Evaluation of Environmental Hazards at Sites with Contaminated Soil and Groundwater

Volume 2: Background Documentation for the Development of Tier 1 Environmental Action Levels

Appendix 1: Detailed Lookup Tables

Tropical Pacific Edition

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Summer 2016

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DISCLAIMER

This report, *Evaluation of Environmental Hazards at Sites with Contaminated Soil and Groundwater – Tropical Pacific Edition* (Summer 2016), is a technical guidance document prepared in cooperation with the US Environmental Protection Agency (USEPA), the Commonwealth of the Northern Mariana Islands Division of Environmental Quality (CNMI DEQ) and the Guam Environmental Protection Agency (Guam EPA). The guidance and associated models represent an update to a similar document prepared under the direction of the USEPA and CNMI DEQ in 2005, as well as subsequent updates prepared under the direction of Guam EPA. Similar guidance documents have been prepared for the State of California and State of Hawai‘i by the same author (Dr. Roger Brewer). This version of the guidance, referred to as the Tropical Pacific Edition (referred to as the "Pacific Basin Edition" in earlier versions), adheres most strictly to USEPA standards and publications and is considered to be the most widely applicable of the three to other areas of the tropical Pacific. Use outside of the tropical Pacific could require adjustment of some screening levels, particularly those associated with vapor intrusion (see Section 4.3.2).

The document provides guidance for identification and evaluation of potential environmental hazards associated with contaminated soil and groundwater. The Environmental Screening Levels (ESLs) presented in this document and the accompanying text are specifically *not* intended to serve as: 1) a stand-alone decision making tool, 2) guidance for the preparation of baseline environmental risk assessments, 3) a rule to determine if a waste is hazardous under the state or federal regulations, or 4) a rule to

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VOLUME 2: BACKGROUND DOCUMENTATION FOR THE DEVELOPMENT OF TIER 1 SOIL AND GROUNDWATER ACTION LEVELS

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GLOSSARY OF TERMS

AWQC: Aquatic Water Quality Criteria
CCC: Criterion for Continuous Concentration
CCM: Criterion for Maximum Concentration
EPA: Environmental Protection Agency
ESL: Environmental Screening Level
FVC: Final Chronic Value
HIDOH: Hawai'i Department of Health
HH: Human Health-consumption of aquatic organisms
LOEL: Lowest-Observed-Effects Level
MADEP: Massachusetts Department of Environmental Protection
MCL: Maximum Concentration Level
MOEE: Ontario Ministry of Environment and Energy
MTBE: Methyl tert-Butyl Ethylene
PCE: Tetrachloroethylene
PRG: Preliminary Remediation Goals
RBSL: Risk-Based Screening Level
RSL: Regional Screening Level
RWQCB: Regional Water Quality Control Board
TPH: Total Petroleum Hydrocarbons
USEPA: U.S. Environmental Protection Agency
USDOE: U.S. Department of Energy

APPENDIX 1

DEVELOPMENT OF TIER 1 LOOKUP TABLES

[Refer to Appendix 8 for summary of most recent updates]

APPENDIX 1
DEVELOPMENT OF TIER 1 LOOKUP TABLES

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1 Development of Tier 1 Lookup Tables

1.1 Introduction

This guidance document represents an update to guidance prepared for the Commonwealth of the Northern Mariana Islands Division of Environmental Quality (CNMI DEQ) in 2005 (CNMI 2005a) and subsequently updated in coordination with Guam Environmental Protection Agency (Guam EPA) in 2008. Compilation and presentation of the environmental screening levels (ESLs) presented in this document is modeled after similar documents published by the California Environmental Protection Agency (CalEPA) (RWQCBSFB 2005), the Hawai‘i Department of Health (HDOH) (HDOH 2016), the Ontario Ministry of Environment and Energy (MOEE) (MOEE 1996), the Massachusetts Department of Environmental Protection (MADEP) (MADEP 1994) and the Netherlands (Vetger 1993). The document also incorporates Regional Screening Levels (RSL) for soil, ambient air and tapwater prepared by U.S. Environmental Protection Agency (USEPA) with modifications as noted in the text (USEPA 2016). Screening levels for the following environmental concerns are presented (refer also to Figure 1):

Groundwater:
- Protection of human health
- Current or potential drinking water resource;
- Intrusion of subsurface vapors to building interiors;
- Protection of aquatic habitats (discharges to surface water);
- Protection against gross contamination concerns (free product, odors, etc.) and general resource degradation.

Soil:
- Protection of human health
  - Direct/indirect exposure with impacted soil (ingestion, dermal absorption, inhalation of vapors and dust in outdoor air);
  - Intrusion of subsurface vapors to building interiors;
- Protection of groundwater quality (leaching of chemicals from soil);
- Protection against gross contamination concerns (free product, odors, etc.) and general resource degradation.

Shallow Soil Gas:
- Protection of human health
  - Intrusion of subsurface vapors into building interiors;
- Protection of groundwater quality

- Leaching of volatile chemicals from soil and migration to groundwater.

For use in this document, the term "soil" refers to any unconsolidated material found in the subsurface, including actual soil, saprolite, sediment, fill material, etc. Screening levels for each concern are organized as follows:

[1]BENEFICIAL USE OF THREATENED GROUNDWATER	[2]LOCATION OF IMPACTED SOIL	
	Shallow Soil (≤ 3m bgs)	**[3]Deep Soil (> 3m bgs)**
Current or Potential Source of Drinking Water	Soil: Tables A-1, A-2 Water: Table F-1a	Soil: Tables C-1, C-2 Water: Table F-1a
NOT a Current or Potential Source of Drinking Water	Soil: Tables B-1, B-2 Water: Table F-2	Soil: Tables D-1, D-2 Water: Table F-2

bgs: below ground surface
1. Shallow-most saturated zone beneath the subject site and deeper zones as appropriate.
2. Depth to top of impacted soil from ground surface (3 meters = 10 feet).
3. Application of Deep Soil ESLs to soils <3m deep may require institutional controls (see text).

The Table A through D series summarize screening levels complied for soil under residential/unrestricted (A-1, B-1, C-1, D-1) and commercial/industrial (A-2, B-2, C-2, D-2) land use scenarios. The Table E series summarizes soil, groundwater, soil gas and indoor air screening levels complied for the potential intrusion of subsurface vapors into buildings. Screening levels for groundwater and surface water are summarized in the Table F series. Tables G through L provide supporting screening levels and other information for the earlier tables. An electronic version of the lookup tables, the “ESL Surfer”, is available from the HDOH environmental hazard evaluation (EHE) web page as well as the CNMI DEQ and the Guam EPA (Guam EPA, pending).

Chapters 2 and 3 discuss screening levels prepared for evaluation of vapor intrusion hazards. Screening levels compiled for soil are discussed in Chapter 4. A discussion of screening levels compiled for surface water and groundwater is provided in Chapter 5. Screening levels developed for Total Petroleum Hydrocarbon (TPH) are discussed in Chapter 6. Other issues pertinent to the lookup tables are discussed in Chapter 7.

1.2 Example Selection of Tier 1 ESLs for Tetrachloroethylene (PCE)

Figure 2 illustrates the selection of final Tier 1 soil and groundwater ESLs for the chemical tetrachloroethylene (PCE). The example assumes impacts to shallow soils (≤3 meters below ground surface) under an unrestricted (e.g., residential) land-use scenario. Groundwater immediately underlying the site is assumed to be a potential source of

drinking water. This scenario places the site under Table A-1 of the Tier 1 lookup tables (refer to Section 1.1).

The Tier 1 ESL for PCE in shallow soil is selected as the lowest of the individual action levels for Direct Exposure (0.64 mg/kg), Vapor Intrusion (1.8 mg/kg), Gross Contamination (170 mg/kg) and Groundwater Protection (leaching concerns, (0.64 mg/kg). The final soil ESL for PCE is the lowest of the individual screening levels, or 0.64 mg/kg, based on potential vapor intrusion concerns for buildings overlying contaminated soil (see also Table A-1 in this appendix and Table A in Volume 1).

The process for selection of a Tier 1 PCE ESL in groundwater is similar (refer to Figure 2). Individual screening levels for Drinking Water (5.0 [µg/L]), Vapor Intrusion (3,500 µg/L), Discharge to Surface Water (53 µg/L) and Gross Contamination (170 µg/L) concerns are compared and the lowest of these is selected for inclusion in the Volume 1 summary, Tier 1 lookup tables. In this example, the groundwater screening level for drinking water concerns drives potential risks and is selected as the Tier 1 ESL (5.0 µg/L).

Selection of ESLs for PCE in deep soils is similar (i.e., >1m below ground surface). The direct-exposure screening level is modified to focus on infrequent exposure of construction and utility workers. The ceiling level for gross contamination concerns is generally somewhat less stringent. Soil screening levels for leaching and groundwater protection concerns remain the same. For deep soils, evaluate of potential terrestrial ecotoxicity may not be necessary

The process described above was carried out for each of the 100+ chemicals included in the Tier 1 lookup tables under each combination of groundwater beneficial use, soil depth and land use. The results are summarized in Tables A through D (soil) and Table F (groundwater) of this appendix. As can be seen from a review of these tables, the selection of final, Tier 1 ESLs for highly mobile or highly toxic chemicals is typically driven by groundwater protection or vapor intrusion concerns (e.g., see selection process for benzene or vinyl chloride ESLs in Table A-1). Final ESLs for chemicals that are relatively immobile in soils but highly toxic are typically driven by direct-exposure concerns (e.g., see selection process for polychlorinated biphenyls [PCBs] in Table A-1). In contrast, selection of ESLs for heavy metals that are relatively non-toxic to humans is typically driven by ceiling levels for general resource degradation (e.g., see selection process for copper ESL in Table A-1). For chemicals that have particularly strong odors, selection of ESLs may be driven in part by gross contamination concerns ("ceiling levels", e.g., see TPH ESLs in Table B-1). The consideration of gross contamination becomes especially important in the selection of ESLs for relatively immobile chemicals in isolated, deep soils (e.g., refer to Table C-1).

1.3 Toxicity Factors and Physiochemical Constants

Toxicity factors and physiochemical constants used in the soil, tapwater and vapor intrusion models for risk to human health are taken directly from the May 2016 USEPA Regional Screening Levels (RSLs) guidance except as noted in footnotes to Table J (USEPA 2016). . The original, Region IX Preliminary Remediation Goals (PRGs) used route-to-route extrapolation to develop interim inhalation toxicity factors for chemical where studies specific to this pathway were not available or inadequate to develop toxicity factors (USEPA 2004b, see also USEPA 2011a). This approach was discontinued in the USEPA RSLs, which were first published in 2005. The guidance instead calls for a case-by-case review of this issue by local toxicologists. This is not practical for initial screening of sites and use of a route-to-route extrapolation approach continues to be incorporated in this ESL guidance, as well as guidance published by the Hawai‘i DOH (HDOH 20011a). Chemicals where this approach was used are noted in the footnotes of Table J (primarily volatile chemicals that lack inhalation-based toxicity factors in the USEPA RSL guidance).

Several contaminants included in the Pacific Basin ESLs are not listed in the USEPA RSLs (e.g., TPH). In these cases alternative sources were referred to for compilation of toxicity factors and physiochemical constants, as discussed in this appendix. Chemicals that to fall in this category and references used to compile toxicity factors and constants are highlighted in the footnotes of Table J.

Chemicals are subdivided in terms of volatility into the following categories for use in this guidance (see Table J):

- Volatile: Henry’s Constant >0.00001 (atm-m^3/mole) OR VP >1 (mm) Hg AND molecular weight <200;
- Semivolatile: Henry’s Constant >0.00001 (atm-m^3/mole) OR VP >1 mm Hg and molecular weight $\geq$200;
- Nonvolatile: Henry’s Constant $\leq$0.00001 (atm-m^3/mole) AND VP $\leq$1 mm Hg.

Soil and groundwater screening levels for vapor intrusion are only developed for “volatile” chemicals as defined above (Tables E-1a and E-1b), although indoor air and subslab soil vapor screening levels are also included for semi-volatile chemicals (Tables E-2 and E-3). Tapwater and soil direct exposure screening levels are calculated using the “volatile” chemical model incorporated into the USEPA RSLs for both “volatile” and “semi-volatile” chemicals (Tables F-3b and K-1 through K-3). Soil and water screening levels for nonvolatile chemicals are generated using alternative models, as discussed below.

1.4 Cumulative Risk

Exposure assumptions used to develop direct-exposure and indoor-air screening levels primarily reflect parameter values presented in USEPA risk assessment guidance for Superfund sites (refer to USEPA 2016). Alternative, and in some cases less conservative and presumable more accurate, exposure assumptions are presented in the USEPA technical document *Exposure Factors Handbook* (USEPA 1997, 2011), among other examples. For example, recommended inhalation rates for residents are 11.3 m^3/day for women and 15.2 m^3/day for men, in comparison to the value of 20 m^3/day used to develop the direct-exposure screening levels presented in this appendix (Section 4.2). More recent reviews of soil ingestion rates also suggest that a rate of 25 to 50 mg/day is appropriate for children, versus the rate of 200 mg/day used to develop the residential, direct-exposure screening levels in this document (NZ 2011). Using the lower rate would roughly double to quadruple most screening levels. The average time (50th percentile) spent at one residence is also stated to be 9.0 years, in contrast to the more conservative exposure duration used of 30 years. The average occupational tenure is similarly stated to be 6.6 years, in contrast to the occupational exposure duration used of 25 years. While the more conservative exposure assumptions are still generally recommended for use in site-specific risk assessments, the variance in the assumptions helps to demonstrate the overall conservative nature of the models and risk-based screening levels referenced in this document.

For carcinogens, the risk-based screening levels for unrestricted ("residential") and commercial/industrial exposure scenarios are, in general, based on a target excess cancer risk of 10^{-6}. This represents the upper end (most stringent) of the potentially acceptable range of 10^{-4} to 10^{-6} recommended by the USEPA (USEPA 1989a,b). Remediation or risk management is almost always warranted at sites where the estimated cancer risk exceeds 10^{-4}. For sites where the estimated risk is between 10^{-4} and 10^{-6}, the need for active remediation or risk management is evaluated on a site-specific basis (i.e., risks within this range are "potentially acceptable", depending on site-specific considerations). Consideration of noncancer health hazards must also be included. In general, the noncancer Hazard Quotient begins to approach an upper limit of 1.0 when the excess cancer risk is between 10^{-4} and 10^{-5} (see following discussion).

The use of alternative exposure assumptions in a more "site-specific" risk assessment could easily result in an increase of direct-exposure screening levels by a factor of at least three or more while still meeting the target excess cancer risk. Based on the conservative nature of the model assumptions in general, the direct-exposure screening levels presented in this appendix and the soil and soil gas ESLs in general are considered to be adequate for use at sites where up to three carcinogenic chemicals of concern have been identified. Additional evaluation may be required for sites where more than three carcinogens are identified.

A cumulative, target Hazard Index of 1.0 is typically used in human health risk assessments for evaluation of noncarcinogenic risks. The USEPA RSLs for soil were developed based on a chemical-specific, target Hazard Quotient of 1.0 (i.e., assumes no other contaminant with similar health effects is present; USEPA 2016). The User's Guide to the RSLs recommends that cumulative risk always be evaluated in conjunction with use of the screening levels, although this is rarely done. To account for potential cumulative effects, the USEPA RSLs for soil are adjusted to a target Hazard Quotient of 0.2 for use in the ESL lookup tables, unless otherwise noted in Section 4 (see also Table K series). This adjustment reflects an assumption that up to five chemicals with the same chronic health effects may be present at a given site. A similar target Hazard Quotient was used by the Massachusetts DEP (MADEP 1994) and Ontario MOEE (MOEE 1996) to develop screening levels for direct-exposure concerns. Additional evaluation may be required for sites where more than five chemicals with similar noncarcinogenic health effects are present. For reference, a compilation of chronic health effects for the chemicals listed in the ESLs is provided in Table L of this appendix. Risk-based screening levels for drinking water (tapwater) are based on a target Hazard Quotient of 1.0 and do not take into account potential cumulative health risks (refer to section 5.2).

A Hazard Quotient of 1.0 was used for calculation of risk-based screening levels for Total Petroleum Hydrocarbons (see Section 6 and Appendix 6). The TPH parameter incorporates multiple chemicals within specified carbon ranges. In effect, this largely addresses potential cumulative risk concerns and a less stringent target Hazard Quotient is considered justified. If non-petroleum contaminants are present at concentrations that approach risk-based screening levels and the soil is to be left in place then evaluation of cumulative risk should be carried out. This excludes lead, which is evaluated using a separate approach (refer to USEPA 2016).

The direct-exposure screening levels do not address potential synergistic effects (e.g., 1+1=3). Synergistic effects are primarily of concern for exposure to multiple chemicals at concentrations significantly higher than those expressed in the direct-exposure ESLs. Conservative target risk goals and exposure assumptions used to develop the screening levels further reduce this concern. Methods to quantitatively assess synergistic effects have not been fully developed.

2 Background and Use of Vapor Intrusion Models

2.1 Background

This section describes the general approach used to develop vapor intrusion action levels for indoor air, subslab soil vapor, soil and groundwater, presented in Sections 3, 4 and 5 of this document. Indoor air action levels are based on a model used by USEPA to generate Regional Screening Levels for ambient air (USEPA 2016). Subslab soil vapor action levels were developed based on estimations of indoor air exchange rates and building slab vapor entry rates for tropical settings published by Brewer et al. (2014). A copy of the paper is included in Appendix 3. Corresponding vapor intrusion action levels for soil and groundwater were generated using a computer spreadsheet model published by the USEPA (USEPA 2004a and updates).

The USEPA vapor intrusion model incorporates a model presented in the document *Heuristic Model for Predicting the Intrusion Rate of Contaminant Vapors into Buildings* (Johnson and Ettinger, 1991). These models were developed to study radon intrusion into homes but were subsequently modified for use with any volatile chemical. Development of the models included calibration with field data. They are thus based on empirical data and not purely theoretical. Excerpts of key text from the USEPA guidance document is provided in Appendix 3, as is a sensitivity evaluation of the Johnson and Ettinger model.

The model considers both diffusive and convective flow of subsurface vapors into buildings. Diffusive flow occurs as soil vapor migrates from areas of higher concentration to areas of lower concentration. Wind effects and indoor heating can cause a decrease in air pressure inside a building and lead to upward, convective flow of subsurface vapors through cracks and gaps in the building floor. As described in the USEPA guidance document, effective convective flow of subsurface vapors into buildings is expected to be limited to deep soils within the "immediate" subslab (or crawl space) area of the building.

2.2 Vapor Intrusion Model Parameters

Example printouts of the model as used to calculate action levels for this document are included in Appendix 4. Input parameter values used in the models are noted in the examples (front pages). Default parameters values presented in the spreadsheet technical document were generally selected for use.

2.2.1 Target Risks

Human exposure assumptions were set equal to assumptions used in the USEPA RSLs. Unless otherwise noted in Table E-3. Action levels were calculated using a target risk of 10^{-6} for chemicals with carcinogenic health effects and a target Hazard Quotient of 0.2 for chemicals with noncarcinogenic health effects (1.0 for TPH, see Section 6). For consistency purposes, default physio-chemical constants included in the original USEPA vapor intrusion models were replaced with constants used in the USEPA RSL models if different (refer to Table J and Appendix 4).

2.2.2 Assumed Building Parameters

Default building characteristics presented in the USEPA spreadsheet guidance were used in the models (see Appendices 3 and 4). The thickness of the building floor slab was assumed to be 15 cm. For both unrestricted ("residential") land use and commercial/industrial exposure scenarios, the models assume a small, one-thousand square foot (9.61m x 9.61m), one-story building (ceiling height of 2.44 meters) situated on mono-slab concrete base (total indoor air volume approximately 225m^3). This may be overly conservative for commercial/industrial sites with existing, larger buildings but is considered to be protective of future redevelopment of such sites. The guidance default value of 1mm was used for the assumed perimeter crack width.

Default indoor-air exchange rates of one-time per hour for residences and two-times per hour for commercial/industrial buildings were used (see Brewer et al. 2014; directly input into the model). Based on the input building design and volume, this generates an indoor air exchange rate of 225 m^3/hour or 3,750 L/min for a residential home model and 7,500 L/min for a commercial building of the same size (see Appendix 4). The indoor air exchange rates are assumed to be conservative for the tropical climate of Hawai‘i, where buildings are not heated and windows at homes are often left open year round. Air exchange rates could be lower for homes and buildings that rely on heating, air conditioning and ventilation (HVAC) systems for ventilation. This would result in lower vapor entry rates, however, especially in cases where air conditioning is being used due to over pressurization of lower floors (see Brewer et al, 2014). Assumptions regarding

persistent vapor entry due to wind effects and open windows are therefore considered to be conservative.

2.2.3 Assumed Vapor Entry Rate

An annual average, subslab vapor entry rate (Qsoil) of 2 L/min (per 100m^2 floor area) was incorporated into the vapor intrusion models, based on estimations for tropical climates presented in Brewer et al 2014. This was generated in the models by inputting "Sand" as the soil type for Layer A soil type and a default value of 20 g/cm-s^2 for the "Soil-Building Pressure Differential" parameter (see Appendix 4). The latter reflects the assumed, annual-average difference between indoor and outdoor air pressures and an under pressurization of the structure. This generates a default vapor flux rate through the building slab of approximately 38 cm^3/second or two liters per minute. **A vapor entry rate of 2 L/min per 100m^2 floor space should be maintained for site-specific models where a larger building size is used unless otherwise approved by the overseeing regulatory agency.**

The vapor entry rate and the vapor intrusion models in general are highly sensitive to the permeability of vadose-zone soil immediately beneath the floor of the building. The input soil type for Layer A is one of the most critical model parameters. This is because the permeability of this zone controls the volume of air (and soil vapor) that can be convectively pulled up through the floor and into the building. The soil beneath most buildings is engineered, silty or sandy fill with moderate to high vapor permeability. This is incorporated into the models by included a 15cm thick layer of highly permeable sand immediately beneath the building slab (Layer A). Note that it is critical to include this subslab layer of vapor-permeable fill in all site-specific, vapor intrusion models. Use of the native soil type at the subject site (e.g., more clay rich and less permeable) is not appropriate, since this may not be the soil used for structural fill immediately beneath the slab. Modifications to this assumption must be approved by the overseeing regulatory agency on a site-by-site basis.

The default, annual average vapor entry rates incorporated into the models are intended to reflect an overall lower vapor intrusion risk for buildings in tropical climates in comparison to colder climates, where buildings are heated for much of the year and thus more susceptible to vapor intrusion (see Brewer et al. 2014). Higher, assumed indoor-outdoor pressure differentials and correspondingly higher average vapor entry rates are typically recommended for buildings in colder climates (Brewer et al. 2014; see also USEPA 2004a, 2015a). This would be reflected by a corresponding reduction in soil vapor, soil, and groundwater action levels for vapor intrusion. Example modification of HDOH action levels for use in other climate zone is included in Section 13 of the HDOH *Technical Guidance Manual* (HDOH 2016 and updates).

2.2.4 Assumed Indoor Air: Subslab Soil Vapor Attenuation Factors

A key part of the action levels is the assumed attenuation of subsurface vapors as they intrude a building and mix with indoor air. Shallow soil vapor action levels for vapor intrusion are calculated by dividing the indoor air goal by an Indoor Air: Subslab Soil vapor attenuation factor that reflects dilution of subsurface vapors upon mixing with indoor air:

$$\textit{Soil Vapor Action Level} = \frac{\textit{Indoor Air Action Level}}{\textit{Subslab Attenuation Factor}}$$

The subslab soil attenuation factor (SSAF) reflects the ratio of the estimated, mean annual vapor entry rate and the mean annual indoor air exchange rate (IAER) for tropical climates (see Brewer et al. 2014).

$$SSAF = \frac{\textit{Vapor Entry Rate (L/min)}}{\textit{Indoor Air Exchange Rate (L/min)}}$$

This generates a default, SSAF of approximately 0.0005 (1/2,000) for residential homes and 0.00025 (1/4,000) for commercial and industrial buildings. These attenuation factors are used in Section 3 to calculate subslab vapor intrusion action levels for subslab soil vapor. The default building pressure differential and indoor air exchange rates are incorporated into the soil and groundwater vapor intrusion models to generate correlative action levels for those media.

Note that the vapor intrusion models used to develop soil and groundwater action levels are not sensitive to the "Soil-Building Pressure Differential" parameter. A reduction or increase in the input pressure differential and the calculated SSAF will not result in a significant change in the action levels. This is because the mass of a volatile organic chemical (VOC) entering an overlying structure during a given time period is governed by rate of upward diffusion from the source into the advective zone under the slab, not by the vapor entry rate, and remains unchanged. Reducing the flow rate of vapors under the slab and into the structure by half, for example from 4 L/min to 2 L/min, will result in a doubling of VOC concentrations in vapors under the slab. The volume of vapors entering the building is concurrently reduced by half during the same time period, however, effectively cancelling out the doubling of VOC concentrations in the vapor. This can be observed in the vapor intrusion models by reducing the "Soil-Building Pressure Differential" parameter from 40 to 20 g/cm-s^2. This results in a reduction of the calculated vapor entry rate from approximately 4 L/min to 2 L/min without causing a noticeable change in calculated screening level for a given VOC.

3 Indoor Air and Soil Gas Screening Levels for Vapor Intrusion

3.1 Introduction

This section describes the development of risk-based screening levels for indoor air and subslab soil vapors. Indoor air screening levels were developed based on models and exposure assumptions incorporated into the USEPA Regional Screening Levels for ambient air (USEPA 2016). Corresponding screening levels for VOCs in subslab soil vapors were estimated based on attenuation factors published by Brewer et al. (2014). These screening levels are intended to correlate with and be used in conjunction with vapor intrusion action levels for subsurface soil and groundwater presented in Chapters 4 and 5 respectively.

3.2 Indoor Air Screening Levels

Indoor air screening levels were calculated using the following equation incorporated in the model (see USEPA RSL equations in Appendix 2):

Carcinogens:

$$\text{Cia} = \left(\frac{\text{TR} \times \text{ATc} \times 365\ \text{days/yr}}{\text{URF} \times \text{EF} \times \text{ED} \times \text{ET}} \right)$$

Noncarcinogens:

$$\text{Cia} = \left(\frac{\text{THQ} \times \text{ATnc} \times 365\ \text{days/yr}}{\left(\frac{1}{\text{RfC}} \right) \times \text{EF} \times \text{ED} \times \text{ET}} \right)$$

where:

Cia = Target indoor air concentration

TR = Target risk (carcinogens)

THQ = Target hazard quotient (noncarcinogens)

ATc = Averaging time for carcinogens

ATnc = Averaging time for noncarcinogens

URF = Unit risk factor for carcinogens (carcinogens)

RfC = Reference concentration (noncarcinogens)

EF = Exposure frequency

ED = Exposure duration

ET = Exposure time

Exposure time is expressed in terms of a 24 hour day. An ET of 24hr/24hrs is assumed for residents. An ET of 8hrs/24hrs is assumed for commercial/industrial workers (see Appendix 2). A summary of the indoor-air goals calculated is provided in Table E-3. A target excess cancer risk was of 10^{-6} was used for carcinogenic VOCs. A noncancer, target Hazard Quotient of 0.2 was used for all chemicals except TPH, where a Hazard Quotient of 1.0 was used (refer to Section 1.4 and Section 6). Inhalation toxicity factors for volatile chemicals are summarized in Table J.

3.3 Soil Gas Screening Levels

Section 2.2.4 describes the development of default SSAFs for subsurface vapors that intrude homes and impact indoor air. A default SSAF of 0.0005 was estimated for residential homes. A default SSAF of 0.00025 was estimated for commercial/industrial structures. The latter assumes better and more consistent ventilation of businesses during normal operating hours.

Soil vapor action levels (C_{sv}) were subsequently calculated as:

$$C_{sv} = \frac{Indoor\ Air\ Action\ Level\ (\mu g/m^3)}{SSAF}$$

A summary of soil vapor action levels for volatile chemicals is provided in Tables E-2.

Note that soil-gas screening levels do not take into account the actual mass of the chemical present and could be overly conservative for the evaluation of long-term impacts to indoor air. At sites where a limited amount of impacted soil or groundwater is

present, the concentration of the chemical in soil gas can be expected to decrease over time as the supply of the chemical is depleted. This would lead to steadily decreasing impacts to indoor air. Thus, while impacts to indoor air may initially exceed target goals, average, long-term impacts could conceivably fall below these goals.

This issue should be evaluated on a site-by-site basis as needed. As a conservative measure, and for the purpose of this screening levels document, it is recommended that indoor-air goals be used as "not-to-exceed" criteria and adjustment of models and soil gas to address potential mass-balance not be carried out in the absence of strong site data. This issue is currently under reviewed. Additional information will be incorporated into the ESL document as available.

4 Soil Screening Levels

4.1 Introduction - Shallow Versus Deep Soils

Residents and commercial or industrial workers may regularly be exposed to contaminated, vadose-zone soils or dust derived from these soils. (Regular exposure to contaminated soils below the water table is not generally considered except for construction workers.) A depth of 3 meters (approximately 10 feet) is used to delineate between shallow, "surface" soils where regular exposure to residents and/or workers is assumed and deeper, "subsurface" soils where only periodic contact during construction and utility maintenance work is assumed (refer also to Section 2.2 of Volume 1). A depth of 3 meters is consistent with guidance presented in the CalEPA document *Supplemental Guidance For Human Health Multimedia Risk Assessments of Hazardous Waste Sites and Permitted Facilities* (CalEPA 1996). This is regarded as the maximum, likely depth that impacted soil could at some point in the future be excavated and left exposed at the surface (e.g., pool or utility excavations). The potential for deeper soils to be brought to the surface during large-scale redevelopment activities should be evaluated on a site-by-site basis.

Environmental concerns specifically considered for shallow versus deep soil ESLs are summarized in Table 4-1. For shallow soils, the final ESL represents the lowest of a chemicals screening level for human direct-exposure (residential and commercial/industrial land use), vapor intrusion, leaching and the chemicals maximum ceiling level (nuisance concerns etc.). For deep soils, the final ESL represents the lowest of a chemicals screening level for human direct-exposure (trench/construction worker exposure), vapor intrusion, leaching and an alternative ceiling level.

Final ESLs for relatively non-mobile chemicals are generally less stringent for deep soils in comparison to shallow soils (e.g., compare final ESLs for PCBs in Tables A-1 and C-1). A few exceptions are noted in Section 4.2. For chemicals that are highly mobile in the subsurface and easily leached from soil or emitted as vapors to the ground surface, groundwater protection and vapor intrusion concerns usually drive risk regardless of the depth of the impacted soil (e.g., chlorinated solvents). Final shallow and deep soil ESLs for these chemicals are therefore identical (e.g., compare benzene and vinyl chloride ESLs in Tables A-1 and C-1).

4.2 Soil Screening Levels for Direct-Exposure Concerns

4.2.1 Direct Exposure Models and Assumptions

Direct exposure soil screening levels for unrestricted land use (referred to in previous editions as "residential"), commercial/industrial-only land use and construction/trench worker exposure are presented in Tables K-1 through K-3, respectively. A summary of the models and assumptions used to develop the direct-exposure screening levels for soil is provided in Appendix 2. Screening levels for the Unrestricted Land Use category are based on a standard, residential exposure scenario (refer to Appendix 2). The screening levels are considered to be adequate for residential housing, schools, day care and medical facilities, parks and similar sites with sensitive land use. The screening levels are intended to be protective of residents and workers who may be exposed to chemicals in exposed soils on regular basis via incidental ingestion, dermal absorption, and inhalation of vapors and particulate matter.

The direct-exposure screening levels closely follow the approach used to develop the USEPA Regional Screening Levels, with the exceptions noted below (RSLs; USEPA 2016). Direct-exposure soil screening levels generated for the Unrestricted Land Use category are consistently more stringent (lower) than screening levels developed for the commercial/industrial and construction/trench worker exposure scenarios. This is due to the longer, assumed exposure duration (years) and frequency (days per year) as well as the presence of young children in comparison to the latter two scenarios (see Appendix 2). Screening levels for construction and trench workers take precedence over screening levels based on residential and/or commercial/industrial exposure scenarios if lower. This is the case for Cr VI and cobalt (see Section 4.2.4 below).

Preliminary Remediation Goals (PRGs) previously published USEPA Region IX included a hybrid, direct-exposure screening level for total chromium in soil based on an assumed 1:6 ratio of Cr VI (highly toxic) to Cr III (minimally toxic) (USEPA 2004b). This is no longer included in the USEPA RSLs (USEPA 2016) and or the HDOH EALs (2011a). As discussed in Section 4.7, background metals data for the Pacific Basin area outside of Hawai‘i (primarily soils over mafic igneous rock) is limited and likely to be highly variable based on the underlying bedrock (e.g., felsic volcanic rocks versus limestone). A background concentration of 1,000 mg/kg total chromium is included in the lookup tables, based on comparison to available information (see Section 7.1; refer to Table M). If the reported concentration of total chromium in soil exceeds this screening level then an evaluation of background chromium should be carried out and/or chromium in the sample should be speciated into Cr III and Cr VI and data compared to individual screening levels for these compounds. If a release of Cr VI is suspected at a site then chromium should be

speciated and evaluated, even if total chromium concentrations do not exceed the default screening level.

4.2.2 Target Risks

Direct-exposure soil screening levels for contaminants that pose carcinogenic health concerns are based on an excess cancer risk of 10^{-6} (one-in-a-million), except as noted below. This follows the approach used in the USEPA RSLs. Screening levels for contaminants that pose noncarcinogenic health concerns are based on a target Hazard Quotient of 0.2 unless otherwise noted. The USEPA RSLs for noncancer concerns are, in contrast, based on a target Hazard Quotient of 1.0, with a stipulation that cumulative health risks should be estimated at sites where multiple contaminants with similar, chronic health effects are present. In reality this is almost never done. A target Hazard Quotient of 0.2 is used in this guidance to take into account upfront the potential presence of up to five contaminants with the same chronic target health effects at a given site. The incorporation of conservative, target health risks for both cancer and noncancer concerns for development of the direct-exposure action levels negates the need to calculate cumulative health risks at the majority of sites where contaminated soil is identified.

Due to the short, assumed exposure duration for **construction/trench workers**, direct-exposure screening levels for nonvolatile chemicals are based on a target excess cancer risk of 10^{-5} (Table K-3; see also Appendix 2). Due to low confidence in the vapor emission model for this scenario, however, an excess cancer risk of 10^{-6} was retained for carcinogenic VOCs (see Table K-3). A more conservative vapor emission factor is also incorporated into the direct-exposure models for construction and trench workers to reflect poor air flow in trench and other construction environments (see Appendix 2).

Other exceptions to the default target risk of 10^{-6} include direct-exposure screening levels for polynuclear aromatic hydrocarbons (PAHs) and PCBs. Low levels of **PAHs** in soil are ubiquitous in urban environments due to auto exhaust and the use of asphalt. Anthropogenic, background concentrations of PAHs in urban area soils due to auto exhaust and other sources can easily exceed risk-based screening levels based on a conservative, excess cancer risk of 10^{-6}. Massachusetts, for example, using a background soil screening level of 2.0 mg/kg for benzo(a)pyrene (MADEP 2002a). A target excess cancer risk of 10^{-4} was therefore used to help screen out low-risk sites and identify sites with potentially significant levels of PAHs above typical urban background. This generates, for example, a residential soil screening level of 1.6 mg/kg for benzo(a)pyrene, just below the default screening level used by Massachusetts (refer to Table K-1). A target risk of 10^{-5} was retained, however, for commercial/industrial and construction worker exposure scenarios, since the resulting screening levels are above anticipated background (refer to Tables K-2 and K-3).

Note that concentrations of PAHs in coal tar and older formulations of asphalt and can be orders of magnitude higher that direct-exposure screening levels set at a target risk of 10^{-4} (see Section 2.5 in Volume 1). Since asphalt is likewise ubiquitous in urban environments, cleanup of soil contaminated with small particles of asphalt that was used in its intended manner is generally not warranted. This exception would not apply to sites where asphalt, coal tar or similar materials was manufactured and disposed of as waste associated with these operations.

A similar approach was taken for **PCBs**. Use of PCBs in transformers, capacitors and other electrical equipment was widespread in the 1960s and 1970s. Although less widespread than PAHs, ambient levels in soil often fall within a target risk range of 10^{-5} and 10^{-6}. In order to again help focus attention on sites where significant releases of PCBs occurred, a target excess cancer risk of 10^{-5} was used to develop direct-exposure screening levels for soil. A target Hazard Quotient of 1.0 for noncarcinogenic effects was retained. Note that noncarcinogenic effects drives human health concerns for PCBs in soils under a residential exposure scenario (refer to Table K-1).

A target Hazard Quotient of 1.0 was used to develop risk-based screening levels for **TPH**. Nonspecific compounds collectively reported under "TPH" dominate the total mass of petroleum in soil, as well as water, soil gas and indoor air (refer to Appendix 6). Use of a target Hazard Quotient of 1.0 is therefore justified.

A target excess cancer risk of 10^{-5} was used for **Technical Chlordane**. This is was done to reflect the cumulative inclusion of multiple chemicals (i.e., chlordane isomers, heptachlor, heptachlor epoxide) as a single concentration in the Technical Chlordane laboratory analysis, as well as the toxicity factors used in the models (see discussion in Volume 1). A target noncancer Hazard Quotient of 1.0 was used to reflect the common sole occurrence of Technical Chlordane in the absence of other contaminants (used as a termiticide around and beneath older buildings).

A target excess cancer risk of 10^{-4} was used for **aldrin** and **dieldrin** was used to reflect low confidence in cancer slope factors and the potency of these chemicals (see update notes in Appendix 9). Updated cancer- and noncancer-based toxicity published by Hooker et al. (2013) were used to develop screening levels. A target noncancer Hazard Quotient of 0.5 was used to reflect the common co-occurrence of these two chemicals in the absence of other contaminants (aldrin was used as a termiticide around and beneath older buildings, with dieldrin as a breakdown product).

A target excess cancer risk of 10^{-4} was used for **hexavalent chromium** in order to reflect natural background concentrations of this chemical in soil and groundwater (see

groundwater technical memo in Appendix 8). Confidence in the cancer-based toxicity factors is also low.

Separate guidance has been prepared for **arsenic** (HDOH 2011) in soil. Risk-based soil screening (action) levels presented in the HDOH technical memorandums are incorporated into the K-series tables of Appendix 1. The screening levels are based on a noncancer Hazard Quotient of 1.0. The screening levels apply to bioaccessible arsenic in the <250µm fraction of the soil. A sample should be tested for bioaccessible arsenic if total arsenic in the <2mm soil fraction exceeds the upper limit of anticipated background of 20 mg/kg. Use of the Solubility/Bioavailability Research Council (SBRC) gastric-phase bioaccessibility method is recommended (Drexler and Brattin 2007).

Soil screening levels for dioxins and furans are presented in terms of "TEQ" dioxins. This represents the sum of individual congener concentrations adjusted with respect to 2,3,7,8 TCDD Toxicity Equivalent Factors (WHO 2006; see also HDOH 2010). A target risk of 10^{-4} was used to calculate cancer-based screening levels. This reflects greater confidence in noncancer toxicity factors as well as anticipated background exposures. The final TEQ dioxin screening levels are based on a noncancer reference dose of $7x10^{-10}$ mg/kg-day (0.7 pg/kg-day]) for 2,3,7,8 TCDD, posted to the USEPA IRIS database in 2012 and a Hazard Quotient of 1.0 (see Tables J and K series). Consideration of noncancer health hazards is assumed to be adequately protective of potential cancer risks. An assumed bioavailability of dioxins in soil of 50% was incorporated into the calculations, based on a review of published information presented in the HDOH guidance for dioxins (HDOH 2010; refer also to WHO 2001, 2002). This was carried out by dividing the screening level calculated for the soil ingestion portion of the model by a factor of 0.5 (see equation in USEPA RSL in Attachment 2). The dermal portion of the model was not adjusted for bioavailability. Note that TEQ dioxin screening levels to be published by USEPA will likely be half of the ESLs presented in this guidance due to a lack of consideration for bioavailability in soil.

The USEPA reference dose for 2,3,7,8 TCDD of 0.7 pg/kg-day is identical to the lower end of a Reference Dose range published by the World Health Organization (WHO 2001, 2002). The World Health Organization published a Permissible *Monthly* Tolerable Intake (PTMI) factor range for TEQ Dioxins of 40 to 100 pg/kg-month (WHO 2001, 2002). As described in the HDOH technical memorandum, dividing the WHO PTMI levels by a factor of 30.4 days/month generates an equivalent, tolerable *daily* intake range of 1.3 pg/kg-day to 3.3 pg/kg-day. The WHO values incorporate an assumed bioavailability of 50%. Removing the bioavailability yields a reference dose range of approximately 0.7 pg/kg-day to 1.7 pg/kg-day, with the lowest value of the range again identical to the 2012 USEPA Reference Dose. In essence, the USEPA reviewed the same set of toxicological data as WHO and then selected the most conservative Reference Dose for inclusion in the IRIS database.

For reasons noted in the referenced technical memorandum, HDOH elected to use the upper value in development of that agencies soil screening levels for TEQ dioxins, including an assumed 50% bioavailability in soil (i.e., final reference dose of 3.3 pg/kg-day, HDOH 2010). This explains why the Hawai‘i soil screening levels for TEQ dioxins are slightly higher than the screening levels presented in the Pacific Basin Edition of the guidance (e.g., 240 ng/kg versus 100 ng/kg for residential land use). This was based on the dominance of octa-dioxins and furans in soils tested in Hawai‘i, the least toxic of the congeners. This also acknowledged the presence of trace levels of dioxins in former sugarcane fields and the minimal added health benefit of using a more conservative toxicity factor. Dietary exposure to dioxins and furans was also reviewed and is anticipated to dominate total exposure in comparison to exposure from soil. Use of a less conservative reference dose and correlative screening levels under the Pacific Basin Edition of the ESLs may be acceptable on a site-specific basis provided that similar lines of evidence are presented.

4.2.3 Exposed or Potentially Exposed Soils

Direct-exposure soil screening levels for unrestricted (“residential”) land use (Table K-1) and commercial/industrial land use (Table K-2) are based on an assumption that the soil is, or at some time in the future could be, exposed at the ground surface where regular exposure of residents or workers could occur (refer to Section 2.2 in Volume 1). Equations and exposure assumptions used in each scenario are summarized in Appendix 2. For residential properties, it is assumed that soil within 3 meters (approximately 10 feet) of the ground surface could be exposed at the ground surface at some time in the future. For commercial/industrial properties, it is assumed that soil within one meter of the ground surface could be exposed. This should be reviewed on a site-by-site basis and provisions for long-term management of deeper or otherwise isolated soil made as necessary. As discussed in the next section, risk-based soil screening levels for construction/trench workers take precedence over screening levels for unrestricted or commercial/industrial land use if lower (refer to the next section).

4.2.4 Isolated Soils

By default, soils are assumed to be “isolated” if they are greater than three meters below ground surface in a residential setting and one meter in a commercial/industrial setting (refer to the previous section and Section 2.2 of Volume 1). Direct-exposure screening levels for deep or otherwise isolated soils are based on the potential exposure of construction and utility workers to contaminants in soil (Table K-3). A summary of exposure assumptions used to generate the screening levels is provided in Appendix 2. The exposure assumptions are based on guidance presented in the USEPA Exposure Factor Handbook (USEPA 2011b), trench-worker risk assessment guidance developed by the Massachusetts Department of Environmental Protection (MADEP 1994), general

direct-exposure assumptions included in the USEPA RSL document, and professional judgment (see Appendix 2, Table 1). As discussed above, screening levels were calculated using a target risk of $1x10^{-5}$ for chemicals with carcinogenic health effects and a target Hazard Quotient of 0.2 for chemicals with noncarcinogenic health effects (0.5 for TPH). A more detailed summary of exposure assumptions and selected parameter values is included in Appendix 2.

As can been seen in Table K-2, soil screening levels for construction/trench workers are lower than screening levels generated for commercial/industrial exposure for Cr VI and cobalt under the construction/trench worker scenario. Screening levels for these chemicals are more stringent under the construction/trench worker exposure scenario than under the commercial/industrial exposure scenario (see Table K-2). This is due to the combined high oral and/or inhalation toxicity of these chemicals and the assumed higher soil ingestion rate and higher level of airborn dust under the construction/trench worker exposure scenario. As noted in Table K-2, commercial/industrial land use direct-exposure screening levels for these chemicals are replaced with construction/trench worker screening levels for use in the lookup tables if less stringent.

4.2.5 Soil Saturation Levels

For chemicals that are liquids under ambient conditions, upper limits for soil direct-exposure screening levels are set at the chemicals theoretical soil saturation limit or "Csat" (refer to Appendix 2; see also USEPA 2016). As discussed below, soil screening levels for volatile chemicals are only valid if they are below the chemicals Csat concentration. Csat concentrations represent an upper limit to the applicability of the soil screening level Volatilization Factor (VF) model because a basic principle of the model (Henry's Law) does not apply when contaminants are present in free phase (USEPA 1996a, 2002, 2004, 2016). VF-based inhalation soil screening levels are reliable only if they are at or below Csat. This is discussed in more detail below.

The soil saturation limit represents the point at which additional contaminant mass can no longer be sorbed to soil particles (primarily organic carbon but also clays) or dissolved into soil moisture. Above this concentration it is assumed that free product (e.g., light non-aqueous phase liquid [LNAPL]) will be present in the soil. This is critical for VOCs. Above Csat, the USEPA direct-exposure model is no longer technically viable for prediction of vapor emissions to outdoor air and subsequent direct exposure risks posed by inhalation.

This is because vapor emissions are estimated based on the concentration of the contaminant in soil moisture in the absence of free product (e.g., LNAPL). The model first estimates the dissolved-phase concentration of a contaminant in soil based on the

input total soil concentration and the contaminants estimated soil: water equilibrium partitioning coefficient or "K_d" value (i.e., ratio of sorbed mass to dissolved-phase mass, generally calculated as the contaminants sorption coefficient or "koc" times the known or estimated concentration of organic carbon in the soil; refer to Appendix 2). The model then estimates the concentration of the chemical in soil gas (vapor phase) by comparison of the estimated concentration in the soil moisture to the contaminants air: water equilibrium coefficient (Henry's Law constant). Fick's Law is then used to estimate the vapor emission rate of the contaminant at the ground surface.

When Csat is exceeded, the assumed presence of free product violates the use of only the Henry's Law constant used to estimate the concentration of the chemical in soil gas and subsequently the vapor emission rate at the ground surface. As noted in USEPA risk assessment guidance, the direct-exposure model is no longer valid above this concentration (USEPA 1996a, 2002, 2004a, 2016). Csat is used to set maximum direct-exposure screening levels for volatile contaminants in the USEPA RSLs (USEPA 2016) and in past publications of the USEPA Region IX Preliminary Remediation Goals (USEPA 2004b).

Soil gas data can be used to estimate vapor emission from soil where Csat concentrations of a volatile chemical are exceeded, although direct-exposure models that allow input of soil gas data have not been published. Vapor flux at the surface in the presence of free product can also be modeled mathematically. A model to do this is presented in Appendix A of the USEPA vapor intrusion guidance (USEPA 2004a, see Appendix 4). This is incorporated into the USEPA vapor intrusion model but has yet to be included in USEPA direct exposure models for soil (e.g., USEPA 2016; see below). As discussed above for direct-exposure models, the USEPA vapor intrusion model incorporates a chemical's Henry's Law constant to estimate the concentration of the chemical in soil gas up to Csat. When a residual phase is present, the vapor concentration is independent of the soil concentration but proportional to the mole fraction of the individual component of the residual phase mixture. At this point, the vapor intrusion model numerically estimates the equilibrium vapor concentration of the chemical in soil gas for a series of time-steps. For each time-step, the mass of each constituent that is volatilized is calculated using Raoult's Law and the appropriate mole fraction. At the end of each time-step, the total mass lost is subtracted from the initial mass and the mole fractions are recomputed for the next time-step to take into account mass balanced over time. Refer to the USEPA vapor intrusion guidance for additional information.

The 1996 and 2002 editions of USEPA's *Soil Screening Levels* guidance make an apparent error in the conclusion that the emission flux from soil to air for a chemical reaches a plateau when a chemical's Csat concentration in soil has been reached (USEPA 1996a, 2002, "Soil Saturation Limit"). This error is repeated in the recently published USEPA RSLs guidance (USEPA 2016). Each document mistakenly states that Csat

represents the concentration *at which soil pore air is saturated with the target contaminant*. This is not the case. As noted above, Csat represents the concentration of the chemical in soil in which the *sorbed- and dissolved-phases* are saturated. Saturation of these phases in the soil does *not* necessarily indicate that the vapor phase of the chemical has reached its maximum, nor that the vapor flux rate at the surface has reached a maximum. The concentration of a chemical in soil gas at a soil concentration of Csat merely reflects equilibrium conditions with the chemical in soil moisture at the chemicals solubility limit. Saturation of the vapor phase will only occur in the presence of free product in the soil, when the gas phase reaches equilibrium with the *Nonaqueous Phase Liquid* or NAPL. The concentration of the chemical in the vapor phase at this point is likely to be significantly higher than at the point that the soil moisture has reached the solubility limit of the chemical. This is why the Henry's Law Constant-dependent, vapor flux model incorporated into most soil screening level models (including the one used in this guidance) is only valid in the absence of free product in the soil (i.e., concentration of chemical in soil <Csat). This is also the case frequently observed in soil gas studies, where the concentration of a volatile chemical in soil gas increases significantly in the presence of free product.

4.3 Soil Screening Levels for Potential Vapor Intrusion Concerns

Soil screening levels for the evaluation of potential vapor intrusion concerns are presented in Table E-1b and referenced in the Table A-D series. As discussed in Chapter 3, the use of soil gas data and screening levels to evaluate this concern is preferred (refer also to Section 7 of the HDOH *Technical Guidance Manual*; HDOH 2016).

A spreadsheet included with guidance published by the U.S. Environmental Protection Agency (USEPA 2004a) was used to generate soil screening levels for potential vapor intrusion concerns. A summary of these screening levels is provided in Table E-1b. Correlative soil gas screening levels are provided in Table E-2. Target indoor air goals are provided in Table E-3.

As discussed in Section 2, the spreadsheet is based on a model presented in the document *Heuristic Model for Predicting the Intrusion Rate of Contaminant Vapors Into Buildings* (Johnson and Ettinger 1991). The model considers both diffusive and convective flow of subsurface vapors into buildings. Summary text from the guidance document accompanying the spreadsheet is provided in Appendix 3, as is a sensitivity evaluation of the Johnson and Ettinger model. Example printouts of the model as used to calculate screening levels for this document are included in Appendix 4. A more detailed discussion of models is provided in Section 5.4 for correlative groundwater screening levels.

Input parameter values used in the soil models are noted in the example spreadsheets in Appendix 4 (see front pages). Parameter values assumed for, building characteristics and human exposure were consistent with values used in the soil vapor intrusion models. The aerial extent of impacted soil is assumed to be equal to the footprint of the building. The base of the floor was assumed to immediately overlie impacted soil (depth to top of soil equals thickness of floor). The thickness of impacted soil was assumed to be 200cm (approximately 6 feet). The soil type was assumed to be a highly permeable sand (intrinsic permeability = 1.0E-07 cm^2). This generated a soil vapor flow rate into the building of 67 cm^3/second or 4 liters/minute. The base of the floor was assumed to immediately over impacted soil (depth to top of soil equals thickness of floor). The model is not significantly sensitive to the input "Depth to Top of Contamination" for impacted soil situated within a few meters of the ground surface.

A default Soil-Building Pressure Differential of 20g/cm-s^2 was used. This generates a target vapor entry rate through the building slab of approximately 38 cm^3/second or 2 L/min (refer to Section 2.2.3).

For nonchlorinated VOCs, field experience suggests that the vapor intrusion model typically overestimates in vapor-phase concentrations of these chemicals by an order of magnitude or more, due in part to high rates of natural biodegradation. Evaluation of this issue is ongoing. To address this in the lookup tables, soil screening levels generated with the model were adjusted upwards by a factor of 10 (see Table E-1b). Collection of soil gas data and concurrent use of soil gas screening levels for vapor intrusion concerns is strongly recommended for sites where this pathway may be of significant concern.

The spreadsheet calculates the theoretical emission rate of a chemical into an overlying building based on the properties of the chemical and the soil type. For highly volatile chemicals (e.g., vinyl chloride), however, an unrealistic mass of the chemical per unit area would have to be present at depth to maintain the theoretical emission rates over the assumed exposure duration. To compensate, the model spreadsheet calculates a second, a mass-balanced emission rate by dividing the total mass of the chemical in the soil per unit area by the input exposure duration. This conservatively assumes that the entire mass of the chemical directly beneath the building will ultimately be emitted into the building over the assumed exposure duration. For chemicals where the mass-balanced vapor emission rate is lower than the theoretical emission rate, the mass-balanced emission rate is used to generate a screening level (or calculate risk).

The same set of screening levels developed for shallow soils were applied to deep soils (see Tables C and D of this appendix). While conservative, the parameter for depth to impacted soil does not significantly control calculated screening levels for soils within 5 to 10 meters of the ground surface. The need to re-evaluate the use of these screening levels should be made on a site-by-site basis. As noted earlier, confidence in use of soil

data to screen for potential vapor intrusion hazards is low (see Section 2.1). Subslab or shallow soil gas data are recommended at sites where significant subsurface contamination is present.

4.4 Soil Screening Levels for Groundwater Protection

4.4.1 Default Soil Leaching Model

Soil screening levels for groundwater protection concerns are summarized in Table G-1a and included in summary lookup tables for both shallow and deep soils (refer to Tables A through D of this appendix). These screening levels are intended to address potential leaching of chemicals from vadose-zone soils and subsequent impact on groundwater. The soil screening levels are back calculated based on target groundwater screening levels. Target groundwater screening levels are summarized in the Table F series and discussed in Chapter 5.

The majority of the screening levels were calculated based on an empirical equation presented in guidance published by the Massachusetts DEP (MADEP 1994):

$$C_{soil} = DAF \times C_{gw} \times 0.001 \text{ mg/µg}$$

$$DAF = (6207 \times H) + (0.166 \times Koc)$$

where: DAF = SESOIL-based dilution/attenuation factor
H = Henry's Law Constant (atm-m3/mol)
Koc = Organic carbon partition coefficient (cm^3/g);
C_{soil} = Leaching based soil concentration (mg/kg)
C_{gw} = Target groundwater screening level (µg/L)

The algorithm was originally developed by the State of Oregon (Anderson 1992), slightly modified for use by the Massachusetts DEP (MADEP 1994) and then incorporated into the Ontario MOEE lookup guidance (MOEE 1996). The algorithm is based on a combined use of the computer applications SESOIL and AT123D. These applications model leaching of chemicals from the vadose zone and subsequent migration of the leachate to groundwater, respectively.

SESOIL models the generation and downward migration of leachate in the vadose zone. The AT123D application models the mixing of leachate with groundwater immediately below the impacted area. A more detailed discussion of the derivation and application of the SESOIL/AT123D algorithm as modified by the Massachusetts DEP and adopted for use by the Ontario MOEE is provided in Appendix 5. The algorithm is based on a three-

meter thick vadose zone characterized by one meter of impacted soil sandwiched between two one-meter thick layers of clean soil. The lower layer immediately overlies groundwater. All vadose-zone soil is conservatively assumed to be very permeable sand that freely allows the migration of leachate to groundwater. The organic carbon content of the soil is assumed to be 0.1%. (Note that this is more conservative than the 0.6% organic carbon content assumed in the direct-exposure models.) Mixing with groundwater is modeled over a 10-meter by 10-meter area. Use of a thicker assumed sequence of impacted soil would not significantly alter the results of the model given the assumed one-meter depth to groundwater.

The model assumes an annual rainfall of 1,100mm (approximately 43 inches). A total of 720mm (28 inches) of the total rainfall is assumed to infiltrate the ground surface and reach groundwater (assumed to be conservative for developed areas of the Guam and CNMI). Biodegradation during migration of leachate to groundwater is not considered. This could cause the model to be especially over conservative for non-chlorinated, petroleum compounds. The model does, however, allow for resorption and revolatilization of chemicals from the leachate during migration based on the physio-chemical properties of the chemical and the assumed soil properties. Groundwater is assumed to flow at a moderate rate of approximately 73 meters (240 feet) per year. The concentration of a chemical in leachate is assumed to be further reduced upon mixing of the leachate with groundwater (dilution factor approximately 3).

For moderately volatile and sorptive chemicals (e.g., benzene), screening levels developed using the SESOIL-derived algorithm are similar to screening levels generated using the full SESOIL application under a scenario where impacted soil is within a few meters of groundwater (e.g., HDOH 1995, carried out by the principal editor of this document). Comparison to screening levels developed by full but still conservative use of SESOIL suggests, however, that the simplified algorithm may be excessively conservative in the following cases:

- Leaching of highly volatile chemicals (e.g., vinyl chloride)
- Leaching of highly sorptive chemicals (e.g., PAHs)
- Leaching of highly biodegradable chemicals (e.g., common petroleum compounds)
- Sites where the depth to groundwater is greater than 10 meters below the base of the impacted soil

The depth-to-groundwater factor is particularly important for chemicals that exhibit one or more of the above noted characteristics. As the distance between the base of impacted soil and the top of groundwater increases, there is additional time and area for chemicals to volatilize out of the leachate, resorb to soil particles, or degrade by naturally occurring

biological processes. Site-specific evaluation of the potential for leaching of chemicals from soil may be warranted in such cases (including more rigorous modeling, laboratory leaching tests, groundwater monitoring, etc.).

SESOIL modeling carried out by the Hawai'i Department of Health (HDOH 1995) suggests that chemicals with sorption coefficients greater than 30,000 cm^3/g will be essentially immobile in the surface under normal soil conditions and not likely to impact groundwater. The SESOIL models were run conservatively assuming an annual rainfall of 400 cm/year (158 inches/year), an infiltration rate of 144 cm/year (57 inches/year) and very permeable soil overlying fractured bedrock.

More recent site data, including laboratory batch test leaching data, suggest that chemicals with sorption coefficients as low as 5,000 cm^3/g are likewise essentially immobile in soil (see notes in Appendix 9 summary of updates). This was therefore selected as the koc cutoff for reference to the theoretical soil saturation level as the action level for leaching if higher than the action level generated by use of the SESOIL algorithm (refer to Table G-1a). The equation and assumptions used to calculate the saturation levels is presented and discussed in Appendix 2. The HDOH document *Use of Laboratory Batch Tests to Evaluate Potential Leaching of Contaminants from Soil* (HDOH 2007) provides guidance for calculation of site-specific sorption coefficients and evaluation of potential leaching hazards.

The majority of PCBs releases are related to 1242 to 1260 range Arochlors or similar mixtures. The default koc of 33,000 cm^3/g presented in Table J was considered to be adequately conservative for this range and used in the leaching model. For less chlorinated PCB mixtures, a site-specific evaluation of potential leaching concerns and even possible vapor emission concerns is required.

Leaching based screening levels were generated only for chemicals considered to be significantly soluble and mobile in groundwater under normal, ambient conditions (e.g., pH 5.0 to 9.0 and normal redox conditions). Leaching-based soil screening levels were not developed for metals. Leaching of metals from soil is highly dependent on the species of the metal present and the geochemical nature of the soil. At sites where physio-chemical conditions may promote enhanced leaching of metals and other chemicals from soils or waste piles (e.g., mining related wastes), the use of laboratory-based leaching tests is recommended (refer to Section 4.3.3 in Volume 1).

Leaching based soil screening levels were developed for perchlorate (ClO_4). Perchlorate, a salt, is not significantly sorptive, volatile or biodegradable under normal conditions. Use of the SESOIL/AT123D algorithm was therefore not considered appropriate. As an

alternative, a simple, chemical partitioning model presented in the USEPA Soil Screening Level Guidance document was referred to (USEPA 1996a, 2002):

$$Csoil = Cwater \times \left((Koc \times foc) + \left(\frac{\theta w + (\theta a \times H')}{\rho b} \right) \right) \times DAF$$

where: C_{soil} = Soil screening level for leaching concerns
C_{water} = Target dissolved-phase concentration of chemical
Koc = Sorption coefficient
foc = Fraction organic carbon in soil
$Theta_w$ = Water-filled porosity
$Theta_a$ = Air-filled porosity
H' = Dimensionless Henry's Number constant
p_b = Soil bulk density
DAF = Dilution/Attenuation Factor

This model can be used to backcalculate the total soil concentration of a chemical based on a target dissolved-phase concentration of the chemical in the soil (i.e., concentration in leachate). For perchlorate, koc and H' are presumed to be zero and the equation reduces to:

$$Csoil = Cwater \times \left(\frac{\theta w}{\rho b} \right) \times DAF$$

The default water-filled porosity in the models is 0.15 and the default soil bulk density is 1.5. Based on groundwater screening levels for perchlorate of 3.6 µg/L for drinking water resources and 600 µg/L for non-drinking water resources (refer to Tables F-1a and F-1b), leaching based soil screening levels of 0.00036 mg/kg and 0.06 mg/kg are generated, respectively. A dilution/attenuation factor of 20 was incorporated to account for mixing of leachate with groundwater (USEPA 1996a, 2002). This yielded final soil screening levels for leaching concerns for perclorate of 0.007 mg/kg and 1.2 mg/kg (refer to Table G-1a). Laboratory-based tests are recommended for more site-specific analysis of potential leaching of perchlorate from soil.

4.4.2 Leaching Model for Areas with Thin Soils

Some areas of the Pacific Basin Region are characterized by a very thin soil cover over an unconfined, bedrock, drinking water aquifer (defined as <1m thick; e.g., soil over the

northern, carbonate platform area of Guam). The lack of a soil cover to impede the downward migration of surface releases exacerbates the vulnerability of the groundwater.

This is primarily of concern for moderately sorptive chemicals that are considered to have low mobility in thick soils, including some organochlorine pesticides. The default soil leaching model used to develop the leaching-based screening levels assumes that sorption to organic carbon and clay in soil will decrease the threat of downward mitigation (see previous section). Once in vadose-zone bedrock, however, the chemicals will be difficult to detect and address. Immediate cleanup of releases or freshly exposed, contaminated soil is therefore critical (e.g., termiticide-treated soil under buildings to be demolished). More stringent soil cleanup levels area also warranted.

In order to address this potential concern, the default sorption coefficient used to denote potentially mobile chemicals in soil was increased to 100,000 cm^3/g, versus 5,000 cm^3/g as used in the default leaching model (higher values are more sorptive and less mobile). This is based in part on modeling and in part on professional judgment. The latter includes the presence of trace levels of organochlorine pesticides in basalt aquifers in some parts of Hawai‘i, presumably due to use of termiticides such as chlordane and aldrin around building foundations in areas of thin soil cover. The leaching models focus on drinking water screening levels (i.e., lowest of toxicity-based and taste-and-odor based drinking water goals). If the resulting, soil screening level was lower than the default, Tier 1 screening level for leaching then it was carried forward for inclusion in Table E of Volume 1 (Table G-1b). This resulted in more conservative screening levels for several, moderately sorptive chemicals that would otherwise be immobile in areas with thicker soils, including acenaphthene, aldrin, 1,1 biphenyl, bis(2 ethylhexyl)phthalate, dieldrin, endrin, heptachlor, heptachlor epoxide, and toxaphene (see Table G-1b).

Leaching based soil screening levels for TPHgasoline and TPHdiesel were divided by a factor of two, based on the TPH screening level currently used by Guam for areas with thin soil covers (e.g., TPHgasoline reduced from 100 mg/kg to 50 mg/kg for areas that threaten drinking water resources; reflects modeling by USEPA and professional judgment; see Table G-1b). The leaching based screening level for heavy petroleum TPHresidual fuels) was retained at 1,000 mg/kg, due to the relatively immobility of longer-chain hydrocarbons in soil.

As noted above and in Volume 1 of this guidance, the HDOH document *Use of Laboratory Batch Tests to Evaluate Potential Leaching of Contaminants from Soil* provides guidance for calculation of site-specific sorption coefficients and a more accurate (and in most cases less conservative) evaluation of potential leaching hazards (HDOH 2007). Note that batch tests are generally not amenable to evaluation of petroleum contamination in soil due to the interference of free product with reported levels of hydrocarbons in the leachate solution.

Screening levels for leaching of volatile chemicals from soil are less influenced by the thickness of the soil cover, since these chemicals are not significantly sorptive to begin with. This is reflected by already part-per-billion screening levels for chemicals such as benzene and PCE. Alternative screening levels for areas with thin soil covers were therefore not developed. Soil gas screening levels that can be applied to vapor sample data collected in the underlying bedrock are instead more useful for evaluation of potential groundwater impact hazards than soil oil screening levels, given that most of the contaminant mass is likely to already be in the bedrock. Development and presentation of these additional screening levels is discussed in the next section.

4.4.3 Soil Gas Screening Levels for Groundwater Protection

Soil gas screening levels that can be used to indirectly evaluate leachate conditions in the vadose zone and potential threats to groundwater are presented in Table G-2. The screening levels focus on volatile hydrocarbons, solvents, explosives and fumigants. The evaluation of leachate associated with petroleum fuels focuses on TPHgasoline, TPHmiddle distillates, benzene, toluene, ethylbenzene and xylenes (BTEX) and naphthalene. Testing for additional, semi-volatile, PAHs in soil vapors is not necessary to evaluate potential leachate conditions (e.g., acenaphthene or methylnaphthalenes; see Section 2.5 of Volume 1 and Section 9 of the HDOH *Technical Guidance Manual*; HDOH 2009).

The ultimate focus of soil leaching models is the concentration of a targeted chemical in the soil moisture or "leachate." The leaching threat to groundwater posed by the presence of a chemical in vadose-zone soil would ideally be evaluated by the direct measurement of the dissolved-phase concentration of the chemical in pore water. This could be compared to a target groundwater screening level times an assumed, dilution-attenuation factor. The collection of adequate volumes of pore water to evaluate potential leaching hazards using currently available investigation tools is impractical, however. As an alternative, soil screening levels are developed that represent the total concentration of a chemical in soil at equilibrium with target concentrations of the chemical in soil moisture or leachate (see the previous section; see also USEPA 2002). This allows soil data to be used to evaluate potential leaching hazards as an alternative to the direct collection and testing of soil pore water. Soil batch tests can also be used to more accurately evaluate the mobility of chemicals in soil and the potential threat to groundwater (see Section 4.3.3 in Volume 1).

Although relatively simple in concept and easy to implement in the field, this approach is highly prone to error due to assumptions that must be made regarding how a chemical partitions between sorption to organic carbon (and clay) and dissolution into soil moisture. The collection of representative soil samples from the subsurface is also very prone to error, give the small number of samples typically collected and the small mass of

soil ultimately analyzed (e.g., 5 grams or less than one teaspoon or volatile chemicals). The use of multi-increment sampling (MIS) approaches and preservation of samples in methanol in the field can help, but limited coverage can still hamper the representativeness of the data (HDOH 2009). As discussed in Section 4.3.3 of Volume 1, batch tests suggest that soil leaching overestimate the concentration of a chemical in leachate based on the total concentration of the chemical in soil by orders of magnitude (i.e., greater proportion of chemical sorbed to soil particles than predicted by standard, equilibrium model).

For volatile chemicals (VOCs), direct measurement of the vapor-phase concentration of a chemical in vadose-zone soil or bedrock offers a more accurate method for estimation of the concentration of a chemical in leachate than a soil sample. The equilibrium concentration of a chemical in soil gas to that in leachate is described by the Henry's Constant for that chemical (ratio of concentration in soil gas over concentration dissolved in water at an assumed temperature; see Table J). Soil gas screening levels for potential leaching (or leachate) hazards can be developed by designating a target concentration of the chemical in soil leachate, for example the target groundwater concentration (+/- attenuation factor), and then multiplying this by the chemicals Henry's Constant. (Note that a chemical's Henry's Constant varies as a function of temperature. The Henry's Constants presented in Table J are conservatively based on an assumed temperature of 25ºC, as presented in the USEPA RSL guidance; USEPA 2016.)

This approach was used to generate the soil gas screening levels for leaching concerns presented in Table C of Volume 1 and Table G-2 of this appendix. The screening levels are based on the following, simple equation:

$$Csoil\ gas = Cgw \times H' \times DAF$$

where: $C_{soil\ gas}$ = Soil gas screening level for leaching concerns;
C_{gw} = Target dissolved-phase concentration of chemical in groundwater;
H' = Dimensionless Henry's Number constant; and
DAF = Dilution-Attenuation Factor

Soil gas screening levels for protection of both drinking water and non-drinking water resources are provided. Target groundwater screening levels are taken from Tables F-1a and F-1b. Henry's Constants for VOCs are noted in Table G-2 and Table J. A default DAF of 20 was included in the model to take into account mixing of leachate with groundwater (after USEPA 2002). For example, a concentration of 5 µg/L benzene in vadose zone leachate would in theory yield an equilibrium concentration in soil gas of 24,000 µg/m^3, taking into account the dilution-attenuation factor.

The presence of a VOC in soil gas above its respective screening level suggests that the concentration of the VOC in soil moisture or leachate could adversely impact an unconfined, underlying drinking water aquifer. The screening levels do not consider the actual mobility of the soil moisture. Vapor concentrations would be relatively high in dry soils with little soil moisture in comparison to saturated soils with migrating leachate. Whether or not the leachate (or even the vapors) is actually mobile and poses a true threat to groundwater depends on site-specific factors, including the size of the source area and the mass of contaminant present, the rainfall infiltration rate, the rate and amount of downward moving leachate, the distance to the water table, the rate of groundwater flow and the thickness of the leachate-groundwater mixing zone. These factors need to be evaluated in more detail on a site-specific basis if the soil gas screening levels are exceeded.

4.5 Soil Screening Levels for Terrestrial Habitats

Soil screening levels for the protection of terrestrial flora and fauna were included in previous editions of the Pacific Basin ESLs. The screening levels were taken directly from guidance developed by the Ontario Ministry of Environment and Energy (MOEE 1996). Screening levels were available for heavy metals and some high-molecular-weight organic compounds and pesticides. The screening levels were removed from the Fall 2012 edition of the ESL guidance due to uncertainty in their application to flora and fauna of the Pacific Basin area as well as the presence of naturally occurring, background concentrations of metals in volcanic soils that exceeded the generic screening levels.

References for the ecotoxicity screening levels are included at the end of the appendix. The MOEE guidance is primarily a compilation of criteria published by environmental agencies in Canada and elsewhere, and is an update to previous guidance (e.g., MOEE 1991; CCME 1994). Ecological effects-based soil values developed by the Dutch government (Vegter 1993; van den Berg 1993) were in particular reviewed for inclusion in the MOEE guidance. The Netherlands "C" values referenced are intended to represent the concentration of a chemical in soil at which the No Observed Effects Concentration for 50% of the target ecological species would be exceeded. Earlier versions of the Canadian and Dutch guidance are presented in the U. S. Fish and Wildlife Service document *Evaluation of Soil Contamination* (USFWS 1990).

Soil screening levels for terrestrial ecological concerns can be highly specific to the species of fauna or flora potentially impacted as well as the specific form of the metal present and the geochemistry of the soil. The Ontario MOEE intended use of the screening levels over a broad range of land-use scenarios, including residential land use, agricultural and parkland.

If used, it is important to note that the screening levels are not intended for use in areas where a significant risk to endangered or threatened species may exist or where there is a potentially significant threat to terrestrial ecological receptors that extends beyond the general boundary of a subject site. This could include sites that are adjacent to wetlands, streams, rivers, lakes, ponds or marine shoreline or sites that otherwise contain or border areas where protected or endangered species may be present. Potential impacts to sediment are also not addressed. The need for a detailed risk assessment should be evaluated on a site-by-site basis for areas where significant ecological concerns may exist.

4.6 Soil Ceiling Levels for Gross Contamination Concerns

Ceiling levels for gross contamination concerns are presented in each of the ESL summary tables for soil. These screening levels are intended to be protective against odor and other nuisance and aesthetic concerns, as well as restrict the presence of potentially mobile, free product and limit the overall degradation of soil quality (i.e., "gross contamination"). The selection of soil ceiling levels was based on methods originally published by the Massachusetts DEP (MADEP 1994) and also used by the Ontario MOEE (MOEE 1996), as described in the Table H series of this appendix.

Odor thresholds presented in the Table H series are intended to represent the concentration of a chemical in air at which 50% of the population can detect a chemical odor. An "Odor Index" for a chemical is calculated by dividing the chemical's vapor pressure (in Torr, at 20 to 30ºC) by its odor threshold (in parts per million [ppm]-volume, see Tables H-2 and H-3). This provides a relative ranking of chemicals for potential nuisance concerns. As summarized in Tables H-2 (shallow soils) and H-3 (deep soils), ceiling levels were then selected based a comparison of a chemicals vapor pressure and odor index to a table of generic screening levels (Tables H-1). For chemicals that are liquids under ambient conditions, the final ceiling level was selected as the lowest of the generic level from Table H-1 and the chemicals theoretical saturation level in soil (see Appendix 2). This was intended to prevent the presence of mobile, free product in the subsurface.

4.7 Soil Screening Levels for Background Metals

A comprehensive summary of background concentrations of heavy metals in soil of the Pacific island areas was not available during preparation of this guidance document. Table M presents a limited summary of background concentrations of metals in soils for Hawai‘i and Guam. Data for Hawai‘i primarily reflect soils developed over mafic volcanic rocks (e.g., basalt; HDOH 2012). Data for Guam reflect a mix of soils developed over felsic volcanic rock and limestone (USN 1996). A wide range of

concentrations is noted for each metal in the summary documents. The upper range of background is presented in the table, in order to help screen out sites where reported metals could be related to background. Higher concentrations of metals in soils are generally attributable to soils developed over volcanic rock types, while lower concentrations of metals are typically associated with soils developed over limestone and other sedimentary rock.

The more comprehensive Hawai‘i data were referred to for inclusion in the final Tier 1 ESLs (see Table A-D series). Users should be aware, however that actual background concentrations of some metals could be lower than the default values presented. The range of metal concentrations reported for Hawai‘i should be similar to other areas of the Pacific underlain by basaltic, mafic rocks (e.g., Samoa) but may not be representative of soils developed over non-mafic rock types, including felsic volcanics, limestone or other sedimentary rocks. Summaries of background concentrations of metals in soil have also been prepared for some coastal areas of Hawai‘i that are underlain primarily by limestone and marine sediments (USN 2006).

Naturally occurring, background concentrations of metals in soil exceed risk-based screening levels in some cases. This is especially true for arsenic, but can also occur for heavy metals such as antimony, cadmium, chromium (in comparison to screening levels for hexavalent chromium), thallium and vanadium associated with soils developed over volcanic bedrock. If a release of one of these chemicals is suspected at a site then additional evaluation may be warranted (e.g., testing of soil specifically for hexavalent chromium) and more stringent, risk-based screening levels may be necessary.

A background threshold value of 54 mg/kg for arsenic is reported in the 1996 U.S. Navy document for Guam (see Table M). While this is possible for discrete samples from volcanic soils, it could cause pesticide-contaminated soils in non-volcanic areas to be inadvertently overlooked. As discussed in Section 4.3.1 of Volume 1, a bioaccessibility test is recommended for soil samples when reported total arsenic exceeds the default, background concentration of 24 mg/kg selected for inclusion in the final screening levels. This is then compared to soil screening levels for bioaccessible arsenic (e.g., 23 mg/kg for residential land use; <250µm fraction tested).

TABLE 4-1. ENVIRONMENTAL CONCERNS CONSIDERED IN SOIL ESLs

Category	Human Health (Direct-Exposure)	Human Health (Vapor Intrusion)	*Groundwater Protection (Drinking Water Resource Threatened)	*Groundwater Protection (Drinking Water Resource NOT Threatened)	Ecological Concerns (Terrestrial Receptors)	Ceiling Levels
Table A						
Residential Land Use	X	X	X	X		X
Commercial/Industrial Land Use Only	X	X	X	X		X
Table B						
Residential Land Use	X	X		X		X
Commercial/Industrial Land Use Only	X	X		X		X
Table C						
Residential Land Use	X	X	X	X		X
Commercial/Industrial Land Use Only	X	X	X	X		X
Table D						
Residential Land Use	X	X		X		X
Commercial/Industrial Land Use Only	X	X		X		X

*Groundwater protection concerns not related to drinking water include discharge to surface water, vapor intrusion (impacts to indoor air in overlying buildings), and gross contamination ceiling levels (nuisance concerns, etc.).
Table A - Shallow Soils Overlying Drinking Water Resource
Table B - Shallow Soils NOT Overlying Drinking Water Resource
Table C - Deep Soils Overlying Drinking Water Resource
Table D - Deep Soils NOT Overlying Drinking Water Resource

5 Groundwater and Surface Water Screening Levels

5.1 Introduction

Screening levels for groundwater and surface water are summarized in the "F" series of tables at the end of this appendix. A discuss of individual concerns considered in the screening levels is provided in this Chapter and summarized below.

For the purpose of developing Tier 1 screening levels, it is assumed that all groundwater could at some point in time potentially discharge to a body of surface water and impact an aquatic habitat. Discharge could occur through natural processes (e.g., natural discharge of groundwater to a stream, river, lake, wetland, bay, etc. via springs) or through human activities (e.g., pumping and discharge of groundwater at remediation or construction dewatering projects). The final groundwater ESL for sites that threaten drinking water resources reflects the lowest of a chemicals screening level for drinking water toxicity, aquatic habitat protection, vapor intrusion concerns (volatile chemicals only) and a "ceiling level" for tastes and odors, or other nuisance concerns (Table F-1a). The final groundwater ESL for sites that do not threaten drinking water resources (Table F-1b) reflects the lowest of a chemical's screening level for the same set of environmental concerns with the exception of the drinking water component and an alternative ceiling level.

Screening levels for surface water were compiled in a similar manner with the exception that impacts to indoor air were not considered. For freshwater surface water bodies, the final ESL reflects the lowest of a chemicals screening level for drinking water toxicity, aquatic habitat protection (discharges to surface water) and nuisance concerns (Table F-2a). For marine surface water bodies, the final ESL reflects the lowest of a chemical's screening level for aquatic habitat protection (discharges to surface water) and nuisance concerns (Table F-2b). For estuarine systems, the lowest of the aquatic-habitat screening levels for freshwater and marine surface water bodies were selected (Table F-2c). Drinking water concerns were not considered.

As discussed below, groundwater screening levels for potential discharges to aquatic habitats are based on chronic surface water quality goals. For some chemicals, additional

aquatic habitat goals have been developed for the potential bioaccumulation of contaminants in aquatic organisms and subsequent consumption of the organisms by humans. These goals apply primary to aquatic organisms living in the water column. Use of the bioaccumulation goals is generally recommended for comparison to surface water data only and not for screening of groundwater data.

Groundwater action levels should be normally compared to dissolved-phase chemical concentrations unless instructed by the overseeing regulatory agency. This may require filtering of turbid samples. Filtering should not be carried out on samples to be tested for volatile chemicals. Filtering of samples might also not be acceptable for groundwater in a karst aquifer with direct connections to a surface water body.

5.2 Screening Levels for Drinking Water (Toxicity)

A summary of drinking water standards and guidelines used in this document is provided in Table F-3. The Central Valley Regional Water Quality Control Board (RWQCBCV) technical document *A Compilation of Water Quality Goals* (RWQCBCV 2007) was used as the primary reference. Screening levels for drinking water intended to address human toxicity were generally selected based on the following order of preference:

- USEPA Primary Maximum Contaminant Level (MCL) or Action Level (adopted for use in most of the Pacific Basin area, including CNMI and Guam);
- Hawai'i Department of Health Primary MCL (as referenced in HDOH 2016);
- Risk-based goal calculated using USEPA Region IX RSL Tapwater model (USEPA 2016).

Guam EPA and CNMI DEQ Primary Drinking Water MCLs and screening levels are based on standards published by the USEPA (GEPA 1997b, CNMI 2005b, USEPA 2006). Primary MCLs and risk-based screening levels are available for approximately half of the chemicals listed in the lookup tables (refer to Table F-3). Although numerous factors are taken into account in development of primary MCLs (toxicity, detection limits, attainability, etc.), these standards are primarily intended to address toxicity to humans in drinking water supplies and are used for this purpose in this document.

The USEPA Region Regional Screening Level model for tapwater was used to develop risk-based drinking water goals for chemicals that lack a promulgated Primary MCLs (USEPA 2016*, refer to Table F-3 and Equations 14 and 15 in Appendix 2). For volatile chemicals, the tapwater goals take into account uptake via inhalation of vapors during showering and other activities in addition to toxicity via normal ingestion of drinking water. The more recent RSL tapwater model includes an additional and complicated

component for dermal absorption of VOCs during water use. Risk posed by exposure to VOCs in drinking water is largely driven by ingestion, however, and to a lesser extent inhalation. The inclusion of a dermal absorption pathway in the model does not significantly alter the resulting screening level and was not incorporated into the ESL model. Goals for nonvolatile chemicals are based on ingestion only. Risk-based goals for noncarcinogenic effects take precedence over goals for carcinogenic effects if lower. Drinking water goals intended to address taste and odor concerns (e.g., Secondary MCLs) take precedence over toxicity-based goals if lower (refer to Table F-1a and Section 5.5).

5.3 Screening Levels for Aquatic Habitat Protection

5.3.1 Surface Water Aquatic Habitat Goals

A summary of aquatic habitat goals considered for use in this document is provided in Tables F-4a through F-4c. Separate goals were compiled for freshwater, marine and estuarine habitats. Tidally influenced portions of creeks, rivers and streams flowing into marine habitats are considered to be estuarine.

The goals reflect a compilation of standards formally promulgated in law and goals published by USEPA and other sources. Both Guam EPA and CNMI DEQ regulations incorporate USEPA surface water standards by reference (GEPA 1997a, CNMI 2002). Formal standards have not been promulgated for the majority of chemicals listed. Final goals were selected based on the following order of preference and availability, unless otherwise noted in Table F-4f:

- Hawai'i Surface Water Standard (HDOH 2002);
- USEPA Region 4 (USEPA 2015);
- USEPA Office of Pesticides (USEPA 2016b);
- US Department of Energy (USDOE 1996);
- Ontario Ministry of Energy and Environment (MOEE 1996);
- USEPA AQUIRE database (USEPA 2008b);
- Toxicity-based drinking water goal.

An exception to this approach is the use of a general, acute aquatic toxicity action level of 300 µg/L published by the Canadian Council of Ministers of the Environment (CCME) for semi-volatile PAHs, excluding naphthalenes (CCME 2002; refer to Table F-4e). Goals provided in each reference are generally based on dissolved-phase concentrations of the chemicals in water. Goals for arsenic, chromium III, chromium VI, lead, mercury, nickel, selenium, silver and zinc are, however, based on total concentrations (see USEPA 2015).

Chronic freshwater goals were used as screening levels for saltwater ("marine") if chronic goals for the latter were not available, and vice versa. Acute goals were substituted in a similar manner. Unadjusted chronic goals were substituted for acute goals if the latter were not available.

The USEPA AQUIRE ECOTOX database of ecotoxicity studies was referred to for chemicals with no published aquatic habitat goals, primarily a small number of pesticides (USEPA 2008b). Emphasis was placed 96 hour-duration aquatic animal studies (48 hours for daphnia studies). Modification factors in general followed recommendations and methods provided in the USEPA Great Lakes water quality initiative guidance (USEPA 1995). Note that many if not most of the referenced aquatic ecotoxicity action levels focus on toxicity to fish and benthic organisms. Action levels based on toxicity to aquatic plants could be lower. A more site-specific evaluation of this issue should be considered where discharges of impacted groundwater might adversely affect aquatic plants.

USEPA surface water standards for potential bioaccumulation of chemicals in aquatic organisms and subsequent human consumption of these organisms are presented in Table F-4f (incorporated by reference in Guam EPA and CNMI DEQ regulations). These standards should be applied to surface water data only. Chronic and acute aquatic toxicity action levels presented in Table F-4e that include a component of bioaccumulation and potential impacts to predators are noted in red (see also USEPA 2015).

5.3.2 Groundwater Screening Levels for Aquatic Habitat Impacts

For the purposes of this document, it is assumed that groundwater could discharge into an estuary environment. As such, goals for aquatic habitat protection are based on the lowest of the goals for marine versus freshwater environments. Target surface water goals and correlative groundwater goals can be adjusted on a site-specific basis in areas where this is not appropriate. The goals should be compared to dissolved-phase chemical concentrations unless instructed by the overseeing regulatory agency.

Dilution of groundwater upon discharge to surface water was not considered in the selection of groundwater screening levels for aquatic habitat protection. Benthic organisms were assumed to be exposed to the full concentration of chemicals in impacted groundwater prior to mixing of the groundwater with surface water. Potential dilution of groundwater upon discharge to surface water or in groundwater "mixing zones" adjacent to shorelines areas was therefore not appropriate for development of conservative screening levels. Adjustment of the final groundwater screening levels with respect to potential dilution may, however, be appropriate on a site-specific basis (e.g., no significant benthic habitat present, see Volume 1, Section 4.4).

Note that natural background concentrations of boron, copper, lead, mercury, selenium, thallium and zinc and other metals might exceed the groundwater screening levels presented in Tables F-1a and F-1b. This issue should be evaluated on a site-by-site basis as needed.

Surface water standards for potential bioaccumulation of chemicals in aquatic organisms and subsequent human consumption of these organisms were not directly considered in the selection of groundwater action levels for potential aquatic habitat impacts. Use of these standards would be excessively conservative at the large number of relatively small sites overseen by the regulatory agency. Consideration of the standards may be appropriate for sites where the discharge of large plumes of impacted groundwater threatens long-term impacts to important aquatic habitats. This should be evaluated on a site-by-site basis.

5.4 Groundwater Screening Levels for Potential Vapor Intrusion Concerns

5.4.1 Vapor Intrusion Model Parameters

Groundwater screening levels intended to address the intrusion of vapors into buildings and subsequent impact on indoor-air quality are summarized in Table E-1a and included in Tables F-1a and F-1b. Correlative soil gas screening levels and indoor air screening levels are presented in Tables E-2 and E-3, respectively, and discussed in Chapter 4.

All groundwater was assumed to potentially flow offsite and pass under residential areas. Final screening levels are therefore based on a residential land use exposure scenario. Groundwater screening levels for commercial/industrial areas are included in Table E-1a for reference but were not carried on for use in subsequent lookup tables.

Default building parameters including anticipated indoor air exchange rates and vapor entry rates are discussed in Section 2. The same building characteristic assumptions are used to develop action levels for subslab soil vapor, soil and groundwater. In particular, a default Soil-Building Pressure Differential of 20g/cm-s^2 was incorporated into the model. This generates a targeted vapor entry rate through the building slab of approximately 38 cm^3/second or 2 L/min (refer to Section 2.2.3). This, combined with the default, input indoor air exchange rates for residential versus commercial/industrial settings, is used to generate a targeted SSAF for the intrusion and mixing of vapors into the overlying building. The SSAF subsequently plays an important role in generation of corresponding vapor intrusion action levels for VOCs in underlying groundwater.

For the purposes of this document, the vadose-zone soil profile is modeled as one meter of coarse-grained, dry, sandy soil (S) overlying two meters of somewhat more moist clayey loam (CL, 1/3 sand, 1/3 silt, 1/3 clay). This is considered to be representative of fill material commonly placed beneath the slabs of new buildings. "Sand" is defined as material that is equal to or greater than 0.075 mm in diameter (i.e., will not pass through a U.S. Standard 200 mesh sieve). Silt and clay are defined as material that is less than 0.075 mm in diameter (i.e., will pass through a U.S. Standard 200 mesh sieve). These definitions are consistent with default parameter values for soil types presented in the USEPA model (USEPA 2004a). The depth from the ground surface to the top of impacted groundwater in both sets of models was assumed to be 3.0 meters. This is just above the minimum thickness allowed for modeling of vapor transport through a low to moderate permeability vadose-zone soil profile, due to capillary fringe height constraints.

Input soil parameter values for total porosity, water-filled porosity and fraction organic carbon for the upper portion of the soil profiles were set equal to values used by USEPA for in development of the RSLs (USEPA 2016). Soil moisture was assumed to be somewhat higher for the lower soil units than the upper units, at 0.30 (vs 0.15), consistent with the default recommended in the USEPA vapor intrusion guidance document. Default values presented in the spreadsheet were used for remaining soil properties. For site-specific assessments, soil moisture data should be collected within 5 feet of the groundwater surface and well above the capillary fringe zone.

Default soil vapor permeability values for the selected soil types were used in the models. For site-specific estimation of this parameter, the use of rigorous, in-situ methods intended for the design of soil vapor extraction systems is recommended. Secondary porosity and permeability in fine-grained soils can be significantly enhanced by plant roots, desiccation cracks, disturbance during redevelopment, faulting, etc. Reliance on a small number of borings or laboratory analysis could significantly underestimate the actual vapor permeability of the site and in turn underestimate the risk of potential impacts to indoor air.

Note that when using the spreadsheet to back calculate a groundwater screening level from an input target risk, the values appearing in the spreadsheet for "Csource" (concentration in soil gas) and "Cbuilding" (concentration in indoor air) are based on a theoretical initial soil concentration of 1E-06 g/g or 1,000 micrograms per kilogram and are not directly related to the modeled screening level. The values presented do not represent actual modeled concentrations and should be ignored.

5.4.2 Background and Use of USEPA Vapor Intrusion Model

5.4.2.1 Background

The Johnson and Ettinger model incorporated into the USEPA vapor intrusion spreadsheets was originally developed to predict impacts to indoor air due to the subsurface emission of naturally occurring radon gas (Johnson and Ettinger 1991). Pertinent sections of the guidance document published with the model are presented in Appendix 4. Based on concerns over the conservativeness of the model and a lack of field validation studies, the USEPA initially declined to promote use of the model to develop generic screening levels (USEPA 1996a, 2002). They instead suggested that the model should be used in conjunction with soil gas data to evaluate potential indoor air impacts. In 1997, however, the USEPA published a user's guide to the Johnson and Ettinger model and included a spreadsheet. The 2003 updates to the vapor intrusion spreadsheets developed by USEPA allowed direct input of soil gas data (USEPA 2004a).

The USEPA version of the Johnson and Ettinger model considers both diffusive and convective flow of soil gas into buildings. Diffusive flow occurs as soil gas migrates from areas of higher concentration to areas of lower concentration. Wind effects and indoor heating can cause a decrease in air pressure inside a building and lead to upward, convective flow of subsurface vapors through cracks and gaps in the building floor. As described in the USEPA guidance document, effective convective flow of subsurface vapors into buildings is expected to be limited to deep soils within the "immediate" area of the building.

5.4.2.2 Adjustment of Screening Levels

Field studies at sites impacted by volatile chemicals have clearly documented impacts to indoor air due to the intrusion of subsurface vapors, particularly for sites where soil or groundwater has been impacted by chlorinated VOCs. One example is the report *An Evaluation of Vapor Intrusion Into Buildings Through A Study of Field Data* prepared by staff of the MADEP (Fitzpatrick and Fitzgerald 1997). Results of the Massachusetts DEP study suggest that the vapor intrusion model may over-predict the concentration of chlorinated, volatile chemicals in soil gas by an order of magnitude or more with respect to the measured concentration of the chemical in groundwater, although in some cases the model appeared to be slightly under conservative. More significantly, the MADEP field study indicated that the vapor intrusion model over-predicted the soil gas concentration of petroleum-based VOCs (e.g., benzene) in the vadose zone by up to three or more orders of magnitude. This was interpreted to reflect substantial, natural biodegradation of the vapor-phase of these chemicals in the subsurface. This in turn causes the models to over predict impacts to indoor air by several orders of magnitude and makes use of the model

for this group of chemicals questionable, particularly in the absence of field-based soil gas data.

To account for the potentially over conservative nature of the vapor intrusion model for nonchlorinated volatile chemicals, screening levels generated by the model were adjusted upwards by a factor of 10 (refer to Table E-1a). As discussed below, the use of soil gas data in combination with groundwater studies may be most appropriate for evaluating sites where a more detailed evaluation of this issue is warranted. Evaluation of this issue is ongoing.

5.5 Water Ceiling Levels for Gross Contamination Concerns

Ceiling levels based on gross contamination concerns for surface water and groundwater are summarized in the Table I series. Ceiling levels for surface water and groundwater that is considered to be a current or potential source of drinking water are based on the lowest of the chemicals taste and odor threshold (e.g., Secondary MCLs), one-half the solubility and a maximum of 50000 µg/L for any chemical based on general resource degradation concerns (Tables I-1 and I-3, after MADEP 1994). Taste and odor thresholds for drinking water were selected in the following order of preference and availability:

- USEPA and Guam EPA Secondary MCLs;
- California Department of Health Services Taste and Odor Action Levels;
- Taste and odor levels developed by Amoore and Hautala (as presented in RWQCBCV 2007);
- Odor thresholds presented in Massachusetts DEP (MADEP 1994) and Ontario MOEE (MOEE 1996) guidance documents.

Guam EPA and CNMI DEQ drinking water regulations reference USEPA Secondary MCLs for a short list of chemicals (GEPA 2007a, CNMI 2005b). With the exception of the MADEP and MOEE odor thresholds, data for the noted alternative references are summarized in the document *A Compilation of Water Quality Goals* (RWQCBCV 2007).

