	2.2%		0.047				ug/L	1999	Ambient Water; Method 2001 (GC/MS)
Pesticide Pilot Monitoring Program (PMP)	312	2	Samples	0.6%		0.063				ug/L	1999	Ambient Water; Method 9060 (HPLC/MS)
Pesticide Pilot Monitoring Program (PMP)	228	2	Samples	0.9%		0.041				ug/L	1999	Finished Water; Method 2001 (GC/MS)
Pesticide Pilot Monitoring Program (PMP)	225	0	Samples	0%						ug/L	1999	Finished Water; Method 9060 (HPLC/MS)
Toccalino et al., 2010	898	6	Samples	0.7%	0.00277	0.0196	0.00736	0.0146	0.0191	ug/L	1993-2007	Ground water; Source Water; Toccalino et al., 2010, Quality of source water from public-supply wells in the United States, 1993-2007: USGS Sci. Investigations Report 2010-5024, p. 206
California Drinking Water Monitoring Data	1,488	2	PWS	0.1%	3.5	24	13.8	22	23.8	ug/L	1995-2007	
Florida Drinking Water Monitoring Data	8	0	PWS	0%						ug/L	2004-2007	
Illinois Drinking Water Monitoring Data	22	0	PWS	0%						ug/L	1998-2005	
North Carolina Drinking Water Monitoring Data	2,477	2	PWS	0.1%	22	36	29	34.6	35.9	ug/L	1998-2005	
Ohio Drinking Water Monitoring Data	43	0	PWS	0%						ug/L	1998-2005	
Region 9 Tribes Drinking Water Monitoring Data	232	0	PWS	0%						ug/L	1998-2005	
South Dakota Drinking Water Monitoring Data	256	0	PWS	0%						ug/L	1990-2007	
Wisconsin Drinking Water Monitoring Data	1,447	1	PWS	0.1%	1	1	1	1	1	ug/L	1980-2012	
USGS/California Groundwater Ambient Monitoring and Assessment (GAMA) Program	1,831	1	Sites	0.05%	0.007	0.007	0.007	0.007	0.007	ug/L	2004-2011	
STORage and RETrieval (STORET)	1,213	21	Sites	1.73%	0	50	0	5.5	38.3	ug/L	Updated 2013	

Application/Release Data	Amount Released	Units	Number of States	Units	Date
National Center for Food and Agricultural Policy (NCFAP) – Application	4,857,542	lbs/yr	48	States	1997
Toxics Release Inventory (TRI) – Surface Water	12	lbs/yr	3	States	2010
Toxics Release Inventory (TRI) – Total	1,653	lbs/yr	7	States	2010

Production	Amount Range	Units	Date
Chemical Update System/Inventory Update Reporting (CUS/IUR)		lbs/yr	2006

Note: Highlighted data indicate value was used in attribute scoring. Blank fields indicate there were no data available.

Other Supporting Data	Source	Value	Date
Estimated Environmental Concentration (EEC)	OPP		

Environmental Fate Parameters	Value	Units	Notes
Half Life	38	days	
Degradation Code	BSA		BSA = Biodegrades slow with acclimation
Organic Carbon Partitioning Coefficient (Koc)	242	L/kg	
Log Octanol-water Partitioning Coefficient (Kow)	2.36	dimensionless	
Distribution Coefficient (Kd)		L/kg	
Henry's Law Coefficient	4.36E-09	atm-m ³ /mol	
Solubility in Water	110	mg/L	
Modeled Percent in Water	13	%	

Contaminant:	Chlorothalonil
Substance Key:	12375
Contaminant ID (CASRN):	1897456

Attribute Scores			
Potency	Severity	Prevalence	Magnitude
5	6	4	4

Health Reference Level (HRL)¹: 140 ug/L			
Health Reference Level (HRL)¹ cancer: 4.6 ug/L			
HRL/Concentration Ratio(s)			
NC HRL/NAWQA 90%: 342			
CAR HRL/NAWQA 90%: 11.2			
Status			
CCL 3: No	CCL 4 Universe: Yes	PCCL 4: Yes	Draft CCL 4: No

Source	Use
HSDB	Fungicide; bactericide

3-Model Categorical Prediction
NL?

HEALTH EFFECTS DATA

Non-Cancer Data	Source	Value	Units	Date	Critical Effect	Notes
Reference Dose (RfD)	EPA OPP	0.02	mg/kg-d	1999	Increased kidney weights & hyperplasia of the proximal convoluted tubules in the kidneys, ulcers & forestomach hyperplasia. Q1* 0.00766 (mg/kgday) ¹ -1. Group B2. See CAR	Basis NOAEL = 2 mg/kg-d; UF = 100
Reference Dose (RfD)	IRIS	0.015	mg/kg-d	1987	Renal tubular epithelial vacuolation	Basis NOEL = 1.5 mg/kg/day, UF = 100, kidney, dog, oral (Diamond Shamrock Chemical, 1970a)
Reference Dose (RfD)	EPA HA	0.015	mg/kg-d	1988		
Reference Dose (RfD)	RAIS HE	0.015	mg/kg-d	1987	Tubular epithelial vacuolation	Diamond Shamrock Chemical, 1970, Basis NOEL/LEL, MF = 1, kidney, dog, UF = 100
Minimal Risk Level	ATSDR		mg/kg-d			
Acceptable Daily Intake (ADI)	JMPR	0.03	mg/kg-d	1994		
Acceptable Daily Intake (ADI)	CEDI ADI		mg/kg-d			
Tolerable Daily Intake (TDI)	ITER		mg/kg-d			
No Observed Effect Level (NOEL)	CTD JPN		mg/kg-d			
No Observed Effect Level (NOEL)	Supplemental	1.5	mg/kg-d			
Lowest Observed Adverse Effect Level (LOAEL)	RTECS	75	mg/kg-d	1990	Kidney, Ureter, Bladder - changes in tubules (including acute renal failure, acute tubular necrosis), Kidney, Ureter, Bladder - changes in bladder weight	90-day oral study in rat; TOLED5 Toxicology Letters. (Elsevier Science Pub. B.V., POB 211, 1000 AE Amsterdam, Netherlands) V.1- 1977- Volume(issue)/page/year 53,155,1990
Lethal Dose 50 (LD50)	HSDB		mg/kg			
Lethal Dose 50 (LD50)	CTD JPN		mg/kg			
Lethal Dose 50 (LD50)	RTECS		mg/kg			

Cancer Data	Source	Value	Units	Date	Notes
Lifetime Cancer Risk (10 ⁻⁴)	EPA HA	0.15	mg/L	1988	
Lifetime Cancer Risk (10 ⁻⁴)	EPA	0.46	mg/L	1999	Corresponds with OPP slope factor.
Slope Factor (Oral)	EPA OPP	0.00766	(mg/kg-d) ⁻¹	1999	
Slope Factor (Oral)	OEHHA	0.0031	(mg/kg-d) ⁻¹	2005	
Slope Factor (Oral)	RAIS HE	0.011	(mg/kg-d) ⁻¹		
Cancer Classification ²	EPA OPP	Likely		1999	
Cancer Classification ²	EPA	B2		1988	
Cancer Classification ²	IARC	2B		1999	Vol. 73, 1999; note: OEHHA lists IARCs cancer class as 3.

Other Supporting Data	Source	Value	Units	Notes
Is contaminant on list of carcinogens?	CACART; IARC; EPA; OEHHA; RAIS	Yes		
Is the contaminant on a list of reproductive toxins?	CACART	Yes		
Drinking Water Equivalent Level (DWEL)	EPA HA	0.5	mg/L	

	Source	Male Rat	Female Rat	Male Mouse	Female Mouse
Cancer Classification ²	NTP	Positive	Positive	Negative	Negative

Note: Highlighted data indicate value was used in attribute scoring. Blank fields indicate there were no data available.

¹ For the CCL process HRLs were calculated by converting the RfD or other dose to ug/L, assuming 2 L/day of water consumed by a 70 Kg adult, and a Relative Source Contribution of 20%. For carcinogens, the concentration at the 10⁻⁶ cancer risk was used.

² Cancer classifications were only used for screening. For potency scoring quantitative cancer risk data were used.

OCCURRENCE DATA

	Number of PWSs/Sites/Samples	Number of Detects	PWSs/Sites/Samples	Percent with Detects	Minimum Conc. (Detects)	Maximum Conc. (Detects)	Median Conc. (Detects)	90th Percentile (Detects)	99th Percentile (Detects)	Conc. Units	Date	Notes
Finished Water Data												
Unregulated Contaminant Monitoring Rule (UCMR 1)			PWS							ug/L	2001-2003	
Unregulated Contaminant Monitoring (UCM) Round 1			PWS							ug/L	1988-1992	
Unregulated Contaminant Monitoring (UCM) Round 2			PWS							ug/L	1993-1997	
National Inorganics and Radionuclide Survey (NIRS)			PWS							ug/L	1984-1986	

Ambient Water Data												
National Water-Quality Assessment Program (NAWQA)	4,547	15	Sites	0.33%	0.007	0.71	0.05	0.41	0.71	ug/L	1992-2001	
National Reconnaissance of Emerging Contaminants (NREC)			Sites							ug/L	1999-2004	

Supplemental Water Data												
California Department of Health Services	4,099	0	PWS	0%						ug/L		Drinking water monitoring
Pesticide Data Program (PDP)	6	0	Sites	0%						ug/L	2003-2009	Raw
Pesticide Data Program (PDP)	6	0	Sites	0%						ug/L	2003-2009	Finished
Pesticide Pilot Monitoring Program (PMP)	225	0	Samples	0%						ug/L	1999	Finished Water; Method 9060 (HPLC/MS)
Pesticide Pilot Monitoring Program (PMP)	312	0	Samples	0%						ug/L	1999	Ambient Water; Method 9060 (HPLC/MS)
Toccalino et al., 2010	507	0	Samples	0%						ug/L	1993-2007	Ground water; Source Water; Toccalino et al., 2010, Quality of source water from public-supply wells in the United States, 1993-2007: USGS Sci. Investigations Report 2010-5024, p. 206
California Drinking Water Monitoring Data	1,296	0	PWS	0%						ug/L	1995-2007	
STorage and RETrieval (STORET)	694	12	Sites	1.73%	0	56	0	1.93	47.1	ug/L	Updated 2013	

Application/Release Data	Amount Released	Units	Number of States	Units	Date
National Center for Food and Agricultural Policy (NCFAP) – Application	11,916,713	lbs/yr	48	States	1997
Toxics Release Inventory (TRI) – Surface Water	146	lbs/yr	1	States	2010
Toxics Release Inventory (TRI) – Total	91,363	lbs/yr	7	States	2010

Production	Amount Range	Units	Date
Chemical Update System/Inventory Update Reporting (CUS/IUR)		lbs/yr	2006

Note: Highlighted data indicate value was used in attribute scoring. Blank fields indicate there were no data available.