Ceiling levels for surface water and groundwater that is NOT considered to be a current or potential source of drinking water were selected in a similar manner with the exception that the drinking water taste and odor thresholds were replaced with general nuisance thresholds and gross contamination concerns (Tables I-2 and I-4). Nuisance thresholds are intended to reflect the concentration at which a chemical in water poses unacceptable odor problems. Thresholds presented in the Massachusetts DEP and Ontario MOEE guidance documents were used as the primary sources of data. Taste and odor levels

developed by Amoore and Hautala (in RWQCBCV 2007) were referred to for chemicals that lack odor thresholds in the Ontario MOEE guidance, although conservative considerations for drinking water concerns could cause these criteria to be overly stringent. It is apparent, however, that similar sources were used to develop both the Ontario MOEE and the Amoore and Hautala databases (compare Tables I-1 and I-2). In keeping with the Ontario MOEE and Massachusetts guidance documents, a 10-fold dilution/attenuation of chemical concentrations in groundwater upon discharge to surface water was assumed (non-drinking water resources, gross contamination screening levels only). The nuisance threshold for methyl tertiary butyl ether (MTBE) presented in Table I-2 is based on average, upper range at which most subjects in a USEPA study could smell MTBE in water (180 µg/L), as summarized in the public health goals document for MTBE prepared by CalEPA (CalEPA 1999a). This was selected as a nuisance screening level for MTBE in surface water. Assuming a dilution factor of ten yields the odor threshold of 1,800 µg/L for groundwater.

5.6 Other Groundwater Screening Levels

Additional screening levels for groundwater provided in the CalEPA technical document *A Compilation of Water Quality Goals* include USEPA and National Academy of Sciences "Suggested No-Adverse-Response (SNARL)" goals for toxicity other than cancer risk and "Agricultural Water Quality" goals developed by the United Nations (RWQCBCV 2007). The SNARL goals largely duplicate risk-based screening levels for drinking water presented in Table F-3. Agricultural Water Quality goals for 12 metals are provided in Table F-5. These goals were not considered in the final lookup tables but may need to be considered on a site-specific basis. The agricultural goals are higher than screening levels for both drinking water and surface water protection for 7 of the 12 metals listed. Agricultural goals for copper, cobalt, selenium and zinc are higher than goals for aquatic habitat protection but are lower than goals for drinking water (i.e., drinking water goals may not be adequately protective for irrigation use). The agricultural goal for molybdenum is lower than both the drinking water goal and the surface water goal for this metal. The development of these goals was not reviewed for preparation of the ESL document.

6 Soil, Soil Gas and Groundwater Screening Levels for TPH

6.1 Introduction

Petroleum is a complex mixture of hundreds of different compounds composed of hydrogen and carbon (i.e., "hydrocarbon" compounds). The carbon range makeup of common petroleum fuels is noted in Figure 3. Non-specific, aliphatic and aromatic compounds and related degradation compounds make up the overwhelming majority of the mass in fuels and in vapors emitted from fuels (see Appendix 6). These compound and related, degradation compounds are collectively measured and assessed at “Total Petroleum Hydrocarbons or “TPH” (refer to Volume 1, Section 2.6). Risk to human health and the environmental posed by petroleum releases is evaluated in terms of both TPH and individual, “indicator” compounds such as benzene, toluene, ethylbenzene and xylenes (BTEX) as well as naphthalene and other targeted polyaromatic hydrocarbons (PAHs). The latter only make up a small percentage of the total mass in fuels and in vapors but can pose a significant risk due to their higher toxicity. Testing and evaluation of the TPH component of petroleum-contaminated soil and groundwater and in associated soil gas in addition to targeted, individual compounds is therefore important.

A summary of target analytes for petroleum in soil gas, soil and water in addition to TPH and with respect to different fuel types is provided in Table 6-1. In many cases the TPH component of the contamination will drive risk to human health and the environment over the minority fraction represented by individual BTEX and PAH compounds.

The development of risk-based screening levels for Total Petroleum Hydrocarbons (TPH) in soil, soil gas and groundwater is described below. For the purposes of this document, petroleum mixtures are subdivided into "gasolines", "middles distillates" and "residual fuels", following the methodology used by the American Petroleum Institute (API 1994). Middle distillates include common diesel fuel, kerosene and jet fuels such as JP-8. The screening levels are based on the assumed carbon range makeup of fuel types and associated vapors in conjunction with carbon range-specific toxicity factors published by USEPA and Massachusetts, among other agencies.

Several published documents were available to select a default, carbon range makeup of different fuel types (e.g., TPHCWG 1998, MADEP 1997a, 2003). Published data on the carbon range makeup and toxicity of vapors associated with petroleum fuels are limited. The Hawai‘i DOH carried out a soil gas study of key, petroleum-contaminated sites in Hawai‘i to help fill this data gap and updated the EHE guidance and associated TPH EALs (HDOH 2012). The results of that study are summarized below. A paper published on the study (Brewer et al. 2013) and an overview of common questions regarding TPH are included in Appendix 6.

Not surprisingly, and as described below and in Appendix 6, vapors are strongly biased toward lighter-end aliphatic compounds in comparison to the parent fuel type. Significant vapors were identified at both gasoline and middle distillate release sites. Gasoline is routinely considered to be “volatile” and a potential vapor intrusion hazard. As is obvious by their distinctive smell, middle distillates such as diesel fuel are also volatile and can pose vapor intrusion hazards if present at high enough concentrations and mass in soil and groundwater.

Sections 7 and 9 of the Hawai‘i DOH *Technical Guidance Manual* describes laboratory methods for testing of TPH in soil, water and soil gas contaminated with petroleum fuels. Detailed carbon range analysis of the aliphatic and aromatic makeup of the TPH component of the petroleum and development of site-specific, TPH screening levels can be carried out as needed as an alternative to the screening levels published in this guidance (see Volume 1). This is not anticipated to be necessary or cost-beneficial at most sites, however. An exception might be the need for more detailed carbon range data for soil gas at sites where reported concentrations of TPH exceed the Tier 1 screening levels by less than a factor of three, the approximate magnitude that site-specific screening levels might be increased over the default action level.

As discussed in the Volume 1, the use of ESLs as final “cleanup levels” for petroleum-related compounds that are known to be highly biodegradable may be unnecessarily conservative. This is especially true for TPH and petroleum-related compounds. Final cleanup levels should be evaluated on a site-specific basis and in conjunction with guidance from the overseeing regulatory agency (e.g., refer to HDOH 2007).

6.2 TPH Carbon Range Makeup of Fuels and Fuel Vapors

A summary of the selected, default carbon range TPH makeup of fuels and fuel vapors is provided in Table 6-2. This was used in combination with carbon range toxicity factors published by USEPA and other agencies to developed risk-based screening levels for TPH in indoor air, soil gas, soil and groundwater. A detailed summary of data collected

as part of the Hawai‘i DOH 2011 soil vapor study is provided in Appendix 6 (HDOH 2012).

A detailed review of the chemistry and carbon range makeup of different petroleum fuel types is presented in guidance published by the Total Petroleum Hydrocarbon Working Group (TPHCWG 1998). Summaries have also been published by several states, including Massachusetts (MADEP 1997a, 2003) and Indiana (IDEM 2010). A brief overview is provided below, with a focus on gasoline, #2 diesel fuel and residual fuels such as motor oil.

6.2.1 Gasolines

Gasolines are defined as petroleum mixtures characterized by a predominance of branched alkanes and aromatic hydrocarbons with carbon ranges of C6 to C12 and lesser amounts of straight-chain alkanes, alkenes and cycloalkanes of the same carbon range (TPHCWG 1998). Based on information published by the State of Indiana, a relative TPH carbon range makeup of gasoline fuels (not including BTEX, naphthalene and other individual, targeted compounds) of 45% C5-C8 aliphatics, 12% C9-C12 aliphatics and 43% C9-C12 aromatics was selected for development of TPHgasoline screening levels for soil and groundwater (see Table 6-2a). Separately targeted, individual such as BTEX and naphthalene generally do not make up more than 5% of gasoline fuels in Hawai‘i. Other compounds such as MTBE are not added in significant quantities.

An assumed TPH carbon range makeup of vapors associated with gasolines of 77.3% C5-C8 aliphatics, 7.3% C9-C12 aliphatics and 15.4% C9-C10 aromatics was selected for development of TPHgasoline soil gas screening levels. This is based on the median carbon range composition of gasoline vapors published in the USEPA Petroleum Vapor Intrusion database (see Table 6-2b; Brewer et al. 2013; see also USEPA 2012). A much great dominance of gasoline vapors by C5-C8 aliphatics has been reported by other entities (e.g., BioVapor 2010). The higher, relative proportions of longer chain aliphatics and heavier aromatics in the USEPA database could be due to weathering, inadvertent inclusion of vapor data from middle distillate release sites and/or the incorporation of volatile metabolites in the data. The latter issue has not been studied in detail.

Vapors associated with fresh gasoline are dominated by C2-C4 aliphatics and C5-C8 aliphatics, with only a minor component (<5%) of BTEX and non-specific aromatic compounds (see Appendix 6). Vapors associated with weathered fuel, as is the case at most gasoline-release sites, are dominated by C5-C8 aliphatics with little to no C2-C4 aliphatics remaining and again a relatively minor component of BTEX and non-specific aromatic compounds (see Appendix 6; may differ on the mainland due to local gasoline

formulations). The C2-C4 aliphatics primarily pose explosion hazards. Chronic toxicity factors have not been developed for these compounds.

The ratio of TPH to benzene in soil gas at gasoline-contaminated sites is typically less than 500:1, with the ratio lower ratio (i.e., increased proportion of benzene) at fresh release sites and higher ratio at more weathered sites (i.e., preferential loss of benzene). The ratio of TPH to benzene can be much higher at releases of more recent (post 2005) release of low-benzene gasoline (see Brewer et al 2013).

6.2.2 Middle Distillates

Middle distillates (e.g., kerosene, diesel fuel, home heating fuel, JP-8 jet fuel, etc.) are characterized by a wider variety of straight, branched and cyclic alkanes, PAHs (especially naphthalene and methylnaphthalenes) and heterocyclic compounds with carbon ranges of approximately C9 to C25. A small component of C5-C8 aliphatics and BTEX aromatics is also present.

Diesel #2 was selected as the most representative fuel for this petroleum type due to its more widespread use in comparison to other fuels. (JP-8 jet fuel is essentially diesel fuel with an increased component of lighter-end compounds.) Based on guidance published by the State of Indiana (IDEM 2010), an assumed, carbon range makeup for Diesel #2 fuel of 0.4% C5-C8 aliphatics, 35.2% C9-C12 aliphatics, 42.5% C19 and greater aliphatics, 14.2% C9-C12 aromatics and 7.7% C13 and higher aromatics was selected for development of soil and groundwater TPH screening levels (see Table 6-2a). This is in line with the carbon range makeup of individual chemicals in diesel fuel published by the TPH Working Group (TPHCWG 1998).

Selection of a default, carbon range makeup of vapors associated with middle distillates is less straight forward than for gasolines. Published data regarding the specific, carbon range makeup of vapors associated with diesel fuel and other middle distillates is lacking. Vapor headspace chromatograms have been published by a few private entities, however (e.g. Hayes 2007, NCFS 2011). Not surprising given the chemical makeup of middle distillate fuels, the chromatograms suggest a dominance of C12 and greater aliphatic compounds in vapors associated with these fuels, with an accompanying significant amount of C5-C8 aliphatics. The increased presence of the latter in vapor in part reflects the preferential release of lighter-end and more volatile aliphatic compounds from the fuels. Elevated C5-C8 aliphatics in the vapor could also reflect degradation of longer-chain compounds. The U.S. Geologic Survey (USGS) has documented the latter in groundwater for a diesel release site they have been monitoring since the 1980s (Chaplin et al, 2002). Aromatic compounds, including BTEX and naphthalene make up only a small amount of the total mass of vapor-phase compounds.

Commercial laboratories are only able to reliably report up to C12 aliphatics and C10 aromatics in soil gas samples collected in summa canisters (e.g., see Hayes 2007). This is because longer-chain vapor compounds tend to condense on the inside of the canisters stick and are not extracted when an aliquot is removed for testing. This in turn means that the soil gas samples collected in summa canisters at middle distillate release sites could significantly under report the total concentration of TPH present in the soil gas and subsequently under represents the potential vapor intrusion hazard posed by the contamination.

In order to address this potential concern HDOH collected TO-17 sorbent tube soil gas samples at five key petroleum sites as part of its TPH vapor study (see HDOH 2012). The TO-17 samples allowed full capture and extraction of the full range of petroleum compounds present in the soil gas. The samples were collected by drawing a fixed volume of soil gas (e.g., 50ml) through a narrow tube filed with a carbon-based sorbent material (see Appendix 6). Summa canister samples were also collected at the sites for comparison. The laboratory extracts and measures the mass of targeted VOCs captured by the sorbent material. Dividing this by the volume of soil gas (or air) drawn through the tube yields the original concentration of the individual VOC in the soil gas.

Soil gas data collected by HDOH at several middle distillate release sites in Hawai‘i revealed wide variations in the ratio of C5-C8 and C9-C12+ aliphatic compounds between and even within sites (HDOH 2012; Brewer et al. 2013; see Appendix 6). In some cases C9-C12+ aliphatics dominated, in agreement with published chromatograms for headspace samples over diesel fuel (e.g. Hayes 2007, NCFS 2011). In other cases C5-C8 aliphatics dominated. This may have been in part due to mixing of vapors with nearby gasoline releases and/or the breakdown of longer-chain aliphatics into shorter chain aliphatics at more weather sites. Vapor samples collected over fresh fuels were likewise mixed (see Appendix 6), although it is suspected that the fuel associated with the sample that reported a higher proportion of C5-C8 aliphatics may have been excessively warmed in the sun prior to collection of the vapor sample. The distinct presence of C9-C12+ aliphatics in the soil gas samples, however, clearly distinguishes sites with middle distillate contamination from gasoline-release sites.

Based on the results of the Hawai‘i DOH study, an assumed TPH carbon range makeup of vapors associated with middle distillate fuels of 25% C5-C8 aliphatics, 75% C9-C12+ aliphatics and 0% C9-C10 aromatics was selected for development of TPH soil gas screening levels (see Table 6-2b and Appendix 6). This reflects the worst-case sample collected at diesel-release site and is considered to be conservative, given that the toxicity of longer-chain aliphatics is assumed to be six times greater than shorter-chain aliphatics (see Table 6-3). An assumed dominance of C9-C12+ aliphatic compounds in middle distillate vapors is consistent with published chromatograms for headspace samples over diesel fuel noted above (e.g. Hayes 2007, NCFS 2011). A high percentage of C12+

aliphatics and C10+ aromatics was not, however, identified in the middle distillate sites investigated; even this was predicted by the published chromatograms (maximum 13%, see Appendix 6). This may reflect the fact that the chromatograms reflect vapors collected over fresh fuels.

Small amounts of BTEX and naphthalene were reported in vapor samples collected over fresh fuel. Benzene, naphthalene and other aromatic compounds were present in only trace amounts in soil gas samples collected at targeted middle distillate release sites, however (generally <0.1%). The ratio of TPH to benzene was typically greater than 1,000:1 and in some cases over 10,000:1. Non-specific aliphatics clearly drove vapor intrusion risks at these sites over individual compounds such as benzene and naphthalene. Testing for only the latter in the soil gas samples would have significantly underestimated the vapor intrusion risk.

6.2.3 Residual Fuels Distillates

Residual fuels (e.g., Fuel Oil Nos. 4, 5, and 6, lubricating oils, "waste oils", "oil and grease," asphalts, etc.) are characterized complex, polar PAHs, naphthenoaromatics, asphaltenes and other high-molecular-weight, saturated hydrocarbon compounds with carbon ranges that in general fall between C24 and C40. Published data on the specific, aliphatic and aromatic makeup of the TPH fraction of residual fuels after subtracting individual, targeted PAH compounds was not identified for use in this guidance but is expected to vary widely between different products and wastes.

For the purposes of this guidance, and as a conservative measure for risk-based screening levels, a TPH carbon range composition of 75% C19+ aliphatics and 25% C17+ aromatics was assumed for estimation of a TPH reference dose for residual fuels and subsequent calculation of risk-based screening levels (see Table 6-2a). This is based on the aliphatic-aromatic makeup of lubricating and motor oil presented in Table 13 of the TPH Working group guidance (TPHCWG 1998). Testing for targeted, individual PAHs in addition to TPH at residual fuel release sits is critical. Motor oil that has been heated to high temperatures can, however, contain a significant proportion of carcinogenic, PAH compounds. Significant amounts of PAHs (e.g., naphthalene) could also be present at former gas manufacturing plants, asphalt production facilities, and other sites where PAHs made up a significant proportion of the petroleum product released.

For the purposes of this guidance the makeup of vapors associated with heavy fuels was assumed to be identical to middle distillate vapors, with 25% C5-C8 aliphatics, 75% C9-C12 aliphatics and 0% C9-C10 aromatics (see Table 6-2b). The Hawai‘i DOH study did not include the review or collection of soil gas samples at sites contaminated with heavy petroleum fuels or products (e.g., Bunker C fuel oil). Vapor-phase compounds are

expected to be dominated by C9-C12+ aliphatics, with little to no BTEX. As is suspected for some middle distillates sites, C5-C8 and even C9-C12 aliphatics could be present as breakdown products of longer-chain hydrocarbon compounds. Naphthalene may be a concern at manufacture gas plant (MGP) sites. The TPH fraction of soil and groundwater contaminated with residual fuels is only likely to pose significant vapor intrusion hazards if gross contamination is situated immediately beneath building floors, especially in comparison to gasoline- and even diesel-contaminated sites (with the exception of MGP site). Methane buildup may also be a concern at heavy fuel release sites.

Mineral oils used in electrical transformers are highly refined, fractions of crude oil with little to no chemical additives (EPRI 1998). The oils are dominated by C9-C30 aliphatics (approximately 85%) with a less amount of non-specific, aromatic compounds (approximately 15%) and overlap the carbon ranges discussed for middle distillates and residual fuels (see Figure 3). The volatile component of mineral oils is significantly lower than that found in middle distillates. The viscosity of the oils is also significantly greater. Carcinogenic PAHs such as benzo(a)pyrene are not present in detectable amounts. Releases of mineral oils from electrical transformers are relatively small in comparison to releases of diesel fuels and contamination is generally limited.

6.3 Carbon Range TPH Toxicity Factors and Physiochemical Constants

Carbon range toxicity factors published by Massachusetts (MADEP 2003, see also Hutchinson et al., 1996) and more recently the USEPA (USEPA 2009) were used to calculate weighted oral and inhalation toxicity factors for each of the three noted TPH categories, based on the assumed aliphatic and aromatic makeup of each category. A summary of toxicity factors for the each of the targeted carbon ranges is provided in Table 6.3.

As noted in Table 6-4, weighted, oral Reference Doses of 0.03, 1.3 and 2.3 mg/kg-day were calculated for TPHgasolines, TPHmiddle distillates and TPHresidual fuels, respectively, based on the assumed carbon range makeup of the petroleum products. Weighted, inhalation Reference Concentrations of 595 µg/day and 225 µg/day were calculated for TPHgasolines and TPHmiddle distillates, respectively, based on the assumed carbon range makeup of vapors associated with each petroleum product.

Default physiochemical constant values for TPH categories used in previous editions of the guidance were retained for use in the screening level models (see Table J). The constants are based primarily on guidance published by Massachusetts DEP (MADEP 1997a, 2002). As summarized below and in Appendix 1, these toxicity factors and physiochemical constants were used to develop soil gas, soil and groundwater TPH

screening levels. Risk-based screening levels for TPH are based on a target, noncancer hazard quotient of 1.0. This is based on an assumption that TPH represents the primary noncancer threat posed by petroleum-contaminated soil, soil gas and groundwater due to the overwhelming mass of hydrocarbon compounds included in the analysis (see Section 1.4 and Appendix 6).

6.4 TPH Screening Levels for Indoor Air and Soil Gas

Preliminary, risk-based screening levels for TPHgasolines and TPH middle distillates in indoor air and soil vapor as were calculated in the same manner as done for other volatile chemicals but with the use of a target, noncancer Hazard Quotient of 1.0 (see above and equations in Appendix 2). An indoor screening level of 290 $\mu g/m^3$ was calculated for TPHgasolines. An indoor screening level of 130 $\mu g/m^3$ was calculated for TPHmiddle distillates. Soil vapor screening levels were calculated using the default, Indoor Air: Soil vapor attenuation factors discussed in Section 2 (Residential: 1/2,000, Commercial/Industrial: 1/4,000). This generates residential soil vapor screening levels of 590,000 $\mu g/m^3$ for TPHgasolines and 260,000 $\mu g/m^3$ for TPHmiddle distillates (Table 6-5; soil vapor screening levels for carbon ranges also provided). Commercial/Industrial screening levels are much higher--4,900,000 $\mu g/m^3$ for TPHgasolines and 2,200,000 $\mu g/m^3$ for TPHmiddle distillates. This is due to both an adult-only exposure scenario and an average, daily exposure time of 8 hours instead of 24 hours (see Appendix 2).

Petroleum release sites often contain a mix of fuels. Vapors in soil gas could likewise be a mix of several fuel types. Applying soil gas (and indoor air) screening levels for gasolines versus middle distillate fuels is therefore not straightforward. The default, carbon range makeup assumed in the action levels can be re-evaluated on a site-specific basis as needed. Note also that the TPH indoor air screening levels could be below ambient background levels for indoor and outdoor air, due to the use of petroleum-based cleaners, auto exhaust, etc.

The soil gas screening levels do not take into account an expected reduction in concentration and associated risk over time due to biodegradation. This is also true for risk-based, TPH soil screening levels presented in the Table K series. This can be evaluated on a site-specific basis as needed.

The collection and evaluation of soil gas samples at sites impacted with impacted with residual fuels is warranted where heavy contamination is to be left in place (see HDOH 2007). Soil gas screening levels for vapors associated with TPHmiddle distillates should be applied in the absence of soil gas carbon range data. This will help to rule out potential vapor intrusion hazards and ensure that other sources of petroleum contamination were not missed.

6.5 TPH Screening Levels for Soil

6.5.1 TPH (gasolines, middle distillates)

Risk-based, direct-exposure screening levels for TPHgasolines and TPHmiddle distillates in soil were calculated in the same manner as done for individual chemicals, using the toxicity factors noted above and physiochemical constants noted in Table J (see Chapter 4). As discussed in Chapter 4, maximum, direct-exposure screening levels for volatile liquids in soil are normally set equal to the contaminants theoretical soil saturation level or Csat. This represents the concentration above which the contaminant can no longer be sorbed to soil particles (e.g., organic carbon or clay) or dissolved into the soil moisture (e.g., solubility limits reached). Above this concentration, free product will be present in the soil. This is important because the USEPA model used to calculate screening levels for direct-exposure hazards is not valid above the Csat concentration for volatile chemicals (refer to Section 4.2.5). Maximum, direct-exposure screening levels for volatile liquids in soil are therefore in general set to the chemical Csat concentration (e.g., refer to xylene screening levels in Table K series).

This approach was used to establish Csat and maximum direct-exposure screening levels for TPHgasolines (4,500 mg/kg; e.g., refer to Table K-3). For TPH as middle distillates (e.g., diesel) the theoretical Csat concentration is much lower – 150mg/kg. This is due to the assumed, lower solubility of diesel and related middle distillate fuels (5 mg/L vs 150 mg/L for TPHgasoline, refer to Table J). Confidence in the Csat value of 150 mg/kg is low, however, and this value is considered to be excessively conservative for use as a maximum, direct exposure action level. The use of alternative approaches to evaluate direct-exposure hazards posed by TPHmiddle distillates and other volatile contaminants in soil is currently being evaluated (e.g., using soil gas rather than soil data). For the purposes of this document, it is assumed that the gross contamination action level for TPHmiddle distillates of 500 mg/kg is adequate for protection of direct-exposure hazards posed by TPHmiddle distillates. This value was used as an alternative Csat action level for TPHmiddle distillates in the Table K series. Residual fuels are not considered to pose significant vapor emission hazards other than the potential generation of methane and related explosion hazards (refer to Volume 1).

Massachusetts developed generic physio-chemical constants for the C11-C22 aromatics carbon range fraction based on a review of compounds included within this fraction (MADEP 2002b). These constants were adopted in this document to develop a soil leaching action level for TPH as gasolines and middle distillates (see Tables G-1a, G-1b and J). The soil action level calculated for leaching of TPH from soil and protection of groundwater that is a source of drinking water (rounded to 100 mg/kg) is coincidental with screening levels presented in other technical documents prepared by local regulatory

agencies in California (e.g., RWQCBSF 1990; RWQCBLA 1996). Similarly, the soil action level calculated for leaching of TPH from soil and protection of groundwater that could discharge into a body of surface water (rounded to 400 mg/kg [gasolines] and 500 mg/kg [middle distillates]) is coincidental with the action level developed for use in the CalEPA Board Order for the San Francisco Airport (RWQCBSF 1999).

Ceiling levels for nuisance and other gross contamination concerns developed by Massachusetts for TPH as gasoline and diesel (latter included under "middle distillates") were modified for use in this document (MADEP 1997a,b, refer to Table H series). Based on calculated "odor indexes", a shallow soil ceiling level of 100 mg/kg was selected for unrestricted ("residential") land-use scenarios and a ceiling level of 500 mg/kg was selected for commercial/industrial land-use (both categories of TPH). For deep soils, a ceiling level of 5,000 mg/kg was retained (primarily intended to prevent the presence of potentially mobile free product in soil).

6.5.2 TPH (residual fuels)

Risk-based, direct-exposure screening levels for TPH as residual fuels were calculated in the same manner as done for individual chemicals, using the toxicity factors and physiochemical constants noted earlier. The screening levels developed incorporate the Particulate Emission Factor used by USEPA to calculate RSLs for nonvolatile contaminants (USEPA 2016, refer to Appendix 2). Risk-based screening levels for TPHresidual fuels in drinking water and soil were then developed in the same manner as done for other chemicals (Table F-3a and Table K series, respectively). As discussed in Volume 1, testing for individual, target indicator compounds is also recommended for soil and groundwater contaminated by heavy fuels (e.g., PAHs, heavy metals, etc.).

Individual PAHs are likely to drive health risks posed by soils contaminated with residual fuels. The non-specific, TPH fraction of the petroleum may, however, pose gross contamination concerns even in the absence of significant PAHs. Following Massachusetts DEP guidance (MADEP 1997a,b), ceiling levels for gross contamination concerns of 500 mg/kg and 2,500 mg/kg were selected for exposed or potentially exposed soils in unrestricted ("residential") and commercial/industrial land use scenarios, respectively (see Table H series). The MADEP ceiling level of 5,000 mg/kg was selected for isolated or otherwise deep soils.

The Massachusetts DEP did not develop specific screening levels for leaching of heavy hydrocarbons from soil (refer to C19-C36 carbon range summary in Appendix 6). Residual fuels are by definition characterized by a predominance hydrocarbon compounds with carbon ranges greater than C24. These compounds are considered to be substantially less mobile in the subsurface that hydrocarbon compounds that make up the

lighter-weight petroleum mixtures. For TPH that is characterized by a predominance of C23-C32 carbon range compounds, the CalEPA Los Angeles Regional Water Quality Control Board proposes an action level of 1,000 mg/kg for protection of drinking water resources (RWQCBLA 1996). This action level was adopted for use in this document (refer to Table G-1a). The target TPH action level for groundwater was not specifically stated but is presumably 100 µg/L or less.

The Los Angeles Regional Water Quality Control Board did not present a similar action level for potential leaching of TPH from soil and subsequent discharge of impacted groundwater to a body of surface water. Although conservative, the Los Angeles TPH soil leaching action level of 1,000 mg/kg was retained for this purpose (see Table G-1a, refer also to Section 4.4).

The toxicity of mineral oils and vegetable oils is low. The oils are more viscous and less volatile than fuels. Significant vapor emissions from contaminated soil and groundwater are not anticipated, although methane buildup could be a concern for very large, subsurface releases. For the purpose of this guidance and in order to address potential gross contamination concerns, a TPH action level of 5,000 mg/kg is recommended for exposed soils or soils within 3 feet of the ground surface that has been contaminated with mineral or vegetable oil. For deeper soils an action level of 25,000 mg/kg is recommended. Refer also to the HEER Office 2007 guidance for the long-term management of petroleum-contaminated sites (HDOH 2007). These action levels are not specifically called out in the ESL lookup tables. Soil and other media contaminated by releases of oil from electrical equipment should also be tested for PCBs unless it can be demonstrated that PCB-based oils were never used in the equipment.

6.6 TPH Screening Levels for Groundwater

Regulatory drinking water standards for TPH and petroleum in general have not been developed. Toxicity-based drinking water goals of 300 µg/L for gasoline, 160 µg/L for diesel and 2,400 µg/L for residual fuels were developed using on the USEPA RSL tapwater model and the above-noted toxicity factors (refer to Table F-3a). A TPH-diesel taste and odor threshold of 100 µg/L referenced in the technical document *A Compilation of Water Quality Goals* (RWQCBCV 2007) was referred to as a substitute secondary screening level for all categories of TPH (see Table I-1). This takes precedence over the toxicity-based action level for selection of a final drinking water action level (see Tables F-1a and F-1b).

For the protection of aquatic life, an action level of 500 µg/L was selected for TPH-gasoline in freshwater and 3,700 µg/L in saltwater (see Table F-4b). A single action level of 640 µg/L was selected for TPHdiesel and TPHresidual fuels in both freshwater and

saltwater. The freshwater action level for TPHgasoline is based on a summary of available eco-toxicity data compiled for use at the Presidio of San Francisco under Regional Water Board Order 96-070 (RWQCBSF 1998b, Montgomery Watson 1999). The TPHgasoline criteria for saltwater and the TPH criteria for diesel and residual fuels in general are based on screening levels developed for use at the San Francisco Airport under Regional Water Quality Control Board Order No. 99-045 (RWQCBSF 1999a).

The groundwater nuisance and odor concerns action level of 5,000 µg/L for TPH (all categories) noted in the Table I series for nondrinking water was taken directly from Massachusetts DEP risk assessment guidance (MADEP 1997a,b). MADEP lists a gross contamination, "Ceiling Value" of 50,000 µg /L for all aliphatic and aromatic carbon ranges. This includes an assumed a dilution factor of "10", however. The dilution factor was omitted for used in the action levels, since as a default groundwater should meet surface water action levels at the point of discharge, both for aquatic toxicity and potential nuisance concerns. This also corresponds with the approximate solubility of diesel fuel and light motor oil in fresh water (ATSDR 2001) and is intended to address potential nuisance issues (odors, etc.) if discharged to surface water. The TPH ceiling levels for gross contamination concerns are based on 1/2 the solubility of the respective TPH categories (refer to Table I series). The solubility of gasoline in freshwater is approximately 150,000 µg/L. The solubility of diesel range and heavier fuels is assumed to be approximately 5,000 µg/L. These screening levels are intended to highlight the potential presence of free product on groundwater.

6.7 Additional Target Indicator Compounds

Laboratory measurement and assessment of each individual compound within a petroleum mixture is technically complex and generally not feasible or appropriate under most circumstances. More importantly, data regarding the physio-chemical and toxicity characteristics of the majority of petroleum compounds are lacking. Impacts to soil and water from petroleum mixtures are instead evaluated in terms of both TPH and well characterized "indicator chemicals" (e.g., BTEX and targeted PAHs). Indicator chemicals typically recommended for petroleum mixtures include (after CalEPA 1996):

Monocyclic Aromatic Compounds (primarily gasolines and middle distillates)

- benzene
- ethylbenzene
- toluene
- xylene

Fuel additives (primarily gasolines)

- MTBE
- other oxygenates as necessary

Polycyclic Aromatic Compounds (primarily middle distillates and residual fuels)

- methylnaphthalene (1- and 2-)
- acenaphthene
- acenaphthylene
- anthracene
- benzo(a)anthracene
- benzo(b)fluoranthene
- benzo(g,h,i)perylene
- benzo(a)pyrene
- benzo(k)fluoranthene
- chrysene
- dibenzo(a,h)anthracene
- fluoranthene
- fluorene
- indeno(1,2,3)pyrene
- naphthalene
- phenanthrene
- pyrene.

The TPH ESLs should be used in conjunction with ESLs for these chemicals. Note that volatile chemicals such as butylbenzene, isopropyl benzene, isopropyl toluene and trimethylbenzenes are often reported in analyses of gasoline and other light-end petroleum products. These chemicals are collectively addressed under screening levels for "TPH" and generally do not need to be evaluated separately.

Soil and groundwater impacted by releases of waste oil may also require testing for heavy metals and chemicals such as chlorinated solvents and PCBs. Screening levels for these chemicals are included in the lookup tables.

6.8 Ethanol

Gasoline formulations are anticipated to include an increasing proportion of ethanol in the near future. Soil, soil gas, indoor air and groundwater screening levels for ethanol have therefore been added to the ESL document. Human-health, chronic toxicity factors for ethanol have not been developed. Ethanol is not considered to pose chronic health risks at the low doses posed by exposure to contaminated soil and groundwater. The screening levels are therefore based only on nuisance and gross contamination concerns. “Ceiling Levels” for these concerns are presented in Tables H (soil and indoor air) and I (groundwater and surface water). The final action level for each of the groundwater categories is based on an “Upper Limit” of 50 mg/L (Table I series, see also Tables F-1a and F-1b). The final soil action level presented in each of the soil categories of 45 mg/kg is based on the protection of groundwater to the noted target groundwater action level

(Table G-1a, see also Table A and B series). The leaching based action level was adjusted upwards by a factor of 10 to take into account the high, anticipated biodegradation rate of ethanol in the environment. The adequacy of this action level should be further evaluated in the field as appropriate (e.g., sites near producing water wells or bodies of surface water). The indoor air action level of 19,200 $\mu g/m^3$ (10 ppmv) is based on the published odor threshold potential for ethanol (Table H series, see also Table E-3). This concentration is well below the Occupational Safety and Health Administration (OSHA) Permissible Exposure Limit (PEL) of 1,000 ppmv for workers.

Although highly mobile in the environment, ethanol is also highly biodegradable, not significantly toxic in low doses and is likely to only persist in the presence of other, more toxic components of gasoline, including benzene (Ulrich 1999). An assessment and cleanup of contaminated soil and groundwater to address health threats posed by associated compounds is expected to address any potential health concerns posed by exposure to residual ethanol in soil, air or water.

TABLE 6-1. TARGET ANALYTES FOR PETROLEUM CONTAMINATED MEDIA (see also Section 9 of the HDOH Technical Guidance Manual; HDOH 2016).

Petroleum Product	Media	Recommended Target Analytes
Gasolines	Soil	TPH, BTEX, naphthalene, MTBE and appropriate additives and breakdown products (e.g., DBA, TBA, lead, ethanol, etc.)
	Soil Vapor	Same as soil plus volatile additives and methane
	Groundwater	Same as soil
Middle Distillates (diesel, kerosene, Stoddard solvent, heating fuels, jet fuel, etc.)	Soil	TPH, BTEX, naphthalene, and methylnaphthalenes (1- and 2-)
	Soil Vapor	TPH, BTEX, naphthalene, and methane
	Groundwater	Same as soil
Residual Fuels (lube oils, hydraulic oils, transformer oils, Fuel Oil #6/Bunker C, waste oil, etc.)	Soil	TPH, *VOCs, naphthalene, methylnaphthalenes (1- and 2-), the remaining 16 priority pollutant PAHs, PCBs, and heavy metals unless otherwise justified
	Soil Vapor	TPH, BTEX, naphthalene, and methane
	Groundwater	same as soil

*VOCs include BTEX and chlorinated solvent compounds

TABLE 6-2a. DEFAULT CARBON RANGE MAKEUP OF TPH IN PETROLEUM FUELS (after IDEM 2010).

Carbon Range	[1]$TPH_{gasoline}$	[1]TPH_{diesel}	[2]$TPH_{residual\ fuels}$
C5-C8 aliphatics	45%	0.4%	0%
C9-C18 aliphatics	12%	35.2%	0%
C19+ aliphatics	0%	42.6%	75%
C9-C16 aromatics	43%	21.8%	25%

1. Indiana Department of Environmental management (IDEM 2010).
2. Massachusetts DEP (MADEP 1997).

TABLE 6-2b. DEFAULT CARBON RANGE MAKEUP OF TPH IN PETROLEUM FUEL VAPORS.

Carbon Range	[1]$TPH_{gasoline}$	[1]TPH_{diesel}
C5-C8 aliphatics	77.3%	25%
C9-C18 aliphatics	7.3%	75%
C9-C16 aromatics	15.4%	0%

1. Median carbon range makeup of gasoline vapors in USEPA 2013 Petroleum Vapor Intrusion database (see Brewer et al. 2013; Appendix 6).
2. HDOH soil vapors study and published information (see Brewer et al. 2013; Appendix 6).

TABLE 6-3. SELECTED TOXICITY FACTORS FOR INDIVIDUAL CARBON RANGE FRACTIONS.

Carbon Range	RfD_{0ral} (mg/kg-day)	RfC ($\mu g/m^3$)
C5-C8 aliphatics	[b]0.04	[a]600
C9-C18 aliphatics	[a]0.01	[a]100
C19+ aliphatics	[a]3.0	[c]nv
C9+ aromatics	[a]0.03	[a]100

a. USEPA 2009
b. MADEP 2003
c. Not significantly volatile. C17+ aromatics not considered separately.

TABLE 6-4. WEIGHTED TPH TOXICITY FACTORS FOR FUELS AND FUEL VAPORS.

Carbon Range	RfD_{0ral} (mg/kg-day)	RfC ($\mu g/m^3$)
$TPH_{gasolines}$	0.03	281
$TPH_{middle\ distillates}$	0.02	126
$TPH_{residual\ fuels}$	0.12	-

TABLE 6-5a. INDOOR AIR AND SOIL GAS CARBON RANGE SCREENING LEVELS.

	[1]Indoor Air		[1]Subslab Soil Gas	
Carbon Range	**Residential (µg/m³)**	**Commercial/ Industrial (µg/m³)**	**Residential (µg/m³)**	**Commercial/ Industrial (µg/m³)**
C5-C8 aliphatics	630	2,600	1,300,000	11,700,000
C9-C18 aliphatics	100	440	210,000	1,800,000
C19+ aliphatics	-	-	-	-
C9+ aromatics	100	440	210,000	1,800,000

1. Assumed indoor air: subslab vapor attenuation factor: Residential = 0.0005; C/I = 0.00025 (see Section 3.3). Noncancer Hazard Quotient = 1.0. Calculate cumulative risk if used to evaluate site-specific carbon range data for soil vapor.

TABLE 6-5b. INDOOR AIR AND SOIL GAS TPH SCREENING LEVELS.

	Indoor Air		Subslab Soil Gas	
Carbon Range	**Residential (µg/m³)**	**Commercial/ Industrial (µg/m³)**	**Residential (µg/m³)**	**Commercial/ Industrial (µg/m³)**
$TPH_{gasolines}$	290	1,200	590,000	4,900,000
$TPH_{middle\ distillates}$	130	330	260,000	2,200,000
[1]$TPH_{residual\ fuels}$	-	-	-	-

1. Use TPHmiddle distillate indoor air and soil gas screening levels sites contaminated with residual fuels.

7 Other Issues

7.1 Laboratory Reporting Levels and Background Levels

Laboratory method reporting limits and background concentrations of chemicals were not directly considered in development of the lookup tables. As discussed in Volume 1 of this document, however, reporting limits approved by the overseeing regulatory agency should be used in place of the ESLs presented in this document when higher. An ESL should similarly be replaced with the natural background concentration of the chemical if the background value is higher.

7.2 Reporting of Soil Data

Soil data are calculated by dividing the mass of the chemical of concern detected in the soil by the total weight of the soil. The weight of a soil sample can be measured on either a dry-weight basis (i.e., excluding the weight of water in the soil sample) or a wet-weight basis (i.e., including the weight of water in the soil sample). For a typical soil sample, the inclusion of soil moisture in calculation of chemical concentrations can effectively reduce the reported concentrations by 10-20% or greater, simply because the measured total weight of the sample is greater.

From a site-investigation and risk assessment-standpoint, a difference in the reported concentration of a chemical of 10-20% is not necessarily significant. **For consistency and for comparison to soil ESLs presented in this document, however, soil data should be reported on dry-weight basis.** This is in part because soil ingestion rates assumed in direct-exposure models (see Appendices 1 and 2) are based on dry-weight studies (USEPA 2011B). Comparison of wet-weight data to direct-exposure screening level would technically require adjustment of the direct-exposure screening levels to reflect wet weight-based soil ingestion rates. A site-specific consideration of wet-weight soil data will be dependent on assumptions in the model(s) being used to evaluate risk or generate environmental screening levels. Existing wet-weight soil data may not necessarily need to be adjusted prior to comparison to the ESLs unless the introduced bias is considered to be a potentially significant factor at the site. (Note that sediment data should also be reported on a dry-weight basis.)

7.3 Additional Soil Parameters

For surface soils, screening levels are also presented for Electrical Conductivity and Sodium Absorption Ratio (after MOEE 1996). Both parameters are intended primarily for evaluation of soils impacted by brines (e.g., from former salt ponds and discharges of brackish groundwater). The Sodium Absorption Ratio reflects the amount of sodium present in the soil with respect to other major cations. An overabundance of sodium can inhibit plant uptake of nutrients, reduce soil cohesion and cause excessive erosion of topsoil. The electrical conductivity of a soil reflects the total concentration of soluble salts in the soil solution. A high concentration of salts can have a significant influence on osmotic processes involved in plant growth. (NOTE: The Electrical Conductivity screening levels assumes a fixed 2:1 water:soil solution in the laboratory method. The USEPA Laboratory Method 120.1(Mod) normally calls for a 1:1 dilution ratio, i.e., extract from a saturated sample. The laboratory should be notified of the need for a 2:1 dilution ratio prior to analysis.)

7.4 Degradation to Daughter Products

Consideration of the degradation of a chemical to more toxic daughter products, such as the breakdown of PCE to vinyl chloride, is an important part of site investigations. Tier 1 lookup tables generated by some regulatory agencies incorporate a very conservative assumption that the entire mass of a parent chemical will be eventually be transformed to the daughter product at the same initial concentration (e.g., MADEP 1994, MOEE 1996). They in turn reduce the initially derived screening levels for these parent compounds to reflect the screening levels for the more toxic daughter product, without taking into account issues such as the lower molecular weights (and lower ultimate masses) of the daughter products. While the need to monitor for degradation byproducts is well founded, it is felt that the above approach is overly conservative in most cases and not reflective of naturally occurring conditions. In the case of tetrachlorethylene, for example, degradation to vinyl chloride and further degradation of vinyl chloride to non-toxic ethene gas (and ultimately carbon dioxide and water) can be expected to be a steady-state process at sites where degradation is occurring, removing a portion of the vinyl chloride as it is generated. At most release sites this process has already been initiated, and the already conservative screening levels for individual, primary compounds are considered to be adequately protective of human health and the environment. The need to reconsider this assumption should be evaluated on a site-by-site basis.

This issue is currently be evaluated in more detail. It should be pointed out that at some sites degradation of chlorinated solvents in groundwater is minimal (e.g., PCE) but levels

of daughter products in soil gas are very elevated (e.g., vinyl chloride). This emphasizes the need to collect soil gas data at sites where vapor intrusion is of potential concern.

8 References

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FIGURES

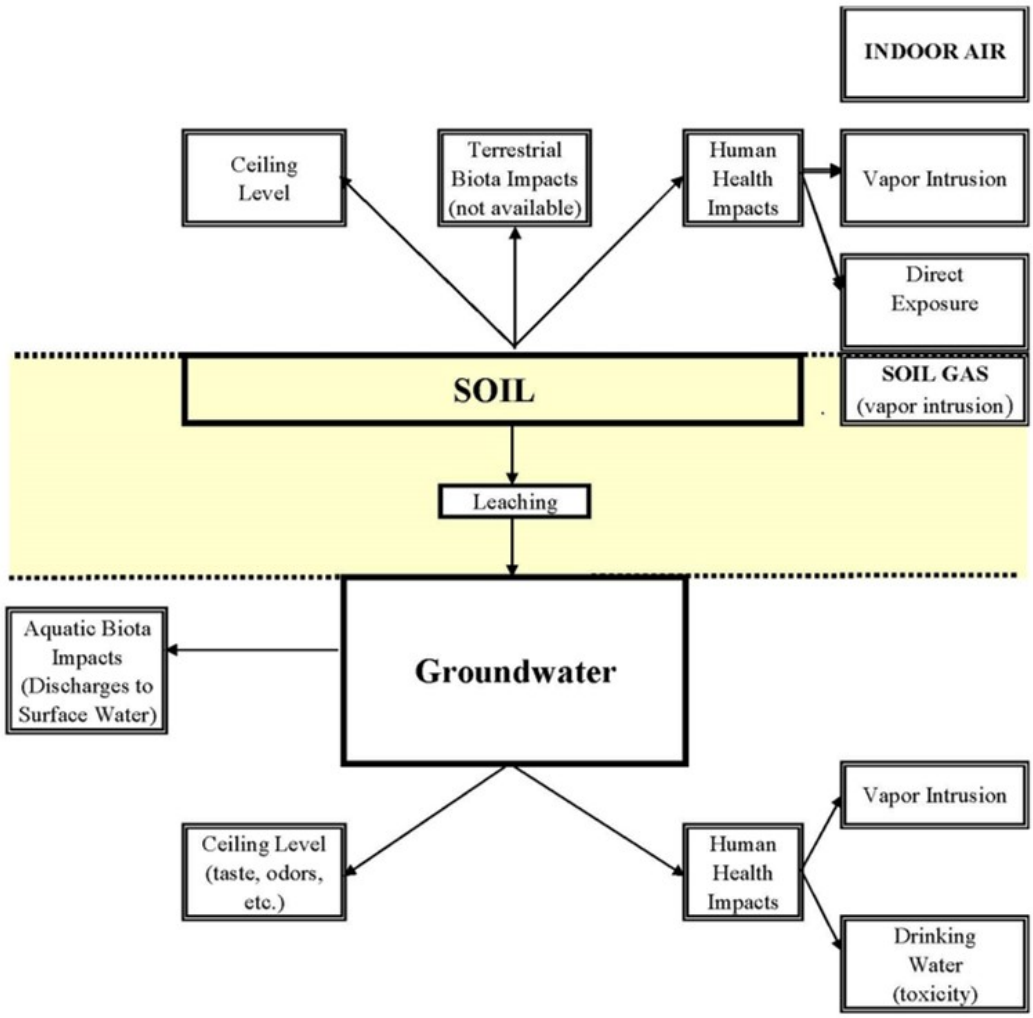

Figure 1. Summary of environmental hazards considered in action levels. Additional site-specific considerations include groundwater beneficial use, depth to impacted soil, soil type and land use. Evaluation of environmental hazards in additional to those shown should be carried out in a site-specific EHE.

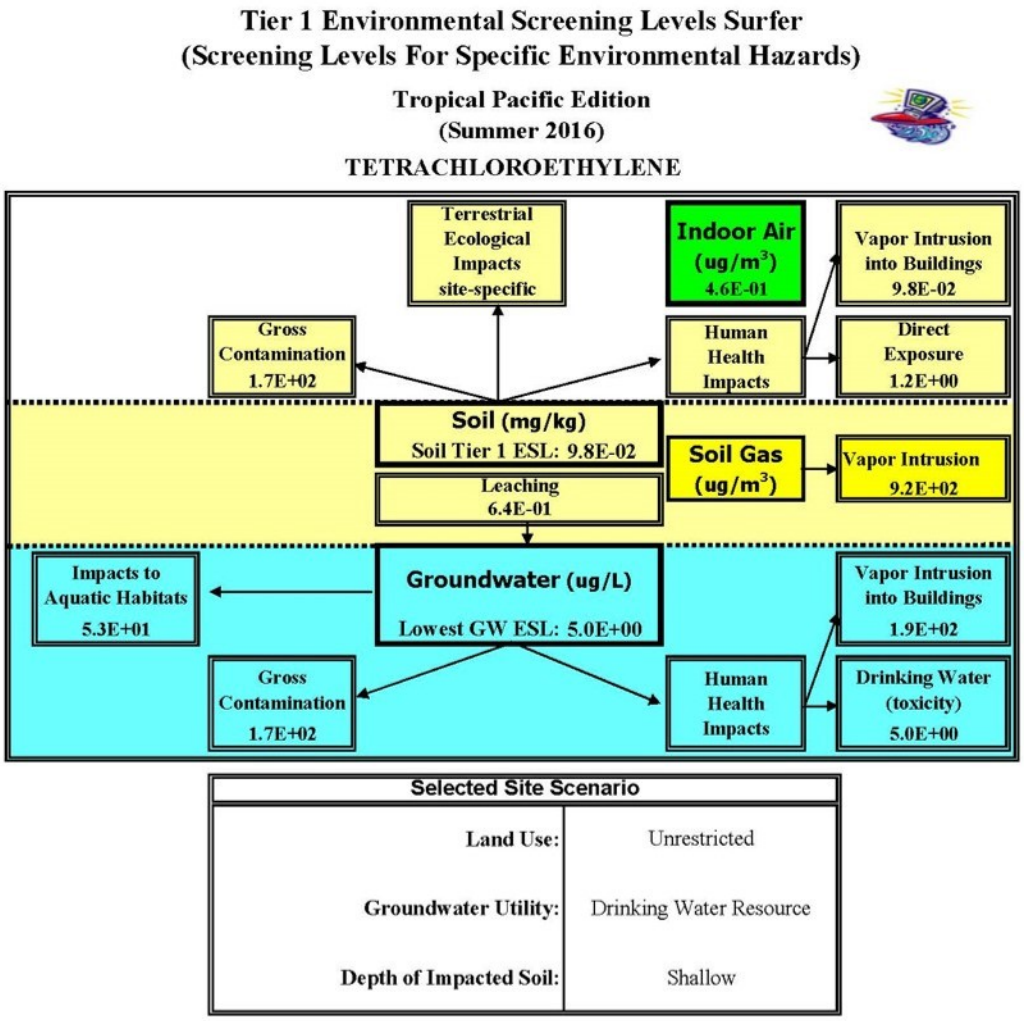

Figure 2. Summary of individual action levels used to select final, Tier 1 ESLs for PCE in soils situated within 10 feet of the ground surface and in groundwater that is a current or potential source of drinking water; based on a residential land-use scenario. Final ESLs presented in Volume 1 summary tables are the lowest of the individual action levels. Vapor intrusion concerns drive selection of the final soil Tier 1 ESL (0.098 mg/kg). For groundwater, drinking water toxicity concerns drive selection of final Tier 1 ESL (5.0 [µg/L]).

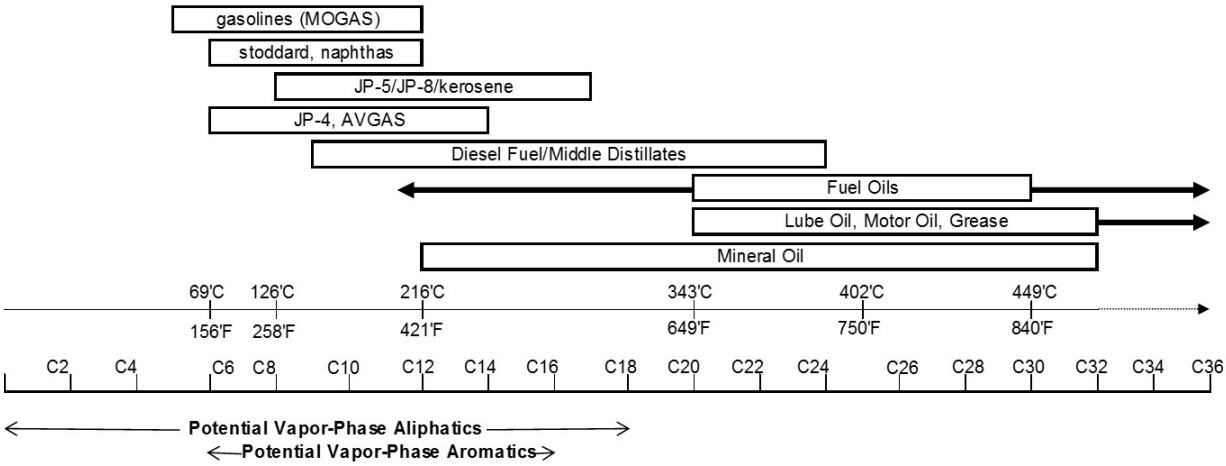

Figure 3. Fuel types versus carbon range composition.

TABLES

TABLE A-1. [1]SOIL SCREENING LEVELS
[2]UNRESTRICTED LAND USE
(potentially impacted groundwater IS a current or potential drinking water resource)

	[2]UNRESTRICTED LAND USE (mg/kg)							
						Human Health		[1]Groundwater Protection (Soil Leaching)
			Gross Contamination Ceiling Value (Odors, etc.)	Terrestrial Ecotoxicity Criteria		Direct Exposure	Vapor Intrusion Into Buildings	Drinking Water Resource
CHEMICAL PARAMETER	Final ESL	Basis	Table H-2		Background	Table K-1	Table E-1b	Table G-1a
ACENAPHTHENE	4.0E+01	Groundwater Protection	1.0E+03	site-specific		6.6E+02	1.2E+02	4.0E+01
ACENAPHTHYLENE	5.5E+00	Groundwater Protection	5.0E+02	site-specific		3.4E+02	(Use soil gas)	5.5E+00
ACETONE	9.2E-01	Groundwater Protection	5.0E+02	site-specific		1.2E+04	1.4E+04	9.2E-01
ALDRIN	2.8E+00	Groundwater Protection	1.0E+03	site-specific		3.9E+00		2.8E+00
AMETRYN	1.3E+01	Groundwater Protection	5.0E+02	site-specific		1.1E+02		1.3E+01
AMINO,2- DINITROTOLUENE,3,6-	8.5E-01	Groundwater Protection	5.0E+02	site-specific		3.1E+01		8.5E-01
AMINO,4- DINITROTOLUENE,2,6-	5.2E-01	Groundwater Protection	5.0E+02	site-specific		3.1E+01		5.2E-01
ANTHRACENE	1.4E+00	Groundwater Protection	5.0E+02	site-specific		3.5E+03	4.2E+00	1.4E+00
ANTIMONY	6.3E+00	Direct Exposure	1.0E+03	site-specific	2.4E+00	6.3E+00		(Use batch test)
ARSENIC	2.4E+01	Background	1.0E+03	site-specific	2.4E+01	2.1E+01		(Use batch test)
ATRAZINE	1.3E-02	Groundwater Protection	5.0E+02	site-specific		2.4E+00		1.3E-02
BARIUM	1.0E+03	Ceiling Value	1.0E+03	site-specific	6.9E+02	3.1E+03		(Use batch test)
BENOMYL	7.8E-03	Groundwater Protection	1.0E+03	site-specific		6.3E+02		7.8E-03
BENZENE	3.0E-01	Groundwater Protection	5.0E+02	site-specific		1.2E+00	7.7E-01	3.0E-01
BENZO(a)ANTHRACENE	3.3E+00	Groundwater Protection	5.0E+02	site-specific		1.6E+01		3.3E+00
BENZO(a)PYRENE	1.6E+00	Direct Exposure	5.0E+02	site-specific		1.6E+00		5.9E+00
BENZO(b)FLUORANTHENE	2.9E+00	Groundwater Protection	5.0E+02	site-specific		1.6E+01		2.9E+00
BENZO(g,h,i)PERYLENE	3.5E+01	Groundwater Protection	5.0E+02	site-specific		4.8E+02		3.5E+01
BENZO(k)FLUORANTHENE	2.9E+01	Groundwater Protection	5.0E+02	site-specific		1.6E+02		2.9E+01
BERYLLIUM	3.1E+01	Direct Exposure	1.0E+03	site-specific	3.0E+00	3.1E+01		(Use batch test)
BIPHENYL, 1,1-	1.0E+01	Direct Exposure	5.0E+02	site-specific		1.0E+01	(Use soil gas)	7.7E+01
BIS(2-CHLOROETHYL)ETHER	7.5E-05	Groundwater Protection	5.0E+02	site-specific		2.4E-01	7.9E-03	7.5E-05
BIS(2-CHLORO-1-METHYLETHYL)ETHER	4.0E-03	Groundwater Protection	5.0E+02	site-specific		3.8E+00	(Use soil gas)	4.0E-03
BIS(2-ETHYLHEXYL)PHTHALATE	3.9E+01	Direct Exposure	5.0E+02	site-specific		3.9E+01		6.5E+01
BORON	1.0E+03	Ceiling Value	1.0E+03	site-specific		3.1E+03		(Use batch test)
BROMODICHLOROMETHANE	2.5E-03	Groundwater Protection	9.3E+02	site-specific		3.2E-01	1.6E-02	2.5E-03
BROMOFORM	8.6E-01	Groundwater Protection	5.0E+02	site-specific		2.0E+01		8.6E-01
BROMOMETHANE	2.2E-01	Vapor Intrusion	5.0E+02	site-specific		1.5E+00	2.2E-01	3.6E-01
CADMIUM	7.4E+00	Direct Exposure	1.0E+03	site-specific	2.3E+00	7.4E+00		(Use batch test)
CARBON TETRACHLORIDE	1.0E-01	Vapor Intrusion	4.5E+02	site-specific		7.1E-01	1.0E-01	9.1E-01
CHLORDANE (TECHNICAL)	7.6E+00	Groundwater Protection	1.0E+03	site-specific		1.7E+01		7.6E+00
CHLOROANILINE, p-	7.3E-03	Groundwater Protection	1.0E+03	site-specific		2.7E+00		7.3E-03
CHLOROBENZENE	1.5E+00	Groundwater Protection	5.0E+02	site-specific		5.9E+01	2.2E+00	1.5E+00
CHLOROETHANE	1.2E+00	Groundwater Protection	5.0E+02	site-specific		2.1E+03	4.5E+02	1.2E+00
CHLOROFORM	2.6E-02	Vapor Intrusion	5.0E+02	site-specific		3.4E-01	2.6E-02	7.9E-01
CHLOROMETHANE	4.0E+00	Vapor Intrusion	1.0E+02	site-specific		2.4E+01	4.0E+00	1.1E+01
CHLOROPHENOL, 2-	1.2E-02	Groundwater Protection	1.0E+02	site-specific		7.0E+01	4.2E+01	1.2E-02
CHROMIUM (Total)	1.1E+03	Background	-	site-specific	1.1E+03			(Use batch test)
CHROMIUM III	1.0E+03	Ceiling Value	1.0E+03	site-specific		2.3E+04		(Use batch test)
CHROMIUM VI	3.0E+01	Direct Exposure	1.0E+03	site-specific		3.0E+01		(Use batch test)
CHRYSENE	3.0E+01	Groundwater Protection	1.0E+03	site-specific		1.6E+03		3.0E+01
COBALT	8.0E+01	Background	1.0E+03	site-specific	8.0E+01	4.7E+00		(Use batch test)
COPPER	6.3E+02	Direct Exposure	1.0E+03	site-specific	2.5E+02	6.3E+02		(Use batch test)
CYANIDE (Free)	4.8E+00	Direct Exposure	1.0E+02	site-specific		4.8E+00	(Use soil gas)	(Use batch test)
CYCLO-1,3,5-TRIMETHYLENE-2,4,6-TRINITRAMINE (RDX)	1.0E-02	Groundwater Protection	5.0E+02	site-specific		6.1E+00		1.0E-02

TABLE A-1. [1]SOIL SCREENING LEVELS
[2]UNRESTRICTED LAND USE
(potentially impacted groundwater IS a current or potential drinking water resource)

	[2]UNRESTRICTED LAND USE (mg/kg)							
						Human Health		[1]Groundwater Protection (Soil Leaching)
			Gross Contamination Ceiling Value (Odors, etc.)	Terrestrial Ecotoxicity Criteria		Direct Exposure	Vapor Intrusion Into Buildings	Drinking Water Resource
CHEMICAL PARAMETER	Final ESL	Basis	Table H-2		Background	Table K-1	Table E-1b	Table G-1a
DALAPON	1.6E-01	Groundwater Protection	5.0E+02	site-specific		3.8E+02		1.6E-01
DIBENZO(a,h)ANTHTRACENE	1.6E+00	Direct Exposure	5.0E+02	site-specific		1.6E+00		9.6E+00
DIBROMO,1,2- CHLOROPROPANE,3-	4.0E-03	Groundwater Protection	5.0E+02	site-specific		5.7E-03	(Use soil gas)	4.0E-03
DIBROMOCHLOROMETHANE	2.1E-03	Groundwater Protection	1.0E+02	site-specific		1.0E+00	2.9E-02	2.1E-03
DIBROMOETHANE, 1,2-	5.3E-04	Groundwater Protection	5.0E+02	site-specific		3.9E-02	1.0E-03	5.3E-04
DICHLOROBENZENE, 1,2-	7.5E-01	Groundwater Protection	3.8E+02	site-specific		3.8E+02	8.9E+00	7.5E-01
DICHLOROBENZENE, 1,3-	2.5E+00	Groundwater Protection	1.0E+02	site-specific		2.0E+02	(Use soil gas)	2.5E+00
DICHLOROBENZENE, 1,4-	5.5E-02	Vapor Intrusion	5.0E+02	site-specific		2.8E+00	5.5E-02	3.9E-01
DICHLOROBENZIDINE, 3,3-	9.2E-02	Groundwater Protection	5.0E+02	site-specific		1.2E+00		9.2E-02
DICHLORODIPHENYLDICHLOROETHANE (DDD)	2.3E+00	Direct Exposure	5.0E+02	site-specific		2.3E+00		2.1E+01
DICHLORODIPHENYLDICHLOROETHYLENE (DDE)	2.0E+00	Direct Exposure	5.0E+02	site-specific		2.0E+00		9.4E+00
DICHLORODIPHENYLTRICHLOROETHANE (DDT)	1.9E+00	Groundwater Protection	1.0E+03	site-specific		1.9E+00		1.9E+00
DICHLOROETHANE, 1,1-	1.1E-01	Groundwater Protection	5.0E+02	site-specific		3.8E+00	3.8E-01	1.1E-01
DICHLOROETHANE, 1,2-	2.3E-02	Vapor Intrusion	5.0E+02	site-specific		5.0E-01	2.3E-02	7.0E-02
DICHLOROETHYLENE, 1,1-	1.2E+00	Groundwater Protection	5.0E+02	site-specific		4.9E+01	8.9E+00	1.2E+00
DICHLOROETHYLENE, Cis 1,2-	3.6E-01	Vapor Intrusion	1.0E+02	site-specific		3.9E+00	3.6E-01	2.2E+00
DICHLOROETHYLENE, Trans 1,2-	3.6E+00	Vapor Intrusion	5.0E+02	site-specific		2.9E+01	3.6E+00	6.5E+00
DICHLOROPHENOL, 2,4-	7.3E-03	Groundwater Protection	5.0E+02	site-specific		3.8E+01		7.3E-03
DICHLOROPHENOXYACETIC ACID (2,4-D)	3.4E-01	Groundwater Protection	5.0E+02	site-specific		1.4E+02		3.4E-01
DICHLOROPROPANE, 1,2-	6.0E-02	Vapor Intrusion	1.0E+02	site-specific		1.1E+00	6.0E-02	1.4E-01
DICHLOROPROPENE, 1,3-	2.1E-03	Groundwater Protection	5.0E+02	site-specific		1.9E+00	1.5E-01	2.1E-03
DIELDRIN	2.5E+00	Direct Exposure	1.0E+03	site-specific		2.5E+00		7.9E+00
DIETHYLPHTHALATE	3.7E+00	Groundwater Protection	5.0E+02	site-specific		1.0E+04		3.7E+00
DIMETHYLPHENOL, 2,4-	9.0E+00	Groundwater Protection	1.0E+02	site-specific		2.5E+02		9.0E+00
DIMETHYLPHTHALATE	2.6E+01	Groundwater Protection	5.0E+02	site-specific		1.3E+05		2.6E+01
DINITROBENZENE, 1,3-	1.2E-01	Groundwater Protection	5.0E+02	site-specific		1.3E+00		1.2E-01
DINITROPHENOL, 2,4-	1.1E+00	Groundwater Protection	5.0E+02	site-specific		2.5E+01		1.1E+00
DINITROTOLUENE, 2,4- (2,4-DNT)	2.4E-02	Groundwater Protection	5.0E+02	site-specific		1.7E+00		2.4E-02
DINITROTOLUENE, 2,6- (2,6-DNT)	5.1E-03	Groundwater Protection	5.0E+02	site-specific		3.6E-01		5.1E-03
DIOXANE, 1,4-	2.1E-04	Groundwater Protection	5.0E+02	site-specific		5.4E+00	(Use soil gas)	2.1E-04
DIOXIN (TEQ)	1.0E-04	Direct Exposure	1.0E+03	site-specific	2.0E-05	1.0E-04		1.0E-01
DIURON	7.3E-01	Groundwater Protection	5.0E+02	site-specific		2.5E+01		7.3E-01
ENDOSULFAN	4.4E+00	Groundwater Protection	5.0E+02	site-specific		9.4E+01		4.4E+00
ENDRIN	3.8E+00	Direct Exposure	5.0E+02	site-specific		3.8E+00		1.0E+01
ETHANOL	4.5E+00	Groundwater Protection	5.0E+02	site-specific			(Use soil gas)	4.5E+00
ETHYLBENZENE	9.0E-01	Groundwater Protection	4.8E+02	site-specific		6.3E+01	2.4E+01	9.0E-01
FLUORANTHENE	2.9E+01	Groundwater Protection	5.0E+02	site-specific		4.8E+02		2.9E+01
FLUORENE	3.1E+01	Groundwater Protection	5.0E+02	site-specific		4.6E+02	9.3E+01	3.1E+01
GLYPHOSATE	5.0E+02	Ceiling Value	5.0E+02	site-specific		1.3E+03		6.3E+02
HEPTACHLOR	1.4E-01	Direct Exposure	1.0E+03	site-specific		1.4E-01		1.5E+01
HEPTACHLOR EPOXIDE	7.1E-02	Direct Exposure	1.0E+03	site-specific		7.1E-02		4.1E+00
HEXACHLOROBENZENE	7.8E-02	Groundwater Protection	5.0E+02	site-specific		2.2E-01		7.8E-02
HEXACHLOROBUTADIENE	4.1E-02	Groundwater Protection	5.0E+02	site-specific		1.3E+00		4.1E-02
HEXACHLOROCYCLOHEXANE (gamma) LINDANE	2.9E-02	Groundwater Protection	5.0E+02	site-specific		5.7E-01		2.9E-02
HEXACHLOROETHANE	2.3E-02	Groundwater Protection	5.0E+02	site-specific		2.0E+00		2.3E-02

TABLE A-1. [1]SOIL SCREENING LEVELS
[2]UNRESTRICTED LAND USE
(potentially impacted groundwater IS a current or potential drinking water resource)

	[2]UNRESTRICTED LAND USE (mg/kg)							
						Human Health		[1]Groundwater Protection (Soil Leaching)
CHEMICAL PARAMETER	Final ESL	Basis	Gross Contamination Ceiling Value (Odors, etc.) Table H-2	Terrestrial Ecotoxicity Criteria	Background	Direct Exposure Table K-1	Vapor Intrusion Into Buildings Table E-1b	Drinking Water Resource Table G-1a
HEXAZINONE	1.4E+01	Groundwater Protection	5.0E+02	site-specific		4.2E+02		1.4E+01
INDENO(1,2,3-cd)PYRENE	9.6E+00	Groundwater Protection	5.0E+02	site-specific		1.6E+01		9.6E+00
ISOPHORONE	8.9E-01	Groundwater Protection	5.0E+02	site-specific		5.7E+02		8.9E-01
LEAD	4.0E+02	Direct Exposure	1.0E+03	site-specific	7.3E+01	4.0E+02		(Use batch test)
MERCURY	4.7E+00	Direct Exposure	5.0E+02	site-specific	7.2E-01	4.7E+00		(Use batch test)
METHOXYCHLOR	5.4E+00	Groundwater Protection	5.0E+02	site-specific		6.3E+01		5.4E+00
METHYL ETHYL KETONE	6.2E+00	Groundwater Protection	5.0E+02	site-specific		5.6E+03	2.2E+03	6.2E+00
METHYL ISOBUTYL KETONE	5.0E-01	Groundwater Protection	1.0E+02	site-specific		3.4E+03	1.3E+03	5.0E-01
METHYL MERCURY	1.6E+00	Direct Exposure	1.0E+02	site-specific		1.6E+00		(Use batch test)
METHYL TERT BUTYL ETHER	2.8E-02	Groundwater Protection	1.0E+02	site-specific		5.0E+01	2.3E+00	2.8E-02
METHYLENE CHLORIDE	1.2E-01	Groundwater Protection	5.0E+02	site-specific		5.8E+01	2.2E+01	1.2E-01
METHYLNAPHTHALENE, 1-	8.9E-01	Groundwater Protection	5.0E+02	site-specific		1.0E+02	5.9E+01	8.9E-01
METHYLNAPHTHALENE, 2-	1.9E+00	Groundwater Protection	5.0E+02	site-specific		3.9E+01	5.0E+01	1.9E+00
MOLYBDENUM	7.8E+01	Direct Exposure	1.0E+03	site-specific	4.0E+00	7.8E+01		(Use batch test)
NAPHTHALENE	3.1E+00	Groundwater Protection	5.0E+02	site-specific		2.8E+01	7.0E+00	3.1E+00
NICKEL	4.1E+02	Background	1.0E+03	site-specific	4.1E+02	3.1E+02		(Use batch test)
NITROBENZENE	5.3E-03	Groundwater Protection	5.0E+02	site-specific		5.6E+00	(Use soil gas)	5.3E-03
NITROGLYCERIN	3.9E-02	Groundwater Protection	5.0E+02	site-specific		1.3E+00		3.9E-02
NITROTOLUENE, 2-	4.9E-03	Groundwater Protection	5.0E+02	site-specific		2.2E+00	(Use soil gas)	4.9E-03
NITROTOLUENE, 3-	1.2E-01	Groundwater Protection	5.0E+02	site-specific		1.3E+00		1.2E-01
NITROTOLUENE, 4-	2.9E-01	Groundwater Protection	5.0E+02	site-specific		3.4E+01		2.9E-01
PENTACHLOROPHENOL	9.8E-02	Groundwater Protection	5.0E+02	site-specific		1.0E+00		9.8E-02
PENTAERYTHRITOLTETRANITRATE (PETN)	2.1E+00	Groundwater Protection	5.0E+02	site-specific		2.5E+01		2.1E+00
PERCHLORATE	7.0E-03	Groundwater Protection	1.0E+03	site-specific		1.1E+01		7.0E-03
PHENANTHRENE	2.3E+01	Groundwater Protection	5.0E+02	site-specific		4.6E+02	(Use soil gas)	2.3E+01
PHENOL	1.6E-01	Groundwater Protection	5.0E+02	site-specific		3.8E+03		1.6E-01
POLYCHLORINATED BIPHENYLS (PCBs)	1.2E+00	Direct Exposure	5.0E+02	site-specific		1.2E+00		1.1E+01
PROPICONAZOLE	2.5E+01	Groundwater Protection	5.0E+02	site-specific		1.6E+02		2.5E+01
PYRENE	4.1E+01	Groundwater Protection	5.0E+02	site-specific		3.6E+02	4.4E+01	4.1E+01
SELENIUM	7.8E+01	Direct Exposure	1.0E+03	site-specific	7.1E+00	7.8E+01		(Use batch test)
SILVER	7.8E+01	Direct Exposure	1.0E+03	site-specific	1.5E+00	7.8E+01		(Use batch test)
SIMAZINE	1.6E-02	Groundwater Protection	5.0E+02	site-specific		4.5E+00		1.6E-02
STYRENE	9.1E-01	Groundwater Protection	5.0E+02	site-specific		8.7E+02	4.5E+02	9.1E-01
TERBACIL	2.2E+00	Groundwater Protection	5.0E+02	site-specific		1.6E+02		2.2E+00
tert-BUTYL ALCOHOL	3.6E-02	Groundwater Protection	1.0E+02	site-specific		9.9E+01	(Use soil gas)	3.6E-02
TETRACHLOROETHANE, 1,1,1,2-	1.8E-02	Groundwater Protection	1.0E+02	site-specific		2.2E+00	(Use soil gas)	1.8E-02
TETRACHLOROETHANE, 1,1,2,2-	1.4E-03	Groundwater Protection	5.0E+02	site-specific		6.5E-01	1.0E-02	1.4E-03
TETRACHLOROETHYLENE	9.8E-02	Vapor Intrusion	1.7E+02	site-specific		1.2E+00	9.8E-02	6.4E-01
TETRACHLOROPHENOL, 2,3,4,6-	5.6E-02	Groundwater Protection	5.0E+02	site-specific		3.8E+02		5.6E-02
TETRANITRO-1,3,5,7-TETRAAZOCYCLOOCTANE (HMX)	1.9E+01	Groundwater Protection	5.0E+02	site-specific		7.7E+02		1.9E+01
THALLIUM	7.8E-01	Direct Exposure	1.0E+03	site-specific	2.5E-01	7.8E-01		(Use batch test)
TOLUENE	7.8E-01	Groundwater Protection	5.0E+02	site-specific		8.2E+02	8.2E+02	7.8E-01
TOXAPHENE	4.9E-01	Direct Exposure	5.0E+02	site-specific		4.9E-01		8.5E+01
TPH (gasolines)	1.0E+02	Ceiling Value	1.0E+02	site-specific		4.8E+02	(Use soil gas)	1.0E+02
TPH (middle distillates)	1.0E+02	Groundwater Protection	5.0E+02	site-specific		2.6E+02	(Use soil gas)	1.0E+02

TABLE A-1. [1]SOIL SCREENING LEVELS
[2]UNRESTRICTED LAND USE
(potentially impacted groundwater IS a current or potential drinking water resource)

	[2]UNRESTRICTED LAND USE (mg/kg)							
						Human Health		[1]Groundwater Protection (Soil Leaching)
			Gross Contamination Ceiling Value (Odors, etc.)	Terrestrial Ecotoxicity Criteria		Direct Exposure	Vapor Intrusion Into Buildings	Drinking Water Resource
CHEMICAL PARAMETER	Final ESL	Basis	Table H-2		Background	Table K-1	Table E-1b	Table G-1a
TPH (residual fuels)	5.0E+02	Ceiling Value	5.0E+02	site-specific		9.4E+03		1.0E+03
TRICHLOROBENZENE, 1,2,4-	1.6E-01	Vapor Intrusion	5.0E+02	site-specific		8.2E+00	1.6E-01	1.6E+01
TRICHLOROETHANE, 1,1,1-	1.2E+00	Groundwater Protection	5.0E+02	site-specific		6.4E+02	2.2E+02	1.2E+00
TRICHLOROETHANE, 1,1,2-	8.9E-03	Vapor Intrusion	1.0E+02	site-specific		3.2E-01	8.9E-03	7.6E-02
TRICHLOROETHYLENE	8.9E-02	Vapor Intrusion	5.0E+02	site-specific		8.9E-01	8.9E-02	3.6E-01
TRICHLOROPHENOL, 2,4,5-	2.9E+00	Groundwater Protection	1.0E+02	site-specific		1.3E+03		2.9E+00
TRICHLOROPHENOL, 2,4,6-	3.1E-01	Groundwater Protection	5.0E+02	site-specific		1.3E+01		3.1E-01
TRICHLOROPHENOXYACETIC ACID, 2,4,5- (2,4,5-T)	3.6E+00	Groundwater Protection	1.0E+03	site-specific		1.3E+02		3.6E+00
TRICHLOROPHENOXYPROPIONIC ACID, 2,4,5- (2,4,5-TP)	8.7E-01	Groundwater Protection	5.0E+02	site-specific		1.0E+02		8.7E-01
TRICHLOROPROPANE, 1,2,3-	4.2E-06	Groundwater Protection	1.0E+02	site-specific		1.6E-03	(Use soil gas)	4.2E-06
TRICHLOROPROPENE, 1,2,3-	8.1E-02	Groundwater Protection	1.0E+02	site-specific		1.6E-01	(Use soil gas)	8.1E-02
TRIFLURALIN	5.9E+00	Groundwater Protection	1.0E+02	site-specific		9.0E+01		5.9E+00
TRINITROBENZENE, 1,3,5-	2.8E+00	Groundwater Protection	5.0E+02	site-specific		4.5E+02		2.8E+00
TRINITROPHENYLMETHYLNITRAMINE, 2,4,6- (TETRYL)	3.1E+01	Groundwater Protection	5.0E+02	site-specific		3.1E+01		3.1E+01
TRINITROTOLUENE, 2,4,6- (TNT)	1.2E+00	Groundwater Protection	5.0E+02	site-specific		7.3E+00		1.2E+00
VANADIUM	7.7E+02	Background	1.0E+03	site-specific	7.7E+02	7.8E+01		(Use batch test)
VINYL CHLORIDE	3.6E-02	Vapor Intrusion	5.0E+02	site-specific		5.9E-02	3.6E-02	3.5E-01
XYLENES	1.4E+00	Groundwater Protection	2.6E+02	site-specific		1.2E+02	4.5E+01	1.4E+00
ZINC	1.0E+03	Ceiling Value	1.0E+03	site-specific	3.5E+02	4.7E+03		(Use batch test)
Electrical Conductivity (mS/cm, USEPA Method 120.1 MOD)	2.0		-	-		-	-	-
Sodium Adsorption Ratio	5.0		-	-		-	-	-

Notes:

1. Standard soil leaching model used; assumes soil cover over bedrock (>1m thick,see Table G-1). Chemical sorption coefficient of 5,000 cm3/g used to define “low-mobility chemicals.”
2. "Unrestricted Land Use" screening levels generally considered adequate for residential and other sensitive uses (e.g., schools, day-care centers, hospitals, etc.).

Final Environmental Screening Level is lowest of ceiling value (nuisance concerns etc.), ecotoxicity, direct-exposure, indoor-air impact, and leaching screening levels.
Assumes soil pH 5.0 to 9.0.
Soil data should be reported on dry-weight basis (see Section 6.2).
TPH -Total Petroleum Hydrocarbons. See text for discussion of different TPH categories.
Typical background As in soils assumed to be <20 mg/kg (refer to Volume 1, Section 2.9 and Appendix 1, Section 3)

TABLE A-2. [1]SOIL SCREENING LEVELS
COMMERCIAL / INDUSTRIAL LAND USE
(potentially impacted groundwater IS a current or potential drinking water resource)

	COMMERCIAL / INDUSTRIAL LAND USE (mg/kg)							
			Gross Contamination Ceiling Value (Odors, etc.)			Human Health		[1]Groundwater Protection (Soil Leaching)
						Direct Exposure	Vapor Intrusion Into Buildings	Drinking Water Resource
CHEMICAL PARAMETER	Final ESL	Basis	Table H-2	Terrestrial Ecotoxicity Criteria	Background	Table K-2	Table E-1b	Table G-1a
ACENAPHTHENE	4.0E+01	Groundwater Protection	2.5E+03	site-specific		7.1E+03	1.2E+02	4.0E+01
ACENAPHTHYLENE	5.5E+00	Groundwater Protection	1.0E+03	site-specific		2.7E+03	(Use soil gas)	5.5E+00
ACETONE	9.2E-01	Groundwater Protection	1.0E+03	site-specific		1.1E+05	1.1E+05	9.2E-01
ALDRIN	2.8E+00	Groundwater Protection	2.5E+03	site-specific		5.6E+01		2.8E+00
AMETRYN	1.3E+01	Groundwater Protection	1.0E+03	site-specific		1.5E+03		1.3E+01
AMINO,2- DINITROTOLUENE,3,6-	8.5E-01	Groundwater Protection	1.0E+03	site-specific		4.6E+02		8.5E-01
AMINO,4- DINITROTOLUENE,2,6-	5.2E-01	Groundwater Protection	1.0E+03	site-specific		4.5E+02		5.2E-01
ANTHRACENE	1.4E+00	Groundwater Protection	1.0E+03	site-specific		4.2E+04	4.2E+00	1.4E+00
ANTIMONY	9.3E+01	Direct Exposure	2.5E+03	site-specific	2.4E+00	9.3E+01		(Use batch test)
ARSENIC	9.7E+01	Direct Exposure	2.5E+03	site-specific	2.4E+01	9.7E+01		(Use batch test)
ATRAZINE	1.3E-02	Groundwater Protection	1.0E+03	site-specific		1.0E+01		1.3E-02
BARIUM	2.5E+03	Ceiling Value	2.5E+03	site-specific	6.9E+02	4.3E+03		(Use batch test)
BENOMYL	7.8E-03	Groundwater Protection	2.5E+03	site-specific		8.2E+03		7.8E-03
BENZENE	3.0E-01	Groundwater Protection	1.0E+03	site-specific		5.5E+00	5.6E+00	3.0E-01
BENZO(a)ANTHRACENE	3.3E+00	Groundwater Protection	1.0E+03	site-specific		2.9E+01		3.3E+00
BENZO(a)PYRENE	2.9E+00	Direct Exposure	1.0E+03	site-specific		2.9E+00		5.9E+00
BENZO(b)FLUORANTHENE	2.9E+00	Groundwater Protection	1.0E+03	site-specific		2.9E+01		2.9E+00
BENZO(g,h,i)PERYLENE	3.5E+01	Groundwater Protection	1.0E+03	site-specific		6.0E+03		3.5E+01
BENZO(k)FLUORANTHENE	2.9E+01	Groundwater Protection	1.0E+03	site-specific		2.9E+02		2.9E+01
BERYLLIUM	1.5E+02	Direct Exposure	2.5E+03	site-specific	3.0E+00	1.5E+02		(Use batch test)
BIPHENYL, 1,1-	4.3E+01	Direct Exposure	1.0E+03	site-specific		4.3E+01	(Use soil gas)	7.7E+01
BIS(2-CHLOROETHYL)ETHER	7.5E-05	Groundwater Protection	1.0E+03	site-specific		1.1E+00	6.7E-02	7.5E-05
BIS(2-CHLORO-1-METHYLETHYL)ETHER	4.0E-03	Groundwater Protection	7.9E+02	site-specific		1.7E+01	(Use soil gas)	4.0E-03
BIS(2-ETHYLHEXYL)PHTHALATE	6.5E+01	Groundwater Protection	1.0E+03	site-specific		1.6E+02		6.5E+01
BORON	2.5E+03	Ceiling Value	2.5E+03	site-specific		4.7E+04		(Use batch test)
BROMODICHLOROMETHANE	2.5E-03	Groundwater Protection	9.3E+02	site-specific		1.4E+00	1.2E-01	2.5E-03
BROMOFORM	8.6E-01	Groundwater Protection	1.0E+03	site-specific		9.1E+01		8.6E-01
BROMOMETHANE	3.6E-01	Groundwater Protection	1.0E+03	site-specific		6.5E+00	1.6E+00	3.6E-01
CADMIUM	6.5E+01	Direct Exposure	2.5E+03	site-specific	2.3E+00	6.5E+01		(Use batch test)
CARBON TETRACHLORIDE	7.3E-01	Vapor Intrusion	4.5E+02	site-specific		3.1E+00	7.3E-01	9.1E-01
CHLORDANE (TECHNICAL)	7.6E+00	Groundwater Protection	2.5E+03	site-specific		7.7E+01		7.6E+00
CHLOROANILINE, p-	7.3E-03	Groundwater Protection	2.5E+03	site-specific		1.1E+01		7.3E-03
CHLOROBENZENE	1.5E+00	Groundwater Protection	7.6E+02	site-specific		2.9E+02	1.6E+01	1.5E+00
CHLOROETHANE	1.2E+00	Groundwater Protection	1.0E+03	site-specific		2.1E+03	2.1E+03	1.2E+00
CHLOROFORM	1.9E-01	Vapor Intrusion	1.0E+03	site-specific		1.5E+00	1.9E-01	7.9E-01
CHLOROMETHANE	1.1E+01	Groundwater Protection	5.0E+02	site-specific		1.0E+02	2.8E+01	1.1E+01
CHLOROPHENOL, 2-	1.2E-02	Groundwater Protection	5.0E+02	site-specific		8.1E+02	3.5E+02	1.2E-02
CHROMIUM (Total)	1.1E+03	Background	-	site-specific	1.1E+03			(Use batch test)
CHROMIUM III	2.5E+03	Ceiling Value	2.5E+03	site-specific		3.5E+05		(Use batch test)
CHROMIUM VI	4.8E+02	Direct Exposure	2.5E+03	site-specific		4.8E+02		(Use batch test)
CHRYSENE	3.0E+01	Groundwater Protection	2.5E+03	site-specific		2.9E+03		3.0E+01
COBALT	8.0E+01	Background	2.5E+03	site-specific	8.0E+01	4.0E+01		(Use batch test)
COPPER	2.5E+03	Ceiling Value	2.5E+03	site-specific	2.5E+02	9.3E+03		(Use batch test)
CYANIDE (Free)	3.1E+01	Direct Exposure	5.0E+02	site-specific		3.1E+01	(Use soil gas)	(Use batch test)
CYCLO-1,3,5-TRIMETHYLENE-2,4,6-TRINITRAMINE (RDX)	1.0E-02	Groundwater Protection	1.0E+03	site-specific		2.8E+01		1.0E-02

TABLE A-2. [1]SOIL SCREENING LEVELS
COMMERCIAL / INDUSTRIAL LAND USE
(potentially impacted groundwater IS a current or potential drinking water resource)

	COMMERCIAL / INDUSTRIAL LAND USE (mg/kg)							
			Gross Contamination Ceiling Value (Odors, etc.)			Human Health		[1]Groundwater Protection (Soil Leaching)
						Direct Exposure	Vapor Intrusion Into Buildings	Drinking Water Resource
CHEMICAL PARAMETER	Final ESL	Basis	Table H-2	Terrestrial Ecotoxicity Criteria	Background	Table K-2	Table E-1b	Table G-1a
DALAPON	1.6E-01	Groundwater Protection	1.0E+03	site-specific		4.9E+03		1.6E-01
DIBENZO(a,h)ANTHTRACENE	2.9E+00	Direct Exposure	1.0E+03	site-specific		2.9E+00		9.6E+00
DIBROMO,1,2- CHLOROPROPANE,3-	1.7E-03	Vapor Intrusion	9.8E+02	site-specific		7.0E-02	1.7E-03	4.0E-03
DIBROMOCHLOROMETHANE	2.1E-03	Groundwater Protection	5.0E+02	site-specific		4.4E+00	(Use soil gas)	2.1E-03
DIBROMOETHANE, 1,2-	5.3E-04	Groundwater Protection	1.0E+03	site-specific		1.7E-01	7.3E-03	5.3E-04
DICHLOROBENZENE, 1,2-	7.5E-01	Groundwater Protection	3.8E+02	site-specific		3.8E+02	6.2E+01	7.5E-01
DICHLOROBENZENE, 1,3-	2.5E+00	Groundwater Protection	5.0E+02	site-specific		6.0E+02	(Use soil gas)	2.5E+00
DICHLOROBENZENE, 1,4-	3.9E-01	Groundwater Protection	1.0E+03	site-specific		1.2E+01	4.0E-01	3.9E-01
DICHLOROBENZIDINE, 3,3-	9.2E-02	Groundwater Protection	1.0E+03	site-specific		5.1E+00		9.2E-02
DICHLORODIPHENYLDICHLOROETHANE (DDD)	9.6E+00	Direct Exposure	1.0E+03	site-specific		9.6E+00		2.1E+01
DICHLORODIPHENYLDICHLOROETHYLENE (DDE)	9.3E+00	Direct Exposure	1.0E+03	site-specific		9.3E+00		9.4E+00
DICHLORODIPHENYLTRICHLOROETHANE (DDT)	1.9E+00	Groundwater Protection	2.5E+03	site-specific		8.5E+00		1.9E+00
DICHLOROETHANE, 1,1-	1.1E-01	Groundwater Protection	1.0E+03	site-specific		1.7E+01	2.7E+00	1.1E-01
DICHLOROETHANE, 1,2-	7.0E-02	Groundwater Protection	1.0E+03	site-specific		2.2E+00	1.7E-01	7.0E-02
DICHLOROETHYLENE, 1,1-	1.2E+00	Groundwater Protection	1.0E+03	site-specific		2.1E+02	6.2E+01	1.2E+00
DICHLOROETHYLENE, Cis 1,2-	2.2E+00	Groundwater Protection	5.0E+02	site-specific		1.8E+01	2.5E+00	2.2E+00
DICHLOROETHYLENE, Trans 1,2-	6.5E+00	Groundwater Protection	1.0E+03	site-specific		1.3E+02	2.5E+01	6.5E+00
DICHLOROPHENOL, 2,4-	7.3E-03	Groundwater Protection	1.0E+03	site-specific		4.9E+02		7.3E-03
DICHLOROPHENOXYACETIC ACID (2,4-D)	3.4E-01	Groundwater Protection	1.0E+03	site-specific		1.9E+03		3.4E-01
DICHLOROPROPANE, 1,2-	1.4E-01	Groundwater Protection	5.0E+02	site-specific		4.7E+00	4.4E-01	1.4E-01
DICHLOROPROPENE, 1,3-	2.1E-03	Groundwater Protection	1.0E+03	site-specific		8.6E+00	1.1E+00	2.1E-03
DIELDRIN	7.9E+00	Groundwater Protection	2.5E+03	site-specific		3.3E+01		7.9E+00
DIETHYLPHTHALATE	3.7E+00	Groundwater Protection	1.0E+03	site-specific		1.3E+05		3.7E+00
DIMETHYLPHENOL, 2,4-	9.0E+00	Groundwater Protection	5.0E+02	site-specific		3.3E+03		9.0E+00
DIMETHYLPHTHALATE	2.6E+01	Groundwater Protection	1.0E+03	site-specific		1.0E+06		2.6E+01
DINITROBENZENE, 1,3-	1.2E-01	Groundwater Protection	1.0E+03	site-specific		1.6E+01		1.2E-01
DINITROPHENOL, 2,4-	1.1E+00	Groundwater Protection	1.0E+03	site-specific		3.3E+02		1.1E+00
DINITROTOLUENE, 2,4- (2,4-DNT)	2.4E-02	Groundwater Protection	1.0E+03	site-specific		7.4E+00		2.4E-02
DINITROTOLUENE, 2,6- (2,6-DNT)	5.1E-03	Groundwater Protection	1.0E+03	site-specific		1.5E+00		5.1E-03
DIOXANE, 1,4-	2.1E-04	Groundwater Protection	1.0E+03	site-specific		2.5E+01	(Use soil gas)	2.1E-04
DIOXIN (TEQ)	1.4E-03	Direct Exposure	2.5E+03	site-specific	2.0E-05	1.4E-03		1.0E-01
DIURON	7.3E-01	Groundwater Protection	1.0E+03	site-specific		3.3E+02		7.3E-01
ENDOSULFAN	4.4E+00	Groundwater Protection	1.0E+03	site-specific		1.4E+03		4.4E+00
ENDRIN	1.0E+01	Groundwater Protection	1.0E+03	site-specific		4.9E+01		1.0E+01
ETHANOL	4.5E+00	Groundwater Protection	1.0E+03	site-specific			(Use soil gas)	4.5E+00
ETHYLBENZENE	9.0E-01	Groundwater Protection	4.8E+02	site-specific		1.5E+02	1.7E+02	9.0E-01
FLUORANTHENE	2.9E+01	Groundwater Protection	1.0E+03	site-specific		6.0E+03		2.9E+01
FLUORENE	3.1E+01	Groundwater Protection	1.0E+03	site-specific		5.3E+03	9.3E+01	3.1E+01
GLYPHOSATE	6.3E+02	Groundwater Protection	1.0E+03	site-specific		1.6E+04		6.3E+02
HEPTACHLOR	6.3E-01	Direct Exposure	2.5E+03	site-specific		6.3E-01		1.5E+01
HEPTACHLOR EPOXIDE	3.3E-01	Direct Exposure	2.5E+03	site-specific		3.3E-01		4.1E+00
HEXACHLOROBENZENE	7.8E-02	Groundwater Protection	1.0E+03	site-specific		1.0E+00		7.8E-02
HEXACHLOROBUTADIENE	4.1E-02	Groundwater Protection	1.0E+03	site-specific		5.6E+00		4.1E-02
HEXACHLOROCYCLOHEXANE (gamma) LINDANE	2.9E-02	Groundwater Protection	1.0E+03	site-specific		2.5E+00		2.9E-02
HEXACHLOROETHANE	2.3E-02	Groundwater Protection	1.0E+03	site-specific		8.7E+00		2.3E-02

TABLE A-2. [1]SOIL SCREENING LEVELS
COMMERCIAL / INDUSTRIAL LAND USE
(potentially impacted groundwater IS a current or potential drinking water resource)

	COMMERCIAL / INDUSTRIAL LAND USE (mg/kg)							
			Gross Contamination Ceiling Value (Odors, etc.)			Human Health		[1]Groundwater Protection (Soil Leaching)
						Direct Exposure	Vapor Intrusion Into Buildings	Drinking Water Resource
CHEMICAL PARAMETER	Final ESL	Basis	Table H-2	Terrestrial Ecotoxicity Criteria	Background	Table K-2	Table E-1b	Table G-1a
HEXAZINONE	1.4E+01	Groundwater Protection	1.0E+03	site-specific		5.4E+03		1.4E+01
INDENO(1,2,3-cd)PYRENE	9.6E+00	Groundwater Protection	1.0E+03	site-specific		2.9E+01		9.6E+00
ISOPHORONE	8.9E-01	Groundwater Protection	1.0E+03	site-specific		2.4E+03		8.9E-01
LEAD	8.0E+02	Direct Exposure	2.5E+03	site-specific	7.3E+01	8.0E+02		(Use batch test)
MERCURY	7.0E+01	Direct Exposure	1.0E+03	site-specific	7.2E-01	7.0E+01		(Use batch test)
METHOXYCHLOR	5.4E+00	Groundwater Protection	1.0E+03	site-specific		8.2E+02		5.4E+00
METHYL ETHYL KETONE	6.2E+00	Groundwater Protection	1.0E+03	site-specific		2.8E+04	1.6E+04	6.2E+00
METHYL ISOBUTYL KETONE	5.0E-01	Groundwater Protection	5.0E+02	site-specific		3.4E+03	3.4E+03	5.0E-01
METHYL MERCURY	2.3E+01	Direct Exposure	5.0E+02	site-specific		2.3E+01		(Use batch test)
METHYL TERT BUTYL ETHER	2.8E-02	Groundwater Protection	5.0E+02	site-specific		2.2E+02	1.7E+01	2.8E-02
METHYLENE CHLORIDE	1.2E-01	Groundwater Protection	1.0E+03	site-specific		6.6E+02	1.9E+02	1.2E-01
METHYLNAPHTHALENE, 1-	8.9E-01	Groundwater Protection	1.0E+03	site-specific		2.7E+02	3.9E+02	8.9E-01
METHYLNAPHTHALENE, 2-	1.9E+00	Groundwater Protection	1.0E+03	site-specific		3.6E+02	3.7E+02	1.9E+00
MOLYBDENUM	1.2E+03	Direct Exposure	2.5E+03	site-specific	4.0E+00	1.2E+03		(Use batch test)
NAPHTHALENE	3.1E+00	Groundwater Protection	1.0E+03	site-specific		9.6E+01	5.8E+01	3.1E+00
NICKEL	7.5E+02	Direct Exposure	2.5E+03	site-specific	4.1E+02	7.5E+02		(Use batch test)
NITROBENZENE	5.3E-03	Groundwater Protection	1.0E+03	site-specific		2.4E+01	(Use soil gas)	5.3E-03
NITROGLYCERIN	3.9E-02	Groundwater Protection	1.0E+03	site-specific		1.6E+01		3.9E-02
NITROTOLUENE, 2-	4.9E-03	Groundwater Protection	1.0E+03	site-specific		1.0E+01	(Use soil gas)	4.9E-03
NITROTOLUENE, 3-	1.2E-01	Groundwater Protection	1.0E+03	site-specific		1.6E+01		1.2E-01
NITROTOLUENE, 4-	2.9E-01	Groundwater Protection	1.0E+03	site-specific		1.4E+02		2.9E-01
PENTACHLOROPHENOL	9.8E-02	Groundwater Protection	1.0E+03	site-specific		4.0E+00		9.8E-02
PENTAERYTHRITOLTETRANITRATE (PETN)	2.1E+00	Groundwater Protection	1.0E+03	site-specific		3.3E+02		2.1E+00
PERCHLORATE	7.0E-03	Groundwater Protection	2.5E+03	site-specific		1.6E+02		7.0E-03
PHENANTHRENE	2.3E+01	Groundwater Protection	1.0E+03	site-specific		5.6E+03	(Use soil gas)	2.3E+01
PHENOL	1.6E-01	Groundwater Protection	1.0E+03	site-specific		4.9E+04		1.6E-01
POLYCHLORINATED BIPHENYLS (PCBs)	9.8E+00	Direct Exposure	1.0E+03	site-specific		9.8E+00		1.1E+01
PROPICONAZOLE	2.5E+01	Groundwater Protection	1.0E+03	site-specific		2.1E+03		2.5E+01
PYRENE	4.1E+01	Groundwater Protection	1.0E+03	site-specific		4.4E+03	4.4E+01	4.1E+01
SELENIUM	1.2E+03	Direct Exposure	2.5E+03	site-specific	7.1E+00	1.2E+03		(Use batch test)
SILVER	1.2E+03	Direct Exposure	2.5E+03	site-specific	1.5E+00	1.2E+03		(Use batch test)
SIMAZINE	1.6E-02	Groundwater Protection	1.0E+03	site-specific		1.9E+01		1.6E-02
STYRENE	9.1E-01	Groundwater Protection	8.7E+02	site-specific		8.7E+02	8.7E+02	9.1E-01
TERBACIL	2.2E+00	Groundwater Protection	1.0E+03	site-specific		2.1E+03		2.2E+00
tert-BUTYL ALCOHOL	3.6E-02	Groundwater Protection	5.0E+02	site-specific		4.5E+02	(Use soil gas)	3.6E-02
TETRACHLOROETHANE, 1,1,1,2-	1.8E-02	Groundwater Protection	5.0E+02	site-specific		9.6E+00	(Use soil gas)	1.8E-02
TETRACHLOROETHANE, 1,1,2,2-	1.4E-03	Groundwater Protection	1.0E+03	site-specific		2.9E+00	7.5E-02	1.4E-03
TETRACHLOROETHYLENE	6.4E-01	Groundwater Protection	1.7E+02	site-specific		5.1E+00	7.2E-01	6.4E-01
TETRACHLOROPHENOL, 2,3,4,6-	5.6E-02	Groundwater Protection	1.0E+03	site-specific		4.9E+03		5.6E-02
TETRANITRO-1,3,5,7-TETRAAZOCYCLOOCTANE (HMX)	1.9E+01	Groundwater Protection	1.0E+03	site-specific		1.1E+04		1.9E+01
THALLIUM	1.2E+01	Direct Exposure	2.5E+03	site-specific	2.5E-01	1.2E+01		(Use batch test)
TOLUENE	7.8E-01	Groundwater Protection	8.2E+02	site-specific		8.2E+02	8.2E+02	7.8E-01
TOXAPHENE	2.1E+00	Direct Exposure	1.0E+03	site-specific		2.1E+00		8.5E+01
TPH (gasolines)	1.0E+02	Groundwater Protection	5.0E+02	site-specific		2.4E+03	(Use soil gas)	1.0E+02
TPH (middle distillates)	1.0E+02	Groundwater Protection	5.0E+02	site-specific		5.0E+02	(Use soil gas)	1.0E+02

TABLE A-2. [1]SOIL SCREENING LEVELS
COMMERCIAL / INDUSTRIAL LAND USE
(potentially impacted groundwater IS a current or potential drinking water resource)

	COMMERCIAL / INDUSTRIAL LAND USE (mg/kg)							
			Gross Contamination Ceiling Value (Odors, etc.)			Human Health		[1]Groundwater Protection (Soil Leaching)
						Direct Exposure	Vapor Intrusion Into Buildings	Drinking Water Resource
CHEMICAL PARAMETER	Final ESL	Basis	Table H-2	Terrestrial Ecotoxicity Criteria	Background	Table K-2	Table E-1b	Table G-1a
TPH (residual fuels)	1.0E+03	Groundwater Protection	2.5E+03	site-specific		1.4E+05		1.0E+03
TRICHLOROBENZENE, 1,2,4-	1.4E+00	Vapor Intrusion	1.0E+03	site-specific		3.7E+01	1.4E+00	1.6E+01
TRICHLOROETHANE, 1,1,1-	1.2E+00	Groundwater Protection	6.4E+02	site-specific		6.4E+02	6.4E+02	1.2E+00
TRICHLOROETHANE, 1,1,2-	6.2E-02	Vapor Intrusion	5.0E+02	site-specific		1.4E+00	6.2E-02	7.6E-02
TRICHLOROETHYLENE	3.6E-01	Groundwater Protection	6.9E+02	site-specific		4.1E+00	6.2E-01	3.6E-01
TRICHLOROPHENOL, 2,4,5-	2.9E+00	Groundwater Protection	5.0E+02	site-specific		1.6E+04		2.9E+00
TRICHLOROPHENOL, 2,4,6-	3.1E-01	Groundwater Protection	1.0E+03	site-specific		1.6E+02		3.1E-01
TRICHLOROPHENOXYACETIC ACID, 2,4,5- (2,4,5-T)	3.6E+00	Groundwater Protection	2.5E+03	site-specific		1.6E+03		3.6E+00
TRICHLOROPHENOXYPROPIONIC ACID, 2,4,5- (2,4,5-TP)	8.7E-01	Groundwater Protection	1.0E+03	site-specific		1.3E+03		8.7E-01
TRICHLOROPROPANE, 1,2,3-	4.2E-06	Groundwater Protection	5.0E+02	site-specific		2.2E-02	(Use soil gas)	4.2E-06
TRICHLOROPROPENE, 1,2,3-	8.1E-02	Groundwater Protection	3.1E+02	site-specific		6.7E-01	(Use soil gas)	8.1E-02
TRIFLURALIN	5.9E+00	Groundwater Protection	5.0E+02	site-specific		4.2E+02		5.9E+00
TRINITROBENZENE, 1,3,5-	2.8E+00	Groundwater Protection	1.0E+03	site-specific		6.5E+03		2.8E+00
TRINITROPHENYLMETHYLNITRAMINE, 2,4,6- (TETRYL)	3.1E+01	Groundwater Protection	1.0E+03	site-specific		4.7E+02		3.1E+01
TRINITROTOLUENE, 2,4,6- (TNT)	1.2E+00	Groundwater Protection	1.0E+03	site-specific		9.6E+01		1.2E+00
VANADIUM	7.7E+02	Background	2.5E+03	site-specific	7.7E+02	6.6E+02		(Use batch test)
VINYL CHLORIDE	3.5E-01	Groundwater Protection	1.0E+03	site-specific		1.8E+00	9.9E-01	3.5E-01
XYLENES	1.4E+00	Groundwater Protection	2.6E+02	site-specific		2.6E+02	2.6E+02	1.4E+00
ZINC	2.5E+03	Ceiling Value	2.5E+03	site-specific	3.5E+02	7.0E+04		(Use batch test)
Electrical Conductivity (mS/cm, USEPA Method 120.1 MOD)	4.0		-	-	-	-	-	-
Sodium Adsorption Ratio	12		-	-	-	-	-	-

Notes:

1. Standard soil leaching model used; assumes soil cover over bedrock (>1m thick,see Table G-1). Chemical sorption coefficient of 5,000 cm3/g used to define "low-mobility chemicals."