Other Supporting Data	Source	Value	Date
Estimated Environmental Concentration (EEC)	OPP		

Environmental Fate Parameters	Value	Units	Notes
Half Life		length of time	
Degradation Code	BF		BF = Biodegrades fast (BIODEG)
Organic Carbon Partitioning Coefficient (Koc)	2,392	L/kg	
Log Octanol-water Partitioning Coefficient (Kow)	3.05	dimensionless	
Distribution Coefficient (Kd)		L/kg	
Henry's Law Coefficient	2E-06	atm-m ³ /mol	
Solubility in Water	0.6	mg/L	
Modeled Percent in Water	7	%	

Contaminant:	Dichlorvos
Substance Key:	2444
Contaminant ID (CASRN):	62737

Attribute Scores			
Potency	Severity	Prevalence	Magnitude
6	3	1	1

Health Reference Level (HRL):¹ 3.5 ug/L
Health Reference Level (HRL)¹ cancer: 0.1 ug/L

HRL/Concentration Ratio(s)
No data for calculating HRL ratio

Source	Use
HSDB	Insecticide; veterinary medicine

3-Model Categorical Prediction
NL

Status			
CCL 3: No	CCL 4 Universe: Yes	PCCL 4: Yes	Draft CCL 4: No

HEALTH EFFECTS DATA

Non-Cancer Data	Source	Value	Units	Date	Critical Effect	Notes
Reference Dose (RfD)	EPA OPP	0.0005	mg/kg-d	2006	Plasma and RBC cholinesterase inhibition (dog study)	UF = 100; Basis NOAEL = 0.05 mg/kg-day
Reference Dose (RfD)	IRIS	0.0005	mg/kg-d	1993	Cholinesterase inhibition	AMVAC Chemical Corporation, 1990, NOAEL, dog, UF=100; Basis NOAEL = 0.05 mg/kg-d
Reference Dose (RfD)	EPA HA		mg/kg-d			
Reference Dose (RfD)	RAIS HE	0.0005	mg/kg-d	1990	Plasma and RBC ChE inhibition; blood	AMVAC Chemical Corporation, 1990, NOAEL/LOAEL, dog, UF=100
Minimal Risk Level	ATSDR	0.0005	mg/kg-d	1997	Neurol.	UF = 100
Acceptable Daily Intake (ADI)	JMPR	0.004	mg/kg-d	1993		
Acceptable Daily Intake (ADI)	CEDI ADI		mg/kg-d			
Tolerable Daily Intake (TDI)	ITER		mg/kg-d			
No Observed Effect Level (NOEL)	CTD JPN		mg/kg-d			
Lowest Observed Adverse Effect Level (LOAEL)	RTECS	0.625	mg/kg-d	1974	Brain and Coverings - other degenerative changes, Kidney, Ureter, Bladder - urine volume increased, Biochemical - Enzyme inhibition, induction, or change in blood or tissue levels - true cholinesterase	90-day dog study; NYZZA3 Nippon Yakuzaisaikai Zasshi. Journal of the Japan Pharmaceutical Association. (Nippon Yakuznshikai, 2-12-15 Shibuya, Shibuya-ku, Tokyo 150, Japan) V.1- 1949- Volume(issue)/page/year 26,739,1974
Lethal Dose 50 (LD50)	HSDB		mg/kg			
Lethal Dose 50 (LD50)	CTD JPN		mg/kg			
Lethal Dose 50 (LD50)	RTECS		mg/kg			

Cancer Data	Source	Value	Units	Date	Notes
Lifetime Cancer Risk (10 ⁻⁴)	EPA IRIS	0.01	mg/L	1988	
Slope Factor (Oral)	OEHHA	0.41	(mg/kg-d) ⁻¹	2005	
Slope Factor (Oral)	RAIS HE	0.29	(mg/kg-d) ⁻¹		
Cancer Classification ²	EPA OPP	Suggestive		2006	
Cancer Classification ²	EPA	B2		1989	GI, pancreas, leukemia; NTP, 1986
Cancer Classification ²	IARC	2B		1991	Vol. 53

Other Supporting Data	Source	Value	Units	Notes
Is contaminant on list of carcinogens?	EPA; RAISHE; OEHHA; IARC; CACART	Yes		
Is the contaminant on a list of reproductive toxins?	UMD	Yes		Teratogen list
Drinking Water Equivalent Level (DWEL)	EPA HA		mg/L	

	Source	Male Rat	Female Rat	Male Mouse	Female Mouse
Cancer Classification ²	NTP	Some Evidence	Equivocal Evidence	Some Evidence	Clear Evidence

Note: Highlighted data indicate value was used in attribute scoring. Blank fields indicate there were no data available.

¹ For the CCL process HRLs were calculated by converting the RfD or other dose to ug/L, assuming 2 L/day of water consumed by a 70 Kg adult, and a Relative Source Contribution of 20%. For carcinogens, the concentration at the 10⁻⁶ cancer risk was used.

² Cancer classifications were only used for screening. For potency scoring quantitative cancer risk data were used.

OCCURRENCE DATA

	Number of PWSs/Sites/Samples	Number of Detects	PWSs/Sites/Samples	Percent with Detects	Minimum Conc. (Detects)	Maximum Conc. (Detects)	Median Conc. (Detects)	90th Percentile (Detects)	99th Percentile (Detects)	Conc. Units	Date	Notes
Finished Water Data												
Unregulated Contaminant Monitoring Rule (UCMR 1)			PWS							ug/L	2001-2003	
Unregulated Contaminant Monitoring (UCM) Round 1			PWS							ug/L	1988-1992	
Unregulated Contaminant Monitoring (UCM) Round 2			PWS							ug/L	1993-1997	
National Inorganics and Radionuclide Survey (NIRS)			PWS							ug/L	1984-1986	

Ambient Water Data												
National Water-Quality Assessment Program (NAWQA)			Sites							ug/L	1992-2001	
National Reconnaissance of Emerging Contaminants (NREC)			Sites	0.00%						ug/L	1999-2004	Surface water; National Aggregate. Size of dataset not reported.
National Reconnaissance of Emerging Contaminants (NREC)			Sites	0.00%						ug/L	1999-2004	Ground water; National Aggregate. Size of dataset not reported.
National Reconnaissance of Emerging Contaminants (NREC)			Sites							ug/L	1999-2004	

Supplemental Water Data												
California Department of Health Services	107	0	PWS	0%						ug/L		Drinking water monitoring
Pesticide Pilot Monitoring Program (PMP)	317	0	Samples	0%						ug/L	1999	Ambient Water; Method 9002 (GC/MS)
Pesticide Pilot Monitoring Program (PMP)	221	0	Samples	0%						ug/L	1999	Finished Water; Method 9002 (GC/MS)
Hopple et al., 2009	221		Samples	0%						ug/L	2002-2005	Ground water; Phase 1; Source water; Hopple et al., 2009
Hopple et al., 2009	49		Samples	0%						ug/L	2002-2005	Ground water; Phase 2; Finished water; Hopple et al., 2009
Hopple et al., 2009	49		Samples	0%						ug/L	2002-2005	Ground water; Phase 2; Source water; Hopple et al., 2009, Anthropogenic organic compounds in source water of selected community water systems that use groundwater, 2002-05: USGS Sci. Investigations Report 2009-5200, p.74
California Drinking Water Monitoring Data	68	0	PWS	0%						ug/L	1995-2007	
USGS/California Groundwater Ambient Monitoring and Assessment (GAMA) Program	1,828	1	Sites	0.05%	0.01	0.01	0.01	0.01	0.01	ug/L	2004-2011	
STORage and RETrieval (STORET)	321	7	Sites	2.18%	0.07	0.218	0.178	0.199	0.216	ug/L	Updated 2013	

Application/Release Data	Amount Released	Units	Number of States	Units	Date
National Center for Food and Agricultural Policy (NCFAP) – Application		lbs/yr		States	1997
Toxics Release Inventory (TRI) – Surface Water	0	lbs/yr	0	States	2010
Toxics Release Inventory (TRI) – Total	265	lbs/yr	2	States	2010

Production	Amount Range	Units	Date
Chemical Update System/Inventory Update Reporting (CUS/IUR)	No Reports	lbs/yr	2002

Note: Highlighted data indicate value was used in attribute scoring. Blank fields indicate there were no data available.