Final Environmental Screening Level is lowest of ceiling value (nuisance concerns etc.), ecotoxicity, direct-exposure, indoor-air impact, and leaching screening levels.
Assumes soil pH 5.0 to 9.0.
Soil data should be reported on dry-weight basis (see Section 6.2).
TPH -Total Petroleum Hydrocarbons. See text for discussion of different TPH categories.
Typical background As in soils assumed to be <20 mg/kg (refer to Volume 1, Section 2.9 and Appendix 1, Section 3)

TABLE B-1. [1]SOIL SCREENING LEVELS
[2]UNRESTRICTED LAND USE
(potentially impacted groundwater IS NOT a current or potential drinking water resource)

	[2]UNRESTRICTED LAND USE (mg/kg)							
						Human Health		[1]Groundwater Protection (Soil Leaching)
			Gross Contamination Ceiling Value (Odors, etc.)	Terrestrial Ecotoxicity Criteria		Direct Exposure	Vapor Intrusion Into Buildings	NON-Drinking Water Resource
CHEMICAL PARAMETER	Final ESL	Basis	Table H-2		Background	Table K-1	Table E-1b	Table G-1a
ACENAPHTHENE	4.0E+01	Groundwater Protection	1.0E+03	site-specific		6.6E+02	1.2E+02	4.0E+01
ACENAPHTHYLENE	5.5E+00	Groundwater Protection	5.0E+02	site-specific		3.4E+02	(Use soil gas)	5.5E+00
ACETONE	9.2E-01	Groundwater Protection	5.0E+02	site-specific		1.2E+04	1.4E+04	9.2E-01
ALDRIN	2.8E+00	Groundwater Protection	1.0E+03	site-specific		3.9E+00		2.8E+00
AMETRYN	5.0E+01	Groundwater Protection	5.0E+02	site-specific		1.1E+02		5.0E+01
AMINO,2- DINITROTOLUENE,3,6-	8.5E-01	Groundwater Protection	5.0E+02	site-specific		3.1E+01		8.5E-01
AMINO,4- DINITROTOLUENE,2,6-	5.2E-01	Groundwater Protection	5.0E+02	site-specific		3.1E+01		5.2E-01
ANTHRACENE	1.4E+00	Groundwater Protection	5.0E+02	site-specific		3.5E+03	4.2E+00	1.4E+00
ANTIMONY	6.3E+00	Direct Exposure	1.0E+03	site-specific	2.4E+00	6.3E+00		(Use batch test)
ARSENIC	2.4E+01	Background	1.0E+03	site-specific	2.4E+01	2.1E+01		(Use batch test)
ATRAZINE	4.5E-01	Groundwater Protection	5.0E+02	site-specific		2.4E+00		4.5E-01
BARIUM	1.0E+03	Ceiling Value	1.0E+03	site-specific	6.9E+02	3.1E+03		(Use batch test)
BENOMYL	7.8E-03	Groundwater Protection	1.0E+03	site-specific		6.3E+02		7.8E-03
BENZENE	7.7E-01	Vapor Intrusion	5.0E+02	site-specific		1.2E+00	7.7E-01	4.3E+00
BENZO(a)ANTHRACENE	3.3E+00	Groundwater Protection	5.0E+02	site-specific		1.6E+01		3.3E+00
BENZO(a)PYRENE	1.6E+00	Direct Exposure	5.0E+02	site-specific		1.6E+00		5.9E+00
BENZO(b)FLUORANTHENE	1.6E+01	Direct Exposure	5.0E+02	site-specific		1.6E+01		6.8E+01
BENZO(g,h,i)PERYLENE	3.5E+01	Groundwater Protection	5.0E+02	site-specific		4.8E+02		3.5E+01
BENZO(k)FLUORANTHENE	3.9E+01	Groundwater Protection	5.0E+02	site-specific		1.6E+02		3.9E+01
BERYLLIUM	3.1E+01	Direct Exposure	1.0E+03	site-specific	3.0E+00	3.1E+01		(Use batch test)
BIPHENYL, 1,1-	1.0E+01	Direct Exposure	5.0E+02	site-specific		1.0E+01	(Use soil gas)	7.7E+01
BIS(2-CHLOROETHYL)ETHER	7.9E-03	Vapor Intrusion	5.0E+02	site-specific		2.4E-01	7.9E-03	9.6E-01
BIS(2-CHLORO-1-METHYLETHYL)ETHER	4.0E-03	Groundwater Protection	5.0E+02	site-specific		3.8E+00	(Use soil gas)	4.0E-03
BIS(2-ETHYLHEXYL)PHTHALATE	3.9E+01	Direct Exposure	5.0E+02	site-specific		3.9E+01		6.5E+01
BORON	1.0E+03	Ceiling Value	1.0E+03	site-specific		3.1E+03		(Use batch test)
BROMODICHLOROMETHANE	1.6E-02	Vapor Intrusion	9.3E+02	site-specific		3.2E-01	1.6E-02	2.1E+00
BROMOFORM	2.0E+00	Groundwater Protection	5.0E+02	site-specific		2.0E+01		2.0E+00
BROMOMETHANE	2.2E-01	Vapor Intrusion	5.0E+02	site-specific		1.5E+00	2.2E-01	7.6E-01
CADMIUM	7.4E+00	Direct Exposure	1.0E+03	site-specific	2.3E+00	7.4E+00		(Use batch test)
CARBON TETRACHLORIDE	1.0E-01	Vapor Intrusion	4.5E+02	site-specific		7.1E-01	1.0E-01	1.8E+00
CHLORDANE (TECHNICAL)	7.6E+00	Groundwater Protection	1.0E+03	site-specific		1.7E+01		7.6E+00
CHLOROANILINE, p-	3.6E-01	Groundwater Protection	1.0E+03	site-specific		2.7E+00		3.6E-01
CHLOROBENZENE	1.5E+00	Groundwater Protection	5.0E+02	site-specific		5.9E+01	2.2E+00	1.5E+00
CHLOROETHANE	1.2E+01	Groundwater Protection	5.0E+02	site-specific		2.1E+03	4.5E+02	1.2E+01
CHLOROFORM	2.6E-02	Vapor Intrusion	5.0E+02	site-specific		3.4E-01	2.6E-02	7.9E-01
CHLOROMETHANE	4.0E+00	Vapor Intrusion	1.0E+02	site-specific		2.4E+01	4.0E+00	1.1E+01
CHLOROPHENOL, 2-	1.2E-01	Groundwater Protection	1.0E+02	site-specific		7.0E+01	4.2E+01	1.2E-01
CHROMIUM (Total)	1.1E+03	Background	-	site-specific	1.1E+03			(Use batch test)
CHROMIUM III	1.0E+03	Ceiling Value	1.0E+03	site-specific		2.3E+04		(Use batch test)
CHROMIUM VI	3.0E+01	Direct Exposure	1.0E+03	site-specific		3.0E+01		(Use batch test)
CHRYSENE	3.0E+01	Groundwater Protection	1.0E+03	site-specific		1.6E+03		3.0E+01
COBALT	8.0E+01	Background	1.0E+03	site-specific	8.0E+01	4.7E+00		(Use batch test)
COPPER	6.3E+02	Direct Exposure	1.0E+03	site-specific	2.5E+02	6.3E+02		(Use batch test)
CYANIDE (Free)	4.8E+00	Direct Exposure	1.0E+02	site-specific		4.8E+00	(Use soil gas)	(Use batch test)
CYCLO-1,3,5-TRIMETHYLENE-2,4,6-TRINITRAMINE (RDX)	1.2E+00	Groundwater Protection	5.0E+02	site-specific		6.1E+00		1.2E+00

TABLE B-1. [1]SOIL SCREENING LEVELS
[2]UNRESTRICTED LAND USE
(potentially impacted groundwater IS NOT a current or potential drinking water resource)

	[2]UNRESTRICTED LAND USE (mg/kg)							
						Human Health		[1]Groundwater Protection (Soil Leaching)
			Gross Contamination Ceiling Value (Odors, etc.)	Terrestrial Ecotoxicity Criteria		Direct Exposure	Vapor Intrusion Into Buildings	NON-Drinking Water Resource
CHEMICAL PARAMETER	Final ESL	Basis	Table H-2		Background	Table K-1	Table E-1b	Table G-1a
DALAPON	1.6E-01	Groundwater Protection	5.0E+02	site-specific		3.8E+02		1.6E-01
DIBENZO(a,h)ANTHTRACENE	1.6E+00	Direct Exposure	5.0E+02	site-specific		1.6E+00		2.5E+02
DIBROMO,1,2- CHLOROPROPANE,3-	4.0E-03	Groundwater Protection	5.0E+02	site-specific		5.7E-03	(Use soil gas)	4.0E-03
DIBROMOCHLOROMETHANE	2.9E-02	Vapor Intrusion	1.0E+02	site-specific		1.0E+00	2.9E-02	3.4E-01
DIBROMOETHANE, 1,2-	1.0E-03	Vapor Intrusion	5.0E+02	site-specific		3.9E-02	1.0E-03	2.0E-01
DICHLOROBENZENE, 1,2-	1.1E+00	Groundwater Protection	3.8E+02	site-specific		3.8E+02	8.9E+00	1.1E+00
DICHLOROBENZENE, 1,3-	2.5E+00	Groundwater Protection	1.0E+02	site-specific		2.0E+02	(Use soil gas)	2.5E+00
DICHLOROBENZENE, 1,4-	5.5E-02	Vapor Intrusion	5.0E+02	site-specific		2.8E+00	5.5E-02	7.3E-01
DICHLOROBENZIDINE, 3,3-	1.2E+00	Direct Exposure	5.0E+02	site-specific		1.2E+00		2.4E+00
DICHLORODIPHENYLDICHLOROETHANE (DDD)	2.3E+00	Direct Exposure	5.0E+02	site-specific		2.3E+00		2.1E+01
DICHLORODIPHENYLDICHLOROETHYLENE (DDE)	2.0E+00	Direct Exposure	5.0E+02	site-specific		2.0E+00		9.4E+00
DICHLORODIPHENYLTRICHLOROETHANE (DDT)	1.9E+00	Groundwater Protection	1.0E+03	site-specific		1.9E+00		1.9E+00
DICHLOROETHANE, 1,1-	3.8E-01	Vapor Intrusion	5.0E+02	site-specific		3.8E+00	3.8E-01	1.9E+00
DICHLOROETHANE, 1,2-	2.3E-02	Vapor Intrusion	5.0E+02	site-specific		5.0E-01	2.3E-02	2.6E+00
DICHLOROETHYLENE, 1,1-	4.2E+00	Groundwater Protection	5.0E+02	site-specific		4.9E+01	8.9E+00	4.2E+00
DICHLOROETHYLENE, Cis 1,2-	3.6E-01	Vapor Intrusion	1.0E+02	site-specific		3.9E+00	3.6E-01	2.0E+01
DICHLOROETHYLENE, Trans 1,2-	3.6E+00	Vapor Intrusion	5.0E+02	site-specific		2.9E+01	3.6E+00	3.6E+01
DICHLOROPHENOL, 2,4-	7.3E-02	Groundwater Protection	5.0E+02	site-specific		3.8E+01		7.3E-02
DICHLOROPHENOXYACETIC ACID (2,4-D)	3.4E-01	Groundwater Protection	5.0E+02	site-specific		1.4E+02		3.4E-01
DICHLOROPROPANE, 1,2-	6.0E-02	Vapor Intrusion	1.0E+02	site-specific		1.1E+00	6.0E-02	2.7E+00
DICHLOROPROPENE, 1,3-	2.1E-03	Groundwater Protection	5.0E+02	site-specific		1.9E+00	1.5E-01	2.1E-03
DIELDRIN	2.5E+00	Direct Exposure	1.0E+03	site-specific		2.5E+00		7.9E+00
DIETHYLPHTHALATE	3.7E+00	Groundwater Protection	5.0E+02	site-specific		1.0E+04		3.7E+00
DIMETHYLPHENOL, 2,4-	9.0E+00	Groundwater Protection	1.0E+02	site-specific		2.5E+02		9.0E+00
DIMETHYLPHTHALATE	2.6E+01	Groundwater Protection	5.0E+02	site-specific		1.3E+05		2.6E+01
DINITROBENZENE, 1,3-	5.8E-01	Groundwater Protection	5.0E+02	site-specific		1.3E+00		5.8E-01
DINITROPHENOL, 2,4-	1.1E+00	Groundwater Protection	5.0E+02	site-specific		2.5E+01		1.1E+00
DINITROTOLUENE, 2,4- (2,4-DNT)	8.7E-01	Groundwater Protection	5.0E+02	site-specific		1.7E+00		8.7E-01
DINITROTOLUENE, 2,6- (2,6-DNT)	3.6E-01	Direct Exposure	5.0E+02	site-specific		3.6E-01		7.9E+00
DIOXANE, 1,4-	5.4E+00	Direct Exposure	5.0E+02	site-specific		5.4E+00	(Use soil gas)	2.3E+01
DIOXIN (TEQ)	1.0E-04	Direct Exposure	1.0E+03	site-specific	2.0E-05	1.0E-04		1.0E-01
DIURON	1.1E+00	Groundwater Protection	5.0E+02	site-specific		2.5E+01		1.1E+00
ENDOSULFAN	4.4E+00	Groundwater Protection	5.0E+02	site-specific		9.4E+01		4.4E+00
ENDRIN	3.8E+00	Direct Exposure	5.0E+02	site-specific		3.8E+00		1.0E+01
ETHANOL	4.5E+00	Groundwater Protection	5.0E+02	site-specific			(Use soil gas)	4.5E+00
ETHYLBENZENE	9.0E-01	Groundwater Protection	4.8E+02	site-specific		6.3E+01	2.4E+01	9.0E-01
FLUORANTHENE	2.9E+01	Groundwater Protection	5.0E+02	site-specific		4.8E+02		2.9E+01
FLUORENE	3.1E+01	Groundwater Protection	5.0E+02	site-specific		4.6E+02	9.3E+01	3.1E+01
GLYPHOSATE	5.0E+02	Ceiling Value	5.0E+02	site-specific		1.3E+03		6.3E+02
HEPTACHLOR	1.4E-01	Direct Exposure	1.0E+03	site-specific		1.4E-01		1.5E+01
HEPTACHLOR EPOXIDE	7.1E-02	Direct Exposure	1.0E+03	site-specific		7.1E-02		4.1E+00
HEXACHLOROBENZENE	7.8E-02	Groundwater Protection	5.0E+02	site-specific		2.2E-01		7.8E-02
HEXACHLOROBUTADIENE	6.1E-02	Groundwater Protection	5.0E+02	site-specific		1.3E+00		6.1E-02
HEXACHLOROCYCLOHEXANE (gamma) LINDANE	2.9E-02	Groundwater Protection	5.0E+02	site-specific		5.7E-01		2.9E-02
HEXACHLOROETHANE	6.8E-01	Groundwater Protection	5.0E+02	site-specific		2.0E+00		6.8E-01

TABLE B-1. [1]SOIL SCREENING LEVELS
[2]UNRESTRICTED LAND USE
(potentially impacted groundwater IS NOT a current or potential drinking water resource)

	[2]UNRESTRICTED LAND USE (mg/kg)							
						Human Health		[1]Groundwater Protection (Soil Leaching)
			Gross Contamination Ceiling Value (Odors, etc.)	Terrestrial		Direct Exposure	Vapor Intrusion Into Buildings	NON-Drinking Water Resource
CHEMICAL PARAMETER	Final ESL	Basis	Table H-2	Ecotoxicity Criteria	Background	Table K-1	Table E-1b	Table G-1a
HEXAZINONE	3.7E+02	Groundwater Protection	5.0E+02	site-specific		4.2E+02		3.7E+02
INDENO(1,2,3-cd)PYRENE	1.6E+01	Direct Exposure	5.0E+02	site-specific		1.6E+01		3.1E+01
ISOPHORONE	1.0E+01	Groundwater Protection	5.0E+02	site-specific		5.7E+02		1.0E+01
LEAD	4.0E+02	Direct Exposure	1.0E+03	site-specific	7.3E+01	4.0E+02		(Use batch test)
MERCURY	4.7E+00	Direct Exposure	5.0E+02	site-specific	7.2E-01	4.7E+00		(Use batch test)
METHOXYCHLOR	5.4E+00	Groundwater Protection	5.0E+02	site-specific		6.3E+01		5.4E+00
METHYL ETHYL KETONE	1.5E+01	Groundwater Protection	5.0E+02	site-specific		5.6E+03	2.2E+03	1.5E+01
METHYL ISOBUTYL KETONE	5.0E-01	Groundwater Protection	1.0E+02	site-specific		3.4E+03	1.3E+03	5.0E-01
METHYL MERCURY	1.6E+00	Direct Exposure	1.0E+02	site-specific		1.6E+00		(Use batch test)
METHYL TERT BUTYL ETHER	2.3E+00	Vapor Intrusion	1.0E+02	site-specific		5.0E+01	2.3E+00	1.0E+01
METHYLENE CHLORIDE	2.2E+01	Vapor Intrusion	5.0E+02	site-specific		5.8E+01	2.2E+01	3.6E+01
METHYLNAPHTHALENE, 1-	8.9E-01	Groundwater Protection	5.0E+02	site-specific		1.0E+02	5.9E+01	8.9E-01
METHYLNAPHTHALENE, 2-	1.9E+00	Groundwater Protection	5.0E+02	site-specific		3.9E+01	5.0E+01	1.9E+00
MOLYBDENUM	7.8E+01	Direct Exposure	1.0E+03	site-specific	4.0E+00	7.8E+01		(Use batch test)
NAPHTHALENE	3.1E+00	Groundwater Protection	5.0E+02	site-specific		2.8E+01	7.0E+00	3.1E+00
NICKEL	4.1E+02	Background	1.0E+03	site-specific	4.1E+02	3.1E+02		(Use batch test)
NITROBENZENE	5.6E+00	Direct Exposure	5.0E+02	site-specific		5.6E+00	(Use soil gas)	1.4E+01
NITROGLYCERIN	3.5E-01	Groundwater Protection	5.0E+02	site-specific		1.3E+00		3.5E-01
NITROTOLUENE, 2-	2.2E+00	Direct Exposure	5.0E+02	site-specific		2.2E+00	(Use soil gas)	4.4E+00
NITROTOLUENE, 3-	1.3E+00	Direct Exposure	5.0E+02	site-specific		1.3E+00		2.5E+00
NITROTOLUENE, 4-	2.8E+00	Groundwater Protection	5.0E+02	site-specific		3.4E+01		2.8E+00
PENTACHLOROPHENOL	7.8E-01	Groundwater Protection	5.0E+02	site-specific		1.0E+00		7.8E-01
PENTAERYTHRITOLTETRANITRATE (PETN)	2.5E+01	Direct Exposure	5.0E+02	site-specific		2.5E+01		2.3E+03
PERCHLORATE	1.2E+00	Groundwater Protection	1.0E+03	site-specific		1.1E+01		1.2E+00
PHENANTHRENE	2.3E+01	Groundwater Protection	5.0E+02	site-specific		4.6E+02	(Use soil gas)	2.3E+01
PHENOL	1.8E+00	Groundwater Protection	5.0E+02	site-specific		3.8E+03		1.8E+00
POLYCHLORINATED BIPHENYLS (PCBs)	1.2E+00	Direct Exposure	5.0E+02	site-specific		1.2E+00		1.1E+01
PROPICONAZOLE	2.5E+01	Groundwater Protection	5.0E+02	site-specific		1.6E+02		2.5E+01
PYRENE	4.1E+01	Groundwater Protection	5.0E+02	site-specific		3.6E+02	4.4E+01	4.1E+01
SELENIUM	7.8E+01	Direct Exposure	1.0E+03	site-specific	7.1E+00	7.8E+01		(Use batch test)
SILVER	7.8E+01	Direct Exposure	1.0E+03	site-specific	1.5E+00	7.8E+01		(Use batch test)
SIMAZINE	2.2E-01	Groundwater Protection	5.0E+02	site-specific		4.5E+00		2.2E-01
STYRENE	2.9E+00	Groundwater Protection	5.0E+02	site-specific		8.7E+02	4.5E+02	2.9E+00
TERBACIL	2.2E+00	Groundwater Protection	5.0E+02	site-specific		1.6E+02		2.2E+00
tert-BUTYL ALCOHOL	9.9E+01	Direct Exposure	1.0E+02	site-specific		9.9E+01	(Use soil gas)	1.1E+02
TETRACHLOROETHANE, 1,1,1,2-	3.2E-01	Groundwater Protection	1.0E+02	site-specific		2.2E+00	(Use soil gas)	3.2E-01
TETRACHLOROETHANE, 1,1,2,2-	1.0E-02	Vapor Intrusion	5.0E+02	site-specific		6.5E-01	1.0E-02	3.6E+00
TETRACHLOROETHYLENE	9.8E-02	Vapor Intrusion	1.7E+02	site-specific		1.2E+00	9.8E-02	6.8E+00
TETRACHLOROPHENOL, 2,3,4,6-	5.6E-02	Groundwater Protection	5.0E+02	site-specific		3.8E+02		5.6E-02
TETRANITRO-1,3,5,7-TETRAAZOCYCLOOCTANE (HMX)	1.9E+01	Groundwater Protection	5.0E+02	site-specific		7.7E+02		1.9E+01
THALLIUM	7.8E-01	Direct Exposure	1.0E+03	site-specific	2.5E-01	7.8E-01		(Use batch test)
TOLUENE	7.8E-01	Groundwater Protection	5.0E+02	site-specific		8.2E+02	8.2E+02	7.8E-01
TOXAPHENE	4.9E-01	Direct Exposure	5.0E+02	site-specific		4.9E-01		8.5E+01
TPH (gasolines)	1.0E+02	Ceiling Value	1.0E+02	site-specific		4.8E+02	(Use soil gas)	4.0E+02
TPH (middle distillates)	2.6E+02	Direct Exposure	5.0E+02	site-specific		2.6E+02	(Use soil gas)	5.0E+02

TABLE B-1. [1]SOIL SCREENING LEVELS
[2]UNRESTRICTED LAND USE
(potentially impacted groundwater IS NOT a current or potential drinking water resource)

	[2]UNRESTRICTED LAND USE (mg/kg)							
						Human Health		[1]Groundwater Protection (Soil Leaching)
			Gross Contamination Ceiling Value (Odors, etc.)	Terrestrial Ecotoxicity Criteria		Direct Exposure	Vapor Intrusion Into Buildings	NON-Drinking Water Resource
CHEMICAL PARAMETER	Final ESL	Basis	Table H-2		Background	Table K-1	Table E-1b	Table G-1a
TPH (residual fuels)	5.0E+02	Ceiling Value	5.0E+02	site-specific		9.4E+03		1.0E+03
TRICHLOROBENZENE, 1,2,4-	1.6E-01	Vapor Intrusion	5.0E+02	site-specific		8.2E+00	1.6E-01	2.6E+01
TRICHLOROETHANE, 1,1,1-	1.2E+00	Groundwater Protection	5.0E+02	site-specific		6.4E+02	2.2E+02	1.2E+00
TRICHLOROETHANE, 1,1,2-	8.9E-03	Vapor Intrusion	1.0E+02	site-specific		3.2E-01	8.9E-03	1.6E+00
TRICHLOROETHYLENE	8.9E-02	Vapor Intrusion	5.0E+02	site-specific		8.9E-01	8.9E-02	3.4E+00
TRICHLOROPHENOL, 2,4,5-	2.9E+00	Groundwater Protection	1.0E+02	site-specific		1.3E+03		2.9E+00
TRICHLOROPHENOL, 2,4,6-	3.1E-01	Groundwater Protection	5.0E+02	site-specific		1.3E+01		3.1E-01
TRICHLOROPHENOXYACETIC ACID, 2,4,5- (2,4,5-T)	1.2E+01	Groundwater Protection	1.0E+03	site-specific		1.3E+02		1.2E+01
TRICHLOROPHENOXYPROPIONIC ACID, 2,4,5- (2,4,5-TP)	8.7E-01	Groundwater Protection	5.0E+02	site-specific		1.0E+02		8.7E-01
TRICHLOROPROPANE, 1,2,3-	1.6E-03	Direct Exposure	1.0E+02	site-specific		1.6E-03	(Use soil gas)	3.0E-01
TRICHLOROPROPENE, 1,2,3-	8.1E-02	Groundwater Protection	1.0E+02	site-specific		1.6E-01	(Use soil gas)	8.1E-02
TRIFLURALIN	5.9E+00	Groundwater Protection	1.0E+02	site-specific		9.0E+01		5.9E+00
TRINITROBENZENE, 1,3,5-	2.8E+00	Groundwater Protection	5.0E+02	site-specific		4.5E+02		2.8E+00
TRINITROPHENYLMETHYLNITRAMINE, 2,4,6- (TETRYL)	3.1E+01	Groundwater Protection	5.0E+02	site-specific		3.1E+01		3.1E+01
TRINITROTOLUENE, 2,4,6- (TNT)	6.1E+00	Groundwater Protection	5.0E+02	site-specific		7.3E+00		6.1E+00
VANADIUM	7.7E+02	Background	1.0E+03	site-specific	7.7E+02	7.8E+01		(Use batch test)
VINYL CHLORIDE	3.6E-02	Vapor Intrusion	5.0E+02	site-specific		5.9E-02	3.6E-02	3.3E+00
XYLENES	1.4E+00	Groundwater Protection	2.6E+02	site-specific		1.2E+02	4.5E+01	1.4E+00
ZINC	1.0E+03	Ceiling Value	1.0E+03	site-specific	3.5E+02	4.7E+03		(Use batch test)
Electrical Conductivity (mS/cm, USEPA Method 120.1 MOD)	2.0		-	-	-	-	-	-
Sodium Adsorption Ratio	5.0		-	-	-	-	-	-

Notes:

1. Standard soil leaching model used; assumes soil cover over bedrock (>1m thick,see Table G-1). Chemical sorption coefficient of 5,000 cm3/g used to define "low-mobility chemicals."
2. "Unrestricted Land Use" screening levels generally considered adequate for residential and other sensitive uses (e.g., schools, day-care centers, hospitals, etc.).

Final Environmental Screening Level is lowest of ceiling value (nuisance concerns etc.), ecotoxicity, direct-exposure, indoor-air impact, and leaching screening levels.
Assumes soil pH 5.0 to 9.0.
Soil data should be reported on dry-weight basis (see Section 6.2).
TPH -Total Petroleum Hydrocarbons. See text for discussion of different TPH categories.
Typical background As in soils assumed to be <20 mg/kg (refer to Volume 1, Section 2.9 and Appendix 1, Section 3)

TABLE B-2. [1]SOIL SCREENING LEVELS
COMMERCIAL / INDUSTRIAL LAND USE
(potentially impacted groundwater IS NOT a current or potential drinking water resource)

	COMMERCIAL / INDUSTRIAL LAND USE (mg/kg)							
						Human Health		[1]Groundwater Protection (Soil Leaching)
			Gross Contamination Ceiling Value (Odors, etc.)	Terrestrial Ecotoxicity Criteria		Direct Exposure	Vapor Intrusion Into Buildings	NON-Drinking Water Resource
CHEMICAL PARAMETER	Final ESL	Basis	Table H-2		Background	Table K-2	Table E-1b	Table G-1a
ACENAPHTHENE	4.0E+01	Groundwater Protection	2.5E+03	site-specific		7.1E+03	1.2E+02	4.0E+01
ACENAPHTHYLENE	5.5E+00	Groundwater Protection	1.0E+03	site-specific		2.7E+03	(Use soil gas)	5.5E+00
ACETONE	9.2E-01	Groundwater Protection	1.0E+03	site-specific		1.1E+05	1.1E+05	9.2E-01
ALDRIN	2.8E+00	Groundwater Protection	2.5E+03	site-specific		5.6E+01		2.8E+00
AMETRYN	5.0E+01	Groundwater Protection	1.0E+03	site-specific		1.5E+03		5.0E+01
AMINO,2- DINITROTOLUENE,3,6-	8.5E-01	Groundwater Protection	1.0E+03	site-specific		4.6E+02		8.5E-01
AMINO,4- DINITROTOLUENE,2,6-	5.2E-01	Groundwater Protection	1.0E+03	site-specific		4.5E+02		5.2E-01
ANTHRACENE	1.4E+00	Groundwater Protection	1.0E+03	site-specific		4.2E+04	4.2E+00	1.4E+00
ANTIMONY	9.3E+01	Direct Exposure	2.5E+03	site-specific	2.4E+00	9.3E+01		(Use batch test)
ARSENIC	9.7E+01	Direct Exposure	2.5E+03	site-specific	2.4E+01	9.7E+01		(Use batch test)
ATRAZINE	4.5E-01	Groundwater Protection	1.0E+03	site-specific		1.0E+01		4.5E-01
BARIUM	2.5E+03	Ceiling Value	2.5E+03	site-specific	6.9E+02	4.3E+03		(Use batch test)
BENOMYL	7.8E-03	Groundwater Protection	2.5E+03	site-specific		8.2E+03		7.8E-03
BENZENE	4.3E+00	Groundwater Protection	1.0E+03	site-specific		5.5E+00	5.6E+00	4.3E+00
BENZO(a)ANTHRACENE	3.3E+00	Groundwater Protection	1.0E+03	site-specific		2.9E+01		3.3E+00
BENZO(a)PYRENE	2.9E+00	Direct Exposure	1.0E+03	site-specific		2.9E+00		5.9E+00
BENZO(b)FLUORANTHENE	2.9E+01	Direct Exposure	1.0E+03	site-specific		2.9E+01		6.8E+01
BENZO(g,h,i)PERYLENE	3.5E+01	Groundwater Protection	1.0E+03	site-specific		6.0E+03		3.5E+01
BENZO(k)FLUORANTHENE	3.9E+01	Groundwater Protection	1.0E+03	site-specific		2.9E+02		3.9E+01
BERYLLIUM	1.5E+02	Direct Exposure	2.5E+03	site-specific	3.0E+00	1.5E+02		(Use batch test)
BIPHENYL, 1,1-	4.3E+01	Direct Exposure	1.0E+03	site-specific		4.3E+01	(Use soil gas)	7.7E+01
BIS(2-CHLOROETHYL)ETHER	6.7E-02	Vapor Intrusion	1.0E+03	site-specific		1.1E+00	6.7E-02	9.6E-01
BIS(2-CHLORO-1-METHYLETHYL)ETHER	4.0E-03	Groundwater Protection	7.9E+02	site-specific		1.7E+01	(Use soil gas)	4.0E-03
BIS(2-ETHYLHEXYL)PHTHALATE	6.5E+01	Groundwater Protection	1.0E+03	site-specific		1.6E+02		6.5E+01
BORON	2.5E+03	Ceiling Value	2.5E+03	site-specific		4.7E+04		(Use batch test)
BROMODICHLOROMETHANE	1.2E-01	Vapor Intrusion	9.3E+02	site-specific		1.4E+00	1.2E-01	2.1E+00
BROMOFORM	2.0E+00	Groundwater Protection	1.0E+03	site-specific		9.1E+01		2.0E+00
BROMOMETHANE	7.6E-01	Groundwater Protection	1.0E+03	site-specific		6.5E+00	1.6E+00	7.6E-01
CADMIUM	6.5E+01	Direct Exposure	2.5E+03	site-specific	2.3E+00	6.5E+01		(Use batch test)
CARBON TETRACHLORIDE	7.3E-01	Vapor Intrusion	4.5E+02	site-specific		3.1E+00	7.3E-01	1.8E+00
CHLORDANE (TECHNICAL)	7.6E+00	Groundwater Protection	2.5E+03	site-specific		7.7E+01		7.6E+00
CHLOROANILINE, p-	3.6E-01	Groundwater Protection	2.5E+03	site-specific		1.1E+01		3.6E-01
CHLOROBENZENE	1.5E+00	Groundwater Protection	7.6E+02	site-specific		2.9E+02	1.6E+01	1.5E+00
CHLOROETHANE	1.2E+01	Groundwater Protection	1.0E+03	site-specific		2.1E+03	2.1E+03	1.2E+01
CHLOROFORM	1.9E-01	Vapor Intrusion	1.0E+03	site-specific		1.5E+00	1.9E-01	7.9E-01
CHLOROMETHANE	1.1E+01	Groundwater Protection	5.0E+02	site-specific		1.0E+02	2.8E+01	1.1E+01
CHLOROPHENOL, 2-	1.2E-01	Groundwater Protection	5.0E+02	site-specific		8.1E+02	3.5E+02	1.2E-01
CHROMIUM (Total)	1.1E+03	Background	-	site-specific	1.1E+03			(Use batch test)
CHROMIUM III	2.5E+03	Ceiling Value	2.5E+03	site-specific		3.5E+05		(Use batch test)
CHROMIUM VI	4.8E+02	Direct Exposure	2.5E+03	site-specific		4.8E+02		(Use batch test)
CHRYSENE	3.0E+01	Groundwater Protection	2.5E+03	site-specific		2.9E+03		3.0E+01
COBALT	8.0E+01	Background	2.5E+03	site-specific	8.0E+01	4.0E+01		(Use batch test)
COPPER	2.5E+03	Ceiling Value	2.5E+03	site-specific	2.5E+02	9.3E+03		(Use batch test)
CYANIDE (Free)	3.1E+01	Direct Exposure	5.0E+02	site-specific		3.1E+01	(Use soil gas)	(Use batch test)
CYCLO-1,3,5-TRIMETHYLENE-2,4,6-TRINITRAMINE (RDX)	1.2E+00	Groundwater Protection	1.0E+03	site-specific		2.8E+01		1.2E+00

TABLE B-2. [1]SOIL SCREENING LEVELS
COMMERCIAL / INDUSTRIAL LAND USE
(potentially impacted groundwater IS NOT a current or potential drinking water resource)

	COMMERCIAL / INDUSTRIAL LAND USE (mg/kg)							
						Human Health		[1]Groundwater Protection (Soil Leaching)
			Gross Contamination Ceiling Value (Odors, etc.)	Terrestrial Ecotoxicity Criteria		Direct Exposure	Vapor Intrusion Into Buildings	NON-Drinking Water Resource
CHEMICAL PARAMETER	Final ESL	Basis	Table H-2		Background	Table K-2	Table E-1b	Table G-1a
DALAPON	1.6E-01	Groundwater Protection	1.0E+03	site-specific		4.9E+03		1.6E-01
DIBENZO(a,h)ANTHTRACENE	2.9E+00	Direct Exposure	1.0E+03	site-specific		2.9E+00		2.5E+02
DIBROMO,1,2- CHLOROPROPANE,3-	1.7E-03	Vapor Intrusion	9.8E+02	site-specific		7.0E-02	1.7E-03	4.0E-03
DIBROMOCHLOROMETHANE	3.4E-01	Groundwater Protection	5.0E+02	site-specific		4.4E+00	(Use soil gas)	3.4E-01
DIBROMOETHANE, 1,2-	7.3E-03	Vapor Intrusion	1.0E+03	site-specific		1.7E-01	7.3E-03	2.0E-01
DICHLOROBENZENE, 1,2-	1.1E+00	Groundwater Protection	3.8E+02	site-specific		3.8E+02	6.2E+01	1.1E+00
DICHLOROBENZENE, 1,3-	2.5E+00	Groundwater Protection	5.0E+02	site-specific		6.0E+02	(Use soil gas)	2.5E+00
DICHLOROBENZENE, 1,4-	4.0E-01	Vapor Intrusion	1.0E+03	site-specific		1.2E+01	4.0E-01	7.3E-01
DICHLOROBENZIDINE, 3,3-	2.4E+00	Groundwater Protection	1.0E+03	site-specific		5.1E+00		2.4E+00
DICHLORODIPHENYLDICHLOROETHANE (DDD)	9.6E+00	Direct Exposure	1.0E+03	site-specific		9.6E+00		2.1E+01
DICHLORODIPHENYLDICHLOROETHYLENE (DDE)	9.3E+00	Direct Exposure	1.0E+03	site-specific		9.3E+00		9.4E+00
DICHLORODIPHENYLTRICHLOROETHANE (DDT)	1.9E+00	Groundwater Protection	2.5E+03	site-specific		8.5E+00		1.9E+00
DICHLOROETHANE, 1,1-	1.9E+00	Groundwater Protection	1.0E+03	site-specific		1.7E+01	2.7E+00	1.9E+00
DICHLOROETHANE, 1,2-	1.7E-01	Vapor Intrusion	1.0E+03	site-specific		2.2E+00	1.7E-01	2.6E+00
DICHLOROETHYLENE, 1,1-	4.2E+00	Groundwater Protection	1.0E+03	site-specific		2.1E+02	6.2E+01	4.2E+00
DICHLOROETHYLENE, Cis 1,2-	2.5E+00	Vapor Intrusion	5.0E+02	site-specific		1.8E+01	2.5E+00	2.0E+01
DICHLOROETHYLENE, Trans 1,2-	2.5E+01	Vapor Intrusion	1.0E+03	site-specific		1.3E+02	2.5E+01	3.6E+01
DICHLOROPHENOL, 2,4-	7.3E-02	Groundwater Protection	1.0E+03	site-specific		4.9E+02		7.3E-02
DICHLOROPHENOXYACETIC ACID (2,4-D)	3.4E-01	Groundwater Protection	1.0E+03	site-specific		1.9E+03		3.4E-01
DICHLOROPROPANE, 1,2-	4.4E-01	Vapor Intrusion	5.0E+02	site-specific		4.7E+00	4.4E-01	2.7E+00
DICHLOROPROPENE, 1,3-	2.1E-03	Groundwater Protection	1.0E+03	site-specific		8.6E+00	1.1E+00	2.1E-03
DIELDRIN	7.9E+00	Groundwater Protection	2.5E+03	site-specific		3.3E+01		7.9E+00
DIETHYLPHTHALATE	3.7E+00	Groundwater Protection	1.0E+03	site-specific		1.3E+05		3.7E+00
DIMETHYLPHENOL, 2,4-	9.0E+00	Groundwater Protection	5.0E+02	site-specific		3.3E+03		9.0E+00
DIMETHYLPHTHALATE	2.6E+01	Groundwater Protection	1.0E+03	site-specific		1.0E+06		2.6E+01
DINITROBENZENE, 1,3-	5.8E-01	Groundwater Protection	1.0E+03	site-specific		1.6E+01		5.8E-01
DINITROPHENOL, 2,4-	1.1E+00	Groundwater Protection	1.0E+03	site-specific		3.3E+02		1.1E+00
DINITROTOLUENE, 2,4- (2,4-DNT)	8.7E-01	Groundwater Protection	1.0E+03	site-specific		7.4E+00		8.7E-01
DINITROTOLUENE, 2,6- (2,6-DNT)	1.5E+00	Direct Exposure	1.0E+03	site-specific		1.5E+00		7.9E+00
DIOXANE, 1,4-	2.3E+01	Groundwater Protection	1.0E+03	site-specific		2.5E+01	(Use soil gas)	2.3E+01
DIOXIN (TEQ)	1.4E-03	Direct Exposure	2.5E+03	site-specific	2.0E-05	1.4E-03		1.0E-01
DIURON	1.1E+00	Groundwater Protection	1.0E+03	site-specific		3.3E+02		1.1E+00
ENDOSULFAN	4.4E+00	Groundwater Protection	1.0E+03	site-specific		1.4E+03		4.4E+00
ENDRIN	1.0E+01	Groundwater Protection	1.0E+03	site-specific		4.9E+01		1.0E+01
ETHANOL	4.5E+00	Groundwater Protection	1.0E+03	site-specific			(Use soil gas)	4.5E+00
ETHYLBENZENE	9.0E-01	Groundwater Protection	4.8E+02	site-specific		1.5E+02	1.7E+02	9.0E-01
FLUORANTHENE	2.9E+01	Groundwater Protection	1.0E+03	site-specific		6.0E+03		2.9E+01
FLUORENE	3.1E+01	Groundwater Protection	1.0E+03	site-specific		5.3E+03	9.3E+01	3.1E+01
GLYPHOSATE	6.3E+02	Groundwater Protection	1.0E+03	site-specific		1.6E+04		6.3E+02
HEPTACHLOR	6.3E-01	Direct Exposure	2.5E+03	site-specific		6.3E-01		1.5E+01
HEPTACHLOR EPOXIDE	3.3E-01	Direct Exposure	2.5E+03	site-specific		3.3E-01		4.1E+00
HEXACHLOROBENZENE	7.8E-02	Groundwater Protection	1.0E+03	site-specific		1.0E+00		7.8E-02
HEXACHLOROBUTADIENE	6.1E-02	Groundwater Protection	1.0E+03	site-specific		5.6E+00		6.1E-02
HEXACHLOROCYCLOHEXANE (gamma) LINDANE	2.9E-02	Groundwater Protection	1.0E+03	site-specific		2.5E+00		2.9E-02
HEXACHLOROETHANE	6.8E-01	Groundwater Protection	1.0E+03	site-specific		8.7E+00		6.8E-01

TABLE B-2. [1]SOIL SCREENING LEVELS
COMMERCIAL / INDUSTRIAL LAND USE
(potentially impacted groundwater IS NOT a current or potential drinking water resource)

	COMMERCIAL / INDUSTRIAL LAND USE (mg/kg)							
						Human Health		[1]Groundwater Protection (Soil Leaching)
			Gross Contamination Ceiling Value (Odors, etc.)	Terrestrial Ecotoxicity Criteria		Direct Exposure	Vapor Intrusion Into Buildings	NON-Drinking Water Resource
CHEMICAL PARAMETER	Final ESL	Basis	Table H-2		Background	Table K-2	Table E-1b	Table G-1a
HEXAZINONE	3.7E+02	Groundwater Protection	1.0E+03	site-specific		5.4E+03		3.7E+02
INDENO(1,2,3-cd)PYRENE	2.9E+01	Direct Exposure	1.0E+03	site-specific		2.9E+01		3.1E+01
ISOPHORONE	1.0E+01	Groundwater Protection	1.0E+03	site-specific		2.4E+03		1.0E+01
LEAD	8.0E+02	Direct Exposure	2.5E+03	site-specific	7.3E+01	8.0E+02		(Use batch test)
MERCURY	7.0E+01	Direct Exposure	1.0E+03	site-specific	7.2E-01	7.0E+01		(Use batch test)
METHOXYCHLOR	5.4E+00	Groundwater Protection	1.0E+03	site-specific		8.2E+02		5.4E+00
METHYL ETHYL KETONE	1.5E+01	Groundwater Protection	1.0E+03	site-specific		2.8E+04	1.6E+04	1.5E+01
METHYL ISOBUTYL KETONE	5.0E-01	Groundwater Protection	5.0E+02	site-specific		3.4E+03	3.4E+03	5.0E-01
METHYL MERCURY	2.3E+01	Direct Exposure	5.0E+02	site-specific		2.3E+01		(Use batch test)
METHYL TERT BUTYL ETHER	1.0E+01	Groundwater Protection	5.0E+02	site-specific		2.2E+02	1.7E+01	1.0E+01
METHYLENE CHLORIDE	3.6E+01	Groundwater Protection	1.0E+03	site-specific		6.6E+02	1.9E+02	3.6E+01
METHYLNAPHTHALENE, 1-	8.9E-01	Groundwater Protection	1.0E+03	site-specific		2.7E+02	3.9E+02	8.9E-01
METHYLNAPHTHALENE, 2-	1.9E+00	Groundwater Protection	1.0E+03	site-specific		3.6E+02	3.7E+02	1.9E+00
MOLYBDENUM	1.2E+03	Direct Exposure	2.5E+03	site-specific	4.0E+00	1.2E+03		(Use batch test)
NAPHTHALENE	3.1E+00	Groundwater Protection	1.0E+03	site-specific		9.6E+01	5.8E+01	3.1E+00
NICKEL	7.5E+02	Direct Exposure	2.5E+03	site-specific	4.1E+02	7.5E+02		(Use batch test)
NITROBENZENE	1.4E+01	Groundwater Protection	1.0E+03	site-specific		2.4E+01	(Use soil gas)	1.4E+01
NITROGLYCERIN	3.5E-01	Groundwater Protection	1.0E+03	site-specific		1.6E+01		3.5E-01
NITROTOLUENE, 2-	4.4E+00	Groundwater Protection	1.0E+03	site-specific		1.0E+01	(Use soil gas)	4.4E+00
NITROTOLUENE, 3-	2.5E+00	Groundwater Protection	1.0E+03	site-specific		1.6E+01		2.5E+00
NITROTOLUENE, 4-	2.8E+00	Groundwater Protection	1.0E+03	site-specific		1.4E+02		2.8E+00
PENTACHLOROPHENOL	7.8E-01	Groundwater Protection	1.0E+03	site-specific		4.0E+00		7.8E-01
PENTAERYTHRITOLTETRANITRATE (PETN)	3.3E+02	Direct Exposure	1.0E+03	site-specific		3.3E+02		2.3E+03
PERCHLORATE	1.2E+00	Groundwater Protection	2.5E+03	site-specific		1.6E+02		1.2E+00
PHENANTHRENE	2.3E+01	Groundwater Protection	1.0E+03	site-specific		5.6E+03	(Use soil gas)	2.3E+01
PHENOL	1.8E+00	Groundwater Protection	1.0E+03	site-specific		4.9E+04		1.8E+00
POLYCHLORINATED BIPHENYLS (PCBs)	9.8E+00	Direct Exposure	1.0E+03	site-specific		9.8E+00		1.1E+01
PROPICONAZOLE	2.5E+01	Groundwater Protection	1.0E+03	site-specific		2.1E+03		2.5E+01
PYRENE	4.1E+01	Groundwater Protection	1.0E+03	site-specific		4.4E+03	4.4E+01	4.1E+01
SELENIUM	1.2E+03	Direct Exposure	2.5E+03	site-specific	7.1E+00	1.2E+03		(Use batch test)
SILVER	1.2E+03	Direct Exposure	2.5E+03	site-specific	1.5E+00	1.2E+03		(Use batch test)
SIMAZINE	2.2E-01	Groundwater Protection	1.0E+03	site-specific		1.9E+01		2.2E-01
STYRENE	2.9E+00	Groundwater Protection	8.7E+02	site-specific		8.7E+02	8.7E+02	2.9E+00
TERBACIL	2.2E+00	Groundwater Protection	1.0E+03	site-specific		2.1E+03		2.2E+00
tert-BUTYL ALCOHOL	1.1E+02	Groundwater Protection	5.0E+02	site-specific		4.5E+02	(Use soil gas)	1.1E+02
TETRACHLOROETHANE, 1,1,1,2-	3.2E-01	Groundwater Protection	5.0E+02	site-specific		9.6E+00	(Use soil gas)	3.2E-01
TETRACHLOROETHANE, 1,1,2,2-	7.5E-02	Vapor Intrusion	1.0E+03	site-specific		2.9E+00	7.5E-02	3.6E+00
TETRACHLOROETHYLENE	7.2E-01	Vapor Intrusion	1.7E+02	site-specific		5.1E+00	7.2E-01	6.8E+00
TETRACHLOROPHENOL, 2,3,4,6-	5.6E-02	Groundwater Protection	1.0E+03	site-specific		4.9E+03		5.6E-02
TETRANITRO-1,3,5,7-TETRAAZOCYCLOOCTANE (HMX)	1.9E+01	Groundwater Protection	1.0E+03	site-specific		1.1E+04		1.9E+01
THALLIUM	1.2E+01	Direct Exposure	2.5E+03	site-specific	2.5E-01	1.2E+01		(Use batch test)
TOLUENE	7.8E-01	Groundwater Protection	8.2E+02	site-specific		8.2E+02	8.2E+02	7.8E-01
TOXAPHENE	2.1E+00	Direct Exposure	1.0E+03	site-specific		2.1E+00		8.5E+01
TPH (gasolines)	4.0E+02	Groundwater Protection	5.0E+02	site-specific		2.4E+03	(Use soil gas)	4.0E+02
TPH (middle distillates)	5.0E+02	Ceiling Value	5.0E+02	site-specific		5.0E+02	(Use soil gas)	5.0E+02

TABLE B-2. [1]SOIL SCREENING LEVELS
COMMERCIAL / INDUSTRIAL LAND USE
(potentially impacted groundwater IS NOT a current or potential drinking water resource)

	COMMERCIAL / INDUSTRIAL LAND USE (mg/kg)							
						Human Health		[1]Groundwater Protection (Soil Leaching)
			Gross Contamination Ceiling Value (Odors, etc.)	Terrestrial Ecotoxicity Criteria		Direct Exposure	Vapor Intrusion Into Buildings	NON-Drinking Water Resource
CHEMICAL PARAMETER	Final ESL	Basis	Table H-2		Background	Table K-2	Table E-1b	Table G-1a
TPH (residual fuels)	1.0E+03	Groundwater Protection	2.5E+03	site-specific		1.4E+05		1.0E+03
TRICHLOROBENZENE, 1,2,4-	1.4E+00	Vapor Intrusion	1.0E+03	site-specific		3.7E+01	1.4E+00	2.6E+01
TRICHLOROETHANE, 1,1,1-	1.2E+00	Groundwater Protection	6.4E+02	site-specific		6.4E+02	6.4E+02	1.2E+00
TRICHLOROETHANE, 1,1,2-	6.2E-02	Vapor Intrusion	5.0E+02	site-specific		1.4E+00	6.2E-02	1.6E+00
TRICHLOROETHYLENE	6.2E-01	Vapor Intrusion	6.9E+02	site-specific		4.1E+00	6.2E-01	3.4E+00
TRICHLOROPHENOL, 2,4,5-	2.9E+00	Groundwater Protection	5.0E+02	site-specific		1.6E+04		2.9E+00
TRICHLOROPHENOL, 2,4,6-	3.1E-01	Groundwater Protection	1.0E+03	site-specific		1.6E+02		3.1E-01
TRICHLOROPHENOXYACETIC ACID, 2,4,5- (2,4,5-T)	1.2E+01	Groundwater Protection	2.5E+03	site-specific		1.6E+03		1.2E+01
TRICHLOROPHENOXYPROPIONIC ACID, 2,4,5- (2,4,5-TP)	8.7E-01	Groundwater Protection	1.0E+03	site-specific		1.3E+03		8.7E-01
TRICHLOROPROPANE, 1,2,3-	2.2E-02	Direct Exposure	5.0E+02	site-specific		2.2E-02	(Use soil gas)	3.0E-01
TRICHLOROPROPENE, 1,2,3-	8.1E-02	Groundwater Protection	3.1E+02	site-specific		6.7E-01	(Use soil gas)	8.1E-02
TRIFLURALIN	5.9E+00	Groundwater Protection	5.0E+02	site-specific		4.2E+02		5.9E+00
TRINITROBENZENE, 1,3,5-	2.8E+00	Groundwater Protection	1.0E+03	site-specific		6.5E+03		2.8E+00
TRINITROPHENYLMETHYLNITRAMINE, 2,4,6- (TETRYL)	3.1E+01	Groundwater Protection	1.0E+03	site-specific		4.7E+02		3.1E+01
TRINITROTOLUENE, 2,4,6- (TNT)	6.1E+00	Groundwater Protection	1.0E+03	site-specific		9.6E+01		6.1E+00
VANADIUM	7.7E+02	Background	2.5E+03	site-specific	7.7E+02	6.6E+02		(Use batch test)
VINYL CHLORIDE	9.9E-01	Vapor Intrusion	1.0E+03	site-specific		1.8E+00	9.9E-01	3.3E+00
XYLENES	1.4E+00	Groundwater Protection	2.6E+02	site-specific		2.6E+02	2.6E+02	1.4E+00
ZINC	2.5E+03	Ceiling Value	2.5E+03	site-specific	3.5E+02	7.0E+04		(Use batch test)
Electrical Conductivity (mS/cm, USEPA Method 120.1 MOD)	4.0		-	-	-	-	-	-
Sodium Adsorption Ratio	12		-	-	-	-	-	-

Notes:

1. Standard soil leaching model used; assumes soil cover over bedrock (>1m thick,see Table G-1). Chemical sorption coefficient of 5,000 cm3/g used to define "low-mobility chemicals."

Final Environmental Screening Level is lowest of ceiling value (nuisance concerns etc.), ecotoxicity, direct-exposure, indoor-air impact, and leaching screening levels.
Assumes soil pH 5.0 to 9.0.
Soil data should be reported on dry-weight basis (see Section 6.2).
TPH -Total Petroleum Hydrocarbons. See text for discussion of different TPH categories.
Typical background As in soils assumed to be <20 mg/kg (refer to Volume 1, Section 2.9 and Appendix 1, Section 3).

TABLE C-1. [1]DEEP SOIL SCREENING LEVELS (>3m bgs)
[2]UNRESTRICTED LAND USE
(potentially impacted groundwater IS a current or potential drinking water resource)

	[2]UNRESTRICTED LAND USE (mg/kg)						
					Human Health		Groundwater Protection (Soil Leaching)
			Gross Contamination Ceiling Value (Odors, etc.)		Direct Exposure	Vapor Intrusion Into Buildings	Drinking Water Resource
CHEMICAL PARAMETER	Final ESL	Basis	Table H-3	Background	Table K-3	Table E-1b	Table G-1a
ACENAPHTHENE	4.0E+01	Groundwater Protection	2.5E+03		1.3E+04	1.2E+02	4.0E+01
ACENAPHTHYLENE	5.5E+00	Groundwater Protection	1.0E+03		4.5E+03	(Use soil gas)	5.5E+00
ACETONE	9.2E-01	Groundwater Protection	1.0E+03		1.1E+05	1.4E+04	9.2E-01
ALDRIN	2.8E+00	Groundwater Protection	2.5E+03		1.2E+02		2.8E+00
AMETRYN	1.3E+01	Groundwater Protection	1.0E+03		3.0E+03		1.3E+01
AMINO,2- DINITROTOLUENE,3,6-	8.5E-01	Groundwater Protection	1.0E+03		9.8E+02		8.5E-01
AMINO,4- DINITROTOLUENE,2,6-	5.2E-01	Groundwater Protection	1.0E+03		9.7E+02		5.2E-01
ANTHRACENE	1.4E+00	Groundwater Protection	1.0E+03		8.1E+04	4.2E+00	1.4E+00
ANTIMONY	2.0E+02	Direct Exposure	2.5E+03	2.4E+00	2.0E+02		(Use batch test)
ARSENIC	3.3E+02	Direct Exposure	2.5E+03	2.4E+01	3.3E+02		(Use batch test)
ATRAZINE	1.3E-02	Groundwater Protection	1.0E+03		7.2E+02		1.3E-02
BARIUM	2.5E+03	Ceiling Value	2.5E+03	6.9E+02	4.3E+03		(Use batch test)
BENOMYL	7.8E-03	Groundwater Protection	2.5E+03		1.7E+04		7.8E-03
BENZENE	3.0E-01	Groundwater Protection	1.0E+03		3.0E+01	7.7E-01	3.0E-01
BENZO(a)ANTHRACENE	3.3E+00	Groundwater Protection	1.0E+03		2.0E+02		3.3E+00
BENZO(a)PYRENE	5.9E+00	Groundwater Protection	1.0E+03		2.0E+01		5.9E+00
BENZO(b)FLUORANTHENE	2.9E+00	Groundwater Protection	1.0E+03		2.0E+02		2.9E+00
BENZO(g,h,i)PERYLENE	3.5E+01	Groundwater Protection	1.0E+03		1.2E+04		3.5E+01
BENZO(k)FLUORANTHENE	2.9E+01	Groundwater Protection	1.0E+03		2.0E+03		2.9E+01
BERYLLIUM	1.5E+02	Direct Exposure	2.5E+03	3.0E+00	1.5E+02		(Use batch test)
BIPHENYL, 1,1-	6.2E+01	Direct Exposure	1.0E+03		6.2E+01	(Use soil gas)	7.7E+01
BIS(2-CHLOROETHYL)ETHER	7.5E-05	Groundwater Protection	1.0E+03		6.5E+00	7.9E-03	7.5E-05
BIS(2-CHLORO-1-METHYLETHYL)ETHER	4.0E-03	Groundwater Protection	7.9E+02		1.0E+02	(Use soil gas)	4.0E-03
BIS(2-ETHYLHEXYL)PHTHALATE	6.5E+01	Groundwater Protection	1.0E+03		6.6E+03		6.5E+01
BORON	2.5E+03	Ceiling Value	2.5E+03		6.5E+04		(Use batch test)
BROMODICHLOROMETHANE	2.5E-03	Groundwater Protection	9.3E+02		7.4E+00	1.6E-02	2.5E-03
BROMOFORM	8.6E-01	Groundwater Protection	1.0E+03		5.2E+03		8.6E-01
BROMOMETHANE	2.2E-01	Vapor Intrusion	1.0E+03		9.8E+00	2.2E-01	3.6E-01
CADMIUM	6.5E+01	Direct Exposure	2.5E+03	2.3E+00	6.5E+01		(Use batch test)
CARBON TETRACHLORIDE	1.0E-01	Vapor Intrusion	4.5E+02		1.7E+01	1.0E-01	9.1E-01
CHLORDANE (TECHNICAL)	7.6E+00	Groundwater Protection	2.5E+03		5.6E+02		7.6E+00
CHLOROANILINE, p-	7.3E-03	Groundwater Protection	2.5E+03		8.3E+02		7.3E-03
CHLOROBENZENE	1.5E+00	Groundwater Protection	7.6E+02		4.3E+02	2.2E+00	1.5E+00
CHLOROETHANE	1.2E+00	Groundwater Protection	1.0E+03		2.1E+03	4.5E+02	1.2E+00
CHLOROFORM	2.6E-02	Vapor Intrusion	1.0E+03		8.0E+00	2.6E-02	7.9E-01
CHLOROMETHANE	4.0E+00	Vapor Intrusion	5.0E+02		1.5E+02	4.0E+00	1.1E+01
CHLOROPHENOL, 2-	1.2E-02	Groundwater Protection	5.0E+02		1.5E+03	4.2E+01	1.2E-02
CHROMIUM (Total)	1.1E+03	Background	-	1.1E+03			(Use batch test)
CHROMIUM III	2.5E+03	Ceiling Value	2.5E+03		7.6E+05		(Use batch test)
CHROMIUM VI	4.8E+02	Direct Exposure	2.5E+03		4.8E+02		(Use batch test)
CHRYSENE	3.0E+01	Groundwater Protection	2.5E+03		2.0E+04		3.0E+01
COBALT	8.0E+01	Background	2.5E+03	8.0E+01	4.0E+01		(Use batch test)
COPPER	2.5E+03	Ceiling Value	2.5E+03	2.5E+02	2.0E+04		(Use batch test)
CYANIDE (Free)	5.0E+01	Direct Exposure	5.0E+02		5.0E+01	(Use soil gas)	(Use batch test)
CYCLO-1,3,5-TRIMETHYLENE-2,4,6-TRINITRAMINE (RDX)	1.0E-02	Groundwater Protection	1.0E+03		1.4E+03		1.0E-02

TABLE C-1. [1]DEEP SOIL SCREENING LEVELS (>3m bgs)
[2]UNRESTRICTED LAND USE
(potentially impacted groundwater IS a current or potential drinking water resource)

	[2]UNRESTRICTED LAND USE (mg/kg)						
					Human Health		Groundwater Protection (Soil Leaching)
			Gross Contamination Ceiling Value (Odors, etc.)		Direct Exposure	Vapor Intrusion Into Buildings	Drinking Water Resource
CHEMICAL PARAMETER	Final ESL	Basis	Table H-3	Background	Table K-3	Table E-1b	Table G-1a
DALAPON	1.6E-01	Groundwater Protection	1.0E+03		9.9E+03		1.6E-01
DIBENZO(a,h)ANTHTRACENE	9.6E+00	Groundwater Protection	1.0E+03		2.0E+01		9.6E+00
DIBROMO,1,2- CHLOROPROPANE,3-	4.0E-03	Groundwater Protection	9.8E+02		3.7E-01	(Use soil gas)	4.0E-03
DIBROMOCHLOROMETHANE	2.1E-03	Groundwater Protection	5.0E+02		2.4E+01	2.9E-02	2.1E-03
DIBROMOETHANE, 1,2-	5.3E-04	Groundwater Protection	1.0E+03		9.3E-01	1.0E-03	5.3E-04
DICHLOROBENZENE, 1,2-	7.5E-01	Groundwater Protection	3.8E+02		3.8E+02	8.9E+00	7.5E-01
DICHLOROBENZENE, 1,3-	2.5E+00	Groundwater Protection	5.0E+02		6.0E+02	(Use soil gas)	2.5E+00
DICHLOROBENZENE, 1,4-	5.5E-02	Vapor Intrusion	1.0E+03		6.6E+01	5.5E-02	3.9E-01
DICHLOROBENZIDINE, 3,3-	9.2E-02	Groundwater Protection	1.0E+03		3.6E+02		9.2E-02
DICHLORODIPHENYLDICHLOROETHANE (DDD)	2.1E+01	Groundwater Protection	1.0E+03		6.8E+02		2.1E+01
DICHLORODIPHENYLDICHLOROETHYLENE (DDE)	9.4E+00	Groundwater Protection	1.0E+03		7.0E+02		9.4E+00
DICHLORODIPHENYLTRICHLOROETHANE (DDT)	1.9E+00	Groundwater Protection	2.5E+03		2.2E+02		1.9E+00
DICHLOROETHANE, 1,1-	1.1E-01	Groundwater Protection	1.0E+03		9.0E+01	3.8E-01	1.1E-01
DICHLOROETHANE, 1,2-	2.3E-02	Vapor Intrusion	1.0E+03		1.2E+01	2.3E-02	7.0E-02
DICHLOROETHYLENE, 1,1-	1.2E+00	Groundwater Protection	1.0E+03		3.2E+02	8.9E+00	1.2E+00
DICHLOROETHYLENE, Cis 1,2-	3.6E-01	Vapor Intrusion	5.0E+02		2.7E+01	3.6E-01	2.2E+00
DICHLOROETHYLENE, Trans 1,2-	3.6E+00	Vapor Intrusion	1.0E+03		1.9E+02	3.6E+00	6.5E+00
DICHLOROPHENOL, 2,4-	7.3E-03	Groundwater Protection	1.0E+03		9.9E+02		7.3E-03
DICHLOROPHENOXYACETIC ACID (2,4-D)	3.4E-01	Groundwater Protection	1.0E+03		4.0E+03		3.4E-01
DICHLOROPROPANE, 1,2-	6.0E-02	Vapor Intrusion	5.0E+02		2.1E+01	6.0E-02	1.4E-01
DICHLOROPROPENE, 1,3-	2.1E-03	Groundwater Protection	1.0E+03		5.0E+01	1.5E-01	2.1E-03
DIELDRIN	7.9E+00	Groundwater Protection	2.5E+03		6.6E+01		7.9E+00
DIETHYLPHTHALATE	3.7E+00	Groundwater Protection	1.0E+03		2.6E+05		3.7E+00
DIMETHYLPHENOL, 2,4-	9.0E+00	Groundwater Protection	5.0E+02		6.6E+03		9.0E+00
DIMETHYLPHTHALATE	2.6E+01	Groundwater Protection	1.0E+03		1.0E+06		2.6E+01
DINITROBENZENE, 1,3-	1.2E-01	Groundwater Protection	1.0E+03		3.3E+01		1.2E-01
DINITROPHENOL, 2,4-	1.1E+00	Groundwater Protection	1.0E+03		6.6E+02		1.1E+00
DINITROTOLUENE, 2,4- (2,4-DNT)	2.4E-02	Groundwater Protection	1.0E+03		5.2E+02		2.4E-02
DINITROTOLUENE, 2,6- (2,6-DNT)	5.1E-03	Groundwater Protection	1.0E+03		1.0E+02		5.1E-03
DIOXANE, 1,4-	2.1E-04	Groundwater Protection	1.0E+03		1.5E+03	(Use soil gas)	2.1E-04
DIOXIN (TEQ)	1.4E-03	Direct Exposure	2.5E+03	2.0E-05	1.4E-03		1.0E-01
DIURON	7.3E-01	Groundwater Protection	1.0E+03		6.6E+02		7.3E-01
ENDOSULFAN	4.4E+00	Groundwater Protection	1.0E+03		3.0E+03		4.4E+00
ENDRIN	1.0E+01	Groundwater Protection	1.0E+03		9.9E+01		1.0E+01
ETHANOL	4.5E+00	Groundwater Protection	1.0E+03			(Use soil gas)	4.5E+00
ETHYLBENZENE	9.0E-01	Groundwater Protection	4.8E+02		1.5E+02	2.4E+01	9.0E-01
FLUORANTHENE	2.9E+01	Groundwater Protection	1.0E+03		1.2E+04		2.9E+01
FLUORENE	3.1E+01	Groundwater Protection	1.0E+03		1.0E+04	9.3E+01	3.1E+01
GLYPHOSATE	6.3E+02	Groundwater Protection	1.0E+03		3.3E+04		6.3E+02
HEPTACHLOR	1.5E+01	Groundwater Protection	2.5E+03		4.6E+01		1.5E+01
HEPTACHLOR EPOXIDE	4.1E+00	Groundwater Protection	2.5E+03		6.6E+00		4.1E+00
HEXACHLOROBENZENE	7.8E-02	Groundwater Protection	1.0E+03		6.2E+01		7.8E-02
HEXACHLOROBUTADIENE	4.1E-02	Groundwater Protection	1.0E+03		3.1E+02		4.1E-02
HEXACHLOROCYCLOHEXANE (gamma) LINDANE	2.9E-02	Groundwater Protection	1.0E+03		1.3E+02		2.9E-02
HEXACHLOROETHANE	2.3E-02	Groundwater Protection	1.0E+03		1.7E+02		2.3E-02

TABLE C-1. [1]DEEP SOIL SCREENING LEVELS (>3m bgs)
[2]UNRESTRICTED LAND USE
(potentially impacted groundwater IS a current or potential drinking water resource)

	[2]UNRESTRICTED LAND USE (mg/kg)						
					Human Health		Groundwater Protection (Soil Leaching)
			Gross Contamination Ceiling Value (Odors, etc.)		Direct Exposure	Vapor Intrusion Into Buildings	Drinking Water Resource
CHEMICAL PARAMETER	Final ESL	Basis	Table H-3	Background	Table K-3	Table E-1b	Table G-1a
HEXAZINONE	1.4E+01	Groundwater Protection	1.0E+03		1.1E+04		1.4E+01
INDENO(1,2,3-cd)PYRENE	9.6E+00	Groundwater Protection	1.0E+03		2.0E+02		9.6E+00
ISOPHORONE	8.9E-01	Groundwater Protection	1.0E+03		6.6E+04		8.9E-01
LEAD	8.0E+02	Direct Exposure	2.5E+03	7.3E+01	8.0E+02		(Use batch test)
MERCURY	1.4E+02	Direct Exposure	1.0E+03	7.2E-01	1.4E+02		(Use batch test)
METHOXYCHLOR	5.4E+00	Groundwater Protection	1.0E+03		1.7E+03		5.4E+00
METHYL ETHYL KETONE	6.2E+00	Groundwater Protection	1.0E+03		2.8E+04	2.2E+03	6.2E+00
METHYL ISOBUTYL KETONE	5.0E-01	Groundwater Protection	5.0E+02		3.4E+03	1.3E+03	5.0E-01
METHYL MERCURY	5.1E+01	Direct Exposure	5.0E+02		5.1E+01		(Use batch test)
METHYL TERT BUTYL ETHER	2.8E-02	Groundwater Protection	5.0E+02		1.2E+03	2.3E+00	2.8E-02
METHYLENE CHLORIDE	1.2E-01	Groundwater Protection	1.0E+03		1.2E+03	2.2E+01	1.2E-01
METHYLNAPHTHALENE, 1-	8.9E-01	Groundwater Protection	1.0E+03		2.7E+02	5.9E+01	8.9E-01
METHYLNAPHTHALENE, 2-	1.9E+00	Groundwater Protection	1.0E+03		6.3E+02	5.0E+01	1.9E+00
MOLYBDENUM	2.5E+03	Ceiling Value	2.5E+03	4.0E+00	2.5E+03		(Use batch test)
NAPHTHALENE	3.1E+00	Groundwater Protection	1.0E+03		9.6E+01	7.0E+00	3.1E+00
NICKEL	7.5E+02	Direct Exposure	2.5E+03	4.1E+02	7.5E+02		(Use batch test)
NITROBENZENE	5.3E-03	Groundwater Protection	1.0E+03		1.3E+02	(Use soil gas)	5.3E-03
NITROGLYCERIN	3.9E-02	Groundwater Protection	1.0E+03		3.3E+01		3.9E-02
NITROTOLUENE, 2-	4.9E-03	Groundwater Protection	1.0E+03		6.9E+01	(Use soil gas)	4.9E-03
NITROTOLUENE, 3-	1.2E-01	Groundwater Protection	1.0E+03		3.3E+01		1.2E-01
NITROTOLUENE, 4-	2.9E-01	Groundwater Protection	1.0E+03		1.3E+03		2.9E-01
PENTACHLOROPHENOL	9.8E-02	Groundwater Protection	1.0E+03		2.7E+02		9.8E-02
PENTAERYTHRITOLTETRANITRATE (PETN)	2.1E+00	Groundwater Protection	1.0E+03		6.6E+02		2.1E+00
PERCHLORATE	7.0E-03	Groundwater Protection	2.5E+03		3.5E+02		7.0E-03
PHENANTHRENE	2.3E+01	Groundwater Protection	1.0E+03		1.1E+04	(Use soil gas)	2.3E+01
PHENOL	1.6E-01	Groundwater Protection	1.0E+03		9.4E+04		1.6E-01
POLYCHLORINATED BIPHENYLS (PCBs)	1.1E+01	Groundwater Protection	1.0E+03		2.9E+01		1.1E+01
PROPICONAZOLE	2.5E+01	Groundwater Protection	1.0E+03		4.3E+03		2.5E+01
PYRENE	4.1E+01	Groundwater Protection	1.0E+03		8.7E+03	4.4E+01	4.1E+01
SELENIUM	2.5E+03	Direct Exposure	2.5E+03	7.1E+00	2.5E+03		(Use batch test)
SILVER	2.5E+03	Ceiling Value	2.5E+03	1.5E+00	2.5E+03		(Use batch test)
SIMAZINE	1.6E-02	Groundwater Protection	1.0E+03		1.4E+03		1.6E-02
STYRENE	9.1E-01	Groundwater Protection	8.7E+02		8.7E+02	4.5E+02	9.1E-01
TERBACIL	2.2E+00	Groundwater Protection	1.0E+03		4.3E+03		2.2E+00
tert-BUTYL ALCOHOL	3.6E-02	Groundwater Protection	5.0E+02		2.7E+03	(Use soil gas)	3.6E-02
TETRACHLOROETHANE, 1,1,1,2-	1.8E-02	Groundwater Protection	5.0E+02		5.2E+01	(Use soil gas)	1.8E-02
TETRACHLOROETHANE, 1,1,2,2-	1.4E-03	Groundwater Protection	1.0E+03		1.6E+01	1.0E-02	1.4E-03
TETRACHLOROETHYLENE	9.8E-02	Vapor Intrusion	1.7E+02		2.7E+01	9.8E-02	6.4E-01
TETRACHLOROPHENOL, 2,3,4,6-	5.6E-02	Groundwater Protection	1.0E+03		9.9E+03		5.6E-02
TETRANITRO-1,3,5,7-TETRAAZOCYCLOOCTANE (HMX)	1.9E+01	Groundwater Protection	1.0E+03		2.5E+04		1.9E+01
THALLIUM	2.5E+01	Direct Exposure	2.5E+03	2.5E-01	2.5E+01		(Use batch test)
TOLUENE	7.8E-01	Groundwater Protection	8.2E+02		8.2E+02	8.2E+02	7.8E-01
TOXAPHENE	8.5E+01	Groundwater Protection	1.0E+03		1.5E+02		8.5E+01
TPH (gasolines)	1.0E+02	Groundwater Protection	5.0E+03		3.7E+03	(Use soil gas)	1.0E+02
TPH (middle distillates)	1.0E+02	Groundwater Protection	5.0E+03		5.0E+02	(Use soil gas)	1.0E+02

TABLE C-1. [1]DEEP SOIL SCREENING LEVELS (>3m bgs)
[2]UNRESTRICTED LAND USE
(potentially impacted groundwater IS a current or potential drinking water resource)

	[2]UNRESTRICTED LAND USE (mg/kg)						
			Gross Contamination Ceiling Value (Odors, etc.)		Human Health		Groundwater Protection (Soil Leaching)
					Direct Exposure	Vapor Intrusion Into Buildings	Drinking Water Resource
CHEMICAL PARAMETER	Final ESL	Basis	Table H-3	Background	Table K-3	Table E-1b	Table G-1a
TPH (residual fuels)	1.0E+03	Groundwater Protection	5.0E+03		3.0E+05		1.0E+03
TRICHLOROBENZENE, 1,2,4-	1.6E-01	Vapor Intrusion	1.0E+03		8.2E+01	1.6E-01	1.6E+01
TRICHLOROETHANE, 1,1,1-	1.2E+00	Groundwater Protection	6.4E+02		6.4E+02	2.2E+02	1.2E+00
TRICHLOROETHANE, 1,1,2-	8.9E-03	Vapor Intrusion	5.0E+02		2.0E+00	8.9E-03	7.6E-02
TRICHLOROETHYLENE	8.9E-02	Vapor Intrusion	6.9E+02		6.1E+00	8.9E-02	3.6E-01
TRICHLOROPHENOL, 2,4,5-	2.9E+00	Groundwater Protection	5.0E+02		3.3E+04		2.9E+00
TRICHLOROPHENOL, 2,4,6-	3.1E-01	Groundwater Protection	1.0E+03		3.3E+02		3.1E-01
TRICHLOROPHENOXYACETIC ACID, 2,4,5- (2,4,5-T)	3.6E+00	Groundwater Protection	2.5E+03		3.3E+03		3.6E+00
TRICHLOROPHENOXYPROPIONIC ACID, 2,4,5- (2,4,5-TP)	8.7E-01	Groundwater Protection	1.0E+03		2.6E+03		8.7E-01
TRICHLOROPROPANE, 1,2,3-	4.2E-06	Groundwater Protection	5.0E+02		1.3E-01	(Use soil gas)	4.2E-06
TRICHLOROPROPENE, 1,2,3-	8.1E-02	Groundwater Protection	3.1E+02		9.9E-01	(Use soil gas)	8.1E-02
TRIFLURALIN	5.9E+00	Groundwater Protection	1.0E+03		3.8E+03		5.9E+00
TRINITROBENZENE, 1,3,5-	2.8E+00	Groundwater Protection	1.0E+03		1.4E+04		2.8E+00
TRINITROPHENYLMETHYLNITRAMINE, 2,4,6- (TETRYL)	3.1E+01	Groundwater Protection	1.0E+03		1.0E+03		3.1E+01
TRINITROTOLUENE, 2,4,6- (TNT)	1.2E+00	Groundwater Protection	1.0E+03		2.2E+02		1.2E+00
VANADIUM	7.7E+02	Background	2.5E+03	7.7E+02	6.6E+02		(Use batch test)
VINYL CHLORIDE	3.6E-02	Vapor Intrusion	1.0E+03		1.1E+01	3.6E-02	3.5E-01
XYLENES	1.4E+00	Groundwater Protection	2.6E+02		2.6E+02	4.5E+01	1.4E+00
ZINC	2.5E+03	Ceiling Value	2.5E+03	3.5E+02	1.5E+05		(Use batch test)
Electrical Conductivity (mS/cm, USEPA Method 120.1 MOD)	not applicable		-	-	-	-	-
Sodium Adsorption Ratio	not applcable		-	-	-	-	-

Notes:

1. Deep soils defined as soils situated >3 meters below ground surface (or shallower with institutional controls).
2. "Unrestricted Land Use" screening levels generally considered adequate for residential and other sensitive uses (e.g., schools, day-care centers, hospitals, etc.).

Final Environmental Screening Level is lowest of ceiling values (nuisance concerns etc.), direct-exposure, indoor-air impact, and leaching screening levels.
Assumes soil pH 5.0 to 11.
Soil data should be reported on dry-weight basis (see Section 6.2).
TPH -Total Petroleum Hydrocarbons. See text for discussion of different TPH categories.
Typical background As in soils assumed to be <20 mg/kg (refer to Volume 1, Section 2.9 and Appendix 1, Section 3).