Other Supporting Data	Source	Value	Date
Estimated Environmental Concentration (EEC)	OPP		

Environmental Fate Parameters	Value	Units	Notes
Half Life	<1-3.5	days	
Degradation Code	DF		DF = Degrades fast (HSDB)
Organic Carbon Partitioning Coefficient (Koc)	40.2	L/kg	
Log Octanol-water Partitioning Coefficient (Kow)	1.47	dimensionless	
Distribution Coefficient (Kd)		L/kg	
Henry's Law Coefficient	5.75E-07	atm-m ³ /mol	
Solubility in Water	8,000	mg/L	
Modeled Percent in Water	27	%	

Contaminant:	Dicofol
Substance Key:	5106
Contaminant ID (CASRN):	115322

Attribute Scores			
Potency	Severity	Prevalence	Magnitude
6	3	10	6

Health Reference Level (HRL): ¹ 2.8 ug/L
Health Reference Level (HRL)¹ cancer: N/A

HRL/Concentration Ratio(s)
NC HRL/SW Chronic EEC: 5.6

Source	Use
HSDB	Insecticide

3-Model Categorical Prediction
L?

Status			
CCL 3: No	CCL 4 Universe: Yes	PCCL 4: Yes	Draft CCL 4: No

HEALTH EFFECTS DATA

Non-Cancer Data	Source	Value	Units	Date	Critical Effect	Notes
Reference Dose (RfD)	EPA OPP	0.0004	mg/kg-d	1998	Inhibition of adrenal corticotropic hormone 3X FQPA (dog study) became an uncertainty factor (E-mail from OPP; NOAEL - 0.12 mg/kg-day)	UF = 300; Basis NOAEL = 0.12 mg/kg-day
Reference Dose (RfD)	IRIS		mg/kg-d			
Reference Dose (RfD)	EPA HA		mg/kg-d			
Reference Dose (RfD)	RAIS HE		mg/kg-d			
Minimal Risk Level	ATSDR		mg/kg-d			
Acceptable Daily Intake (ADI)	JMPR	0.002	mg/kg-d	1992		
Acceptable Daily Intake (ADI)	CEDI ADI		mg/kg-d			
Tolerable Daily Intake (TDI)	ITER		mg/kg-d			
No Observed Effect Level (NOEL)	CTD JPN		mg/kg-d			
Lowest Observed Adverse Effect Level (LOAEL)	RTECS	22.5	mg/kg-d	2001	Related to Chronic Data - death	one year dog study; HBPTO Handbook of pesticide toxicology. Robert Krieger ed, Academic press, 2001 Volume(issue)/page/year 2,1342,2001
Lethal Dose 50 (LD50)	HSDB		mg/kg			
Lethal Dose 50 (LD50)	CTD JPN		mg/kg			
Lethal Dose 50 (LD50)	RTECS		mg/kg			

Cancer Data	Source	Value	Units	Date	Notes
Lifetime Cancer Risk (10 ⁻⁴)	EPA		mg/L		
Slope Factor (Oral)	OEHHA		(mg/kg-d) ⁻¹		
Slope Factor (Oral)	RAIS HE		(mg/kg-d) ⁻¹		
Cancer Classification ²	EPA OPP	C		1998	
Cancer Classification ²	IARC	3		1987	

Other Supporting Data	Source	Value	Units	Notes
Is contaminant on list of carcinogens?				
Is the contaminant on a list of reproductive toxins?				
Drinking Water Equivalent Level (DWEL)	EPA HA		mg/L	

	Source	Male Rat	Female Rat	Male Mouse	Female Mouse
Cancer Classification ²	NTP	Negative	Negative	Positive	Negative

Note: Highlighted data indicate value was used in attribute scoring. Blank fields indicate there were no data available.

¹ For the CCL process HRLs were calculated by converting the RfD or other dose to ug/L, assuming 2 L/day of water consumed by a 70 Kg adult, and a Relative Source Contribution of 20%. For carcinogens, the concentration at the 10⁻⁶ cancer risk was used.

² Cancer classifications were only used for screening. For potency scoring quantitative cancer risk data were used.

OCCURRENCE DATA

	Number of PWSs/Sites/Samples	Number of Detects	PWSs/Sites/Samples	Percent with Detects	Minimum Conc. (Detects)	Maximum Conc. (Detects)	Median Conc. (Detects)	90th Percentile (Detects)	99th Percentile (Detects)	Conc. Units	Date	Notes
Finished Water Data												
Unregulated Contaminant Monitoring Rule (UCMR 1)			PWS							ug/L	2001-2003	
Unregulated Contaminant Monitoring (UCM) Round 1			PWS							ug/L	1988-1992	
Unregulated Contaminant Monitoring (UCM) Round 2			PWS							ug/L	1993-1997	
National Inorganics and Radionuclide Survey (NIRS)			PWS							ug/L	1984-1986	
Ambient Water Data												
National Water-Quality Assessment Program (NAWQA)			Sites							ug/L	1992-2001	
National Reconnaissance of Emerging Contaminants (NREC)			Sites							ug/L	1999-2004	
Supplemental Water Data												
California Department of Health Services	21	0	PWS	0%						ug/L		Drinking water monitoring
California Drinking Water Monitoring Data	17	0	PWS	0%						ug/L	1995-2007	
STORage and RETrieval (STORET)	35	0	Sites	0%						ug/L	Updated 2013	

Application/Release Data	Amount Released	Units	Number of States	Units	Date
National Center for Food and Agricultural Policy (NCFAP) – Application	786,805	lbs/yr	36	States	1997
Toxics Release Inventory (TRI) – Surface Water	0	lbs/yr	0	States	2004
Toxics Release Inventory (TRI) – Total	33	lbs/yr	2	States	2004

Production	Amount Range	Units	Date
Chemical Update System/Inventory Update Reporting (CUS/IUR)		lbs/yr	2006

Note: Highlighted data indicate value was used in attribute scoring. Blank fields indicate there were no data available.

Other Supporting Data	Source	Value	Date
Estimated Environmental Concentration (EEC)	OPP	SW Chronic = 0.5 ug/L; GW Chronic = 0.069 ug/L	
Environmental Fate Parameters	Value	Units	Notes
Half Life	180	days	
Degradation Code	BST		BST = Biodegrades sometimes/recalcitrant (PBT)
Organic Carbon Partitioning Coefficient (Koc)	10,500	L/kg	
Log Octanol-water Partitioning Coefficient (Kow)	5.02	dimensionless	
Distribution Coefficient (Kd)		L/kg	
Henry's Law Coefficient	2.42E-07	atm-m ³ /mol	
Solubility in Water	0.8	mg/L	
Modeled Percent in Water	4	%	

Contaminant:	Endosulfan
Substance Key:	5104
Contaminant ID (CASRN):	115297

Attribute Scores			
Potency	Severity	Prevalence	Magnitude
5	6	10	7

Health Reference Level (HRL)¹: 42 ug/L			
Health Reference Level (HRL)¹ cancer: N/A			
HRL/Concentration Ratio(s)			
NC HRL/SW Chronic EEC: 28			
Status			
CCL 3: No	CCL 4 Universe: Yes	PCCL 4: Yes	Draft CCL 4: No

Source	Use
HSDB	Insecticide

3-Model Categorical Prediction
L? - L

HEALTH EFFECTS DATA

Non-Cancer Data	Source	Value	Units	Date	Critical Effect	Notes
Reference Dose (RfD)	EPA OPP		mg/kg-d			
Reference Dose (RfD)	EPA OPP	0.006	mg/kg-d	2007	Reduced body weight gain, enlarged kidneys, increased incidences of marked progressive glomerulonephrosis; blood vessel aneurysms in males.	Basis NOAEL = 0.6 mg/kg-d; UF = 100 (rat study)
Reference Dose (RfD)	IRIS	0.006	mg/kg-d	1994	Reduced body weight gain in males and females, increased incidence of marked progressive glomerulonephrosis and blood vessel aneurysms in males.	Hoechst, 1989a, Basis NOAEL = 0.7 mg/kg-d (female) and 0.6mg/kg-d (male); UF=100 (rat study)
Reference Dose (RfD)	EPA HA		mg/kg-d			
Minimal Risk Level	ATSDR	0.002	mg/kg-d	2000	hepatic; liver	Hoechst, 1989c, Basis NOAEL = 0.18 mg/kg-d, dog, UF=100
Acceptable Daily Intake (ADI)	JMPR	0.006	mg/kg-d	1998		
Acceptable Daily Intake (ADI)	CEDI ADI		mg/kg-d			
Tolerable Daily Intake (TDI)	ITER		mg/kg-d			
No Observed Effect Level (NOEL)	CTD JPN		mg/kg-d			
Lowest Observed Adverse Effect Level (LOAEL)	RTECS		mg/kg-d			
Lethal Dose 50 (LD50)	HSDB		mg/kg			
Lethal Dose 50 (LD50)	CTD JPN		mg/kg			
Lethal Dose 50 (LD50)	RTECS		mg/kg			

Cancer Data	Source	Value	Units	Date	Notes
Lifetime Cancer Risk (10 ⁻⁴)	EPA		mg/L		
Slope Factor (Oral)	OEHHA		(mg/kg-d) ⁻¹		
Slope Factor (Oral)	RAIS HE		(mg/kg-d) ⁻¹		
Cancer Classification ²	EPA IRIS	IN		1994	
Cancer Classification ²	EPA OPP	E		2007	
Cancer Classification ²	IARC				

Other Supporting Data	Source	Value	Units	Notes
Is contaminant on list of carcinogens?				
Is the contaminant on a list of reproductive toxins?	UMD	Yes		teratogen list
Drinking Water Equivalent Level (DWEL)	EPA HA		mg/L	

	Source	Male Rat	Female Rat	Male Mouse	Female Mouse
Cancer Classification ²	NTP	Inadequate Study	Negative	Inadequate Study	Negative

Note: Highlighted data indicate value was used in attribute scoring. Blank fields indicate there were no data available.

¹ For the CCL process HRLs were calculated by converting the RfD or other dose to ug/L, assuming 2 L/day of water consumed by a 70 Kg adult, and a Relative Source Contribution of 20%. For carcinogens, the concentration at the 10⁻⁶ cancer risk was used.

² Cancer classifications were only used for screening. For potency scoring quantitative cancer risk data were used.

OCCURRENCE DATA

	Number of PWSs/Sites/Samples	Number of Detects	PWSs/Sites/Samples	Percent with Detects	Minimum Conc. (Detects)	Maximum Conc. (Detects)	Median Conc. (Detects)	90th Percentile (Detects)	99th Percentile (Detects)	Conc. Units	Date	Notes
Finished Water Data												
Unregulated Contaminant Monitoring Rule (UCMR 1)			PWS							ug/L	2001-2003	
Unregulated Contaminant Monitoring (UCM) Round 1			PWS							ug/L	1988-1992	
Unregulated Contaminant Monitoring (UCM) Round 2			PWS							ug/L	1993-1997	
National Inorganics and Radionuclide Survey (NIRS)			PWS							ug/L	1984-1986	

Ambient Water Data												
National Water-Quality Assessment Program (NAWQA)			Sites							ug/L	1992-2001	
National Reconnaissance of Emerging Contaminants (NREC)			Sites							ug/L	1999-2004	

Supplemental Water Data												
STorage and REtrieval (STORET)	665	105	Sites	15.79%		0.1		0.01	0.01	ug/L	Updated 2013	

Application/Release Data	Amount Released	Units	Number of States	Units	Date
National Center for Food and Agricultural Policy (NCFAP) – Application	1,601,195	lbs/yr	44	States	1997
Toxics Release Inventory (TRI) – Surface Water		lbs/yr		States	2010
Toxics Release Inventory (TRI) – Total		lbs/yr		States	2010

Production	Amount Range	Units	Date
Chemical Update System/Inventory Update Reporting (CUS/IUR)		lbs/yr	2006

Note: Highlighted data indicate value was used in attribute scoring. Blank fields indicate there were no data available.

Other Supporting Data	Source	Value	Date
Estimated Environmental Concentration (EEC)	OPP	SW Chronic = 1.5 ug/L; GW Chronic = 0.012 ug/L	
Environmental Fate Parameters	Value	Units	Notes
Half Life	180	days	
Degradation Code	BST		BST = Biodegrades sometimes/recalcitrant (PBT)
Organic Carbon Partitioning Coefficient (Koc)	22,000	L/kg	
Log Octanol-water Partitioning Coefficient (Kow)	3.83	dimensionless	
Distribution Coefficient (Kd)		L/kg	
Henry's Law Coefficient	6.51E-05	atm-m ³ /mol	
Solubility in Water	0.45	mg/L	
Modeled Percent in Water	4	%	

Contaminant:	Fluometuron
Substance Key:	12839
Contaminant ID (CASRN):	2164172

Attribute Scores			
Potency	Severity	Prevalence	Magnitude
5	3	9	5

Health Reference Level (HRL)¹: 38.5 ug/L			
Health Reference Level (HRL)¹ cancer: 1.94 ug/L			
HRL/Concentration Ratio(s)			
NC HRL/NAWQA AW 90%: 19.25			
CAR HRL/NAWQA AW 90%: 0.97			
Status			
CCL 3: No	CCL 4 Universe: Yes	PCCL 4: Yes	Draft CCL 4: No

Source	Use
HSDB	Herbicide

3-Model Categorical Prediction
NL?

HEALTH EFFECTS DATA

Non-Cancer Data	Source	Value	Units	Date	Critical Effect	Notes
Reference Dose (RfD)	EPA OPP	0.0055	mg/kg-d		Decreased body weight gain and discoloration in the spleen.	Basis NOAEL = 0.55 mg/kg-day; UF = 100
Reference Dose (RfD)	IRIS	0.013	mg/kg-d	1987	No adverse effects.	NCI, 1980, NOAEL 12.5 mg/kg-d, rat, UF=1000
Reference Dose (RfD)	EPA HA	0.01	mg/kg-d	1987		
Reference Dose (RfD)	RAIS HE	0.013	mg/kg-d	1987		
Minimal Risk Level	ATSDR		mg/kg-d			
Acceptable Daily Intake (ADI)	JMPR		mg/kg-d			
Acceptable Daily Intake (ADI)	CEDI ADI		mg/kg-d			
Tolerable Daily Intake (TDI)	ITER		mg/kg-d			
No Observed Effect Level (NOEL)	CTD JPN		mg/kg-d			
Lowest Observed Adverse Effect Level (LOAEL)	RTECS	100	mg/kg-d		Endocrine - changes in spleen weight, Blood - changes in spleen, Nutritional and Gross Metabolic - weight loss or decreased weight gain	90-day oral study in rat; NTIS National Technical Information Service. (Springfield, VA 22161) Formerly U.S. Clearinghouse for Scientific & Technical Information. Volume(issue)/page/year PB80-217904
Lethal Dose 50 (LD50)	HSDB		mg/kg			
Lethal Dose 50 (LD50)	CTD JPN		mg/kg			
Lethal Dose 50 (LD50)	RTECS		mg/kg			

Cancer Data	Source	Value	Units	Date	Notes
Lifetime Cancer Risk (10 ⁻⁴)	EPA		mg/L		
Slope Factor (Oral)	EPA OPP	0.018	(mg/kg-d) ⁻¹		
Slope Factor (Oral)	OEHHA		(mg/kg-d) ⁻¹		
Slope Factor (Oral)	RAIS HE		(mg/kg-d) ⁻¹		
Cancer Classification ²	EPA OPP	C		2005	
Cancer Classification ²	IARC	3		1987	

Other Supporting Data	Source	Value	Units	Notes
Is contaminant on list of carcinogens?	EPA	Yes		
Is the contaminant on a list of reproductive toxins?				
Drinking Water Equivalent Level (DWEL)	EPA HA	0.5	mg/L	

	Source	Male Rat	Female Rat	Male Mouse	Female Mouse
Cancer Classification ²	NTP	Negative	Negative	Equivocal	Negative

Note: Highlighted data indicate value was used in attribute scoring. Blank fields indicate there were no data available.

¹ For the CCL process HRLs were calculated by converting the RfD or other dose to ug/L, assuming 2 L/day of water consumed by a 70 Kg adult, and a Relative Source Contribution of 20%. For carcinogens, the concentration at the 10⁻⁶ cancer risk was used.

² Cancer classifications were only used for screening. For potency scoring quantitative cancer risk data were used.

OCCURRENCE DATA

	Number of PWSs/Sites/Samples	Number of Detects	PWSs/Sites/Samples	Percent with Detects	Minimum Conc. (Detects)	Maximum Conc. (Detects)	Median Conc. (Detects)	90th Percentile (Detects)	99th Percentile (Detects)	Conc. Units	Date	Notes
Finished Water Data												
Unregulated Contaminant Monitoring Rule (UCMR 1)			PWS							ug/L	2001-2003	
Unregulated Contaminant Monitoring (UCM) Round 1			PWS							ug/L	1988-1992	
Unregulated Contaminant Monitoring (UCM) Round 2			PWS							ug/L	1993-1997	
National Inorganics and Radionuclide Survey (NIRS)			PWS							ug/L	1984-1986	

Ambient Water Data												
National Water-Quality Assessment Program (NAWQA)	4,600	130	Sites	2.83%	0.003	37.77	0.22	2	8.34	ug/L	1992-2001	
National Reconnaissance of Emerging Contaminants (NREC)			Sites							ug/L	1999-2004	

Supplemental Water Data												
	Number	Number of Detects	PWSs/Sites/Samples	Percent with Detects	Minimum Conc. (Detects)	Maximum Conc. (Detects)	Median Conc. (Detects)	75th Percentile (Detects)	95th Percentile (Detects)	Conc. Units	Date	Notes
Pesticide Data Program (PDP)	11	2	Sites	18.2%	0.002	0.042	0.007	0.007	0.033	ug/L	2003-2009	Finished
Pesticide Data Program (PDP)	5	2	Sites	40%	0.002	0.028	0.007	0.007	0.019	ug/L	2003-2009	Raw
Toccalino et al., 2010	590	6	Samples	1%	0.0044	1.22	0.0139	0.699	1.17	ug/L	1993-2007	Ground water; Source Water; Toccalino et al., 2010, Quality of source water from public-supply wells in the United States, 1993-2007: USGS Sci. Investigations Report 2010-5024, p. 206
California Drinking Water Monitoring Data	27	0	PWS	0%						ug/L	1995-2007	
STorage and RETrieval (STORET)	505	8	Sites	1.58%	0	0	0	0	0	ug/L	Updated 2013	
Pesticide Pilot Monitoring Program (PMP)	225	19	Samples	8.4%		0.1			0.062	ug/L	1999	Finished Water; Method 9060 (HPLC/MS)
Pesticide Pilot Monitoring Program (PMP)	312	24	Samples	7.7%		0.264			0.145	ug/L	1999	Ambient Water; Method 9060 (HPLC/MS)

Application/Release Data	Amount Released	Units	Number of States	Units	Date
National Center for Food and Agricultural Policy (NCFAP) – Application	5,313,290	lbs/yr	15	States	1997
Toxics Release Inventory (TRI) – Surface Water	0	lbs/yr	0	States	2010
Toxics Release Inventory (TRI) – Total	0	lbs/yr	0	States	2010

Production	Amount Range	Units	Date
Chemical Update System/Inventory Update Reporting (CUS/IUR)		lbs/yr	2006

Note: Highlighted data indicate value was used in attribute scoring. Blank fields indicate there were no data available.