TABLE C-2. [1]DEEP SOIL SCREENING LEVELS (>3m bgs)
COMMERCIAL/INDUSTRIAL LAND USE ONLY
(potentially impacted groundwater IS a current or potential drinking water resource)

	[2]UNRESTRICTED LAND USE (mg/kg)						
					Human Health		Groundwater Protection (Soil Leaching)
			Gross Contamination Ceiling Value (Odors, etc.)		Direct Exposure	Vapor Intrusion Into Buildings	Drinking Water Resource
CHEMICAL PARAMETER	Final ESL	Basis	Table H-3	Background	Table K-3	Table E-1b	Table G-1a
ACENAPHTHENE	4.0E+01	Groundwater Protection	5.0E+03		1.3E+04	1.2E+02	4.0E+01
ACENAPHTHYLENE	5.5E+00	Groundwater Protection	2.5E+03		4.5E+03	(Use soil gas)	5.5E+00
ACETONE	9.2E-01	Groundwater Protection	2.5E+03		1.1E+05	1.1E+05	9.2E-01
ALDRIN	2.8E+00	Groundwater Protection	5.0E+03		1.2E+02		2.8E+00
AMETRYN	1.3E+01	Groundwater Protection	2.5E+03		3.0E+03		1.3E+01
AMINO,2- DINITROTOLUENE,3,6-	8.5E-01	Groundwater Protection	2.5E+03		9.8E+02		8.5E-01
AMINO,4- DINITROTOLUENE,2,6-	5.2E-01	Groundwater Protection	2.5E+03		9.7E+02		5.2E-01
ANTHRACENE	1.4E+00	Groundwater Protection	2.5E+03		8.1E+04	4.2E+00	1.4E+00
ANTIMONY	2.0E+02	Direct Exposure	5.0E+03	2.4E+00	2.0E+02		(Use batch test)
ARSENIC	3.3E+02	Direct Exposure	5.0E+03	2.4E+01	3.3E+02		(Use batch test)
ATRAZINE	1.3E-02	Groundwater Protection	2.5E+03		7.2E+02		1.3E-02
BARIUM	4.3E+03	Direct Exposure	5.0E+03	6.9E+02	4.3E+03		(Use batch test)
BENOMYL	7.8E-03	Groundwater Protection	5.0E+03		1.7E+04		7.8E-03
BENZENE	3.0E-01	Groundwater Protection	1.9E+03		3.0E+01	5.6E+00	3.0E-01
BENZO(a)ANTHRACENE	3.3E+00	Groundwater Protection	2.5E+03		2.0E+02		3.3E+00
BENZO(a)PYRENE	5.9E+00	Groundwater Protection	2.5E+03		2.0E+01		5.9E+00
BENZO(b)FLUORANTHENE	2.9E+00	Groundwater Protection	2.5E+03		2.0E+02		2.9E+00
BENZO(g,h,i)PERYLENE	3.5E+01	Groundwater Protection	2.5E+03		1.2E+04		3.5E+01
BENZO(k)FLUORANTHENE	2.9E+01	Groundwater Protection	2.5E+03		2.0E+03		2.9E+01
BERYLLIUM	1.5E+02	Direct Exposure	5.0E+03	3.0E+00	1.5E+02		(Use batch test)
BIPHENYL, 1,1-	6.2E+01	Direct Exposure	2.5E+03		6.2E+01	(Use soil gas)	7.7E+01
BIS(2-CHLOROETHYL)ETHER	7.5E-05	Groundwater Protection	2.5E+03		6.5E+00	6.7E-02	7.5E-05
BIS(2-CHLORO-1-METHYLETHYL)ETHER	4.0E-03	Groundwater Protection	7.9E+02		1.0E+02	(Use soil gas)	4.0E-03
BIS(2-ETHYLHEXYL)PHTHALATE	6.5E+01	Groundwater Protection	2.5E+03		6.6E+03		6.5E+01
BORON	5.0E+03	Ceiling Value	5.0E+03		6.5E+04		(Use batch test)
BROMODICHLOROMETHANE	2.5E-03	Groundwater Protection	9.3E+02		7.4E+00	1.2E-01	2.5E-03
BROMOFORM	8.6E-01	Groundwater Protection	2.5E+03		5.2E+03		8.6E-01
BROMOMETHANE	3.6E-01	Groundwater Protection	2.5E+03		9.8E+00	1.6E+00	3.6E-01
CADMIUM	6.5E+01	Direct Exposure	5.0E+03	2.3E+00	6.5E+01		(Use batch test)
CARBON TETRACHLORIDE	7.3E-01	Vapor Intrusion	4.5E+02		1.7E+01	7.3E-01	9.1E-01
CHLORDANE (TECHNICAL)	7.6E+00	Groundwater Protection	5.0E+03		5.6E+02		7.6E+00
CHLOROANILINE, p-	7.3E-03	Groundwater Protection	5.0E+03		8.3E+02		7.3E-03
CHLOROBENZENE	1.5E+00	Groundwater Protection	7.6E+02		4.3E+02	1.6E+01	1.5E+00
CHLOROETHANE	1.2E+00	Groundwater Protection	2.1E+03		2.1E+03	2.1E+03	1.2E+00
CHLOROFORM	1.9E-01	Vapor Intrusion	2.5E+03		8.0E+00	1.9E-01	7.9E-01
CHLOROMETHANE	1.1E+01	Groundwater Protection	1.0E+03		1.5E+02	2.8E+01	1.1E+01
CHLOROPHENOL, 2-	1.2E-02	Groundwater Protection	1.0E+03		1.5E+03	3.5E+02	1.2E-02
CHROMIUM (Total)	1.1E+03	Background	-	1.1E+03			(Use batch test)
CHROMIUM III	5.0E+03	Ceiling Value	5.0E+03		7.6E+05		(Use batch test)
CHROMIUM VI	4.8E+02	Direct Exposure	5.0E+03		4.8E+02		(Use batch test)
CHRYSENE	3.0E+01	Groundwater Protection	5.0E+03		2.0E+04		3.0E+01
COBALT	8.0E+01	Background	5.0E+03	8.0E+01	4.0E+01		(Use batch test)
COPPER	5.0E+03	Ceiling Value	5.0E+03	2.5E+02	2.0E+04		(Use batch test)
CYANIDE (Free)	5.0E+01	Direct Exposure	1.0E+03		5.0E+01	(Use soil gas)	(Use batch test)
CYCLO-1,3,5-TRIMETHYLENE-2,4,6-TRINITRAMINE (RDX)	1.0E-02	Groundwater Protection	2.5E+03		1.4E+03		1.0E-02
DALAPON	1.6E-01	Groundwater Protection	2.5E+03		9.9E+03		1.6E-01

TABLE C-2. [1]DEEP SOIL SCREENING LEVELS (>3m bgs)
COMMERCIAL/INDUSTRIAL LAND USE ONLY
(potentially impacted groundwater IS a current or potential drinking water resource)

	[2]UNRESTRICTED LAND USE (mg/kg)						
					Human Health		Groundwater Protection (Soil Leaching)
			Gross Contamination Ceiling Value (Odors, etc.)		Direct Exposure	Vapor Intrusion Into Buildings	Drinking Water Resource
CHEMICAL PARAMETER	Final ESL	Basis	Table H-3	Background	Table K-3	Table E-1b	Table G-1a
DIBENZO(a,h)ANTHTRACENE	9.6E+00	Groundwater Protection	2.5E+03		2.0E+01		9.6E+00
DIBROMO,1,2- CHLOROPROPANE,3-	1.7E-03	Vapor Intrusion	9.8E+02		3.7E-01	1.7E-03	4.0E-03
DIBROMOCHLOROMETHANE	2.1E-03	Groundwater Protection	1.0E+03		2.4E+01	(Use soil gas)	2.1E-03
DIBROMOETHANE, 1,2-	5.3E-04	Groundwater Protection	2.5E+03		9.3E-01	7.3E-03	5.3E-04
DICHLOROBENZENE, 1,2-	7.5E-01	Groundwater Protection	3.8E+02		3.8E+02	6.2E+01	7.5E-01
DICHLOROBENZENE, 1,3-	2.5E+00	Groundwater Protection	6.0E+02		6.0E+02	(Use soil gas)	2.5E+00
DICHLOROBENZENE, 1,4-	3.9E-01	Groundwater Protection	2.5E+03		6.6E+01	4.0E-01	3.9E-01
DICHLOROBENZIDINE, 3,3-	9.2E-02	Groundwater Protection	2.5E+03		3.6E+02		9.2E-02
DICHLORODIPHENYLDICHLOROETHANE (DDD)	2.1E+01	Groundwater Protection	2.5E+03		6.8E+02		2.1E+01
DICHLORODIPHENYLDICHLOROETHYLENE (DDE)	9.4E+00	Groundwater Protection	2.5E+03		7.0E+02		9.4E+00
DICHLORODIPHENYLTRICHLOROETHANE (DDT)	1.9E+00	Groundwater Protection	5.0E+03		2.2E+02		1.9E+00
DICHLOROETHANE, 1,1-	1.1E-01	Groundwater Protection	1.7E+03		9.0E+01	2.7E+00	1.1E-01
DICHLOROETHANE, 1,2-	7.0E-02	Groundwater Protection	2.5E+03		1.2E+01	1.7E-01	7.0E-02
DICHLOROETHYLENE, 1,1-	1.2E+00	Groundwater Protection	1.2E+03		3.2E+02	6.2E+01	1.2E+00
DICHLOROETHYLENE, Cis 1,2-	2.2E+00	Groundwater Protection	1.0E+03		2.7E+01	2.5E+00	2.2E+00
DICHLOROETHYLENE, Trans 1,2-	6.5E+00	Groundwater Protection	1.9E+03		1.9E+02	2.5E+01	6.5E+00
DICHLOROPHENOL, 2,4-	7.3E-03	Groundwater Protection	2.5E+03		9.9E+02		7.3E-03
DICHLOROPHENOXYACETIC ACID (2,4-D)	3.4E-01	Groundwater Protection	2.5E+03		4.0E+03		3.4E-01
DICHLOROPROPANE, 1,2-	1.4E-01	Groundwater Protection	1.0E+03		2.1E+01	4.4E-01	1.4E-01
DICHLOROPROPENE, 1,3-	2.1E-03	Groundwater Protection	1.6E+03		5.0E+01	1.1E+00	2.1E-03
DIELDRIN	7.9E+00	Groundwater Protection	5.0E+03		6.6E+01		7.9E+00
DIETHYLPHTHALATE	3.7E+00	Groundwater Protection	2.5E+03		2.6E+05		3.7E+00
DIMETHYLPHENOL, 2,4-	9.0E+00	Groundwater Protection	1.0E+03		6.6E+03		9.0E+00
DIMETHYLPHTHALATE	2.6E+01	Groundwater Protection	2.5E+03		1.0E+06		2.6E+01
DINITROBENZENE, 1,3-	1.2E-01	Groundwater Protection	2.5E+03		3.3E+01		1.2E-01
DINITROPHENOL, 2,4-	1.1E+00	Groundwater Protection	2.5E+03		6.6E+02		1.1E+00
DINITROTOLUENE, 2,4- (2,4-DNT)	2.4E-02	Groundwater Protection	2.5E+03		5.2E+02		2.4E-02
DINITROTOLUENE, 2,6- (2,6-DNT)	5.1E-03	Groundwater Protection	2.5E+03		1.0E+02		5.1E-03
DIOXANE, 1,4-	2.1E-04	Groundwater Protection	2.5E+03		1.5E+03	(Use soil gas)	2.1E-04
DIOXIN (TEQ)	1.4E-03	Direct Exposure	5.0E+03	2.0E-05	1.4E-03		1.0E-01
DIURON	7.3E-01	Groundwater Protection	2.5E+03		6.6E+02		7.3E-01
ENDOSULFAN	4.4E+00	Groundwater Protection	2.5E+03		3.0E+03		4.4E+00
ENDRIN	1.0E+01	Groundwater Protection	2.5E+03		9.9E+01		1.0E+01
ETHANOL	4.5E+00	Groundwater Protection	2.5E+03			(Use soil gas)	4.5E+00
ETHYLBENZENE	9.0E-01	Groundwater Protection	4.8E+02		1.5E+02	1.7E+02	9.0E-01
FLUORANTHENE	2.9E+01	Groundwater Protection	2.5E+03		1.2E+04		2.9E+01
FLUORENE	3.1E+01	Groundwater Protection	2.5E+03		1.0E+04	9.3E+01	3.1E+01
GLYPHOSATE	6.3E+02	Groundwater Protection	2.5E+03		3.3E+04		6.3E+02
HEPTACHLOR	1.5E+01	Groundwater Protection	5.0E+03		4.6E+01		1.5E+01
HEPTACHLOR EPOXIDE	4.1E+00	Groundwater Protection	5.0E+03		6.6E+00		4.1E+00
HEXACHLOROBENZENE	7.8E-02	Groundwater Protection	2.5E+03		6.2E+01		7.8E-02
HEXACHLOROBUTADIENE	4.1E-02	Groundwater Protection	2.5E+03		3.1E+02		4.1E-02
HEXACHLOROCYCLOHEXANE (gamma) LINDANE	2.9E-02	Groundwater Protection	2.5E+03		1.3E+02		2.9E-02
HEXACHLOROETHANE	2.3E-02	Groundwater Protection	2.5E+03		1.7E+02		2.3E-02
HEXAZINONE	1.4E+01	Groundwater Protection	2.5E+03		1.1E+04		1.4E+01
INDENO(1,2,3-cd)PYRENE	9.6E+00	Groundwater Protection	2.5E+03		2.0E+02		9.6E+00

TABLE C-2. [1]DEEP SOIL SCREENING LEVELS (>3m bgs)
COMMERCIAL/INDUSTRIAL LAND USE ONLY
(potentially impacted groundwater IS a current or potential drinking water resource)

	[2]UNRESTRICTED LAND USE (mg/kg)						
					Human Health		Groundwater Protection (Soil Leaching)
			Gross Contamination Ceiling Value (Odors, etc.)		Direct Exposure	Vapor Intrusion Into Buildings	Drinking Water Resource
CHEMICAL PARAMETER	Final ESL	Basis	Table H-3	Background	Table K-3	Table E-1b	Table G-1a
ISOPHORONE	8.9E-01	Groundwater Protection	2.5E+03		6.6E+04		8.9E-01
LEAD	8.0E+02	Direct Exposure	5.0E+03	7.3E+01	8.0E+02		(Use batch test)
MERCURY	1.4E+02	Direct Exposure	2.5E+03	7.2E-01	1.4E+02		(Use batch test)
METHOXYCHLOR	5.4E+00	Groundwater Protection	2.5E+03		1.7E+03		5.4E+00
METHYL ETHYL KETONE	6.2E+00	Groundwater Protection	2.5E+03		2.8E+04	1.6E+04	6.2E+00
METHYL ISOBUTYL KETONE	5.0E-01	Groundwater Protection	1.0E+03		3.4E+03	3.4E+03	5.0E-01
METHYL MERCURY	5.1E+01	Direct Exposure	1.0E+03		5.1E+01		(Use batch test)
METHYL TERT BUTYL ETHER	2.8E-02	Groundwater Protection	1.0E+03		1.2E+03	1.7E+01	2.8E-02
METHYLENE CHLORIDE	1.2E-01	Groundwater Protection	2.5E+03		1.2E+03	1.9E+02	1.2E-01
METHYLNAPHTHALENE, 1-	8.9E-01	Groundwater Protection	2.5E+03		2.7E+02	3.9E+02	8.9E-01
METHYLNAPHTHALENE, 2-	1.9E+00	Groundwater Protection	2.5E+03		6.3E+02	3.7E+02	1.9E+00
MOLYBDENUM	2.5E+03	Direct Exposure	5.0E+03	4.0E+00	2.5E+03		(Use batch test)
NAPHTHALENE	3.1E+00	Groundwater Protection	2.5E+03		9.6E+01	5.8E+01	3.1E+00
NICKEL	7.5E+02	Direct Exposure	5.0E+03	4.1E+02	7.5E+02		(Use batch test)
NITROBENZENE	5.3E-03	Groundwater Protection	2.5E+03		1.3E+02	(Use soil gas)	5.3E-03
NITROGLYCERIN	3.9E-02	Groundwater Protection	2.5E+03		3.3E+01		3.9E-02
NITROTOLUENE, 2-	4.9E-03	Groundwater Protection	2.5E+03		6.9E+01	(Use soil gas)	4.9E-03
NITROTOLUENE, 3-	1.2E-01	Groundwater Protection	2.5E+03		3.3E+01		1.2E-01
NITROTOLUENE, 4-	2.9E-01	Groundwater Protection	2.5E+03		1.3E+03		2.9E-01
PENTACHLOROPHENOL	9.8E-02	Groundwater Protection	2.5E+03		2.7E+02		9.8E-02
PENTAERYTHRITOLTETRANITRATE (PETN)	2.1E+00	Groundwater Protection	2.5E+03		6.6E+02		2.1E+00
PERCHLORATE	7.0E-03	Groundwater Protection	5.0E+03		3.5E+02		7.0E-03
PHENANTHRENE	2.3E+01	Groundwater Protection	2.5E+03		1.1E+04	(Use soil gas)	2.3E+01
PHENOL	1.6E-01	Groundwater Protection	2.5E+03		9.4E+04		1.6E-01
POLYCHLORINATED BIPHENYLS (PCBs)	1.1E+01	Groundwater Protection	2.5E+03		2.9E+01		1.1E+01
PROPICONAZOLE	2.5E+01	Groundwater Protection	2.5E+03		4.3E+03		2.5E+01
PYRENE	4.1E+01	Groundwater Protection	2.5E+03		8.7E+03	4.4E+01	4.1E+01
SELENIUM	2.5E+03	Direct Exposure	5.0E+03	7.1E+00	2.5E+03		(Use batch test)
SILVER	2.5E+03	Direct Exposure	5.0E+03	1.5E+00	2.5E+03		(Use batch test)
SIMAZINE	1.6E-02	Groundwater Protection	2.5E+03		1.4E+03		1.6E-02
STYRENE	9.1E-01	Groundwater Protection	8.7E+02		8.7E+02	8.7E+02	9.1E-01
TERBACIL	2.2E+00	Groundwater Protection	2.5E+03		4.3E+03		2.2E+00
tert-BUTYL ALCOHOL	3.6E-02	Groundwater Protection	1.0E+03		2.7E+03	(Use soil gas)	3.6E-02
TETRACHLOROETHANE, 1,1,1,2-	1.8E-02	Groundwater Protection	6.8E+02		5.2E+01	(Use soil gas)	1.8E-02
TETRACHLOROETHANE, 1,1,2,2-	1.4E-03	Groundwater Protection	1.9E+03		1.6E+01	7.5E-02	1.4E-03
TETRACHLOROETHYLENE	6.4E-01	Groundwater Protection	1.7E+02		2.7E+01	7.2E-01	6.4E-01
TETRACHLOROPHENOL, 2,3,4,6-	5.6E-02	Groundwater Protection	2.5E+03		9.9E+03		5.6E-02
TETRANITRO-1,3,5,7-TETRAAZOCYCLOOCTANE (HMX)	1.9E+01	Groundwater Protection	2.5E+03		2.5E+04		1.9E+01
THALLIUM	2.5E+01	Direct Exposure	5.0E+03	2.5E-01	2.5E+01		(Use batch test)
TOLUENE	7.8E-01	Groundwater Protection	8.2E+02		8.2E+02	8.2E+02	7.8E-01
TOXAPHENE	8.5E+01	Groundwater Protection	2.5E+03		1.5E+02		8.5E+01
TPH (gasolines)	1.0E+02	Groundwater Protection	5.0E+03		3.7E+03	(Use soil gas)	1.0E+02
TPH (middle distillates)	1.0E+02	Groundwater Protection	5.0E+03		5.0E+02	(Use soil gas)	1.0E+02
TPH (residual fuels)	1.0E+03	Groundwater Protection	5.0E+03		3.0E+05		1.0E+03
TRICHLOROBENZENE, 1,2,4-	1.4E+00	Vapor Intrusion	2.5E+03		8.2E+01	1.4E+00	1.6E+01
TRICHLOROETHANE, 1,1,1-	1.2E+00	Groundwater Protection	6.4E+02		6.4E+02	6.4E+02	1.2E+00

TABLE C-2. [1]DEEP SOIL SCREENING LEVELS (>3m bgs)
COMMERCIAL/INDUSTRIAL LAND USE ONLY
(potentially impacted groundwater IS a current or potential drinking water resource)

	[2]UNRESTRICTED LAND USE (mg/kg)						
					Human Health		Groundwater Protection (Soil Leaching)
			Gross Contamination Ceiling Value (Odors, etc.)		Direct Exposure	Vapor Intrusion Into Buildings	Drinking Water Resource
CHEMICAL PARAMETER	Final ESL	Basis	Table H-3	Background	Table K-3	Table E-1b	Table G-1a
TRICHLOROETHANE, 1,1,2-	6.2E-02	Vapor Intrusion	1.0E+03		2.0E+00	6.2E-02	7.6E-02
TRICHLOROETHYLENE	3.6E-01	Groundwater Protection	6.9E+02		6.1E+00	6.2E-01	3.6E-01
TRICHLOROPHENOL, 2,4,5-	2.9E+00	Groundwater Protection	1.0E+03		3.3E+04		2.9E+00
TRICHLOROPHENOL, 2,4,6-	3.1E-01	Groundwater Protection	2.5E+03		3.3E+02		3.1E-01
TRICHLOROPHENOXYACETIC ACID, 2,4,5- (2,4,5-T)	3.6E+00	Groundwater Protection	5.0E+03		3.3E+03		3.6E+00
TRICHLOROPHENOXYPROPIONIC ACID, 2,4,5- (2,4,5-TP)	8.7E-01	Groundwater Protection	2.5E+03		2.6E+03		8.7E-01
TRICHLOROPROPANE, 1,2,3-	4.2E-06	Groundwater Protection	1.0E+03		1.3E-01	(Use soil gas)	4.2E-06
TRICHLOROPROPENE, 1,2,3-	8.1E-02	Groundwater Protection	3.1E+02		9.9E-01	(Use soil gas)	8.1E-02
TRIFLURALIN	5.9E+00	Groundwater Protection	2.5E+03		3.8E+03		5.9E+00
TRINITROBENZENE, 1,3,5-	2.8E+00	Groundwater Protection	2.5E+03		1.4E+04		2.8E+00
TRINITROPHENYLMETHYLNITRAMINE, 2,4,6- (TETRYL)	3.1E+01	Groundwater Protection	2.5E+03		1.0E+03		3.1E+01
TRINITROTOLUENE, 2,4,6- (TNT)	1.2E+00	Groundwater Protection	2.5E+03		2.2E+02		1.2E+00
VANADIUM	7.7E+02	Background	5.0E+03	7.7E+02	6.6E+02		(Use batch test)
VINYL CHLORIDE	3.5E-01	Groundwater Protection	2.5E+03		1.1E+01	9.9E-01	3.5E-01
XYLENES	1.4E+00	Groundwater Protection	2.6E+02		2.6E+02	2.6E+02	1.4E+00
ZINC	5.0E+03	Ceiling Value	5.0E+03	3.5E+02	1.5E+05		(Use batch test)
Electrical Conductivity (mS/cm, USEPA Method 120.1 MOD)	not applicable		-	-	-	-	-
Sodium Adsorption Ratio	not applcable		-	-	-	-	-

Notes:

1. Deep soils defined as soils situated >3 meters below ground surface (or shallower with institutional controls).
2. "Unrestricted Land Use" screening levels generally considered adequate for residential and other sensitive uses (e.g., schools, day-care centers, hospitals, etc.).

Final Environmental Screening Level is lowest of ceiling values (nuisance concerns etc.), direct-exposure, indoor-air impact, and leaching screening levels.
Assumes soil pH 5.0 to 11.
Soil data should be reported on dry-weight basis (see Section 6.2).
TPH -Total Petroleum Hydrocarbons. See text for discussion of different TPH categories.
Typical background As in soils assumed to be <20 mg/kg (refer to Volume 1, Section 2.9 and Appendix 1, Section 3).

TABLE D-1. [1]DEEP SOIL SCREENING LEVELS (>3m bgs)
[2]UNRESTRICTED LAND USE
(potentially impacted groundwater IS NOT a current or potential drinking water resource)

	[2]RESIDENTIAL LAND USE (mg/kg)						
					Human Health		Groundwater Protection (Soil Leaching)
			Gross Contamination Ceiling Value (Odors, etc.)		Direct Exposure	Vapor Intrusion Into Buildings	NON-Drinking Water Resource
CHEMICAL PARAMETER	Final ESL	Basis	Table H-3	Background	Table K-3	Table E-1b	Table G-1a
ACENAPHTHENE	4.0E+01	Groundwater Protection	2.5E+03		1.3E+04	1.2E+02	4.0E+01
ACENAPHTHYLENE	5.5E+00	Groundwater Protection	1.0E+03		4.5E+03	(Use soil gas)	5.5E+00
ACETONE	9.2E-01	Groundwater Protection	1.0E+03		1.1E+05	1.4E+04	9.2E-01
ALDRIN	2.8E+00	Groundwater Protection	2.5E+03		1.2E+02		2.8E+00
AMETRYN	5.0E+01	Groundwater Protection	1.0E+03		3.0E+03		5.0E+01
AMINO,2- DINITROTOLUENE,3,6-	8.5E-01	Groundwater Protection	1.0E+03		9.8E+02		8.5E-01
AMINO,4- DINITROTOLUENE,2,6-	5.2E-01	Groundwater Protection	1.0E+03		9.7E+02		5.2E-01
ANTHRACENE	1.4E+00	Groundwater Protection	1.0E+03		8.1E+04	4.2E+00	1.4E+00
ANTIMONY	2.0E+02	Direct Exposure	2.5E+03	2.4E+00	2.0E+02		(Use batch test)
ARSENIC	3.3E+02	Direct Exposure	2.5E+03	2.4E+01	3.3E+02		(Use batch test)
ATRAZINE	4.5E-01	Groundwater Protection	1.0E+03		7.2E+02		4.5E-01
BARIUM	2.5E+03	Ceiling Value	2.5E+03	6.9E+02	4.3E+03		(Use batch test)
BENOMYL	7.8E-03	Groundwater Protection	2.5E+03		1.7E+04		7.8E-03
BENZENE	7.7E-01	Vapor Intrusion	1.0E+03		3.0E+01	7.7E-01	4.3E+00
BENZO(a)ANTHRACENE	3.3E+00	Groundwater Protection	1.0E+03		2.0E+02		3.3E+00
BENZO(a)PYRENE	5.9E+00	Groundwater Protection	1.0E+03		2.0E+01		5.9E+00
BENZO(b)FLUORANTHENE	6.8E+01	Groundwater Protection	1.0E+03		2.0E+02		6.8E+01
BENZO(g,h,i)PERYLENE	3.5E+01	Groundwater Protection	1.0E+03		1.2E+04		3.5E+01
BENZO(k)FLUORANTHENE	3.9E+01	Groundwater Protection	1.0E+03		2.0E+03		3.9E+01
BERYLLIUM	1.5E+02	Direct Exposure	2.5E+03	3.0E+00	1.5E+02		(Use batch test)
BIPHENYL, 1,1-	6.2E+01	Direct Exposure	1.0E+03		6.2E+01	(Use soil gas)	7.7E+01
BIS(2-CHLOROETHYL)ETHER	7.9E-03	Vapor Intrusion	1.0E+03		6.5E+00	7.9E-03	9.6E-01
BIS(2-CHLORO-1-METHYLETHYL)ETHER	4.0E-03	Groundwater Protection	7.9E+02		1.0E+02	(Use soil gas)	4.0E-03
BIS(2-ETHYLHEXYL)PHTHALATE	6.5E+01	Groundwater Protection	1.0E+03		6.6E+03		6.5E+01
BORON	2.5E+03	Ceiling Value	2.5E+03		6.5E+04		(Use batch test)
BROMODICHLOROMETHANE	1.6E-02	Vapor Intrusion	9.3E+02		7.4E+00	1.6E-02	2.1E+00
BROMOFORM	2.0E+00	Groundwater Protection	1.0E+03		5.2E+03		2.0E+00
BROMOMETHANE	2.2E-01	Vapor Intrusion	1.0E+03		9.8E+00	2.2E-01	7.6E-01
CADMIUM	6.5E+01	Direct Exposure	2.5E+03	2.3E+00	6.5E+01		(Use batch test)
CARBON TETRACHLORIDE	1.0E-01	Vapor Intrusion	4.5E+02		1.7E+01	1.0E-01	1.8E+00
CHLORDANE (TECHNICAL)	7.6E+00	Groundwater Protection	2.5E+03		5.6E+02		7.6E+00
CHLOROANILINE, p-	3.6E-01	Groundwater Protection	2.5E+03		8.3E+02		3.6E-01
CHLOROBENZENE	1.5E+00	Groundwater Protection	7.6E+02		4.3E+02	2.2E+00	1.5E+00
CHLOROETHANE	1.2E+01	Groundwater Protection	1.0E+03		2.1E+03	4.5E+02	1.2E+01
CHLOROFORM	2.6E-02	Vapor Intrusion	1.0E+03		8.0E+00	2.6E-02	7.9E-01
CHLOROMETHANE	4.0E+00	Vapor Intrusion	5.0E+02		1.5E+02	4.0E+00	1.1E+01
CHLOROPHENOL, 2-	1.2E-01	Groundwater Protection	5.0E+02		1.5E+03	4.2E+01	1.2E-01
CHROMIUM (Total)	1.1E+03	Background	-	1.1E+03			(Use batch test)
CHROMIUM III	2.5E+03	Ceiling Value	2.5E+03		7.6E+05		(Use batch test)
CHROMIUM VI	4.8E+02	Direct Exposure	2.5E+03		4.8E+02		(Use batch test)
CHRYSENE	3.0E+01	Groundwater Protection	2.5E+03		2.0E+04		3.0E+01
COBALT	8.0E+01	Background	2.5E+03	8.0E+01	4.0E+01		(Use batch test)
COPPER	2.5E+03	Ceiling Value	2.5E+03	2.5E+02	2.0E+04		(Use batch test)
CYANIDE (Free)	5.0E+01	Direct Exposure	5.0E+02		5.0E+01	(Use soil gas)	(Use batch test)
CYCLO-1,3,5-TRIMETHYLENE-2,4,6-TRINITRAMINE (RDX)	1.2E+00	Groundwater Protection	1.0E+03		1.4E+03		1.2E+00

TABLE D-1. [1]DEEP SOIL SCREENING LEVELS (>3m bgs)
[2]UNRESTRICTED LAND USE
(potentially impacted groundwater IS NOT a current or potential drinking water resource)

	[2]RESIDENTIAL LAND USE (mg/kg)						
					Human Health		Groundwater Protection (Soil Leaching)
			Gross Contamination Ceiling Value (Odors, etc.)		Direct Exposure	Vapor Intrusion Into Buildings	NON-Drinking Water Resource
CHEMICAL PARAMETER	Final ESL	Basis	Table H-3	Background	Table K-3	Table E-1b	Table G-1a
DALAPON	1.6E-01	Groundwater Protection	1.0E+03		9.9E+03		1.6E-01
DIBENZO(a,h)ANTHTRACENE	2.0E+01	Direct Exposure	1.0E+03		2.0E+01		2.5E+02
DIBROMO,1,2- CHLOROPROPANE,3-	4.0E-03	Groundwater Protection	9.8E+02		3.7E-01	(Use soil gas)	4.0E-03
DIBROMOCHLOROMETHANE	2.9E-02	Vapor Intrusion	5.0E+02		2.4E+01	2.9E-02	3.4E-01
DIBROMOETHANE, 1,2-	1.0E-03	Vapor Intrusion	1.0E+03		9.3E-01	1.0E-03	2.0E-01
DICHLOROBENZENE, 1,2-	1.1E+00	Groundwater Protection	3.8E+02		3.8E+02	8.9E+00	1.1E+00
DICHLOROBENZENE, 1,3-	2.5E+00	Groundwater Protection	5.0E+02		6.0E+02	(Use soil gas)	2.5E+00
DICHLOROBENZENE, 1,4-	5.5E-02	Vapor Intrusion	1.0E+03		6.6E+01	5.5E-02	7.3E-01
DICHLOROBENZIDINE, 3,3-	2.4E+00	Groundwater Protection	1.0E+03		3.6E+02		2.4E+00
DICHLORODIPHENYLDICHLOROETHANE (DDD)	2.1E+01	Groundwater Protection	1.0E+03		6.8E+02		2.1E+01
DICHLORODIPHENYLDICHLOROETHYLENE (DDE)	9.4E+00	Groundwater Protection	1.0E+03		7.0E+02		9.4E+00
DICHLORODIPHENYLTRICHLOROETHANE (DDT)	1.9E+00	Groundwater Protection	2.5E+03		2.2E+02		1.9E+00
DICHLOROETHANE, 1,1-	3.8E-01	Vapor Intrusion	1.0E+03		9.0E+01	3.8E-01	1.9E+00
DICHLOROETHANE, 1,2-	2.3E-02	Vapor Intrusion	1.0E+03		1.2E+01	2.3E-02	2.6E+00
DICHLOROETHYLENE, 1,1-	4.2E+00	Groundwater Protection	1.0E+03		3.2E+02	8.9E+00	4.2E+00
DICHLOROETHYLENE, Cis 1,2-	3.6E-01	Vapor Intrusion	5.0E+02		2.7E+01	3.6E-01	2.0E+01
DICHLOROETHYLENE, Trans 1,2-	3.6E+00	Vapor Intrusion	1.0E+03		1.9E+02	3.6E+00	3.6E+01
DICHLOROPHENOL, 2,4-	7.3E-02	Groundwater Protection	1.0E+03		9.9E+02		7.3E-02
DICHLOROPHENOXYACETIC ACID (2,4-D)	3.4E-01	Groundwater Protection	1.0E+03		4.0E+03		3.4E-01
DICHLOROPROPANE, 1,2-	6.0E-02	Vapor Intrusion	5.0E+02		2.1E+01	6.0E-02	2.7E+00
DICHLOROPROPENE, 1,3-	2.1E-03	Groundwater Protection	1.0E+03		5.0E+01	1.5E-01	2.1E-03
DIELDRIN	7.9E+00	Groundwater Protection	2.5E+03		6.6E+01		7.9E+00
DIETHYLPHTHALATE	3.7E+00	Groundwater Protection	1.0E+03		2.6E+05		3.7E+00
DIMETHYLPHENOL, 2,4-	9.0E+00	Groundwater Protection	5.0E+02		6.6E+03		9.0E+00
DIMETHYLPHTHALATE	2.6E+01	Groundwater Protection	1.0E+03		1.0E+06		2.6E+01
DINITROBENZENE, 1,3-	5.8E-01	Groundwater Protection	1.0E+03		3.3E+01		5.8E-01
DINITROPHENOL, 2,4-	1.1E+00	Groundwater Protection	1.0E+03		6.6E+02		1.1E+00
DINITROTOLUENE, 2,4- (2,4-DNT)	8.7E-01	Groundwater Protection	1.0E+03		5.2E+02		8.7E-01
DINITROTOLUENE, 2,6- (2,6-DNT)	7.9E+00	Groundwater Protection	1.0E+03		1.0E+02		7.9E+00
DIOXANE, 1,4-	2.3E+01	Groundwater Protection	1.0E+03		1.5E+03	(Use soil gas)	2.3E+01
DIOXIN (TEQ)	1.4E-03	Direct Exposure	2.5E+03	2.0E-05	1.4E-03		1.0E-01
DIURON	1.1E+00	Groundwater Protection	1.0E+03		6.6E+02		1.1E+00
ENDOSULFAN	4.4E+00	Groundwater Protection	1.0E+03		3.0E+03		4.4E+00
ENDRIN	1.0E+01	Groundwater Protection	1.0E+03		9.9E+01		1.0E+01
ETHANOL	4.5E+00	Groundwater Protection	1.0E+03			(Use soil gas)	4.5E+00
ETHYLBENZENE	9.0E-01	Groundwater Protection	4.8E+02		1.5E+02	2.4E+01	9.0E-01
FLUORANTHENE	2.9E+01	Groundwater Protection	1.0E+03		1.2E+04		2.9E+01
FLUORENE	3.1E+01	Groundwater Protection	1.0E+03		1.0E+04	9.3E+01	3.1E+01
GLYPHOSATE	6.3E+02	Groundwater Protection	1.0E+03		3.3E+04		6.3E+02
HEPTACHLOR	1.5E+01	Groundwater Protection	2.5E+03		4.6E+01		1.5E+01
HEPTACHLOR EPOXIDE	4.1E+00	Groundwater Protection	2.5E+03		6.6E+00		4.1E+00
HEXACHLOROBENZENE	7.8E-02	Groundwater Protection	1.0E+03		6.2E+01		7.8E-02
HEXACHLOROBUTADIENE	6.1E-02	Groundwater Protection	1.0E+03		3.1E+02		6.1E-02
HEXACHLOROCYCLOHEXANE (gamma) LINDANE	2.9E-02	Groundwater Protection	1.0E+03		1.3E+02		2.9E-02
HEXACHLOROETHANE	6.8E-01	Groundwater Protection	1.0E+03		1.7E+02		6.8E-01

TABLE D-1. [1]DEEP SOIL SCREENING LEVELS (>3m bgs)
[2]UNRESTRICTED LAND USE
(potentially impacted groundwater IS NOT a current or potential drinking water resource)

	[2]RESIDENTIAL LAND USE (mg/kg)						
					Human Health		Groundwater Protection (Soil Leaching)
			Gross Contamination Ceiling Value (Odors, etc.)		Direct Exposure	Vapor Intrusion Into Buildings	NON-Drinking Water Resource
CHEMICAL PARAMETER	Final ESL	Basis	Table H-3	Background	Table K-3	Table E-1b	Table G-1a
HEXAZINONE	3.7E+02	Groundwater Protection	1.0E+03		1.1E+04		3.7E+02
INDENO(1,2,3-cd)PYRENE	3.1E+01	Groundwater Protection	1.0E+03		2.0E+02		3.1E+01
ISOPHORONE	1.0E+01	Groundwater Protection	1.0E+03		6.6E+04		1.0E+01
LEAD	8.0E+02	Direct Exposure	2.5E+03	7.3E+01	8.0E+02		(Use batch test)
MERCURY	1.4E+02	Direct Exposure	1.0E+03	7.2E-01	1.4E+02		(Use batch test)
METHOXYCHLOR	5.4E+00	Groundwater Protection	1.0E+03		1.7E+03		5.4E+00
METHYL ETHYL KETONE	1.5E+01	Groundwater Protection	1.0E+03		2.8E+04	2.2E+03	1.5E+01
METHYL ISOBUTYL KETONE	5.0E-01	Groundwater Protection	5.0E+02		3.4E+03	1.3E+03	5.0E-01
METHYL MERCURY	5.1E+01	Direct Exposure	5.0E+02		5.1E+01		(Use batch test)
METHYL TERT BUTYL ETHER	2.3E+00	Vapor Intrusion	5.0E+02		1.2E+03	2.3E+00	1.0E+01
METHYLENE CHLORIDE	2.2E+01	Vapor Intrusion	1.0E+03		1.2E+03	2.2E+01	3.6E+01
METHYLNAPHTHALENE, 1-	8.9E-01	Groundwater Protection	1.0E+03		2.7E+02	5.9E+01	8.9E-01
METHYLNAPHTHALENE, 2-	1.9E+00	Groundwater Protection	1.0E+03		6.3E+02	5.0E+01	1.9E+00
MOLYBDENUM	2.5E+03	Ceiling Value	2.5E+03	4.0E+00	2.5E+03		(Use batch test)
NAPHTHALENE	3.1E+00	Groundwater Protection	1.0E+03		9.6E+01	7.0E+00	3.1E+00
NICKEL	7.5E+02	Direct Exposure	2.5E+03	4.1E+02	7.5E+02		(Use batch test)
NITROBENZENE	1.4E+01	Groundwater Protection	1.0E+03		1.3E+02	(Use soil gas)	1.4E+01
NITROGLYCERIN	3.5E-01	Groundwater Protection	1.0E+03		3.3E+01		3.5E-01
NITROTOLUENE, 2-	4.4E+00	Groundwater Protection	1.0E+03		6.9E+01	(Use soil gas)	4.4E+00
NITROTOLUENE, 3-	2.5E+00	Groundwater Protection	1.0E+03		3.3E+01		2.5E+00
NITROTOLUENE, 4-	2.8E+00	Groundwater Protection	1.0E+03		1.3E+03		2.8E+00
PENTACHLOROPHENOL	7.8E-01	Groundwater Protection	1.0E+03		2.7E+02		7.8E-01
PENTAERYTHRITOLTETRANITRATE (PETN)	6.6E+02	Direct Exposure	1.0E+03		6.6E+02		2.3E+03
PERCHLORATE	1.2E+00	Groundwater Protection	2.5E+03		3.5E+02		1.2E+00
PHENANTHRENE	2.3E+01	Groundwater Protection	1.0E+03		1.1E+04	(Use soil gas)	2.3E+01
PHENOL	1.8E+00	Groundwater Protection	1.0E+03		9.4E+04		1.8E+00
POLYCHLORINATED BIPHENYLS (PCBs)	1.1E+01	Groundwater Protection	1.0E+03		2.9E+01		1.1E+01
PROPICONAZOLE	2.5E+01	Groundwater Protection	1.0E+03		4.3E+03		2.5E+01
PYRENE	4.1E+01	Groundwater Protection	1.0E+03		8.7E+03	4.4E+01	4.1E+01
SELENIUM	2.5E+03	Direct Exposure	2.5E+03	7.1E+00	2.5E+03		(Use batch test)
SILVER	2.5E+03	Ceiling Value	2.5E+03	1.5E+00	2.5E+03		(Use batch test)
SIMAZINE	2.2E-01	Groundwater Protection	1.0E+03		1.4E+03		2.2E-01
STYRENE	2.9E+00	Groundwater Protection	8.7E+02		8.7E+02	4.5E+02	2.9E+00
TERBACIL	2.2E+00	Groundwater Protection	1.0E+03		4.3E+03		2.2E+00
tert-BUTYL ALCOHOL	1.1E+02	Groundwater Protection	5.0E+02		2.7E+03	(Use soil gas)	1.1E+02
TETRACHLOROETHANE, 1,1,1,2-	3.2E-01	Groundwater Protection	5.0E+02		5.2E+01	(Use soil gas)	3.2E-01
TETRACHLOROETHANE, 1,1,2,2-	1.0E-02	Vapor Intrusion	1.0E+03		1.6E+01	1.0E-02	3.6E+00
TETRACHLOROETHYLENE	9.8E-02	Vapor Intrusion	1.7E+02		2.7E+01	9.8E-02	6.8E+00
TETRACHLOROPHENOL, 2,3,4,6-	5.6E-02	Groundwater Protection	1.0E+03		9.9E+03		5.6E-02
TETRANITRO-1,3,5,7-TETRAAZOCYCLOOCTANE (HMX)	1.9E+01	Groundwater Protection	1.0E+03		2.5E+04		1.9E+01
THALLIUM	2.5E+01	Direct Exposure	2.5E+03	2.5E-01	2.5E+01		(Use batch test)
TOLUENE	7.8E-01	Groundwater Protection	8.2E+02		8.2E+02	8.2E+02	7.8E-01
TOXAPHENE	8.5E+01	Groundwater Protection	1.0E+03		1.5E+02		8.5E+01
TPH (gasolines)	4.0E+02	Groundwater Protection	5.0E+03		3.7E+03	(Use soil gas)	4.0E+02
TPH (middle distillates)	5.0E+02	Direct Exposure	5.0E+03		5.0E+02	(Use soil gas)	5.0E+02

TABLE D-1. [1]DEEP SOIL SCREENING LEVELS (>3m bgs)
[2]UNRESTRICTED LAND USE
(potentially impacted groundwater IS NOT a current or potential drinking water resource)

	[2]RESIDENTIAL LAND USE (mg/kg)						
					Human Health		Groundwater Protection (Soil Leaching)
			Gross Contamination Ceiling Value (Odors, etc.)		Direct Exposure	Vapor Intrusion Into Buildings	NON-Drinking Water Resource
CHEMICAL PARAMETER	Final ESL	Basis	Table H-3	Background	Table K-3	Table E-1b	Table G-1a
TPH (residual fuels)	1.0E+03	Groundwater Protection	5.0E+03		3.0E+05		1.0E+03
TRICHLOROBENZENE, 1,2,4-	1.6E-01	Vapor Intrusion	1.0E+03		8.2E+01	1.6E-01	2.6E+01
TRICHLOROETHANE, 1,1,1-	1.2E+00	Groundwater Protection	6.4E+02		6.4E+02	2.2E+02	1.2E+00
TRICHLOROETHANE, 1,1,2-	8.9E-03	Vapor Intrusion	5.0E+02		2.0E+00	8.9E-03	1.6E+00
TRICHLOROETHYLENE	8.9E-02	Vapor Intrusion	6.9E+02		6.1E+00	8.9E-02	3.4E+00
TRICHLOROPHENOL, 2,4,5-	2.9E+00	Groundwater Protection	5.0E+02		3.3E+04		2.9E+00
TRICHLOROPHENOL, 2,4,6-	3.1E-01	Groundwater Protection	1.0E+03		3.3E+02		3.1E-01
TRICHLOROPHENOXYACETIC ACID, 2,4,5- (2,4,5-T)	1.2E+01	Groundwater Protection	2.5E+03		3.3E+03		1.2E+01
TRICHLOROPHENOXYPROPIONIC ACID, 2,4,5- (2,4,5-TP)	8.7E-01	Groundwater Protection	1.0E+03		2.6E+03		8.7E-01
TRICHLOROPROPANE, 1,2,3-	1.3E-01	Direct Exposure	5.0E+02		1.3E-01	(Use soil gas)	3.0E-01
TRICHLOROPROPENE, 1,2,3-	8.1E-02	Groundwater Protection	3.1E+02		9.9E-01	(Use soil gas)	8.1E-02
TRIFLURALIN	5.9E+00	Groundwater Protection	1.0E+03		3.8E+03		5.9E+00
TRINITROBENZENE, 1,3,5-	2.8E+00	Groundwater Protection	1.0E+03		1.4E+04		2.8E+00
TRINITROPHENYLMETHYLNITRAMINE, 2,4,6- (TETRYL)	3.1E+01	Groundwater Protection	1.0E+03		1.0E+03		3.1E+01
TRINITROTOLUENE, 2,4,6- (TNT)	6.1E+00	Groundwater Protection	1.0E+03		2.2E+02		6.1E+00
VANADIUM	7.7E+02	Background	2.5E+03	7.7E+02	6.6E+02		(Use batch test)
VINYL CHLORIDE	3.6E-02	Vapor Intrusion	1.0E+03		1.1E+01	3.6E-02	3.3E+00
XYLENES	1.4E+00	Groundwater Protection	2.6E+02		2.6E+02	4.5E+01	1.4E+00
ZINC	2.5E+03	Ceiling Value	2.5E+03	3.5E+02	1.5E+05		(Use batch test)
Electrical Conductivity (mS/cm, USEPA Method 120.1 MOD)	not applicable		-	-	-	-	-
Sodium Adsorption Ratio	not applcable		-	-	-	-	-

Notes:

1. Deep soils defined as soils situated >3 meters below ground surface (or shallower with institutional controls).
2. "Unrestricted Land Use" screening levels generally considered adequate for residential and other sensitive uses (e.g., schools, day-care centers, hospitals, etc.).

Final Environmental Screening Level is lowest of ceiling values (nuisance concerns etc.), direct-exposure, indoor-air impact, and leaching screening levels.
Assumes soil pH 5.0 to 11.
Soil data should be reported on dry-weight basis (see Section 6.2).
TPH -Total Petroleum Hydrocarbons. See text for discussion of different TPH categories.
Typical background As in soils assumed to be <20 mg/kg (refer to Volume 1, Section 2.9 and Appendix 1, Section 3).

TABLE D-2. [1]DEEP SOIL SCREENING LEVELS (>3m bgs)
COMMERCIAL / INDUSTRIAL LAND USE
(potentially impacted groundwater IS NOT a current or potential drinking water resource)

	COMMERCIAL / INDUSTRIAL LAND USE (mg/kg)						
					Human Health		Groundwater Protection (Soil Leaching)
			Gross Contamination Ceiling Value (Odors, etc.)		Direct Exposure	Vapor Intrusion Into Buildings	NON-Drinking Water Resource
CHEMICAL PARAMETER	Final ESL	Basis	Table H-3	Background	Table K-3	Table E-1b	Table G-1a
ACENAPHTHENE	4.0E+01	Groundwater Protection	5.0E+03		1.3E+04	1.2E+02	4.0E+01
ACENAPHTHYLENE	5.5E+00	Groundwater Protection	2.5E+03		4.5E+03	(Use soil gas)	5.5E+00
ACETONE	9.2E-01	Groundwater Protection	2.5E+03		1.1E+05	1.1E+05	9.2E-01
ALDRIN	2.8E+00	Groundwater Protection	5.0E+03		1.2E+02		2.8E+00
AMETRYN	5.0E+01	Groundwater Protection	2.5E+03		3.0E+03		5.0E+01
AMINO,2- DINITROTOLUENE,3,6-	8.5E-01	Groundwater Protection	2.5E+03		9.8E+02		8.5E-01
AMINO,4- DINITROTOLUENE,2,6-	5.2E-01	Groundwater Protection	2.5E+03		9.7E+02		5.2E-01
ANTHRACENE	1.4E+00	Groundwater Protection	2.5E+03		8.1E+04	4.2E+00	1.4E+00
ANTIMONY	2.0E+02	Direct Exposure	5.0E+03	2.4E+00	2.0E+02		(Use batch test)
ARSENIC	3.3E+02	Direct Exposure	5.0E+03	2.4E+01	3.3E+02		(Use batch test)
ATRAZINE	4.5E-01	Groundwater Protection	2.5E+03		7.2E+02		4.5E-01
BARIUM	4.3E+03	Direct Exposure	5.0E+03	6.9E+02	4.3E+03		(Use batch test)
BENOMYL	7.8E-03	Groundwater Protection	5.0E+03		1.7E+04		7.8E-03
BENZENE	4.3E+00	Groundwater Protection	1.9E+03		3.0E+01	5.6E+00	4.3E+00
BENZO(a)ANTHRACENE	3.3E+00	Groundwater Protection	2.5E+03		2.0E+02		3.3E+00
BENZO(a)PYRENE	5.9E+00	Groundwater Protection	2.5E+03		2.0E+01		5.9E+00
BENZO(b)FLUORANTHENE	6.8E+01	Groundwater Protection	2.5E+03		2.0E+02		6.8E+01
BENZO(g,h,i)PERYLENE	3.5E+01	Groundwater Protection	2.5E+03		1.2E+04		3.5E+01
BENZO(k)FLUORANTHENE	3.9E+01	Groundwater Protection	2.5E+03		2.0E+03		3.9E+01
BERYLLIUM	1.5E+02	Direct Exposure	5.0E+03	3.0E+00	1.5E+02		(Use batch test)
BIPHENYL, 1,1-	6.2E+01	Direct Exposure	2.5E+03		6.2E+01	(Use soil gas)	7.7E+01
BIS(2-CHLOROETHYL)ETHER	6.7E-02	Vapor Intrusion	2.5E+03		6.5E+00	6.7E-02	9.6E-01
BIS(2-CHLORO-1-METHYLETHYL)ETHER	4.0E-03	Groundwater Protection	7.9E+02		1.0E+02	(Use soil gas)	4.0E-03
BIS(2-ETHYLHEXYL)PHTHALATE	6.5E+01	Groundwater Protection	2.5E+03		6.6E+03		6.5E+01
BORON	5.0E+03	Ceiling Value	5.0E+03		6.5E+04		(Use batch test)
BROMODICHLOROMETHANE	1.2E-01	Vapor Intrusion	9.3E+02		7.4E+00	1.2E-01	2.1E+00
BROMOFORM	2.0E+00	Groundwater Protection	2.5E+03		5.2E+03		2.0E+00
BROMOMETHANE	7.6E-01	Groundwater Protection	2.5E+03		9.8E+00	1.6E+00	7.6E-01
CADMIUM	6.5E+01	Direct Exposure	5.0E+03	2.3E+00	6.5E+01		(Use batch test)
CARBON TETRACHLORIDE	7.3E-01	Vapor Intrusion	4.5E+02		1.7E+01	7.3E-01	1.8E+00
CHLORDANE (TECHNICAL)	7.6E+00	Groundwater Protection	5.0E+03		5.6E+02		7.6E+00
CHLOROANILINE, p-	3.6E-01	Groundwater Protection	5.0E+03		8.3E+02		3.6E-01
CHLOROBENZENE	1.5E+00	Groundwater Protection	7.6E+02		4.3E+02	1.6E+01	1.5E+00
CHLOROETHANE	1.2E+01	Groundwater Protection	2.1E+03		2.1E+03	2.1E+03	1.2E+01
CHLOROFORM	1.9E-01	Vapor Intrusion	2.5E+03		8.0E+00	1.9E-01	7.9E-01
CHLOROMETHANE	1.1E+01	Groundwater Protection	1.0E+03		1.5E+02	2.8E+01	1.1E+01
CHLOROPHENOL, 2-	1.2E-01	Groundwater Protection	1.0E+03		1.5E+03	3.5E+02	1.2E-01
CHROMIUM (Total)	1.1E+03	Background	-	1.1E+03			(Use batch test)
CHROMIUM III	5.0E+03	Ceiling Value	5.0E+03		7.6E+05		(Use batch test)
CHROMIUM VI	4.8E+02	Direct Exposure	5.0E+03		4.8E+02		(Use batch test)
CHRYSENE	3.0E+01	Groundwater Protection	5.0E+03		2.0E+04		3.0E+01
COBALT	8.0E+01	Background	5.0E+03	8.0E+01	4.0E+01		(Use batch test)
COPPER	5.0E+03	Ceiling Value	5.0E+03	2.5E+02	2.0E+04		(Use batch test)
CYANIDE (Free)	5.0E+01	Direct Exposure	1.0E+03		5.0E+01	(Use soil gas)	(Use batch test)
CYCLO-1,3,5-TRIMETHYLENE-2,4,6-TRINITRAMINE (RDX)	1.2E+00	Groundwater Protection	2.5E+03		1.4E+03		1.2E+00
DALAPON	1.6E-01	Groundwater Protection	2.5E+03		9.9E+03		1.6E-01

TABLE D-2. [1]DEEP SOIL SCREENING LEVELS (>3m bgs)
COMMERCIAL / INDUSTRIAL LAND USE
(potentially impacted groundwater IS NOT a current or potential drinking water resource)

	COMMERCIAL / INDUSTRIAL LAND USE (mg/kg)						
					Human Health		Groundwater Protection (Soil Leaching)
			Gross Contamination Ceiling Value (Odors, etc.)		Direct Exposure	Vapor Intrusion Into Buildings	NON-Drinking Water Resource
CHEMICAL PARAMETER	Final ESL	Basis	Table H-3	Background	Table K-3	Table E-1b	Table G-1a
DIBENZO(a,h)ANTHTRACENE	2.0E+01	Direct Exposure	2.5E+03		2.0E+01		2.5E+02
DIBROMO,1,2- CHLOROPROPANE,3-	1.7E-03	Vapor Intrusion	9.8E+02		3.7E-01	1.7E-03	4.0E-03
DIBROMOCHLOROMETHANE	3.4E-01	Groundwater Protection	1.0E+03		2.4E+01	(Use soil gas)	3.4E-01
DIBROMOETHANE, 1,2-	7.3E-03	Vapor Intrusion	2.5E+03		9.3E-01	7.3E-03	2.0E-01
DICHLOROBENZENE, 1,2-	1.1E+00	Groundwater Protection	3.8E+02		3.8E+02	6.2E+01	1.1E+00
DICHLOROBENZENE, 1,3-	2.5E+00	Groundwater Protection	6.0E+02		6.0E+02	(Use soil gas)	2.5E+00
DICHLOROBENZENE, 1,4-	4.0E-01	Vapor Intrusion	2.5E+03		6.6E+01	4.0E-01	7.3E-01
DICHLOROBENZIDINE, 3,3-	2.4E+00	Groundwater Protection	2.5E+03		3.6E+02		2.4E+00
DICHLORODIPHENYLDICHLOROETHANE (DDD)	2.1E+01	Groundwater Protection	2.5E+03		6.8E+02		2.1E+01
DICHLORODIPHENYLDICHLOROETHYLENE (DDE)	9.4E+00	Groundwater Protection	2.5E+03		7.0E+02		9.4E+00
DICHLORODIPHENYLTRICHLOROETHANE (DDT)	1.9E+00	Groundwater Protection	5.0E+03		2.2E+02		1.9E+00
DICHLOROETHANE, 1,1-	1.9E+00	Groundwater Protection	1.7E+03		9.0E+01	2.7E+00	1.9E+00
DICHLOROETHANE, 1,2-	1.7E-01	Vapor Intrusion	2.5E+03		1.2E+01	1.7E-01	2.6E+00
DICHLOROETHYLENE, 1,1-	4.2E+00	Groundwater Protection	1.2E+03		3.2E+02	6.2E+01	4.2E+00
DICHLOROETHYLENE, Cis 1,2-	2.5E+00	Vapor Intrusion	1.0E+03		2.7E+01	2.5E+00	2.0E+01
DICHLOROETHYLENE, Trans 1,2-	2.5E+01	Vapor Intrusion	1.9E+03		1.9E+02	2.5E+01	3.6E+01
DICHLOROPHENOL, 2,4-	7.3E-02	Groundwater Protection	2.5E+03		9.9E+02		7.3E-02
DICHLOROPHENOXYACETIC ACID (2,4-D)	3.4E-01	Groundwater Protection	2.5E+03		4.0E+03		3.4E-01
DICHLOROPROPANE, 1,2-	4.4E-01	Vapor Intrusion	1.0E+03		2.1E+01	4.4E-01	2.7E+00
DICHLOROPROPENE, 1,3-	2.1E-03	Groundwater Protection	1.6E+03		5.0E+01	1.1E+00	2.1E-03
DIELDRIN	7.9E+00	Groundwater Protection	5.0E+03		6.6E+01		7.9E+00
DIETHYLPHTHALATE	3.7E+00	Groundwater Protection	2.5E+03		2.6E+05		3.7E+00
DIMETHYLPHENOL, 2,4-	9.0E+00	Groundwater Protection	1.0E+03		6.6E+03		9.0E+00
DIMETHYLPHTHALATE	2.6E+01	Groundwater Protection	2.5E+03		1.0E+06		2.6E+01
DINITROBENZENE, 1,3-	5.8E-01	Groundwater Protection	2.5E+03		3.3E+01		5.8E-01
DINITROPHENOL, 2,4-	1.1E+00	Groundwater Protection	2.5E+03		6.6E+02		1.1E+00
DINITROTOLUENE, 2,4- (2,4-DNT)	8.7E-01	Groundwater Protection	2.5E+03		5.2E+02		8.7E-01
DINITROTOLUENE, 2,6- (2,6-DNT)	7.9E+00	Groundwater Protection	2.5E+03		1.0E+02		7.9E+00
DIOXANE, 1,4-	2.3E+01	Groundwater Protection	2.5E+03		1.5E+03	(Use soil gas)	2.3E+01
DIOXIN (TEQ)	1.4E-03	Direct Exposure	5.0E+03	2.0E-05	1.4E-03		1.0E-01
DIURON	1.1E+00	Groundwater Protection	2.5E+03		6.6E+02		1.1E+00
ENDOSULFAN	4.4E+00	Groundwater Protection	2.5E+03		3.0E+03		4.4E+00
ENDRIN	1.0E+01	Groundwater Protection	2.5E+03		9.9E+01		1.0E+01
ETHANOL	4.5E+00	Groundwater Protection	2.5E+03			(Use soil gas)	4.5E+00
ETHYLBENZENE	9.0E-01	Groundwater Protection	4.8E+02		1.5E+02	1.7E+02	9.0E-01
FLUORANTHENE	2.9E+01	Groundwater Protection	2.5E+03		1.2E+04		2.9E+01
FLUORENE	3.1E+01	Groundwater Protection	2.5E+03		1.0E+04	9.3E+01	3.1E+01
GLYPHOSATE	6.3E+02	Groundwater Protection	2.5E+03		3.3E+04		6.3E+02
HEPTACHLOR	1.5E+01	Groundwater Protection	5.0E+03		4.6E+01		1.5E+01
HEPTACHLOR EPOXIDE	4.1E+00	Groundwater Protection	5.0E+03		6.6E+00		4.1E+00
HEXACHLOROBENZENE	7.8E-02	Groundwater Protection	2.5E+03		6.2E+01		7.8E-02
HEXACHLOROBUTADIENE	6.1E-02	Groundwater Protection	2.5E+03		3.1E+02		6.1E-02
HEXACHLOROCYCLOHEXANE (gamma) LINDANE	2.9E-02	Groundwater Protection	2.5E+03		1.3E+02		2.9E-02
HEXACHLOROETHANE	6.8E-01	Groundwater Protection	2.5E+03		1.7E+02		6.8E-01
HEXAZINONE	3.7E+02	Groundwater Protection	2.5E+03		1.1E+04		3.7E+02
INDENO(1,2,3-cd)PYRENE	3.1E+01	Groundwater Protection	2.5E+03		2.0E+02		3.1E+01

TABLE D-2. [1]DEEP SOIL SCREENING LEVELS (>3m bgs)
COMMERCIAL / INDUSTRIAL LAND USE
(potentially impacted groundwater IS NOT a current or potential drinking water resource)

	COMMERCIAL / INDUSTRIAL LAND USE (mg/kg)						
					Human Health		Groundwater Protection (Soil Leaching)
			Gross Contamination Ceiling Value (Odors, etc.)		Direct Exposure	Vapor Intrusion Into Buildings	NON-Drinking Water Resource
CHEMICAL PARAMETER	Final ESL	Basis	Table H-3	Background	Table K-3	Table E-1b	Table G-1a
ISOPHORONE	1.0E+01	Groundwater Protection	2.5E+03		6.6E+04		1.0E+01
LEAD	8.0E+02	Direct Exposure	5.0E+03	7.3E+01	8.0E+02		(Use batch test)
MERCURY	1.4E+02	Direct Exposure	2.5E+03	7.2E-01	1.4E+02		(Use batch test)
METHOXYCHLOR	5.4E+00	Groundwater Protection	2.5E+03		1.7E+03		5.4E+00
METHYL ETHYL KETONE	1.5E+01	Groundwater Protection	2.5E+03		2.8E+04	1.6E+04	1.5E+01
METHYL ISOBUTYL KETONE	5.0E-01	Groundwater Protection	1.0E+03		3.4E+03	3.4E+03	5.0E-01
METHYL MERCURY	5.1E+01	Direct Exposure	1.0E+03		5.1E+01		(Use batch test)
METHYL TERT BUTYL ETHER	1.0E+01	Groundwater Protection	1.0E+03		1.2E+03	1.7E+01	1.0E+01
METHYLENE CHLORIDE	3.6E+01	Groundwater Protection	2.5E+03		1.2E+03	1.9E+02	3.6E+01
METHYLNAPHTHALENE, 1-	8.9E-01	Groundwater Protection	2.5E+03		2.7E+02	3.9E+02	8.9E-01
METHYLNAPHTHALENE, 2-	1.9E+00	Groundwater Protection	2.5E+03		6.3E+02	3.7E+02	1.9E+00
MOLYBDENUM	2.5E+03	Direct Exposure	5.0E+03	4.0E+00	2.5E+03		(Use batch test)
NAPHTHALENE	3.1E+00	Groundwater Protection	2.5E+03		9.6E+01	5.8E+01	3.1E+00
NICKEL	7.5E+02	Direct Exposure	5.0E+03	4.1E+02	7.5E+02		(Use batch test)
NITROBENZENE	1.4E+01	Groundwater Protection	2.5E+03		1.3E+02	(Use soil gas)	1.4E+01
NITROGLYCERIN	3.5E-01	Groundwater Protection	2.5E+03		3.3E+01		3.5E-01
NITROTOLUENE, 2-	4.4E+00	Groundwater Protection	2.5E+03		6.9E+01	(Use soil gas)	4.4E+00
NITROTOLUENE, 3-	2.5E+00	Groundwater Protection	2.5E+03		3.3E+01		2.5E+00
NITROTOLUENE, 4-	2.8E+00	Groundwater Protection	2.5E+03		1.3E+03		2.8E+00
PENTACHLOROPHENOL	7.8E-01	Groundwater Protection	2.5E+03		2.7E+02		7.8E-01
PENTAERYTHRITOLTETRANITRATE (PETN)	6.6E+02	Direct Exposure	2.5E+03		6.6E+02		2.3E+03
PERCHLORATE	1.2E+00	Groundwater Protection	5.0E+03		3.5E+02		1.2E+00
PHENANTHRENE	2.3E+01	Groundwater Protection	2.5E+03		1.1E+04	(Use soil gas)	2.3E+01
PHENOL	1.8E+00	Groundwater Protection	2.5E+03		9.4E+04		1.8E+00
POLYCHLORINATED BIPHENYLS (PCBs)	1.1E+01	Groundwater Protection	2.5E+03		2.9E+01		1.1E+01
PROPICONAZOLE	2.5E+01	Groundwater Protection	2.5E+03		4.3E+03		2.5E+01
PYRENE	4.1E+01	Groundwater Protection	2.5E+03		8.7E+03	4.4E+01	4.1E+01
SELENIUM	2.5E+03	Direct Exposure	5.0E+03	7.1E+00	2.5E+03		(Use batch test)
SILVER	2.5E+03	Direct Exposure	5.0E+03	1.5E+00	2.5E+03		(Use batch test)
SIMAZINE	2.2E-01	Groundwater Protection	2.5E+03		1.4E+03		2.2E-01
STYRENE	2.9E+00	Groundwater Protection	8.7E+02		8.7E+02	8.7E+02	2.9E+00
TERBACIL	2.2E+00	Groundwater Protection	2.5E+03		4.3E+03		2.2E+00
tert-BUTYL ALCOHOL	1.1E+02	Groundwater Protection	1.0E+03		2.7E+03	(Use soil gas)	1.1E+02
TETRACHLOROETHANE, 1,1,1,2-	3.2E-01	Groundwater Protection	6.8E+02		5.2E+01	(Use soil gas)	3.2E-01
TETRACHLOROETHANE, 1,1,2,2-	7.5E-02	Vapor Intrusion	1.9E+03		1.6E+01	7.5E-02	3.6E+00
TETRACHLOROETHYLENE	7.2E-01	Vapor Intrusion	1.7E+02		2.7E+01	7.2E-01	6.8E+00
TETRACHLOROPHENOL, 2,3,4,6-	5.6E-02	Groundwater Protection	2.5E+03		9.9E+03		5.6E-02
TETRANITRO-1,3,5,7-TETRAAZOCYCLOOCTANE (HMX)	1.9E+01	Groundwater Protection	2.5E+03		2.5E+04		1.9E+01
THALLIUM	2.5E+01	Direct Exposure	5.0E+03	2.5E-01	2.5E+01		(Use batch test)
TOLUENE	7.8E-01	Groundwater Protection	8.2E+02		8.2E+02	8.2E+02	7.8E-01
TOXAPHENE	8.5E+01	Groundwater Protection	2.5E+03		1.5E+02		8.5E+01
TPH (gasolines)	4.0E+02	Groundwater Protection	5.0E+03		3.7E+03	(Use soil gas)	4.0E+02
TPH (middle distillates)	5.0E+02	Direct Exposure	5.0E+03		5.0E+02	(Use soil gas)	5.0E+02
TPH (residual fuels)	1.0E+03	Groundwater Protection	5.0E+03		3.0E+05		1.0E+03
TRICHLOROBENZENE, 1,2,4-	1.4E+00	Vapor Intrusion	2.5E+03		8.2E+01	1.4E+00	2.6E+01
TRICHLOROETHANE, 1,1,1-	1.2E+00	Groundwater Protection	6.4E+02		6.4E+02	6.4E+02	1.2E+00

TABLE D-2. [1]DEEP SOIL SCREENING LEVELS (>3m bgs)
COMMERCIAL / INDUSTRIAL LAND USE
(potentially impacted groundwater IS NOT a current or potential drinking water resource)

	COMMERCIAL / INDUSTRIAL LAND USE (mg/kg)						
			Gross Contamination Ceiling Value (Odors, etc.)		Human Health		Groundwater Protection (Soil Leaching)
					Direct Exposure	Vapor Intrusion Into Buildings	NON-Drinking Water Resource
CHEMICAL PARAMETER	Final ESL	Basis	Table H-3	Background	Table K-3	Table E-1b	Table G-1a
TRICHLOROETHANE, 1,1,2-	6.2E-02	Vapor Intrusion	1.0E+03		2.0E+00	6.2E-02	1.6E+00
TRICHLOROETHYLENE	6.2E-01	Vapor Intrusion	6.9E+02		6.1E+00	6.2E-01	3.4E+00
TRICHLOROPHENOL, 2,4,5-	2.9E+00	Groundwater Protection	1.0E+03		3.3E+04		2.9E+00
TRICHLOROPHENOL, 2,4,6-	3.1E-01	Groundwater Protection	2.5E+03		3.3E+02		3.1E-01
TRICHLOROPHENOXYACETIC ACID, 2,4,5- (2,4,5-T)	1.2E+01	Groundwater Protection	5.0E+03		3.3E+03		1.2E+01
TRICHLOROPHENOXYPROPIONIC ACID, 2,4,5- (2,4,5-TP)	8.7E-01	Groundwater Protection	2.5E+03		2.6E+03		8.7E-01
TRICHLOROPROPANE, 1,2,3-	1.3E-01	Direct Exposure	1.0E+03		1.3E-01	(Use soil gas)	3.0E-01
TRICHLOROPROPENE, 1,2,3-	8.1E-02	Groundwater Protection	3.1E+02		9.9E-01	(Use soil gas)	8.1E-02
TRIFLURALIN	5.9E+00	Groundwater Protection	2.5E+03		3.8E+03		5.9E+00
TRINITROBENZENE, 1,3,5-	2.8E+00	Groundwater Protection	2.5E+03		1.4E+04		2.8E+00
TRINITROPHENYLMETHYLNITRAMINE, 2,4,6- (TETRYL)	3.1E+01	Groundwater Protection	2.5E+03		1.0E+03		3.1E+01
TRINITROTOLUENE, 2,4,6- (TNT)	6.1E+00	Groundwater Protection	2.5E+03		2.2E+02		6.1E+00
VANADIUM	7.7E+02	Background	5.0E+03	7.7E+02	6.6E+02		(Use batch test)
VINYL CHLORIDE	9.9E-01	Vapor Intrusion	2.5E+03		1.1E+01	9.9E-01	3.3E+00
XYLENES	1.4E+00	Groundwater Protection	2.6E+02		2.6E+02	2.6E+02	1.4E+00
ZINC	5.0E+03	Ceiling Value	5.0E+03	3.5E+02	1.5E+05		(Use batch test)
Electrical Conductivity (mS/cm, USEPA Method 120.1 MOD)	not applicable		-	-	-	-	-
Sodium Adsorption Ratio	not applcable		-	-	-	-	-

Notes:

1. Deep soils defined as soils situated >3 meters below ground surface (or shallower with institutional controls).

Final Environmental Screening Level is lowest of ceiling values (nuisance concerns etc.), direct-exposure, indoor-air impact, and leaching screening levels.
Assumes soil pH 5.0 to 11.
Soil data should be reported on dry-weight basis (see Section 6.2).
TPH -Total Petroleum Hydrocarbons. See text for discussion of different TPH categories.
Typical background As in soils assumed to be <20 mg/kg (refer to Volume 1, Section 2.9 and Appendix 1, Section 3).

TABLE E-1a. GROUNDWATER SCREENING LEVELS FOR EVALUATION OF POTENTIAL VAPOR INTRUSION HAZARDS (volatile chemicals only)

CHEMICAL PARAMETER	Physical State		[1,3]Unrestricted Land Use (ug/L)	Commercial/ Industrial Land Use Only (ug/L)
#ACENAPHTHENE	V	S	3.9E+03	3.9E+03
ACENAPHTHYLENE	V	S	(Use soil gas)	(Use soil gas)
#ACETONE	V	L	6.2E+08	1.0E+09
ALDRIN	SV	S		
AMETRYN	NV	S		
AMINO,2- DINITROTOLUENE,4,6-	NV	S		
AMINO,4- DINITROTOLUENE,2,6-	NV	S		
#ANTHRACENE	V	S	4.3E+01	4.3E+01
ANTIMONY	NV	S		
ARSENIC	NV	S		
ATRAZINE	NV	S		
BARIUM	NV	S		
BENOMYL	NV	S		
#BENZENE	V	L	2.3E+03	2.0E+04
BENZO(a)ANTHRACENE	SV	S		
BENZO(a)PYRENE	NV	S		
BENZO(b)FLUORANTHENE	NV	S		
BENZO(g,h,i)PERYLENE	NV	S		
BENZO(k)FLUORANTHENE	NV	S		
BERYLLIUM	NV	S		
BIPHENYL, 1,1-	V	S	(Use soil gas)	(Use soil gas)
BIS(2-CHLOROETHYL)ETHER	V	L	1.8E+02	1.5E+03
BIS(2-CHLORO-1-METHYLETHYL)ETHER	V	L	(Use soil gas)	(Use soil gas)
BIS(2-ETHYLHEXYL)PHTHALATE	NV	S		
BORON	NV	S		
BROMODICHLOROMETHANE	V	L	1.1E+02	1.0E+03
BROMOFORM	SV	S		
BROMOMETHANE	V	G	4.1E+02	3.4E+03
CADMIUM	NV	S		
CARBON TETRACHLORIDE	V	L	1.1E+02	9.6E+02
CHLORDANE (TECHNICAL)	SV	S		
CHLOROANILINE, p-	NV	S		
CHLOROBENZENE	V	L	1.2E+04	1.0E+05
CHLOROETHANE	V	G	6.0E+05	5.1E+06
CHLOROFORM	V	L	1.1E+02	9.5E+02
CHLOROMETHANE	V	G	5.2E+03	4.4E+04
CHLOROPHENOL, 2-	V	L	1.0E+05	8.4E+05
CHROMIUM (Total)	NV	S		
CHROMIUM III	NV	S		
CHROMIUM VI	NV	S		
CHRYSENE	NV	S		
COBALT	NV	S		
COPPER	NV	S		
CYANIDE (Free)	V	S	(Use soil gas)	(Use soil gas)
CYCLO-1,3,5-TRIMETHYLENE-2,4,6-TRINITRAMINE (RDX)	NV	S		
DALAPON	NV	L		
DIBENZO(a,h)ANTHTRACENE	NV	S		
DIBROMO,1,2- CHLOROPROPANE,3-	V	L	(Use soil gas)	(Use soil gas)
DIBROMOCHLOROMETHANE	V	S	4.5E+02	3.9E+03
DIBROMOETHANE, 1,2-	V	S	1.9E+01	1.6E+02
DICHLOROBENZENE, 1,2-	V	L	8.3E+04	1.6E+05
DICHLOROBENZENE, 1,3-	V	L	(Use soil gas)	(Use soil gas)
DICHLOROBENZENE, 1,4-	V	S	4.5E+02	3.9E+03
DICHLOROBENZIDINE, 3,3-	NV	S		
DICHLORODIPHENYLDICHLOROETHANE (DDD)	NV	S		
DICHLORODIPHENYLDICHLOROETHYLENE (DDE)	SV	S		

TABLE E-1a. GROUNDWATER SCREENING LEVELS FOR EVALUATION OF POTENTIAL VAPOR INTRUSION HAZARDS (volatile chemicals only)

CHEMICAL PARAMETER	Physical State		[1,3]Unrestricted Land Use (ug/L)	Commercial/ Industrial Land Use Only (ug/L)
DICHLORODIPHENYLTRICHLOROETHANE (DDT)	NV	S		
DICHLOROETHANE, 1,1-	V	L	1.1E+03	9.6E+03
DICHLOROETHANE, 1,2-	V	L	1.8E+02	1.6E+03
DICHLOROETHYLENE, 1,1-	V	L	6.6E+03	5.6E+04
DICHLOROETHYLENE, Cis 1,2-	V	L	1.3E+03	1.1E+04
DICHLOROETHYLENE, Trans 1,2-	V	L	6.6E+03	5.5E+04
DICHLOROPHENOL, 2,4-	NV	S		
DICHLOROPHENOXYACETIC ACID (2,4-D)	NV	S		
DICHLOROPROPANE, 1,2-	V	L	3.4E+02	2.9E+03
DICHLOROPROPENE, 1,3-	V	L	6.7E+02	5.9E+03
DIELDRIN	NV	S		
DIETHYLPHTHALATE	NV	S		
#DIMETHYLPHENOL, 2,4-	NV	S		
DIMETHYLPHTHALATE	NV	S		
DINITROBENZENE, 1,3-	NV	S		
DINITROPHENOL, 2,4-	NV	S		
DINITROTOLUENE, 2,4- (2,4-DNT)	NV	S		
DINITROTOLUENE, 2,6- (2,6-DNT)	NV	S		
DIOXANE, 1,4-	V	L	(Use soil gas)	(Use soil gas)
DIOXINS (TEQ)	SV	S		
DIURON	NV	S		
ENDOSULFAN	SV	S		
ENDRIN	NV	S		
ETHANOL	V	L	(Use soil gas)	(Use soil gas)
#ETHYLBENZENE	V	L	7.6E+04	1.7E+05
FLUORANTHENE	NV	S		
#FLUORENE	V	S	1.7E+03	1.7E+03
GLYPHOSATE	NV	S		
HEPTACHLOR	SV	S		
HEPTACHLOR EPOXIDE	SV	S		
HEXACHLOROBENZENE	SV	S		
HEXACHLOROBUTADIENE	SV	S		
HEXACHLOROCYCLOHEXANE (gamma) LINDANE	NV	S		
HEXACHLOROETHANE	SV	S		
HEXAZINONE	NV	S		
INDENO(1,2,3-cd)PYRENE	NV	S		
ISOPHORONE	NV	L		
LEAD	NV	S		
MERCURY	NV	S		
METHOXYCHLOR	NV	S		
#METHYL ETHYL KETONE	V	L	2.2E+08	2.2E+08
#METHYL ISOBUTYL KETONE	V	L	1.9E+07	1.9E+07
METHYL MERCURY	NV	S		
METHYL TERT BUTYL ETHER	V	L	3.1E+04	2.7E+05
METHYLENE CHLORIDE	V	L	7.6E+04	7.9E+05
#METHYLNAPHTHALENE, 1-	V	S	2.6E+04	2.6E+04
#METHYLNAPHTHALENE, 2-	V	S	2.5E+04	2.5E+04
MOLYBDENUM	NV	S		
#NAPHTHALENE	V	S	2.9E+04	3.1E+04
NICKEL	NV	S		
NITROBENZENE	V	L	(Use soil gas)	(Use soil gas)
NITROGLYCERIN	NV	L		
NITROTOLUENE, 2-	V	S	(Use soil gas)	(Use soil gas)
NITROTOLUENE, 3-	NV	S		
NITROTOLUENE, 4-	NV	S		
PENTACHLOROPHENOL	NV	S		

TABLE E-1a. GROUNDWATER SCREENING LEVELS FOR EVALUATION OF POTENTIAL VAPOR INTRUSION HAZARDS (volatile chemicals only)

CHEMICAL PARAMETER	Physical State		[1,3]Unrestricted Land Use (ug/L)	Commercial/ Industrial Land Use Only (ug/L)
PENTAERYTHRITOLTETRANITRATE (PETN)	NV	S		
PERCHLORATE	NV	S		
PHENANTHRENE	V	S	(Use soil gas)	(Use soil gas)
PHENOL	NV	S		
POLYCHLORINATED BIPHENYLS (PCBs)	SV	S		
PROPICONAZOLE	NV	L		
#PYRENE	V	S	1.4E+02	1.4E+02
SELENIUM	NV	S		
SILVER	NV	S		
SIMAZINE	NV	S		
#STYRENE	V	L	3.1E+05	3.1E+05
TERBACIL	NV	S		
tert-BUTYL ALCOHOL	V	L	(Use soil gas)	(Use soil gas)
TETRACHLOROETHANE, 1,1,1,2-	V	L	(Use soil gas)	(Use soil gas)
TETRACHLOROETHANE, 1,1,2,2-	V	L	2.4E+02	2.1E+03
TETRACHLOROETHYLENE	V	L	1.9E+02	1.7E+03
TETRACHLOROPHENOL, 2,3,4,6-	NV	S		
TETRANITRO-1,3,5,7-TETRAAZOCYCLOOCTANE (HMX)	NV	S		
THALLIUM	NV	S		
#TOLUENE	V	L	5.3E+05	5.3E+05
TOXAPHENE	NV	S		
TPH (gasolines)	V	L	(Use soil gas)	(Use soil gas)
TPH (middle distillates)	V	L	(Use soil gas)	(Use soil gas)
TPH (residual fuels)	NV	L		
TRICHLOROBENZENE, 1,2,4-	V	S	1.2E+03	1.0E+04
TRICHLOROETHANE, 1,1,1-	V	L	3.4E+05	1.3E+06
TRICHLOROETHANE, 1,1,2-	V	L	1.1E+02	9.0E+02
TRICHLOROETHYLENE	V	L	2.1E+02	1.8E+03
TRICHLOROPHENOL, 2,4,5-	NV	S		
TRICHLOROPHENOL, 2,4,6-	NV	S		
TRICHLOROPHENOXYACETIC ACID, 2,4,5- (2,4,5-T)	NV	S		
TRICHLOROPHENOXYPROPIONIC ACID, 2,4,5- (2,4,5-TP)	NV	S		
TRICHLOROPROPANE, 1,2,3-	V	L	(Use soil gas)	(Use soil gas)
TRICHLOROPROPENE, 1,2,3-	V	L	(Use soil gas)	(Use soil gas)
TRIFLURALIN	SV	S		
TRINITROBENZENE, 1,3,5-	NV	S		
TRINITROPHENYLMETHYLNITRAMINE, 2,4,6- (TETRYL)	NV	S		
TRINITROTOLUENE, 2,4,6- (TNT)	NV	S		
VANADIUM	NV	S		

TABLE E-1a. GROUNDWATER SCREENING LEVELS FOR EVALUATION OF POTENTIAL VAPOR INTRUSION HAZARDS (volatile chemicals only)

CHEMICAL PARAMETER	Physical State		[1,3]Unrestricted Land Use (ug/L)	Commercial/ Industrial Land Use Only (ug/L)
VINYL CHLORIDE	V	G	1.8E+01	6.1E+02
#XYLENES	V	L	1.1E+05	1.1E+05
ZINC	NV	S		

Notes:

1. Based on unrestricted current or future land use. Considered adequate for residential housing, schools, medical facilities, day-care centers and other sensitive uses.
2. Soil model: One meter dry sandy soil (92% sand, 5% silt, 3% clay) over one meter moist clayey loam (33% sand, 34% silt, 33% clay).
3. For inclusion in Tier 1 screening levels, all groundwater assumed to potentially migrate under a residential area. Screening levels for protection of indoor air under a residential exposure scenario carried forward for use at both residential and commercial/industrial sites (see Table D series).

Screening levels calculated using spreadhseet provided with User's Guide for the USEPA vapor intrusion guidance (USEPA 2004)
Assumed vadose-zone thickness/depth to groundwater three meters. See Appendix 1 text for model details.
Physical state of chemical at ambient conditions (V - volatile, NV - nonvolatile, S -solid, L - liquid, G - gas).
Chemical considered to be "volatile" if Henry's number (atm m3/mole) >0.00001 and molecular weight <200.
Dibromochloromethane, dibromochloropropane and pyrene considered volatile for purposes of modeling (USEPA 2004, 2008).
Target cancer risk = 1E-06, Target Hazard Quotient = 0.2 except as noted.
"#": Nonchlorinated VOCs (except MTBE) adjusted upwards by factor of ten to account for assumed biodegradation in vadose-zone prior to emission at surface.
Target Hazard Quotient = 0.5 for TPH.

TABLE E-1b. SOIL SCREENING LEVELS
FOR EVALUATION OF POTENTIAL VAPOR INTRUSION HAZARDS
(volatile chemicals only)
(Use with Soil Gas Screening Levels for sites with significant VOC releases)

CHEMICAL PARAMETER	Physical State		[1]Unrestricted Land Use (mg/kg)	Commercial/ Industrial Land Use Only (mg/kg)
#ACENAPHTHENE	V	S	1.2E+02	1.2E+02
ACENAPHTHYLENE	V	S	(Use soil gas)	(Use soil gas)
#ACETONE	V	L	1.4E+04	1.1E+05
ALDRIN	SV	S		
AMETRYN	NV	S		
AMINO,2- DINITROTOLUENE,4,6-	NV	S		
AMINO,4- DINITROTOLUENE,2,6-	NV	S		
#ANTHRACENE	V	S	4.2E+00	4.2E+00
ANTIMONY	NV	S		
ARSENIC	NV	S		
ATRAZINE	NV	S		
BARIUM	NV	S		
BENOMYL	NV	S		
#BENZENE	V	L	7.7E-01	5.6E+00
BENZO(a)ANTHRACENE	SV	S		
BENZO(a)PYRENE	NV	S		
BENZO(b)FLUORANTHENE	NV	S		
BENZO(g,h,i)PERYLENE	NV	S		
BENZO(k)FLUORANTHENE	NV	S		
BERYLLIUM	NV	S		
BIPHENYL, 1,1-	V	S	(Use soil gas)	(Use soil gas)
BIS(2-CHLOROETHYL)ETHER	V	L	7.9E-03	6.7E-02
BIS(2-CHLORO-1-METHYLETHYL)ETHER	V	L	(Use soil gas)	(Use soil gas)
BIS(2-ETHYLHEXYL)PHTHALATE	NV	S		
BORON	NV	S		
BROMODICHLOROMETHANE	V	L	1.6E-02	1.2E-01
BROMOFORM	SV	S		
BROMOMETHANE	V	G	2.2E-01	1.6E+00
CADMIUM	NV	S		
CARBON TETRACHLORIDE	V	L	1.0E-01	7.3E-01
CHLORDANE (TECHNICAL)	SV	S		
CHLOROANILINE, p-	NV	S		
CHLOROBENZENE	V	L	2.2E+00	1.6E+01
CHLOROETHANE	V	G	4.5E+02	2.1E+03
CHLOROFORM	V	L	2.6E-02	1.9E-01
CHLOROMETHANE	V	G	4.0E+00	2.8E+01
CHLOROPHENOL, 2-	V	L	4.2E+01	3.5E+02
CHROMIUM (Total)	NV	S		
CHROMIUM III	NV	S		
CHROMIUM VI	NV	S		
CHRYSENE	NV	S		
COBALT	NV	S		
COPPER	NV	S		
CYANIDE (Free)	V	S	(Use soil gas)	(Use soil gas)
CYCLO-1,3,5-TRIMETHYLENE-2,4,6-TRINITRAMINE (RDX)	NV	S		
DALAPON	NV	L		
DIBENZO(a,h)ANTHTRACENE	NV	S		
DIBROMO,1,2- CHLOROPROPANE,3-	V	L	(Use soil gas)	1.7E-03
DIBROMOCHLOROMETHANE	V	S	2.9E-02	(Use soil gas)
DIBROMOETHANE, 1,2-	V	S	1.0E-03	7.3E-03
DICHLOROBENZENE, 1,2-	V	L	8.9E+00	6.2E+01
DICHLOROBENZENE, 1,3-	V	L	(Use soil gas)	(Use soil gas)
DICHLOROBENZENE, 1,4-	V	S	5.5E-02	4.0E-01
DICHLOROBENZIDINE, 3,3-	NV	S		
DICHLORODIPHENYLDICHLOROETHANE (DDD)	NV	S		

TABLE E-1b. SOIL SCREENING LEVELS
FOR EVALUATION OF POTENTIAL VAPOR INTRUSION HAZARDS
(volatile chemicals only)
(Use with Soil Gas Screening Levels for sites with significant VOC releases)

CHEMICAL PARAMETER	Physical State		[1]Unrestricted Land Use (mg/kg)	Commercial/ Industrial Land Use Only (mg/kg)
DICHLORODIPHENYLDICHLOROETHYLENE (DDE)	SV	S		
DICHLORODIPHENYLTRICHLOROETHANE (DDT)	NV	S		
DICHLOROETHANE, 1,1-	V	L	3.8E-01	2.7E+00
DICHLOROETHANE, 1,2-	V	L	2.3E-02	1.7E-01
DICHLOROETHYLENE, 1,1-	V	L	8.9E+00	6.2E+01
DICHLOROETHYLENE, Cis 1,2-	V	L	3.6E-01	2.5E+00
DICHLOROETHYLENE, Trans 1,2-	V	L	3.6E+00	2.5E+01
DICHLOROPHENOL, 2,4-	NV	S		
DICHLOROPHENOXYACETIC ACID (2,4-D)	NV	S		
DICHLOROPROPANE, 1,2-	V	L	6.0E-02	4.4E-01
DICHLOROPROPENE, 1,3-	V	L	1.5E-01	1.1E+00
DIELDRIN	NV	S		
DIETHYLPHTHALATE	NV	S		
#DIMETHYLPHENOL, 2,4-	NV	S		
DIMETHYLPHTHALATE	NV	S		
DINITROBENZENE, 1,3-	NV	S		
DINITROPHENOL, 2,4-	NV	S		
DINITROTOLUENE, 2,4- (2,4-DNT)	NV	S		
DINITROTOLUENE, 2,6- (2,6-DNT)	NV	S		
DIOXANE, 1,4-	V	L	(Use soil gas)	(Use soil gas)
DIOXINS (TEQ)	SV	S		
DIURON	NV	S		
ENDOSULFAN	SV	S		
ENDRIN	NV	S		
ETHANOL	V	L	(Use soil gas)	(Use soil gas)
#ETHYLBENZENE	V	L	2.4E+01	1.7E+02
FLUORANTHENE	NV	S		
#FLUORENE	V	S	9.3E+01	9.3E+01
GLYPHOSATE	NV	S		
HEPTACHLOR	SV	S		
HEPTACHLOR EPOXIDE	SV	S		
HEXACHLOROBENZENE	SV	S		
HEXACHLOROBUTADIENE	SV	S		
HEXACHLOROCYCLOHEXANE (gamma) LINDANE	NV	S		
HEXACHLOROETHANE	SV	S		
HEXAZINONE	NV	S		
INDENO(1,2,3-cd)PYRENE	NV	S		
ISOPHORONE	NV	L		
LEAD	NV	S		
MERCURY	NV	S		
METHOXYCHLOR	NV	S		
#METHYL ETHYL KETONE	V	L	2.2E+03	1.6E+04
#METHYL ISOBUTYL KETONE	V	L	1.3E+03	3.4E+03
METHYL MERCURY	NV	S		
METHYL TERT BUTYL ETHER	V	L	2.3E+00	1.7E+01
METHYLENE CHLORIDE	V	L	2.2E+01	1.9E+02
#METHYLNAPHTHALENE, 1-	V	S	5.9E+01	3.9E+02
#METHYLNAPHTHALENE, 2-	V	S	5.0E+01	3.7E+02
MOLYBDENUM	NV	S		
#NAPHTHALENE	V	S	7.0E+00	5.8E+01
NICKEL	NV	S		
NITROBENZENE	V	L	(Use soil gas)	(Use soil gas)
NITROGLYCERIN	NV	L		
NITROTOLUENE, 2-	V	S	(Use soil gas)	(Use soil gas)
NITROTOLUENE, 3-	NV	S		

TABLE E-1b. SOIL SCREENING LEVELS
FOR EVALUATION OF POTENTIAL VAPOR INTRUSION HAZARDS
(volatile chemicals only)
(Use with Soil Gas Screening Levels for sites with significant VOC releases)

CHEMICAL PARAMETER	Physical State		[1]Unrestricted Land Use (mg/kg)	Commercial/ Industrial Land Use Only (mg/kg)
NITROTOLUENE, 4-	NV	S		
PENTACHLOROPHENOL	NV	S		
PENTAERYTHRITOLTETRANITRATE (PETN)	NV	S		
PERCHLORATE	NV	S		
PHENANTHRENE	V	S	(Use soil gas)	(Use soil gas)
PHENOL	NV	S		
POLYCHLORINATED BIPHENYLS (PCBs)	SV	S		
PROPICONAZOLE	NV	L		
#PYRENE	V	S	4.4E+01	4.4E+01
SELENIUM	NV	S		
SILVER	NV	S		
SIMAZINE	NV	S		
#STYRENE	V	L	4.5E+02	8.7E+02
TERBACIL	NV	S		
tert-BUTYL ALCOHOL	V	L	(Use soil gas)	(Use soil gas)
TETRACHLOROETHANE, 1,1,1,2-	V	L	(Use soil gas)	(Use soil gas)
TETRACHLOROETHANE, 1,1,2,2-	V	L	1.0E-02	7.5E-02
TETRACHLOROETHYLENE	V	L	9.8E-02	7.2E-01
TETRACHLOROPHENOL, 2,3,4,6-	NV	S		
TETRANITRO-1,3,5,7-TETRAAZOCYCLOOCTANE (HMX)	NV	S		
THALLIUM	NV	S		
#TOLUENE	V	L	8.2E+02	8.2E+02
TOXAPHENE	NV	S		
TPH (gasolines)	V	L	(Use soil gas)	(Use soil gas)
TPH (middle distillates)	V	L	(Use soil gas)	(Use soil gas)
TPH (residual fuels)	NV	L		
TRICHLOROBENZENE, 1,2,4-	V	S	1.6E-01	1.4E+00
TRICHLOROETHANE, 1,1,1-	V	L	2.2E+02	6.4E+02
TRICHLOROETHANE, 1,1,2-	V	L	8.9E-03	6.2E-02
TRICHLOROETHYLENE	V	L	8.9E-02	6.2E-01
TRICHLOROPHENOL, 2,4,5-	NV	S		
TRICHLOROPHENOL, 2,4,6-	NV	S		
TRICHLOROPHENOXYACETIC ACID, 2,4,5- (2,4,5-T)	NV	S		
TRICHLOROPHENOXYPROPIONIC ACID, 2,4,5- (2,4,5-TP)	NV	S		
TRICHLOROPROPANE, 1,2,3-	V	L	(Use soil gas)	(Use soil gas)
TRICHLOROPROPENE, 1,2,3-	V	L	(Use soil gas)	(Use soil gas)
TRIFLURALIN	SV	S		
TRINITROBENZENE, 1,3,5-	NV	S		
TRINITROPHENYLMETHYLNITRAMINE, 2,4,6- (TETRYL)	NV	S		
TRINITROTOLUENE, 2,4,6- (TNT)	NV	S		
VANADIUM	NV	S		

TABLE E-1b. SOIL SCREENING LEVELS
FOR EVALUATION OF POTENTIAL VAPOR INTRUSION HAZARDS
(volatile chemicals only)
(Use with Soil Gas Screening Levels for sites with significant VOC releases)

CHEMICAL PARAMETER	Physical State		[1]Unrestricted Land Use (mg/kg)	Commercial/ Industrial Land Use Only (mg/kg)
VINYL CHLORIDE	V	G	3.6E-02	9.9E-01
#XYLENES	V	L	4.5E+01	2.6E+02
ZINC	NV	S		

Notes:

1. Based on unrestricted current or future land use. Considered adequate for residential housing, schools, medical facilities, day-care centers and other sensitive uses.

Screening levels calculated using spreadhseet provided with User's Guide for the USEPA vapor intrusion guidance (USEPA 2004)
Soil model: Two meters dry sandy soil (92% sand, 5% silt, 3% clay) directly underlying building foundation.
Physical state of chemical at ambient conditions (V - volatile, NV - nonvolatile, S -solid, L - liquid, G - gas).
Chemical considered to be "volatile" if Henry's number (atm m3/mole) >0.00001 and molecular weight <200.
Dibromochloromethane, dibromochloropropane and pyrene considered volatile for purposes of modeling (USEPA 2004, 2008).
Target cancer risk = 1E-06, Target Hazard Quotient = 0.2 except as noted.
"#": Nonchlorinated VOCs (except MTBE) adjusted upwards by factor of ten to account for assumed biodegradation in vadose-zone prior to emission at surface.
Target Hazard Quotient = 0.5 for TPH.