Other Supporting Data	Source	Value	Date
Estimated Environmental Concentration (EEC)	OPP		

Environmental Fate Parameters	Value	Units	Notes
Half Life		length of time	
Degradation Code	BST		BST = Biodegrades sometimes/recalcitrant (BIODEG)
Organic Carbon Partitioning Coefficient (Koc)	363	L/kg	
Log Octanol-water Partitioning Coefficient (Kow)	2.42	dimensionless	
Distribution Coefficient (Kd)		L/kg	
Henry's Law Coefficient	1.8E-09	atm-m ³ /mol	
Solubility in Water	110	mg/L	
Modeled Percent in Water	12	%	

Contaminant:	Linuron
Substance Key:	6584
Contaminant ID (CASRN):	330552

Attribute Scores			
Potency	Severity	Prevalence	Magnitude
5	3	1	1

Health Reference Level (HRL)¹: 56 ug/L
Health Reference Level (HRL)¹ cancer: N/A

HRL/Concentration Ratio(s)
NC HRL/NAWQA 90%: 215

Source	Use
HSDB	Herbicide

3-Model Categorical Prediction
NL

Status			
CCL 3: No	CCL 4 Universe: Yes	PCCL 4: Yes	Draft CCL 4: No

HEALTH EFFECTS DATA

Non-Cancer Data	Source	Value	Units	Date	Critical Effect	Notes
Reference Dose (RfD)	EPA OPP	0.008	mg/kg-d	1995	Decreased RBC count, hematocrit & hemoglobin levels	Basis NOAEL = 0.77 mg/kg-day; UF = 100. du Pont, 1962.
Reference Dose (RfD)	IRIS	0.002	mg/kg-d	1986	Abnormal blood pigment	du Pont, 1962; Basis LEL 0.625 mg/kg-d, dog, UF=300. NOEL not established.
Reference Dose (RfD)	EPA HA		mg/kg-d			
Reference Dose (RfD)	RAIS HE	0.002	mg/kg-d		Abnormal blood pigment	du Pont, 1962; Basis LEL 0.625 mg/kg-d, dog, UF=300. NOEL not established.
Minimal Risk Level	ATSDR		mg/kg-d			
Acceptable Daily Intake (ADI)	JMPR		mg/kg-d			
Acceptable Daily Intake (ADI)	CEDI ADI		mg/kg-d			
Tolerable Daily Intake (TDI)	ITER		mg/kg-d			
No Observed Effect Level (NOEL)	CTD JPN		mg/kg-d			
Lowest Observed Adverse Effect Level (LOAEL)	RTECS	4.93	mg/kg-d	1975	Blood - changes in serum composition (e.g. TP, bilirubin, cholesterol), Biochemical - Enzyme inhibition, induction, or change in blood or tissue levels - other Enzymes	31-week oral study in rat; GISAAA Gigiena i Sanitariya. For English translation, see HYSAAV. (V/O Mezhdunarodnaya Kniga, 113095 Moscow, USSR) V.1- 1936- Volume(issue)/page/year 40(7),46,1975
Lethal Dose 50 (LD50)	HSDB		mg/kg			
Lethal Dose 50 (LD50)	CTD JPN		mg/kg			
Lethal Dose 50 (LD50)	RTECS		mg/kg			

Cancer Data	Source	Value	Units	Date	Notes
Lifetime Cancer Risk (10 ⁻⁴)	EPA		mg/L		
Slope Factor (Oral)	OEHHA		(mg/kg-d) ⁻¹		
Slope Factor (Oral)	RAIS HE		(mg/kg-d) ⁻¹		
Cancer Classification ²	EPA IRIS	C		1989	
Cancer Classification ²	EPA OPP	C		1995	
Cancer Classification ²	IARC				

Other Supporting Data	Source	Value	Units	Notes
Is contaminant on list of carcinogens?				
Is the contaminant on a list of reproductive toxins?	CACART	Yes		Developmental
Drinking Water Equivalent Level (DWEL)	EPA HA		mg/L	

	Source	Male Rat	Female Rat	Male Mouse	Female Mouse
Cancer Classification ²	NTP				

Note: Highlighted data indicate value was used in attribute scoring. Blank fields indicate there were no data available.

¹ For the CCL process HRLs were calculated by converting the RfD or other dose to ug/L, assuming 2 L/day of water consumed by a 70 Kg adult, and a Relative Source Contribution of 20%. For carcinogens, the concentration at the 10⁻⁶ cancer risk was used.

² Cancer classifications were only used for screening. For potency scoring quantitative cancer risk data were used.

OCCURRENCE DATA

	Number of PWSs/Sites/Samples	Number of Detects	PWSs/Sites/Samples	Percent with Detects	Minimum Conc. (Detects)	Maximum Conc. (Detects)	Median Conc. (Detects)	90th Percentile (Detects)	99th Percentile (Detects)	Conc. Units	Date	Notes
Finished Water Data												
Unregulated Contaminant Monitoring Rule (UCMR 1)	293	0	PWS	0%						ug/L	2001-2003	
Unregulated Contaminant Monitoring (UCM) Round 1			PWS							ug/L	1988-1992	
Unregulated Contaminant Monitoring (UCM) Round 2			PWS							ug/L	1993-1997	
National Inorganics and Radionuclide Survey (NIRS)			PWS							ug/L	1984-1986	

Ambient Water Data												
National Water-Quality Assessment Program (NAWQA)	7,142	105	Sites	1.47%	0.0005	1.4	0.03	0.26	0.74	ug/L	1992-2001	
National Reconnaissance of Emerging Contaminants (NREC)			Sites							ug/L	1999-2004	

Supplemental Water Data												
California Department of Health Services	142	0	PWS	0%						ug/L		Drinking water monitoring
Pesticide Data Program (PDP)	13	2	Sites	15.4%	0.0075	0.315	0.161	0.284	0.312	ug/L	2003-2009	Finished
Pesticide Data Program (PDP)	7	1	Sites	14.3%	0.0042	0.019	0.011	0.017	0.019	ug/L	2003-2009	Raw
Pesticide Pilot Monitoring Program (PMP)	323	1	Samples	0.3%		0.035				ug/L	1999	Ambient Water; Method 2001 (GC/MS)
Pesticide Pilot Monitoring Program (PMP)	312	0	Samples	0%						ug/L	1999	Ambient Water; Method 9060 (HPLC/MS)
Pesticide Pilot Monitoring Program (PMP)	228	0	Samples	0%						ug/L	1999	Finished Water; Method 2001 (GC/MS)
Pesticide Pilot Monitoring Program (PMP)	225	0	Samples	0%						ug/L	1999	Finished Water; Method 9060 (HPLC/MS)
Toccalino et al., 2010	512	1	Samples	0.2%	0.0123	0.0123	0.0123	0.0123	0.0123	ug/L	1993-2007	Ground water; Source Water; Toccalino et al., 2010, Quality of source water from public-supply wells in the United States, 1993-2007: USGS Sci. Investigations Report 2010-5024, p. 206
California Drinking Water Monitoring Data	42	0	PWS	0%						ug/L	1995-2007	
Illinois Drinking Water Monitoring Data	1	0	PWS	0%						ug/L	1998-2005	
USGS/California Groundwater Ambient Monitoring and Assessment (GAMA) Program	753	0	Sites	0%						ug/L	2004-2011	
STOrage and RETrieval (STORET)	592	15	Sites	2.53%	0	3.5	0	1.3	3.3	ug/L	Updated 2013	

Application/Release Data	Amount Released	Units	Number of States	Units	Date
National Center for Food and Agricultural Policy (NCFAP) – Application	516,133	lbs/yr	35	States	1997
Toxics Release Inventory (TRI) – Surface Water	0	lbs/yr	0	States	2010
Toxics Release Inventory (TRI) – Total	1	lbs/yr	1	States	2010

Production	Amount Range	Units	Date
Chemical Update System/Inventory Update Reporting (CUS/IUR)	No Reports	lbs/yr	2002

Note: Highlighted data indicate value was used in attribute scoring. Blank fields indicate there were no data available.

Other Supporting Data	Source	Value	Date
Estimated Environmental Concentration (EEC)	OPP		

Environmental Fate Parameters	Value	Units	Notes
Half Life	60	days	
Degradation Code	BST		BST = Biodegrades sometimes/recalcitrant (PBT)
Organic Carbon Partitioning Coefficient (Koc)	350	L/kg	
Log Octanol-water Partitioning Coefficient (Kow)	3.2	dimensionless	
Distribution Coefficient (Kd)		L/kg	
Henry's Law Coefficient	6.26E-09	atm-m ³ /mol	
Solubility in Water	75	mg/L	
Modeled Percent in Water	11	%	

Contaminant:	Malathion
Substance Key:	5402
Contaminant ID (CASRN):	121755

Attribute Scores			
Potency	Severity	Prevalence	Magnitude
4	3	9	3

Health Reference Level (HRL)¹: 490 ug/L
Health Reference Level (HRL)¹ cancer: N/A

HRL/Concentration Ratio(s)
NC HRL/NAWQA 90%: 5,698

Source	Use
HSDB	Insecticide; veterinary medicine

3-Model Categorical Prediction
NL

Status			
CCL 3: No	CCL 4 Universe: Yes	PCCL 4: Yes	Draft CCL 4: No

HEALTH EFFECTS DATA

Non-Cancer Data	Source	Value	Units	Date	Critical Effect	Notes
Reference Dose (RfD)	EPA OPP	0.07	mg/kg-d	2006	RBC cholinesterase inhibition in pups	Basis BMDL = 7.1 mg/kg-d; UF = 100 (rat study)
Reference Dose (RfD)	IRIS	0.02	mg/kg-d	1987	Red blood cell cholinesterase inhibition	Moeller and Rider, 1962, basis NOEL 0.23 mg/kg-d, human, UF=10
Reference Dose (RfD)	EPA HA	0.02	mg/kg-d	1992		
Reference Dose (RfD)	RAIS HE	0.02	mg/kg-d	1987	RDB ChE depression	Moeller and Rider, 1962, basis NOEL/LEL, human, UF=10
Minimal Risk Level	ATSDR	0.02	mg/kg-d	2003	cholinesterase inhibition	Daly, 1996, basis NOAEL 2 mg/kg-d, rat, UF=100
Acceptable Daily Intake (ADI)	JMPR	0.3	mg/kg-d	1997		
Acceptable Daily Intake (ADI)	CEDI ADI		mg/kg-d			
Tolerable Daily Intake (TDI)	ITER		mg/kg-d			
No Observed Effect Level (NOEL)	CTD JPN		mg/kg-d			
Lowest Observed Adverse Effect Level (LOAEL)	RTECS	0.34	mg/kg-d	2001	Blood - changes in serum composition (e.g. TP, bilirubin, cholesterol), Biochemical - Enzyme inhibition, induction, or change in blood or tissue levels - true cholinesterase	56-day oral study in human; HBPTO Handbook of pesticide toxicology. Robert Krieger ed, Academic press, 2001 Volume(issue)/page/year 1,59,2001
Lethal Dose 50 (LD50)	HSDB		mg/kg			
Lethal Dose 50 (LD50)	CTD JPN		mg/kg			
Lethal Dose 50 (LD50)	RTECS		mg/kg			

Cancer Data	Source	Value	Units	Date	Notes
Lifetime Cancer Risk (10 ⁻⁴)	EPA		mg/L		
Slope Factor (Oral)	OEHHA		(mg/kg-d) ⁻¹		
Slope Factor (Oral)	RAIS HE		(mg/kg-d) ⁻¹		
Cancer Classification ²	EPA OPP	Suggestive		2006	
Cancer Classification ²	IARC	3			

Other Supporting Data	Source	Value	Units	Notes
Is contaminant on list of carcinogens?				
Is the contaminant on a list of reproductive toxins?	UMD	Yes		teratogen
Drinking Water Equivalent Level (DWEL)	EPA HA	0.8	mg/L	Drinking Water Equivalent Level
Maximum Acceptable Concentration (MAC)	CADW	0.19	mg/L	Canadian Drinking Water Maximum Acceptable Concentration

	Source	Male Rat	Female Rat	Male Mouse	Female Mouse
Cancer Classification ²	NTP	Negative	Negative	Not Tested	Not Tested

Note: Highlighted data indicate value was used in attribute scoring. Blank fields indicate there were no data available.

¹ For the CCL process HRLs were calculated by converting the RfD or other dose to ug/L, assuming 2 L/day of water consumed by a 70 Kg adult, and a Relative Source Contribution of 20%. For carcinogens, the concentration at the 10⁻⁶ cancer risk was used.

² Cancer classifications were only used for screening. For potency scoring quantitative cancer risk data were used.

OCCURRENCE DATA

	Number of PWSs/Sites/Samples	Number of Detects	PWSs/Sites/Samples	Percent with Detects	Minimum Conc. (Detects)	Maximum Conc. (Detects)	Median Conc. (Detects)	90th Percentile (Detects)	99th Percentile (Detects)	Conc. Units	Date	Notes
Finished Water Data												
Unregulated Contaminant Monitoring Rule (UCMR 1)			PWS							ug/L	2001-2003	
Unregulated Contaminant Monitoring (UCM) Round 1			PWS							ug/L	1988-1992	
Unregulated Contaminant Monitoring (UCM) Round 2			PWS							ug/L	1993-1997	
National Inorganics and Radionuclide Survey (NIRS)			PWS							ug/L	1984-1986	

Ambient Water Data												
National Water-Quality Assessment Program (NAWQA)	7,117	344	Sites	4.83%	0.0015	9.58	0.0137	0.0863	0.394	ug/L	1992-2001	
National Reconnaissance of Emerging Contaminants (NREC)			Sites							ug/L	1999-2004	

Supplemental Water Data												
California Department of Health Services	271	0	PWS	0%						ug/L		Drinking water monitoring
Pesticide Data Program (PDP)	7	0	Sites	0%						ug/L	2003-2009	Raw
Pesticide Data Program (PDP)	13	2	Sites	15.4%	0.01	0.331	0.171	0.299	0.328	ug/L	2003-2009	Finished
Pesticide Pilot Monitoring Program (PMP)	323	6	Samples	1.9%		0.106				ug/L	1999	Ambient Water; Method 2001 (GC/MS)
Pesticide Pilot Monitoring Program (PMP)	228	0	Samples	0%						ug/L	1999	Finished Water; Method 2001 (GC/MS)
Toccalino et al., 2010	898	0	Samples	0%						ug/L	1993-2007	Ground water; Source Water; Toccalino et al., 2010, Quality of source water from public-supply wells in the United States, 1993-2007: USGS Sci. Investigations Report 2010-5024, p. 206
California Drinking Water Monitoring Data	58	0	PWS	0%						ug/L	1995-2007	
USGS/California Groundwater Ambient Monitoring and Assessment (GAMA) Program	1,828	0	Sites	0%						ug/L	2004-2011	
STORage and RETrieval (STORET)	1,491	178	Sites	11.94%	0	3.43	0.048	0.186	1.2	ug/L	Updated 2013	

Application/Release Data	Amount Released	Units	Number of States	Units	Date
National Center for Food and Agricultural Policy (NCFAP) – Application	5,809,943	lbs/yr	42	States	1997
Toxics Release Inventory (TRI) – Surface Water	5	lbs/yr	1	States	2010
Toxics Release Inventory (TRI) – Total	13,250	lbs/yr	7	States	2010

Production	Amount Range	Units	Date
Chemical Update System/Inventory Update Reporting (CUS/IUR)		lbs/yr	2006

Note: Highlighted data indicate value was used in attribute scoring. Blank fields indicate there were no data available.

Other Supporting Data	Source	Value	Date
Estimated Environmental Concentration (EEC)	OPP		

Environmental Fate Parameters	Value	Units	Notes
Half Life	11	days	
Degradation Code	DF		DF = Degrades fast (HSDB)
Organic Carbon Partitioning Coefficient (Koc)	30.5	L/kg	
Log Octanol-water Partitioning Coefficient (Kow)	2.36	dimensionless	
Distribution Coefficient (Kd)		L/kg	
Henry's Law Coefficient	4.89E-09	atm-m ³ /mol	
Solubility in Water	143	mg/L	
Modeled Percent in Water	25	%	

Contaminant:	Phosmet
Substance Key:	9544
Contaminant ID (CASRN):	732116

Attribute Scores			
Potency	Severity	Prevalence	Magnitude
6	3	1	1

Health Reference Level (HRL)¹: 42 ug/L
Health Reference Level (HRL)¹ cancer: N/A

HRL/Concentration Ratio(s)
NC HRL/GWC EEC: 105

Source	Use
HSDB	Insecticide

3-Model Categorical Prediction
NL

Status			
CCL 3: No	CCL 4 Universe: Yes	PCCL 4: Yes	Draft CCL 4: No

HEALTH EFFECTS DATA

Non-Cancer Data	Source	Value	Units	Date	Critical Effect	Notes
Reference Dose (RfD)	EPA OPP	0.006	mg/kg-d	2010	RBC cholinesterase inhibition (rat study)	Basis BMDL = 0.6 mg/kg-day. RfD is for general population.
Reference Dose (RfD)	IRIS	0.02	mg/kg-d	1986	Red. Body weight; liver cell vacuolization; ChE inhibition	Stauffer Chemical 1967; Basis NOEL 2 mg/kg-d, male rat, UF=100
Reference Dose (RfD)	EPA HA		mg/kg-d			
Reference Dose (RfD)	RAIS HE	0.02	mg/kg-d	1986	Reduced body wt; liver cell vacuolization; Cholinesterase inhibition	Stauffer Chemical 1967; Basis NOEL/LEL, male rat, UF=101
Minimal Risk Level	ATSDR		mg/kg-d			
Acceptable Daily Intake (ADI)	JMPR	0.01	mg/kg-d	1998		
Acceptable Daily Intake (ADI)	CEDI ADI		mg/kg-d			
Tolerable Daily Intake (TDI)	ITER		mg/kg-d			
No Observed Effect Level (NOEL)	CTD JPN		mg/kg-d			
Lowest Observed Adverse Effect Level (LOAEL)	RTECS		mg/kg-d			
Lethal Dose 50 (LD50)	HSDB		mg/kg			
Lethal Dose 50 (LD50)	CTD JPN		mg/kg			
Lethal Dose 50 (LD50)	RTECS	26	mg/kg	1969	Behavioral - somnolence (general depressed activity), Behavioral - muscle contraction or spasticity, Lungs, Thorax, or Respiration - dyspnea	HYSAAV Hygiene and Sanitation (USSR). English translation of GISAAA. (Springfield, VA) 1964-71. Discontinued. Volume(issue)/page/year 34(1-3),192,1969

Cancer Data	Source	Value	Units	Date	Notes
Lifetime Cancer Risk (10 ⁻⁴)	EPA		mg/L		
Slope Factor (Oral)	OEHHA		(mg/kg-d) ⁻¹		
Slope Factor (Oral)	RAIS HE		(mg/kg-d) ⁻¹		
Cancer Classification ²	EPA OPP	Suggestive		2010	
Cancer Classification ²	IARC				

Other Supporting Data	Source	Value	Units	Notes
Is contaminant on list of carcinogens?				
Is the contaminant on a list of reproductive toxins?				
Drinking Water Equivalent Level (DWEL)	EPA HA		mg/L	

	Source	Male Rat	Female Rat	Male Mouse	Female Mouse
Cancer Classification ²	NTP				

Note: Highlighted data indicate value was used in attribute scoring. Blank fields indicate there were no data available.