TABLE E-2. [1]SHALLOW SOIL GAS SCREENING LEVELS FOR EVALUATION OF POTENTIAL VAPOR INTRUSION HAZARDS (volatile chemicals only)

			[2]Unrestricted Land Use			Commercial/Industrial Land Use Only		
CHEMICAL PARAMETER	Physical State		Lowest Residential (ug/m^3)	Carcinogenic Effects (ug/m^3)	Noncarcinogenic Effects (ug/m^3)	Lowest C/I (ug/m^3)	Carcinogenic Effects (ug/m^3)	Noncarcinogenic Effects (ug/m^3)
ACENAPHTHENE	V	S	1.0E+05		1.0E+05	8.4E+05		8.4E+05
ACENAPHTHYLENE	V	S	6.7E+04		6.7E+04	5.6E+05		5.6E+05
ACETONE	V	L	1.3E+07		1.3E+07	1.1E+08		1.1E+08
ALDRIN	SV	S	4.2E+02	6.6E+02	4.2E+02	3.5E+03	5.8E+03	3.5E+03
AMETRYN	NV	S						
AMINO,2- DINITROTOLUENE,4,6-	NV	S						
AMINO,4- DINITROTOLUENE,2,6-	NV	S						
ANTHRACENE	V	S	5.0E+05		5.0E+05	4.2E+06		4.2E+06
ANTIMONY	NV	S						
ARSENIC	NV	S						
ATRAZINE	NV	S						
BARIUM	NV	S						
BENOMYL	NV	S						
BENZENE	V	L	7.2E+02	7.2E+02	1.3E+04	6.3E+03	6.3E+03	1.1E+05
BENZO(a)ANTHRACENE	SV	S	1.8E+03	1.8E+03		4.5E+03	4.5E+03	
BENZO(a)PYRENE	NV	S						
BENZO(b)FLUORANTHENE	NV	S						
BENZO(g,h,i)PERYLENE	NV	S						
BENZO(k)FLUORANTHENE	NV	S						
BERYLLIUM	NV	S						
BIPHENYL, 1,1-	V	S	1.7E+02	2.8E+03	1.7E+02	1.4E+03	2.5E+04	1.4E+03
BIS(2-CHLOROETHYL)ETHER	V	L	1.7E+01	1.7E+01		1.5E+02	1.5E+02	
BIS(2-CHLORO-1-METHYLETHYL)ETHER	V	L	5.6E+02	5.6E+02	5.8E+04	4.9E+03	4.9E+03	4.9E+05
BIS(2-ETHYLHEXYL)PHTHALATE	NV	S						
BORON	NV	S						
BROMODICHLOROMETHANE	V	L	1.5E+02	1.5E+02	3.3E+04	1.3E+03	1.3E+03	2.8E+05
BROMOFORM	SV	S	5.1E+03	5.1E+03		4.5E+04	4.5E+04	
BROMOMETHANE	V	G	2.1E+03		2.1E+03	1.8E+04		1.8E+04
CADMIUM	NV	S						
CARBON TETRACHLORIDE	V	L	9.4E+02	9.4E+02	4.2E+04	8.2E+03	8.2E+03	3.5E+05
CHLORDANE (TECHNICAL)	SV	S	5.6E+02	5.6E+02	1.5E+03	4.9E+03	4.9E+03	1.2E+04
CHLOROANILINE, p-	NV	S						
CHLOROBENZENE	V	L	2.1E+04		2.1E+04	1.8E+05		1.8E+05
CHLOROETHANE	V	G	4.2E+06		4.2E+06	3.5E+07		3.5E+07
CHLOROFORM	V	L	2.4E+02	2.4E+02	4.1E+04	2.1E+03	2.1E+03	3.4E+05
CHLOROMETHANE	V	G	3.8E+04		3.8E+04	3.2E+05		3.2E+05
CHLOROPHENOL, 2-	V	L	8.3E+03		8.3E+03	7.0E+04		7.0E+04
CHROMIUM (Total)	NV	S						
CHROMIUM III	NV	S						
CHROMIUM VI	NV	S						
CHRYSENE	NV	S						
COBALT	NV	S						
COPPER	NV	S						
CYANIDE (Free)	V	S	3.3E+02		3.3E+02	2.8E+03		2.8E+03
CYCLO-1,3,5-TRIMETHYLENE-2,4,6-TRINITRAMINE (RDX)	NV	S						
DALAPON	NV	L						

TABLE E-2. [1]SHALLOW SOIL GAS SCREENING LEVELS FOR EVALUATION OF POTENTIAL VAPOR INTRUSION HAZARDS (volatile chemicals only)

CHEMICAL PARAMETER	Physical State		[2]Unrestricted Land Use			Commercial/Industrial Land Use Only		
			Lowest Residential (ug/m^3)	Carcinogenic Effects (ug/m^3)	Noncarcinogenic Effects (ug/m^3)	Lowest C/I (ug/m^3)	Carcinogenic Effects (ug/m^3)	Noncarcinogenic Effects (ug/m^3)
DIBENZO(a,h)ANTHTRACENE	NV	S						
DIBROMO,1,2- CHLOROPROPANE,3-	V	L	3.4E-01	3.4E-01	8.3E+01	8.2E+00	8.2E+00	7.0E+02
DIBROMOCHLOROMETHANE	V	S	2.7E+02	2.7E+02	3.3E+04	2.3E+03	2.3E+03	2.8E+05
DIBROMOETHANE, 1,2-	V	S	9.4E+00	9.4E+00	3.8E+03	8.2E+01	8.2E+01	3.2E+04
DICHLOROBENZENE, 1,2-	V	L	8.3E+04		8.3E+04	7.0E+05		7.0E+05
DICHLOROBENZENE, 1,3-	V	L	5.0E+04		5.0E+04	4.2E+05		4.2E+05
DICHLOROBENZENE, 1,4-	V	S	5.1E+02	5.1E+02	3.3E+05	4.5E+03	4.5E+03	2.8E+06
DICHLOROBENZIDINE, 3,3-	NV	S						
DICHLORODIPHENYLDICHLOROETHANE (DDD)	NV	S						
DICHLORODIPHENYLDICHLOROETHYLENE (DDE)	SV	S	5.8E+01	5.8E+01		5.1E+02	5.1E+02	
DICHLORODIPHENYLTRICHLOROETHANE (DDT)	NV	S						
DICHLOROETHANE, 1,1-	V	L	3.5E+03	3.5E+03	3.3E+05	3.1E+04	3.1E+04	2.8E+06
DICHLOROETHANE, 1,2-	V	L	2.2E+02	2.2E+02	2.9E+03	1.9E+03	1.9E+03	2.5E+04
DICHLOROETHYLENE, 1,1-	V	L	8.3E+04		8.3E+04	7.0E+05		7.0E+05
DICHLOROETHYLENE, Cis 1,2-	V	L	3.3E+03		3.3E+03	2.8E+04		2.8E+04
DICHLOROETHYLENE, Trans 1,2-	V	L	3.3E+04		3.3E+04	2.8E+05		2.8E+05
DICHLOROPHENOL, 2,4-	NV	S						
DICHLOROPHENOXYACETIC ACID (2,4-D)	NV	S						
DICHLOROPROPANE, 1,2-	V	L	5.6E+02	5.6E+02	1.7E+03	4.9E+03	4.9E+03	1.4E+04
DICHLOROPROPENE, 1,3-	V	L	1.4E+03	1.4E+03	8.3E+03	1.2E+04	1.2E+04	7.0E+04
DIELDRIN	NV	S						
DIETHYLPHTHALATE	NV	S						
DIMETHYLPHENOL, 2,4-	NV	S						
DIMETHYLPHTHALATE	NV	S						
DINITROBENZENE, 1,3-	NV	S						
DINITROPHENOL, 2,4-	NV	S						
DINITROTOLUENE, 2,4- (2,4-DNT)	NV	S						
DINITROTOLUENE, 2,6- (2,6-DNT)	NV	S						
DIOXANE, 1,4-	V	L	1.1E+03	1.1E+03	1.3E+04	9.8E+03	9.8E+03	1.1E+05
DIOXINS (TEQ)	SV	S	1.5E-02	1.5E-02	8.3E-02	1.3E-01	1.3E-01	7.0E-01
DIURON	NV	S						
ENDOSULFAN	SV	S						
ENDRIN	NV	S						
ETHANOL	V	L						
ETHYLBENZENE	V	L	2.2E+04	2.2E+04	4.2E+05	2.0E+05	2.0E+05	3.5E+06
FLUORANTHENE	NV	S						
FLUORENE	V	S	6.7E+04		6.7E+04	5.6E+05		5.6E+05
GLYPHOSATE	NV	S						
HEPTACHLOR	SV	S	4.3E+00	4.3E+00		3.8E+01	3.8E+01	
HEPTACHLOR EPOXIDE	SV	S	2.2E+00	2.2E+00		1.9E+01	1.9E+01	
HEXACHLOROBENZENE	SV	S	1.2E+01	1.2E+01		1.1E+02	1.1E+02	
HEXACHLOROBUTADIENE	SV	S	2.6E+02	2.6E+02		2.2E+03	2.2E+03	
HEXACHLOROCYCLOHEXANE (gamma) LINDANE	NV	S						
HEXACHLOROETHANE	SV	S	5.1E+02	5.1E+02	1.3E+04	4.5E+03	4.5E+03	1.1E+05
HEXAZINONE	NV	S						
INDENO(1,2,3-cd)PYRENE	NV	S						

TABLE E-2. [1]SHALLOW SOIL GAS SCREENING LEVELS FOR EVALUATION OF POTENTIAL VAPOR INTRUSION HAZARDS (volatile chemicals only)

CHEMICAL PARAMETER	Physical State		[2]Unrestricted Land Use			Commercial/Industrial Land Use Only		
			Lowest Residential (ug/m^3)	Carcinogenic Effects (ug/m^3)	Noncarcinogenic Effects (ug/m^3)	Lowest C/I (ug/m^3)	Carcinogenic Effects (ug/m^3)	Noncarcinogenic Effects (ug/m^3)
ISOPHORONE	NV	L						
LEAD	NV	S						
MERCURY	NV	S						
METHOXYCHLOR	NV	S						
METHYL ETHYL KETONE	V	L	2.1E+06		2.1E+06	1.8E+07		1.8E+07
METHYL ISOBUTYL KETONE	V	L	1.3E+06		1.3E+06	1.1E+07		1.1E+07
METHYL MERCURY	NV	S						
METHYL TERT BUTYL ETHER	V	L	2.2E+04	2.2E+04	1.3E+06	1.9E+05	1.9E+05	1.1E+07
METHYLENE CHLORIDE	V	L	2.0E+05	2.0E+05	2.5E+05	2.1E+06	4.9E+06	2.1E+06
METHYLNAPHTHALENE, 1-	V	S	7.7E+03	7.7E+03	1.2E+05	6.8E+04	6.8E+04	9.8E+05
METHYLNAPHTHALENE, 2-	V	S	6.7E+03		6.7E+03	5.6E+04		5.6E+04
MOLYBDENUM	NV	S						
NAPHTHALENE	V	S	1.3E+03	1.7E+03	1.3E+03	1.1E+04	1.4E+04	1.1E+04
NICKEL	NV	S						
NITROBENZENE	V	L	1.4E+02	1.4E+02	3.8E+03	1.2E+03	1.2E+03	3.2E+04
NITROGLYCERIN	NV	L						
NITROTOLUENE, 2-	V	S	1.0E+02	1.0E+02	1.5E+03	8.9E+02	8.9E+02	1.3E+04
NITROTOLUENE, 3-	NV	S						
NITROTOLUENE, 4-	NV	S						
PENTACHLOROPHENOL	NV	S						
PENTAERYTHRITOLTETRANITRATE (PETN)	NV	S						
PERCHLORATE	NV	S						
PHENANTHRENE	V	S	6.7E+04		6.7E+04	5.6E+05		5.6E+05
PHENOL	NV	S						
POLYCHLORINATED BIPHENYLS (PCBs)	SV	S	9.9E+01	9.9E+01		8.6E+02	8.6E+02	
PROPICONAZOLE	NV	L						
PYRENE	V	S	5.0E+04		5.0E+04	4.2E+05		4.2E+05
SELENIUM	NV	S						
SILVER	NV	S						
SIMAZINE	NV	S						
STYRENE	V	L	4.2E+05		4.2E+05	3.5E+06		3.5E+06
TERBACIL	NV	S						
tert-BUTYL ALCOHOL	V	L	7.5E+03	7.5E+03		6.5E+04	6.5E+04	
TETRACHLOROETHANE, 1,1,1,2-	V	L	7.6E+02	7.6E+02	5.0E+04	6.6E+03	6.6E+03	4.2E+05
TETRACHLOROETHANE, 1,1,2,2-	V	L	9.7E+01	9.7E+01		8.5E+02	8.5E+02	
TETRACHLOROETHYLENE	V	L	9.2E+02	9.2E+02	1.7E+04	8.0E+03	8.0E+03	1.4E+05
TETRACHLOROPHENOL, 2,3,4,6-	NV	S						
TETRANITRO-1,3,5,7-TETRAAZOCYCLOOCTANE (HMX)	NV	S						
THALLIUM	NV	S						
TOLUENE	V	L	2.1E+06		2.1E+06	1.8E+07		1.8E+07
TOXAPHENE	NV	S						
TPH (gasolines)	V	L	5.9E+05		5.9E+05	4.9E+06		4.9E+06
TPH (middle distillates)	V	L	2.6E+05		2.6E+05	2.2E+06		2.2E+06
TPH (residual fuels)	NV	L						
TRICHLOROBENZENE, 1,2,4-	V	S	7.7E+02	7.7E+02	8.3E+02	6.8E+03	6.8E+03	7.0E+03
TRICHLOROETHANE, 1,1,1-	V	L	2.1E+06		2.1E+06	1.8E+07		1.8E+07

TABLE E-2. [1]SHALLOW SOIL GAS SCREENING LEVELS FOR EVALUATION OF POTENTIAL VAPOR INTRUSION HAZARDS (volatile chemicals only)

CHEMICAL PARAMETER	Physical State		[2]Unrestricted Land Use			Commercial/Industrial Land Use Only		
			Lowest Residential (ug/m^3)	Carcinogenic Effects (ug/m^3)	Noncarcinogenic Effects (ug/m^3)	Lowest C/I (ug/m^3)	Carcinogenic Effects (ug/m^3)	Noncarcinogenic Effects (ug/m^3)
TRICHLOROETHANE, 1,1,2-	V	L	8.3E+01	3.5E+02	8.3E+01	7.0E+02	3.1E+03	7.0E+02
TRICHLOROETHYLENE	V	L	8.3E+02	9.6E+02	8.3E+02	7.0E+03	1.2E+04	7.0E+03
TRICHLOROPHENOL, 2,4,5-	NV	S						
TRICHLOROPHENOL, 2,4,6-	NV	S						
TRICHLOROPHENOXYACETIC ACID, 2,4,5- (2,4,5-T)	NV	S						
TRICHLOROPHENOXYPROPIONIC ACID, 2,4,5- (2,4,5-TP)	NV	S						
TRICHLOROPROPANE, 1,2,3-	V	L	2.7E-01	2.7E-01	1.3E+02	6.5E+00	6.5E+00	1.1E+03
TRICHLOROPROPENE, 1,2,3-	V	L	1.3E+02		1.3E+02	1.1E+03		1.1E+03
TRIFLURALIN	SV	S						
TRINITROBENZENE, 1,3,5-	NV	S						
TRINITROPHENYLMETHYLNITRAMINE, 2,4,6- (TETRYL)	NV	S						
TRINITROTOLUENE, 2,4,6- (TNT)	NV	S						
VANADIUM	NV	S						
VINYL CHLORIDE	V	G	3.4E+02	3.4E+02	4.2E+04	1.1E+04	1.1E+04	3.5E+05
XYLENES	V	L	4.2E+04		4.2E+04	3.5E+05		3.5E+05
ZINC	NV	S						

Notes:

1. Shallow soil gas defined as soil gas sample data collected within 1.5 meters (five feet) from a building foundation or the ground surface. Assumes very permeable (e.g., sandy) fill material immediately beneath building slab or could be present below future buildings following redevelopment. Evaluation of deeper soil gas data (e.g., >1.5m bgs) should be carried out on a site-specific basis.
2. Based on unrestricted current or future land use. Considered adequate for residential housing, schools, medical facilities, day-care centers and other sensitive uses.

Soil gas screening levels intended to be protective of indoor air quality, calculated for volatile chemicals only.
Physical state of chemical at ambient conditions (V - volatile, NV - nonvolatile, S - solid, L - liquid, G - gas).
Chemical considered to be "volatile" if Henry's number (atm m3/mole) >0.00001 and molecular weight <200.
Dibromochloromethane, dibromochloropropane and pyrene considered volatile for purposes of modeling (USEPA 2004, 2008).
Target cancer risk = 1E-06, Target Hazard Quotient = 0.2 for all chemicals except as noted.
Target Hazard Quotient = 0.5 for TPH.
Residential soil gas:indoor air attenuation factor = 0.001 (1/1000). Commercial/industrial soil gas:indoor air attenuation factor = 0.0005 (1/2000). Refer to Section 3.3.
Soil gas screening level for ethanol based on potential indoor air nuisance concerns (refer to Chapter 4 and Table F series).
Soil gas screening levels do not address mass-balance issues. May be overly conservative for sites with low permeability soils immediately beneath a building slab or limited soil impacts and no source of VOCs in groundwater.
Indoor-air sampling and/or passive vapor mitigation measures may be prudent for sites where concentrations of chemicals in soil gas approach but do not exceed screening levels. Consider other sources of VOCs in all indoor air studies

TABLE E-3. INDOOR AIR SCREENING LEVELS
(volatile chemicals only)

			Risk-Based Screening Levels								50% Odor Recognition Threshold (Table H-2)
			Unit Risk Factor	Reference Concentration	[1]Unrestricted Land Use			Commercial/Industrial Use Only			
CHEMICAL PARAMETER	Physical State		URF $(ug/m^3)^{-1}$	RfC (ug/m^3)	Lowest Residential (ug/m^3)	Indoor Air (carcinogens) (ug/m^3)	Indoor Air (noncarcinogens) (ug/m^3)	Lowest C/I (ug/m^3)	Indoor Air (carcinogens) (ug/m^3)	Indoor Air (noncarcinogens) (ug/m^3)	(ug/m^3)
ACENAPHTHENE	V	S		2.4E+02	5.0E+01		5.0E+01	2.1E+02		2.1E+02	5.13E+02
ACENAPHTHYLENE	V	S		1.6E+02	3.3E+01		3.3E+01	1.4E+02		1.4E+02	-
ACETONE	V	L		3.1E+04	6.5E+03		6.5E+03	2.7E+04		2.7E+04	3.09E+04
ALDRIN	SV	S	8.5E-04	4.0E-01	2.1E-01	3.3E-01	2.1E-01	8.8E-01	1.4E+00	8.8E-01	2.63E+02
AMETRYN	NV	S									-
AMINO,2- DINITROTOLUENE,4,6-	NV	S									-
AMINO,4- DINITROTOLUENE,2,6-	NV	S									-
ANTHRACENE	V	S		1.2E+03	2.5E+02		2.5E+02	1.1E+03		1.1E+03	-
ANTIMONY	NV	S									-
ARSENIC	NV	S									-
ATRAZINE	NV	S									-
BARIUM	NV	S									-
BENOMYL	NV	S									-
BENZENE	V	L	7.8E-06	3.0E+01	3.6E-01	3.6E-01	6.3E+00	1.6E+00	1.6E+00	2.6E+01	4.89E+03
BENZO(a)ANTHRACENE	SV	S	1.1E-04		9.2E-01	9.2E-01		1.1E+00	1.1E+00		-
BENZO(a)PYRENE	NV	S									-
BENZO(b)FLUORANTHENE	NV	S									-
BENZO(g,h,i)PERYLENE	NV	S									-
BENZO(k)FLUORANTHENE	NV	S									-
BERYLLIUM	NV	S									-
BIPHENYL, 1,1-	V	S	2.0E-06	4.0E-01	8.3E-02	1.4E+00	8.3E-02	3.5E-01	6.1E+00	3.5E-01	6.00E+01
BIS(2-CHLOROETHYL)ETHER	V	L	3.3E-04		8.5E-03	8.5E-03		3.7E-02	3.7E-02		2.87E+02
BIS(2-CHLORO-1-METHYLETHYL)ETHER	V	L	1.0E-05	1.4E+02	2.8E-01	2.8E-01	2.9E+01	1.2E+00	1.2E+00	1.2E+02	2.24E+03
BIS(2-ETHYLHEXYL)PHTHALATE	NV	S									-
BORON	NV	S									-
BROMODICHLOROMETHANE	V	L	3.7E-05	8.0E+01	7.6E-02	7.6E-02	1.7E+01	3.3E-01	3.3E-01	7.0E+01	1.10E+07
BROMOFORM	SV	S	1.1E-06		2.6E+00	2.6E+00		1.1E+01	1.1E+01		1.35E+04
BROMOMETHANE	V	G		5.0E+00	1.0E+00		1.0E+00	4.4E+00		4.4E+00	8.00E+04
CADMIUM	NV	S									-
CARBON TETRACHLORIDE	V	L	6.0E-06	1.0E+02	4.7E-01	4.7E-01	2.1E+01	2.0E+00	2.0E+00	8.8E+01	6.30E+04
CHLORDANE (TECHNICAL)	SV	S	1.0E-04	7.0E-01	2.8E-01	2.8E-01	7.3E-01	1.2E+00	1.2E+00	3.1E+00	8.40E+00
CHLOROANILINE, p-	NV	S									-
CHLOROBENZENE	V	L		5.0E+01	1.0E+01		1.0E+01	4.4E+01		4.4E+01	1.00E+03
CHLOROETHANE	V	G		1.0E+04	2.1E+03		2.1E+03	8.8E+03		8.8E+03	3.80E+05
CHLOROFORM	V	L	2.3E-05	9.8E+01	1.2E-01	1.2E-01	2.0E+01	5.3E-01	5.3E-01	8.6E+01	4.22E+05
CHLOROMETHANE	V	G		9.0E+01	1.9E+01		1.9E+01	7.9E+01		7.9E+01	-
CHLOROPHENOL, 2-	V	L		2.0E+01	4.2E+00		4.2E+00	1.8E+01		1.8E+01	1.90E+01
CHROMIUM (Total)	NV	S									-
CHROMIUM III	NV	S									-
CHROMIUM VI	NV	S									-
CHRYSENE	NV	S									-
COBALT	NV	S									-
COPPER	NV	S									-
CYANIDE (Free)	V	S		8.0E-01	1.7E-01		1.7E-01	7.0E-01		7.0E-01	6.52E+02

TABLE E-3. INDOOR AIR SCREENING LEVELS
(volatile chemicals only)

CHEMICAL PARAMETER	Physical State		Risk-Based Screening Levels: Unit Risk Factor URF $(ug/m^3)^{-1}$	Reference Concentration RfC (ug/m^3)	[1]Unrestricted Land Use: Lowest Residential (ug/m^3)	Indoor Air (carcinogens) (ug/m^3)	Indoor Air (noncarcinogens) (ug/m^3)	Commercial/Industrial Use Only: Lowest C/I (ug/m^3)	Indoor Air (carcinogens) (ug/m^3)	Indoor Air (noncarcinogens) (ug/m^3)	50% Odor Recognition Threshold (Table H-2) (ug/m^3)
CYCLO-1,3,5-TRIMETHYLENE-2,4,6-TRINITRAMINE (RDX)	NV	S									-
DALAPON	NV	L									-
DIBENZO(a,h)ANTHTRACENE	NV	S									-
DIBROMO,1,2- CHLOROPROPANE,3-	V	L	6.0E-03	2.0E-01	1.7E-04	1.7E-04	4.2E-02	2.0E-03	2.0E-03	1.8E-01	-
DIBROMOCHLOROMETHANE	V	S	2.1E-05	8.0E+01	1.3E-01	1.3E-01	1.7E+01	5.8E-01	5.8E-01	7.0E+01	-
DIBROMOETHANE, 1,2-	V	S	6.0E-04	9.0E+00	4.7E-03	4.7E-03	1.9E+00	2.0E-02	2.0E-02	7.9E+00	2.00E+05
DICHLOROBENZENE, 1,2-	V	L		2.0E+02	4.2E+01		4.2E+01	1.8E+02		1.8E+02	3.05E+05
DICHLOROBENZENE, 1,3-	V	L		1.2E+02	2.5E+01		2.5E+01	1.1E+02		1.1E+02	-
DICHLOROBENZENE, 1,4-	V	S	1.1E-05	8.0E+02	2.6E-01	2.6E-01	1.7E+02	1.1E+00	1.1E+00	7.0E+02	1.10E+03
DICHLOROBENZIDINE, 3,3-	NV	S									-
DICHLORODIPHENYLDICHLOROETHANE (DDD)	NV	S									-
DICHLORODIPHENYLDICHLOROETHYLENE (DDE)	SV	S	9.7E-05		2.9E-02	2.9E-02		1.3E-01	1.3E-01		-
DICHLORODIPHENYLTRICHLOROETHANE (DDT)	NV	S									-
DICHLOROETHANE, 1,1-	V	L	1.6E-06	8.0E+02	1.8E+00	1.8E+00	1.7E+02	7.7E+00	7.7E+00	7.0E+02	1.25E+05
DICHLOROETHANE, 1,2-	V	L	2.6E-05	7.0E+00	1.1E-01	1.1E-01	1.5E+00	4.7E-01	4.7E-01	6.1E+00	2.42E+03
DICHLOROETHYLENE, 1,1-	V	L		2.0E+02	4.2E+01		4.2E+01	1.8E+02		1.8E+02	2.00E+06
DICHLOROETHYLENE, Cis 1,2-	V	L		8.0E+00	1.7E+00		1.7E+00	7.0E+00		7.0E+00	-
DICHLOROETHYLENE, Trans 1,2-	V	L		8.0E+01	1.7E+01		1.7E+01	7.0E+01		7.0E+01	6.73E+04
DICHLOROPHENOL, 2,4-	NV	S									1.40E+03
DICHLOROPHENOXYACETIC ACID (2,4-D)	NV	S									-
DICHLOROPROPANE, 1,2-	V	L	1.0E-05	4.0E+00	2.8E-01	2.8E-01	8.3E-01	1.2E+00	1.2E+00	3.5E+00	1.19E+03
DICHLOROPROPENE, 1,3-	V	L	4.0E-06	2.0E+01	7.0E-01	7.0E-01	4.2E+00	3.1E+00	3.1E+00	1.8E+01	4.16E+03
DIELDRIN	NV	S									-
DIETHYLPHTHALATE	NV	S									-
DIMETHYLPHENOL, 2,4-	NV	S									1.00E+00
DIMETHYLPHTHALATE	NV	S									-
DINITROBENZENE, 1,3-	NV	S									-
DINITROPHENOL, 2,4-	NV	S									-
DINITROTOLUENE, 2,4- (2,4-DNT)	NV	S									-
DINITROTOLUENE, 2,6- (2,6-DNT)	NV	S									-
DIOXANE, 1,4-	V	L	5.0E-06	3.0E+01	5.6E-01	5.6E-01	6.3E+00	2.5E+00	2.5E+00	2.6E+01	6.12E+05
DIOXINS (TEQ)	SV	S	3.8E+01	4.0E-05	7.4E-06	7.4E-06	4.2E-05	3.2E-05	3.2E-05	1.8E-04	-
DIURON	NV	S									-
ENDOSULFAN	SV	S									-
ENDRIN	NV	S									-
ETHANOL	V	L									1.92E+04
ETHYLBENZENE	V	L	2.5E-06	1.0E+03	1.1E+01	1.1E+01	2.1E+02	4.9E+01	4.9E+01	8.8E+02	2.00E+03
FLUORANTHENE	NV	S									-
FLUORENE	V	S		1.6E+02	3.3E+01		3.3E+01	1.4E+02		1.4E+02	-
GLYPHOSATE	NV	S									-
HEPTACHLOR	SV	S	1.3E-03		2.2E-03	2.2E-03		9.4E-03	9.4E-03		3.00E+02
HEPTACHLOR EPOXIDE	SV	S	2.6E-03		1.1E-03	1.1E-03		4.7E-03	4.7E-03		3.00E+02
HEXACHLOROBENZENE	SV	S	4.6E-04		6.1E-03	6.1E-03		2.7E-02	2.7E-02		-
HEXACHLOROBUTADIENE	SV	S	2.2E-05		1.3E-01	1.3E-01		5.6E-01	5.6E-01		1.20E+04

TABLE E-3. INDOOR AIR SCREENING LEVELS
(volatile chemicals only)

CHEMICAL PARAMETER	Physical State		Risk-Based Screening Levels: Unit Risk Factor URF $(ug/m^3)^{-1}$	Reference Concentration RfC (ug/m^3)	[1]Unrestricted Land Use: Lowest Residential (ug/m^3)	Indoor Air (carcinogens) (ug/m^3)	Indoor Air (noncarcinogens) (ug/m^3)	Commercial/Industrial Use Only: Lowest C/I (ug/m^3)	Indoor Air (carcinogens) (ug/m^3)	Indoor Air (noncarcinogens) (ug/m^3)	50% Odor Recognition Threshold (Table H-2) (ug/m^3)
HEXACHLOROCYCLOHEXANE (gamma) LINDANE	NV	S									-
HEXACHLOROETHANE	SV	S	1.1E-05	3.0E+01	2.6E-01	2.6E-01	6.3E+00	1.1E+00	1.1E+00	2.6E+01	-
HEXAZINONE	NV	S									-
INDENO(1,2,3-cd)PYRENE	NV	S									-
ISOPHORONE	NV	L									-
LEAD	NV	S									-
MERCURY	NV	S									-
METHOXYCHLOR	NV	S									-
METHYL ETHYL KETONE	V	L		5.0E+03	1.0E+03		1.0E+03	4.4E+03		4.4E+03	3.20E+04
METHYL ISOBUTYL KETONE	V	L		3.0E+03	6.3E+02		6.3E+02	2.6E+03		2.6E+03	4.20E+02
METHYL MERCURY	NV	S									-
METHYL TERT BUTYL ETHER	V	L	2.6E-07	3.0E+03	1.1E+01	1.1E+01	6.3E+02	4.7E+01	4.7E+01	2.6E+03	5.30E+02
METHYLENE CHLORIDE	V	L	1.0E-08	6.0E+02	1.0E+02	1.0E+02	1.3E+02	5.3E+02	1.2E+03	5.3E+02	5.60E+05
METHYLNAPHTHALENE, 1-	V	S	7.3E-06	2.8E+02	3.9E+00	3.9E+00	5.8E+01	1.7E+01	1.7E+01	2.5E+02	6.80E+01
METHYLNAPHTHALENE, 2-	V	S		1.6E+01	3.3E+00		3.3E+00	1.4E+01		1.4E+01	6.80E+01
MOLYBDENUM	NV	S									-
NAPHTHALENE	V	S	3.4E-05	3.0E+00	6.3E-01	8.3E-01	6.3E-01	2.6E+00	3.6E+00	2.6E+00	4.40E+02
NICKEL	NV	S									-
NITROBENZENE	V	L	4.0E-05	9.0E+00	7.0E-02	7.0E-02	1.9E+00	3.1E-01	3.1E-01	7.9E+00	-
NITROGLYCERIN	NV	L									-
NITROTOLUENE, 2-	V	S	5.5E-05	3.6E+00	5.1E-02	5.1E-02	7.5E-01	2.2E-01	2.2E-01	3.2E+00	-
NITROTOLUENE, 3-	NV	S									-
NITROTOLUENE, 4-	NV	S									-
PENTACHLOROPHENOL	NV	S									-
PENTAERYTHRITOLTETRANITRATE (PETN)	NV	S									-
PERCHLORATE	NV	S									-
PHENANTHRENE	V	S		1.6E+02	3.3E+01		3.3E+01	1.4E+02		1.4E+02	5.50E+01
PHENOL	NV	S									1.56E+02
POLYCHLORINATED BIPHENYLS (PCBs)	SV	S	5.7E-04		4.9E-02	4.9E-02		2.2E-01	2.2E-01		-
PROPICONAZOLE	NV	L									-
PYRENE	V	S		1.2E+02	2.5E+01		2.5E+01	1.1E+02		1.1E+02	-
SELENIUM	NV	S									-
SILVER	NV	S									-
SIMAZINE	NV	S									-
STYRENE	V	L		1.0E+03	2.1E+02		2.1E+02	8.8E+02		8.8E+02	1.36E+03
TERBACIL	NV	S									-
tert-BUTYL ALCOHOL	V	L	7.5E-07		3.7E+00	3.7E+00		1.6E+01	1.6E+01		-
TETRACHLOROETHANE, 1,1,1,2-	V	L	7.4E-06	1.2E+02	3.8E-01	3.8E-01	2.5E+01	1.7E+00	1.7E+00	1.1E+02	-
TETRACHLOROETHANE, 1,1,2,2-	V	L	5.8E-05		4.8E-02	4.8E-02		2.1E-01	2.1E-01		1.05E+04
TETRACHLOROETHYLENE	V	L	6.1E-06	4.0E+01	4.6E-01	4.6E-01	8.3E+00	2.0E+00	2.0E+00	3.5E+01	3.17E+04
TETRACHLOROPHENOL, 2,3,4,6-	NV	S									-
TETRANITRO-1,3,5,7-TETRAAZOCYCLOOCTANE (HMX)	NV	S									-
THALLIUM	NV	S									-
TOLUENE	V	L		5.0E+03	1.0E+03		1.0E+03	4.4E+03		4.4E+03	3.00E+04

TABLE E-3. INDOOR AIR SCREENING LEVELS
(volatile chemicals only)

CHEMICAL PARAMETER	Physical State		Risk-Based Screening Levels: Unit Risk Factor URF $(ug/m^3)^{-1}$	Reference Concentration RfC (ug/m^3)	[1]Unrestricted Land Use: Lowest Residential (ug/m^3)	Indoor Air (carcinogens) (ug/m^3)	Indoor Air (noncarcinogens) (ug/m^3)	Commercial/Industrial Use Only: Lowest C/I (ug/m^3)	Indoor Air (carcinogens) (ug/m^3)	Indoor Air (noncarcinogens) (ug/m^3)	50% Odor Recognition Threshold (Table H-2) (ug/m^3)
TOXAPHENE	NV	S									-
TPH (gasolines)	V	L		2.8E+02	2.9E+02		2.9E+02	1.2E+03		1.2E+03	1.10E+03
TPH (middle distillates)	V	L		1.3E+02	1.3E+02		1.3E+02	5.5E+02		5.5E+02	5.00E+03
TPH (residual fuels)	NV	L									-
TRICHLOROBENZENE, 1,2,4-	V	S	7.3E-06	2.0E+00	3.9E-01	3.9E-01	4.2E-01	1.7E+00	1.7E+00	1.8E+00	2.20E+04
TRICHLOROETHANE, 1,1,1-	V	L		5.0E+03	1.0E+03		1.0E+03	4.4E+03		4.4E+03	6.51E+04
TRICHLOROETHANE, 1,1,2-	V	L	1.6E-05	2.0E-01	4.2E-02	1.8E-01	4.2E-02	1.8E-01	7.7E-01	1.8E-01	-
TRICHLOROETHYLENE	V	L	4.1E-06	2.0E+00	4.2E-01	4.8E-01	4.2E-01	1.8E+00	3.0E+00	1.8E+00	1.36E+06
TRICHLOROPHENOL, 2,4,5-	NV	S									-
TRICHLOROPHENOL, 2,4,6-	NV	S									3.00E-01
TRICHLOROPHENOXYACETIC ACID, 2,4,5- (2,4,5-T)	NV	S									-
TRICHLOROPHENOXYPROPIONIC ACID, 2,4,5- (2,4,5-TP)	NV	S									-
TRICHLOROPROPANE, 1,2,3-	V	L	7.5E-03	3.0E-01	1.4E-04	1.4E-04	6.3E-02	1.6E-03	1.6E-03	2.6E-01	-
TRICHLOROPROPENE, 1,2,3-	V	L		3.0E-01	6.3E-02		6.3E-02	2.6E-01		2.6E-01	-
TRIFLURALIN	SV	S									-
TRINITROBENZENE, 1,3,5-	NV	S									-
TRINITROPHENYLMETHYLNITRAMINE, 2,4,6- (TETRYL)	NV	S									-
TRINITROTOLUENE, 2,4,6- (TNT)	NV	S									-
VANADIUM	NV	S									-
VINYL CHLORIDE	V	G	4.4E-06	1.0E+02	1.7E-01	1.7E-01	2.1E+01	2.8E+00	2.8E+00	8.8E+01	7.71E+05
XYLENES	V	L		1.0E+02	2.1E+01		2.1E+01	8.8E+01		8.8E+01	4.41E+02
ZINC	NV	S									-

Notes:

1. Based on unrestricted current or future land use. Considered adequate for residential housing, schools, medical facilities, day-care centers and other sensitive uses.

Target cancer risk = 1E-06, Target Hazard Quotient = 0.2 for all chemicals except as noted.
Target Hazard Quotient = 0.5 for TPH.
Physical state of chemical at ambient conditions (V - volatile, NV - nonvolatile, S - solid, L - liquid, G - gas).
Chemical considered to be "volatile" if Henry's number (atm m3/mole) >0.00001 and molecular weight <200.
Dibromochloromethane, dibromochloropropane and pyrene considered volatile for purposes of modeling (USEPA 2004, 2008).
Screening levels calculated using spreadhseet provided with User's Guide for the USEPA vapor intrusion guidance (USEPA 2004, refer to Appendix 2 for equations and default input parameter values).
Indoor air screening levels listed only for volatile chemicals included in database of referenced model spreadsheet (plus MTBE).
Indoor air screening level for ethanol based on potential odor concerns (refer to Chapter 4 and Table F series). Human health risk toxicity data not available but likely to exceed odor thresholds.
50% Odor Recognition Thresholds from Massachusetts Department of Environmental Protection (MADEP, 1994) and ATSDR; included for reference (potential nuisance concerns, see Table F series).

TABLE F-1a. GROUNDWATER SCREENING LEVELS
(groundwater IS a current or potential drinking water resource)
(ug/l)

CHEMICAL PARAMETER	[1]Final Groundwater Screening Level	Basis	Gross Contamination (Taste & Odors, etc.) Table I-1	Drinking Water (Toxicity) Table F-3a	Vapor Intrusion Into Buildings Table E-1a	Estuary Aquatic Habitat Goal (Chronic) Table F-4a
ACENAPHTHENE	1.5E+01	Aquatic Habitat Goal	2.0E+01	3.5E+02	3.9E+03	1.5E+01
ACENAPHTHYLENE	1.3E+01	Aquatic Habitat Goal	2.0E+03	2.4E+02	(Use soil gas)	1.3E+01
ACETONE	1.5E+03	Aquatic Habitat Goal	2.0E+04	1.4E+04	6.2E+08	1.5E+03
ALDRIN	1.4E-04	Aquatic Habitat Goal	8.5E+00	5.1E-03		1.4E-04
AMETRYN	1.8E+02	Drinking Water Toxicity	5.0E+04	1.8E+02		7.0E+02
AMINO,2- DINITROTOLUENE,4,6-	1.8E+01	Aquatic Habitat Goal	5.0E+04	4.0E+01		1.8E+01
AMINO,4- DINITROTOLUENE,2,6-	1.1E+01	Aquatic Habitat Goal	5.0E+04	4.0E+01		1.1E+01
ANTHRACENE	2.0E-02	Aquatic Habitat Goal	2.2E+01	1.8E+03	4.3E+01	2.0E-02
ANTIMONY	6.0E+00	Drinking Water Toxicity	5.0E+04	6.0E+00		3.0E+01
ARSENIC	1.0E+01	Drinking Water Toxicity	5.0E+04	1.0E+01		3.6E+01
ATRAZINE	3.4E-01	Drinking Water Toxicity	1.8E+04	3.4E-01		1.2E+01
BARIUM	2.2E+02	Aquatic Habitat Goal	5.0E+04	2.0E+03		2.2E+02
BENOMYL	1.4E-01	Aquatic Habitat Goal	1.9E+03	1.0E+03		1.4E-01
BENZENE	5.0E+00	Drinking Water Toxicity	1.7E+02	5.0E+00	2.3E+03	7.1E+01
BENZO(a)ANTHRACENE	1.1E-02	Drinking Water Toxicity	4.7E+00	1.1E-02		2.7E-02
BENZO(a)PYRENE	6.0E-02	Aquatic Habitat Goal	8.0E-01	2.0E-01		6.0E-02
BENZO(b)FLUORANTHENE	2.9E-02	Drinking Water Toxicity	7.5E-01	2.9E-02		6.8E-01
BENZO(g,h,i)PERYLENE	1.3E-01	Gross Contamination	1.3E-01	8.0E+02		4.4E-01
BENZO(k)FLUORANTHENE	2.9E-01	Drinking Water Toxicity	4.0E-01	2.9E-01		6.4E-01
BERYLLIUM	6.6E-01	Aquatic Habitat Goal	5.0E+04	4.0E+00		6.6E-01
BIPHENYL, 1,1-	5.0E-01	Gross Contamination	5.0E-01	8.3E-01	(Use soil gas)	6.5E+00
BIS(2-CHLOROETHYL)ETHER	1.4E-02	Drinking Water Toxicity	3.6E+02	1.4E-02	1.8E+02	2.4E+03
BIS(2-CHLORO-1-METHYLETHYL)ETHER	3.7E-01	Aquatic Habitat Goal	3.2E+02	3.7E-01	(Use soil gas)	3.7E-01
BIS(2-ETHYLHEXYL)PHTHALATE	3.0E+00	Aquatic Habitat Goal	1.4E+02	6.0E+00		3.0E+00
BORON	1.0E+03	Aquatic Habitat Goal	5.0E+04	4.0E+03		1.0E+03
BROMODICHLOROMETHANE	1.4E-01	Drinking Water Toxicity	5.0E+04	1.4E-01	1.1E+02	3.4E+02
BROMOFORM	1.0E+02	Drinking Water Toxicity	5.1E+02	1.0E+02		2.3E+02
BROMOMETHANE	7.6E+00	Drinking Water Toxicity	5.0E+04	7.6E+00	4.1E+02	1.6E+01
CADMIUM	2.5E-01	Aquatic Habitat Goal	5.0E+04	5.0E+00		2.5E-01
CARBON TETRACHLORIDE	5.0E+00	Drinking Water Toxicity	5.2E+02	5.0E+00	1.1E+02	9.8E+00
CHLORDANE (TECHNICAL)	4.0E-03	Aquatic Habitat Goal	2.5E+00	2.0E+00		4.0E-03
CHLOROANILINE, p-	3.9E-01	Drinking Water Toxicity	5.0E+04	3.9E-01		1.9E+01
CHLOROBENZENE	2.5E+01	Aquatic Habitat Goal	5.0E+01	1.0E+02	1.2E+04	2.5E+01
CHLOROETHANE	1.6E+01	Gross Contamination	1.6E+01	2.1E+04	6.0E+05	2.1E+04
CHLOROFORM	2.8E+01	Aquatic Habitat Goal	2.4E+03	1.0E+02	1.1E+02	2.8E+01
CHLOROMETHANE	1.9E+02	Aquatic Habitat Goal	5.0E+04	1.9E+02	5.2E+03	1.9E+02
CHLOROPHENOL, 2-	1.8E-01	Gross Contamination	1.8E-01	2.9E+01	1.0E+05	3.2E+01
CHROMIUM (Total)	1.1E+01	Aquatic Habitat Goal	5.0E+04	1.0E+02		1.1E+01
CHROMIUM III	2.0E+01	Aquatic Habitat Goal	5.0E+04	3.0E+04		2.0E+01
CHROMIUM VI	4.3E-02	Drinking Water Toxicity	5.0E+04	4.3E-02		1.1E+01
CHRYSENE	1.0E+00	Gross Contamination	1.0E+00	2.9E+00		2.0E+00
COBALT	6.0E+00	Drinking Water Toxicity	5.0E+04	6.0E+00		1.9E+01
COPPER	3.1E+00	Aquatic Habitat Goal	1.0E+03	1.3E+03		3.1E+00
CYANIDE (Free)	1.0E+00	Aquatic Habitat Goal	1.7E+02	2.0E+02	(Use soil gas)	1.0E+00
CYCLO-1,3,5-TRIMETHYLENE-2,4,6-TRINITRAMINE (RDX)	7.1E-01	Drinking Water Toxicity	3.0E+04	7.1E-01		7.9E+01
DALAPON	3.0E+02	Aquatic Habitat Goal	5.0E+04	6.0E+02		3.0E+02

TABLE F-1a. GROUNDWATER SCREENING LEVELS
(groundwater IS a current or potential drinking water resource)
(ug/l)

CHEMICAL PARAMETER	[1]Final Groundwater Screening Level	Basis	Gross Contamination (Taste & Odors, etc.) Table I-1	Drinking Water (Toxicity) Table F-3a	Vapor Intrusion Into Buildings Table E-1a	Estuary Aquatic Habitat Goal (Chronic) Table F-4a
DIBENZO(a,h)ANTHTRACENE	2.9E-03	Drinking Water Toxicity	1.3E+00	2.9E-03		8.0E-01
DIBROMO,1,2- CHLOROPROPANE,3-	2.0E-01	Aquatic Habitat Goal	1.0E+01	2.0E-01	(Use soil gas)	2.0E-01
DIBROMOCHLOROMETHANE	2.1E-01	Drinking Water Toxicity	5.0E+04	2.1E-01	4.5E+02	3.4E+01
DIBROMOETHANE, 1,2-	5.0E-02	Drinking Water Toxicity	5.0E+04	5.0E-02	1.9E+01	1.4E+03
DICHLOROBENZENE, 1,2-	1.0E+01	Gross Contamination	1.0E+01	6.0E+02	8.3E+04	1.4E+01
DICHLOROBENZENE, 1,3-	2.2E+01	Aquatic Habitat Goal	5.0E+04	1.8E+02	(Use soil gas)	2.2E+01
DICHLOROBENZENE, 1,4-	5.0E+00	Gross Contamination	5.0E+00	7.5E+01	4.5E+02	9.4E+00
DICHLOROBENZIDINE, 3,3-	1.7E-01	Drinking Water Toxicity	1.6E+03	1.7E-01		4.5E+00
DICHLORODIPHENYLDICHLOROETHANE (DDD)	1.1E-02	Aquatic Habitat Goal	4.5E+01	3.2E-01		1.1E-02
DICHLORODIPHENYLDICHLOROETHYLENE (DDE)	4.6E-02	Drinking Water Toxicity	2.0E+01	4.6E-02		4.1E-01
DICHLORODIPHENYLTRICHLOROETHANE (DDT)	1.0E-03	Aquatic Habitat Goal	2.8E+00	2.3E-01		1.0E-03
DICHLOROETHANE, 1,1-	2.8E+00	Drinking Water Toxicity	5.0E+04	2.8E+00	1.1E+03	4.7E+01
DICHLOROETHANE, 1,2-	5.0E+00	Drinking Water Toxicity	7.0E+03	5.0E+00	1.8E+02	9.1E+02
DICHLOROETHYLENE, 1,1-	7.0E+00	Drinking Water Toxicity	1.5E+03	7.0E+00	6.6E+03	2.5E+01
DICHLOROETHYLENE, Cis 1,2-	7.0E+01	Drinking Water Toxicity	5.0E+04	7.0E+01	1.3E+03	6.2E+02
DICHLOROETHYLENE, Trans 1,2-	1.0E+02	Drinking Water Toxicity	2.6E+02	1.0E+02	6.6E+03	5.6E+02
DICHLOROPHENOL, 2,4-	3.0E-01	Gross Contamination	3.0E-01	6.0E+01		1.1E+01
DICHLOROPHENOXYACETIC ACID (2,4-D)	7.0E+01	Aquatic Habitat Goal	5.0E+04	2.0E+02		7.0E+01
DICHLOROPROPANE, 1,2-	5.0E+00	Drinking Water Toxicity	1.0E+01	5.0E+00	3.4E+02	5.2E+02
DICHLOROPROPENE, 1,3-	6.0E-02	Aquatic Habitat Goal	5.0E+04	5.0E-01	6.7E+02	6.0E-02
DIELDRIN	1.9E-03	Aquatic Habitat Goal	4.1E+01	1.1E-02		1.9E-03
DIETHYLPHTHALATE	2.1E+02	Aquatic Habitat Goal	5.0E+04	1.6E+04		2.1E+02
DIMETHYLPHENOL, 2,4-	1.1E+02	Aquatic Habitat Goal	4.0E+02	4.0E+02		1.1E+02
DIMETHYLPHTHALATE	1.1E+03	Aquatic Habitat Goal	5.0E+04	2.0E+05		1.1E+03
DINITROBENZENE, 1,3-	2.0E+00	Drinking Water Toxicity	5.0E+04	2.0E+00		1.0E+01
DINITROPHENOL, 2,4-	1.4E+01	Aquatic Habitat Goal	5.0E+04	4.0E+01		1.4E+01
DINITROTOLUENE, 2,4- (2,4-DNT)	2.5E-01	Drinking Water Toxicity	5.0E+04	2.5E-01		9.1E+00
DINITROTOLUENE, 2,6- (2,6-DNT)	5.2E-02	Drinking Water Toxicity	5.0E+04	5.2E-02		8.1E+01
DIOXANE, 1,4-	4.6E-01	Drinking Water Toxicity	5.0E+04	4.6E-01	(Use soil gas)	3.4E+05
DIOXINS (TEQ)	3.1E-09	Aquatic Habitat Goal	1.0E-01	3.0E-08		3.1E-09
DIURON	4.0E+01	Drinking Water Toxicity	2.1E+04	4.0E+01		6.0E+01
ENDOSULFAN	8.7E-03	Aquatic Habitat Goal	1.6E+02	1.2E+02		8.7E-03
ENDRIN	2.3E-03	Aquatic Habitat Goal	4.1E+01	2.0E+00		2.3E-03
ETHANOL	5.0E+04	Gross Contamination	5.0E+04		(Use soil gas)	
ETHYLBENZENE	7.3E+00	Aquatic Habitat Goal	3.0E+01	7.0E+02	7.6E+04	7.3E+00
FLUORANTHENE	8.0E-01	Aquatic Habitat Goal	1.3E+02	8.0E+02		8.0E-01
FLUORENE	3.9E+00	Aquatic Habitat Goal	8.5E+02	2.4E+02	1.7E+03	3.9E+00
GLYPHOSATE	1.8E+03	Aquatic Habitat Goal	5.0E+04	2.0E+03		1.8E+03
HEPTACHLOR	3.6E-03	Aquatic Habitat Goal	2.0E+01	4.0E-01		3.6E-03
HEPTACHLOR EPOXIDE	3.6E-03	Aquatic Habitat Goal	1.0E+02	2.0E-01		3.6E-03
HEXACHLOROBENZENE	3.0E-04	Aquatic Habitat Goal	3.1E+00	1.0E+00		3.0E-04
HEXACHLOROBUTADIENE	2.0E-01	Drinking Water Toxicity	6.0E+00	2.0E-01		3.0E-01
HEXACHLOROCYCLOHEXANE (gamma) LINDANE	6.3E-02	Aquatic Habitat Goal	3.7E+03	2.0E-01		6.3E-02
HEXACHLOROETHANE	4.0E-01	Drinking Water Toxicity	1.0E+01	4.0E-01		1.2E+01
HEXAZINONE	6.6E+02	Drinking Water Toxicity	5.0E+04	6.6E+02		1.7E+04

TABLE F-1a. GROUNDWATER SCREENING LEVELS
(groundwater IS a current or potential drinking water resource)
(ug/l)

CHEMICAL PARAMETER	[1]Final Groundwater Screening Level	Basis	Gross Contamination (Taste & Odors, etc.) Table I-1	Drinking Water (Toxicity) Table F-3a	Vapor Intrusion Into Buildings Table E-1a	Estuary Aquatic Habitat Goal (Chronic) Table F-4a
INDENO(1,2,3-cd)PYRENE	2.9E-02	Drinking Water Toxicity	9.5E-02	2.9E-02		2.8E-01
ISOPHORONE	8.2E+01	Drinking Water Toxicity	5.0E+04	8.2E+01		9.2E+02
LEAD	2.5E+00	Aquatic Habitat Goal	5.0E+04	1.5E+01		2.5E+00
MERCURY	0.0E+00	Gross Contamination	0.0E+00	2.0E+00		7.7E-01
METHOXYCHLOR	1.9E-02	Aquatic Habitat Goal	5.0E+01	4.0E+01		1.9E-02
METHYL ETHYL KETONE	5.6E+03	Drinking Water Toxicity	8.4E+03	5.6E+03	2.2E+08	1.4E+04
METHYL ISOBUTYL KETONE	1.7E+02	Aquatic Habitat Goal	1.3E+03	6.3E+03	1.9E+07	1.7E+02
METHYL MERCURY	2.8E-03	Aquatic Habitat Goal	5.0E+04	2.0E+00		2.8E-03
METHYL TERT BUTYL ETHER	5.0E+00	Gross Contamination	5.0E+00	1.4E+01	3.1E+04	1.8E+04
METHYLENE CHLORIDE	5.0E+00	Drinking Water Toxicity	9.1E+03	5.0E+00	7.6E+04	1.5E+03
METHYLNAPHTHALENE, 1-	2.1E+00	Aquatic Habitat Goal	1.0E+01	6.0E+00	2.6E+04	2.1E+00
METHYLNAPHTHALENE, 2-	4.7E+00	Aquatic Habitat Goal	1.0E+01	2.4E+01	2.5E+04	4.7E+00
MOLYBDENUM	1.0E+02	Drinking Water Toxicity	5.0E+04	1.0E+02		3.7E+02
NAPHTHALENE	1.2E+01	Aquatic Habitat Goal	2.1E+01	1.7E+01	2.9E+04	1.2E+01
NICKEL	8.2E+00	Aquatic Habitat Goal	5.0E+04	1.0E+02		8.2E+00
NITROBENZENE	1.4E-01	Drinking Water Toxicity	5.0E+04	1.4E-01	(Use soil gas)	3.8E+02
NITROGLYCERIN	2.0E+00	Drinking Water Toxicity	5.0E+04	2.0E+00		1.8E+01
NITROTOLUENE, 2-	7.9E-02	Drinking Water Toxicity	5.0E+04	7.9E-02	(Use soil gas)	7.1E+01
NITROTOLUENE, 3-	2.0E+00	Drinking Water Toxicity	5.0E+04	2.0E+00		4.2E+01
NITROTOLUENE, 4-	4.9E+00	Drinking Water Toxicity	5.0E+04	4.9E+00		4.6E+01
PENTACHLOROPHENOL	1.0E+00	Drinking Water Toxicity	3.0E+01	1.0E+00		7.9E+00
PENTAERYTHRITOLTETRANITRATE (PETN)	1.9E+01	Drinking Water Toxicity	2.2E+04	1.9E+01		8.5E+05
PERCHLORATE	1.5E+01	Drinking Water Toxicity	5.0E+04	1.5E+01		6.0E+02
PHENANTHRENE	4.6E+00	Aquatic Habitat Goal	4.1E+02	2.4E+02	(Use soil gas)	4.6E+00
PHENOL	5.0E+00	Gross Contamination	5.0E+00	6.0E+03		5.8E+01
POLYCHLORINATED BIPHENYLS (PCBs)	1.4E-02	Aquatic Habitat Goal	2.2E+01	5.0E-01		1.4E-02
PROPICONAZOLE	9.5E+01	Aquatic Habitat Goal	5.0E+04	2.6E+02		9.5E+01
PYRENE	4.6E+00	Aquatic Habitat Goal	6.8E+01	1.8E+02	1.4E+02	4.6E+00
SELENIUM	5.0E+00	Aquatic Habitat Goal	5.0E+04	5.0E+01		5.0E+00
SILVER	6.0E-02	Aquatic Habitat Goal	1.0E+02	1.0E+02		6.0E-02
SIMAZINE	6.5E-01	Drinking Water Toxicity	3.1E+03	6.5E-01		9.0E+00
STYRENE	1.0E+01	Gross Contamination	1.0E+01	1.0E+02	3.1E+05	3.2E+01
TERBACIL	2.6E+02	Aquatic Habitat Goal	5.0E+04	2.6E+02		2.6E+02
tert-BUTYL ALCOHOL	5.8E+00	Drinking Water Toxicity	5.0E+04	5.8E+00	(Use soil gas)	1.8E+04
TETRACHLOROETHANE, 1,1,1,2-	6.1E-01	Drinking Water Toxicity	5.0E+04	6.1E-01	(Use soil gas)	1.1E+01
TETRACHLOROETHANE, 1,1,2,2-	7.8E-02	Drinking Water Toxicity	5.0E+02	7.8E-02	2.4E+02	2.0E+02
TETRACHLOROETHYLENE	5.0E+00	Drinking Water Toxicity	1.7E+02	5.0E+00	1.9E+02	5.3E+01
TETRACHLOROPHENOL, 2,3,4,6-	1.2E+00	Aquatic Habitat Goal	1.2E+04	6.0E+02		1.2E+00
TETRANITRO-1,3,5,7-TETRAAZOCYCLOOCTANE (HMX)	2.2E+02	Aquatic Habitat Goal	2.5E+03	1.0E+03		2.2E+02
THALLIUM	2.0E+00	Drinking Water Toxicity	5.0E+04	2.0E+00		6.0E+00
TOLUENE	9.8E+00	Aquatic Habitat Goal	4.0E+01	1.0E+03	5.3E+05	9.8E+00
TOXAPHENE	2.0E-04	Aquatic Habitat Goal	1.4E+02	3.0E+00		2.0E-04
TPH (gasolines)	1.0E+02	Gross Contamination	1.0E+02	3.0E+02	(Use soil gas)	5.0E+02
TPH (middle distillates)	1.0E+02	Gross Contamination	1.0E+02	1.6E+02	(Use soil gas)	6.4E+02
TPH (residual fuels)	1.0E+02	Gross Contamination	1.0E+02	2.4E+03		6.4E+02

TABLE F-1a. GROUNDWATER SCREENING LEVELS
(groundwater IS a current or potential drinking water resource)
(ug/l)

CHEMICAL PARAMETER	[1]Final Groundwater Screening Level	Basis	Gross Contamination (Taste & Odors, etc.) Table I-1	Drinking Water (Toxicity) Table F-3a	Vapor Intrusion Into Buildings Table E-1a	Estuary Aquatic Habitat Goal (Chronic) Table F-4a
TRICHLOROBENZENE, 1,2,4-	7.0E+01	Drinking Water Toxicity	3.0E+03	7.0E+01	1.2E+03	1.1E+02
TRICHLOROETHANE, 1,1,1-	1.1E+01	Aquatic Habitat Goal	9.7E+02	2.0E+02	3.4E+05	1.1E+01
TRICHLOROETHANE, 1,1,2-	5.0E+00	Drinking Water Toxicity	5.0E+04	5.0E+00	1.1E+02	7.3E+02
TRICHLOROETHYLENE	5.0E+00	Drinking Water Toxicity	3.1E+02	5.0E+00	2.1E+02	4.7E+01
TRICHLOROPHENOL, 2,4,5-	1.1E+01	Aquatic Habitat Goal	2.0E+02	2.0E+03		1.1E+01
TRICHLOROPHENOL, 2,4,6-	4.9E+00	Aquatic Habitat Goal	1.0E+02	7.1E+00		4.9E+00
TRICHLOROPHENOXYACETIC ACID, 2,4,5- (2,4,5-T)	2.0E+02	Drinking Water Toxicity	5.0E+04	2.0E+02		6.9E+02
TRICHLOROPHENOXYPROPIONIC ACID, 2,4,5- (2,4,5-TP)	3.0E+01	Aquatic Habitat Goal	3.6E+04	1.6E+02		3.0E+01
TRICHLOROPROPANE, 1,2,3-	2.0E-04	Drinking Water Toxicity	5.0E+04	2.0E-04	(Use soil gas)	1.4E+01
TRICHLOROPROPENE, 1,2,3-	6.2E-01	Aquatic Habitat Goal	5.0E+04	6.2E-01	(Use soil gas)	6.2E-01
TRIFLURALIN	1.1E+00	Aquatic Habitat Goal	9.0E+01	1.0E+01		1.1E+00
TRINITROBENZENE, 1,3,5-	1.0E+01	Aquatic Habitat Goal	5.0E+04	6.0E+02		1.0E+01
TRINITROPHENYLMETHYLNITRAMINE, 2,4,6- (TETRYL)	4.0E+01	Aquatic Habitat Goal	3.7E+04	4.0E+01		4.0E+01
TRINITROTOLUENE, 2,4,6- (TNT)	2.6E+00	Drinking Water Toxicity	5.0E+04	2.6E+00		1.3E+01
VANADIUM	2.7E+01	Aquatic Habitat Goal	5.0E+04	1.0E+02		2.7E+01
VINYL CHLORIDE	2.0E+00	Drinking Water Toxicity	3.4E+03	2.0E+00	1.8E+01	9.3E+02
XYLENES	1.3E+01	Aquatic Habitat Goal	2.0E+01	1.0E+04	1.1E+05	1.3E+01
ZINC	8.1E+01	Aquatic Habitat Goal	5.0E+03	6.0E+03		8.1E+01

Notes:

1. Lowest of groundwater Gross Contamination, Vapor Intrusion and Aquatic Habitat screening levels. Used to develop soil leaching levels for protection of groundwater quality.

TPH -Total Petroleum Hydrocarbons. See text for discussion of different TPH categories.

sol - solubility threshold

Gross Contamination: Odor threshold, 1/2 solubility or 50000 ug/L maximum, whichever is lower. Intended to limit general groundwater resource degradation. Odor-thresholds assume no dilution.

Human Toxicity: Based on primary maximum concentration levels (MCLs), or equivalent. Considered protective of human health.

Vapor Intrusion: Addresses potential emission of volatile chemicals from groundwater into buildings and subsequent impact on indoor air. Assumes moderately permeable, sandy soil or fill material immediately beneath building slab (refer to Chapter 2).

Aquatic Habitat Goal: Addresses potential discharge of groundwater to estuarine aquatic habitat and subsequent impact on aquatic life; dilution of groundwater upon discharge to surface water not considered, in order to take into account potential impacts to benthic organisms (see Chapter 2).

Review of aquatic ecotoxicity data for ethanol underway. Based on preliminary review of available data, chronic toxicity screening levels likely to be significantly greater than ceiling level of 50,000 ug/L (refer to USEPA 2003b, ECOTOX database).

Method detection limits and background concentrations replace final screening level as appropriate.

TABLE F-1b. GROUNDWATER SCREENING LEVELS
(groundwater IS NOT a current or potential drinking water resource)
(ug/l)

CHEMICAL PARAMETER	[1]Final Groundwater Screening Level	Basis	Gross Contamination (Odors, etc.) Table I-2	Vapor Intrusion Into Buildings Table E-1a	Estuary Aquatic Habitat Goal (Chronic) Table F-4a
ACENAPHTHENE	1.5E+01	Aquatic Habitat Goal	2.0E+02	3.9E+03	1.5E+01
ACENAPHTHYLENE	1.3E+01	Aquatic Habitat Goal	2.0E+03	(Use soil gas)	1.3E+01
ACETONE	1.5E+03	Aquatic Habitat Goal	5.0E+04	6.2E+08	1.5E+03
ALDRIN	1.4E-04	Aquatic Habitat Goal	8.5E+00		1.4E-04
AMETRYN	7.0E+02	Aquatic Habitat Goal	5.0E+04		7.0E+02
AMINO,2- DINITROTOLUENE,4,6-	1.8E+01	Aquatic Habitat Goal	5.0E+04		1.8E+01
AMINO,4- DINITROTOLUENE,2,6-	1.1E+01	Aquatic Habitat Goal	5.0E+04		1.1E+01
ANTHRACENE	2.0E-02	Aquatic Habitat Goal	2.2E+01	4.3E+01	2.0E-02
ANTIMONY	3.0E+01	Aquatic Habitat Goal	5.0E+04		3.0E+01
ARSENIC	3.6E+01	Aquatic Habitat Goal	5.0E+04		3.6E+01
ATRAZINE	1.2E+01	Aquatic Habitat Goal	1.8E+04		1.2E+01
BARIUM	2.2E+02	Aquatic Habitat Goal	5.0E+04		2.2E+02
BENOMYL	1.4E-01	Aquatic Habitat Goal	1.9E+03		1.4E-01
BENZENE	7.1E+01	Aquatic Habitat Goal	2.0E+04	2.3E+03	7.1E+01
BENZO(a)ANTHRACENE	2.7E-02	Aquatic Habitat Goal	4.7E+00		2.7E-02
BENZO(a)PYRENE	6.0E-02	Aquatic Habitat Goal	8.0E-01		6.0E-02
BENZO(b)FLUORANTHENE	6.8E-01	Aquatic Habitat Goal	7.5E-01		6.8E-01
BENZO(g,h,i)PERYLENE	1.3E-01	Gross Contamination	1.3E-01		4.4E-01
BENZO(k)FLUORANTHENE	4.0E-01	Gross Contamination	4.0E-01		6.4E-01
BERYLLIUM	6.6E-01	Aquatic Habitat Goal	5.0E+04		6.6E-01
BIPHENYL, 1,1-	5.0E+00	Gross Contamination	5.0E+00	(Use soil gas)	6.5E+00
BIS(2-CHLOROETHYL)ETHER	1.8E+02	Vapor Intrusion	3.6E+03	1.8E+02	2.4E+03
BIS(2-CHLORO-1-METHYLETHYL)ETHER	3.7E-01	Aquatic Habitat Goal	3.2E+03	(Use soil gas)	3.7E-01
BIS(2-ETHYLHEXYL)PHTHALATE	3.0E+00	Aquatic Habitat Goal	1.4E+02		3.0E+00
BORON	1.0E+03	Aquatic Habitat Goal	5.0E+04		1.0E+03
BROMODICHLOROMETHANE	1.1E+02	Vapor Intrusion	5.0E+04	1.1E+02	3.4E+02
BROMOFORM	2.3E+02	Aquatic Habitat Goal	5.1E+03		2.3E+02
BROMOMETHANE	1.6E+01	Aquatic Habitat Goal	5.0E+04	4.1E+02	1.6E+01
CADMIUM	2.5E-01	Aquatic Habitat Goal	5.0E+04		2.5E-01
CARBON TETRACHLORIDE	9.8E+00	Aquatic Habitat Goal	5.2E+03	1.1E+02	9.8E+00
CHLORDANE (TECHNICAL)	4.0E-03	Aquatic Habitat Goal	2.5E+01		4.0E-03
CHLOROANILINE, p-	1.9E+01	Aquatic Habitat Goal	5.0E+04		1.9E+01
CHLOROBENZENE	2.5E+01	Aquatic Habitat Goal	5.0E+02	1.2E+04	2.5E+01
CHLOROETHANE	1.6E+02	Gross Contamination	1.6E+02	6.0E+05	2.1E+04
CHLOROFORM	2.8E+01	Aquatic Habitat Goal	2.4E+04	1.1E+02	2.8E+01
CHLOROMETHANE	1.9E+02	Aquatic Habitat Goal	5.0E+04	5.2E+03	1.9E+02
CHLOROPHENOL, 2-	1.8E+00	Gross Contamination	1.8E+00	1.0E+05	3.2E+01
CHROMIUM (Total)	1.1E+01	Aquatic Habitat Goal	5.0E+04		1.1E+01
CHROMIUM III	2.0E+01	Aquatic Habitat Goal	5.0E+04		2.0E+01
CHROMIUM VI	1.1E+01	Aquatic Habitat Goal	5.0E+04		1.1E+01
CHRYSENE	1.0E+00	Gross Contamination	1.0E+00		2.0E+00
COBALT	1.9E+01	Aquatic Habitat Goal	5.0E+04		1.9E+01
COPPER	3.1E+00	Aquatic Habitat Goal	5.0E+04		3.1E+00
CYANIDE (Free)	1.0E+00	Aquatic Habitat Goal	1.7E+03	(Use soil gas)	1.0E+00
CYCLO-1,3,5-TRIMETHYLENE-2,4,6-TRINITRAMINE (RDX)	7.9E+01	Aquatic Habitat Goal	3.0E+04		7.9E+01
DALAPON	3.0E+02	Aquatic Habitat Goal	5.0E+04		3.0E+02
DIBENZO(a,h)ANTHTRACENE	8.0E-01	Aquatic Habitat Goal	1.3E+00		8.0E-01

TABLE F-1b. GROUNDWATER SCREENING LEVELS
(groundwater IS NOT a current or potential drinking water resource)
(ug/l)

CHEMICAL PARAMETER	[1]Final Groundwater Screening Level	Basis	Gross Contamination (Odors, etc.) Table I-2	Vapor Intrusion Into Buildings Table E-1a	Estuary Aquatic Habitat Goal (Chronic) Table F-4a
DIBROMO,1,2- CHLOROPROPANE,3-	2.0E-01	Aquatic Habitat Goal	1.0E+02	(Use soil gas)	2.0E-01
DIBROMOCHLOROMETHANE	3.4E+01	Aquatic Habitat Goal	5.0E+04	4.5E+02	3.4E+01
DIBROMOETHANE, 1,2-	1.9E+01	Vapor Intrusion	5.0E+04	1.9E+01	1.4E+03
DICHLOROBENZENE, 1,2-	1.4E+01	Aquatic Habitat Goal	1.0E+02	8.3E+04	1.4E+01
DICHLOROBENZENE, 1,3-	2.2E+01	Aquatic Habitat Goal	5.0E+04	(Use soil gas)	2.2E+01
DICHLOROBENZENE, 1,4-	9.4E+00	Aquatic Habitat Goal	1.1E+02	4.5E+02	9.4E+00
DICHLOROBENZIDINE, 3,3-	4.5E+00	Aquatic Habitat Goal	1.6E+03		4.5E+00
DICHLORODIPHENYLDICHLOROETHANE (DDD)	1.1E-02	Aquatic Habitat Goal	4.5E+01		1.1E-02
DICHLORODIPHENYLDICHLOROETHYLENE (DDE)	4.1E-01	Aquatic Habitat Goal	2.0E+01		4.1E-01
DICHLORODIPHENYLTRICHLOROETHANE (DDT)	1.0E-03	Aquatic Habitat Goal	2.8E+00		1.0E-03
DICHLOROETHANE, 1,1-	4.7E+01	Aquatic Habitat Goal	5.0E+04	1.1E+03	4.7E+01
DICHLOROETHANE, 1,2-	1.8E+02	Vapor Intrusion	5.0E+04	1.8E+02	9.1E+02
DICHLOROETHYLENE, 1,1-	2.5E+01	Aquatic Habitat Goal	1.5E+04	6.6E+03	2.5E+01
DICHLOROETHYLENE, Cis 1,2-	6.2E+02	Aquatic Habitat Goal	5.0E+04	1.3E+03	6.2E+02
DICHLOROETHYLENE, Trans 1,2-	5.6E+02	Aquatic Habitat Goal	2.6E+03	6.6E+03	5.6E+02
DICHLOROPHENOL, 2,4-	3.0E+00	Gross Contamination	3.0E+00		1.1E+01
DICHLOROPHENOXYACETIC ACID (2,4-D)	7.0E+01	Aquatic Habitat Goal	5.0E+04		7.0E+01
DICHLOROPROPANE, 1,2-	1.0E+02	Gross Contamination	1.0E+02	3.4E+02	5.2E+02
DICHLOROPROPENE, 1,3-	6.0E-02	Aquatic Habitat Goal	5.0E+04	6.7E+02	6.0E-02
DIELDRIN	1.9E-03	Aquatic Habitat Goal	9.8E+01		1.9E-03
DIETHYLPHTHALATE	2.1E+02	Aquatic Habitat Goal	5.0E+04		2.1E+02
DIMETHYLPHENOL, 2,4-	1.1E+02	Aquatic Habitat Goal	4.0E+03		1.1E+02
DIMETHYLPHTHALATE	1.1E+03	Aquatic Habitat Goal	5.0E+04		1.1E+03
DINITROBENZENE, 1,3-	1.0E+01	Aquatic Habitat Goal	5.0E+04		1.0E+01
DINITROPHENOL, 2,4-	1.4E+01	Aquatic Habitat Goal	5.0E+04		1.4E+01
DINITROTOLUENE, 2,4- (2,4-DNT)	9.1E+00	Aquatic Habitat Goal	5.0E+04		9.1E+00
DINITROTOLUENE, 2,6- (2,6-DNT)	8.1E+01	Aquatic Habitat Goal	5.0E+04		8.1E+01
DIOXANE, 1,4-	5.0E+04	Gross Contamination	5.0E+04	(Use soil gas)	3.4E+05
DIOXINS (TEQ)	3.1E-09	Aquatic Habitat Goal	1.0E-01		3.1E-09
DIURON	6.0E+01	Aquatic Habitat Goal	2.1E+04		6.0E+01
ENDOSULFAN	8.7E-03	Aquatic Habitat Goal	1.6E+02		8.7E-03
ENDRIN	2.3E-03	Aquatic Habitat Goal	1.3E+02		2.3E-03
ETHANOL	5.0E+04	Gross Contamination	5.0E+04	(Use soil gas)	
ETHYLBENZENE	7.3E+00	Aquatic Habitat Goal	3.0E+02	7.6E+04	7.3E+00
FLUORANTHENE	8.0E-01	Aquatic Habitat Goal	1.3E+02		8.0E-01
FLUORENE	3.9E+00	Aquatic Habitat Goal	8.5E+02	1.7E+03	3.9E+00
GLYPHOSATE	1.8E+03	Aquatic Habitat Goal	5.0E+04		1.8E+03
HEPTACHLOR	3.6E-03	Aquatic Habitat Goal	9.0E+01		3.6E-03
HEPTACHLOR EPOXIDE	3.6E-03	Aquatic Habitat Goal	1.0E+02		3.6E-03
HEXACHLOROBENZENE	3.0E-04	Aquatic Habitat Goal	3.1E+00		3.0E-04
HEXACHLOROBUTADIENE	3.0E-01	Aquatic Habitat Goal	6.0E+01		3.0E-01
HEXACHLOROCYCLOHEXANE (gamma) LINDANE	6.3E-02	Aquatic Habitat Goal	3.7E+03		6.3E-02
HEXACHLOROETHANE	1.2E+01	Aquatic Habitat Goal	1.0E+02		1.2E+01
HEXAZINONE	1.7E+04	Aquatic Habitat Goal	5.0E+04		1.7E+04
INDENO(1,2,3-cd)PYRENE	9.5E-02	Gross Contamination	9.5E-02		2.8E-01
ISOPHORONE	9.2E+02	Aquatic Habitat Goal	5.0E+04		9.2E+02
LEAD	2.5E+00	Aquatic Habitat Goal	5.0E+04		2.5E+00

TABLE F-1b. GROUNDWATER SCREENING LEVELS
(groundwater IS NOT a current or potential drinking water resource)
(ug/l)

CHEMICAL PARAMETER	[1]Final Groundwater Screening Level	Basis	Gross Contamination (Odors, etc.) Table I-2	Vapor Intrusion Into Buildings Table E-1a	Estuary Aquatic Habitat Goal (Chronic) Table F-4a
MERCURY	0.0E+00	Gross Contamination	0.0E+00		7.7E-01
METHOXYCHLOR	1.9E-02	Aquatic Habitat Goal	5.0E+01		1.9E-02
METHYL ETHYL KETONE	1.4E+04	Aquatic Habitat Goal	5.0E+04	2.2E+08	1.4E+04
METHYL ISOBUTYL KETONE	1.7E+02	Aquatic Habitat Goal	1.3E+04	1.9E+07	1.7E+02
METHYL MERCURY	2.8E-03	Aquatic Habitat Goal	5.0E+04		2.8E-03
METHYL TERT BUTYL ETHER	1.8E+03	Gross Contamination	1.8E+03	3.1E+04	1.8E+04
METHYLENE CHLORIDE	1.5E+03	Aquatic Habitat Goal	5.0E+04	7.6E+04	1.5E+03
METHYLNAPHTHALENE, 1-	2.1E+00	Aquatic Habitat Goal	1.0E+02	2.6E+04	2.1E+00
METHYLNAPHTHALENE, 2-	4.7E+00	Aquatic Habitat Goal	1.0E+02	2.5E+04	4.7E+00
MOLYBDENUM	3.7E+02	Aquatic Habitat Goal	5.0E+04		3.7E+02
NAPHTHALENE	1.2E+01	Aquatic Habitat Goal	2.1E+02	2.9E+04	1.2E+01
NICKEL	8.2E+00	Aquatic Habitat Goal	5.0E+04		8.2E+00
NITROBENZENE	3.8E+02	Aquatic Habitat Goal	5.0E+04	(Use soil gas)	3.8E+02
NITROGLYCERIN	1.8E+01	Aquatic Habitat Goal	5.0E+04		1.8E+01
NITROTOLUENE, 2-	7.1E+01	Aquatic Habitat Goal	5.0E+04	(Use soil gas)	7.1E+01
NITROTOLUENE, 3-	4.2E+01	Aquatic Habitat Goal	5.0E+04		4.2E+01
NITROTOLUENE, 4-	4.6E+01	Aquatic Habitat Goal	5.0E+04		4.6E+01
PENTACHLOROPHENOL	7.9E+00	Aquatic Habitat Goal	5.9E+03		7.9E+00
PENTAERYTHRITOLTETRANITRATE (PETN)	2.2E+04	Gross Contamination	2.2E+04		8.5E+05
PERCHLORATE	6.0E+02	Aquatic Habitat Goal	5.0E+04		6.0E+02
PHENANTHRENE	4.6E+00	Aquatic Habitat Goal	4.1E+02	(Use soil gas)	4.6E+00
PHENOL	5.8E+01	Aquatic Habitat Goal	5.0E+04		5.8E+01
POLYCHLORINATED BIPHENYLS (PCBs)	1.4E-02	Aquatic Habitat Goal	2.2E+01		1.4E-02
PROPICONAZOLE	9.5E+01	Aquatic Habitat Goal	5.0E+04		9.5E+01
PYRENE	4.6E+00	Aquatic Habitat Goal	6.8E+01	1.4E+02	4.6E+00
SELENIUM	5.0E+00	Aquatic Habitat Goal	5.0E+04		5.0E+00
SILVER	6.0E-02	Aquatic Habitat Goal	5.0E+04		6.0E-02
SIMAZINE	9.0E+00	Aquatic Habitat Goal	3.1E+03		9.0E+00
STYRENE	3.2E+01	Aquatic Habitat Goal	1.1E+02	3.1E+05	3.2E+01
TERBACIL	2.6E+02	Aquatic Habitat Goal	5.0E+04		2.6E+02
tert-BUTYL ALCOHOL	1.8E+04	Aquatic Habitat Goal	5.0E+04	(Use soil gas)	1.8E+04
TETRACHLOROETHANE, 1,1,1,2-	1.1E+01	Aquatic Habitat Goal	5.0E+04	(Use soil gas)	1.1E+01
TETRACHLOROETHANE, 1,1,2,2-	2.0E+02	Aquatic Habitat Goal	5.0E+03	2.4E+02	2.0E+02
TETRACHLOROETHYLENE	5.3E+01	Aquatic Habitat Goal	3.0E+03	1.9E+02	5.3E+01
TETRACHLOROPHENOL, 2,3,4,6-	1.2E+00	Aquatic Habitat Goal	1.2E+04		1.2E+00
TETRANITRO-1,3,5,7-TETRAAZOCYCLOOCTANE (HMX)	2.2E+02	Aquatic Habitat Goal	2.5E+03		2.2E+02
THALLIUM	6.0E+00	Aquatic Habitat Goal	5.0E+04		6.0E+00
TOLUENE	9.8E+00	Aquatic Habitat Goal	4.0E+02	5.3E+05	9.8E+00
TOXAPHENE	2.0E-04	Aquatic Habitat Goal	1.4E+02		2.0E-04
TPH (gasolines)	5.0E+02	Aquatic Habitat Goal	5.0E+03	(Use soil gas)	5.0E+02
TPH (middle distillates)	6.4E+02	Aquatic Habitat Goal	2.5E+03	(Use soil gas)	6.4E+02
TPH (residual fuels)	6.4E+02	Aquatic Habitat Goal	2.5E+03		6.4E+02
TRICHLOROBENZENE, 1,2,4-	1.1E+02	Aquatic Habitat Goal	2.5E+04	1.2E+03	1.1E+02
TRICHLOROETHANE, 1,1,1-	1.1E+01	Aquatic Habitat Goal	5.0E+04	3.4E+05	1.1E+01
TRICHLOROETHANE, 1,1,2-	1.1E+02	Vapor Intrusion	5.0E+04	1.1E+02	7.3E+02
TRICHLOROETHYLENE	4.7E+01	Aquatic Habitat Goal	5.0E+04	2.1E+02	4.7E+01
TRICHLOROPHENOL, 2,4,5-	1.1E+01	Aquatic Habitat Goal	2.0E+03		1.1E+01

TABLE F-1b. GROUNDWATER SCREENING LEVELS
(groundwater IS NOT a current or potential drinking water resource)
(ug/l)

CHEMICAL PARAMETER	[1]Final Groundwater Screening Level	Basis	Gross Contamination (Odors, etc.) Table I-2	Vapor Intrusion Into Buildings Table E-1a	Estuary Aquatic Habitat Goal (Chronic) Table F-4a
TRICHLOROPHENOL, 2,4,6-	4.9E+00	Aquatic Habitat Goal	1.0E+03		4.9E+00
TRICHLOROPHENOXYACETIC ACID, 2,4,5- (2,4,5-T)	6.9E+02	Aquatic Habitat Goal	5.0E+04		6.9E+02
TRICHLOROPHENOXYPROPIONIC ACID, 2,4,5- (2,4,5-TP)	3.0E+01	Aquatic Habitat Goal	3.6E+04		3.0E+01
TRICHLOROPROPANE, 1,2,3-	1.4E+01	Aquatic Habitat Goal	5.0E+04	(Use soil gas)	1.4E+01
TRICHLOROPROPENE, 1,2,3-	6.2E-01	Aquatic Habitat Goal	5.0E+04	(Use soil gas)	6.2E-01
TRIFLURALIN	1.1E+00	Aquatic Habitat Goal	9.0E+01		1.1E+00
TRINITROBENZENE, 1,3,5-	1.0E+01	Aquatic Habitat Goal	5.0E+04		1.0E+01
TRINITROPHENYLMETHYLNITRAMINE, 2,4,6- (TETRYL)	4.0E+01	Aquatic Habitat Goal	3.7E+04		4.0E+01
TRINITROTOLUENE, 2,4,6- (TNT)	1.3E+01	Aquatic Habitat Goal	5.0E+04		1.3E+01
VANADIUM	2.7E+01	Aquatic Habitat Goal	5.0E+04		2.7E+01
VINYL CHLORIDE	1.8E+01	Vapor Intrusion	3.4E+04	1.8E+01	9.3E+02
XYLENES	1.3E+01	Aquatic Habitat Goal	5.3E+03	1.1E+05	1.3E+01
ZINC	8.1E+01	Aquatic Habitat Goal	5.0E+04		8.1E+01

Notes:

1. Lowest of groundwater Gross Contamination, Vapor Intrusion and Aquatic Habitat screening levels. Used to develop soil leaching levels for protection of groundwater quality.

NV: No Value. Use of soil gas screening levels recommended for chemicals with inadequate physio-chemical constant data for groundwater models.

TPH -Total Petroleum Hydrocarbons. See text for discussion of different TPH categories.

sol - solubility threshold

Category includes groundwater that does not meet drinking water quality requirements under natural conditions (e.g., excessive total dissolved solids) AND/OR situated in strata that lack adequate aquifer characteristics AND is not likely to otherwise directly impact a source of drinking water.

Gross Contamination: Odor threshold, 1/2 solubility or 50000 ug/L maximum, whichever is lower. Intended to limit general groundwater resource degradation.

Odor-thresholds assume ten-fold dilution of groundwater upon mixing with surface water.

Vapor Intrusion: Addresses potential emission of volatile chemicals from groundwater into buildings and subsequent impact on indoor air. Assumes moderately permeable, sandy soil or fill material immediately beneath building slab (refer to Chapter 2).

Aquatic Life Protection: Addresses potential discharge of groundwater to surface waterbody and subsequent impact on aquatic life; screening levels assume no dilution upon discharge to surface water unless otherwise noted.

Review of aquatic ecotoxicity data for ethanol underway. Based on preliminary review of available data, chronic toxicity screening levels likely to be significantly greater than ceiling level of 50,000 ug/L (refer to USEPA 2003b, ECOTOX database).

TABLE F-2a. SURFACE WATER SCREENING LEVELS
Fresh Water Habitats
(ug/l)

CHEMICAL PARAMETER	[1]Final Surface Water Screening Level	Basis	Gross Contamination (Taste & Odors, etc.) Table I-3	Drinking Water (Toxicity) Table F-3a	Fresh Water Aquatic Habitat Goal (Chronic Toxicity) Table F-4a	Bioaccumulation and Human Consumption Table F-4f
ACENAPHTHENE	1.5E+01	Aquatic Habitat Chronic Toxicity	2.0E+01	3.5E+02	1.5E+01	9.9E+02
ACENAPHTHYLENE	1.3E+01	Aquatic Habitat Chronic Toxicity	2.0E+03	2.4E+02	1.3E+01	-
ACETONE	1.7E+03	Aquatic Habitat Chronic Toxicity	2.0E+04	1.4E+04	1.7E+03	-
ALDRIN	5.0E-05	Bioaccumulation/Human Consumption	8.5E+00	5.1E-03	3.5E-02	5.0E-05
AMETRYN	1.8E+02	Drinking Water Toxicity	5.0E+04	1.8E+02	7.0E+02	-
AMINO,2- DINITROTOLUENE,4,6-	1.8E+01	Aquatic Habitat Chronic Toxicity	5.0E+04	4.0E+01	1.8E+01	-
AMINO,4- DINITROTOLUENE,2,6-	1.1E+01	Aquatic Habitat Chronic Toxicity	5.0E+04	4.0E+01	1.1E+01	-
ANTHRACENE	2.0E-02	Aquatic Habitat Chronic Toxicity	2.2E+01	1.8E+03	2.0E-02	4.0E+04
ANTIMONY	6.0E+00	Drinking Water Toxicity	5.0E+04	6.0E+00	3.0E+01	6.4E+02
ARSENIC	1.4E-01	Bioaccumulation/Human Consumption	5.0E+04	1.0E+01	1.5E+02	1.4E-01
ATRAZINE	3.4E-01	Drinking Water Toxicity	1.8E+04	3.4E-01	1.2E+01	-
BARIUM	2.2E+02	Aquatic Habitat Chronic Toxicity	5.0E+04	2.0E+03	2.2E+02	-
BENOMYL	1.4E-01	Aquatic Habitat Chronic Toxicity	1.9E+03	1.0E+03	1.4E-01	-
BENZENE	5.0E+00	Drinking Water Toxicity	1.7E+02	5.0E+00	1.6E+02	5.1E+01
BENZO(a)ANTHRACENE	1.1E-02	Drinking Water Toxicity	4.7E+00	1.1E-02	4.7E+00	1.8E-02
BENZO(a)PYRENE	1.8E-02	Bioaccumulation/Human Consumption	8.0E-01	2.0E-01	6.0E-02	1.8E-02
BENZO(b)FLUORANTHENE	1.8E-02	Bioaccumulation/Human Consumption	7.5E-01	2.9E-02	2.6E+00	1.8E-02
BENZO(g,h,i)PERYLENE	1.3E-01	Ceiling Value	1.3E-01	8.0E+02	4.4E-01	-
BENZO(k)FLUORANTHENE	1.8E-02	Bioaccumulation/Human Consumption	4.0E-01	2.9E-01	6.4E-01	1.8E-02
BERYLLIUM	4.0E+00	Drinking Water Toxicity	5.0E+04	4.0E+00	1.1E+01	-
BIPHENYL, 1,1-	5.0E-01	Ceiling Value	5.0E-01	8.3E-01	6.5E+00	-
BIS(2-CHLOROETHYL)ETHER	1.4E-02	Drinking Water Toxicity	3.6E+02	1.4E-02	2.4E+03	5.3E-01
BIS(2-CHLORO-1-METHYLETHYL)ETHER	3.7E-01	Drinking Water Toxicity	3.2E+02	3.7E-01	3.7E-01	6.5E+04
BIS(2-ETHYLHEXYL)PHTHALATE	2.2E+00	Bioaccumulation/Human Consumption	1.4E+02	6.0E+00	3.0E+00	2.2E+00
BORON	4.0E+03	Drinking Water Toxicity	5.0E+04	4.0E+03	7.2E+03	-
BROMODICHLOROMETHANE	1.4E-01	Drinking Water Toxicity	5.0E+04	1.4E-01	3.4E+02	-
BROMOFORM	1.0E+02	Drinking Water Toxicity	5.1E+02	1.0E+02	2.3E+02	1.4E+02
BROMOMETHANE	7.6E+00	Drinking Water Toxicity	5.0E+04	7.6E+00	1.6E+01	1.5E+03
CADMIUM	2.5E-01	Aquatic Habitat Chronic Toxicity	5.0E+04	5.0E+00	2.5E-01	-
CARBON TETRACHLORIDE	1.6E+00	Bioaccumulation/Human Consumption	5.2E+02	5.0E+00	7.7E+01	1.6E+00
CHLORDANE (TECHNICAL)	8.1E-04	Bioaccumulation/Human Consumption	2.5E+00	2.0E+00	4.3E-03	8.1E-04
CHLOROANILINE, p-	3.9E-01	Drinking Water Toxicity	5.0E+04	3.9E-01	1.9E+01	-
CHLOROBENZENE	2.5E+01	Aquatic Habitat Chronic Toxicity	5.0E+01	1.0E+02	2.5E+01	2.1E+04
CHLOROETHANE	1.6E+01	Ceiling Value	1.6E+01	2.1E+04	2.1E+04	-
CHLOROFORM	1.0E+02	Drinking Water Toxicity	2.4E+03	1.0E+02	1.4E+02	4.7E+02
CHLOROMETHANE	1.9E+02	Drinking Water Toxicity	5.0E+04	1.9E+02	1.9E+02	-
CHLOROPHENOL, 2-	1.8E-01	Ceiling Value	1.8E-01	2.9E+01	3.2E+01	1.5E+02
CHROMIUM (Total)	1.1E+01	Aquatic Habitat Chronic Toxicity	5.0E+04	1.0E+02	1.1E+01	-
CHROMIUM III	7.4E+01	Aquatic Habitat Chronic Toxicity	5.0E+04	3.0E+04	7.4E+01	-
CHROMIUM VI	4.3E-02	Drinking Water Toxicity	5.0E+04	4.3E-02	1.1E+01	-
CHRYSENE	1.8E-02	Bioaccumulation/Human Consumption	1.0E+00	2.9E+00	4.7E+00	1.8E-02
COBALT	6.0E+00	Drinking Water Toxicity	5.0E+04	6.0E+00	1.9E+01	-
COPPER	9.0E+00	Aquatic Habitat Chronic Toxicity	1.0E+03	1.3E+03	9.0E+00	-
CYANIDE (Free)	5.2E+00	Aquatic Habitat Chronic Toxicity	1.7E+02	2.0E+02	5.2E+00	2.2E+05

TABLE F-2a. SURFACE WATER SCREENING LEVELS
Fresh Water Habitats
(ug/l)

CHEMICAL PARAMETER	[1]Final Surface Water Screening Level	Basis	Gross Contamination (Taste & Odors, etc.) Table I-3	Drinking Water (Toxicity) Table F-3a	Fresh Water Aquatic Habitat Goal (Chronic Toxicity) Table F-4a	Bioaccumulation and Human Consumption Table F-4f
CYCLO-1,3,5-TRIMETHYLENE-2,4,6-TRINITRAMINE (RDX)	7.1E-01	Drinking Water Toxicity	3.0E+04	7.1E-01	7.9E+01	-
DALAPON	3.0E+02	Aquatic Habitat Chronic Toxicity	5.0E+04	6.0E+02	3.0E+02	-
DIBENZO(a,h)ANTHTRACENE	2.9E-03	Drinking Water Toxicity	1.3E+00	2.9E-03	8.0E-01	1.8E-02
DIBROMO,1,2- CHLOROPROPANE,3-	2.0E-01	Drinking Water Toxicity	1.0E+01	2.0E-01	2.0E-01	-
DIBROMOCHLOROMETHANE	2.1E-01	Drinking Water Toxicity	5.0E+04	2.1E-01	3.2E+02	1.3E+01
DIBROMOETHANE, 1,2-	5.0E-02	Drinking Water Toxicity	5.0E+04	5.0E-02	1.4E+03	-
DICHLOROBENZENE, 1,2-	1.0E+01	Ceiling Value	1.0E+01	6.0E+02	2.3E+01	1.7E+04
DICHLOROBENZENE, 1,3-	2.2E+01	Aquatic Habitat Chronic Toxicity	5.0E+04	1.8E+02	2.2E+01	9.6E+02
DICHLOROBENZENE, 1,4-	5.0E+00	Ceiling Value	5.0E+00	7.5E+01	9.4E+00	2.6E+03
DICHLOROBENZIDINE, 3,3-	2.8E-02	Bioaccumulation/Human Consumption	1.6E+03	1.7E-01	4.5E+00	2.8E-02
DICHLORODIPHENYLDICHLOROETHANE (DDD)	3.1E-04	Bioaccumulation/Human Consumption	4.5E+01	3.2E-01	1.1E-02	3.1E-04
DICHLORODIPHENYLDICHLOROETHYLENE (DDE)	2.2E-04	Bioaccumulation/Human Consumption	2.0E+01	4.6E-02	4.1E-01	2.2E-04
DICHLORODIPHENYLTRICHLOROETHANE (DDT)	2.2E-04	Bioaccumulation/Human Consumption	2.8E+00	2.3E-01	1.0E-03	2.2E-04
DICHLOROETHANE, 1,1-	2.8E+00	Drinking Water Toxicity	5.0E+04	2.8E+00	4.1E+02	-
DICHLOROETHANE, 1,2-	5.0E+00	Drinking Water Toxicity	7.0E+03	5.0E+00	2.0E+03	3.7E+01
DICHLOROETHYLENE, 1,1-	3.2E+00	Bioaccumulation/Human Consumption	1.5E+03	7.0E+00	1.3E+02	3.2E+00
DICHLOROETHYLENE, Cis 1,2-	7.0E+01	Drinking Water Toxicity	5.0E+04	7.0E+01	6.2E+02	-
DICHLOROETHYLENE, Trans 1,2-	1.0E+02	Drinking Water Toxicity	2.6E+02	1.0E+02	5.6E+02	140000
DICHLOROPHENOL, 2,4-	3.0E-01	Ceiling Value	3.0E-01	6.0E+01	1.1E+01	2.9E+02
DICHLOROPHENOXYACETIC ACID (2,4-D)	7.9E+01	Aquatic Habitat Chronic Toxicity	5.0E+04	2.0E+02	7.9E+01	-
DICHLOROPROPANE, 1,2-	5.0E+00	Drinking Water Toxicity	1.0E+01	5.0E+00	5.2E+02	1.5E+01
DICHLOROPROPENE, 1,3-	5.0E-01	Drinking Water Toxicity	5.0E+04	5.0E-01	1.7E+00	1.7E+03
DIELDRIN	5.4E-05	Bioaccumulation/Human Consumption	4.1E+01	1.1E-02	5.6E-02	5.4E-05
DIETHYLPHTHALATE	2.2E+02	Aquatic Habitat Chronic Toxicity	5.0E+04	1.6E+04	2.2E+02	4.4E+04
DIMETHYLPHENOL, 2,4-	4.0E+02	Ceiling Value	4.0E+02	4.0E+02	5.3E+02	8.5E+02
DIMETHYLPHTHALATE	1.1E+03	Aquatic Habitat Chronic Toxicity	5.0E+04	2.0E+05	1.1E+03	1.1E+06
DINITROBENZENE, 1,3-	2.0E+00	Drinking Water Toxicity	5.0E+04	2.0E+00	2.2E+01	-
DINITROPHENOL, 2,4-	4.0E+01	Drinking Water Toxicity	5.0E+04	4.0E+01	7.1E+01	5.3E+03
DINITROTOLUENE, 2,4- (2,4-DNT)	2.5E-01	Drinking Water Toxicity	5.0E+04	2.5E-01	4.4E+01	3.4E+00
DINITROTOLUENE, 2,6- (2,6-DNT)	5.2E-02	Drinking Water Toxicity	5.0E+04	5.2E-02	8.1E+01	-
DIOXANE, 1,4-	4.6E-01	Drinking Water Toxicity	5.0E+04	4.6E-01	3.4E+05	-
DIOXINS (TEQ)	3.1E-09	Aquatic Habitat Chronic Toxicity	1.0E-01	3.0E-08	3.1E-09	5.1E-09
DIURON	4.0E+01	Drinking Water Toxicity	2.1E+04	4.0E+01	6.0E+01	-
ENDOSULFAN	5.6E-02	Aquatic Habitat Chronic Toxicity	1.6E+02	1.2E+02	5.6E-02	8.9E+01
ENDRIN	3.6E-02	Aquatic Habitat Chronic Toxicity	4.1E+01	2.0E+00	3.6E-02	8.1E-01
ETHANOL	5.0E+04	Ceiling Value	5.0E+04			-
ETHYLBENZENE	3.0E+01	Ceiling Value	3.0E+01	7.0E+02	6.1E+01	2.9E+04
FLUORANTHENE	8.0E-01	Aquatic Habitat Chronic Toxicity	1.3E+02	8.0E+02	8.0E-01	1.4E+02
FLUORENE	1.9E+01	Aquatic Habitat Chronic Toxicity	8.5E+02	2.4E+02	1.9E+01	5.3E+03
GLYPHOSATE	1.8E+03	Aquatic Habitat Chronic Toxicity	5.0E+04	2.0E+03	1.8E+03	-
HEPTACHLOR	7.9E-05	Bioaccumulation/Human Consumption	2.0E+01	4.0E-01	3.8E-03	7.9E-05
HEPTACHLOR EPOXIDE	3.9E-05	Bioaccumulation/Human Consumption	1.0E+02	2.0E-01	3.8E-03	3.9E-05
HEXACHLOROBENZENE	2.9E-04	Bioaccumulation/Human Consumption	3.1E+00	1.0E+00	3.7E+00	2.9E-04
HEXACHLOROBUTADIENE	2.0E-01	Drinking Water Toxicity	6.0E+00	2.0E-01	1.0E+00	1.8E+01

TABLE F-2a. SURFACE WATER SCREENING LEVELS
Fresh Water Habitats
(ug/l)

CHEMICAL PARAMETER	[1]Final Surface Water Screening Level	Basis	Gross Contamination (Taste & Odors, etc.) Table I-3	Drinking Water (Toxicity) Table F-3a	Fresh Water Aquatic Habitat Goal (Chronic Toxicity) Table F-4a	Bioaccumulation and Human Consumption Table F-4f
HEXACHLOROCYCLOHEXANE (gamma) LINDANE	6.3E-02	Bioaccumulation/Human Consumption	3.7E+03	2.0E-01	1.1E-01	6.3E-02
HEXACHLOROETHANE	4.0E-01	Drinking Water Toxicity	1.0E+01	4.0E-01	1.2E+01	3.3E+00
HEXAZINONE	6.6E+02	Drinking Water Toxicity	5.0E+04	6.6E+02	1.7E+04	-
INDENO(1,2,3-cd)PYRENE	1.8E-02	Bioaccumulation/Human Consumption	9.5E-02	2.9E-02	2.8E-01	1.8E-02
ISOPHORONE	8.2E+01	Drinking Water Toxicity	5.0E+04	8.2E+01	9.2E+02	-
LEAD	2.5E+00	Aquatic Habitat Chronic Toxicity	5.0E+04	1.5E+01	2.5E+00	-
MERCURY	0.0E+00	Ceiling Value	0.0E+00	2.0E+00	7.7E-01	3.0E-01
METHOXYCHLOR	3.0E-02	Aquatic Habitat Chronic Toxicity	5.0E+01	4.0E+01	3.0E-02	-
METHYL ETHYL KETONE	5.6E+03	Drinking Water Toxicity	8.4E+03	5.6E+03	2.2E+04	-
METHYL ISOBUTYL KETONE	1.7E+02	Aquatic Habitat Chronic Toxicity	1.3E+03	6.3E+03	1.7E+02	-
METHYL MERCURY	2.8E-03	Aquatic Habitat Chronic Toxicity	5.0E+04	2.0E+00	2.8E-03	-
METHYL TERT BUTYL ETHER	5.0E+00	Ceiling Value	5.0E+00	1.4E+01	5.1E+04	-
METHYLENE CHLORIDE	5.0E+00	Drinking Water Toxicity	9.1E+03	5.0E+00	1.5E+03	5.9E+02
METHYLNAPHTHALENE, 1-	2.1E+00	Aquatic Habitat Chronic Toxicity	1.0E+01	6.0E+00	2.1E+00	-
METHYLNAPHTHALENE, 2-	4.7E+00	Aquatic Habitat Chronic Toxicity	1.0E+01	2.4E+01	4.7E+00	-
MOLYBDENUM	1.0E+02	Drinking Water Toxicity	5.0E+04	1.0E+02	8.0E+02	-
NAPHTHALENE	1.7E+01	Drinking Water Toxicity	2.1E+01	1.7E+01	2.1E+01	-
NICKEL	5.2E+01	Aquatic Habitat Chronic Toxicity	5.0E+04	1.0E+02	5.2E+01	4.6E+03
NITROBENZENE	1.4E-01	Drinking Water Toxicity	5.0E+04	1.4E-01	3.8E+02	-
NITROGLYCERIN	2.0E+00	Drinking Water Toxicity	5.0E+04	2.0E+00	1.8E+01	-
NITROTOLUENE, 2-	7.9E-02	Drinking Water Toxicity	5.0E+04	7.9E-02	7.1E+01	-
NITROTOLUENE, 3-	2.0E+00	Drinking Water Toxicity	5.0E+04	2.0E+00	4.2E+01	-
NITROTOLUENE, 4-	4.9E+00	Drinking Water Toxicity	5.0E+04	4.9E+00	4.6E+01	-
PENTACHLOROPHENOL	1.0E+00	Drinking Water Toxicity	3.0E+01	1.0E+00	1.5E+01	3.0E+00
PENTAERYTHRITOLTETRANITRATE (PETN)	1.9E+01	Drinking Water Toxicity	2.2E+04	1.9E+01	8.5E+05	-
PERCHLORATE	1.5E+01	Drinking Water Toxicity	5.0E+04	1.5E+01	6.0E+02	-
PHENANTHRENE	6.3E+00	Aquatic Habitat Chronic Toxicity	4.1E+02	2.4E+02	6.3E+00	-
PHENOL	5.0E+00	Ceiling Value	5.0E+00	6.0E+03	1.6E+02	1.7E+06
POLYCHLORINATED BIPHENYLS (PCBs)	6.4E-05	Bioaccumulation/Human Consumption	2.2E+01	5.0E-01	1.4E-02	6.4E-05
PROPICONAZOLE	9.5E+01	Aquatic Habitat Chronic Toxicity	5.0E+04	2.6E+02	9.5E+01	-
PYRENE	4.6E+00	Aquatic Habitat Chronic Toxicity	6.8E+01	1.8E+02	4.6E+00	4.0E+03
SELENIUM	5.0E+00	Aquatic Habitat Chronic Toxicity	5.0E+04	5.0E+01	5.0E+00	-
SILVER	6.0E-02	Aquatic Habitat Chronic Toxicity	1.0E+02	1.0E+02	6.0E-02	-
SIMAZINE	6.5E-01	Drinking Water Toxicity	3.1E+03	6.5E-01	9.0E+00	-
STYRENE	1.0E+01	Ceiling Value	1.0E+01	1.0E+02	3.2E+01	-
TERBACIL	2.6E+02	Drinking Water Toxicity	5.0E+04	2.6E+02	1.2E+03	-
tert-BUTYL ALCOHOL	5.8E+00	Drinking Water Toxicity	5.0E+04	5.8E+00	1.8E+04	-
TETRACHLOROETHANE, 1,1,1,2-	6.1E-01	Drinking Water Toxicity	5.0E+04	6.1E-01	8.5E+01	-
TETRACHLOROETHANE, 1,1,2,2-	7.8E-02	Drinking Water Toxicity	5.0E+02	7.8E-02	2.0E+02	4.0E+00
TETRACHLOROETHYLENE	3.3E+00	Bioaccumulation/Human Consumption	1.7E+02	5.0E+00	5.3E+01	3.3E+00
TETRACHLOROPHENOL, 2,3,4,6-	1.2E+00	Aquatic Habitat Chronic Toxicity	1.2E+04	6.0E+02	1.2E+00	-
TETRANITRO-1,3,5,7-TETRAAZOCYCLOOCTANE (HMX)	2.2E+02	Aquatic Habitat Chronic Toxicity	2.5E+03	1.0E+03	2.2E+02	-
THALLIUM	2.0E+00	Drinking Water Toxicity	5.0E+04	2.0E+00	6.0E+00	6.3E+00
TOLUENE	4.0E+01	Ceiling Value	4.0E+01	1.0E+03	6.2E+01	2.0E+05

TABLE F-2a. SURFACE WATER SCREENING LEVELS
Fresh Water Habitats
(ug/l)

CHEMICAL PARAMETER	[1]Final Surface Water Screening Level	Basis	Gross Contamination (Taste & Odors, etc.) Table I-3	Drinking Water (Toxicity) Table F-3a	Fresh Water Aquatic Habitat Goal (Chronic Toxicity) Table F-4a	Bioaccumulation and Human Consumption Table F-4f
TOXAPHENE	2.0E-04	Aquatic Habitat Chronic Toxicity	1.4E+02	3.0E+00	2.0E-04	2.8E-04
TPH (gasolines)	1.0E+02	Ceiling Value	1.0E+02	3.0E+02	5.0E+02	-
TPH (middle distillates)	1.0E+02	Ceiling Value	1.0E+02	1.6E+02	6.4E+02	-
TPH (residual fuels)	1.0E+02	Ceiling Value	1.0E+02	2.4E+03	6.4E+02	-
TRICHLOROBENZENE, 1,2,4-	7.0E+01	Drinking Water Toxicity	3.0E+03	7.0E+01	1.3E+02	-
TRICHLOROETHANE, 1,1,1-	7.6E+01	Aquatic Habitat Chronic Toxicity	9.7E+02	2.0E+02	7.6E+01	-
TRICHLOROETHANE, 1,1,2-	5.0E+00	Drinking Water Toxicity	5.0E+04	5.0E+00	7.3E+02	1.6E+01
TRICHLOROETHYLENE	5.0E+00	Drinking Water Toxicity	3.1E+02	5.0E+00	2.0E+02	3.0E+01
TRICHLOROPHENOL, 2,4,5-	6.3E+01	Aquatic Habitat Chronic Toxicity	2.0E+02	2.0E+03	6.3E+01	3.6E+03
TRICHLOROPHENOL, 2,4,6-	4.9E+00	Aquatic Habitat Chronic Toxicity	1.0E+02	7.1E+00	4.9E+00	-
TRICHLOROPHENOXYACETIC ACID, 2,4,5- (2,4,5-T)	2.0E+02	Drinking Water Toxicity	5.0E+04	2.0E+02	6.9E+02	-
TRICHLOROPHENOXYPROPIONIC ACID, 2,4,5- (2,4,5-TP)	3.0E+01	Aquatic Habitat Chronic Toxicity	3.6E+04	1.6E+02	3.0E+01	-
TRICHLOROPROPANE, 1,2,3-	2.0E-04	Drinking Water Toxicity	5.0E+04	2.0E-04	1.4E+01	-
TRICHLOROPROPENE, 1,2,3-	6.2E-01	Drinking Water Toxicity	5.0E+04	6.2E-01	6.2E-01	-
TRIFLURALIN	1.1E+00	Aquatic Habitat Chronic Toxicity	9.0E+01	1.0E+01	1.1E+00	-
TRINITROBENZENE, 1,3,5-	1.1E+01	Aquatic Habitat Chronic Toxicity	5.0E+04	6.0E+02	1.1E+01	-
TRINITROPHENYLMETHYLNITRAMINE, 2,4,6- (TETRYL)	4.0E+01	Drinking Water Toxicity	3.7E+04	4.0E+01	4.0E+01	-
TRINITROTOLUENE, 2,4,6- (TNT)	2.6E+00	Drinking Water Toxicity	5.0E+04	2.6E+00	1.3E+01	-
VANADIUM	2.7E+01	Aquatic Habitat Chronic Toxicity	5.0E+04	1.0E+02	2.7E+01	-
VINYL CHLORIDE	2.0E+00	Drinking Water Toxicity	3.4E+03	2.0E+00	9.3E+02	5.3E+02
XYLENES	2.0E+01	Ceiling Value	2.0E+01	1.0E+04	2.7E+01	-
ZINC	1.2E+02	Aquatic Habitat Chronic Toxicity	5.0E+03	6.0E+03	1.2E+02	-

Notes:

1. Lowest of gross contamination, drinking water toxicity, aquatic habitat and bioaccumulation screening levels.

TPH -Total Petroleum Hydrocarbons. See text for discussion of different TPH categories.
Gorss Contamination: Odor threshold, 1/2 solubility or 50000 ug/L maximum, whichever is lower. Intended to limit nuisances and general resource degradation.
Review of aquatic ecotoxicity data for ethanol underway. Based on preliminary review of available data, chronic toxicity screening levels likely to be significantly greater than ceiling level of 50,000 ug/L (refer to USEPA 2003b, ECOTOX database).
Method detection limits and background concentrations replace final screening level as appropriate.