¹ For the CCL process HRLs were calculated by converting the RfD or other dose to ug/L, assuming 2 L/day of water consumed by a 70 Kg adult, and a Relative Source Contribution of 20%. For carcinogens, the concentration at the 10⁻⁶ cancer risk was used.

² Cancer classifications were only used for screening. For potency scoring quantitative cancer risk data were used.

OCCURRENCE DATA

	Number of PWSs/Sites/Samples	Number of Detects	PWSs/Sites/Samples	Percent with Detects	Minimum Conc. (Detects)	Maximum Conc. (Detects)	Median Conc. (Detects)	90th Percentile (Detects)	99th Percentile (Detects)	Conc. Units	Date	Notes
Finished Water Data												
Unregulated Contaminant Monitoring Rule (UCMR 1)			PWS							ug/L	2001-2003	
Unregulated Contaminant Monitoring (UCM) Round 1			PWS							ug/L	1988-1992	
Unregulated Contaminant Monitoring (UCM) Round 2			PWS							ug/L	1993-1997	
National Inorganics and Radionuclide Survey (NIRS)			PWS							ug/L	1984-1986	

Ambient Water Data												
National Water-Quality Assessment Program (NAWQA)			Sites							ug/L	1992-2001	
National Reconnaissance of Emerging Contaminants (NREC)			Sites							ug/L	1999-2004	

Supplemental Water Data												
California Department of Health Services	11	0	PWS	0%						ug/L		Drinking water monitoring
Pesticide Data Program (PDP)	13	0	Sites	0%						ug/L	2003-2009	Finished
Pesticide Data Program (PDP)	6	0	Sites	0%						ug/L	2003-2009	Raw
Pesticide Pilot Monitoring Program (PMP)	317	0	Samples	0%						ug/L	1999	Ambient Water; Method 9002 (GC/MS)
Pesticide Pilot Monitoring Program (PMP)	221	0	Samples	0%						ug/L	1999	Finished Water; Method 9002 (GC/MS)
Hopple et al., 2009	34		Samples	0%						ug/L	2002-2005	Ground water; Phase 2; Source water; Hopple et al., 2009, Anthropogenic organic compounds in source water of selected community water systems that use groundwater, 2002-05: USGS Sci. Investigations Report 2009-5200, p.74
Hopple et al., 2009	211		Samples	0%						ug/L	2002-2005	Ground water; Phase 1; Source water; Hopple et al., 2009
Hopple et al., 2009	34		Samples	0%						ug/L	2002-2005	Ground water; Phase 2; Finished water; Hopple et al., 2009
California Drinking Water Monitoring Data	2	0	PWS	0%						ug/L	1995-2007	
STorage and RETrieval (STORET)	700	20	Sites	2.86%	0	0.222	0	0.198	0.217	ug/L	Updated 2013	

Application/Release Data	Amount Released	Units	Number of States	Units	Date
National Center for Food and Agricultural Policy (NCFAP) – Application	1,333,468	lbs/yr	40	States	1997
Toxics Release Inventory (TRI) – Surface Water		lbs/yr		States	2010
Toxics Release Inventory (TRI) – Total		lbs/yr		States	2010

Production	Amount Range	Units	Date
Chemical Update System/Inventory Update Reporting (CUS/IUR)		lbs/yr	2006

Note: Highlighted data indicate value was used in attribute scoring. Blank fields indicate there were no data available.

Other Supporting Data	Source	Value	Date
Estimated Environmental Concentration (EEC)	OPP	SW Chronic = N/A; GW Chronic = 0.4 ug/L	

Environmental Fate Parameters	Value	Units	Notes
Half Life	38	days	
Degradation Code	BSA		BSA = Biodegrades slow with acclimation (PBT)
Organic Carbon Partitioning Coefficient (Koc)	42.9	L/kg	
Log Octanol-water Partitioning Coefficient (Kow)	2.78	dimensionless	
Distribution Coefficient (Kd)		L/kg	
Henry's Law Coefficient	8.39E-09	atm-m ³ /mol	
Solubility in Water	24.4	mg/L	
Modeled Percent in Water	41	%	

Appendix 2: Microbial Contaminant Information Sheets

Adenovirus Scoring Data

Scoring Summary^{1,2}	
Occurrence	3
Health Effects	
General population	6
Sensitive subpopulation(s) [CD, C]	4

¹ Bolded Text indicates the highest score for that particular protocol. For the health effects protocol two scores were selected: the general population [G] and the highest score for a sensitive subpopulation. These 2 scores were added and normalized by multiplying by 5/14 for a final health effects score. The higher score between the WBDO and Occurrence protocols was used for total pathogen score calculation. Health Effects protocol: G – General, C - Child, E-Elderly, P - Pregnant Women, CD -Chronic Disease

Score²	Data Element	Scoring Data	Reference³
<i>Waterborne Disease Outbreaks</i>			
5	Has caused multiple (2 or more) documented WBDOs in the U.S. as reported by CDC surveillance between 1990 and 2008	No	CDC, 1991 – CDC, 2011
4	Has caused at least one documented WBDOs in the U.S. as reported by CDC surveillance between 1990 and 2008	No	CDC, 1991 – CDC, 2011
3	Has caused documented WBDOs at any time in the U.S.?	No	
2	Has caused WBDOs in countries other than the U.S.?	Yes Europe	Kukkula et al., 1997
1	Has never caused WBDOs in any country, but has been epidemiologically associated with water related disease?	N/A	
<i>Occurrence</i>			
3	Detected in drinking water in the U.S.?	Yes PCR in connection with an outbreak.	O'Reilly et al., 2007 Fong et al., 2007

Score ²	Data Element	Scoring Data	Reference ³
2	Detected in source water in the U.S.?	Yes 38% of surface water samples collected as part of the Information Collection Rule contained Adenovirus 40/41.	USEPA, 2007
1	Not detected in the U.S.?	N/A	
<i>Health Effects</i>			
7	Does the organism cause significant mortality (> 1/1,000 cases)?		
6 [G]	Does the organism cause pneumonia, meningitis, hepatitis, encephalitis, endocarditis, cancer, or other severe manifestations of illness necessitating long term hospitalization (> week)?	[G] A frequent cause of pneumonia among (unvaccinated) military recruits. Two deaths in previously-healthy adults. ARD is still a significant problem in military. Less common manifestations include fatal neonatal disease, meningoencephalitis and myocarditis.	Gray et al., 2001 Robinson in Murray, 2010
5	Does the illness result in long term or permanent dysfunction or disability, i.e. sequelae?	None reported	
4 [C, CD]	Does the illness require short term hospitalization (< week)?	[CD] Children with chronic disease required respiratory ventilation. [C] Young adults may contract acute respiratory disease.	CDC, 1983 CDC, 1998
3	Does the illness require physician intervention?	Physician office visits are indicated for ocular infections.	Robinson in Murray, 2010

Score ²	Data Element	Scoring Data	Reference ³
2 [E, P]	Is the illness self-limiting within 72 hours (without requiring medical intervention)?	[E, P] Approximately 50% of cases are asymptomatic, symptomatic cases usually present as upper respiratory infections similar to the common cold.	Robinson in Murray, 2010
1	Does the illness result in mild symptoms with minimal or no impact on daily activities?		

¹ Bolded Text indicates the highest score for that particular protocol. For the health effects protocol two scores were selected: the general population [G] and the highest score for a sensitive subpopulation. These 2 scores were added and normalized by multiplying by 5/14 for a final health effects score. The higher score between the WBDO and Occurrence protocols was used for total pathogen score calculation. Health Effects protocol: G – General, C - Child, E-Elderly, P - Pregnant Women, CD -Chronic Disease.

²See *Final Contaminant Candidate List 3 Microbes: PCCL to CCL Process*. EPA 815-R-09-009. Final. August 2009 for a detailed description on how to calculate the total pathogen score.

³EPA based the WBDO scores on the CDC MMWR reports from 1991 – 2008 and then collected occurrence citations if there were no CDC WBDOs.

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Naegleria fowleri Scoring Data

Scoring Summary^{1,2}	
Waterborne Disease Outbreak	4
Health Effects	
General population	7
Sensitive subpopulation(s) [C, P, E, CD]	7

¹ Bolded Text indicates the highest score for that particular protocol. For the health effects protocol two scores were selected: the general population [G] and the highest score for a sensitive subpopulation. These 2 scores were added and normalized by multiplying by 5/14 for a final health effects score. The higher score between the WBDO and Occurrence protocols was used for total pathogen score calculation. Health Effects protocol: G – General, C - Child, E-Elderly, P - Pregnant Women, CD -Chronic Disease

Score²	Data Element	Scoring Data	Reference³
<i>Waterborne Disease Outbreaks</i>			
5	Has caused multiple (2 or more) documented WBDOs in the U.S. as reported by CDC surveillance between 1990 and 2008?	No	CDC, 1991 – CDC, 2011
4	Has caused at least one documented WBDOs in the U.S. as reported by CDC surveillance between 1990 and 2008?	Yes 1 Community	CDC, 2004
3	Has caused documented WBDOs at any time in the U.S.?	N/A	
2	Has caused WBDOs in countries other than the U.S.?	N/A	
1	Has never caused WBDOs in any country, but has been epidemiologically associated with water related disease?	N/A	

Score ²	Data Element	Scoring Data	Reference ³
<i>Occurrence</i>			
3	Detected in drinking water in the U.S.?	Yes Arizona storage - Sampled pre-treatment multiple-well study in Arizona.	Gerba et al., 2007 Marciano-Cabral et al., 2003
2	Detected in source water in the U.S.?	Yes	Schuster and Visvesvara, 2004
1	Not detected in the U.S.?	N/A	
<i>Health Effects</i>			
7 [G, C, P, E, CD]	Does the organism cause significant mortality (> 1/1,000 cases)?	[All populations] Recovery from primary amoebic meningoencephalitis is rare.	Heymann, 2005
6	Does the organism cause pneumonia, meningitis, hepatitis, encephalitis, endocarditis, cancer, or other severe manifestations of illness necessitating long term hospitalization (> week)?	Acute fulminating disease. Only a few patients have survived.	Visvesvara in Murray, 2010
5	Does the illness result in long term or permanent dysfunction or disability, i.e. sequelae?	No	
4	Does the illness require short term hospitalization (< week)?	All cases are hospitalized for diagnosis and treatment.	Visvesvara in Murray, 2010
3	Does the illness require physician intervention?		
2	Is the illness self-limiting within 72 hours (without requiring medical intervention)?		

Score ²	Data Element	Scoring Data	Reference ³
1	Does the illness result in mild symptoms with minimal or no impact on daily activities?		

¹ Bolded Text indicates the highest score for that particular protocol. For the health effects protocol two scores were selected: the general population [G] and the highest score for a sensitive subpopulation. These 2 scores were added and normalized by multiplying by 5/14 for a final health effects score. The higher score between the WBDO and Occurrence protocols was used for total pathogen score calculation. Health Effects protocol: G – General, C - Child, E-Elderly, P - Pregnant Women, CD -Chronic Disease.

²See *Final Contaminant Candidate List 3 Microbes: PCCL to CCL Process*. EPA 815-R-09-009. Final. August 2009 for a detailed description on how to calculate the total pathogen score.

³EPA based the WBDO scores on the CDC MMWR reports from 1991 – 2008 and then collected occurrence citations if there were no CDC WBDOs.

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***Toxoplasma gondii* Scoring Data**

Scoring Summary^{1,2}	
Waterborne Disease Outbreak	2
Health Effects	
General population	2
Sensitive subpopulation(s) [P]	7

¹ Bolded Text indicates the highest score for that particular protocol. For the health effects protocol two scores were selected: the general population [G] and the highest score for a sensitive subpopulation. These 2 scores were added and normalized by multiplying by 5/14 for a final health effects score. The higher score between the WBDO and Occurrence protocols was used for total pathogen score calculation. Health Effects protocol: G – General, C - Child, E-Elderly, P - Pregnant Women, CD -Chronic Disease

Score²	Data Element	Scoring Data	Reference³
<i>Waterborne Disease Outbreaks</i>			
5	Has caused multiple (2 or more) documented WBDOs in the U.S. as reported by CDC surveillance between 1990 and 2008?	No	CDC, 1991 – CDC, 2011
4	Has caused at least one documented WBDOs in the U.S. as reported by CDC surveillance between 1990 and 2008?	No	CDC, 1991 – CDC, 2011
3	Has caused documented WBDOs at any time in the U.S.?	No	
2	Has caused WBDOs in countries other than the U.S.?	Yes Canada and Brazil.	Bowie et al., 1997 de Moura, 2006
1	Has never caused WBDOs in any country, but has been epidemiologically associated with water related disease?	N/A	

Score ²	Data Element	Scoring Data	Reference ³
<i>Occurrence</i>			
3	Detected in drinking water in the U.S.?	No	
2	Detected in source water in the U.S.?	No	
1	Not detected in the U.S.?	Yes Groundwater in Poland and Canada.	Sroka et al., 2006 Isaac-Renton et al., 1998
<i>Health Effects</i>			
7 [P]	Does the organism cause significant mortality (> 1/1,000 cases)?	[P] Congenital infection of neonates severe. Infection during early pregnancy may lead to fetal infection with death of the fetus or other severe manifestations. Later in pregnancy, maternal infection results in mild or subclinical fetal disease.	Wilson in Murray, 2010 Heymann, 2005
6	Does the organism cause pneumonia, meningitis, hepatitis, encephalitis, endocarditis, cancer, or other severe manifestations of illness necessitating long term hospitalization (> week)?	Immunocompromised hosts may experience CNS, pneumonitis, and myocarditis.	Wilson in Murray, 2010
5	Does the illness result in long term or permanent dysfunction or disability, i.e. sequelae?		

Score ²	Data Element	Scoring Data	Reference ³
4	Does the illness require short term hospitalization (< week)?		
3	Does the illness require physician intervention?	Treatment is indicated only for pregnant women, infants and immunocompromised hosts.	Wilson in Murray, 2010
2 [G, C, E, CD]	Is the illness self-limiting within 72 hours (without requiring medical intervention)?	[G, C, E, CD] Infection is generally asymptomatic; however 10 – 20% of patients with acute infection may develop cervical lymphadenopathy and/or flu-like symptoms.	Wilson in Murray, 2010
1	Does the illness result in mild symptoms with minimal or no impact on daily activities?		

¹ Bolded Text indicates the highest score for that particular protocol. For the health effects protocol two scores were selected: the general population [G] and the highest score for a sensitive subpopulation. These 2 scores were added and normalized by multiplying by 5/14 for a final health effects score. The higher score between the WBDO and Occurrence protocols was used for total pathogen score calculation. Health Effects protocol: G – General, C - Child, E-Elderly, P - Pregnant Women, CD -Chronic Disease.

²See *Final Contaminant Candidate List 3 Microbes: PCCL to CCL Process*. EPA 815-R-09-009. Final. August 2009 for a detailed description on how to calculate the total pathogen score.

³EPA based the WBDO scores on the CDC MMWR reports from 1991 – 2008 and then collected occurrence citations if there were no CDC WBDOs.

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Vibrio cholerae Scoring Data

Scoring Summary^{1,2}	
Waterborne Disease Outbreak	4
Health Effects	
General population	3
Sensitive subpopulation(s) [C, E, P, CD]	3

¹ Bolded Text indicates the highest score for that particular protocol. For the health effects protocol two scores were selected: the general population [G] and the highest score for a sensitive subpopulation. These 2 scores were added and normalized by multiplying by 5/14 for a final health effects score. The higher score between the WBDO and Occurrence protocols was used for total pathogen score calculation. Health Effects protocol: G – General, C - Child, E-Elderly, P - Pregnant Women, CD -Chronic Disease

Score²	Data Element	Scoring Data	Reference³
<i>Waterborne Disease Outbreaks</i>			
5	Has caused multiple (2 or more) documented WBDOs in the U.S. as reported by CDC surveillance between 1990 and 2008?	No	CDC, 1991 – CDC, 2011
4	Has caused at least one documented WBDOs in the U.S. as reported by CDC surveillance between 1990 and 2008?	1 Community	CDC, 1996
3	Has caused documented WBDOs at any time in the U.S.?	N/A	
2	Has caused WBDOs in countries other than the U.S.?	N/A	
1	Has never caused WBDOs in any country, but has been epidemiologically associated with water related disease?	N/A	
<i>Occurrence</i>			
3	Detected in drinking water in the U.S.?	Yes (outbreak data)	CDC, 1996

Score ²	Data Element	Scoring Data	Reference ³
2	Detected in source water in the U.S.?	Yes	Rhodes et al., 1986 Kaper et al., 1982
1	Not detected in the U.S.?	N/A	
<i>Health Effects</i>			
7	Does the organism cause significant mortality (> 1/1,000 cases)?	<i>V. cholerae</i> Non-O1: third most commonly isolated in U.S. - Septicemia case fatality rate from 24-65%.	Abbott in Murray, 2010
6	Does the organism cause pneumonia, meningitis, hepatitis, encephalitis, endocarditis, cancer, or other severe manifestations of illness necessitating long term hospitalization (> week)?	<i>V. cholerae</i> O1: Extremely rare cases causes severe extraintestinal infection. If untreated, <i>V. cholerae</i> O1 infection causes severe dehydration which leads to hypovolemic shock, acidosis, circulatory collapse, and death. Unlike O1 strains, non-O1 isolates are commonly associated with extraintestinal infections such as septicemia.	Abbott in Murray, 2010
5	Does the illness result in long term or permanent dysfunction or disability, i.e. sequelae?		

Score ²	Data Element	Scoring Data	Reference ³
4	Does the illness require short term hospitalization (< week)?	In severely dehydrated cases (cholera gravis), death may occur within a few hours, and the case-fatality rate may exceed 50%. With proper and timely rehydration, this can be less than 1%.	Heymann, 2005
3 [G, C, P, E, CD]	Does the illness require physician intervention?	[All populations] In most cases infection is asymptomatic or causes self-limiting diarrhea. Treatment consists of fluid replacement by oral rehydration therapy and/or intravenous fluids.	Abbott in Murray, 2010
2	Is the illness self-limiting within 72 hours (without requiring medical intervention)?		
1	Does the illness result in mild symptoms with minimal or no impact on daily activities?		

¹ Bolded Text indicates the highest score for that particular protocol. For the health effects protocol two scores were selected: the general population [G] and the highest score for a sensitive subpopulation. These 2 scores were added and normalized by multiplying by 5/14 for a final health effects score. The higher score between the WBDO and Occurrence protocols was used for total pathogen score calculation. Health Effects protocol: G – General, C - Child, E-Elderly, P - Pregnant Women, CD -Chronic Disease.

²See *Final Contaminant Candidate List 3 Microbes: PCCL to CCL Process*. EPA 815-R-09-009. Final. August 2009 for a detailed description on how to calculate the total pathogen score.

³EPA based the WBDO scores on the CDC MMWR reports from 1991 – 2008 and then collected occurrence citations if there were no CDC WBDOs.

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