TABLE F-2b. SURFACE WATER SCREENING LEVELS
Marine Habitats
(ug/l)

CHEMICAL PARAMETER	[1]Final Surface Water Screening Level	Basis	Gross Contamination (Odors, etc.) Table I-4	Marine Aquatic Habitat Goal (Chronic Toxicity) Table F-4a	Bioaccumulation and Human Consumption Table F-4f
ACENAPHTHENE	2.0E+01	Ceiling Level	2.0E+01	2.0E+01	9.9E+02
ACENAPHTHYLENE	3.1E+02	Aquatic Habitat Chronic Toxicity	2.0E+03	3.1E+02	-
ACETONE	1.5E+03	Aquatic Habitat Chronic Toxicity	2.0E+04	1.5E+03	-
ALDRIN	5.0E-05	Bioaccumulation/Human Consumption	8.5E+00	1.4E-04	5.0E-05
AMETRYN	7.0E+02	Aquatic Habitat Chronic Toxicity	5.0E+04	7.0E+02	-
AMINO,2- DINITROTOLUENE,4,6-	2.0E+01	Aquatic Habitat Chronic Toxicity	5.0E+04	2.0E+01	-
AMINO,4- DINITROTOLUENE,2,6-	1.1E+01	Aquatic Habitat Chronic Toxicity	5.0E+04	1.1E+01	-
ANTHRACENE	7.3E-01	Aquatic Habitat Chronic Toxicity	2.2E+01	7.3E-01	4.0E+04
ANTIMONY	5.0E+02	Aquatic Habitat Chronic Toxicity	5.0E+04	5.0E+02	6.4E+02
ARSENIC	1.4E-01	Bioaccumulation/Human Consumption	5.0E+04	3.6E+01	1.4E-01
ATRAZINE	2.6E+01	Aquatic Habitat Chronic Toxicity	1.8E+04	2.6E+01	-
BARIUM	2.2E+02	Aquatic Habitat Chronic Toxicity	5.0E+04	2.2E+02	-
BENOMYL	1.4E-01	Aquatic Habitat Chronic Toxicity	1.9E+03	1.4E-01	-
BENZENE	5.1E+01	Bioaccumulation/Human Consumption	2.0E+03	7.1E+01	5.1E+01
BENZO(a)ANTHRACENE	1.8E-02	Bioaccumulation/Human Consumption	4.7E+00	2.7E-02	1.8E-02
BENZO(a)PYRENE	1.8E-02	Bioaccumulation/Human Consumption	8.0E-01	3.0E-01	1.8E-02
BENZO(b)FLUORANTHENE	1.8E-02	Bioaccumulation/Human Consumption	7.5E-01	6.8E-01	1.8E-02
BENZO(g,h,i)PERYLENE	1.3E-01	Ceiling Level	1.3E-01	4.4E-01	-
BENZO(k)FLUORANTHENE	1.8E-02	Bioaccumulation/Human Consumption	4.0E-01	6.4E-01	1.8E-02
BERYLLIUM	6.6E-01	Aquatic Habitat Chronic Toxicity	5.0E+04	6.6E-01	-
BIPHENYL, 1,1-	5.0E-01	Ceiling Level	5.0E-01	1.4E+01	-
BIS(2-CHLOROETHYL)ETHER	5.3E-01	Bioaccumulation/Human Consumption	3.6E+02	2.4E+03	5.3E-01
BIS(2-CHLORO-1-METHYLETHYL)ETHER	3.7E-01	Aquatic Habitat Chronic Toxicity	3.2E+02	3.7E-01	6.5E+04
BIS(2-ETHYLHEXYL)PHTHALATE	2.2E+00	Bioaccumulation/Human Consumption	1.4E+02	3.0E+00	2.2E+00
BORON	1.0E+03	Aquatic Habitat Chronic Toxicity	5.0E+04	1.0E+03	-
BROMODICHLOROMETHANE	3.4E+02	Aquatic Habitat Chronic Toxicity	5.0E+04	3.4E+02	-
BROMOFORM	1.4E+02	Bioaccumulation/Human Consumption	5.1E+02	3.2E+02	1.4E+02
BROMOMETHANE	1.6E+01	Aquatic Habitat Chronic Toxicity	5.0E+04	1.6E+01	1.5E+03
CADMIUM	8.8E+00	Aquatic Habitat Chronic Toxicity	5.0E+04	8.8E+00	-
CARBON TETRACHLORIDE	1.6E+00	Bioaccumulation/Human Consumption	5.2E+02	9.8E+00	1.6E+00
CHLORDANE (TECHNICAL)	8.1E-04	Bioaccumulation/Human Consumption	2.5E+00	4.0E-03	8.1E-04
CHLOROANILINE, p-	1.9E+01	Aquatic Habitat Chronic Toxicity	5.0E+04	1.9E+01	-
CHLOROBENZENE	5.0E+01	Ceiling Level	5.0E+01	6.4E+01	2.1E+04
CHLOROETHANE	1.6E+01	Ceiling Level	1.6E+01	2.1E+04	-
CHLOROFORM	2.8E+01	Aquatic Habitat Chronic Toxicity	2.4E+03	2.8E+01	4.7E+02
CHLOROMETHANE	1.9E+02	Aquatic Habitat Chronic Toxicity	5.0E+04	1.9E+02	-
CHLOROPHENOL, 2-	1.8E-01	Ceiling Level	1.8E-01	4.0E+02	1.5E+02
CHROMIUM (Total)	5.0E+01	Aquatic Habitat Chronic Toxicity	5.0E+04	5.0E+01	-
CHROMIUM III	2.0E+01	Aquatic Habitat Chronic Toxicity	5.0E+04	2.0E+01	-
CHROMIUM VI	5.0E+01	Aquatic Habitat Chronic Toxicity	5.0E+04	5.0E+01	-
CHRYSENE	1.8E-02	Bioaccumulation/Human Consumption	1.0E+00	2.0E+00	1.8E-02
COBALT	2.3E+01	Aquatic Habitat Chronic Toxicity	5.0E+04	2.3E+01	-
COPPER	3.1E+00	Aquatic Habitat Chronic Toxicity	5.0E+04	3.1E+00	-
CYANIDE (Free)	1.0E+00	Aquatic Habitat Chronic Toxicity	1.7E+02	1.0E+00	2.2E+05

TABLE F-2b. SURFACE WATER SCREENING LEVELS
Marine Habitats
(ug/l)

CHEMICAL PARAMETER	[1]Final Surface Water Screening Level	Basis	Gross Contamination (Odors, etc.) Table I-4	Marine Aquatic Habitat Goal (Chronic Toxicity) Table F-4a	Bioaccumulation and Human Consumption Table F-4f
CYCLO-1,3,5-TRIMETHYLENE-2,4,6-TRINITRAMINE (RDX)	1.9E+02	Aquatic Habitat Chronic Toxicity	3.0E+04	1.9E+02	-
DALAPON	3.0E+02	Aquatic Habitat Chronic Toxicity	5.0E+04	3.0E+02	-
DIBENZO(a,h)ANTHTRACENE	1.8E-02	Bioaccumulation/Human Consumption	1.3E+00	7.1E+00	1.8E-02
DIBROMO,1,2- CHLOROPROPANE,3-	2.0E-01	Aquatic Habitat Chronic Toxicity	1.0E+01	2.0E-01	-
DIBROMOCHLOROMETHANE	1.3E+01	Bioaccumulation/Human Consumption	5.0E+04	3.4E+01	1.3E+01
DIBROMOETHANE, 1,2-	1.4E+03	Aquatic Habitat Chronic Toxicity	5.0E+04	1.4E+03	-
DICHLOROBENZENE, 1,2-	1.0E+01	Ceiling Level	1.0E+01	1.4E+01	1.7E+04
DICHLOROBENZENE, 1,3-	7.1E+01	Aquatic Habitat Chronic Toxicity	5.0E+04	7.1E+01	9.6E+02
DICHLOROBENZENE, 1,4-	1.1E+01	Ceiling Level	1.1E+01	1.5E+01	2.6E+03
DICHLOROBENZIDINE, 3,3-	2.8E-02	Bioaccumulation/Human Consumption	1.6E+03	4.5E+00	2.8E-02
DICHLORODIPHENYLDICHLOROETHANE (DDD)	3.1E-04	Bioaccumulation/Human Consumption	4.5E+01	1.1E-02	3.1E-04
DICHLORODIPHENYLDICHLOROETHYLENE (DDE)	2.2E-04	Bioaccumulation/Human Consumption	2.0E+01	4.1E-01	2.2E-04
DICHLORODIPHENYLTRICHLOROETHANE (DDT)	2.2E-04	Bioaccumulation/Human Consumption	2.8E+00	1.0E-03	2.2E-04
DICHLOROETHANE, 1,1-	4.7E+01	Aquatic Habitat Chronic Toxicity	5.0E+04	4.7E+01	-
DICHLOROETHANE, 1,2-	3.7E+01	Bioaccumulation/Human Consumption	2.0E+04	9.1E+02	3.7E+01
DICHLOROETHYLENE, 1,1-	3.2E+00	Bioaccumulation/Human Consumption	1.5E+03	2.5E+01	3.2E+00
DICHLOROETHYLENE, Cis 1,2-	6.2E+02	Aquatic Habitat Chronic Toxicity	5.0E+04	6.2E+02	-
DICHLOROETHYLENE, Trans 1,2-	2.6E+02	Ceiling Level	2.6E+02	5.6E+02	140000
DICHLOROPHENOL, 2,4-	3.0E-01	Ceiling Level	3.0E-01	7.9E+02	2.9E+02
DICHLOROPHENOXYACETIC ACID (2,4-D)	7.0E+01	Aquatic Habitat Chronic Toxicity	5.0E+04	7.0E+01	-
DICHLOROPROPANE, 1,2-	1.0E+01	Ceiling Level	1.0E+01	5.2E+02	1.5E+01
DICHLOROPROPENE, 1,3-	6.0E-02	Aquatic Habitat Chronic Toxicity	5.0E+04	6.0E-02	1.7E+03
DIELDRIN	5.4E-05	Bioaccumulation/Human Consumption	4.1E+01	1.9E-03	5.4E-05
DIETHYLPHTHALATE	2.1E+02	Aquatic Habitat Chronic Toxicity	5.0E+04	2.1E+02	4.4E+04
DIMETHYLPHENOL, 2,4-	1.1E+02	Aquatic Habitat Chronic Toxicity	4.0E+02	1.1E+02	8.5E+02
DIMETHYLPHTHALATE	2.9E+03	Aquatic Habitat Chronic Toxicity	5.0E+04	2.9E+03	1.1E+06
DINITROBENZENE, 1,3-	1.0E+01	Aquatic Habitat Chronic Toxicity	5.0E+04	1.0E+01	-
DINITROPHENOL, 2,4-	1.4E+01	Aquatic Habitat Chronic Toxicity	5.0E+04	1.4E+01	5.3E+03
DINITROTOLUENE, 2,4- (2,4-DNT)	3.4E+00	Bioaccumulation/Human Consumption	5.0E+04	9.1E+00	3.4E+00
DINITROTOLUENE, 2,6- (2,6-DNT)	8.1E+01	Aquatic Habitat Chronic Toxicity	5.0E+04	8.1E+01	-
DIOXANE, 1,4-	5.0E+04	Ceiling Level	5.0E+04	5.0E+05	-
DIOXINS (TEQ)	3.1E-09	Aquatic Habitat Chronic Toxicity	1.0E-01	3.1E-09	5.1E-09
DIURON	6.0E+01	Aquatic Habitat Chronic Toxicity	2.1E+04	6.0E+01	-
ENDOSULFAN	8.7E-03	Aquatic Habitat Chronic Toxicity	1.6E+02	8.7E-03	8.9E+01
ENDRIN	2.3E-03	Aquatic Habitat Chronic Toxicity	4.1E+01	2.3E-03	8.1E-01
ETHANOL	5.0E+04	Ceiling Level	5.0E+04		-
ETHYLBENZENE	7.3E+00	Aquatic Habitat Chronic Toxicity	3.0E+01	7.3E+00	2.9E+04
FLUORANTHENE	7.1E+00	Aquatic Habitat Chronic Toxicity	1.3E+02	7.1E+00	1.4E+02
FLUORENE	3.9E+00	Aquatic Habitat Chronic Toxicity	8.5E+02	3.9E+00	5.3E+03
GLYPHOSATE	1.8E+03	Aquatic Habitat Chronic Toxicity	5.0E+04	1.8E+03	-
HEPTACHLOR	7.9E-05	Bioaccumulation/Human Consumption	2.0E+01	3.6E-03	7.9E-05
HEPTACHLOR EPOXIDE	3.9E-05	Bioaccumulation/Human Consumption	1.0E+02	3.6E-03	3.9E-05
HEXACHLOROBENZENE	2.9E-04	Bioaccumulation/Human Consumption	3.1E+00	3.0E-04	2.9E-04
HEXACHLOROBUTADIENE	3.0E-01	Aquatic Habitat Chronic Toxicity	6.0E+00	3.0E-01	1.8E+01

TABLE F-2b. SURFACE WATER SCREENING LEVELS
Marine Habitats
(ug/l)

CHEMICAL PARAMETER	[1]Final Surface Water Screening Level	Basis	Gross Contamination (Odors, etc.) Table I-4	Marine Aquatic Habitat Goal (Chronic Toxicity) Table F-4a	Bioaccumulation and Human Consumption Table F-4f
HEXACHLOROCYCLOHEXANE (gamma) LINDANE	6.3E-02	Aquatic Habitat Chronic Toxicity	3.7E+03	6.3E-02	6.3E-02
HEXACHLOROETHANE	3.3E+00	Bioaccumulation/Human Consumption	1.0E+01	1.2E+01	3.3E+00
HEXAZINONE	1.7E+04	Aquatic Habitat Chronic Toxicity	5.0E+04	1.7E+04	-
INDENO(1,2,3-cd)PYRENE	1.8E-02	Bioaccumulation/Human Consumption	9.5E-02	2.8E-01	1.8E-02
ISOPHORONE	9.2E+02	Aquatic Habitat Chronic Toxicity	5.0E+04	9.2E+02	-
LEAD	8.1E+00	Aquatic Habitat Chronic Toxicity	5.0E+04	8.1E+00	-
MERCURY	0.0E+00	Ceiling Level	0.0E+00	9.4E-01	3.0E-01
METHOXYCHLOR	1.9E-02	Aquatic Habitat Chronic Toxicity	5.0E+01	1.9E-02	-
METHYL ETHYL KETONE	8.4E+03	Ceiling Level	8.4E+03	1.4E+04	-
METHYL ISOBUTYL KETONE	1.7E+02	Aquatic Habitat Chronic Toxicity	1.3E+03	1.7E+02	-
METHYL MERCURY	2.8E-03	Aquatic Habitat Chronic Toxicity	5.0E+04	2.8E-03	-
METHYL TERT BUTYL ETHER	1.8E+02	Ceiling Level	1.8E+02	1.8E+04	-
METHYLENE CHLORIDE	5.9E+02	Bioaccumulation/Human Consumption	9.1E+03	2.2E+03	5.9E+02
METHYLNAPHTHALENE, 1-	2.1E+00	Aquatic Habitat Chronic Toxicity	1.0E+01	2.1E+00	-
METHYLNAPHTHALENE, 2-	1.0E+01	Ceiling Level	1.0E+01	7.2E+01	-
MOLYBDENUM	3.7E+02	Aquatic Habitat Chronic Toxicity	5.0E+04	3.7E+02	-
NAPHTHALENE	1.2E+01	Aquatic Habitat Chronic Toxicity	2.1E+01	1.2E+01	-
NICKEL	8.2E+00	Aquatic Habitat Chronic Toxicity	5.0E+04	8.2E+00	4.6E+03
NITROBENZENE	3.8E+02	Aquatic Habitat Chronic Toxicity	5.0E+04	3.8E+02	-
NITROGLYCERIN	1.8E+01	Aquatic Habitat Chronic Toxicity	5.0E+04	1.8E+01	-
NITROTOLUENE, 2-	7.1E+01	Aquatic Habitat Chronic Toxicity	5.0E+04	7.1E+01	-
NITROTOLUENE, 3-	4.2E+01	Aquatic Habitat Chronic Toxicity	5.0E+04	4.2E+01	-
NITROTOLUENE, 4-	4.6E+01	Aquatic Habitat Chronic Toxicity	5.0E+04	4.6E+01	-
PENTACHLOROPHENOL	3.0E+00	Bioaccumulation/Human Consumption	5.9E+02	7.9E+00	3.0E+00
PENTAERYTHRITOLTETRANITRATE (PETN)	2.2E+04	Ceiling Level	2.2E+04	8.5E+05	-
PERCHLORATE	6.0E+02	Aquatic Habitat Chronic Toxicity	5.0E+04	6.0E+02	-
PHENANTHRENE	4.6E+00	Aquatic Habitat Chronic Toxicity	4.1E+02	4.6E+00	-
PHENOL	5.8E+01	Aquatic Habitat Chronic Toxicity	7.9E+03	5.8E+01	1.7E+06
POLYCHLORINATED BIPHENYLS (PCBs)	6.4E-05	Bioaccumulation/Human Consumption	2.2E+01	3.0E-02	6.4E-05
PROPICONAZOLE	9.5E+01	Aquatic Habitat Chronic Toxicity	5.0E+04	9.5E+01	-
PYRENE	1.0E+01	Aquatic Habitat Chronic Toxicity	6.8E+01	1.0E+01	4.0E+03
SELENIUM	7.1E+01	Aquatic Habitat Chronic Toxicity	5.0E+04	7.1E+01	-
SILVER	1.0E-01	Aquatic Habitat Chronic Toxicity	5.0E+04	1.0E-01	-
SIMAZINE	9.0E+00	Aquatic Habitat Chronic Toxicity	3.1E+03	9.0E+00	-
STYRENE	1.1E+01	Ceiling Level	1.1E+01	3.2E+01	-
TERBACIL	2.6E+02	Aquatic Habitat Chronic Toxicity	5.0E+04	2.6E+02	-
tert-BUTYL ALCOHOL	1.8E+04	Aquatic Habitat Chronic Toxicity	5.0E+04	1.8E+04	-
TETRACHLOROETHANE, 1,1,1,2-	1.1E+01	Aquatic Habitat Chronic Toxicity	5.0E+04	1.1E+01	-
TETRACHLOROETHANE, 1,1,2,2-	4.0E+00	Bioaccumulation/Human Consumption	5.0E+02	6.1E+02	4.0E+00
TETRACHLOROETHYLENE	3.3E+00	Bioaccumulation/Human Consumption	3.0E+02	9.8E+01	3.3E+00
TETRACHLOROPHENOL, 2,3,4,6-	1.2E+00	Aquatic Habitat Chronic Toxicity	1.2E+04	1.2E+00	-
TETRANITRO-1,3,5,7-TETRAAZOCYCLOOCTANE (HMX)	3.3E+02	Aquatic Habitat Chronic Toxicity	2.5E+03	3.3E+02	-
THALLIUM	6.3E+00	Bioaccumulation/Human Consumption	5.0E+04	1.2E+01	6.3E+00
TOLUENE	9.8E+00	Aquatic Habitat Chronic Toxicity	4.0E+01	9.8E+00	2.0E+05

TABLE F-2b. SURFACE WATER SCREENING LEVELS
Marine Habitats
(ug/l)

CHEMICAL PARAMETER	[1]Final Surface Water Screening Level	Basis	Gross Contamination (Odors, etc.) Table I-4	Marine Aquatic Habitat Goal (Chronic Toxicity) Table F-4a	Bioaccumulation and Human Consumption Table F-4f
TOXAPHENE	2.0E-04	Aquatic Habitat Chronic Toxicity	1.4E+02	2.0E-04	2.8E-04
TPH (gasolines)	3.7E+03	Aquatic Habitat Chronic Toxicity	5.0E+03	3.7E+03	-
TPH (middle distillates)	6.4E+02	Aquatic Habitat Chronic Toxicity	2.5E+03	6.4E+02	-
TPH (residual fuels)	6.4E+02	Aquatic Habitat Chronic Toxicity	2.5E+03	6.4E+02	-
TRICHLOROBENZENE, 1,2,4-	1.1E+02	Aquatic Habitat Chronic Toxicity	3.0E+03	1.1E+02	-
TRICHLOROETHANE, 1,1,1-	1.1E+01	Aquatic Habitat Chronic Toxicity	5.0E+04	1.1E+01	-
TRICHLOROETHANE, 1,1,2-	1.6E+01	Bioaccumulation/Human Consumption	5.0E+04	1.2E+03	1.6E+01
TRICHLOROETHYLENE	3.0E+01	Bioaccumulation/Human Consumption	1.0E+04	4.7E+01	3.0E+01
TRICHLOROPHENOL, 2,4,5-	1.1E+01	Aquatic Habitat Chronic Toxicity	2.0E+02	1.1E+01	3.6E+03
TRICHLOROPHENOL, 2,4,6-	6.5E+00	Aquatic Habitat Chronic Toxicity	1.0E+02	6.5E+00	-
TRICHLOROPHENOXYACETIC ACID, 2,4,5- (2,4,5-T)	6.9E+02	Aquatic Habitat Chronic Toxicity	5.0E+04	6.9E+02	-
TRICHLOROPHENOXYPROPIONIC ACID, 2,4,5- (2,4,5-TP)	5.0E+01	Aquatic Habitat Chronic Toxicity	3.6E+04	5.0E+01	-
TRICHLOROPROPANE, 1,2,3-	1.4E+01	Aquatic Habitat Chronic Toxicity	5.0E+04	1.4E+01	-
TRICHLOROPROPENE, 1,2,3-	6.2E-01	Aquatic Habitat Chronic Toxicity	5.0E+04	6.2E-01	-
TRIFLURALIN	1.1E+00	Aquatic Habitat Chronic Toxicity	9.0E+01	1.1E+00	-
TRINITROBENZENE, 1,3,5-	1.0E+01	Aquatic Habitat Chronic Toxicity	5.0E+04	1.0E+01	-
TRINITROPHENYLMETHYLNITRAMINE, 2,4,6- (TETRYL)	4.0E+01	Aquatic Habitat Chronic Toxicity	3.7E+04	4.0E+01	-
TRINITROTOLUENE, 2,4,6- (TNT)	2.0E+01	Ceiling Level	2.0E+01	9.0E+01	-
VANADIUM	8.1E+01	Aquatic Habitat Chronic Toxicity	5.0E+04	8.1E+01	-
VINYL CHLORIDE	5.3E+02	Bioaccumulation/Human Consumption	3.4E+03	9.3E+02	5.3E+02
XYLENES	1.3E+01	Aquatic Habitat Chronic Toxicity	5.3E+02	1.3E+01	-
ZINC	8.1E+01	Aquatic Habitat Chronic Toxicity	5.0E+04	8.1E+01	-

Notes:

1. Lowest of gross contamination, aquatic habitat and bioaccumulation screening levels.

TPH -Total Petroleum Hydrocarbons. See text for discussion of different TPH categories.
Gross Contamination: Odor threshold, 1/2 solubility or 50000 ug/L maximum, whichever is lower. Intended to limit nuisances and general resource degradation.
Review of aquatic ecotoxicity data for ethanol underway. Based on preliminary review of available data, chronic toxicity screening levels likely to be significantly greater than ceiling level of 50,000 ug/L (refer to USEPA 2003b, ECOTOX database).
Method detection limits and background concentrations replace final screening level as appropriate.

TABLE F-2c. SURFACE WATER SCREENING LEVELS
*Estuary Habitats
(ug/l)

CHEMICAL PARAMETER	[1]Final Surface Water Screening Level	Basis	Gross Contamination (Odors, etc.) Table I-4	Estuary Aquatic Habitat Goal (Chronic Toxicity) Table F-4a	Bioaccumulation and Human Consumption Table F-4f
ACENAPHTHENE	1.5E+01	Aquatic Habitat Chronic Toxicity	2.0E+01	1.5E+01	9.9E+02
ACENAPHTHYLENE	1.3E+01	Aquatic Habitat Chronic Toxicity	2.0E+03	1.3E+01	-
ACETONE	1.5E+03	Aquatic Habitat Chronic Toxicity	2.0E+04	1.5E+03	-
ALDRIN	5.0E-05	Bioaccumulation/Human Consumption	8.5E+00	1.4E-04	5.0E-05
AMETRYN	7.0E+02	Aquatic Habitat Chronic Toxicity	5.0E+04	7.0E+02	-
AMINO,2- DINITROTOLUENE,4,6-	1.8E+01	Aquatic Habitat Chronic Toxicity	5.0E+04	1.8E+01	-
AMINO,4- DINITROTOLUENE,2,6-	1.1E+01	Aquatic Habitat Chronic Toxicity	5.0E+04	1.1E+01	-
ANTHRACENE	2.0E-02	Aquatic Habitat Chronic Toxicity	2.2E+01	2.0E-02	4.0E+04
ANTIMONY	3.0E+01	Aquatic Habitat Chronic Toxicity	5.0E+04	3.0E+01	6.4E+02
ARSENIC	1.4E-01	Bioaccumulation/Human Consumption	5.0E+04	3.6E+01	1.4E-01
ATRAZINE	1.2E+01	Aquatic Habitat Chronic Toxicity	1.8E+04	1.2E+01	-
BARIUM	2.2E+02	Aquatic Habitat Chronic Toxicity	5.0E+04	2.2E+02	-
BENOMYL	1.4E-01	Aquatic Habitat Chronic Toxicity	1.9E+03	1.4E-01	-
BENZENE	5.1E+01	Bioaccumulation/Human Consumption	2.0E+03	7.1E+01	5.1E+01
BENZO(a)ANTHRACENE	1.8E-02	Bioaccumulation/Human Consumption	4.7E+00	2.7E-02	1.8E-02
BENZO(a)PYRENE	1.8E-02	Bioaccumulation/Human Consumption	8.0E-01	6.0E-02	1.8E-02
BENZO(b)FLUORANTHENE	1.8E-02	Bioaccumulation/Human Consumption	7.5E-01	6.8E-01	1.8E-02
BENZO(g,h,i)PERYLENE	1.3E-01	Ceiling Level	1.3E-01	4.4E-01	-
BENZO(k)FLUORANTHENE	1.8E-02	Bioaccumulation/Human Consumption	4.0E-01	6.4E-01	1.8E-02
BERYLLIUM	6.6E-01	Aquatic Habitat Chronic Toxicity	5.0E+04	6.6E-01	-
BIPHENYL, 1,1-	5.0E-01	Ceiling Level	5.0E-01	6.5E+00	-
BIS(2-CHLOROETHYL)ETHER	5.3E-01	Bioaccumulation/Human Consumption	3.6E+02	2.4E+03	5.3E-01
BIS(2-CHLORO-1-METHYLETHYL)ETHER	3.7E-01	Aquatic Habitat Chronic Toxicity	3.2E+02	3.7E-01	6.5E+04
BIS(2-ETHYLHEXYL)PHTHALATE	2.2E+00	Bioaccumulation/Human Consumption	1.4E+02	3.0E+00	2.2E+00
BORON	1.0E+03	Aquatic Habitat Chronic Toxicity	5.0E+04	1.0E+03	-
BROMODICHLOROMETHANE	3.4E+02	Aquatic Habitat Chronic Toxicity	5.0E+04	3.4E+02	-
BROMOFORM	1.4E+02	Bioaccumulation/Human Consumption	5.1E+02	2.3E+02	1.4E+02
BROMOMETHANE	1.6E+01	Aquatic Habitat Chronic Toxicity	5.0E+04	1.6E+01	1.5E+03
CADMIUM	2.5E-01	Aquatic Habitat Chronic Toxicity	5.0E+04	2.5E-01	-
CARBON TETRACHLORIDE	1.6E+00	Bioaccumulation/Human Consumption	5.2E+02	9.8E+00	1.6E+00
CHLORDANE (TECHNICAL)	8.1E-04	Bioaccumulation/Human Consumption	2.5E+00	4.0E-03	8.1E-04
CHLOROANILINE, p-	1.9E+01	Aquatic Habitat Chronic Toxicity	5.0E+04	1.9E+01	-
CHLOROBENZENE	2.5E+01	Aquatic Habitat Chronic Toxicity	5.0E+01	2.5E+01	2.1E+04
CHLOROETHANE	1.6E+01	Ceiling Level	1.6E+01	2.1E+04	-
CHLOROFORM	2.8E+01	Aquatic Habitat Chronic Toxicity	2.4E+03	2.8E+01	4.7E+02
CHLOROMETHANE	1.9E+02	Aquatic Habitat Chronic Toxicity	5.0E+04	1.9E+02	-
CHLOROPHENOL, 2-	1.8E-01	Ceiling Level	1.8E-01	3.2E+01	1.5E+02
CHROMIUM (Total)	1.1E+01	Aquatic Habitat Chronic Toxicity	5.0E+04	1.1E+01	-
CHROMIUM III	2.0E+01	Aquatic Habitat Chronic Toxicity	5.0E+04	2.0E+01	-
CHROMIUM VI	1.1E+01	Aquatic Habitat Chronic Toxicity	5.0E+04	1.1E+01	-
CHRYSENE	1.8E-02	Bioaccumulation/Human Consumption	1.0E+00	2.0E+00	1.8E-02
COBALT	1.9E+01	Aquatic Habitat Chronic Toxicity	5.0E+04	1.9E+01	-
COPPER	3.1E+00	Aquatic Habitat Chronic Toxicity	5.0E+04	3.1E+00	-
CYANIDE (Free)	1.0E+00	Aquatic Habitat Chronic Toxicity	1.7E+02	1.0E+00	2.2E+05

TABLE F-2c. SURFACE WATER SCREENING LEVELS
*Estuary Habitats
(ug/l)

CHEMICAL PARAMETER	[1]Final Surface Water Screening Level	Basis	Gross Contamination (Odors, etc.) Table I-4	Estuary Aquatic Habitat Goal (Chronic Toxicity) Table F-4a	Bioaccumulation and Human Consumption Table F-4f
CYCLO-1,3,5-TRIMETHYLENE-2,4,6-TRINITRAMINE (RDX)	7.9E+01	Aquatic Habitat Chronic Toxicity	3.0E+04	7.9E+01	-
DALAPON	3.0E+02	Aquatic Habitat Chronic Toxicity	5.0E+04	3.0E+02	-
DIBENZO(a,h)ANTHTRACENE	1.8E-02	Bioaccumulation/Human Consumption	1.3E+00	8.0E-01	1.8E-02
DIBROMO,1,2- CHLOROPROPANE,3-	2.0E-01	Aquatic Habitat Chronic Toxicity	1.0E+01	2.0E-01	-
DIBROMOCHLOROMETHANE	1.3E+01	Bioaccumulation/Human Consumption	5.0E+04	3.4E+01	1.3E+01
DIBROMOETHANE, 1,2-	1.4E+03	Aquatic Habitat Chronic Toxicity	5.0E+04	1.4E+03	-
DICHLOROBENZENE, 1,2-	1.0E+01	Ceiling Level	1.0E+01	1.4E+01	1.7E+04
DICHLOROBENZENE, 1,3-	2.2E+01	Aquatic Habitat Chronic Toxicity	5.0E+04	2.2E+01	9.6E+02
DICHLOROBENZENE, 1,4-	9.4E+00	Aquatic Habitat Chronic Toxicity	1.1E+01	9.4E+00	2.6E+03
DICHLOROBENZIDINE, 3,3-	2.8E-02	Bioaccumulation/Human Consumption	1.6E+03	4.5E+00	2.8E-02
DICHLORODIPHENYLDICHLOROETHANE (DDD)	3.1E-04	Bioaccumulation/Human Consumption	4.5E+01	1.1E-02	3.1E-04
DICHLORODIPHENYLDICHLOROETHYLENE (DDE)	2.2E-04	Bioaccumulation/Human Consumption	2.0E+01	4.1E-01	2.2E-04
DICHLORODIPHENYLTRICHLOROETHANE (DDT)	2.2E-04	Bioaccumulation/Human Consumption	2.8E+00	1.0E-03	2.2E-04
DICHLOROETHANE, 1,1-	4.7E+01	Aquatic Habitat Chronic Toxicity	5.0E+04	4.7E+01	-
DICHLOROETHANE, 1,2-	3.7E+01	Bioaccumulation/Human Consumption	2.0E+04	9.1E+02	3.7E+01
DICHLOROETHYLENE, 1,1-	3.2E+00	Bioaccumulation/Human Consumption	1.5E+03	2.5E+01	3.2E+00
DICHLOROETHYLENE, Cis 1,2-	6.2E+02	Aquatic Habitat Chronic Toxicity	5.0E+04	6.2E+02	-
DICHLOROETHYLENE, Trans 1,2-	2.6E+02	Ceiling Level	2.6E+02	5.6E+02	140000
DICHLOROPHENOL, 2,4-	3.0E-01	Ceiling Level	3.0E-01	1.1E+01	2.9E+02
DICHLOROPHENOXYACETIC ACID (2,4-D)	7.0E+01	Aquatic Habitat Chronic Toxicity	5.0E+04	7.0E+01	-
DICHLOROPROPANE, 1,2-	1.0E+01	Ceiling Level	1.0E+01	5.2E+02	1.5E+01
DICHLOROPROPENE, 1,3-	6.0E-02	Aquatic Habitat Chronic Toxicity	5.0E+04	6.0E-02	1.7E+03
DIELDRIN	5.4E-05	Bioaccumulation/Human Consumption	4.1E+01	1.9E-03	5.4E-05
DIETHYLPHTHALATE	2.1E+02	Aquatic Habitat Chronic Toxicity	5.0E+04	2.1E+02	4.4E+04
DIMETHYLPHENOL, 2,4-	1.1E+02	Aquatic Habitat Chronic Toxicity	4.0E+02	1.1E+02	8.5E+02
DIMETHYLPHTHALATE	1.1E+03	Aquatic Habitat Chronic Toxicity	5.0E+04	1.1E+03	1.1E+06
DINITROBENZENE, 1,3-	1.0E+01	Aquatic Habitat Chronic Toxicity	5.0E+04	1.0E+01	-
DINITROPHENOL, 2,4-	1.4E+01	Aquatic Habitat Chronic Toxicity	5.0E+04	1.4E+01	5.3E+03
DINITROTOLUENE, 2,4- (2,4-DNT)	3.4E+00	Bioaccumulation/Human Consumption	5.0E+04	9.1E+00	3.4E+00
DINITROTOLUENE, 2,6- (2,6-DNT)	8.1E+01	Aquatic Habitat Chronic Toxicity	5.0E+04	8.1E+01	-
DIOXANE, 1,4-	5.0E+04	Ceiling Level	5.0E+04	3.4E+05	-
DIOXINS (TEQ)	3.1E-09	Aquatic Habitat Chronic Toxicity	1.0E-01	3.1E-09	5.1E-09
DIURON	6.0E+01	Aquatic Habitat Chronic Toxicity	2.1E+04	6.0E+01	-
ENDOSULFAN	8.7E-03	Aquatic Habitat Chronic Toxicity	1.6E+02	8.7E-03	8.9E+01
ENDRIN	2.3E-03	Aquatic Habitat Chronic Toxicity	4.1E+01	2.3E-03	8.1E-01
ETHANOL	5.0E+04	Ceiling Level	5.0E+04		-
ETHYLBENZENE	7.3E+00	Aquatic Habitat Chronic Toxicity	3.0E+01	7.3E+00	2.9E+04
FLUORANTHENE	8.0E-01	Aquatic Habitat Chronic Toxicity	1.3E+02	8.0E-01	1.4E+02
FLUORENE	3.9E+00	Aquatic Habitat Chronic Toxicity	8.5E+02	3.9E+00	5.3E+03
GLYPHOSATE	1.8E+03	Aquatic Habitat Chronic Toxicity	5.0E+04	1.8E+03	-
HEPTACHLOR	7.9E-05	Bioaccumulation/Human Consumption	2.0E+01	3.6E-03	7.9E-05
HEPTACHLOR EPOXIDE	3.9E-05	Bioaccumulation/Human Consumption	1.0E+02	3.6E-03	3.9E-05
HEXACHLOROBENZENE	2.9E-04	Bioaccumulation/Human Consumption	3.1E+00	3.0E-04	2.9E-04
HEXACHLOROBUTADIENE	3.0E-01	Aquatic Habitat Chronic Toxicity	6.0E+00	3.0E-01	1.8E+01

TABLE F-2c. SURFACE WATER SCREENING LEVELS
*Estuary Habitats
(ug/l)

CHEMICAL PARAMETER	[1]Final Surface Water Screening Level	Basis	Gross Contamination (Odors, etc.) Table I-4	Estuary Aquatic Habitat Goal (Chronic Toxicity) Table F-4a	Bioaccumulation and Human Consumption Table F-4f
HEXACHLOROCYCLOHEXANE (gamma) LINDANE	6.3E-02	Aquatic Habitat Chronic Toxicity	3.7E+03	6.3E-02	6.3E-02
HEXACHLOROETHANE	3.3E+00	Bioaccumulation/Human Consumption	1.0E+01	1.2E+01	3.3E+00
HEXAZINONE	1.7E+04	Aquatic Habitat Chronic Toxicity	5.0E+04	1.7E+04	-
INDENO(1,2,3-cd)PYRENE	1.8E-02	Bioaccumulation/Human Consumption	9.5E-02	2.8E-01	1.8E-02
ISOPHORONE	9.2E+02	Aquatic Habitat Chronic Toxicity	5.0E+04	9.2E+02	-
LEAD	2.5E+00	Aquatic Habitat Chronic Toxicity	5.0E+04	2.5E+00	-
MERCURY	0.0E+00	Ceiling Level	0.0E+00	7.7E-01	3.0E-01
METHOXYCHLOR	1.9E-02	Aquatic Habitat Chronic Toxicity	5.0E+01	1.9E-02	-
METHYL ETHYL KETONE	8.4E+03	Ceiling Level	8.4E+03	1.4E+04	-
METHYL ISOBUTYL KETONE	1.7E+02	Aquatic Habitat Chronic Toxicity	1.3E+03	1.7E+02	-
METHYL MERCURY	2.8E-03	Aquatic Habitat Chronic Toxicity	5.0E+04	2.8E-03	-
METHYL TERT BUTYL ETHER	1.8E+02	Ceiling Level	1.8E+02	1.8E+04	-
METHYLENE CHLORIDE	5.9E+02	Bioaccumulation/Human Consumption	9.1E+03	1.5E+03	5.9E+02
METHYLNAPHTHALENE, 1-	2.1E+00	Aquatic Habitat Chronic Toxicity	1.0E+01	2.1E+00	-
METHYLNAPHTHALENE, 2-	4.7E+00	Aquatic Habitat Chronic Toxicity	1.0E+01	4.7E+00	-
MOLYBDENUM	3.7E+02	Aquatic Habitat Chronic Toxicity	5.0E+04	3.7E+02	-
NAPHTHALENE	1.2E+01	Aquatic Habitat Chronic Toxicity	2.1E+01	1.2E+01	-
NICKEL	8.2E+00	Aquatic Habitat Chronic Toxicity	5.0E+04	8.2E+00	4.6E+03
NITROBENZENE	3.8E+02	Aquatic Habitat Chronic Toxicity	5.0E+04	3.8E+02	-
NITROGLYCERIN	1.8E+01	Aquatic Habitat Chronic Toxicity	5.0E+04	1.8E+01	-
NITROTOLUENE, 2-	7.1E+01	Aquatic Habitat Chronic Toxicity	5.0E+04	7.1E+01	-
NITROTOLUENE, 3-	4.2E+01	Aquatic Habitat Chronic Toxicity	5.0E+04	4.2E+01	-
NITROTOLUENE, 4-	4.6E+01	Aquatic Habitat Chronic Toxicity	5.0E+04	4.6E+01	-
PENTACHLOROPHENOL	3.0E+00	Bioaccumulation/Human Consumption	5.9E+02	7.9E+00	3.0E+00
PENTAERYTHRITOLTETRANITRATE (PETN)	2.2E+04	Ceiling Level	2.2E+04	8.5E+05	-
PERCHLORATE	6.0E+02	Aquatic Habitat Chronic Toxicity	5.0E+04	6.0E+02	-
PHENANTHRENE	4.6E+00	Aquatic Habitat Chronic Toxicity	4.1E+02	4.6E+00	-
PHENOL	5.8E+01	Aquatic Habitat Chronic Toxicity	7.9E+03	5.8E+01	1.7E+06
POLYCHLORINATED BIPHENYLS (PCBs)	6.4E-05	Bioaccumulation/Human Consumption	2.2E+01	1.4E-02	6.4E-05
PROPICONAZOLE	9.5E+01	Aquatic Habitat Chronic Toxicity	5.0E+04	9.5E+01	-
PYRENE	4.6E+00	Aquatic Habitat Chronic Toxicity	6.8E+01	4.6E+00	4.0E+03
SELENIUM	5.0E+00	Aquatic Habitat Chronic Toxicity	5.0E+04	5.0E+00	-
SILVER	6.0E-02	Aquatic Habitat Chronic Toxicity	5.0E+04	6.0E-02	-
SIMAZINE	9.0E+00	Aquatic Habitat Chronic Toxicity	3.1E+03	9.0E+00	-
STYRENE	1.1E+01	Ceiling Level	1.1E+01	3.2E+01	-
TERBACIL	2.6E+02	Aquatic Habitat Chronic Toxicity	5.0E+04	2.6E+02	-
tert-BUTYL ALCOHOL	1.8E+04	Aquatic Habitat Chronic Toxicity	5.0E+04	1.8E+04	-
TETRACHLOROETHANE, 1,1,1,2-	1.1E+01	Aquatic Habitat Chronic Toxicity	5.0E+04	1.1E+01	-
TETRACHLOROETHANE, 1,1,2,2-	4.0E+00	Bioaccumulation/Human Consumption	5.0E+02	2.0E+02	4.0E+00
TETRACHLOROETHYLENE	3.3E+00	Bioaccumulation/Human Consumption	3.0E+02	5.3E+01	3.3E+00
TETRACHLOROPHENOL, 2,3,4,6-	1.2E+00	Aquatic Habitat Chronic Toxicity	1.2E+04	1.2E+00	-
TETRANITRO-1,3,5,7-TETRAAZOCYCLOOCTANE (HMX)	2.2E+02	Aquatic Habitat Chronic Toxicity	2.5E+03	2.2E+02	-
THALLIUM	6.0E+00	Aquatic Habitat Chronic Toxicity	5.0E+04	6.0E+00	6.3E+00
TOLUENE	9.8E+00	Aquatic Habitat Chronic Toxicity	4.0E+01	9.8E+00	2.0E+05

TABLE F-2c. SURFACE WATER SCREENING LEVELS
*Estuary Habitats
(ug/l)

CHEMICAL PARAMETER	[1]Final Surface Water Screening Level	Basis	Gross Contamination (Odors, etc.) Table I-4	Estuary Aquatic Habitat Goal (Chronic Toxicity) Table F-4a	Bioaccumulation and Human Consumption Table F-4f
TOXAPHENE	2.0E-04	Aquatic Habitat Chronic Toxicity	1.4E+02	2.0E-04	2.8E-04
TPH (gasolines)	5.0E+02	Aquatic Habitat Chronic Toxicity	5.0E+03	5.0E+02	-
TPH (middle distillates)	6.4E+02	Aquatic Habitat Chronic Toxicity	2.5E+03	6.4E+02	-
TPH (residual fuels)	6.4E+02	Aquatic Habitat Chronic Toxicity	2.5E+03	6.4E+02	-
TRICHLOROBENZENE, 1,2,4-	1.1E+02	Aquatic Habitat Chronic Toxicity	3.0E+03	1.1E+02	-
TRICHLOROETHANE, 1,1,1-	1.1E+01	Aquatic Habitat Chronic Toxicity	5.0E+04	1.1E+01	-
TRICHLOROETHANE, 1,1,2-	1.6E+01	Bioaccumulation/Human Consumption	5.0E+04	7.3E+02	1.6E+01
TRICHLOROETHYLENE	3.0E+01	Bioaccumulation/Human Consumption	1.0E+04	4.7E+01	3.0E+01
TRICHLOROPHENOL, 2,4,5-	1.1E+01	Aquatic Habitat Chronic Toxicity	2.0E+02	1.1E+01	3.6E+03
TRICHLOROPHENOL, 2,4,6-	4.9E+00	Aquatic Habitat Chronic Toxicity	1.0E+02	4.9E+00	-
TRICHLOROPHENOXYACETIC ACID, 2,4,5- (2,4,5-T)	6.9E+02	Aquatic Habitat Chronic Toxicity	5.0E+04	6.9E+02	-
TRICHLOROPHENOXYPROPIONIC ACID, 2,4,5- (2,4,5-TP)	3.0E+01	Aquatic Habitat Chronic Toxicity	3.6E+04	3.0E+01	-
TRICHLOROPROPANE, 1,2,3-	1.4E+01	Aquatic Habitat Chronic Toxicity	5.0E+04	1.4E+01	-
TRICHLOROPROPENE, 1,2,3-	6.2E-01	Aquatic Habitat Chronic Toxicity	5.0E+04	6.2E-01	-
TRIFLURALIN	1.1E+00	Aquatic Habitat Chronic Toxicity	9.0E+01	1.1E+00	-
TRINITROBENZENE, 1,3,5-	1.0E+01	Aquatic Habitat Chronic Toxicity	5.0E+04	1.0E+01	-
TRINITROPHENYLMETHYLNITRAMINE, 2,4,6- (TETRYL)	4.0E+01	Aquatic Habitat Chronic Toxicity	3.7E+04	4.0E+01	-
TRINITROTOLUENE, 2,4,6- (TNT)	1.3E+01	Aquatic Habitat Chronic Toxicity	2.0E+01	1.3E+01	-
VANADIUM	2.7E+01	Aquatic Habitat Chronic Toxicity	5.0E+04	2.7E+01	-
VINYL CHLORIDE	5.3E+02	Bioaccumulation/Human Consumption	3.4E+03	9.3E+02	5.3E+02
XYLENES	1.3E+01	Aquatic Habitat Chronic Toxicity	5.3E+02	1.3E+01	-
ZINC	8.1E+01	Aquatic Habitat Chronic Toxicity	5.0E+04	8.1E+01	-

Notes:

***Estuary Habitats: Mixed freshwater/marine water habitats.**

1. Lowest of gross contamination, aquatic habitat and bioaccumulation screening levels.

TPH -Total Petroleum Hydrocarbons. See text for discussion of different TPH categories.

Ceiling Level: Odor threshold, 1/2 solubility or 50000 ug/L maximum, whichever is lower. Intended to limit nuisances and general resource degradation.

Review of aquatic ecotoxicity data for ethanol underway. Based on preliminary review of available data, chronic toxicity screening levels likely to be significantly greater than ceiling level of 50,000 ug/L (refer to USEPA 2003b, ECOTOX database).

Method detection limits and background concentrations replace final screening level as appropriate.

TABLE F-3a. FINAL DRINKING WATER SCREENING LEVELS FOR HUMAN TOXICITY.
(ug/L)

CHEMICAL PARAMETER	Final Screening Level	Basis	Primary MCL	Other Criteria	Reference	Risk-Based Screening Level (Table F-3b)	Basis
ACENAPHTHENE	3.5E+02	noncancer effects				3.5E+02	noncancer effects
ACENAPHTHYLENE	2.4E+02	noncancer effects				2.4E+02	noncancer effects
ACETONE	1.4E+04	noncancer effects				1.4E+04	noncancer effects
ALDRIN	5.1E-03	carcinogenic effects				5.1E-03	carcinogenic effects
AMETRYN	1.8E+02	noncancer effects				1.8E+02	noncancer effects
AMINO,2- DINITROTOLUENE,4,6-	4.0E+01	noncancer effects				4.0E+01	noncancer effects
AMINO,4- DINITROTOLUENE,2,6-	4.0E+01	noncancer effects				4.0E+01	noncancer effects
ANTHRACENE	1.8E+03	noncancer effects				1.8E+03	noncancer effects
ANTIMONY	6.0E+00	Primary MCL	6.0E+00			8.0E+00	noncancer effects
ARSENIC	1.0E+01	Primary MCL	1.0E+01			5.2E-02	carcinogenic effects
ATRAZINE	3.4E-01	carcinogenic effects				3.4E-01	carcinogenic effects
BARIUM	2.0E+03	Primary MCL	2.0E+03			4.0E+03	noncancer effects
BENOMYL	1.0E+03	noncancer effects				1.0E+03	noncancer effects
BENZENE	5.0E+00	Primary MCL	5.0E+00			4.8E-01	carcinogenic effects
BENZO(a)ANTHRACENE	1.1E-02	mutagenic effects				1.1E-02	mutagenic effects
BENZO(a)PYRENE	2.0E-01	Primary MCL	2.0E-01			2.9E-03	mutagenic effects
BENZO(b)FLUORANTHENE	2.9E-02	mutagenic effects				2.9E-02	mutagenic effects
BENZO(g,h,i)PERYLENE	8.0E+02	noncancer effects				8.0E+02	noncancer effects
BENZO(k)FLUORANTHENE	2.9E-01	mutagenic effects				2.9E-01	mutagenic effects
BERYLLIUM	4.0E+00	Primary MCL	4.0E+00			4.0E+01	noncancer effects
BIPHENYL, 1,1-	8.3E-01	noncancer effects				8.3E-01	noncancer effects
BIS(2-CHLOROETHYL)ETHER	1.4E-02	carcinogenic effects				1.4E-02	carcinogenic effects
BIS(2-CHLORO-1-METHYLETHYL)ETHER	3.7E-01	carcinogenic effects				3.7E-01	carcinogenic effects
BIS(2-ETHYLHEXYL)PHTHALATE	6.0E+00	Primary MCL	6.0E+00			5.6E+00	carcinogenic effects
BORON	4.0E+03	noncancer effects				4.0E+03	noncancer effects
BROMODICHLOROMETHANE	1.4E-01	carcinogenic effects				1.4E-01	carcinogenic effects
BROMOFORM	1.0E+02	HDOH Primary MCL		1.0E+02	HDOH Primary MCL	3.4E+00	carcinogenic effects
BROMOMETHANE	7.6E+00	noncancer effects				7.6E+00	noncancer effects
CADMIUM	5.0E+00	Primary MCL	5.0E+00			1.0E+01	noncancer effects
CARBON TETRACHLORIDE	5.0E+00	Primary MCL	5.0E+00			5.1E-01	carcinogenic effects
CHLORDANE (TECHNICAL)	2.0E+00	Primary MCL	2.0E+00			4.5E-02	carcinogenic effects
CHLOROANILINE, p-	3.9E-01	carcinogenic effects				3.9E-01	carcinogenic effects
CHLOROBENZENE	1.0E+02	Primary MCL	1.0E+02			8.3E+01	noncancer effects
CHLOROETHANE	2.1E+04	noncancer effects				2.1E+04	noncancer effects
CHLOROFORM	1.0E+02	HDOH Primary MCL		1.0E+02	HDOH Primary MCL	2.2E-01	carcinogenic effects
CHLOROMETHANE	1.9E+02	noncancer effects				1.9E+02	noncancer effects
CHLOROPHENOL, 2-	2.9E+01	noncancer effects				2.9E+01	noncancer effects
CHROMIUM (Total)	1.0E+02	Primary MCL	1.0E+02				
CHROMIUM III	3.0E+04	noncancer effects				3.0E+04	noncancer effects
CHROMIUM VI	4.3E-02	mutagenic effects				4.3E-02	mutagenic effects
CHRYSENE	2.9E+00	mutagenic effects				2.9E+00	mutagenic effects
COBALT	6.0E+00	noncancer effects				6.0E+00	noncancer effects
COPPER	1.3E+03	HDOH Primary MCL		1.3E+03	HDOH Primary MCL	8.0E+02	noncancer effects

TABLE F-3a. FINAL DRINKING WATER SCREENING LEVELS FOR HUMAN TOXICITY.
(ug/L)

CHEMICAL PARAMETER	Final Screening Level	Basis	Primary MCL	Other Criteria	Reference	Risk-Based Screening Level (Table F-3b)	Basis
CYANIDE (Free)	2.0E+02	Primary MCL	2.0E+02			1.5E+00	noncancer effects
CYCLO-1,3,5-TRIMETHYLENE-2,4,6-TRINITRAMINE (RDX)	7.1E-01	carcinogenic effects				7.1E-01	carcinogenic effects
DALAPON	6.0E+02	noncancer effects				6.0E+02	noncancer effects
DIBENZO(a,h)ANTHTRACENE	2.9E-03	mutagenic effects				2.9E-03	mutagenic effects
DIBROMO,1,2- CHLOROPROPANE,3-	2.0E-01	Primary MCL	2.0E-01			3.3E-04	mutagenic effects
DIBROMOCHLOROMETHANE	2.1E-01	carcinogenic effects				2.1E-01	carcinogenic effects
DIBROMOETHANE, 1,2-	5.0E-02	Primary MCL	5.0E-02			7.5E-03	carcinogenic effects
DICHLOROBENZENE, 1,2-	6.0E+02	Primary MCL	6.0E+02			3.4E+02	noncancer effects
DICHLOROBENZENE, 1,3-	1.8E+02	noncancer effects				1.8E+02	noncancer effects
DICHLOROBENZENE, 1,4-	7.5E+01	Primary MCL	7.5E+01			4.9E-01	carcinogenic effects
DICHLOROBENZIDINE, 3,3-	1.7E-01	carcinogenic effects				1.7E-01	carcinogenic effects
DICHLORODIPHENYLDICHLOROETHANE (DDD)	3.2E-01	carcinogenic effects				3.2E-01	carcinogenic effects
DICHLORODIPHENYLDICHLOROETHYLENE (DDE)	4.6E-02	carcinogenic effects				4.6E-02	carcinogenic effects
DICHLORODIPHENYLTRICHLOROETHANE (DDT)	2.3E-01	carcinogenic effects				2.3E-01	carcinogenic effects
DICHLOROETHANE, 1,1-	2.8E+00	carcinogenic effects				2.8E+00	carcinogenic effects
DICHLOROETHANE, 1,2-	5.0E+00	Primary MCL	5.0E+00			1.7E-01	carcinogenic effects
DICHLOROETHYLENE, 1,1-	7.0E+00	Primary MCL	7.0E+00			2.9E+02	noncancer effects
DICHLOROETHYLENE, Cis 1,2-	7.0E+01	Primary MCL	7.0E+01			1.2E+01	noncancer effects
DICHLOROETHYLENE, Trans 1,2-	1.0E+02	Primary MCL	1.0E+02			1.2E+02	noncancer effects
DICHLOROPHENOL, 2,4-	6.0E+01	noncancer effects				6.0E+01	noncancer effects
DICHLOROPHENOXYACETIC ACID (2,4-D)	2.0E+02	noncancer effects				2.0E+02	noncancer effects
DICHLOROPROPANE, 1,2-	5.0E+00	Primary MCL	5.0E+00			4.5E-01	carcinogenic effects
DICHLOROPROPENE, 1,3-	5.0E-01	carcinogenic effects				5.0E-01	carcinogenic effects
DIELDRIN	1.1E-02	carcinogenic effects				1.1E-02	carcinogenic effects
DIETHYLPHTHALATE	1.6E+04	noncancer effects				1.6E+04	noncancer effects
DIMETHYLPHENOL, 2,4-	4.0E+02	noncancer effects				4.0E+02	noncancer effects
DIMETHYLPHTHALATE	2.0E+05	noncancer effects				2.0E+05	noncancer effects
DINITROBENZENE, 1,3-	2.0E+00	noncancer effects				2.0E+00	noncancer effects
DINITROPHENOL, 2,4-	4.0E+01	noncancer effects				4.0E+01	noncancer effects
DINITROTOLUENE, 2,4- (2,4-DNT)	2.5E-01	carcinogenic effects				2.5E-01	carcinogenic effects
DINITROTOLUENE, 2,6- (2,6-DNT)	5.2E-02	carcinogenic effects				5.2E-02	carcinogenic effects
DIOXANE, 1,4-	4.6E-01	carcinogenic effects				4.6E-01	carcinogenic effects
DIOXINS (TEQ)	3.0E-08	Primary MCL	3.0E-08			1.2E-07	carcinogenic effects
DIURON	4.0E+01	noncancer effects				4.0E+01	noncancer effects
ENDOSULFAN	1.2E+02	noncancer effects				1.2E+02	noncancer effects
ENDRIN	2.0E+00	Primary MCL	2.0E+00			6.0E+00	noncancer effects
ETHANOL							not available+C5
ETHYLBENZENE	7.0E+02	Primary MCL	7.0E+02			1.7E+00	carcinogenic effects
FLUORANTHENE	8.0E+02	noncancer effects				8.0E+02	noncancer effects
FLUORENE	2.4E+02	noncancer effects				2.4E+02	noncancer effects
GLYPHOSATE	2.0E+03	noncancer effects				2.0E+03	noncancer effects
HEPTACHLOR	4.0E-01	Primary MCL	4.0E-01			3.5E-03	carcinogenic effects
HEPTACHLOR EPOXIDE	2.0E-01	Primary MCL	2.0E-01			1.7E-03	carcinogenic effects

TABLE F-3a. FINAL DRINKING WATER SCREENING LEVELS FOR HUMAN TOXICITY.
(ug/L)

CHEMICAL PARAMETER	Final Screening Level	Basis	Primary MCL	Other Criteria	Reference	Risk-Based Screening Level (Table F-3b)	Basis
HEXACHLOROBENZENE	1.0E+00	Primary MCL	1.0E+00			9.8E-03	carcinogenic effects
HEXACHLOROBUTADIENE	2.0E-01	carcinogenic effects				2.0E-01	carcinogenic effects
HEXACHLOROCYCLOHEXANE (gamma) LINDANE	2.0E-01	Primary MCL	2.0E-01			7.1E-02	carcinogenic effects
HEXACHLOROETHANE	4.0E-01	carcinogenic effects				4.0E-01	carcinogenic effects
HEXAZINONE	6.6E+02	noncancer effects				6.6E+02	noncancer effects
INDENO(1,2,3-cd)PYRENE	2.9E-02	mutagenic effects				2.9E-02	mutagenic effects
ISOPHORONE	8.2E+01	carcinogenic effects				8.2E+01	carcinogenic effects
LEAD	1.5E+01	USEPA Action Level		1.5E+01	USEPA Action Level		
MERCURY	2.0E+00	Primary MCL	2.0E+00			6.0E+00	noncancer effects
METHOXYCHLOR	4.0E+01	Primary MCL	4.0E+01			1.0E+02	noncancer effects
METHYL ETHYL KETONE	5.6E+03	noncancer effects				5.6E+03	noncancer effects
METHYL ISOBUTYL KETONE	6.3E+03	noncancer effects				6.3E+03	noncancer effects
METHYL MERCURY	2.0E+00	noncancer effects				2.0E+00	noncancer effects
METHYL TERT BUTYL ETHER	1.4E+01	carcinogenic effects				1.4E+01	carcinogenic effects
METHYLENE CHLORIDE	5.0E+00	Primary MCL	5.0E+00			1.0E+01	mutagenic effects
METHYLNAPHTHALENE, 1-	6.0E+00	carcinogenic effects				6.0E+00	carcinogenic effects
METHYLNAPHTHALENE, 2-	2.4E+01	noncancer effects				2.4E+01	noncancer effects
MOLYBDENUM	1.0E+02	noncancer effects				1.0E+02	noncancer effects
NAPHTHALENE	1.7E+01	CDPH notification level		1.7E+01	CDPH notification level	1.7E-01	carcinogenic effects
NICKEL	1.0E+02	HDOH Primary MCL		1.0E+02	HDOH Primary MCL	4.0E+02	noncancer effects
NITROBENZENE	1.4E-01	carcinogenic effects				1.4E-01	carcinogenic effects
NITROGLYCERIN	2.0E+00	noncancer effects				2.0E+00	noncancer effects
NITROTOLUENE, 2-	7.9E-02	carcinogenic effects				7.9E-02	carcinogenic effects
NITROTOLUENE, 3-	2.0E+00	noncancer effects				2.0E+00	noncancer effects
NITROTOLUENE, 4-	4.9E+00	carcinogenic effects				4.9E+00	carcinogenic effects
PENTACHLOROPHENOL	1.0E+00	Primary MCL	1.0E+00			1.9E-01	carcinogenic effects
PENTAERYTHRITOLTETRANITRATE (PETN)	1.9E+01	carcinogenic effects				1.9E+01	carcinogenic effects
PERCHLORATE	1.5E+01	Primary MCL	1.5E+01			1.4E+01	noncancer effects
PHENANTHRENE	2.4E+02	noncancer effects				2.4E+02	noncancer effects
PHENOL	6.0E+03	noncancer effects				6.0E+03	noncancer effects
POLYCHLORINATED BIPHENYLS (PCBs)	5.0E-01	Primary MCL	5.0E-01			7.9E-03	carcinogenic effects
PROPICONAZOLE	2.6E+02	noncancer effects				2.6E+02	noncancer effects
PYRENE	1.8E+02	noncancer effects				1.8E+02	noncancer effects
SELENIUM	5.0E+01	Primary MCL	5.0E+01			1.0E+02	noncancer effects
SILVER	1.0E+02	noncancer effects				1.0E+02	noncancer effects
SIMAZINE	6.5E-01	carcinogenic effects				6.5E-01	carcinogenic effects
STYRENE	1.0E+02	Primary MCL	1.0E+02			1.4E+03	noncancer effects
TERBACIL	2.6E+02	noncancer effects				2.6E+02	noncancer effects
tert-BUTYL ALCOHOL	5.8E+00	carcinogenic effects				5.8E+00	carcinogenic effects
TETRACHLOROETHANE, 1,1,1,2-	6.1E-01	carcinogenic effects				6.1E-01	carcinogenic effects
TETRACHLOROETHANE, 1,1,2,2-	7.8E-02	carcinogenic effects				7.8E-02	carcinogenic effects
TETRACHLOROETHYLENE	5.0E+00	Primary MCL	5.0E+00			9.0E-01	carcinogenic effects
TETRACHLOROPHENOL, 2,3,4,6-	6.0E+02	noncancer effects				6.0E+02	noncancer effects

TABLE F-3a. FINAL DRINKING WATER SCREENING LEVELS FOR HUMAN TOXICITY.
(ug/L)

CHEMICAL PARAMETER	Final Screening Level	Basis	Primary MCL	Other Criteria	Reference	Risk-Based Screening Level (Table F-3b)	Basis
TETRANITRO-1,3,5,7-TETRAAZOCYCLOOCTANE (HMX)	1.0E+03	noncancer effects				1.0E+03	noncancer effects
THALLIUM	2.0E+00	Primary MCL	2.0E+00			2.0E-01	noncancer effects
TOLUENE	1.0E+03	Primary MCL	1.0E+03			1.4E+03	noncancer effects
TOXAPHENE	3.0E+00	Primary MCL	3.0E+00			7.1E-02	carcinogenic effects
TPH (gasolines)	3.0E+02	noncancer effects				3.0E+02	noncancer effects
TPH (middle distillates)	1.6E+02	noncancer effects				1.6E+02	noncancer effects
TPH (residual fuels)	2.4E+03	noncancer effects				2.4E+03	noncancer effects
TRICHLOROBENZENE, 1,2,4-	7.0E+01	Primary MCL	7.0E+01			6.0E-01	carcinogenic effects
TRICHLOROETHANE, 1,1,1-	2.0E+02	Primary MCL	2.0E+02			8.3E+03	noncancer effects
TRICHLOROETHANE, 1,1,2-	5.0E+00	Primary MCL	5.0E+00			2.8E-01	carcinogenic effects
TRICHLOROETHYLENE	5.0E+00	Primary MCL	5.0E+00			2.4E-01	mutagenic effects
TRICHLOROPHENOL, 2,4,5-	2.0E+03	noncancer effects				2.0E+03	noncancer effects
TRICHLOROPHENOL, 2,4,6-	7.1E+00	carcinogenic effects				7.1E+00	carcinogenic effects
TRICHLOROPHENOXYACETIC ACID, 2,4,5- (2,4,5-T)	2.0E+02	noncancer effects				2.0E+02	noncancer effects
TRICHLOROPHENOXYPROPIONIC ACID, 2,4,5- (2,4,5-TP)	1.6E+02	noncancer effects				1.6E+02	noncancer effects
TRICHLOROPROPANE, 1,2,3-	2.0E-04	mutagenic effects				2.0E-04	mutagenic effects
TRICHLOROPROPENE, 1,2,3-	6.2E-01	noncancer effects				6.2E-01	noncancer effects
TRIFLURALIN	1.0E+01	carcinogenic effects				1.0E+01	carcinogenic effects
TRINITROBENZENE, 1,3,5-	6.0E+02	noncancer effects				6.0E+02	noncancer effects
TRINITROPHENYLMETHYLNITRAMINE, 2,4,6- (TETRYL)	4.0E+01	noncancer effects				4.0E+01	noncancer effects
TRINITROTOLUENE, 2,4,6- (TNT)	2.6E+00	carcinogenic effects				2.6E+00	carcinogenic effects
VANADIUM	1.0E+02	noncancer effects				1.0E+02	noncancer effects
VINYL CHLORIDE	2.0E+00	Primary MCL	2.0E+00			2.0E-02	carcinogenic effects
XYLENES	1.0E+04	Primary MCL	1.0E+04			2.0E+02	noncancer effects
ZINC	6.0E+03	noncancer effects				6.0E+03	noncancer effects

Source (unless otherwise noted):
Guam EPA & USEPA Primary Drinking Water MCLs (refer to Appendix 1).
CDPH: California Department of Public Health, Drinking Water Notification Level (December 2007), http://ww2.cdph.ca.gov/certlic/drinkingwater/Pages/NotificationLevels.aspx
Notes:
Used for development of groundwater and soil screening levels.
Final health-based screening level for drinking water: Primary MCLs or risk-based tapwater goal if primary MCL not available.
TPH -Total Petroleum Hydrocarbons. See text for discussion of different TPH categories.

TABLE F-3b. RISK-BASED SCREENING LEVELS FOR TAPWATER
(ug/l)

CHEMICAL PARAMETER	Lowest Tapwater Goal (ug/L	Basis	Carcinogenic Effects	Mutagenic Effects	Noncancer Effects
ACENAPHTHENE	3.5E+02	noncancer effects			3.5E+02
ACENAPHTHYLENE	2.4E+02	noncancer effects			2.4E+02
ACETONE	1.4E+04	noncancer effects			1.4E+04
ALDRIN	5.1E-03	carcinogenic effects	5.1E-03		5.9E-01
AMETRYN	1.8E+02	noncancer effects			1.8E+02
AMINO,2- DINITROTOLUENE,4,6-	4.0E+01	noncancer effects			4.0E+01
AMINO,4- DINITROTOLUENE,2,6-	4.0E+01	noncancer effects			4.0E+01
ANTHRACENE	1.8E+03	noncancer effects			1.8E+03
ANTIMONY	8.0E+00	noncancer effects			8.0E+00
ARSENIC	5.2E-02	carcinogenic effects	5.2E-02		6.0E+00
ATRAZINE	3.4E-01	carcinogenic effects	3.4E-01		7.0E+02
BARIUM	4.0E+03	noncancer effects			4.0E+03
BENOMYL	1.0E+03	noncancer effects			1.0E+03
BENZENE	4.8E-01	carcinogenic effects	4.8E-01		3.5E+01
BENZO(a)ANTHRACENE	1.1E-02	mutagenic effects	3.5E-02	1.1E-02	
BENZO(a)PYRENE	2.9E-03	mutagenic effects	1.1E-02	2.9E-03	
BENZO(b)FLUORANTHENE	2.9E-02	mutagenic effects	1.1E-01	2.9E-02	
BENZO(g,h,i)PERYLENE	8.0E+02	noncancer effects			8.0E+02
BENZO(k)FLUORANTHENE	2.9E-01	mutagenic effects	1.1E+00	2.9E-01	
BERYLLIUM	4.0E+01	noncancer effects			4.0E+01
BIPHENYL, 1,1-	8.3E-01	noncancer effects	2.2E+00		8.3E-01
BIS(2-CHLOROETHYL)ETHER	1.4E-02	carcinogenic effects	1.4E-02		
BIS(2-CHLORO-1-METHYLETHYL)ETHER	3.7E-01	carcinogenic effects	3.7E-01		2.1E+02
BIS(2-ETHYLHEXYL)PHTHALATE	5.6E+00	carcinogenic effects	5.6E+00		4.0E+02
BORON	4.0E+03	noncancer effects			4.0E+03
BROMODICHLOROMETHANE	1.4E-01	carcinogenic effects	1.4E-01		1.2E+02
BROMOFORM	3.4E+00	carcinogenic effects	3.4E+00		4.0E+02
BROMOMETHANE	7.6E+00	noncancer effects			7.6E+00
CADMIUM	1.0E+01	noncancer effects			1.0E+01
CARBON TETRACHLORIDE	5.1E-01	carcinogenic effects	5.1E-01		5.8E+01
CHLORDANE (TECHNICAL)	4.5E-02	carcinogenic effects	4.5E-02		1.2E+00
CHLOROANILINE, p-	3.9E-01	carcinogenic effects	3.9E-01		8.0E+01
CHLOROBENZENE	8.3E+01	noncancer effects			8.3E+01
CHLOROETHANE	2.1E+04	noncancer effects			2.1E+04
CHLOROFORM	2.2E-01	carcinogenic effects	2.2E-01		1.0E+02
CHLOROMETHANE	1.9E+02	noncancer effects			1.9E+02
CHLOROPHENOL, 2-	2.9E+01	noncancer effects			2.9E+01
CHROMIUM (Total)					
CHROMIUM III	3.0E+04	noncancer effects			3.0E+04
CHROMIUM VI	4.3E-02	mutagenic effects	1.6E-01	4.3E-02	6.0E+01
CHRYSENE	2.9E+00	mutagenic effects	1.1E+01	2.9E+00	
COBALT	6.0E+00	noncancer effects			6.0E+00
COPPER	8.0E+02	noncancer effects			8.0E+02
CYANIDE (Free)	1.5E+00	noncancer effects			1.5E+00
CYCLO-1,3,5-TRIMETHYLENE-2,4,6-TRINITRAMINE (RDX)	7.1E-01	carcinogenic effects	7.1E-01		6.0E+01
DALAPON	6.0E+02	noncancer effects			6.0E+02
DIBENZO(a,h)ANTHTRACENE	2.9E-03	mutagenic effects	1.1E-02	2.9E-03	
DIBROMO,1,2- CHLOROPROPANE,3-	3.3E-04	mutagenic effects	9.3E-04	3.3E-04	3.8E-01
DIBROMOCHLOROMETHANE	2.1E-01	carcinogenic effects	2.1E-01		1.2E+02
DIBROMOETHANE, 1,2-	7.5E-03	carcinogenic effects	7.5E-03		1.7E+01
DICHLOROBENZENE, 1,2-	3.4E+02	noncancer effects			3.4E+02
DICHLOROBENZENE, 1,3-	1.8E+02	noncancer effects			1.8E+02
DICHLOROBENZENE, 1,4-	4.9E-01	carcinogenic effects	4.9E-01		7.6E+02
DICHLOROBENZIDINE, 3,3-	1.7E-01	carcinogenic effects	1.7E-01		
DICHLORODIPHENYLDICHLOROETHANE (DDD)	3.2E-01	carcinogenic effects	3.2E-01		
DICHLORODIPHENYLDICHLOROETHYLENE (DDE)	4.6E-02	carcinogenic effects	4.6E-02		
DICHLORODIPHENYLTRICHLOROETHANE (DDT)	2.3E-01	carcinogenic effects	2.3E-01		1.0E+01
DICHLOROETHANE, 1,1-	2.8E+00	carcinogenic effects	2.8E+00		1.2E+03
DICHLOROETHANE, 1,2-	1.7E-01	carcinogenic effects	1.7E-01		1.3E+01
DICHLOROETHYLENE, 1,1-	2.9E+02	noncancer effects			2.9E+02
DICHLOROETHYLENE, Cis 1,2-	1.2E+01	noncancer effects			1.2E+01
DICHLOROETHYLENE, Trans 1,2-	1.2E+02	noncancer effects			1.2E+02
DICHLOROPHENOL, 2,4-	6.0E+01	noncancer effects			6.0E+01
DICHLOROPHENOXYACETIC ACID (2,4-D)	2.0E+02	noncancer effects			2.0E+02
DICHLOROPROPANE, 1,2-	4.5E-01	carcinogenic effects	4.5E-01		8.3E+00
DICHLOROPROPENE, 1,3-	5.0E-01	carcinogenic effects	5.0E-01		3.9E+01
DIELDRIN	1.1E-02	carcinogenic effects	1.1E-02		1.6E+00
DIETHYLPHTHALATE	1.6E+04	noncancer effects			1.6E+04
DIMETHYLPHENOL, 2,4-	4.0E+02	noncancer effects			4.0E+02
DIMETHYLPHTHALATE	2.0E+05	noncancer effects			2.0E+05
DINITROBENZENE, 1,3-	2.0E+00	noncancer effects			2.0E+00
DINITROPHENOL, 2,4-	4.0E+01	noncancer effects			4.0E+01
DINITROTOLUENE, 2,4- (2,4-DNT)	2.5E-01	carcinogenic effects	2.5E-01		4.0E+01
DINITROTOLUENE, 2,6- (2,6-DNT)	5.2E-02	carcinogenic effects	5.2E-02		6.0E+00

TABLE F-3b. RISK-BASED SCREENING LEVELS FOR TAPWATER
(ug/l)

CHEMICAL PARAMETER	Lowest Tapwater Goal (ug/L	Basis	Carcinogenic Effects	Mutagenic Effects	Noncancer Effects
DIOXANE, 1,4-	4.6E-01	carcinogenic effects	4.6E-01		5.7E+01
DIOXINS (TEQ)	1.2E-07	carcinogenic effects	1.2E-07		1.2E-05
DIURON	4.0E+01	noncancer effects			4.0E+01
ENDOSULFAN	1.2E+02	noncancer effects			1.2E+02
ENDRIN	6.0E+00	noncancer effects			6.0E+00
ETHANOL		not available+C5			
ETHYLBENZENE	1.7E+00	carcinogenic effects	1.7E+00		1.0E+03
FLUORANTHENE	8.0E+02	noncancer effects			8.0E+02
FLUORENE	2.4E+02	noncancer effects			2.4E+02
GLYPHOSATE	2.0E+03	noncancer effects			2.0E+03
HEPTACHLOR	3.5E-03	carcinogenic effects	3.5E-03		1.0E+01
HEPTACHLOR EPOXIDE	1.7E-03	carcinogenic effects	1.7E-03		2.6E-01
HEXACHLOROBENZENE	9.8E-03	carcinogenic effects	9.8E-03		1.6E+01
HEXACHLOROBUTADIENE	2.0E-01	carcinogenic effects	2.0E-01		2.0E+01
HEXACHLOROCYCLOHEXANE (gamma) LINDANE	7.1E-02	carcinogenic effects	7.1E-02		6.0E+00
HEXACHLOROETHANE	4.0E-01	carcinogenic effects	4.0E-01		1.1E+01
HEXAZINONE	6.6E+02	noncancer effects			6.6E+02
INDENO(1,2,3-cd)PYRENE	2.9E-02	mutagenic effects	1.1E-01	2.9E-02	
ISOPHORONE	8.2E+01	carcinogenic effects	8.2E+01		4.0E+03
LEAD					
MERCURY	6.0E+00	noncancer effects			6.0E+00
METHOXYCHLOR	1.0E+02	noncancer effects			1.0E+02
METHYL ETHYL KETONE	5.6E+03	noncancer effects			5.6E+03
METHYL ISOBUTYL KETONE	6.3E+03	noncancer effects			6.3E+03
METHYL MERCURY	2.0E+00	noncancer effects			2.0E+00
METHYL TERT BUTYL ETHER	1.4E+01	carcinogenic effects	1.4E+01		6.3E+03
METHYLENE CHLORIDE	1.0E+01	mutagenic effects	3.6E+01	1.0E+01	1.1E+02
METHYLNAPHTHALENE, 1-	6.0E+00	carcinogenic effects	6.0E+00		4.1E+02
METHYLNAPHTHALENE, 2-	2.4E+01	noncancer effects			2.4E+01
MOLYBDENUM	1.0E+02	noncancer effects			1.0E+02
NAPHTHALENE	1.7E-01	carcinogenic effects	1.7E-01		6.2E+00
NICKEL	4.0E+02	noncancer effects			4.0E+02
NITROBENZENE	1.4E-01	carcinogenic effects	1.4E-01		1.3E+01
NITROGLYCERIN	2.0E+00	noncancer effects	4.6E+00		2.0E+00
NITROTOLUENE, 2-	7.9E-02	carcinogenic effects	7.9E-02		5.3E+00
NITROTOLUENE, 3-	2.0E+00	noncancer effects			2.0E+00
NITROTOLUENE, 4-	4.9E+00	carcinogenic effects	4.9E+00		8.0E+01
PENTACHLOROPHENOL	1.9E-01	carcinogenic effects	1.9E-01		1.0E+02
PENTAERYTHRITOLTETRANITRATE (PETN)	1.9E+01	carcinogenic effects	1.9E+01		4.0E+01
PERCHLORATE	1.4E+01	noncancer effects			1.4E+01
PHENANTHRENE	2.4E+02	noncancer effects			2.4E+02
PHENOL	6.0E+03	noncancer effects			6.0E+03
POLYCHLORINATED BIPHENYLS (PCBs)	7.9E-03	carcinogenic effects	7.9E-03		4.0E-01
PROPICONAZOLE	2.6E+02	noncancer effects			2.6E+02
PYRENE	1.8E+02	noncancer effects			1.8E+02
SELENIUM	1.0E+02	noncancer effects			1.0E+02
SILVER	1.0E+02	noncancer effects			1.0E+02
SIMAZINE	6.5E-01	carcinogenic effects	6.5E-01		1.0E+02
STYRENE	1.4E+03	noncancer effects			1.4E+03
TERBACIL	2.6E+02	noncancer effects			2.6E+02
tert-BUTYL ALCOHOL	5.8E+00	carcinogenic effects	5.8E+00		
TETRACHLOROETHANE, 1,1,1,2-	6.1E-01	carcinogenic effects	6.1E-01		1.8E+02
TETRACHLOROETHANE, 1,1,2,2-	7.8E-02	carcinogenic effects	7.8E-02		4.0E+02
TETRACHLOROETHYLENE	9.0E-01	carcinogenic effects	9.0E-01		4.9E+01
TETRACHLOROPHENOL, 2,3,4,6-	6.0E+02	noncancer effects			6.0E+02
TETRANITRO-1,3,5,7-TETRAAZOCYCLOOCTANE (HMX)	1.0E+03	noncancer effects			1.0E+03
THALLIUM	2.0E-01	noncancer effects			2.0E-01
TOLUENE	1.4E+03	noncancer effects			1.4E+03
TOXAPHENE	7.1E-02	carcinogenic effects	7.1E-02		
TPH (gasolines)	3.0E+02	noncancer effects			3.0E+02
TPH (middle distillates)	1.6E+02	noncancer effects			1.6E+02
TPH (residual fuels)	2.4E+03	noncancer effects			2.4E+03
TRICHLOROBENZENE, 1,2,4-	6.0E-01	carcinogenic effects	6.0E-01		4.1E+00
TRICHLOROETHANE, 1,1,1-	8.3E+03	noncancer effects			8.3E+03
TRICHLOROETHANE, 1,1,2-	2.8E-01	carcinogenic effects	2.8E-01		4.1E-01
TRICHLOROETHYLENE	2.4E-01	mutagenic effects	7.6E-01	2.4E-01	2.9E+00
TRICHLOROPHENOL, 2,4,5-	2.0E+03	noncancer effects			2.0E+03
TRICHLOROPHENOL, 2,4,6-	7.1E+00	carcinogenic effects	7.1E+00		2.0E+01
TRICHLOROPHENOXYACETIC ACID, 2,4,5- (2,4,5-T)	2.0E+02	noncancer effects			2.0E+02
TRICHLOROPHENOXYPROPIONIC ACID, 2,4,5- (2,4,5-TP)	1.6E+02	noncancer effects			1.6E+02
TRICHLOROPROPANE, 1,2,3-	2.0E-04	mutagenic effects	5.8E-04	2.0E-04	6.2E-01
TRICHLOROPROPENE, 1,2,3-	6.2E-01	noncancer effects			6.2E-01
TRIFLURALIN	1.0E+01	carcinogenic effects	1.0E+01		1.5E+02
TRINITROBENZENE, 1,3,5-	6.0E+02	noncancer effects			6.0E+02

TABLE F-3b. RISK-BASED SCREENING LEVELS FOR TAPWATER
(ug/l)

CHEMICAL PARAMETER	Lowest Tapwater Goal (ug/L	Basis	Carcinogenic Effects	Mutagenic Effects	Noncancer Effects
TRINITROPHENYLMETHYLNITRAMINE, 2,4,6- (TETRYL)	4.0E+01	noncancer effects			4.0E+01
TRINITROTOLUENE, 2,4,6- (TNT)	2.6E+00	carcinogenic effects	2.6E+00		1.0E+01
VANADIUM	1.0E+02	noncancer effects			1.0E+02
VINYL CHLORIDE	2.0E-02	carcinogenic effects	2.0E-02	2.8E-02	4.7E+01
XYLENES	2.0E+02	noncancer effects			2.0E+02
ZINC	6.0E+03	noncancer effects			6.0E+03

References:
Calculated using Tap Water equations in USEPA Regional Screening Levels guidance (USEPA 2008a).

Notes:
Addresses use of water for drinking water and inhalation of volatile chemicals during showering.
Target risk = 10^{-6}. Target HQ = 1.0. See Appendix 2 for equations

TABLE F-4a. SUMMARY OF AQUATIC HABITAT GOALS

	Estuarine		Freshwater		Marine	
CONTAMINANT	**Chronic Aquatic Toxicity (ug/L)**	**Acute Aquatic Toxicity (ug/L)**	**Chronic Aquatic Toxicity (ug/L)**	**Acute Aquatic Toxicity (ug/L)**	**Chronic Aquatic Toxicity (ug/L)**	**Acute Aquatic Toxicity (ug/L)**
ACENAPHTHENE	1.5E+01	3.0E+02	1.5E+01	3.0E+02	2.0E+01	3.0E+02
ACENAPHTHYLENE	1.3E+01	3.0E+02	1.3E+01	3.0E+02	3.1E+02	3.0E+02
ACETONE	1.5E+03	1.5E+04	1.7E+03	1.5E+04	1.5E+03	2.8E+04
ALDRIN	1.4E-04	1.3E+00	3.5E-02	3.0E+00	1.4E-04	1.3E+00
AMETRYN	7.0E+02	1.8E+03	7.0E+02	1.8E+03	7.0E+02	1.8E+03
AMINO,2- DINITROTOLUENE,4,6-	1.8E+01	1.6E+02	1.8E+01	1.6E+02	2.0E+01	1.8E+02
AMINO,4- DINITROTOLUENE,2,6-	1.1E+01	9.8E+01	1.1E+01	9.8E+01	1.1E+01	9.8E+01
ANTHRACENE	2.0E-02	1.8E-01	2.0E-02	1.8E-01	7.3E-01	1.3E+01
ANTIMONY	3.0E+01	8.8E+01	3.0E+01	8.8E+01	5.0E+02	1.5E+03
ARSENIC	3.6E+01	6.9E+01	1.5E+02	3.4E+02	3.6E+01	6.9E+01
ATRAZINE	1.2E+01	3.5E+02	1.2E+01	3.5E+02	2.6E+01	7.6E+02
BARIUM	2.2E+02	2.0E+03	2.2E+02	2.0E+03	2.2E+02	2.0E+03
BENOMYL	1.4E-01	2.8E+00	1.4E-01	2.8E+00	1.4E-01	2.8E+00
BENZENE	7.1E+01	7.0E+02	1.6E+02	7.0E+02	7.1E+01	7.0E+02
BENZO(a)ANTHRACENE	2.7E-02	3.0E+02	4.7E+00	3.0E+02	2.7E-02	3.0E+02
BENZO(a)PYRENE	6.0E-02	3.0E+02	6.0E-02	3.0E+02	3.0E-01	3.0E+02
BENZO(b)FLUORANTHENE	6.8E-01	3.0E+02	2.6E+00	3.0E+02	6.8E-01	3.0E+02
BENZO(g,h,i)PERYLENE	4.4E-01	3.0E+02	4.4E-01	3.0E+02	4.4E-01	3.0E+02
BENZO(k)FLUORANTHENE	6.4E-01	3.0E+02	6.4E-01	3.0E+02	6.4E-01	3.0E+02
BERYLLIUM	6.6E-01	3.5E+01	1.1E+01	9.3E+01	6.6E-01	3.5E+01
BIPHENYL, 1,1-	6.5E+00	2.6E+01	6.5E+00	2.6E+01	1.4E+01	2.6E+01
BIS(2-CHLOROETHYL)ETHER	2.4E+03	2.4E+04	2.4E+03	2.4E+04	2.4E+03	2.4E+04
BIS(2-CHLORO-1-METHYLETHYL)ETHER	3.7E-01	3.7E-01	3.7E-01	3.7E-01	3.7E-01	3.7E-01
BIS(2-ETHYLHEXYL)PHTHALATE	3.0E+00	2.7E+01	3.0E+00	2.7E+01	3.0E+00	2.7E+01
BORON	1.0E+03	3.4E+04	7.2E+03	3.4E+04	1.0E+03	3.4E+04
BROMODICHLOROMETHANE	3.4E+02	3.1E+03	3.4E+02	3.1E+03	3.4E+02	3.1E+03
BROMOFORM	2.3E+02	1.1E+03	2.3E+02	1.1E+03	3.2E+02	2.3E+03
BROMOMETHANE	1.6E+01	3.8E+01	1.6E+01	3.8E+01	1.6E+01	3.8E+01
CADMIUM	2.5E-01	2.0E+00	2.5E-01	2.0E+00	8.8E+00	4.0E+01
CARBON TETRACHLORIDE	9.8E+00	1.8E+02	7.7E+01	6.9E+02	9.8E+00	1.8E+02
CHLORDANE (TECHNICAL)	4.0E-03	9.0E-02	4.3E-03	2.4E+00	4.0E-03	9.0E-02
CHLOROANILINE, p-	1.9E+01	4.6E+02	1.9E+01	4.6E+02	1.9E+01	4.6E+02
CHLOROBENZENE	2.5E+01	2.2E+02	2.5E+01	2.2E+02	6.4E+01	1.1E+03
CHLOROETHANE	2.1E+04	2.1E+04	2.1E+04	2.1E+04	2.1E+04	2.1E+04
CHLOROFORM	2.8E+01	4.9E+02	1.4E+02	1.3E+03	2.8E+01	4.9E+02
CHLOROMETHANE	1.9E+02	1.9E+02	1.9E+02	1.9E+02	1.9E+02	1.9E+02
CHLOROPHENOL, 2-	3.2E+01	2.9E+02	3.2E+01	2.9E+02	4.0E+02	4.0E+02
CHROMIUM (Total)	1.1E+01	1.6E+01	1.1E+01	1.6E+01	5.0E+01	1.0E+03
CHROMIUM III	2.0E+01	5.7E+02	7.4E+01	5.7E+02	2.0E+01	5.7E+02
CHROMIUM VI	1.1E+01	1.6E+01	1.1E+01	1.6E+01	5.0E+01	1.1E+03
CHRYSENE	2.0E+00	3.0E+02	4.7E+00	3.0E+02	2.0E+00	3.0E+02
COBALT	1.9E+01	1.2E+02	1.9E+01	1.2E+02	2.3E+01	1.5E+03

TABLE F-4a. SUMMARY OF AQUATIC HABITAT GOALS

	Estuarine		Freshwater		Marine	
CONTAMINANT	Chronic Aquatic Toxicity (ug/L)	Acute Aquatic Toxicity (ug/L)	Chronic Aquatic Toxicity (ug/L)	Acute Aquatic Toxicity (ug/L)	Chronic Aquatic Toxicity (ug/L)	Acute Aquatic Toxicity (ug/L)
COPPER	3.1E+00	4.8E+00	9.0E+00	1.3E+01	3.1E+00	4.8E+00
CYANIDE (Free)	1.0E+00	1.0E+00	5.2E+00	2.2E+01	1.0E+00	1.0E+00
CYCLO-1,3,5-TRIMETHYLENE-2,4,6-TRINITRAMINE (RDX)	7.9E+01	5.2E+02	7.9E+01	5.2E+02	1.9E+02	7.0E+02
DALAPON	3.0E+02	3.0E+03	3.0E+02	3.0E+03	3.0E+02	3.0E+03
DIBENZO(a,h)ANTHTRACENE	8.0E-01	3.0E+02	8.0E-01	3.0E+02	7.1E+00	3.0E+02
DIBROMO-3-CHLOROPROPANE, 1,2-	2.0E-01	2.0E-01	2.0E-01	2.0E-01	2.0E-01	2.0E-01
DIBROMOCHLOROMETHANE	3.4E+01	2.9E+03	3.2E+02	2.9E+03	3.4E+01	2.9E+03
DIBROMOETHANE, 1,2-	1.4E+03	1.4E+03	1.4E+03	1.4E+03	1.4E+03	1.4E+03
DICHLOROBENZENE, 1,2-	1.4E+01	1.3E+02	2.3E+01	1.3E+02	1.4E+01	2.6E+02
DICHLOROBENZENE, 1,3-	2.2E+01	7.9E+01	2.2E+01	7.9E+01	7.1E+01	6.3E+02
DICHLOROBENZENE, 1,4-	9.4E+00	5.7E+01	9.4E+00	5.7E+01	1.5E+01	1.8E+02
DICHLOROBENZIDINE, 3,3-	4.5E+00	4.1E+01	4.5E+00	4.1E+01	4.5E+00	4.1E+01
DICHLORODIPHENYLDICHLOROETHANE (DDD)	1.1E-02	1.9E-01	1.1E-02	1.9E-01	1.1E-02	1.9E-01
DICHLORODIPHENYLDICHLOROETHYLENE (DDE)	4.1E-01	7.0E+00	4.1E-01	7.0E+00	4.1E-01	7.0E+00
DICHLORODIPHENYLTRICHLOROETHANE (DDT)	1.0E-03	1.3E-01	1.0E-03	1.1E+00	1.0E-03	1.3E-01
DICHLOROETHANE, 1,1-	4.7E+01	8.3E+02	4.1E+02	3.7E+03	4.7E+01	8.3E+02
DICHLOROETHANE, 1,2-	9.1E+02	8.2E+03	2.0E+03	8.2E+03	9.1E+02	8.8E+03
DICHLOROETHYLENE, 1,1-	2.5E+01	4.5E+02	1.3E+02	1.2E+03	2.5E+01	4.5E+02
DICHLOROETHYLENE, Cis 1,2-	6.2E+02	5.5E+03	6.2E+02	5.5E+03	6.2E+02	5.5E+03
DICHLOROETHYLENE, Trans 1,2-	5.6E+02	1.0E+04	5.6E+02	1.0E+04	5.6E+02	1.0E+04
DICHLOROPHENOL, 2,4-	1.1E+01	1.1E+02	1.1E+01	1.1E+02	7.9E+02	7.9E+02
DICHLOROPHENOXYACETIC ACID (2,4-D)	7.0E+01	1.3E+02	7.9E+01	1.3E+02	7.0E+01	1.3E+02
DICHLOROPROPANE, 1,2-	5.2E+02	3.3E+03	5.2E+02	3.3E+03	5.2E+02	3.4E+03
DICHLOROPROPENE, 1,3-	6.0E-02	9.9E-01	1.7E+00	1.5E+01	6.0E-02	9.9E-01
DIELDRIN	1.9E-03	2.4E-01	5.6E-02	2.4E-01	1.9E-03	7.1E-01
DIETHYLPHTHALATE	2.1E+02	9.8E+02	2.2E+02	9.8E+02	2.1E+02	1.8E+03
DIMETHYLPHENOL, 2,4-	1.1E+02	2.7E+02	5.3E+02	1.3E+03	1.1E+02	2.7E+02
DIMETHYLPHTHALATE	1.1E+03	3.2E+03	1.1E+03	3.2E+03	2.9E+03	3.2E+03
DINITROBENZENE, 1,3-	1.0E+01	1.0E+02	2.2E+01	1.0E+02	1.0E+01	1.1E+02
DINITROPHENOL, 2,4-	1.4E+01	3.8E+02	7.1E+01	3.8E+02	1.4E+01	3.8E+02
DINITROTOLUENE, 2,4- (2,4-DNT)	9.1E+00	2.0E+02	4.4E+01	3.9E+02	9.1E+00	2.0E+02
DINITROTOLUENE, 2,6- (2,6-DNT)	8.1E+01	2.0E+02	8.1E+01	7.3E+02	8.1E+01	2.0E+02
DIOXANE, 1,4-	3.4E+05	3.4E+06	3.4E+05	3.4E+06	5.0E+05	5.0E+06
DIOXINS (TEQ)	3.1E-09	3.0E-03	3.1E-09	3.0E-03	3.1E-09	3.0E-03
DIURON	6.0E+01	2.0E+02	6.0E+01	2.0E+02	6.0E+01	5.5E+02
ENDOSULFAN	8.7E-03	3.4E-02	5.6E-02	2.2E-01	8.7E-03	3.4E-02
ENDRIN	2.3E-03	3.7E-02	3.6E-02	8.6E-02	2.3E-03	3.7E-02
ETHANOL						
ETHYLBENZENE	7.3E+00	1.3E+02	6.1E+01	5.5E+02	7.3E+00	1.3E+02
FLUORANTHENE	8.0E-01	3.0E+02	8.0E-01	3.0E+02	7.1E+00	3.0E+02
FLUORENE	3.9E+00	3.0E+02	1.9E+01	3.0E+02	3.9E+00	3.0E+02
GLYPHOSATE	1.8E+03	2.2E+04	1.8E+03	2.2E+04	1.8E+03	2.2E+04

TABLE F-4a. SUMMARY OF AQUATIC HABITAT GOALS

	Estuarine		Freshwater		Marine	
CONTAMINANT	Chronic Aquatic Toxicity (ug/L)	Acute Aquatic Toxicity (ug/L)	Chronic Aquatic Toxicity (ug/L)	Acute Aquatic Toxicity (ug/L)	Chronic Aquatic Toxicity (ug/L)	Acute Aquatic Toxicity (ug/L)
HEPTACHLOR	3.6E-03	5.3E-02	3.8E-03	5.2E-01	3.6E-03	5.3E-02
HEPTACHLOR EPOXIDE	3.6E-03	5.3E-02	3.8E-03	5.2E-01	3.6E-03	5.3E-02
HEXACHLOROBENZENE	3.0E-04	3.0E-04	3.7E+00	6.0E+00	3.0E-04	3.0E-04
HEXACHLOROBUTADIENE	3.0E-01	3.0E+00	1.0E+00	1.0E+01	3.0E-01	3.0E+00
HEXACHLOROCYCLOHEXANE (gamma) LINDANE	6.3E-02	1.6E-01	1.1E-01	9.5E-01	6.3E-02	1.6E-01
HEXACHLOROETHANE	1.2E+01	2.1E+02	1.2E+01	2.1E+02	1.2E+01	2.1E+02
HEXAZINONE	1.7E+04	1.4E+05	1.7E+04	1.4E+05	1.7E+04	1.4E+05
INDENO(1,2,3-cd)PYRENE	2.8E-01	3.0E+02	2.8E-01	3.0E+02	2.8E-01	3.0E+02
ISOPHORONE	9.2E+02	7.5E+03	9.2E+02	7.5E+03	9.2E+02	7.5E+03
LEAD	2.5E+00	6.5E+01	2.5E+00	6.5E+01	8.1E+00	2.1E+02
MERCURY	7.7E-01	1.4E+00	7.7E-01	1.4E+00	9.4E-01	1.8E+00
METHOXYCHLOR	1.9E-02	3.0E-02	3.0E-02	3.0E-02	1.9E-02	3.0E-02
METHYL ETHYL KETONE	1.4E+04	2.0E+05	2.2E+04	2.0E+05	1.4E+04	2.4E+05
METHYL ISOBUTYL KETONE	1.7E+02	2.2E+03	1.7E+02	2.2E+03	1.7E+02	2.2E+03
METHYL MERCURY	2.8E-03	9.9E-02	2.8E-03	9.9E-02	2.8E-03	9.9E-02
METHYL TERT BUTYL ETHER	1.8E+04	5.3E+04	5.1E+04	1.5E+05	1.8E+04	5.3E+04
METHYLENE CHLORIDE	1.5E+03	8.5E+03	1.5E+03	8.5E+03	2.2E+03	2.6E+04
METHYLNAPHTHALENE, 1-	2.1E+00	3.7E+01	2.1E+00	3.7E+01	2.1E+00	3.7E+01
METHYLNAPHTHALENE, 2-	4.7E+00	4.2E+01	4.7E+00	4.2E+01	7.2E+01	8.6E+01
MOLYBDENUM	3.7E+02	7.2E+03	8.0E+02	7.2E+03	3.7E+02	1.6E+04
NAPHTHALENE	1.2E+01	1.7E+02	2.1E+01	1.7E+02	1.2E+01	1.9E+02
NICKEL	8.2E+00	7.4E+01	5.2E+01	4.7E+02	8.2E+00	7.4E+01
NITROBENZENE	3.8E+02	2.0E+03	3.8E+02	2.0E+03	3.8E+02	2.0E+03
NITROGLYCERIN	1.8E+01	1.6E+02	1.8E+01	1.6E+02	1.8E+01	1.6E+02
NITROTOLUENE, 2-	7.1E+01	6.4E+02	7.1E+01	6.4E+02	7.1E+01	6.4E+02
NITROTOLUENE, 3-	4.2E+01	3.8E+02	4.2E+01	3.8E+02	4.2E+01	3.8E+02
NITROTOLUENE, 4-	4.6E+01	4.1E+02	4.6E+01	4.1E+02	4.6E+01	4.1E+02
PENTACHLOROPHENOL	7.9E+00	1.3E+01	1.5E+01	1.9E+01	7.9E+00	1.3E+01
PENTAERYTHRITOLTETRANITRATE (PETN)	8.5E+05	8.5E+05	8.5E+05	8.5E+05	8.5E+05	8.5E+05
PERCHLORATE	6.0E+02	5.0E+03	6.0E+02	5.0E+03	6.0E+02	5.0E+03
PHENANTHRENE	4.6E+00	7.7E+00	6.3E+00	3.0E+01	4.6E+00	7.7E+00
PHENOL	5.8E+01	3.0E+02	1.6E+02	4.7E+03	5.8E+01	3.0E+02
POLYCHLORINATED BIPHENYLS (PCBs)	1.4E-02	1.4E-02	1.4E-02	1.4E-02	3.0E-02	1.4E-02
PROPICONAZOLE	9.5E+01	4.3E+02	9.5E+01	4.3E+02	9.5E+01	4.3E+02
PYRENE	4.6E+00	3.0E+02	4.6E+00	3.0E+02	1.0E+01	3.0E+02
SELENIUM	5.0E+00	2.0E+01	5.0E+00	2.0E+01	7.1E+01	2.9E+02
SILVER	6.0E-02	1.9E+00	6.0E-02	3.2E+00	1.0E-01	1.9E+00
SIMAZINE	9.0E+00	8.0E+01	9.0E+00	8.0E+01	9.0E+00	8.0E+01
STYRENE	3.2E+01	2.9E+02	3.2E+01	2.9E+02	3.2E+01	2.9E+02
TERBACIL	2.6E+02	2.6E+02	1.2E+03	2.3E+04	2.6E+02	2.6E+02
tert-BUTYL ALCOHOL	1.8E+04	1.8E+05	1.8E+04	1.8E+05	1.8E+04	1.8E+05
TETRACHLOROETHANE, 1,1,1,2-	1.1E+01	7.7E+02	8.5E+01	7.7E+02	1.1E+01	7.7E+02

TABLE F-4a. SUMMARY OF AQUATIC HABITAT GOALS

	Estuarine		Freshwater		Marine	
CONTAMINANT	**Chronic Aquatic Toxicity (ug/L)**	**Acute Aquatic Toxicity (ug/L)**	**Chronic Aquatic Toxicity (ug/L)**	**Acute Aquatic Toxicity (ug/L)**	**Chronic Aquatic Toxicity (ug/L)**	**Acute Aquatic Toxicity (ug/L)**
TETRACHLOROETHANE, 1,1,2,2-	2.0E+02	9.1E+02	2.0E+02	9.1E+02	6.1E+02	2.1E+03
TETRACHLOROETHYLENE	5.3E+01	4.3E+02	5.3E+01	4.3E+02	9.8E+01	8.3E+02
TETRACHLOROPHENOL, 2,3,4,6-	1.2E+00	1.1E+01	1.2E+00	1.1E+01	1.2E+00	1.1E+01
TETRANITRO-1,3,5,7-TETRAAZOCYCLOOCTANE (HMX)	2.2E+02	1.2E+03	2.2E+02	1.2E+03	3.3E+02	1.9E+03
THALLIUM	6.0E+00	5.4E+01	6.0E+00	5.4E+01	1.2E+01	1.1E+02
TOLUENE	9.8E+00	1.2E+02	6.2E+01	5.6E+02	9.8E+00	1.2E+02
TOXAPHENE	2.0E-04	2.1E-01	2.0E-04	7.3E-01	2.0E-04	2.1E-01
TPH (gasolines)	5.0E+02	5.0E+03	5.0E+02	5.0E+03	3.7E+03	5.0E+03
TPH (middle distillates)	6.4E+02	2.5E+03	6.4E+02	2.5E+03	6.4E+02	2.5E+03
TPH (residual fuels)	6.4E+02	2.5E+03	6.4E+02	2.5E+03	6.4E+02	2.5E+03
TRICHLOROBENZENE, 1,2,4-	1.1E+02	4.2E+02	1.3E+02	4.2E+02	1.1E+02	7.0E+02
TRICHLOROETHANE, 1,1,1-	1.1E+01	2.0E+02	7.6E+01	6.9E+02	1.1E+01	2.0E+02
TRICHLOROETHANE, 1,1,2-	7.3E+02	3.2E+03	7.3E+02	3.2E+03	1.2E+03	5.2E+03
TRICHLOROETHYLENE	4.7E+01	4.4E+02	2.0E+02	2.0E+03	4.7E+01	4.4E+02
TRICHLOROPHENOL, 2,4,5-	1.1E+01	1.0E+02	6.3E+01	1.0E+02	1.1E+01	2.4E+02
TRICHLOROPHENOL, 2,4,6-	4.9E+00	3.9E+01	4.9E+00	3.9E+01	6.5E+00	3.9E+01
TRICHLOROPHENOXYACETIC ACID, 2,4,5- (2,4,5-T)	6.9E+02	6.9E+02	6.9E+02	6.9E+02	6.9E+02	6.9E+02
TRICHLOROPHENOXYPROPIONIC ACID, 2,4,5- (2,4,5-TP)	3.0E+01	2.7E+02	3.0E+01	2.7E+02	5.0E+01	2.7E+02
TRICHLOROPROPANE, 1,2,3-	1.4E+01	1.4E+02	1.4E+01	1.4E+02	1.4E+01	1.4E+02
TRICHLOROPROPENE, 1,2,3-	6.2E-01	6.2E-01	6.2E-01	6.2E-01	6.2E-01	6.2E-01
TRIFLURALIN	1.1E+00	2.1E+01	1.1E+00	2.1E+01	1.1E+00	2.1E+01
TRINITROBENZENE, 1,3,5-	1.0E+01	2.7E+01	1.1E+01	2.7E+01	1.0E+01	3.0E+01
TRINITROPHENYLMETHYLNITRAMINE, 2,4,6- (TETRYL)	4.0E+01	4.0E+01	4.0E+01	4.0E+01	4.0E+01	4.0E+01
TRINITROTOLUENE, 2,4,6- (TNT)	1.3E+01	2.1E+02	1.3E+01	2.1E+02	9.0E+01	5.7E+02
VANADIUM	2.7E+01	9.0E+01	2.7E+01	1.2E+02	8.1E+01	9.0E+01
VINYL CHLORIDE	9.3E+02	8.4E+03	9.3E+02	8.4E+03	9.3E+02	8.4E+03
XYLENES	1.3E+01	2.3E+02	2.7E+01	2.4E+02	1.3E+01	2.3E+02
ZINC	8.1E+01	9.0E+01	1.2E+02	1.2E+02	8.1E+01	9.0E+01

Notes:

Reference: Appendix 1, Table F-4b (chronic) and F-4c (acute).

Aquatic goals for estuarine environments based on lowest of lowest of freshwater and marine goals.

TABLE F-4b. SUMMARY OF SELECTED CHRONIC AQUATIC HABITAT GOALS

	[1]Aquatic Habitat Goals					
CHEMICAL PARAMETER	[1]Estuarine Aquatic Habitat Goal (ug/L)	Basis	Lowest Freshwater Aquatic Habitat Goal (ug/L)	Basis	Lowest Marine Aquatic Habitat Goal (ug/L)	Basis
ACENAPHTHENE	1.5E+01	USEPA Chronic FW	1.5E+01	USEPA Chronic FW	2.0E+01	USEPA Chronic SW
ACENAPHTHYLENE	1.3E+01	USEPA Chronic FW	1.3E+01	USEPA Chronic FW	3.1E+02	USEPA Chronic SW
ACETONE	1.5E+03	USEPA Chronic SW	1.7E+03	USEPA Chronic FW	1.5E+03	USEPA Chronic SW
ALDRIN	1.4E-04	USEPA Chronic SW	3.5E-02	USEPA Chronic FW	1.4E-04	USEPA Chronic SW
AMETRYN	7.0E+02	USEPA Off Pesticides (FW)	7.0E+02	USEPA Off Pesticides	7.0E+02	USEPA Off Pesticides (FW)
AMINO,2- DINITROTOLUENE,4,6-	1.8E+01	USEPA Chronic FW	1.8E+01	USEPA Chronic FW	2.0E+01	USEPA Chronic SW
AMINO,4- DINITROTOLUENE,2,6-	1.1E+01	USEPA Reg IV (FW)	1.1E+01	USEPA Chronic FW	1.1E+01	USEPA Reg IV (FW)
ANTHRACENE	2.0E-02	USEPA Chronic FW	2.0E-02	USEPA Chronic FW	7.3E-01	USEPA Chronic SW
ANTIMONY	3.0E+01	Guam-CNMI Chronic FW	3.0E+01	Guam-CNMI Chronic FW	5.0E+02	Guam-CNMI Chronic SW
ARSENIC	3.6E+01	Guam-CNMI Chronic SW	1.5E+02	Guam-CNMI Chronic FW	3.6E+01	Guam-CNMI Chronic SW
ATRAZINE	1.2E+01	Guam-CNMI Chronic FW	1.2E+01	Guam-CNMI Chronic FW	2.6E+01	Guam-CNMI Chronic SW
BARIUM	2.2E+02	USEPA Chronic SW	2.2E+02	USEPA Chronic FW	2.2E+02	USEPA Chronic SW
BENOMYL	1.4E-01	5% USGS 2012 FW acute	1.4E-01	5% USGS 2012 acute	1.4E-01	5% USGS 2012 FW acute
BENZENE	7.1E+01	USEPA Chronic SW	1.6E+02	USEPA Chronic FW	7.1E+01	USEPA Chronic SW
BENZO(a)ANTHRACENE	2.7E-02	USEPA Chronic SW	4.7E+00	USEPA Chronic FW	2.7E-02	USEPA Chronic SW
BENZO(a)PYRENE	6.0E-02	USEPA Chronic FW	6.0E-02	USEPA Chronic FW	3.0E-01	USEPA Chronic SW
BENZO(b)FLUORANTHENE	6.8E-01	USEPA Chronic SW	2.6E+00	USEPA Chronic FW	6.8E-01	USEPA Chronic SW
BENZO(g,h,i)PERYLENE	4.4E-01	USEPA Chronic SW	4.4E-01	USEPA Chronic FW	4.4E-01	USEPA Chronic SW
BENZO(k)FLUORANTHENE	6.4E-01	USEPA Chronic SW	6.4E-01	USEPA Chronic FW	6.4E-01	USEPA Chronic SW
BERYLLIUM	6.6E-01	USEPA Chronic SW	1.1E+01	USEPA Chronic FW	6.6E-01	USEPA Chronic SW
BIPHENYL, 1,1-	6.5E+00	USEPA Chronic FW	6.5E+00	USEPA Chronic FW	1.4E+01	USEPA Chronic SW
BIS(2-CHLOROETHYL)ETHER	2.4E+03	USDOE Chronic (FW)	2.4E+03	USDOE Chronic	2.4E+03	USDOE Chronic (FW)
BIS(2-CHLORO-1-METHYLETHYL)ETHER	3.7E-01	Drinking Water Toxicity	3.7E-01	Drinking Water Toxicity	3.7E-01	Drinking Water Toxicity
BIS(2-ETHYLHEXYL)PHTHALATE	3.0E+00	USEPA Chronic SW	3.0E+00	USEPA Chronic FW	3.0E+00	USEPA Chronic SW
BORON	1.0E+03	USEPA Chronic SW	7.2E+03	USEPA Chronic FW	1.0E+03	USEPA Chronic SW
BROMODICHLOROMETHANE	3.4E+02	USEPA Reg IV (FW)	3.4E+02	USEPA Chronic FW	3.4E+02	USEPA Reg IV (FW)
BROMOFORM	2.3E+02	USEPA Chronic FW	2.3E+02	USEPA Chronic FW	3.2E+02	USEPA Chronic SW
BROMOMETHANE	1.6E+01	USEPA Reg IV (FW)	1.6E+01	USEPA Chronic FW	1.6E+01	USEPA Reg IV (FW)
CADMIUM	2.5E-01	Guam-CNMI Chronic FW	2.5E-01	Guam-CNMI Chronic FW	8.8E+00	Guam-CNMI Chronic SW
CARBON TETRACHLORIDE	9.8E+00	USEPA Chronic SW	7.7E+01	USEPA Chronic FW	9.8E+00	USEPA Chronic SW
CHLORDANE (TECHNICAL)	4.0E-03	Guam-CNMI Chronic SW	4.3E-03	Guam-CNMI Chronic FW	4.0E-03	Guam-CNMI Chronic SW
CHLOROANILINE, p-	1.9E+01	USEPA Reg IV (FW)	1.9E+01	USEPA Chronic FW	1.9E+01	USEPA Reg IV (FW)
CHLOROBENZENE	2.5E+01	USEPA Chronic FW	2.5E+01	USEPA Chronic FW	6.4E+01	USEPA Chronic SW
CHLOROETHANE	2.1E+04	Drinking Water Toxicity	2.1E+04	Drinking Water Toxicity	2.1E+04	Drinking Water Toxicity
CHLOROFORM	2.8E+01	USEPA Chronic SW	1.4E+02	USEPA Chronic FW	2.8E+01	USEPA Chronic SW
CHLOROMETHANE	1.9E+02	Drinking Water Toxicity	1.9E+02	Drinking Water Toxicity	1.9E+02	Drinking Water Toxicity
CHLOROPHENOL, 2-	3.2E+01	USEPA Chronic FW	3.2E+01	USEPA Chronic FW	4.0E+02	USEPA Chronic SW
CHROMIUM (Total)	1.1E+01	Reg IV Cr VI	1.1E+01	Reg IV Cr VI	5.0E+01	Reg IV Cr VI
CHROMIUM III	2.0E+01	USEPA Chronic SW	7.4E+01	Guam-CNMI Chronic FW	2.0E+01	USEPA Chronic SW
CHROMIUM VI	1.1E+01	Guam-CNMI Chronic FW	1.1E+01	Guam-CNMI Chronic FW	5.0E+01	Guam-CNMI Chronic SW
CHRYSENE	2.0E+00	USEPA Chronic SW	4.7E+00	USEPA Chronic FW	2.0E+00	USEPA Chronic SW
COBALT	1.9E+01	USEPA Chronic FW	1.9E+01	USEPA Chronic FW	2.3E+01	USEPA Chronic SW

TABLE F-4b. SUMMARY OF SELECTED CHRONIC AQUATIC HABITAT GOALS

	[1]Aquatic Habitat Goals					
COPPER	3.1E+00	Guam-CNMI Chronic SW	9.0E+00	Guam-CNMI Chronic FW	3.1E+00	Guam-CNMI Chronic SW
CYANIDE (Free)	1.0E+00	USEPA Chronic SW	5.2E+00	Guam-CNMI Chronic FW	1.0E+00	USEPA Chronic SW
CYCLO-1,3,5-TRIMETHYLENE-2,4,6-TRINITRAMINE (RDX)	7.9E+01	USEPA Chronic FW	7.9E+01	USEPA Chronic FW	1.9E+02	USEPA Chronic SW
DALAPON	3.0E+02	USEPA AQUIRE (5% FW LC50)	3.0E+02	USEPA AQUIRE (5% FW LC50)	3.0E+02	USEPA AQUIRE (5% FW LC50)
DIBENZO(a,h)ANTHTRACENE	8.0E-01	USEPA Chronic FW	8.0E-01	USEPA Chronic FW	7.1E+00	USEPA Chronic SW
DIBROMO,1,2- CHLOROPROPANE,3-	2.0E-01	Drinking Water Toxicity	2.0E-01	Drinking Water Toxicity	2.0E-01	Drinking Water Toxicity
DIBROMOCHLOROMETHANE	3.4E+01	USEPA Chronic SW	3.2E+02	USEPA Chronic FW	3.4E+01	USEPA Chronic SW
DIBROMOETHANE, 1,2-	1.4E+03	50% MOEE FW Chronic AWQC	1.4E+03	50% MOEE FW Chronic AWQC	1.4E+03	50% MOEE FW Chronic AWQC
DICHLOROBENZENE, 1,2-	1.4E+01	USEPA Chronic SW	2.3E+01	USEPA Chronic FW	1.4E+01	USEPA Chronic SW
DICHLOROBENZENE, 1,3-	2.2E+01	USEPA Chronic FW	2.2E+01	USEPA Chronic FW	7.1E+01	USEPA Chronic SW
DICHLOROBENZENE, 1,4-	9.4E+00	USEPA Chronic FW	9.4E+00	USEPA Chronic FW	1.5E+01	USEPA Chronic SW
DICHLOROBENZIDINE, 3,3-	4.5E+00	USEPA Reg IV (FW)	4.5E+00	USEPA Chronic FW	4.5E+00	USEPA Reg IV (FW)
DICHLORODIPHENYLDICHLOROETHANE (DDD)	1.1E-02	USEPA Chronic SW	1.1E-02	USEPA Chronic FW	1.1E-02	USEPA Chronic SW
DICHLORODIPHENYLDICHLOROETHYLENE (DDE)	4.1E-01	USEPA Reg IV (FW)	4.1E-01	USEPA Chronic FW	4.1E-01	USEPA Reg IV (FW)
DICHLORODIPHENYLTRICHLOROETHANE (DDT)	1.0E-03	Guam-CNMI Chronic SW	1.0E-03	Guam-CNMI Chronic FW	1.0E-03	Guam-CNMI Chronic SW
DICHLOROETHANE, 1,1-	4.7E+01	USEPA Chronic SW	4.1E+02	USEPA Chronic FW	4.7E+01	USEPA Chronic SW
DICHLOROETHANE, 1,2-	9.1E+02	USEPA Chronic SW	2.0E+03	USEPA Chronic FW	9.1E+02	USEPA Chronic SW
DICHLOROETHYLENE, 1,1-	2.5E+01	USEPA Chronic SW	1.3E+02	USEPA Chronic FW	2.5E+01	USEPA Chronic SW
DICHLOROETHYLENE, Cis 1,2-	6.2E+02	USEPA Reg IV (FW)	6.2E+02	USEPA Chronic FW	6.2E+02	USEPA Reg IV (FW)
DICHLOROETHYLENE, Trans 1,2-	5.6E+02	USEPA Reg IV (FW)	5.6E+02	USEPA Chronic FW	5.6E+02	USEPA Reg IV (FW)
DICHLOROPHENOL, 2,4-	1.1E+01	USEPA Chronic FW	1.1E+01	USEPA Chronic FW	7.9E+02	USEPA Chronic SW
DICHLOROPHENOXYACETIC ACID (2,4-D)	7.0E+01	USEPA Chronic SW	7.9E+01	USEPA Chronic FW	7.0E+01	USEPA Chronic SW
DICHLOROPROPANE, 1,2-	5.2E+02	USEPA Reg IV (FW)	5.2E+02	USEPA Chronic FW	5.2E+02	USEPA Reg IV (FW)
DICHLOROPROPENE, 1,3-	6.0E-02	USEPA Chronic SW	1.7E+00	USEPA Chronic FW	6.0E-02	USEPA Chronic SW
DIELDRIN	1.9E-03	Guam-CNMI Chronic SW	5.6E-02	Guam-CNMI Chronic FW	1.9E-03	Guam-CNMI Chronic SW
DIETHYLPHTHALATE	2.1E+02	USEPA Chronic SW	2.2E+02	USEPA Chronic FW	2.1E+02	USEPA Chronic SW
DIMETHYLPHENOL, 2,4-	1.1E+02	Guam-CNMI Chronic SW	5.3E+02	Guam-CNMI Chronic FW	1.1E+02	Guam-CNMI Chronic SW
DIMETHYLPHTHALATE	1.1E+03	USEPA Chronic FW	1.1E+03	USEPA Chronic FW	2.9E+03	USEPA Chronic SW
DINITROBENZENE, 1,3-	1.0E+01	USEPA Chronic SW	2.2E+01	USEPA Chronic FW	1.0E+01	USEPA Chronic SW
DINITROPHENOL, 2,4-	1.4E+01	USEPA Chronic SW	7.1E+01	USEPA Chronic FW	1.4E+01	USEPA Chronic SW
DINITROTOLUENE, 2,4- (2,4-DNT)	9.1E+00	USEPA Chronic SW	4.4E+01	USEPA Chronic FW	9.1E+00	USEPA Chronic SW
DINITROTOLUENE, 2,6- (2,6-DNT)	8.1E+01	USEPA Reg IV (FW)	8.1E+01	USEPA Chronic FW	8.1E+01	USEPA Reg IV (FW)
DIOXANE, 1,4-	3.4E+05	Mohr (5% Acute FW LC 50)	3.4E+05	Mohr (5% Acute FW LC 50)	5.0E+05	Mohr (5% Acute SW LC 50)
DIOXINS (TEQ)	3.1E-09	USEPA Reg IV (FW)	3.1E-09	USEPA Chronic FW	3.1E-09	USEPA Reg IV (FW)
DIURON	6.0E+01	USEPA AQUIRE (50% FW EC50)	6.0E+01	USEPA AQUIRE (50% FW EC50)	6.0E+01	USEPA AQUIRE (50% FW EC50)
ENDOSULFAN	8.7E-03	Guam-CNMI Chronic SW	5.6E-02	Guam-CNMI Chronic FW	8.7E-03	Guam-CNMI Chronic SW
ENDRIN	2.3E-03	Guam-CNMI Chronic SW	3.6E-02	Guam-CNMI Chronic FW	2.3E-03	Guam-CNMI Chronic SW
ETHANOL		not available		not available		Drinking Water Toxicity
ETHYLBENZENE	7.3E+00	USEPA Chronic SW	6.1E+01	USEPA Chronic FW	7.3E+00	USEPA Chronic SW
FLUORANTHENE	8.0E-01	USEPA Chronic FW	8.0E-01	USEPA Chronic FW	7.1E+00	USEPA Chronic SW
FLUORENE	3.9E+00	USEPA Chronic SW	1.9E+01	USEPA Chronic FW	3.9E+00	USEPA Chronic SW
GLYPHOSATE	1.8E+03	USEPA Off Pesticides (FW)	1.8E+03	USEPA Off Pesticides	1.8E+03	USEPA Off Pesticides (FW)
HEPTACHLOR	3.6E-03	Guam-CNMI Chronic SW	3.8E-03	Guam-CNMI Chronic FW	3.6E-03	Guam-CNMI Chronic SW
HEPTACHLOR EPOXIDE	3.6E-03	Guam-CNMI Chronic SW	3.8E-03	Guam-CNMI Chronic FW	3.6E-03	Guam-CNMI Chronic SW
HEXACHLOROBENZENE	3.0E-04	USEPA Reg IV (FW)	3.7E+00	Guam-CNMI Chronic FW	3.0E-04	USEPA Reg IV (FW)
HEXACHLOROBUTADIENE	3.0E-01	USEPA Chronic SW	1.0E+00	USEPA Chronic FW	3.0E-01	USEPA Chronic SW
HEXACHLOROCYCLOHEXANE (gamma) LINDANE	6.3E-02	USEPA Chronic SW	1.1E-01	USEPA Chronic FW	6.3E-02	USEPA Chronic SW
HEXACHLOROETHANE	1.2E+01	USEPA Chronic SW	1.2E+01	USEPA Chronic FW	1.2E+01	USEPA Chronic SW

TABLE F-4b. SUMMARY OF SELECTED CHRONIC AQUATIC HABITAT GOALS

	[1]Aquatic Habitat Goals					
HEXAZINONE	1.7E+04	USEPA Off Pesticides (FW)	1.7E+04	USEPA Off Pesticides	1.7E+04	USEPA Off Pesticides (FW)
INDENO(1,2,3-cd)PYRENE	2.8E-01	USEPA Chronic SW	2.8E-01	USEPA Chronic FW	2.8E-01	USEPA Chronic SW
ISOPHORONE	9.2E+02	USEPA Reg IV (FW)	9.2E+02	USEPA Chronic FW	9.2E+02	USEPA Reg IV (FW)
LEAD	2.5E+00	Guam-CNMI Chronic FW	2.5E+00	Guam-CNMI Chronic FW	8.1E+00	Guam-CNMI Chronic SW
MERCURY	7.7E-01	Guam-CNMI Chronic FW	7.7E-01	Guam-CNMI Chronic FW	9.4E-01	Guam-CNMI Chronic SW
METHOXYCHLOR	1.9E-02	USEPA Chronic SW	3.0E-02	USEPA Chronic FW	1.9E-02	USEPA Chronic SW
METHYL ETHYL KETONE	1.4E+04	USEPA Chronic SW	2.2E+04	USEPA Chronic FW	1.4E+04	USEPA Chronic SW
METHYL ISOBUTYL KETONE	1.7E+02	USEPA Chronic SW	1.7E+02	USEPA Chronic FW	1.7E+02	USEPA Chronic SW
METHYL MERCURY	2.8E-03	USEPA Chronic SW	2.8E-03	USEPA Chronic FW	2.8E-03	USEPA Chronic SW
METHYL TERT BUTYL ETHER	1.8E+04	Guam-CNMI Chronic SW	5.1E+04	Guam-CNMI Chronic FW	1.8E+04	Guam-CNMI Chronic SW
METHYLENE CHLORIDE	1.5E+03	USEPA Chronic FW	1.5E+03	USEPA Chronic FW	2.2E+03	USEPA Chronic SW
METHYLNAPHTHALENE, 1-	2.1E+00	USEPA Chronic SW	2.1E+00	USEPA Chronic FW	2.1E+00	USEPA Chronic SW
METHYLNAPHTHALENE, 2-	4.7E+00	USEPA Chronic FW	4.7E+00	USEPA Chronic FW	7.2E+01	USEPA Chronic SW
MOLYBDENUM	3.7E+02	USEPA Chronic SW	8.0E+02	USEPA Chronic FW	3.7E+02	USEPA Chronic SW
NAPHTHALENE	1.2E+01	USEPA Chronic SW	2.1E+01	USEPA Chronic FW	1.2E+01	USEPA Chronic SW
NICKEL	8.2E+00	Guam-CNMI Chronic SW	5.2E+01	Guam-CNMI Chronic FW	8.2E+00	Guam-CNMI Chronic SW
NITROBENZENE	3.8E+02	USEPA Reg IV (FW)	3.8E+02	USEPA Chronic FW	3.8E+02	USEPA Reg IV (FW)
NITROGLYCERIN	1.8E+01	USEPA Reg IV (FW)	1.8E+01	USEPA Chronic FW	1.8E+01	USEPA Reg IV (FW)
NITROTOLUENE, 2-	7.1E+01	USEPA Reg IV (FW)	7.1E+01	USEPA Chronic FW	7.1E+01	USEPA Reg IV (FW)
NITROTOLUENE, 3-	4.2E+01	USEPA Reg IV (FW)	4.2E+01	USEPA Chronic FW	4.2E+01	USEPA Reg IV (FW)
NITROTOLUENE, 4-	4.6E+01	USEPA Reg IV (FW)	4.6E+01	USEPA Chronic FW	4.6E+01	USEPA Reg IV (FW)
PENTACHLOROPHENOL	7.9E+00	Guam-CNMI Chronic SW	1.5E+01	Guam-CNMI Chronic FW	7.9E+00	Guam-CNMI Chronic SW
PENTAERYTHRITOLTETRANITRATE (PETN)	8.5E+05	Pascoe et al. (chronic FW)	8.5E+05	Pascoe et al. (chronic FW)	8.5E+05	Pascoe et al. (chronic FW)
PERCHLORATE	6.0E+02	USEPA 2002	6.0E+02	USEPA 2002	6.0E+02	USEPA 2002
PHENANTHRENE	4.6E+00	Guam-CNMI Chronic SW	6.3E+00	Guam-CNMI Chronic FW	4.6E+00	Guam-CNMI Chronic SW
PHENOL	5.8E+01	USEPA Chronic SW	1.6E+02	USEPA Chronic FW	5.8E+01	USEPA Chronic SW
POLYCHLORINATED BIPHENYLS (PCBs)	1.4E-02	Guam-CNMI Chronic FW	1.4E-02	Guam-CNMI Chronic FW	3.0E-02	Guam-CNMI Chronic SW
PROPICONAZOLE	9.5E+01	USEPA Off Pesticides (FW)	9.5E+01	USEPA Off Pesticides	9.5E+01	USEPA Off Pesticides (FW)
PYRENE	4.6E+00	USEPA Chronic FW	4.6E+00	USEPA Chronic FW	1.0E+01	USEPA Chronic SW
SELENIUM	5.0E+00	Guam-CNMI Chronic FW	5.0E+00	Guam-CNMI Chronic FW	7.1E+01	Guam-CNMI Chronic SW
SILVER	6.0E-02	USEPA Chronic FW	6.0E-02	USEPA Chronic FW	1.0E-01	USEPA Chronic SW
SIMAZINE	9.0E+00	USEPA Reg IV (FW)	9.0E+00	USEPA Chronic FW	9.0E+00	USEPA Reg IV (FW)
STYRENE	3.2E+01	USEPA Reg IV (FW)	3.2E+01	USEPA Chronic FW	3.2E+01	USEPA Reg IV (FW)
TERBACIL	2.6E+02	Drinking Water Toxicity	1.2E+03	USEPA Off Pesticides	2.6E+02	Drinking Water Toxicity
tert-BUTYL ALCOHOL	1.8E+04	USEPA AQUIRE (10% FW LC0)	1.8E+04	USEPA AQUIRE (10% FW LC0)	1.8E+04	USEPA AQUIRE (10% FW LC0)
TETRACHLOROETHANE, 1,1,1,2-	1.1E+01	USEPA Chronic SW	8.5E+01	USEPA Chronic FW	1.1E+01	USEPA Chronic SW
TETRACHLOROETHANE, 1,1,2,2-	2.0E+02	USEPA Chronic FW	2.0E+02	USEPA Chronic FW	6.1E+02	USEPA Chronic SW
TETRACHLOROETHYLENE	5.3E+01	USEPA Chronic FW	5.3E+01	USEPA Chronic FW	9.8E+01	USEPA Chronic SW
TETRACHLOROPHENOL, 2,3,4,6-	1.2E+00	USEPA Reg IV (FW)	1.2E+00	USEPA Chronic FW	1.2E+00	USEPA Reg IV (FW)
TETRANITRO-1,3,5,7-TETRAAZOCYCLOOCTANE (HMX)	2.2E+02	USEPA Chronic FW	2.2E+02	USEPA Chronic FW	3.3E+02	USEPA Chronic SW
THALLIUM	6.0E+00	USEPA Chronic FW	6.0E+00	USEPA Chronic FW	1.2E+01	USEPA Chronic SW
TOLUENE	9.8E+00	USEPA Chronic SW	6.2E+01	USEPA Chronic FW	9.8E+00	USEPA Chronic SW
TOXAPHENE	2.0E-04	Guam-CNMI Chronic SW	2.0E-04	Guam-CNMI Chronic FW	2.0E-04	Guam-CNMI Chronic SW
TPH (gasolines)	5.0E+02	CalEPA FW Chronic	5.0E+02	CalEPA FW Chronic	3.7E+03	CalEPA Chronic (SW)
TPH (middle distillates)	6.4E+02	CalEPA Chronic (FW)	6.4E+02	CalEPA FW Chronic	6.4E+02	CalEPA Chronic (FW)
TPH (residual fuels)	6.4E+02	CalEPA Chronic (FW)	6.4E+02	CaEPA FW Chronic	6.4E+02	CalEPA Chronic (FW)
TRICHLOROBENZENE, 1,2,4-	1.1E+02	USEPA Chronic SW	1.3E+02	USEPA Chronic FW	1.1E+02	USEPA Chronic SW
TRICHLOROETHANE, 1,1,1-	1.1E+01	USEPA Chronic SW	7.6E+01	USEPA Chronic FW	1.1E+01	USEPA Chronic SW

TABLE F-4b. SUMMARY OF SELECTED CHRONIC AQUATIC HABITAT GOALS

	[1]Aquatic Habitat Goals					
TRICHLOROETHANE, 1,1,2-	7.3E+02	USEPA Chronic FW	7.3E+02	USEPA Chronic FW	1.2E+03	USEPA Chronic SW
TRICHLOROETHYLENE	4.7E+01	USEPA Chronic SW	2.0E+02	USEPA Chronic FW	4.7E+01	USEPA Chronic SW
TRICHLOROPHENOL, 2,4,5-	1.1E+01	Guam-CNMI Chronic SW	6.3E+01	Guam-CNMI Chronic FW	1.1E+01	Guam-CNMI Chronic SW
TRICHLOROPHENOL, 2,4,6-	4.9E+00	USEPA Chronic FW	4.9E+00	USEPA Chronic FW	6.5E+00	USEPA Chronic SW
TRICHLOROPHENOXYACETIC ACID, 2,4,5- (2,4,5-T)	6.9E+02	USEPA Reg. V FW Chronic	6.9E+02	USEPA Reg. V FW Chronic	6.9E+02	USEPA Reg. V FW Chronic
TRICHLOROPHENOXYPROPIONIC ACID, 2,4,5- (2,4,5-TP)	3.0E+01	USEPA Chronic FW	3.0E+01	USEPA Chronic FW	5.0E+01	USEPA Chronic SW
TRICHLOROPROPANE, 1,2,3-	1.4E+01	USEPA AQUIRE (50% FW EC50)	1.4E+01	USEPA AQUIRE (50% FW EC50)	1.4E+01	USEPA AQUIRE (50% FW EC50)
TRICHLOROPROPENE, 1,2,3-	6.2E-01	Drinking Water Toxicity	6.2E-01	Drinking Water Toxicity	6.2E-01	Drinking Water Toxicity
TRIFLURALIN	1.1E+00	USEPA Reg IV (FW)	1.1E+00	USEPA Chronic FW	1.1E+00	USEPA Reg IV (FW)
TRINITROBENZENE, 1,3,5-	1.0E+01	USEPA Chronic SW	1.1E+01	USEPA Chronic FW	1.0E+01	USEPA Chronic SW
TRINITROPHENYLMETHYLNITRAMINE, 2,4,6- (TETRYL)	4.0E+01	Drinking Water Toxicity	4.0E+01	Drinking Water Toxicity	4.0E+01	Drinking Water Toxicity
TRINITROTOLUENE, 2,4,6- (TNT)	1.3E+01	USEPA Chronic FW	1.3E+01	USEPA Chronic FW	9.0E+01	USEPA Chronic SW

TABLE F-4b. SUMMARY OF SELECTED CHRONIC AQUATIC HABITAT GOALS

	[1]Aquatic Habitat Goals					
VANADIUM	2.7E+01	USEPA Chronic FW	2.7E+01	USEPA Chronic FW	8.1E+01	USEPA Chronic SW
VINYL CHLORIDE	9.3E+02	USEPA Reg. IV SW Chronic	9.3E+02	USEPA Chronic FW	9.3E+02	USEPA Reg. IV SW Chronic
XYLENES	1.3E+01	USEPA Chronic SW	2.7E+01	USEPA Chronic FW	1.3E+01	USEPA Chronic SW
ZINC	8.1E+01	Guam-CNMI Chronic SW	1.2E+02	Guam-CNMI Chronic FW	8.1E+01	Guam-CNMI Chronic SW

Notes:

1. Refer to Table F-4d and F-4e for summary of aquatic habitat goal sources. Used for selection of groundwater screening levels.
2. Estuarine Goal = Lowest of Freshwater vs Saltwater chronic goals.
3. Drinking water goal substituted as aquatic habitat goal if latter was not available (see text).

TABLE F-4c. SUMMARY OF SELECTED ACUTE AQUATIC HABITAT GOALS

	[1]Aquatic Habitat Goals					
CONTAMINANT	**[1]Estuarine Acute Aquatic Habitat Goal (ug/L)**	**Basis**	**Freshwater Acute Aquatic Habitat Goal (ug/L)**	**Basis**	**Saltwater Acute Aquatic Habitat Goal (ug/L)**	**Basis**
ACENAPHTHENE	3.0E+02	CCME 2002	3.0E+02	CCME 2002	3.0E+02	CCME 2002
ACENAPHTHYLENE	3.0E+02	CCME 2002	3.0E+02	CCME 2002	3.0E+02	CCME 2002
ACETONE	1.5E+04	USEPA Acute FW	1.5E+04	USEPA Acute FW	2.8E+04	USEPA Acute SW
ALDRIN	1.3E+00	Guam-CNMI Acute SW	3.0E+00	Guam CNMI Acute FW	1.3E+00	Guam-CNMI Acute SW
AMETRYN	1.8E+03	USEPA Off Pesticides (FW)	1.8E+03	USEPA Off Pesticides	1.8E+03	USEPA Off Pesticides (FW)
AMINO,2- DINITROTOLUENE,4,6-	1.6E+02	USEPA Acute FW	1.6E+02	USEPA Acute FW	1.8E+02	USEPA Acute SW
AMINO,4- DINITROTOLUENE,2,6-	9.8E+01	USEPA Reg IV (FW)	9.8E+01	USEPA Acute FW	9.8E+01	USEPA Reg IV (FW)
ANTHRACENE	1.8E-01	USEPA Acute FW	1.8E-01	USEPA Acute FW	1.3E+01	USEPA Acute SW
ANTIMONY	8.8E+01	Guam CNMI Acute FW	8.8E+01	Guam CNMI Acute FW	1.5E+03	Guam-CNMI Acute SW
ARSENIC	6.9E+01	Guam-CNMI Acute SW	3.4E+02	Guam CNMI Acute FW	6.9E+01	Guam-CNMI Acute SW
ATRAZINE	3.5E+02	Guam CNMI Acute FW	3.5E+02	Guam CNMI Acute FW	7.6E+02	Guam-CNMI Acute SW
BARIUM	2.0E+03	USEPA Acute SW	2.0E+03	USEPA Acute FW	2.0E+03	USEPA Acute SW
BENOMYL	2.8E+00	USGS Acute (FW)	2.8E+00	USGS 2012	2.8E+00	USGS Acute (FW)
BENZENE	7.0E+02	USEPA Reg IV (FW)	7.0E+02	USEPA Acute FW	7.0E+02	USEPA Reg IV (FW)
BENZO(a)ANTHRACENE	3.0E+02	CCME 2002	3.0E+02	CCME 2002	3.0E+02	CCME 2002
BENZO(a)PYRENE	3.0E+02	CCME 2002	3.0E+02	CCME 2002	3.0E+02	CCME 2002
BENZO(b)FLUORANTHENE	3.0E+02	CCME 2002	3.0E+02	CCME 2002	3.0E+02	CCME 2002
BENZO(g,h,i)PERYLENE	3.0E+02	CCME 2002	3.0E+02	CCME 2002	3.0E+02	CCME 2002
BENZO(k)FLUORANTHENE	3.0E+02	CCME 2002	3.0E+02	CCME 2002	3.0E+02	CCME 2002
BERYLLIUM	3.5E+01	USEPA Acute SW	9.3E+01	USEPA Acute FW	3.5E+01	USEPA Acute SW
BIPHENYL, 1,1-	2.6E+01	USEPA Reg IV (FW)	2.6E+01	USEPA Acute FW	2.6E+01	USEPA Reg IV (FW)
BIS(2-CHLOROETHYL)ETHER	2.4E+04	USDOE Acute (FW)	2.4E+04	USDOE Acute	2.4E+04	USDOE Acute (FW)
BIS(2-CHLORO-1-METHYLETHYL)ETHER	3.7E-01	Drinking Water Toxicity	3.7E-01	=Drinking Water Toxicity	3.7E-01	Drinking Water Toxicity
BIS(2-ETHYLHEXYL)PHTHALATE	2.7E+01	USEPA Acute SW	2.7E+01	USEPA Acute FW	2.7E+01	USEPA Acute SW
BORON	3.4E+04	USEPA Reg IV (FW)	3.4E+04	USEPA Acute FW	3.4E+04	USEPA Reg IV (FW)
BROMODICHLOROMETHANE	3.1E+03	USEPA Reg IV (FW)	3.1E+03	USEPA Acute FW	3.1E+03	USEPA Reg IV (FW)
BROMOFORM	1.1E+03	USEPA Acute FW	1.1E+03	USEPA Acute FW	2.3E+03	USEPA Acute SW
BROMOMETHANE	3.8E+01	USEPA Reg IV (FW)	3.8E+01	USEPA Acute FW	3.8E+01	USEPA Reg IV (FW)
CADMIUM	2.0E+00	Guam CNMI Acute FW	2.0E+00	Guam CNMI Acute FW	4.0E+01	Guam-CNMI Acute SW
CARBON TETRACHLORIDE	1.8E+02	USEPA Acute SW	6.9E+02	USEPA Acute FW	1.8E+02	USEPA Acute SW
CHLORDANE (TECHNICAL)	9.0E-02	Guam-CNMI Acute SW	2.4E+00	Guam CNMI Acute FW	9.0E-02	Guam-CNMI Acute SW
CHLOROANILINE, p-	4.6E+02	USEPA Reg IV (FW)	4.6E+02	USEPA Acute FW	4.6E+02	USEPA Reg IV (FW)
CHLOROBENZENE	2.2E+02	USEPA Acute FW	2.2E+02	USEPA Acute FW	1.1E+03	USEPA Acute SW
CHLOROETHANE	2.1E+04	Drinking Water Toxicity	2.1E+04	=Drinking Water Toxicity	2.1E+04	Drinking Water Toxicity
CHLOROFORM	4.9E+02	USEPA Acute SW	1.3E+03	USEPA Acute FW	4.9E+02	USEPA Acute SW
CHLOROMETHANE	1.9E+02	Drinking Water Toxicity	1.9E+02	=Drinking Water Toxicity	1.9E+02	Drinking Water Toxicity
CHLOROPHENOL, 2-	2.9E+02	USEPA Acute FW	2.9E+02	USEPA Acute FW	4.0E+02	USEPA Reg IV (SW chronic)
CHROMIUM (Total)	1.6E+01	Reg IV Cr VI	1.6E+01	Reg IV Cr VI	1.0E+03	Reg IV Cr VI
CHROMIUM III	5.7E+02	USEPA Reg IV (FW)	5.7E+02	Guam CNMI Acute FW	5.7E+02	USEPA Reg IV (FW)
CHROMIUM VI	1.6E+01	Guam CNMI Acute FW	1.6E+01	Guam CNMI Acute FW	1.1E+03	Guam-CNMI Acute SW
CHRYSENE	3.0E+02	CCME 2002	3.0E+02	CCME 2002	3.0E+02	CCME 2002
COBALT	1.2E+02	USEPA Acute FW	1.2E+02	USEPA Acute FW	1.5E+03	USEPA Acute SW
COPPER	4.8E+00	Guam-CNMI Acute SW	1.3E+01	Guam CNMI Acute FW	4.8E+00	Guam-CNMI Acute SW
CYANIDE (Free)	1.0E+00	Guam-CNMI Acute SW	2.2E+01	Guam CNMI Acute FW	1.0E+00	Guam-CNMI Acute SW
CYCLO-1,3,5-TRIMETHYLENE-2,4,6-TRINITRAMINE (RDX)	5.2E+02	USEPA Acute FW	5.2E+02	USEPA Acute FW	7.0E+02	USEPA Acute SW

TABLE F-4c. SUMMARY OF SELECTED ACUTE AQUATIC HABITAT GOALS

	[1]Aquatic Habitat Goals					
CONTAMINANT	**[1]Estuarine Acute Aquatic Habitat Goal (ug/L)**	**Basis**	**Freshwater Acute Aquatic Habitat Goal (ug/L)**	**Basis**	**Saltwater Acute Aquatic Habitat Goal (ug/L)**	**Basis**
DALAPON	3.0E+03	USEPA AQUIRE (50% FW LC50)	3.0E+03	USEPA AQUIRE (50% FW LC50)	3.0E+03	USEPA AQUIRE (50% FW LC50)
DIBENZO(a,h)ANTHTRACENE	3.0E+02	CCME 2002	3.0E+02	CCME 2002	3.0E+02	CCME 2002
DIBROMO-3-CHLOROPROPANE, 1,2-	2.0E-01	Drinking Water Toxicity	2.0E-01	=Drinking Water Toxicity	2.0E-01	Drinking Water Toxicity
DIBROMOCHLOROMETHANE	2.9E+03	USEPA Reg IV (FW)	2.9E+03	USEPA Acute FW	2.9E+03	USEPA Reg IV (FW)
DIBROMOETHANE, 1,2-	1.4E+03	50% MOEE FW Chronic AWQC	1.4E+03	50% MOEE FW Chronic AWQC	1.4E+03	50% MOEE FW Chronic AWQC
DICHLOROBENZENE, 1,2-	1.3E+02	USEPA Acute FW	1.3E+02	USEPA Acute FW	2.6E+02	USEPA Acute SW
DICHLOROBENZENE, 1,3-	7.9E+01	USEPA Acute FW	7.9E+01	USEPA Acute FW	6.3E+02	USEPA Acute SW
DICHLOROBENZENE, 1,4-	5.7E+01	USEPA Acute FW	5.7E+01	USEPA Acute FW	1.8E+02	USEPA Acute SW
DICHLOROBENZIDINE, 3,3-	4.1E+01	USEPA Reg IV (FW)	4.1E+01	USEPA Acute FW	4.1E+01	USEPA Reg IV (FW)
DICHLORODIPHENYLDICHLOROETHANE (DDD)	1.9E-01	USEPA Acute SW	1.9E-01	USEPA Acute FW	1.9E-01	USEPA Acute SW
DICHLORODIPHENYLDICHLOROETHYLENE (DDE)	7.0E+00	USEPA Reg IV (FW)	7.0E+00	USEPA Acute FW	7.0E+00	USEPA Reg IV (FW)
DICHLORODIPHENYLTRICHLOROETHANE (DDT)	1.3E-01	Guam-CNMI Acute SW	1.1E+00	Guam CNMI Acute FW	1.3E-01	Guam-CNMI Acute SW
DICHLOROETHANE, 1,1-	8.3E+02	USEPA Acute SW	3.7E+03	USEPA Acute FW	8.3E+02	USEPA Acute SW
DICHLOROETHANE, 1,2-	8.2E+03	USEPA Acute FW	8.2E+03	USEPA Acute FW	8.8E+03	USEPA Acute SW
DICHLOROETHYLENE, 1,1-	4.5E+02	USEPA Acute SW	1.2E+03	USEPA Acute FW	4.5E+02	USEPA Acute SW
DICHLOROETHYLENE, Cis 1,2-	5.5E+03	USEPA Reg IV (FW)	5.5E+03	USEPA Acute FW	5.5E+03	USEPA Reg IV (FW)
DICHLOROETHYLENE, Trans 1,2-	1.0E+04	USEPA Reg IV (FW)	1.0E+04	USEPA Acute FW	1.0E+04	USEPA Reg IV (FW)
DICHLOROPHENOL, 2,4-	1.1E+02	USEPA Acute FW	1.1E+02	USEPA Acute FW	7.9E+02	USEPA Reg IV (SW chronic)
DICHLOROPHENOXYACETIC ACID (2,4-D)	1.3E+02	USEPA Reg IV (FW)	1.3E+02	USEPA Acute FW	1.3E+02	USEPA Reg IV (FW)
DICHLOROPROPANE, 1,2-	3.3E+03	USEPA Acute FW	3.3E+03	USEPA Acute FW	3.4E+03	USEPA Acute SW
DICHLOROPROPENE, 1,3-	9.9E-01	USEPA Acute SW	1.5E+01	USEPA Acute FW	9.9E-01	USEPA Acute SW
DIELDRIN	2.4E-01	Guam CNMI Acute FW	2.4E-01	Guam CNMI Acute FW	7.1E-01	Guam-CNMI Acute SW
DIETHYLPHTHALATE	9.8E+02	USEPA Acute FW	9.8E+02	USEPA Acute FW	1.8E+03	USEPA Acute SW
DIMETHYLPHENOL, 2,4-	2.7E+02	Guam-CNMI Acute SW	1.3E+03	Guam CNMI Acute FW	2.7E+02	Guam-CNMI Acute SW
DIMETHYLPHTHALATE	3.2E+03	USEPA Reg IV (FW)	3.2E+03	USEPA Acute FW	3.2E+03	USEPA Reg IV (FW)
DINITROBENZENE, 1,3-	1.0E+02	USEPA Acute FW	1.0E+02	USEPA Acute FW	1.1E+02	USEPA Acute SW
DINITROPHENOL, 2,4-	3.8E+02	0.0E+00	3.8E+02	USEPA Acute FW	3.8E+02	0.0E+00
DINITROTOLUENE, 2,4- (2,4-DNT)	2.0E+02	USEPA Acute SW	3.9E+02	USEPA Acute FW	2.0E+02	USEPA Acute SW
DINITROTOLUENE, 2,6- (2,6-DNT)	2.0E+02	USEPA Acute SW	7.3E+02	USEPA Acute FW	2.0E+02	USEPA Acute SW
DIOXANE, 1,4-	3.4E+06	Mohr (50% FW LC50)	3.4E+06	Mohr (50% FW LC50)	5.0E+06	Mohr (50% SW LC50)
DIOXINS (TEQ)	3.0E-03	USEPA Reg IV (FW)	3.0E-03	USEPA Acute FW	3.0E-03	USEPA Reg IV (FW)
DIURON	2.0E+02	USEPA AQUIRE (50% FW LC50)	2.0E+02	USEPA AQUIRE (50% FW LC50)	5.5E+02	USEPA AQUIRE (50% SW LC50)
ENDOSULFAN	3.4E-02	Guam-CNMI Acute SW	2.2E-01	Guam CNMI Acute FW	3.4E-02	Guam-CNMI Acute SW
ENDRIN	3.7E-02	Guam-CNMI Acute SW	8.6E-02	Guam CNMI Acute FW	3.7E-02	Guam-CNMI Acute SW
ETHANOL		not available		not available		Drinking Water Toxicity
ETHYLBENZENE	1.3E+02	USEPA Acute SW	5.5E+02	USEPA Acute FW	1.3E+02	USEPA Acute SW
FLUORANTHENE	3.0E+02	CCME 2002	3.0E+02	CCME 2002	3.0E+02	CCME 2002
FLUORENE	3.0E+02	CCME 2002	3.0E+02	CCME 2002	3.0E+02	CCME 2002
GLYPHOSATE	2.2E+04	USEPA Off Pesticides (FW)	2.2E+04	USEPA Off Pesticides	2.2E+04	USEPA Off Pesticides (FW)
HEPTACHLOR	5.3E-02	Guam-CNMI Acute SW	5.2E-01	Guam CNMI Acute FW	5.3E-02	Guam-CNMI Acute SW
HEPTACHLOR EPOXIDE	5.3E-02	Guam-CNMI Acute SW	5.2E-01	Guam CNMI Acute FW	5.3E-02	Guam-CNMI Acute SW
HEXACHLOROBENZENE	3.0E-04	USEPA Reg IV (FW chronic)	6.0E+00	Guam CNMI Acute FW	3.0E-04	USEPA Reg IV (FW chronic)
HEXACHLOROBUTADIENE	3.0E+00	USEPA Acute SW	1.0E+01	USEPA Acute FW	3.0E+00	USEPA Acute SW
HEXACHLOROCYCLOHEXANE (gamma) LINDANE	1.6E-01	Guam-CNMI Acute SW	9.5E-01	Guam CNMI Acute FW	1.6E-01	Guam-CNMI Acute SW
HEXACHLOROETHANE	2.1E+02	USEPA Acute SW	2.1E+02	USEPA Acute FW	2.1E+02	USEPA Acute SW

TABLE F-4c. SUMMARY OF SELECTED ACUTE AQUATIC HABITAT GOALS

	[1]Aquatic Habitat Goals					
CONTAMINANT	[1]Estuarine Acute Aquatic Habitat Goal (ug/L)	Basis	Freshwater Acute Aquatic Habitat Goal (ug/L)	Basis	Saltwater Acute Aquatic Habitat Goal (ug/L)	Basis
HEXAZINONE	1.4E+05	USEPA Off Pesticides (FW)	1.4E+05	USEPA Off Pesticides	1.4E+05	USEPA Off Pesticides (FW)
INDENO(1,2,3-cd)PYRENE	3.0E+02	CCME 2002	3.0E+02	CCME 2002	3.0E+02	CCME 2002
ISOPHORONE	7.5E+03	USEPA Reg IV (FW)	7.5E+03	USEPA Acute FW	7.5E+03	USEPA Reg IV (FW)
LEAD	6.5E+01	Guam CNMI Acute FW	6.5E+01	Guam CNMI Acute FW	2.1E+02	Guam-CNMI Acute SW
MERCURY	1.4E+00	Guam CNMI Acute FW	1.4E+00	Guam CNMI Acute FW	1.8E+00	Guam-CNMI Acute SW
METHOXYCHLOR	3.0E-02	Guam-CNMI Acute SW	3.0E-02	Guam CNMI Acute FW	3.0E-02	Guam-CNMI Acute SW
METHYL ETHYL KETONE	2.0E+05	USEPA Acute FW	2.0E+05	USEPA Acute FW	2.4E+05	USEPA Acute SW
METHYL ISOBUTYL KETONE	2.2E+03	USEPA Acute SW	2.2E+03	USEPA Acute FW	2.2E+03	USEPA Acute SW
METHYL MERCURY	9.9E-02	USEPA Acute SW	9.9E-02	USEPA Acute FW	9.9E-02	USEPA Acute SW
METHYL TERT BUTYL ETHER	5.3E+04	Guam-CNMI Acute SW	1.5E+05	Guam CNMI Acute FW	5.3E+04	Guam-CNMI Acute SW
METHYLENE CHLORIDE	8.5E+03	USEPA Acute FW	8.5E+03	USEPA Acute FW	2.6E+04	USEPA Acute SW
METHYLNAPHTHALENE, 1-	3.7E+01	USEPA Acute SW	3.7E+01	USEPA Acute FW	3.7E+01	USEPA Acute SW
METHYLNAPHTHALENE, 2-	4.2E+01	USEPA Acute FW	4.2E+01	USEPA Acute FW	8.6E+01	USEPA Acute SW
MOLYBDENUM	7.2E+03	USEPA Acute FW	7.2E+03	USEPA Acute FW	1.6E+04	USEPA Acute SW
NAPHTHALENE	1.7E+02	USEPA Acute FW	1.7E+02	USEPA Acute FW	1.9E+02	USEPA Acute SW
NICKEL	7.4E+01	Guam-CNMI Acute SW	4.7E+02	Guam CNMI Acute FW	7.4E+01	Guam-CNMI Acute SW
NITROBENZENE	2.0E+03	USEPA Acute SW	2.0E+03	USEPA Acute FW	2.0E+03	USEPA Acute SW
NITROGLYCERIN	1.6E+02	USEPA Reg IV (FW)	1.6E+02	USEPA Acute FW	1.6E+02	USEPA Reg IV (FW)
NITROTOLUENE, 2-	6.4E+02	USEPA Reg IV (FW)	6.4E+02	USEPA Acute FW	6.4E+02	USEPA Reg IV (FW)
NITROTOLUENE, 3-	3.8E+02	USEPA Reg IV (FW)	3.8E+02	USEPA Acute FW	3.8E+02	USEPA Reg IV (FW)
NITROTOLUENE, 4-	4.1E+02	USEPA Reg IV (FW)	4.1E+02	USEPA Acute FW	4.1E+02	USEPA Reg IV (FW)
PENTACHLOROPHENOL	1.3E+01	Guam-CNMI Acute SW	1.9E+01	Guam CNMI Acute FW	1.3E+01	Guam-CNMI Acute SW
PENTAERYTHRITOLTETRANITRATE (PETN)	8.5E+05	Pascoe et al. (chronic FW)	8.5E+05	Pascoe et al. (chronic FW)	8.5E+05	Pascoe et al. (chronic FW)
PERCHLORATE	5.0E+03	USEPA 2002	5.0E+03	USEPA 2002	5.0E+03	USEPA 2002
PHENANTHRENE	7.7E+00	Guam-CNMI Acute SW	3.0E+01	Guam CNMI Acute FW	7.7E+00	Guam-CNMI Acute SW
PHENOL	3.0E+02	USEPA Acute SW	4.7E+03	USEPA Acute FW	3.0E+02	USEPA Acute SW
POLYCHLORINATED BIPHENYLS (PCBs)	1.4E-02	USEPA Reg IV (FW)	1.4E-02	USEPA Acute FW	1.4E-02	USEPA Reg IV (FW)
PROPICONAZOLE	4.3E+02	USEPA Off Pesticides (FW)	4.3E+02	USEPA Off Pesticides	4.3E+02	USEPA Off Pesticides (FW)
PYRENE	3.0E+02	CCME 2002	3.0E+02	CCME 2002	3.0E+02	CCME 2002
SELENIUM	2.0E+01	USEPA Acute FW	2.0E+01	USEPA Acute FW	2.9E+02	Guam-CNMI Acute SW
SILVER	1.9E+00	Guam-CNMI Acute SW	3.2E+00	Guam CNMI Acute FW	1.9E+00	Guam-CNMI Acute SW
SIMAZINE	8.0E+01	USEPA Reg IV (FW)	8.0E+01	USEPA Acute FW	8.0E+01	USEPA Reg IV (FW)
STYRENE	2.9E+02	USEPA Reg IV (FW)	2.9E+02	USEPA Acute FW	2.9E+02	USEPA Reg IV (FW)
TERBACIL	2.6E+02	Drinking Water Toxicity	2.3E+04	USEPA Off Pesticides	2.6E+02	Drinking Water Toxicity
tert-BUTYL ALCOHOL	1.8E+05	USEPA AQUIRE (FW LC0)	1.8E+05	USEPA AQUIRE (FW LC0)	1.8E+05	USEPA AQUIRE (FW LC0)
TETRACHLOROETHANE, 1,1,1,2-	7.7E+02	USEPA Reg IV (FW)	7.7E+02	USEPA Acute FW	7.7E+02	USEPA Reg IV (FW)
TETRACHLOROETHANE, 1,1,2,2-	9.1E+02	USEPA Acute FW	9.1E+02	USEPA Acute FW	2.1E+03	USEPA Acute SW
TETRACHLOROETHYLENE	4.3E+02	USEPA Acute FW	4.3E+02	USEPA Acute FW	8.3E+02	USEPA Acute SW
TETRACHLOROPHENOL, 2,3,4,6-	1.1E+01	USEPA Reg IV (FW)	1.1E+01	USEPA Acute FW	1.1E+01	USEPA Reg IV (FW)
TETRANITRO-1,3,5,7-TETRAAZOCYCLOOCTANE (HMX)	1.2E+03	USEPA Acute FW	1.2E+03	USEPA Acute FW	1.9E+03	USEPA Acute SW
THALLIUM	5.4E+01	USEPA Acute FW	5.4E+01	USEPA Acute FW	1.1E+02	USEPA Acute SW
TOLUENE	1.2E+02	USEPA Acute SW	5.6E+02	USEPA Acute FW	1.2E+02	USEPA Acute SW
TOXAPHENE	2.1E-01	Guam-CNMI Acute SW	7.3E-01	Guam CNMI Acute FW	2.1E-01	Guam-CNMI Acute SW
TPH (gasolines)	5.0E+03	Ceiling Level	5.0E+03	Ceiling Level	5.0E+03	Ceiling Level
TPH (middle distillates)	2.5E+03	Ceiling Level	2.5E+03	Ceiling Level	2.5E+03	Ceiling Level

TABLE F-4c. SUMMARY OF SELECTED ACUTE AQUATIC HABITAT GOALS

	[1]Aquatic Habitat Goals					
CONTAMINANT	**[1]Estuarine Acute Aquatic Habitat Goal (ug/L)**	**Basis**	**Freshwater Acute Aquatic Habitat Goal (ug/L)**	**Basis**	**Saltwater Acute Aquatic Habitat Goal (ug/L)**	**Basis**
TPH (residual fuels)	2.5E+03	Ceiling Level	2.5E+03	Ceiling Level	2.5E+03	Ceiling Level
TRICHLOROBENZENE, 1,2,4-	4.2E+02	USEPA Acute FW	4.2E+02	USEPA Acute FW	7.0E+02	USEPA Acute SW
TRICHLOROETHANE, 1,1,1-	2.0E+02	USEPA Acute SW	6.9E+02	USEPA Acute FW	2.0E+02	USEPA Acute SW
TRICHLOROETHANE, 1,1,2-	3.2E+03	USEPA Acute FW	3.2E+03	USEPA Acute FW	5.2E+03	USEPA Acute SW
TRICHLOROETHYLENE	4.4E+02	USEPA Acute SW	2.0E+03	USEPA Acute FW	4.4E+02	USEPA Acute SW
TRICHLOROPHENOL, 2,4,5-	1.0E+02	Guam CNMI Acute FW	1.0E+02	Guam CNMI Acute FW	2.4E+02	Guam-CNMI Acute SW
TRICHLOROPHENOL, 2,4,6-	3.9E+01	USEPA Reg IV (FW)	3.9E+01	USEPA Acute FW	3.9E+01	USEPA Reg IV (FW)
TRICHLOROPHENOXYACETIC ACID, 2,4,5- (2,4,5-T)	6.9E+02	USEPA Reg. V FW Chronic	6.9E+02	USEPA Reg. V FW Chronic	6.9E+02	USEPA Reg. V FW Chronic
TRICHLOROPHENOXYPROPIONIC ACID, 2,4,5- (2,4,5-TP)	2.7E+02	USEPA Reg IV (FW)	2.7E+02	USEPA Acute FW	2.7E+02	USEPA Reg IV (FW)
TRICHLOROPROPANE, 1,2,3-	1.4E+02	USEPA AQUIRE (5xFW EC50)	1.4E+02	USEPA AQUIRE (5xFW EC50)	1.4E+02	USEPA AQUIRE (5xFW EC50)
TRICHLOROPROPENE, 1,2,3-	6.2E-01	Drinking Water Toxicity	6.2E-01	=Drinking Water Toxicity	6.2E-01	Drinking Water Toxicity
TRIFLURALIN	2.1E+01	USEPA Reg IV (FW)	2.1E+01	USEPA Acute FW	2.1E+01	USEPA Reg IV (FW)
TRINITROBENZENE, 1,3,5-	2.7E+01	USEPA Acute FW	2.7E+01	USEPA Acute FW	3.0E+01	USEPA Acute SW
TRINITROPHENYLMETHYLNITRAMINE, 2,4,6- (TETRYL)	4.0E+01	Drinking Water Toxicity	4.0E+01	=Drinking Water Toxicity	4.0E+01	Drinking Water Toxicity
TRINITROTOLUENE, 2,4,6- (TNT)	2.1E+02	USEPA Acute FW	2.1E+02	USEPA Acute FW	5.7E+02	USEPA Acute SW
VANADIUM	9.0E+01	USEPA Acute SW	1.2E+02	USEPA Acute FW	9.0E+01	USEPA Acute SW
VINYL CHLORIDE	8.4E+03	USEPA Reg IV SW Acute	8.4E+03	USEPA Acute FW	8.4E+03	USEPA Reg IV SW Acute
XYLENES	2.3E+02	USEPA Acute SW	2.4E+02	USEPA Acute FW	2.3E+02	USEPA Acute SW
ZINC	9.0E+01	Guam-CNMI Acute SW	1.2E+02	Guam CNMI Acute FW	9.0E+01	Guam-CNMI Acute SW

Notes:

1. Refer to Table F-4d and F-4e for summary of aquatic habitat goal sources. Used for selection of groundwater screening levels.
2. Estuarine Goal = Lowest of Freshwater vs Saltwater chronic goals.
3. Drinking water goal substituted as aquatic habitat goal if latter was not available (see text).

TABLE F-4d. SUMMARY OF GUAM EPA and CNMI DEQ CHRONIC AND ACUTE SURFACE WATER (AQUATIC HABITAT) STANDARDS
(ug/l)

	Freshwater		Saltwater	
CONTAMINANT	**Chronic**	**Acute**	**Chronic**	**Acute**
ACENAPHTHENE				
ACENAPHTHYLENE				
ACETONE				
ALDRIN		3.0E+00		1.3E+00
AMETRYN				
AMINO,2- DINITROTOLUENE,3,6-				
AMINO,4- DINITROTOLUENE,2,6-				
ANTHRACENE				
ANTIMONY	3.0E+01	8.8E+01	5.0E+02	1.5E+03
ARSENIC	1.5E+02	3.4E+02	3.6E+01	6.9E+01
ATRAZINE	1.2E+01	3.5E+02	2.6E+01	7.6E+02
BARIUM				
BENOMYL				
BENZENE				
BENZO(a)ANTHRACENE				
BENZO(a)PYRENE				
BENZO(b)FLUORANTHENE				
BENZO(g,h,i)PERYLENE				
BENZO(k)FLUORANTHENE				
BERYLLIUM				
BIPHENYL, 1,1-				
BIS(2-CHLOROETHYL)ETHER				
BIS(2-CHLORO-1-METHYLETHYL)ETHER				
BIS(2-ETHYLHEXYL)PHTHALATE				
BORON				
BROMODICHLOROMETHANE				
BROMOFORM				
BROMOMETHANE				
CADMIUM	2.5E-01	2.0E+00	8.8E+00	4.0E+01
CARBON TETRACHLORIDE				
CHLORDANE (TECHNICAL)	4.3E-03	2.4E+00	4.0E-03	9.0E-02
CHLOROANILINE, p-				
CHLOROBENZENE				
CHLOROETHANE				
CHLOROFORM				
CHLOROMETHANE				
CHLOROPHENOL, 2-				
CHROMIUM (Total)				
CHROMIUM III	7.4E+01	5.7E+02		
CHROMIUM VI	1.1E+01	1.6E+01	5.0E+01	1.1E+03
CHRYSENE				
COBALT				
COPPER	9.0E+00	1.3E+01	3.1E+00	4.8E+00
CYANIDE (Free)	5.2E+00	2.2E+01		1.0E+00
CYCLO-1,3,5-TRIMETHYLENE-2,4,6-TRINITRAMINE (RDX)				
DALAPON				
DIBENZO(a,h)ANTHTRACENE				
DIBROMO-3-CHLOROPROPANE, 1,2-				
DIBROMOCHLOROMETHANE				
DIBROMOETHANE, 1,2-				

TABLE F-4d. SUMMARY OF GUAM EPA and CNMI DEQ CHRONIC AND ACUTE SURFACE WATER (AQUATIC HABITAT) STANDARDS
(ug/l)

	Freshwater		Saltwater	
DICHLOROBENZENE, 1,2-				
DICHLOROBENZENE, 1,3-				
DICHLOROBENZENE, 1,4-				
DICHLOROBENZIDINE, 3,3-				
DICHLORODIPHENYLDICHLOROETHANE (DDD)				
DICHLORODIPHENYLDICHLOROETHYLENE (DDE)				
DICHLORODIPHENYLTRICHLOROETHANE (DDT)	1.0E-03	1.1E+00	1.0E-03	1.3E-01
DICHLOROETHANE, 1,1-				
DICHLOROETHANE, 1,2-				
DICHLOROETHYLENE, 1,1-				
DICHLOROETHYLENE, Cis 1,2-				
DICHLOROETHYLENE, Trans 1,2-				
DICHLOROPHENOL, 2,4-				
DICHLOROPHENOXYACETIC ACID (2,4-D)				
DICHLOROPROPANE, 1,2-				
DICHLOROPROPENE, 1,3-				
DIELDRIN	5.6E-02	2.4E-01	1.9E-03	7.1E-01
DIETHYLPHTHALATE				
DIMETHYLPHENOL, 2,4-	5.3E+02	1.3E+03	1.1E+02	2.7E+02
DIMETHYLPHTHALATE				
DINITROBENZENE, 1,3-				
DINITROPHENOL, 2,4-				
DINITROTOLUENE, 2,4- (2,4-DNT)				
DINITROTOLUENE, 2,6- (2,6-DNT)				
DIOXANE, 1,4-				
DIOXIN (TEQ)				
DIURON				
ENDOSULFAN	5.6E-02	2.2E-01	8.7E-03	3.4E-02
ENDRIN	3.6E-02	8.6E-02	2.3E-03	3.7E-02
ETHANOL				
ETHYLBENZENE				
FLUORANTHENE				
FLUORENE				
GLYPHOSATE				
HEPTACHLOR	3.8E-03	5.2E-01	3.6E-03	5.3E-02
HEPTACHLOR EPOXIDE	3.8E-03	5.2E-01	3.6E-03	5.3E-02
HEXACHLOROBENZENE	3.7E+00	6.0E+00		
HEXACHLOROBUTADIENE				
HEXACHLOROCYCLOHEXANE (gamma) LINDANE		9.5E-01		1.6E-01
HEXACHLOROETHANE				
HEXAZINONE				
INDENO(1,2,3-cd)PYRENE				
ISOPHORONE				
LEAD	2.5E+00	6.5E+01	8.1E+00	2.1E+02
MERCURY	7.7E-01	1.4E+00	9.4E-01	1.8E+00
METHOXYCHLOR		3.0E-02		3.0E-02
METHYL ETHYL KETONE				
METHYL ISOBUTYL KETONE				
METHYL MERCURY				
METHYL TERT BUTYL ETHER	5.1E+04	1.5E+05	1.8E+04	5.3E+04
METHYLENE CHLORIDE				
METHYLNAPHTHALENE, 1-				
METHYLNAPHTHALENE, 2-				
MOLYBDENUM				
NAPHTHALENE				

TABLE F-4d. SUMMARY OF GUAM EPA and CNMI DEQ CHRONIC AND ACUTE SURFACE WATER (AQUATIC HABITAT) STANDARDS
(ug/l)

	Freshwater		Saltwater	
NICKEL	5.2E+01	4.7E+02	8.2E+00	7.4E+01
NITROBENZENE				
NITROGLYCERIN				
NITROTOLUENE, 2-				
NITROTOLUENE, 3-				
NITROTOLUENE, 4-				
PENTACHLOROPHENOL	1.5E+01	1.9E+01	7.9E+00	1.3E+01
PENTAERYTHRITOLTETRANITRATE (PETN)				
PERCHLORATE				
PHENANTHRENE	6.3E+00	3.0E+01	4.6E+00	7.7E+00
PHENOL				
POLYCHLORINATED BIPHENYLS (PCBs)	1.4E-02		3.0E-02	
PROPICONAZOLE				
PYRENE				
SELENIUM	5.0E+00		7.1E+01	2.9E+02
SILVER		3.2E+00		1.9E+00
SIMAZINE				
STYRENE				
TERBACIL				
tert-BUTYL ALCOHOL				
TETRACHLOROETHANE, 1,1,1,2-				
TETRACHLOROETHANE, 1,1,2,2-				
TETRACHLOROETHYLENE				
TETRACHLOROPHENOL, 2,3,4,6-				
TETRANITRO-1,3,5,7-TETRAAZOCYCLOOCTANE (HMX)				
THALLIUM				
TOLUENE				
TOXAPHENE	2.0E-04	7.3E-01	2.0E-04	2.1E-01
TPH (gasolines)				
TPH (middle distillates)				
TPH (residual fuels)				
TRICHLOROBENZENE, 1,2,4-				
TRICHLOROETHANE, 1,1,1-				
TRICHLOROETHANE, 1,1,2-				
TRICHLOROETHYLENE				
TRICHLOROPHENOL, 2,4,5-	6.3E+01	1.0E+02	1.1E+01	2.4E+02
TRICHLOROPHENOL, 2,4,6-				
TRICHLOROPHENOXYACETIC ACID, 2,4,5- (2,4,5-T)				
TRICHLOROPHENOXYPROPIONIC ACID, 2,4,5- (2,4,5-TP)				
TRICHLOROPROPANE, 1,2,3-				
TRICHLOROPROPENE, 1,2,3-				
TRIFLURALIN				
TRINITROBENZENE, 1,3,5-				
TRINITROPHENYLMETHYLNITRAMINE, 2,4,6- (TETRYL)				
TRINITROTOLUENE, 2,4,6- (TNT)				
VANADIUM				
VINYL CHLORIDE				
XYLENES				
ZINC	1.2E+02	1.2E+02	8.1E+01	9.0E+01

Primary Reference:

1. Water Quality Standards: Commonwealth of the Northern Mariana Islands, Division of Environmental Quality (CNMI 2002).
2. Guam Administrative Rules Titel 22 Chapter 5, Water Quality Standards (GEPA 2007a).

TABLE F-4e. SUMMARY OF USEPA AND OTHER PUBLISHED AQUATIC HABITAT GOALS
(ug/l)

	Freshwater						Marine					
CONTAMINANT	**USEPA Reg IV Chronic**	**USEPA Reg IV Acute**	**Other Chronic**	**Basis**	**Other Acute**	**Basis**	**USEPA Reg IV Chronic**	**USEPA Reg IV Acute**	**Other Chronic**	**Basis**	**Other Acute**	**Basis**
ACENAPHTHENE	1.5E+01				3.0E+02	CCME 2002	2.0E+01				3.0E+02	CCME 2002
ACENAPHTHYLENE	1.3E+01				3.0E+02	CCME 2002	3.1E+02				3.0E+02	CCME 2002
ACETONE	1.7E+03	1.5E+04					1.5E+03	2.8E+04				
ALDRIN	3.5E-02	3.0E+00					1.4E-04	1.3E+00				
AMETRYN			7.0E+02	USEPA Off Pesticides	1.8E+03	USEPA Off Pesticides			7.0E+02	USEPA Off Pesticides (FW)	1.8E+03	USEPA Off Pesticides (FW)
AMINO,2- DINITROTOLUENE,4,6-	1.8E+01	1.6E+02					2.0E+01	1.8E+02				
AMINO,4- DINITROTOLUENE,2,6-	1.1E+01	9.8E+01							1.1E+01	USEPA Reg IV (FW)	9.8E+01	USEPA Reg IV (FW)
ANTHRACENE	2.0E-02	1.8E-01					7.3E-01	1.3E+01			3.0E+02	CCME 2002
ANTIMONY	1.3E+02	3.0E+02					3.0E+01	1.8E+02				
ARSENIC	1.5E+02	3.4E+02					3.6E+01	6.9E+01				
ATRAZINE	1.2E+01	3.3E+02							1.2E+01	USEPA Reg IV (FW)	3.3E+02	USEPA Reg IV (FW)
BARIUM	2.2E+02	2.0E+03					2.2E+02	2.0E+03				
BENOMYL			1.4E-01	5% USGS 2012 acute	2.8E+00	USGS 2012			1.4E-01	5% USGS 2012 FW acute	2.8E+00	USGS Acute (FW)
BENZENE	1.6E+02	7.0E+02					7.1E+01				7.0E+02	USEPA Reg IV (FW)
BENZO(a)ANTHRACENE	4.7E+00				3.0E+02	CCME 2002	2.7E-02				3.0E+02	CCME 2002
BENZO(a)PYRENE	6.0E-02				3.0E+02	CCME 2002	3.0E-01				3.0E+02	CCME 2002
BENZO(b)FLUORANTHENE	2.6E+00				3.0E+02	CCME 2002	6.8E-01				3.0E+02	CCME 2002
BENZO(g,h,i)PERYLENE	4.4E-01				3.0E+02	CCME 2002	4.4E-01				3.0E+02	CCME 2002
BENZO(k)FLUORANTHENE	6.4E-01				3.0E+02	CCME 2002	6.4E-01				3.0E+02	CCME 2002
BERYLLIUM	1.1E+01	9.3E+01					6.6E-01	3.5E+01				
BIPHENYL, 1,1-	6.5E+00	2.6E+01					1.4E+01				2.6E+01	USEPA Reg IV (FW)
BIS(2-CHLOROETHYL)ETHER			2.4E+03	USDOE Chronic	2.4E+04	USDOE Acute			2.4E+03	USDOE Chronic (FW)	2.4E+04	USDOE Acute (FW)
BIS(2-CHLORO-1-METHYLETHYL)ETHER												
BIS(2-ETHYLHEXYL)PHTHALATE	3.0E+00	2.7E+01					3.0E+00	2.7E+01				
BORON	7.2E+03	3.4E+04					1.0E+03				3.4E+04	USEPA Reg IV (FW)
BROMODICHLOROMETHANE	3.4E+02	3.1E+03							3.4E+02	USEPA Reg IV (FW)	3.1E+03	USEPA Reg IV (FW)
BROMOFORM	2.3E+02	1.1E+03					3.2E+02	2.3E+03				
BROMOMETHANE	1.6E+01	3.8E+01							1.6E+01	USEPA Reg IV (FW)	3.8E+01	USEPA Reg IV (FW)
CADMIUM	2.5E-01	2.0E+00					8.8E+00	4.0E+01				
CARBON TETRACHLORIDE	7.7E+01	6.9E+02					9.8E+00	1.8E+02				
CHLORDANE (TECHNICAL)	4.3E-03	2.4E+00					5.9E-04	4.0E-03				
CHLOROANILINE, p-	1.9E+01	4.6E+02							1.9E+01	USEPA Reg IV (FW)	4.6E+02	USEPA Reg IV (FW)
CHLOROBENZENE	2.5E+01	2.2E+02					6.4E+01	1.1E+03				
CHLOROETHANE												
CHLOROFORM	1.4E+02	1.3E+03					2.8E+01	4.9E+02				
CHLOROMETHANE												
CHLOROPHENOL, 2-	3.2E+01	2.9E+02					4.0E+02				4.0E+02	USEPA Reg IV (SW chronic)
CHROMIUM (Total)			1.1E+01	Reg IV Cr VI	1.6E+01	Reg IV Cr VI			5.0E+01	Reg IV Cr VI	1.0E+03	Reg IV Cr VI
CHROMIUM III	7.4E+01	5.7E+02					2.0E+01				5.7E+02	USEPA Reg IV (FW)
CHROMIUM VI	1.1E+01	1.6E+01					5.0E+01	1.1E+03				
CHRYSENE	4.7E+00				3.0E+02	CCME 2002	2.0E+00				3.0E+02	CCME 2002
COBALT	1.9E+01	1.2E+02					2.3E+01	1.5E+03				
COPPER	9.0E+00	1.3E+01					3.1E+00	4.8E+00				
CYANIDE (Free)	5.2E+00	2.2E+01					1.0E+00	1.0E+00				
CYCLO-1,3,5-TRIMETHYLENE-2,4,6-TRINITRAMINE (RDX)	7.9E+01	5.2E+02					1.9E+02	7.0E+02				
DALAPON			3.0E+02	USEPA AQUIRE (5% FW LC50)	3.0E+03	USEPA AQUIRE (50% FW LC50)			3.0E+02	USEPA AQUIRE (5% FW LC50)	3.0E+03	USEPA AQUIRE (50% FW LC50)
DIBENZO(a,h)ANTHTRACENE	8.0E-01			\	3.0E+02	CCME 2002	7.1E+00				3.0E+02	CCME 2002
DIBROMO-3-CHLOROPROPANE, 1,2-												
DIBROMOCHLOROMETHANE	3.2E+02	2.9E+03					3.4E+01				2.9E+03	USEPA Reg IV (FW)
DIBROMOETHANE, 1,2-			1.4E+03	50% MOEE FW Chronic AWQC	1.4E+03	50% MOEE FW Chronic AWQC			1.4E+03	50% MOEE FW Chronic AWQC	1.4E+03	50% MOEE FW Chronic AWQC
DICHLOROBENZENE, 1,2-	2.3E+01	1.3E+02					1.4E+01	2.6E+02				
DICHLOROBENZENE, 1,3-	2.2E+01	7.9E+01					7.1E+01	6.3E+02				
DICHLOROBENZENE, 1,4-	9.4E+00	5.7E+01					1.5E+01	1.8E+02				
DICHLOROBENZIDINE, 3,3-	4.5E+00	4.1E+01							4.5E+00	USEPA Reg IV (FW)	4.1E+01	USEPA Reg IV (FW)
DICHLORODIPHENYLDICHLOROETHANE (DDD)	1.1E-02	1.9E-01					1.1E-02	1.9E-01				
DICHLORODIPHENYLDICHLOROETHYLENE (DDE)	4.1E-01	7.0E+00							4.1E-01	USEPA Reg IV (FW)	7.0E+00	USEPA Reg IV (FW)
DICHLORODIPHENYLTRICHLOROETHANE (DDT)	3.2E-03	1.1E+00					1.0E-03	1.3E-01				
DICHLOROETHANE, 1,1-	4.1E+02	3.7E+03					4.7E+01	8.3E+02				
DICHLOROETHANE, 1,2-	2.0E+03	8.2E+03					9.1E+02	8.8E+03				
DICHLOROETHYLENE, 1,1-	1.3E+02	1.2E+03					2.5E+01	4.5E+02				
DICHLOROETHYLENE, Cis 1,2-	6.2E+02	5.5E+03							6.2E+02	USEPA Reg IV (FW)	5.5E+03	USEPA Reg IV (FW)
DICHLOROETHYLENE, Trans 1,2-	5.6E+02	1.0E+04							5.6E+02	USEPA Reg IV (FW)	1.0E+04	USEPA Reg IV (FW)
DICHLOROPHENOL, 2,4-	1.1E+01	1.1E+02					7.9E+02				7.9E+02	USEPA Reg IV (SW chronic)
DICHLOROPHENOXYACETIC ACID (2,4-D)	7.9E+01	1.3E+02					7.0E+01				1.3E+02	USEPA Reg IV (FW)
DICHLOROPROPANE, 1,2-	5.2E+02	3.3E+03						3.4E+03	5.2E+02	USEPA Reg IV (FW)		

TABLE F-4e. SUMMARY OF USEPA AND OTHER PUBLISHED AQUATIC HABITAT GOALS
(ug/l)

	Freshwater						Marine					
CONTAMINANT	**USEPA Reg IV Chronic**	**USEPA Reg IV Acute**	**Other Chronic**	**Basis**	**Other Acute**	**Basis**	**USEPA Reg IV Chronic**	**USEPA Reg IV Acute**	**Other Chronic**	**Basis**	**Other Acute**	**Basis**
DICHLOROPROPENE, 1,3-	1.7E+00	1.5E+01					6.0E-02	9.9E-01				
DIELDRIN	5.6E-02	2.4E-01					1.9E-03	7.1E-01				
DIETHYLPHTHALATE	2.2E+02	9.8E+02					2.1E+02	1.8E+03				
DIMETHYLPHENOL, 2,4-	1.2E+02	1.1E+03							1.2E+02	USEPA Reg IV (FW)	1.1E+03	USEPA Reg IV (FW)
DIMETHYLPHTHALATE	1.1E+03	3.2E+03					2.9E+03				3.2E+03	USEPA Reg IV (FW)
DINITROBENZENE, 1,3-	2.2E+01	1.0E+02					1.0E+01	1.1E+02				USEPA Reg IV (FW)
DINITROPHENOL, 2,4-	7.1E+01	3.8E+02					1.4E+01				3.8E+02	
DINITROTOLUENE, 2,4- (2,4-DNT)	4.4E+01	3.9E+02					9.1E+00	2.0E+02				
DINITROTOLUENE, 2,6- (2,6-DNT)	8.1E+01	7.3E+02						2.0E+02	8.1E+01	USEPA Reg IV (FW)		
DIOXANE, 1,4-			3.4E+05	Mohr (5% Acute FW LC 50)	3.4E+06	Mohr (50% FW LC50)			5.0E+05	Mohr (5% Acute SW LC 50)	5.0E+06	Mohr (50% SW LC50)
DIOXINS (TEQ)	3.1E-09	3.0E-03							3.1E-09	USEPA Reg IV (FW)	3.0E-03	USEPA Reg IV (FW)
DIURON			6.0E+01	USEPA AQUIRE (50% FW EC50)	2.0E+02	USEPA AQUIRE (50% FW LC50)			6.0E+01	USEPA AQUIRE (50% FW EC50)	5.5E+02	USEPA AQUIRE (50% SW LC50)
ENDOSULFAN	1.0E-02	1.1E-01					8.7E-03	3.4E-02				
ENDRIN	3.6E-02	8.6E-02					2.3E-03	3.7E-02				
ETHANOL												
ETHYLBENZENE	6.1E+01	5.5E+02					7.3E+00	1.3E+02				
FLUORANTHENE	8.0E-01				3.0E+02	CCME 2002	7.1E+00				3.0E+02	CCME 2002
FLUORENE	1.9E+01				3.0E+02	CCME 2002	3.9E+00				3.0E+02	CCME 2002
GLYPHOSATE			1.8E+03	USEPA Off Pesticides	2.2E+04	USEPA Off Pesticides			1.8E+03	USEPA Off Pesticides (FW)	2.2E+04	USEPA Off Pesticides (FW)
HEPTACHLOR	3.8E-03	5.2E-01					3.6E-03	5.3E-02				
HEPTACHLOR EPOXIDE	3.8E-03	5.2E-01					3.6E-03	5.3E-02				
HEXACHLOROBENZENE	3.0E-04				3.0E-04	USEPA Reg IV (FW chronic)			3.0E-04	USEPA Reg IV (FW)	3.0E-04	USEPA Reg IV (FW chronic)
HEXACHLOROBUTADIENE	1.0E+00	1.0E+01					3.0E-01	3.0E+00				
HEXACHLOROCYCLOHEXANE (gamma) LINDANE	1.1E-01	9.5E-01					6.3E-02	1.6E-01				
HEXACHLOROETHANE	1.2E+01	2.1E+02					1.2E+01	2.1E+02				
HEXAZINONE			1.7E+04	USEPA Off Pesticides	1.4E+05	USEPA Off Pesticides			1.7E+04	USEPA Off Pesticides (FW)	1.4E+05	USEPA Off Pesticides (FW)
INDENO(1,2,3-cd)PYRENE	2.8E-01				3.0E+02	CCME 2002	2.8E-01				3.0E+02	CCME 2002
ISOPHORONE	9.2E+02	7.5E+03							9.2E+02	USEPA Reg IV (FW)	7.5E+03	USEPA Reg IV (FW)
LEAD	2.5E+00	6.5E+01					8.1E+00	2.1E+02				
MERCURY	7.7E-01	1.4E+00					9.4E-01	1.8E+00				
METHOXYCHLOR	3.0E-02	7.0E-01					1.9E-02				7.0E-01	USEPA Reg IV (FW)
METHYL ETHYL KETONE	2.2E+04	2.0E+05					1.4E+04	2.4E+05				
METHYL ISOBUTYL KETONE	1.7E+02	2.2E+03					1.7E+02	2.2E+03				
METHYL MERCURY	2.8E-03	9.9E-02					2.8E-03	9.9E-02				
METHYL TERT BUTYL ETHER	7.3E+02	6.5E+03					1.8E+04	5.3E+04				
METHYLENE CHLORIDE	1.5E+03	8.5E+03					2.2E+03	2.6E+04				
METHYLNAPHTHALENE, 1-	2.1E+00	3.7E+01					2.1E+00	3.7E+01				
METHYLNAPHTHALENE, 2-	4.7E+00	4.2E+01					7.2E+01	8.6E+01				
MOLYBDENUM	8.0E+02	7.2E+03					3.7E+02	1.6E+04				
NAPHTHALENE	2.1E+01	1.7E+02					1.2E+01	1.9E+02				
NICKEL	5.2E+01	4.7E+02					8.2E+00	7.4E+01				
NITROBENZENE	3.8E+02	2.0E+03						2.0E+03	3.8E+02	USEPA Reg IV (FW)		
NITROGLYCERIN	1.8E+01	1.6E+02							1.8E+01	USEPA Reg IV (FW)	1.6E+02	USEPA Reg IV (FW)
NITROTOLUENE, 2-	7.1E+01	6.4E+02							7.1E+01	USEPA Reg IV (FW)	6.4E+02	USEPA Reg IV (FW)
NITROTOLUENE, 3-	4.2E+01	3.8E+02							4.2E+01	USEPA Reg IV (FW)	3.8E+02	USEPA Reg IV (FW)
NITROTOLUENE, 4-	4.6E+01	4.1E+02							4.6E+01	USEPA Reg IV (FW)	4.1E+02	USEPA Reg IV (FW)
PENTACHLOROPHENOL	1.5E+01	1.9E+01					7.9E+00	1.3E+01				
PENTAERYTHRITOLTETRANITRATE (PETN)			8.5E+05	Pascoe et al. (chronic FW)	8.5E+05	Pascoe et al. (chronic FW)			8.5E+05	Pascoe et al. (chronic FW)	8.5E+05	Pascoe et al. (chronic FW)
PERCHLORATE			6.0E+02	USEPA 2002	5.0E+03	USEPA 2002			6.0E+02	USEPA 2002	5.0E+03	USEPA 2002
PHENANTHRENE	2.3E+00				3.0E+02	CCME 2002	4.6E+00				3.0E+02	CCME 2002
PHENOL	1.6E+02	4.7E+03					5.8E+01	3.0E+02				
POLYCHLORINATED BIPHENYLS (PCBs)	7.4E-05	1.4E-02							7.4E-05	USEPA Reg IV (FW)	1.4E-02	USEPA Reg IV (FW)
PROPICONAZOLE			9.5E+01	USEPA Off Pesticides	4.3E+02	USEPA Off Pesticides			9.5E+01	USEPA Off Pesticides (FW)	4.3E+02	USEPA Off Pesticides (FW)
PYRENE	4.6E+00				3.0E+02	CCME 2002	1.0E+01				3.0E+02	CCME 2002
SELENIUM	5.0E+00	2.0E+01					7.1E+01	2.9E+02				
SILVER	6.0E-02	3.2E+00					1.0E-01	1.9E+00				
SIMAZINE	9.0E+00	8.0E+01							9.0E+00	USEPA Reg IV (FW)	8.0E+01	USEPA Reg IV (FW)
STYRENE	3.2E+01	2.9E+02							3.2E+01	USEPA Reg IV (FW)	2.9E+02	USEPA Reg IV (FW)
TERBACIL			1.2E+03	USEPA Off Pesticides	2.3E+04	USEPA Off Pesticides						
tert-BUTYL ALCOHOL			1.8E+04	USEPA AQUIRE (10% FW LC0)	1.8E+05	USEPA AQUIRE (FW LC0)			1.8E+04	USEPA AQUIRE (10% FW LC0)	1.8E+05	USEPA AQUIRE (FW LC0)
TETRACHLOROETHANE, 1,1,1,2-	8.5E+01	7.7E+02					1.1E+01				7.7E+02	USEPA Reg IV (FW)
TETRACHLOROETHANE, 1,1,2,2-	2.0E+02	9.1E+02					6.1E+02	2.1E+03				
TETRACHLOROETHYLENE	5.3E+01	4.3E+02					9.8E+01	8.3E+02				
TETRACHLOROPHENOL, 2,3,4,6-	1.2E+00	1.1E+01							1.2E+00	USEPA Reg IV (FW)	1.1E+01	USEPA Reg IV (FW)
TETRANITRO-1,3,5,7-TETRAAZOCYCLOOCTANE (HMX)	2.2E+02	1.2E+03					3.3E+02	1.9E+03				

TABLE F-4e. SUMMARY OF USEPA AND OTHER PUBLISHED AQUATIC HABITAT GOALS
(ug/l)

	Freshwater						Marine					
CONTAMINANT	**USEPA Reg IV Chronic**	**USEPA Reg IV Acute**	**Other Chronic**	**Basis**	**Other Acute**	**Basis**	**USEPA Reg IV Chronic**	**USEPA Reg IV Acute**	**Other Chronic**	**Basis**	**Other Acute**	**Basis**
THALLIUM	6.0E+00	5.4E+01					1.2E+01	1.1E+02				
TOLUENE	6.2E+01	5.6E+02					9.8E+00	1.2E+02				
TOXAPHENE	2.0E-04	7.3E-01					2.0E-04	2.1E-01				
TPH (gasolines)			5.0E+02	CalEPA FW Chronic	5.0E+03	Ceiling Level			3.7E+03	CalEPA Chronic (SW)	5.0E+03	Ceiling Level
TPH (middle distillates)			6.4E+02	CalEPA FW Chronic	2.5E+03	Ceiling Level			6.4E+02	CalEPA Chronic (FW)	2.5E+03	Ceiling Level
TPH (residual fuels)			6.4E+02	CaEPA FW Chronic	2.5E+03	Ceiling Level			6.4E+02	CalEPA Chronic (FW)	2.5E+03	Ceiling Level
TRICHLOROBENZENE, 1,2,4-	1.3E+02	4.2E+02					1.1E+02	7.0E+02				
TRICHLOROETHANE, 1,1,1-	7.6E+01	6.9E+02					1.1E+01	2.0E+02				
TRICHLOROETHANE, 1,1,2-	7.3E+02	3.2E+03					1.2E+03	5.2E+03				
TRICHLOROETHYLENE	2.0E+02	2.0E+03					4.7E+01	4.4E+02				
TRICHLOROPHENOL, 2,4,5-	1.9E+00	1.7E+01					1.2E+01	2.6E+02				
TRICHLOROPHENOL, 2,4,6-	4.9E+00	3.9E+01					6.5E+00				3.9E+01	USEPA Reg IV (FW)
TRICHLOROPHENOXYACETIC ACID, 2,4,5- (2,4,5-T)			6.9E+02	USEPA Reg. V FW Chronic	6.9E+02	USEPA Reg. V FW Chronic			6.9E+02	USEPA Reg. V FW Chronic	6.9E+02	USEPA Reg. V FW Chronic
TRICHLOROPHENOXYPROPIONIC ACID, 2,4,5- (2,4,5-TP)	3.0E+01	2.7E+02					5.0E+01				2.7E+02	USEPA Reg IV (FW)
TRICHLOROPROPANE, 1,2,3-			1.4E+01	USEPA AQUIRE (50% FW EC50)	1.4E+02	USEPA AQUIRE (5xFW EC50)			1.4E+01	USEPA AQUIRE (50% FW EC50)	1.4E+02	USEPA AQUIRE (5xFW EC50)
TRICHLOROPROPENE, 1,2,3-												
TRIFLURALIN	1.1E+00	2.1E+01							1.1E+00	USEPA Reg IV (FW)	2.1E+01	USEPA Reg IV (FW)
TRINITROBENZENE, 1,3,5-	1.1E+01	2.7E+01					1.0E+01	3.0E+01				
TRINITROPHENYLMETHYLNITRAMINE, 2,4,6- (TETRYL)												
TRINITROTOLUENE, 2,4,6- (TNT)	1.3E+01	2.1E+02					9.0E+01	5.7E+02				
VANADIUM	2.7E+01	1.2E+02					8.1E+01	9.0E+01				
VINYL CHLORIDE	9.3E+02	8.4E+03							9.3E+02	USEPA Reg. IV SW Chronic	8.4E+03	USEPA Reg IV SW Acute
XYLENES	2.7E+01	2.4E+02					1.3E+01	2.3E+02	1.0E+02	5% Acute SW LC 50	1.0E+03	50% SW LC50
ZINC	1.2E+02	1.2E+02					8.1E+01	9.0E+01				

References:
screening levels (USEPA 2008b).

Notes:
Used for development of groundwater and soil action levels.
See text for prioritization and selection of surface water quality action levels.
Red: Screening level based on bioaccumulation.
1,4 Dioxane: LC 50 values for presented in "Solvent Stabilizers White Paper" (Mohr 2001).
Perchlorate: Chronic and acute goals from "Perchlorate Environmental Contamination" (USEPA 2002).
tert Buytl Alcohol (TBA): Chronic aquatic goal based on in-house review of USEPA ECOTOX database for TBA (USEPA 2008b). Ten percent of LC0 concentration for Lepomis macrochirus (Bluegill) selected as most conservative goal of data presented.
AWQC: Aquatic Water Quality Criteria
EC50: 50% Effects Concentration
LC0: 0% Lethal Concentration
LC50: 50% Lethal Concentration
FW: Freshwater
SW: Saltwater
TPH Total Petroleum Hydrocarbons. See text for discussion of different TPH categories.
USDOE: US Dept of Energy (Oak Ridge National Laboratories)
USDOE: US Dept of Energy (Oak Ridge National Laboratories)
USEPA: U.S. Environmental Protection Agency

TABLE F-4f. SURFACE WATER QUALITY STANDARDS FOR BIOACCUMULATION AND HUMAN CONSUMPTION OF AQUATIC ORGANISMS

(ug/l)

CHEMICAL PARAMETER	[1]Water Quality Standard
ACENAPHTHENE	9.9E+02
ACENAPHTHYLENE	
ACETONE	
ALDRIN	5.0E-05
AMETRYN	
AMINO,2- DINITROTOLUENE,3,6-	
AMINO,4- DINITROTOLUENE,2,6-	
ANTHRACENE	4.0E+04
ANTIMONY	6.4E+02
ARSENIC	1.4E-01
ATRAZINE	
BARIUM	
BENOMYL	
BENZENE	5.1E+01
BENZO(a)ANTHRACENE	1.8E-02
BENZO(a)PYRENE	1.8E-02
BENZO(b)FLUORANTHENE	1.8E-02
BENZO(g,h,i)PERYLENE	
BENZO(k)FLUORANTHENE	1.8E-02
BERYLLIUM	
BIPHENYL, 1,1-	
BIS(2-CHLOROETHYL)ETHER	5.3E-01
BIS(2-CHLORO-1-METHYLETHYL)ETHER	6.5E+04
BIS(2-ETHYLHEXYL)PHTHALATE	2.2E+00
BORON	
BROMODICHLOROMETHANE	
BROMOFORM	1.4E+02
BROMOMETHANE	1.5E+03
CADMIUM	
CARBON TETRACHLORIDE	1.6E+00
CHLORDANE (TECHNICAL)	8.1E-04
CHLOROANILINE, p-	
CHLOROBENZENE	2.1E+04
CHLOROETHANE	
CHLOROFORM	4.7E+02
CHLOROMETHANE	
CHLOROPHENOL, 2-	1.5E+02
CHROMIUM (Total)	
CHROMIUM III	
CHROMIUM VI	
CHRYSENE	1.8E-02
COBALT	
COPPER	

TABLE F-4f. SURFACE WATER QUALITY STANDARDS FOR BIOACCUMULATION AND HUMAN CONSUMPTION OF AQUATIC ORGANISMS

(ug/l)

CHEMICAL PARAMETER	[1]Water Quality Standard
CYANIDE (Free)	2.2E+05
CYCLO-1,3,5-TRIMETHYLENE-2,4,6-TRINITRAMINE (RDX)	
DALAPON	
DIBENZO(a,h)ANTHTRACENE	1.8E-02
DIBROMO,1,2- CHLOROPROPANE,3-	
DIBROMOCHLOROMETHANE	1.3E+01
DIBROMOETHANE, 1,2-	
DICHLOROBENZENE, 1,2-	1.7E+04
DICHLOROBENZENE, 1,3-	9.6E+02
DICHLOROBENZENE, 1,4-	2.6E+03
DICHLOROBENZIDINE, 3,3-	2.8E-02
DICHLORODIPHENYLDICHLOROETHANE (DDD)	3.1E-04
DICHLORODIPHENYLDICHLOROETHYLENE (DDE)	2.2E-04
DICHLORODIPHENYLTRICHLOROETHANE (DDT)	2.2E-04
DICHLOROETHANE, 1,1-	
DICHLOROETHANE, 1,2-	3.7E+01
DICHLOROETHYLENE, 1,1-	3.2E+00
DICHLOROETHYLENE, Cis 1,2-	
DICHLOROETHYLENE, Trans 1,2-	140000
DICHLOROPHENOL, 2,4-	2.9E+02
DICHLOROPHENOXYACETIC ACID (2,4-D)	
DICHLOROPROPANE, 1,2-	1.5E+01
DICHLOROPROPENE, 1,3-	1.7E+03
DIELDRIN	5.4E-05
DIETHYLPHTHALATE	4.4E+04
DIMETHYLPHENOL, 2,4-	8.5E+02
DIMETHYLPHTHALATE	1.1E+06
DINITROBENZENE, 1,3-	
DINITROPHENOL, 2,4-	5.3E+03
DINITROTOLUENE, 2,4- (2,4-DNT)	3.4E+00
DINITROTOLUENE, 2,6- (2,6-DNT)	
DIOXANE, 1,4-	
DIOXIN (TEQ)	5.1E-09
DIURON	
ENDOSULFAN	8.9E+01
ENDRIN	8.1E-01
ETHANOL	
ETHYLBENZENE	2.9E+04
FLUORANTHENE	1.4E+02
FLUORENE	5.3E+03
GLYPHOSATE	
HEPTACHLOR	7.9E-05
HEPTACHLOR EPOXIDE	3.9E-05

TABLE F-4f. SURFACE WATER QUALITY STANDARDS FOR BIOACCUMULATION AND HUMAN CONSUMPTION OF AQUATIC ORGANISMS

(ug/l)

CHEMICAL PARAMETER	[1]Water Quality Standard
HEXACHLOROBENZENE	2.9E-04
HEXACHLOROBUTADIENE	1.8E+01
HEXACHLOROCYCLOHEXANE (gamma) LINDANE	6.3E-02
HEXACHLOROETHANE	3.3E+00
HEXAZINONE	
INDENO(1,2,3-cd)PYRENE	1.8E-02
ISOPHORONE	
LEAD	
MERCURY	3.0E-01
METHOXYCHLOR	
METHYL ETHYL KETONE	
METHYL ISOBUTYL KETONE	
METHYL MERCURY	
METHYL TERT BUTYL ETHER	
METHYLENE CHLORIDE	5.9E+02
METHYLNAPHTHALENE, 1-	
METHYLNAPHTHALENE, 2-	
MOLYBDENUM	
NAPHTHALENE	
NICKEL	4.6E+03
NITROBENZENE	
NITROGLYCERIN	
NITROTOLUENE, 2-	
NITROTOLUENE, 3-	
NITROTOLUENE, 4-	
PENTACHLOROPHENOL	3.0E+00
PENTAERYTHRITOLTETRANITRATE (PETN)	
PERCHLORATE	
PHENANTHRENE	
PHENOL	1.7E+06
POLYCHLORINATED BIPHENYLS (PCBs)	6.4E-05
PROPICONAZOLE	
PYRENE	4.0E+03
SELENIUM	
SILVER	
SIMAZINE	
STYRENE	
TERBACIL	
tert-BUTYL ALCOHOL	
TETRACHLOROETHANE, 1,1,1,2-	
TETRACHLOROETHANE, 1,1,2,2-	4.0E+00
TETRACHLOROETHYLENE	3.3E+00
TETRACHLOROPHENOL, 2,3,4,6-	

TABLE F-4f. SURFACE WATER QUALITY STANDARDS FOR BIOACCUMULATION AND HUMAN CONSUMPTION OF AQUATIC ORGANISMS

(ug/l)

CHEMICAL PARAMETER	[1]Water Quality Standard
TETRANITRO-1,3,5,7-TETRAAZOCYCLOOCTANE (HMX)	
THALLIUM	6.3E+00
TOLUENE	2.0E+05
TOXAPHENE	2.8E-04
TPH (gasolines)	
TPH (middle distillates)	
TPH (residual fuels)	
TRICHLOROBENZENE, 1,2,4-	
TRICHLOROETHANE, 1,1,1-	
TRICHLOROETHANE, 1,1,2-	1.6E+01
TRICHLOROETHYLENE	3.0E+01
TRICHLOROPHENOL, 2,4,5-	3.6E+03
TRICHLOROPHENOL, 2,4,6-	
TRICHLOROPHENOXYACETIC ACID, 2,4,5- (2,4,5-T)	
TRICHLOROPHENOXYPROPIONIC ACID, 2,4,5- (2,4,5-TP)	
TRICHLOROPROPANE, 1,2,3-	
TRICHLOROPROPENE, 1,2,3-	
TRIFLURALIN	
TRINITROPHENYLMETHYLNITRAMINE, 2,4,6- (TETRYL)	
TRINITROTOLUENE, 1,3,5-	
TRINITROTOLUENE, 2,4,6- (TNT)	
VANADIUM	
VINYL CHLORIDE	5.3E+02
XYLENES	
ZINC	

References:

1. USEPA National Recommended Water Quality Criteria (USEPA 2002a, EPA-822-R-02-047). Incorporated in Guam EPA and CNMI DEQ Water Quality Standards by reference (GEPA 2007a, CNMI 2004).
Addresses potential accumulation of chemical in aquatic organisms and subsequent consumption by humans.

TABLE F-5. CALIFORNIA AGRICULTURAL WATER QUALITY GOALS
(ug/l)

CHEMICAL PARAMETER	Agricultural Water Quality Goals
ACENAPHTHENE	-
ACENAPHTHYLENE	-
ACETONE	-
ALDRIN	-
AMETRYN	-
AMINO,2- DINITROTOLUENE,4,6-	-
AMINO,4- DINITROTOLUENE,2,6-	-
ANTHRACENE	-
ANTIMONY	-
ARSENIC	1.0E+02
ATRAZINE	-
BARIUM	-
BENOMYL	-
BENZENE	-
BENZO(a)ANTHRACENE	-
BENZO(a)PYRENE	-
BENZO(b)FLUORANTHENE	-
BENZO(g,h,i)PERYLENE	-
BENZO(k)FLUORANTHENE	-
BERYLLIUM	1.0E+02
BIPHENYL, 1,1-	-
BIS(2-CHLOROETHYL)ETHER	-
BIS(2-CHLORO-1-METHYLETHYL)ETHER	-
BIS(2-ETHYLHEXYL)PHTHALATE	-
BORON	7.0E+02
BROMODICHLOROMETHANE	-
BROMOFORM	-
BROMOMETHANE	-
CADMIUM	1.0E+01
CARBON TETRACHLORIDE	-
CHLORDANE (TECHNICAL)	-
CHLOROANILINE, p-	-
CHLOROBENZENE	-
CHLOROETHANE	-
CHLOROFORM	-
CHLOROMETHANE	-
CHLOROPHENOL, 2-	-
CHROMIUM (Total)	-
CHROMIUM III	-
CHROMIUM VI	1.0E+02
CHRYSENE	-
COBALT	5.0E+01
COPPER	2.0E+02
CYANIDE (Free)	-
CYCLO-1,3,5-TRIMETHYLENE-2,4,6-TRINITRAMINE (RDX)	-
DALAPON	-
DIBENZO(a,h)ANTHTRACENE	-
DIBROMO,1,2- CHLOROPROPANE,3-	-
DIBROMOCHLOROMETHANE	-
DIBROMOETHANE, 1,2-	-
DICHLOROBENZENE, 1,2-	-
DICHLOROBENZENE, 1,3-	-
DICHLOROBENZENE, 1,4-	-
DICHLOROBENZIDINE, 3,3-	-

TABLE F-5. CALIFORNIA AGRICULTURAL WATER QUALITY GOALS
(ug/l)

CHEMICAL PARAMETER	Agricultural Water Quality Goals
DICHLORODIPHENYLDICHLOROETHANE (DDD)	-
DICHLORODIPHENYLDICHLOROETHYLENE (DDE)	-
DICHLORODIPHENYLTRICHLOROETHANE (DDT)	-
DICHLOROETHANE, 1,1-	-
DICHLOROETHANE, 1,2-	-
DICHLOROETHYLENE, 1,1-	-
DICHLOROETHYLENE, Cis 1,2-	-
DICHLOROETHYLENE, Trans 1,2-	-
DICHLOROPHENOL, 2,4-	-
DICHLOROPHENOXYACETIC ACID (2,4-D)	-
DICHLOROPROPANE, 1,2-	-
DICHLOROPROPENE, 1,3-	-
DIELDRIN	-
DIETHYLPHTHALATE	-
DIMETHYLPHENOL, 2,4-	-
DIMETHYLPHTHALATE	-
DINITROBENZENE, 1,3-	-
DINITROPHENOL, 2,4-	-
DINITROTOLUENE, 2,4- (2,4-DNT)	-
DINITROTOLUENE, 2,6- (2,6-DNT)	-
DIOXANE, 1,4-	-
DIOXINS (TEQ)	-
DIURON	-
ENDOSULFAN	-
ENDRIN	-
ETHANOL	-
ETHYLBENZENE	-
FLUORANTHENE	-
FLUORENE	-
GLYPHOSATE	-
HEPTACHLOR	-
HEPTACHLOR EPOXIDE	-
HEXACHLOROBENZENE	-
HEXACHLOROBUTADIENE	-
HEXACHLOROCYCLOHEXANE (gamma) LINDANE	-
HEXACHLOROETHANE	-
HEXAZINONE	-
INDENO(1,2,3-cd)PYRENE	-
ISOPHORONE	-
LEAD	-
MERCURY	-
METHOXYCHLOR	-
METHYL ETHYL KETONE	-
METHYL ISOBUTYL KETONE	-
METHYL MERCURY	-
METHYL TERT BUTYL ETHER	-
METHYLENE CHLORIDE	-
METHYLNAPHTHALENE, 1-	-
METHYLNAPHTHALENE, 2-	-
MOLYBDENUM	1.0E+01
NAPHTHALENE	-
NICKEL	2.0E+02
NITROBENZENE	-

TABLE F-5. CALIFORNIA AGRICULTURAL WATER QUALITY GOALS
(ug/l)

CHEMICAL PARAMETER	Agricultural Water Quality Goals
NITROGLYCERIN	-
NITROTOLUENE, 2-	-
NITROTOLUENE, 3-	-
NITROTOLUENE, 4-	-
PENTACHLOROPHENOL	-
PENTAERYTHRITOLTETRANITRATE (PETN)	-
PERCHLORATE	-
PHENANTHRENE	-
PHENOL	-
POLYCHLORINATED BIPHENYLS (PCBs)	-
PROPICONAZOLE	-
PYRENE	-
SELENIUM	2.0E+01
SILVER	-
SIMAZINE	-
STYRENE	-
TERBACIL	-
tert-BUTYL ALCOHOL	-
TETRACHLOROETHANE, 1,1,1,2-	-
TETRACHLOROETHANE, 1,1,2,2-	-
TETRACHLOROETHYLENE	-
TETRACHLOROPHENOL, 2,3,4,6-	-
TETRANITRO-1,3,5,7-TETRAAZOCYCLOOCTANE (HMX)	-
THALLIUM	-
TOLUENE	-
TOXAPHENE	-
TPH (gasolines)	-
TPH (middle distillates)	-
TPH (residual fuels)	-
TRICHLOROBENZENE, 1,2,4-	-
TRICHLOROETHANE, 1,1,1-	-
TRICHLOROETHANE, 1,1,2-	-
TRICHLOROETHYLENE	-
TRICHLOROPHENOL, 2,4,5-	-
TRICHLOROPHENOL, 2,4,6-	-
TRICHLOROPHENOXYACETIC ACID, 2,4,5- (2,4,5-T)	-
TRICHLOROPHENOXYPROPIONIC ACID, 2,4,5- (2,4,5-TP)	-
TRICHLOROPROPANE, 1,2,3-	-
TRICHLOROPROPENE, 1,2,3-	-
TRIFLURALIN	-
TRINITROBENZENE, 1,3,5-	-
TRINITROPHENYLMETHYLNITRAMINE, 2,4,6- (TETRYL)	-
TRINITROTOLUENE, 2,4,6- (TNT)	-
VANADIUM	1.0E+02
VINYL CHLORIDE	-
XYLENES	-
ZINC	2.0E+03

References:
A Compiliation of Water Quality Goals (RWQCBCV 2007).

Notes:
Addresses use of water (including groundwater) for agricultural/irrigation purposes.

TABLE G-1a. SOIL SCREENING LEVELS FOR LEACHING CONCERNS
(Default)

					Target Groundwater Concentrations		Soil Leaching Screening Levels	
CHEMICAL	Organic Carbon Coefficient (Koc) (cm^3/g)	Henry's Law Constant (H) ($atm\text{-}m^3/mol$)	Dilution/ Atenuation Factor (DAF)	Saturation Limit (mg/kg)	Target Groundwater Concentration (Drinking Water Resource) (Table F-1a) (ug/L)	Target Groundwater Concentration (NON-Drinking Water Resource) (Table F-1b) (ug/L)	Soil Leaching Screening Level (Drinking Water Resource) (mg/kg)	Soil Leaching Screening Level (NON-Drinking Water Resource) (mg/kg)
ACENAPHTHENE	5.03E+03	1.80E-04	8.36E+02	4.0E+01	1.5E+01	1.5E+01	4.0E+01	4.0E+01
ACENAPHTHYLENE	2.50E+03	1.45E-03	4.24E+02	2.0E+01	1.3E+01	1.3E+01	5.5E+00	5.5E+00
ACETONE	2.40E+00	3.50E-05	6.16E-01	1.1E+05	1.5E+03	1.5E+03	9.2E-01	9.2E-01
#ALDRIN	8.20E+04	4.40E-05	1.36E+04	2.8E+00	1.4E-04	1.4E-04	2.8E+00	2.8E+00
AMETRYN	4.28E+02	2.40E-09	7.11E+01	2.0E+02	1.8E+02	7.0E+02	1.3E+01	5.0E+01
AMINO,2- DINITROTOLUENE,3,6-	2.83E+02	3.30E-11	4.70E+01	8.1E+02	1.8E+01	1.8E+01	8.5E-01	8.5E-01
AMINO,4- DINITROTOLUENE,2,6-	2.83E+02	3.30E-11	4.70E+01	8.1E+02	1.1E+01	1.1E+01	5.2E-01	5.2E-01
ANTHRACENE	1.64E+04	5.60E-05	2.72E+03	1.4E+00	2.0E-02	2.0E-02	1.4E+00	1.4E+00
ANTIMONY					6.0E+00	3.0E+01	(Use batch test)	(Use batch test)
ARSENIC					1.0E+01	3.6E+01	(Use batch test)	(Use batch test)
ATRAZINE	2.25E+02	2.40E-09	3.73E+01	1.9E+01	3.4E-01	1.2E+01	1.3E-02	4.5E-01
BARIUM					2.2E+02	2.2E+02	(Use batch test)	(Use batch test)
BENOMYL	3.36E+02	4.93E-12	5.58E+01	2.9E+00	1.4E-01	1.4E-01	7.8E-03	7.8E-03
BENZENE	1.50E+02	5.60E-03	5.97E+01	7.9E+02	5.0E+00	7.1E+01	3.0E-01	4.3E+00
#BENZO(a)ANTHRACENE	1.77E+05	1.20E-05	2.94E+04	3.3E+00	1.1E-02	2.7E-02	3.3E+00	3.3E+00
#BENZO(a)PYRENE	5.87E+05	4.60E-07	9.75E+04	1.9E+00	6.0E-02	6.0E-02	5.9E+00	5.9E+00
#BENZO(b)FLUORANTHENE	5.99E+05	6.60E-07	9.95E+04	1.8E+00	2.9E-02	6.8E-01	2.9E+00	6.8E+01
#BENZO(g,h,i)PERYLENE	1.60E+06	1.44E-07	2.66E+05	8.3E-01	1.3E-01	1.3E-01	3.5E+01	3.5E+01
#BENZO(k)FLUORANTHENE	5.87E+05	5.80E-07	9.75E+04	9.4E-01	2.9E-01	4.0E-01	2.9E+01	3.9E+01
BERYLLIUM					6.6E-01	6.6E-01	(Use batch test)	(Use batch test)
BIPHENYL, 1,1-	5.13E+03	3.10E-04	8.53E+02	7.7E+01	5.0E-01	5.0E+00	7.7E+01	7.7E+01
BIS(2-CHLOROETHYL)ETHER	3.22E+01	1.70E-05	5.45E+00	2.8E+03	1.4E-02	1.8E+02	7.5E-05	9.6E-01
BIS(2-CHLORO-1-METHYLETHYL)ETHER	6.10E+01	1.13E-04	1.08E+01	3.8E+02	3.7E-01	3.7E-01	4.0E-03	4.0E-03
BIS(2-ETHYLHEXYL)PHTHALATE	1.20E+05	2.70E-07	1.99E+04	6.5E+01	3.0E+00	3.0E+00	6.5E+01	6.5E+01
BORON					1.0E+03	1.0E+03	(Use batch test)	(Use batch test)
BROMODICHLOROMETHANE	3.18E+01	2.10E-03	1.83E+01	5.5E+02	1.4E-01	1.1E+02	2.5E-03	2.1E+00
BROMOFORM	3.18E+01	5.40E-04	8.63E+00	5.2E+02	1.0E+02	2.3E+02	8.6E-01	2.0E+00
BROMOMETHANE	1.32E+01	7.30E-03	4.75E+01	2.8E+03	7.6E+00	1.6E+01	3.6E-01	7.6E-01
CADMIUM					2.5E-01	2.5E-01	(Use batch test)	(Use batch test)
CARBON TETRACHLORIDE	4.39E+01	2.80E-02	1.81E+02	3.1E+02	5.0E+00	9.8E+00	9.1E-01	1.8E+00
#CHLORDANE (TECHNICAL)	6.75E+04	4.90E-05	1.12E+04	7.6E+00	4.0E-03	4.0E-03	7.6E+00	7.6E+00
CHLOROANILINE, p-	1.13E+02	1.20E-06	1.87E+01	1.3E+03	3.9E-01	1.9E+01	7.3E-03	3.6E-01
CHLOROBENZENE	2.34E+02	3.10E-03	5.81E+01	3.0E+02	2.5E+01	2.5E+01	1.5E+00	1.5E+00
CHLOROETHANE	2.17E+01	1.10E-02	7.19E+01	1.5E+03	1.6E+01	1.6E+02	1.2E+00	1.2E+01
CHLOROFORM	3.18E+01	3.70E-03	2.82E+01	1.5E+03	2.8E+01	2.8E+01	7.9E-01	7.9E-01
CHLOROMETHANE	1.32E+01	8.80E-03	5.68E+01	1.0E+03	1.9E+02	1.9E+02	1.1E+01	1.1E+01
CHLOROPHENOL, 2-	3.88E+02	1.10E-05	6.45E+01	9.9E+03	1.8E-01	1.8E+00	1.2E-02	1.2E-01
CHROMIUM (Total)					1.1E+01	1.1E+01	(Use batch test)	(Use batch test)
CHROMIUM III					2.0E+01	2.0E+01	(Use batch test)	(Use batch test)
CHROMIUM VI					4.3E-02	1.1E+01	(Use batch test)	(Use batch test)
#CHRYSENE	1.81E+05	5.20E-06	3.00E+04	7.2E-01	1.0E+00	1.0E+00	3.0E+01	3.0E+01
COBALT					6.0E+00	1.9E+01	(Use batch test)	(Use batch test)
COPPER					3.1E+00	3.1E+00	(Use batch test)	(Use batch test)
CYANIDE (Free)		1.01E-04			1.0E+00	1.0E+00	(Use batch test)	(Use batch test)
CYCLO-1,3,5-TRIMETHYLENE-2,4,6-TRINITRAMINE (RDX)	8.91E+01	2.00E-11	1.48E+01	1.7E+01	7.1E-01	7.9E+01	1.0E-02	1.2E+00
DALAPON	3.20E+00	5.70E-08	5.32E-01	5.3E+04	3.0E+02	3.0E+02	1.6E-01	1.6E-01
#DIBENZO(a,h)ANTHTRACENE	1.91E+06	1.40E-07	3.17E+05	9.6E+00	2.9E-03	8.0E-01	9.6E+00	2.5E+02
DIBROMO,1,2- CHLOROPROPANE,3-	1.16E+02	1.50E-04	2.02E+01	4.1E+02	2.0E-01	2.0E-01	4.0E-03	4.0E-03

TABLE G-1a. SOIL SCREENING LEVELS FOR LEACHING CONCERNS
(Default)

					Target Groundwater Concentrations		Soil Leaching Screening Levels	
CHEMICAL	Organic Carbon Coefficient (Koc) (cm^3/g)	Henry's Law Constant (H) ($atm\text{-}m^3/mol$)	Dilution/ Atenuation Factor (DAF)	Saturation Limit (mg/kg)	Target Groundwater Concentration (Drinking Water Resource) (Table F-1a) (ug/L)	Target Groundwater Concentration (NON-Drinking Water Resource) (Table F-1b) (ug/L)	Soil Leaching Screening Level (Drinking Water Resource) (mg/kg)	Soil Leaching Screening Level (NON-Drinking Water Resource) (mg/kg)
ACENAPHTHENE	5.03E+03	1.80E-04	8.36E+02	4.0E+01	1.5E+01	1.5E+01	4.0E+01	4.0E+01
DIBROMOCHLOROMETHANE	3.18E+01	7.80E-04	1.01E+01	4.6E+02	2.1E-01	3.4E+01	2.1E-03	3.4E-01
DIBROMOETHANE, 1,2-	3.96E+01	6.50E-04	1.06E+01	7.2E+02	5.0E-02	1.9E+01	5.3E-04	2.0E-01
DICHLOROBENZENE, 1,2-	3.83E+02	1.90E-03	7.54E+01	1.4E+02	1.0E+01	1.4E+01	7.5E-01	1.1E+00
DICHLOROBENZENE, 1,3-	6.17E+02	1.90E-03	1.14E+02	2.1E+02	2.2E+01	2.2E+01	2.5E+00	2.5E+00
DICHLOROBENZENE, 1,4-	3.75E+02	2.40E-03	7.72E+01	7.1E+01	5.0E+00	9.4E+00	3.9E-01	7.3E-01
DICHLOROBENZIDINE, 3,3-	3.19E+03	2.80E-11	5.30E+02	2.0E+01	1.7E-01	4.5E+00	9.2E-02	2.4E+00
#DICHLORODIPHENYLDICHLOROETHANE (DDD)	1.18E+05	6.60E-06	1.95E+04	2.1E+01	1.1E-02	1.1E-02	2.1E+01	2.1E+01
#DICHLORODIPHENYLDICHLOROETHYLENE (DDE)	1.18E+05	4.20E-05	1.95E+04	9.4E+00	4.6E-02	4.1E-01	9.4E+00	9.4E+00
#DICHLORODIPHENYLTRICHLOROETHANE (DDT)	1.69E+05	8.30E-06	2.80E+04	1.9E+00	1.0E-03	1.0E-03	1.9E+00	1.9E+00
DICHLOROETHANE, 1,1-	3.18E+01	5.60E-03	4.00E+01	1.0E+03	2.8E+00	4.7E+01	1.1E-01	1.9E+00
DICHLOROETHANE, 1,2-	3.96E+01	1.20E-03	1.40E+01	1.6E+03	5.0E+00	1.8E+02	7.0E-02	2.6E+00
DICHLOROETHYLENE, 1,1-	3.18E+01	2.60E-02	1.67E+02	9.0E+02	7.0E+00	2.5E+01	1.2E+00	4.2E+00
DICHLOROETHYLENE, Cis 1,2-	3.96E+01	4.10E-03	3.20E+01	1.4E+03	7.0E+01	6.2E+02	2.2E+00	2.0E+01
DICHLOROETHYLENE, Trans 1,2-	3.96E+01	9.40E-03	6.49E+01	1.1E+03	1.0E+02	5.6E+02	6.5E+00	3.6E+01
DICHLOROPHENOL, 2,4-	1.47E+02	4.30E-06	2.44E+01	2.2E+03	3.0E-01	3.0E+00	7.3E-03	7.3E-02
DICHLOROPHENOXYACETIC ACID (2,4-D)	2.96E+01	3.50E-08	4.92E+00	1.1E+02	7.0E+01	7.0E+01	3.4E-01	3.4E-01
DICHLOROPROPANE, 1,2-	6.07E+01	2.80E-03	2.75E+01	6.8E+02	5.0E+00	1.0E+02	1.4E-01	2.7E+00
DICHLOROPROPENE, 1,3-	7.22E+01	3.60E-03	3.43E+01	7.6E+02	6.0E-02	6.0E-02	2.1E-03	2.1E-03
DIELDRIN	2.01E+04	1.00E-05	3.34E+03	7.9E+00	1.9E-03	1.9E-03	7.9E+00	7.9E+00
DIETHYLPHTHALATE	1.05E+02	6.10E-07	1.74E+01	3.3E+02	2.1E+02	2.1E+02	3.7E+00	3.7E+00
DIMETHYLPHENOL, 2,4-	4.92E+02	9.50E-07	8.16E+01	8.5E+03	1.1E+02	1.1E+02	9.0E+00	9.0E+00
DIMETHYLPHTHALATE	1.40E+02	1.05E-07	2.32E+01	1.9E+03	1.1E+03	1.1E+03	2.6E+01	2.6E+01
DINITROBENZENE, 1,3-	3.52E+02	4.90E-08	5.84E+01	4.3E+02	2.0E+00	1.0E+01	1.2E-01	5.8E-01
DINITROPHENOL, 2,4-	4.61E+02	8.60E-08	7.65E+01	2.9E+03	1.4E+01	1.4E+01	1.1E+00	1.1E+00
DINITROTOLUENE, 2,4- (2,4-DNT)	5.76E+02	5.40E-08	9.55E+01	2.5E+02	2.5E-01	9.1E+00	2.4E-02	8.7E-01
DINITROTOLUENE, 2,6- (2,6-DNT)	5.87E+02	7.50E-07	9.75E+01	2.3E+02	5.2E-02	8.1E+01	5.1E-03	7.9E+00
DIOXANE, 1,4-	2.60E+00	4.80E-06	4.61E-01	1.1E+05	4.6E-01	5.0E+04	2.1E-04	2.3E+01
DIOXIN (TEQ)	2.49E+05	5.00E-05	4.14E+04	1.0E-01	3.1E-09	3.1E-09	1.0E-01	1.0E-01
DIURON	1.09E+02	5.00E-10	1.81E+01	1.3E+01	4.0E+01	6.0E+01	7.3E-01	1.1E+00
ENDOSULFAN	6.76E+03	6.50E-05	1.12E+03	4.4E+00	8.7E-03	8.7E-03	4.4E+00	4.4E+00
ENDRIN	2.01E+04	6.40E-06	3.33E+03	1.0E+01	2.3E-03	2.3E-03	1.0E+01	1.0E+01
ETHANOL	3.09E-01	6.29E-06	9.03E-02	1.0E+05	5.0E+04	5.0E+04	4.5E+00	4.5E+00
ETHYLBENZENE	4.46E+02	7.90E-03	1.23E+02	1.8E+02	7.3E+00	7.3E+00	9.0E-01	9.0E-01
#FLUORANTHENE	5.55E+04	8.90E-06	9.20E+03	2.9E+01	8.0E-01	8.0E-01	2.9E+01	2.9E+01
FLUORENE	9.16E+03	9.60E-05	1.52E+03	3.1E+01	3.9E+00	3.9E+00	3.1E+01	3.1E+01
GLYPHOSATE	2.10E+03	2.10E-12	3.49E+02	4.5E+04	1.8E+03	1.8E+03	6.3E+02	6.3E+02
HEPTACHLOR	4.13E+04	2.90E-04	6.85E+03	1.5E+01	3.6E-03	3.6E-03	1.5E+01	1.5E+01
HEPTACHLOR EPOXIDE	1.01E+04	2.10E-05	1.68E+03	4.1E+00	3.6E-03	3.6E-03	4.1E+00	4.1E+00
#HEXACHLOROBENZENE	6.20E+03	1.70E-03	1.04E+03	7.8E-02	3.0E-04	3.0E-04	7.8E-02	7.8E-02
HEXACHLOROBUTADIENE	8.45E+02	1.00E-02	2.02E+02	6.0E+00	2.0E-01	3.0E-01	4.1E-02	6.1E-02
HEXACHLOROCYCLOHEXANE (gamma) LINDANE	2.81E+03	5.10E-06	4.66E+02	4.2E+01	6.3E-02	6.3E-02	2.9E-02	2.9E-02
HEXACHLOROETHANE	1.97E+02	3.90E-03	5.69E+01	2.6E+01	4.0E-01	1.2E+01	2.3E-02	6.8E-01
HEXAZINONE	1.29E+02	2.30E-12	2.15E+01	1.2E+04	6.6E+02	1.7E+04	1.4E+01	3.7E+02
#INDENO(1,2,3-cd)PYRENE	1.95E+06	3.50E-07	3.24E+05	7.4E-01	2.9E-02	9.5E-02	9.6E+00	3.1E+01
ISOPHORONE	6.50E+01	6.60E-06	1.08E+01	2.8E+03	8.2E+01	9.2E+02	8.9E-01	1.0E+01
LEAD					2.5E+00	2.5E+00	(Use batch test)	(Use batch test)
MERCURY		0.00E+00			0.0E+00	0.0E+00	(Use batch test)	(Use batch test)

TABLE G-1a. SOIL SCREENING LEVELS FOR LEACHING CONCERNS
(Default)

					Target Groundwater Concentrations		Soil Leaching Screening Levels	
CHEMICAL	Organic Carbon Coefficient (Koc) (cm^3/g)	Henry's Law Constant (H) (atm-m^3/mol)	Dilution/ Atenuation Factor (DAF)	Saturation Limit (mg/kg)	Target Groundwater Concentration (Drinking Water Resource) (Table F-1a) (ug/L)	Target Groundwater Concentration (NON-Drinking Water Resource) (Table F-1b) (ug/L)	Soil Leaching Screening Level (Drinking Water Resource) (mg/kg)	Soil Leaching Screening Level (NON-Drinking Water Resource) (mg/kg)
ACENAPHTHENE	5.03E+03	1.80E-04	8.36E+02	4.0E+01	1.5E+01	1.5E+01	4.0E+01	4.0E+01
#METHOXYCHLOR	2.69E+04	2.00E-07	4.46E+03	5.4E+00	1.9E-02	1.9E-02	5.4E+00	5.4E+00
METHYL ETHYL KETONE	4.51E+00	5.70E-05	1.10E+00	2.4E+04	5.6E+03	1.4E+04	6.2E+00	1.5E+01
METHYL ISOBUTYL KETONE	1.26E+01	1.40E-04	2.96E+00	2.4E+03	1.7E+02	1.7E+02	5.0E-01	5.0E-01
METHYL MERCURY					2.8E-03	2.8E-03	(Use batch test)	(Use batch test)
METHYL TERT BUTYL ETHER	1.16E+01	5.90E-04	5.58E+00	6.5E+03	5.0E+00	1.8E+03	2.8E-02	1.0E+01
METHYLENE CHLORIDE	2.17E+01	3.30E-03	2.41E+01	2.2E+03	5.0E+00	1.5E+03	1.2E-01	3.6E+01
METHYLNAPHTHALENE, 1-	2.53E+03	5.10E-04	4.23E+02	1.3E+02	2.1E+00	2.1E+00	8.9E-01	8.9E-01
METHYLNAPHTHALENE, 2-	2.48E+03	5.20E-04	4.15E+02	1.2E+02	4.7E+00	4.7E+00	1.9E+00	1.9E+00
MOLYBDENUM					1.0E+02	3.7E+02	(Use batch test)	(Use batch test)
NAPHTHALENE	1.54E+03	4.40E-04	2.59E+02	9.9E+01	1.2E+01	1.2E+01	3.1E+00	3.1E+00
NICKEL					8.2E+00	8.2E+00	(Use batch test)	(Use batch test)
NITROBENZENE	2.26E+02	2.40E-05	3.77E+01	1.2E+03	1.4E-01	3.8E+02	5.3E-03	1.4E+01
NITROGLYCERIN	1.16E+02	8.70E-08	1.92E+01	4.6E+02	2.0E+00	1.8E+01	3.9E-02	3.5E-01
NITROTOLUENE, 2-	3.71E+02	1.30E-05	6.16E+01	5.5E+02	7.9E-02	7.1E+01	4.9E-03	4.4E+00
NITROTOLUENE, 3-	3.63E+02	9.30E-06	6.03E+01	4.1E+02	2.0E+00	4.2E+01	1.2E-01	2.5E+00
NITROTOLUENE, 4-	3.63E+02	5.60E-06	6.03E+01	3.7E+02	4.9E+00	4.6E+01	2.9E-01	2.8E+00
PENTACHLOROPHENOL	5.92E+02	2.50E-08	9.83E+01	1.8E+01	1.0E+00	7.9E+00	9.8E-02	7.8E-01
PENTAERYTHRITOLTETRANITRATE (PETN)	6.48E+02	1.30E-09	1.08E+02	6.0E+01	1.9E+01	2.2E+04	2.1E+00	2.3E+03
PERCHLORATE					1.5E+01	6.0E+02	7.0E-03	1.2E+00
PHENANTHRENE	1.40E+04	3.93E-05	2.32E+03	2.3E+01	4.6E+00	4.6E+00	2.3E+01	2.3E+01
PHENOL	1.87E+02	3.30E-07	3.11E+01	3.9E+04	5.0E+00	5.8E+01	1.6E-01	1.8E+00
#POLYCHLORINATED BIPHENYLS (PCBs)	1.31E+05	2.83E-04	2.17E+04	1.1E+01	1.4E-02	1.4E-02	1.1E+01	1.1E+01
PROPICONAZOLE	1.56E+03	1.70E-09	2.58E+02	3.5E+02	9.5E+01	9.5E+01	2.5E+01	2.5E+01
#PYRENE	5.43E+04	1.20E-05	9.02E+03	1.5E+01	4.6E+00	4.6E+00	4.1E+01	4.1E+01
SELENIUM					5.0E+00	5.0E+00	(Use batch test)	(Use batch test)
SILVER					6.0E-02	6.0E-02	(Use batch test)	(Use batch test)
SIMAZINE	1.47E+02	9.40E-10	2.43E+01	2.4E+00	6.5E-01	9.0E+00	1.6E-02	2.2E-01
STYRENE	4.46E+02	2.80E-03	9.14E+01	3.1E+02	1.0E+01	3.2E+01	9.1E-01	2.9E+00
TERBACIL	5.01E+01	1.20E-10	8.32E+00	1.4E+02	2.6E+02	2.6E+02	2.2E+00	2.2E+00
tert-BUTYL ALCOHOL	3.70E+01	1.17E-05	6.21E+00	1.7E+05	5.8E+00	1.8E+04	3.6E-02	1.1E+02
TETRACHLOROETHANE, 1,1,1,2-	8.60E+01	2.50E-03	2.98E+01	3.1E+02	6.1E-01	1.1E+01	1.8E-02	3.2E-01
TETRACHLOROETHANE, 1,1,2,2-	9.49E+01	3.70E-04	1.81E+01	8.3E+02	7.8E-02	2.0E+02	1.4E-03	3.6E+00
TETRACHLOROETHYLENE	9.49E+01	1.80E-02	1.27E+02	8.8E+01	5.0E+00	5.3E+01	6.4E-01	6.8E+00
TETRACHLOROPHENOL, 2,3,4,6-	2.80E+02	8.80E-06	4.65E+01	1.5E+01	1.2E+00	1.2E+00	5.6E-02	5.6E-02
TETRANITRO-1,3,5,7-TETRAAZOCYCLOOCTANE (HMX)	5.32E+02	8.70E-10	8.82E+01	5.8E+00	2.2E+02	2.2E+02	1.9E+01	1.9E+01
THALLIUM					2.0E+00	6.0E+00	(Use batch test)	(Use batch test)
TOLUENE	2.34E+02	6.60E-03	7.98E+01	3.3E+02	9.8E+00	9.8E+00	7.8E-01	7.8E-01
TOXAPHENE	7.72E+04	6.00E-06	1.28E+04	8.5E+01	2.0E-04	2.0E-04	8.5E+01	8.5E+01
TPH (gasolines)	5.00E+03	7.86E-01	5.71E+03	2.4E+03	1.0E+02	5.0E+02	1.0E+02	4.0E+02
TPH (middle distillates)	5.00E+03	5.65E-01	4.34E+03	5.0E+02	1.0E+02	6.4E+02	1.0E+02	5.0E+02
TPH (residual fuels)					1.0E+02	6.4E+02	1.0E+03	1.0E+03
TRICHLOROBENZENE, 1,2,4-	1.36E+03	1.40E-03	2.34E+02	1.4E+02	7.0E+01	1.1E+02	1.6E+01	2.6E+01
TRICHLOROETHANE, 1,1,1-	4.39E+01	1.70E-02	1.13E+02	4.1E+02	1.1E+01	1.1E+01	1.2E+00	1.2E+00
TRICHLOROETHANE, 1,1,2-	6.07E+01	8.20E-04	1.52E+01	1.0E+03	5.0E+00	1.1E+02	7.6E-02	1.6E+00
TRICHLOROETHYLENE	6.07E+01	9.90E-03	7.15E+01	3.8E+02	5.0E+00	4.7E+01	3.6E-01	3.4E+00
TRICHLOROPHENOL, 2,4,5-	1.60E+03	1.60E-06	2.65E+02	4.0E+03	1.1E+01	1.1E+01	2.9E+00	2.9E+00
TRICHLOROPHENOL, 2,4,6-	3.81E+02	2.60E-06	6.33E+01	6.9E+02	4.9E+00	4.9E+00	3.1E-01	3.1E-01

TABLE G-1a. SOIL SCREENING LEVELS FOR LEACHING CONCERNS
(Default)

					Target Groundwater Concentrations		Soil Leaching Screening Levels	
CHEMICAL	Organic Carbon Coefficient (Koc) (cm^3/g)	Henry's Law Constant (H) ($atm\text{-}m^3/mol$)	Dilution/ Atenuation Factor (DAF)	Saturation Limit (mg/kg)	Target Groundwater Concentration (Drinking Water Resource) (Table F-1a) (ug/L)	Target Groundwater Concentration (NON-Drinking Water Resource) (Table F-1b) (ug/L)	Soil Leaching Screening Level (Drinking Water Resource) (mg/kg)	Soil Leaching Screening Level (NON-Drinking Water Resource) (mg/kg)
ACENAPHTHENE	5.03E+03	1.80E-04	8.36E+02	4.0E+01	1.5E+01	1.5E+01	4.0E+01	4.0E+01
TRICHLOROPHENOXYACETIC ACID, 2,4,5- (2,4,5-T)	1.07E+02	8.70E-09	1.78E+01	8.7E+01	2.0E+02	6.9E+02	3.6E+00	1.2E+01
TRICHLOROPHENOXYPROPIONIC ACID, 2,4,5- (2,4,5-TP)	1.75E+02	9.10E-09	2.91E+01	3.2E+01	3.0E+01	3.0E+01	8.7E-01	8.7E-01
TRICHLOROPROPANE, 1,2,3-	1.16E+02	3.40E-04	2.13E+01	5.8E+02	2.0E-04	1.4E+01	4.2E-06	3.0E-01
TRICHLOROPROPENE, 1,2,3-	1.16E+02	1.80E-02	1.31E+02	1.6E+02	6.2E-01	6.2E-01	8.1E-02	8.1E-02
TRIFLURALIN	1.64E+04	1.00E-04	2.72E+03	5.9E+00	1.1E+00	1.1E+00	5.9E+00	5.9E+00
TRINITROBENZENE, 1,3,5-	1.68E+03	6.50E-09	2.79E+02	9.6E+02	1.0E+01	1.0E+01	2.8E+00	2.8E+00
TRINITROPHENYLMETHYLNITRAMINE, 2,4,6- (TETRYL)	4.61E+03	2.70E-09	7.64E+02	6.9E+02	4.0E+01	4.0E+01	3.1E+01	3.1E+01
TRINITROTOLUENE, 2,4,6- (TNT)	2.81E+03	2.10E-08	4.67E+02	6.6E+02	2.6E+00	1.3E+01	1.2E+00	6.1E+00
VANADIUM					2.7E+01	2.7E+01	(Use batch test)	(Use batch test)
VINYL CHLORIDE	2.17E+01	2.80E-02	1.77E+02	3.1E+03	2.0E+00	1.8E+01	3.5E-01	3.3E+00
XYLENES	3.83E+02	6.60E-03	1.05E+02	9.7E+01	1.3E+01	1.3E+01	1.4E+00	1.4E+00
ZINC					8.1E+01	8.1E+01	(Use batch test)	(Use batch test)

Notes:

Soil leaching equation from Ontario MOEE guidance (see text).

Groundwater Category Drinking Water Resource - protective of groundwater that is a source of drinking water AND protective of discharge of groundwater to a surface water and subsequent impact on aquatic life.
Groundwater Category NON-Drinking Water Resource - protective of discharge of impacted groundwater to surface water and subsequent impact on aquatic life.

#: Leaching model used considered to be excessively conservative for highly sorptive chemicals. For chemicals with koc values greater than 5,000 cm3/g, theoretical soil saturation level ("sat") used in place of leaching model action level if higher (see text). Soil saturation levels calculated using equation presented in USEPA Regional Screening Levels guidance (USEPA 2016, see Appendix 2).
TPH -Total Petroleum Hydrocarbons.

Physio-Chemical constants for chemicals from USEPA RSLs (USEPA 2016) or Ontario MOEE (MOEE 1996) when not available unless otherwise noted (see also Table J).

Physio-Chemical constants for TPH (gasolines and middle distillates) based on constants developed for C11 to C22 aromatic carbon range fraction by Massachusetts DEP and used to develop screening for leaching of TPH in general from soil (MADEP 1997). Soil leaching level rounded to nearest hundred.

Target groundwater concentrations from Table F-1a and F-1b.

Ethanol Dilution/Atenuation Factor (DAF) modified by a factor of ten to take into account anticipated high biodegradation rate in nature (refer to Section 3.4 and Chapter 5 of Appendix 1).

Target groundwater concentration and corresponding soil leaching levels for TPH based on criteria in Board Order 99-045 for San Francisco Airport (RWQCBSF,1999).

Screening Levels for TPH (gasolines) and TPH (middle distilates) rounded to nearest 100 mg/kg.

TPH (residual fuels) soil screening level for leaching from California Regional Water Board, Region 4 - drinking water protection, C23-C32 carbon range (RWQCBLA 1996).

Screening levels for perchlorate calculated using leaching equation in USEPA Soil Screening Guidance and assumed Dilution/Attenuation Factor of 20 (see text).

TABLE G-1b. SOIL SCREENING LEVELS FOR LEACHING CONCERNS AT SITES WITH THIN (<1m) SOIL COVER OVER BEDROCK (Potential impacts to highly vulnerable drinking water aquifers)

CHEMICAL	Organic Carbon Coefficient (Koc) (cm^3/g)	Henry's Law Constant (H) ($atm\text{-}m^3/mol$)	Dilution/ Atenuation Factor (DAF)	Saturation Limit (mg/kg)	Target Groundwater Concentration (Drinking Water, see Table F-1a) (ug/L)	Alternative Soil Screening Level (mg/kg)
ACENAPHTHENE	5.03E+03	1.80E-04	8.36E+02	1.2E+02	2.0E+01	1.7E+01
ACENAPHTHYLENE	2.50E+03	1.45E-03	4.24E+02	5.9E+01	-	-
ACETONE	2.40E+00	3.50E-05	6.16E-01	1.1E+05	-	-
#ALDRIN	8.20E+04	4.40E-05	1.36E+04	8.4E+00	5.1E-03	7.0E-02
AMETRYN	4.28E+02	2.40E-09	7.11E+01	5.6E+02	-	-
AMINO,2- DINITROTOLUENE,3,6-	2.83E+02	3.30E-11	4.70E+01	2.2E+03	-	-
AMINO,4- DINITROTOLUENE,2,6-	2.83E+02	3.30E-11	4.70E+01	2.2E+03	-	-
ANTHRACENE	1.64E+04	5.60E-05	2.72E+03	4.2E+00	2.2E+01	5.8E+01
ANTIMONY					-	-
ARSENIC					-	-
ATRAZINE	2.25E+02	2.40E-09	3.73E+01	5.1E+01	-	-
BARIUM					-	-
BENOMYL	3.36E+02	4.93E-12	5.58E+01	8.0E+00	-	-
BENZENE	1.50E+02	5.60E-03	5.97E+01	1.9E+03	-	-
#BENZO(a)ANTHRACENE	1.77E+05	1.20E-05	2.94E+04	1.0E+01	1.1E-02	1.0E+01
#BENZO(a)PYRENE	5.87E+05	4.60E-07	9.75E+04	5.6E+00	2.0E-01	2.0E+01
#BENZO(b)FLUORANTHENE	5.99E+05	6.60E-07	9.95E+04	5.4E+00	2.9E-02	5.4E+00
#BENZO(g,h,i)PERYLENE	1.60E+06	1.44E-07	2.66E+05	2.5E+00	1.3E-01	3.5E+01
#BENZO(k)FLUORANTHENE	5.87E+05	5.80E-07	9.75E+04	2.8E+00	2.9E-01	2.9E+01
BERYLLIUM					-	-
BIPHENYL, 1,1-	5.13E+03	3.10E-04	8.53E+02	2.3E+02	5.0E-01	4.3E-01
BIS(2-CHLOROETHYL)ETHER	3.22E+01	1.70E-05	5.45E+00	5.0E+03	-	-
BIS(2-CHLORO-1-METHYLETHYL)ETHER	6.10E+01	1.13E-04	1.08E+01	7.9E+02	-	-
BIS(2-ETHYLHEXYL)PHTHALATE	1.20E+05	2.70E-07	1.99E+04	1.9E+02	6.0E+00	1.9E+02
BORON					-	-
BROMODICHLOROMETHANE	3.18E+01	2.10E-03	1.83E+01	9.3E+02	-	-
BROMOFORM	3.18E+01	5.40E-04	8.63E+00	9.1E+02	-	-
BROMOMETHANE	1.32E+01	7.30E-03	4.75E+01	3.6E+03	-	-
CADMIUM					-	-
CARBON TETRACHLORIDE	4.39E+01	2.80E-02	1.81E+02	4.5E+02	-	-
#CHLORDANE (TECHNICAL)	6.75E+04	4.90E-05	1.12E+04	2.3E+01	2.0E+00	2.3E+01
CHLOROANILINE, p-	1.13E+02	1.20E-06	1.87E+01	3.0E+03	-	-
CHLOROBENZENE	2.34E+02	3.10E-03	5.81E+01	7.6E+02	-	-
CHLOROETHANE	2.17E+01	1.10E-02	7.19E+01	2.1E+03	-	-
CHLOROFORM	3.18E+01	3.70E-03	2.82E+01	2.5E+03	-	-
CHLOROMETHANE	1.32E+01	8.80E-03	5.68E+01	1.3E+03	-	-
CHLOROPHENOL, 2-	3.88E+02	1.10E-05	6.45E+01	2.7E+04	-	-
CHROMIUM (Total)					-	-
CHROMIUM III					-	-
CHROMIUM VI					-	-
#CHRYSENE	1.81E+05	5.20E-06	3.00E+04	2.2E+00	1.0E+00	3.0E+01
COBALT					-	-
COPPER					-	-
CYANIDE (Free)		1.01E-04	#VALUE!	9.5E+05	-	-
CYCLO-1,3,5-TRIMETHYLENE-2,4,6-TRINITRAMINE (RDX)	8.91E+01	2.00E-11	1.48E+01	3.8E+01	-	-
DALAPON	3.20E+00	5.70E-08	5.32E-01	6.0E+04	-	-
#DIBENZO(a,h)ANTHTRACENE	1.91E+06	1.40E-07	3.17E+05	2.9E+01	2.9E-03	2.9E+01

TABLE G-1b. SOIL SCREENING LEVELS FOR LEACHING CONCERNS AT SITES WITH THIN (<1m) SOIL COVER OVER BEDROCK (Potential impacts to highly vulnerable drinking water aquifers)

CHEMICAL	Organic Carbon Coefficient (Koc) (cm^3/g)	Henry's Law Constant (H) ($atm\text{-}m^3/mol$)	Dilution/ Atenuation Factor (DAF)	Saturation Limit (mg/kg)	Target Groundwater Concentration (Drinking Water, see Table F-1a) (ug/L)	Alternative Soil Screening Level (mg/kg)
DIBROMO,1,2- CHLOROPROPANE,3-	1.16E+02	1.50E-04	2.02E+01	9.8E+02	-	-
DIBROMOCHLOROMETHANE	3.18E+01	7.80E-04	1.01E+01	8.0E+02	-	-
DIBROMOETHANE, 1,2-	3.96E+01	6.50E-04	1.06E+01	1.3E+03	-	-
DICHLOROBENZENE, 1,2-	3.83E+02	1.90E-03	7.54E+01	3.8E+02	-	-
DICHLOROBENZENE, 1,3-	6.17E+02	1.90E-03	1.14E+02	6.0E+02	-	-
DICHLOROBENZENE, 1,4-	3.75E+02	2.40E-03	7.72E+01	1.9E+02	-	-
DICHLOROBENZIDINE, 3,3-	3.19E+03	2.80E-11	5.30E+02	6.0E+01	-	-
#DICHLORODIPHENYLDICHLOROETHANE (DDD)	1.18E+05	6.60E-06	1.95E+04	6.3E+01	3.2E-01	6.3E+01
#DICHLORODIPHENYLDICHLOROETHYLENE (DDE)	1.18E+05	4.20E-05	1.95E+04	2.8E+01	4.6E-02	2.8E+01
#DICHLORODIPHENYLTRICHLOROETHANE (DDT)	1.69E+05	8.30E-06	2.80E+04	5.6E+00	2.3E-01	6.4E+00
DICHLOROETHANE, 1,1-	3.18E+01	5.60E-03	4.00E+01	1.7E+03	-	-
DICHLOROETHANE, 1,2-	3.96E+01	1.20E-03	1.40E+01	3.0E+03	-	-
DICHLOROETHYLENE, 1,1-	3.18E+01	2.60E-02	1.67E+02	1.2E+03	-	-
DICHLOROETHYLENE, Cis 1,2-	3.96E+01	4.10E-03	3.20E+01	2.4E+03	-	-
DICHLOROETHYLENE, Trans 1,2-	3.96E+01	9.40E-03	6.49E+01	1.9E+03	-	-
DICHLOROPHENOL, 2,4-	1.47E+02	4.30E-06	2.44E+01	5.5E+03	-	-
DICHLOROPHENOXYACETIC ACID (2,4-D)	2.96E+01	3.50E-08	4.92E+00	1.9E+02	-	-
DICHLOROPROPANE, 1,2-	6.07E+01	2.80E-03	2.75E+01	1.4E+03	-	-
DICHLOROPROPENE, 1,3-	7.22E+01	3.60E-03	3.43E+01	1.6E+03	-	-
DIELDRIN	2.01E+04	1.00E-05	3.34E+03	2.4E+01	1.1E-02	3.7E-02
DIETHYLPHTHALATE	1.05E+02	6.10E-07	1.74E+01	7.9E+02	-	-
DIMETHYLPHENOL, 2,4-	4.92E+02	9.50E-07	8.16E+01	2.4E+04	-	-
DIMETHYLPHTHALATE	1.40E+02	1.05E-07	2.32E+01	4.7E+03	-	-
DINITROBENZENE, 1,3-	3.52E+02	4.90E-08	5.84E+01	1.2E+03	-	-
DINITROPHENOL, 2,4-	4.61E+02	8.60E-08	7.65E+01	8.0E+03	-	-
DINITROTOLUENE, 2,4- (2,4-DNT)	5.76E+02	5.40E-08	9.55E+01	7.1E+02	-	-
DINITROTOLUENE, 2,6- (2,6-DNT)	5.87E+02	7.50E-07	9.75E+01	6.6E+02	-	-
DIOXANE, 1,4-	2.60E+00	4.80E-06	4.61E-01	1.2E+05	-	-
DIOXIN (TEQ)	2.49E+05	5.00E-05	4.14E+04	3.0E-01	3.0E-08	3.0E-01
DIURON	1.09E+02	5.00E-10	1.81E+01	3.2E+01	-	-
ENDOSULFAN	6.76E+03	6.50E-05	1.12E+03	1.3E+01	1.2E+02	1.4E+02
ENDRIN	2.01E+04	6.40E-06	3.33E+03	3.0E+01	2.0E+00	6.7E+00
ETHANOL	3.09E-01	6.29E-06	9.03E-02	1.0E+05	-	-
ETHYLBENZENE	4.46E+02	7.90E-03	1.23E+02	4.8E+02	-	-
#FLUORANTHENE	5.55E+04	8.90E-06	9.20E+03	8.7E+01	1.3E+02	1.2E+03
FLUORENE	9.16E+03	9.60E-05	1.52E+03	9.3E+01	2.4E+02	3.6E+02
GLYPHOSATE	2.10E+03	2.10E-12	3.49E+02	1.3E+05	-	-
HEPTACHLOR	4.13E+04	2.90E-04	6.85E+03	4.5E+01	4.0E-01	2.7E+00
HEPTACHLOR EPOXIDE	1.01E+04	2.10E-05	1.68E+03	1.2E+01	2.0E-01	3.4E-01
#HEXACHLOROBENZENE	6.20E+03	1.70E-03	1.04E+03	2.3E-01	1.0E+00	1.0E+00
HEXACHLOROBUTADIENE	8.45E+02	1.00E-02	2.02E+02	1.7E+01	-	-
HEXACHLOROCYCLOHEXANE (gamma) LINDANE	2.81E+03	5.10E-06	4.66E+02	1.2E+02	-	-
HEXACHLOROETHANE	1.97E+02	3.90E-03	5.69E+01	6.6E+01	-	-
HEXAZINONE	1.29E+02	2.30E-12	2.15E+01	2.9E+04	-	-
#INDENO(1,2,3-cd)PYRENE	1.95E+06	3.50E-07	3.24E+05	2.2E+00	2.9E-02	9.6E+00
ISOPHORONE	6.50E+01	6.60E-06	1.08E+01	5.9E+03	-	-
LEAD					-	-

TABLE G-1b. SOIL SCREENING LEVELS FOR LEACHING CONCERNS AT SITES WITH THIN (<1m) SOIL COVER OVER BEDROCK (Potential impacts to highly vulnerable drinking water aquifers)

CHEMICAL	Organic Carbon Coefficient (Koc) (cm^3/g)	Henry's Law Constant (H) ($atm\text{-}m^3/mol$)	Dilution/ Atenuation Factor (DAF)	Saturation Limit (mg/kg)	Target Groundwater Concentration (Drinking Water, see Table F-1a) (ug/L)	Alternative Soil Screening Level (mg/kg)
MERCURY		0.00E+00	#VALUE!	#VALUE!	-	-
#METHOXYCHLOR	2.69E+04	2.00E-07	4.46E+03	1.6E+01	4.0E+01	1.8E+02
METHYL ETHYL KETONE	4.51E+00	5.70E-05	1.10E+00	2.8E+04	-	-
METHYL ISOBUTYL KETONE	1.26E+01	1.40E-04	2.96E+00	3.4E+03	-	-
METHYL MERCURY					-	-
METHYL TERT BUTYL ETHER	1.16E+01	5.90E-04	5.58E+00	8.9E+03	-	-
METHYLENE CHLORIDE	2.17E+01	3.30E-03	2.41E+01	3.3E+03	-	-
METHYLNAPHTHALENE, 1-	2.53E+03	5.10E-04	4.23E+02	3.9E+02	-	-
METHYLNAPHTHALENE, 2-	2.48E+03	5.20E-04	4.15E+02	3.7E+02	-	-
MOLYBDENUM					-	-
NAPHTHALENE	1.54E+03	4.40E-04	2.59E+02	2.9E+02	-	-
NICKEL					-	-
NITROBENZENE	2.26E+02	2.40E-05	3.77E+01	3.0E+03	-	-
NITROGLYCERIN	1.16E+02	8.70E-08	1.92E+01	1.1E+03	-	-
NITROTOLUENE, 2-	3.71E+02	1.30E-05	6.16E+01	1.5E+03	-	-
NITROTOLUENE, 3-	3.63E+02	9.30E-06	6.03E+01	1.1E+03	-	-
NITROTOLUENE, 4-	3.63E+02	5.60E-06	6.03E+01	1.0E+03	-	-
PENTACHLOROPHENOL	5.92E+02	2.50E-08	9.83E+01	5.1E+01	-	-
PENTAERYTHRITOLTETRANITRATE (PETN)	6.48E+02	1.30E-09	1.08E+02	1.7E+02	-	-
PERCHLORATE					-	-
PHENANTHRENE	1.40E+04	3.93E-05	2.32E+03	6.9E+01	2.4E+02	5.5E+02
PHENOL	1.87E+02	3.30E-07	3.11E+01	1.0E+05	-	-
#POLYCHLORINATED BIPHENYLS (PCBs)	1.31E+05	2.83E-04	2.17E+04	3.4E+01	5.0E-01	3.4E+01
PROPICONAZOLE	1.56E+03	1.70E-09	2.58E+02	1.0E+03	-	-
#PYRENE	5.43E+04	1.20E-05	9.02E+03	4.4E+01	6.8E+01	6.1E+02
SELENIUM					-	-
SILVER					-	-
SIMAZINE	1.47E+02	9.40E-10	2.43E+01	6.1E+00	-	-
STYRENE	4.46E+02	2.80E-03	9.14E+01	8.7E+02	-	-
TERBACIL	5.01E+01	1.20E-10	8.32E+00	2.8E+02	-	-
tert-BUTYL ALCOHOL	3.70E+01	1.17E-05	6.21E+00	3.2E+05	-	-
TETRACHLOROETHANE, 1,1,1,2-	8.60E+01	2.50E-03	2.98E+01	6.8E+02	-	-
TETRACHLOROETHANE, 1,1,2,2-	9.49E+01	3.70E-04	1.81E+01	1.9E+03	-	-
TETRACHLOROETHYLENE	9.49E+01	1.80E-02	1.27E+02	1.7E+02	-	-
TETRACHLOROPHENOL, 2,3,4,6-	2.80E+02	8.80E-06	4.65E+01	4.1E+01	-	-
TETRANITRO-1,3,5,7-TETRAAZOCYCLOOCTANE (HMX)	5.32E+02	8.70E-10	8.82E+01	1.6E+01	-	-
THALLIUM					-	-
TOLUENE	2.34E+02	6.60E-03	7.98E+01	8.2E+02	-	-
TOXAPHENE	7.72E+04	6.00E-06	1.28E+04	2.5E+02	3.0E+00	3.8E+01
TPH (gasolines)	5.00E+03	7.86E-01	5.71E+03	5.4E+03	1.0E+02	5.0E+01
TPH (middle distillates)	5.00E+03	5.65E-01	4.34E+03	5.0E+02	1.0E+02	5.0E+01
TPH (residual fuels)					-	-
TRICHLOROBENZENE, 1,2,4-	1.36E+03	1.40E-03	2.34E+02	4.0E+02	-	-
TRICHLOROETHANE, 1,1,1-	4.39E+01	1.70E-02	1.13E+02	6.4E+02	-	-
TRICHLOROETHANE, 1,1,2-	6.07E+01	8.20E-04	1.52E+01	2.2E+03	-	-
TRICHLOROETHYLENE	6.07E+01	9.90E-03	7.15E+01	6.9E+02	-	-
TRICHLOROPHENOL, 2,4,5-	1.60E+03	1.60E-06	2.65E+02	1.2E+04	-	-

TABLE G-1b. SOIL SCREENING LEVELS FOR LEACHING CONCERNS AT SITES WITH THIN (<1m) SOIL COVER OVER BEDROCK (Potential impacts to highly vulnerable drinking water aquifers)

CHEMICAL	Organic Carbon Coefficient (Koc) (cm^3/g)	Henry's Law Constant (H) ($atm\text{-}m^3/mol$)	Dilution/ Atenuation Factor (DAF)	Saturation Limit (mg/kg)	Target Groundwater Concentration (Drinking Water, see Table F-1a) (ug/L)	Alternative Soil Screening Level (mg/kg)
TRICHLOROPHENOL, 2,4,6-	3.81E+02	2.60E-06	6.33E+01	1.9E+03	-	-
TRICHLOROPHENOXYACETIC ACID, 2,4,5- (2,4,5-T)	1.07E+02	8.70E-09	1.78E+01	2.1E+02	-	-
TRICHLOROPHENOXYPROPIONIC ACID, 2,4,5- (2,4,5-TP)	1.75E+02	9.10E-09	2.91E+01	8.2E+01	-	-
TRICHLOROPROPANE, 1,2,3-	1.16E+02	3.40E-04	2.13E+01	1.4E+03	-	-
TRICHLOROPROPENE, 1,2,3-	1.16E+02	1.80E-02	1.31E+02	3.1E+02	-	-
TRIFLURALIN	1.64E+04	1.00E-04	2.72E+03	1.8E+01	1.0E+01	2.8E+01
TRINITROBENZENE, 1,3,5-	1.68E+03	6.50E-09	2.79E+02	2.8E+03	-	-
TRINITROPHENYLMETHYLNITRAMINE, 2,4,6- (TETRYL)	4.61E+03	2.70E-09	7.64E+02	2.1E+03	-	-
TRINITROTOLUENE, 2,4,6- (TNT)	2.81E+03	2.10E-08	4.67E+02	2.0E+03	-	-
VANADIUM					-	-
VINYL CHLORIDE	2.17E+01	2.80E-02	1.77E+02	3.9E+03	-	-
XYLENES	3.83E+02	6.60E-03	1.05E+02	2.6E+02	-	-
ZINC					-	-

Notes:

For purposes of "Thin Soil" leaching model moderately mobile chemicals defined as having a sorption coefficient >5,000 g/cm^3 and <100,000 g/cm^3. See Appendix 1.

Soil leaching equation from Ontario MOEE guidance (see text).

Target groundwater concentrations from Table F-1a. Drinking water screening levels only considered. Lowest of toxicity-based screening level and taste-and-odor based screening levels goal for leaching model.

#: Leaching model used considered to be excessively conservative for highly sorptive chemicals. For chemicals with koc values greater than 100,000 cm3/g, theoretical soil saturation leve place of leaching model action level if higher (see text). Soil saturation levels calculated using equation presented in USEPA Regional Screening Levels guidance (USEPA 2011, see App Alternative chlordane screening level (28.8) equivalent to default saturation level of 29 mg/kg after rounding and not retained for use.

TPH -Total Petroleum Hydrocarbons.

Physio-Chemical constants for chemicals from USEPA Region IX (USEPA 2011) or Ontario MOEE (MOEE 1996) when not available unless otherwise noted (see also Table J).

Physio-Chemical constants for TPH (gasolines and middle distillates) based on constants developed for C11 to C22 aromatic carbon range fraction by Massachusetts DEP and used to de leaching of TPH in general from soil (MADEP 1997). Soil leaching level rounded to nearest hundred.

Ethanol Dilution/Atenuation Factor (DAF) modified by a factor of ten to take into account anticipated high biodegradation rate in nature (refer to Section 3.4 and Chapter 5 of Appendix 1).

Screening Levels for TPH (gasolines) and TPH (middle distilates) set to 50 mg/kg based on professional judgement.

TPH (residual fuels) soil screening level for leaching from California Regional Water Board, Region 4 - drinking water protection, C23-C32 carbon range (RWQCBLA 1996).

TABLE G-2. [1]SOIL GAS SCREENING LEVELS FOR EVALUATION OF VADOSE-ZONE LEACHATE AND PROTECTION OF DRINKING WATER AQUIFERS

([2]volatile hydrocarbons, solvents, explosives and fumigants)

CHEMICAL	Physical State		[2]Potential Vapor-Phase COPC?	[3]Henry's Law Constant (H')	[4]Target Drinking Water Concentration (Table F-1a)	Soil Gas Screening Level
				(unitless)	(ug/L)	(ug/m3)
ACENAPHTHENE	V	S	No	7.50E-03	1.5E+01	-
ACENAPHTHYLENE	V	S	No	5.95E-02	1.3E+01	-
ACETONE	V	L	Yes	1.40E-03	1.5E+03	4.2E+04
ALDRIN	SV	S	No	-	-	-
AMETRYN	NV	S	No	-	-	-
AMINO,2- DINITROTOLUENE,3,6-	NV	S	No	-	-	-
AMINO,4- DINITROTOLUENE,2,6-	NV	S	No	-	-	-
ANTHRACENE	V	S	No	2.30E-03	2.0E-02	-
ANTIMONY	NV	S	No	-	-	-
ARSENIC	NV	S	No	-	-	-
ATRAZINE	NV	S	No	-	-	-
BARIUM	NV	S	No	-	-	-
BENOMYL	NV	S	No	-	-	-
BENZENE	V	L	Yes	2.30E-01	5.0E+00	2.3E+04
BENZO(a)ANTHRACENE	SV	S	No	-	-	-
BENZO(a)PYRENE	NV	S	No	-	-	-
BENZO(b)FLUORANTHENE	NV	S	No	-	-	-
BENZO(g,h,i)PERYLENE	NV	S	No	-	-	-
BENZO(k)FLUORANTHENE	NV	S	No	-	-	-
BERYLLIUM	NV	S	No	-	-	-
BIPHENYL, 1,1-	V	S	Yes	1.30E-02	5.0E-01	1.3E+02
BIS(2-CHLOROETHYL)ETHER	V	L	Yes	7.00E-04	1.4E-02	1.9E-01
BIS(2-CHLORO-1-METHYLETHYL)ETHER	V	L	Yes	4.63E-03	3.7E-01	3.5E+01
BIS(2-ETHYLHEXYL)PHTHALATE	NV	S	No	-	-	-
BORON	NV	S	No	-	-	-
BROMODICHLOROMETHANE	V	L	Yes	8.70E-02	1.4E-01	2.4E+02
BROMOFORM	SV	S	No	-	-	-
BROMOMETHANE	V	G	Yes	3.00E-01	7.6E+00	4.6E+04
CADMIUM	NV	S	No	-	-	-
CARBON TETRACHLORIDE	V	L	Yes	1.10E+00	5.0E+00	1.1E+05
CHLORDANE (TECHNICAL)	SV	S	No	-	-	-
CHLOROANILINE, p-	NV	S	No	-	-	-
CHLOROBENZENE	V	L	Yes	1.30E-01	2.5E+01	6.5E+04
CHLOROETHANE	V	G	Yes	4.50E-01	1.6E+01	1.4E+05
CHLOROFORM	V	L	Yes	1.50E-01	2.8E+01	8.4E+04
CHLOROMETHANE	V	G	Yes	3.60E-01	1.9E+02	1.4E+06
CHLOROPHENOL, 2-	V	L	Yes	4.60E-04	1.8E-01	1.7E+00
CHROMIUM (Total)	NV	S	No	-	-	-
CHROMIUM III	NV	S	No	-	-	-
CHROMIUM VI	NV	S	No	-	-	-
CHRYSENE	NV	S	No	-	-	-
COBALT	NV	S	No	-	-	-
COPPER	NV	S	No	-	-	-
CYANIDE (Free)	V	S	No	4.15E-03	1.0E+00	-

TABLE G-2. [1]SOIL GAS SCREENING LEVELS FOR EVALUATION OF VADOSE-ZONE LEACHATE AND PROTECTION OF DRINKING WATER AQUIFERS

([2]volatile hydrocarbons, solvents, explosives and fumigants)

CHEMICAL	Physical State		[2]Potential Vapor-Phase COPC?	[3]Henry's Law Constant (H')	[4]Target Drinking Water Concentration (Table F-1a)	Soil Gas Screening Level
				(unitless)	(ug/L)	(ug/m3)
CYCLO-1,3,5-TRIMETHYLENE-2,4,6-TRINITRAMINE (RDX)	NV	S	No	-	-	-
DALAPON	NV	L	No	-	-	-
DIBENZO(a,h)ANTHTRACENE	NV	S	No	-	-	-
DIBROMO,1,2- CHLOROPROPANE,3-	V	L	Yes	6.00E-03	2.0E-01	2.4E+01
DIBROMOCHLOROMETHANE	V	S	Yes	3.20E-02	2.1E-01	1.3E+02
DIBROMOETHANE, 1,2-	V	S	Yes	2.70E-02	5.0E-02	2.7E+01
DICHLOROBENZENE, 1,2-	V	L	Yes	7.80E-02	1.0E+01	1.6E+04
DICHLOROBENZENE, 1,3-	V	L	Yes	7.79E-02	2.2E+01	3.4E+04
DICHLOROBENZENE, 1,4-	V	S	Yes	9.90E-02	5.0E+00	9.9E+03
DICHLOROBENZIDINE, 3,3-	NV	S	No	-	-	-
DICHLORODIPHENYLDICHLOROETHANE (DDD)	NV	S	No	-	-	-
DICHLORODIPHENYLDICHLOROETHYLENE (DDE)	SV	S	No	-	-	-
DICHLORODIPHENYLTRICHLOROETHANE (DDT)	NV	S	No	-	-	-
DICHLOROETHANE, 1,1-	V	L	Yes	2.30E-01	2.8E+00	1.3E+04
DICHLOROETHANE, 1,2-	V	L	Yes	4.80E-02	5.0E+00	4.8E+03
DICHLOROETHYLENE, 1,1-	V	L	Yes	1.10E+00	7.0E+00	1.5E+05
DICHLOROETHYLENE, Cis 1,2-	V	L	Yes	1.70E-01	7.0E+01	2.4E+05
DICHLOROETHYLENE, Trans 1,2-	V	L	Yes	3.80E-01	1.0E+02	7.6E+05
DICHLOROPHENOL, 2,4-	NV	S	No	-	-	-
DICHLOROPHENOXYACETIC ACID (2,4-D)	NV	S	No	-	-	-
DICHLOROPROPANE, 1,2-	V	L	Yes	1.20E-01	5.0E+00	1.2E+04
DICHLOROPROPENE, 1,3-	V	L	Yes	1.50E-01	6.0E-02	1.8E+02
DIELDRIN	NV	S	No	-	-	-
DIETHYLPHTHALATE	NV	S	No	-	-	-
DIMETHYLPHENOL, 2,4-	NV	S	Yes	-	-	-
DIMETHYLPHTHALATE	NV	S	No	-	-	-
DINITROBENZENE, 1,3-	NV	S	No	-	-	-
DINITROPHENOL, 2,4-	NV	S	No	-	-	-
DINITROTOLUENE, 2,4- (2,4-DNT)	NV	S	No	-	-	-
DINITROTOLUENE, 2,6- (2,6-DNT)	NV	S	No	-	-	-
DIOXANE, 1,4-	V	L	No	2.00E-04	4.6E-01	-
DIOXIN (TEQ)	SV	S	No	-	-	-
DIURON	NV	S	No	-	-	-
ENDOSULFAN	SV	S	No	-	-	-
ENDRIN	NV	S	No	-	-	-
ETHANOL	V	L	No	2.58E-04	5.0E+04	-
ETHYLBENZENE	V	L	Yes	3.20E-01	7.3E+00	4.7E+04
FLUORANTHENE	NV	S	No	-	-	-
FLUORENE	V	S	No	3.90E-03	3.9E+00	-
GLYPHOSATE	NV	S	No	-	-	-
HEPTACHLOR	SV	S	No	-	-	-
HEPTACHLOR EPOXIDE	SV	S	No	-	-	-
HEXACHLOROBENZENE	SV	S	No	-	-	-
HEXACHLOROBUTADIENE	SV	S	No	-	-	-

TABLE G-2. [1]SOIL GAS SCREENING LEVELS FOR EVALUATION OF VADOSE-ZONE LEACHATE AND PROTECTION OF DRINKING WATER AQUIFERS

([2]volatile hydrocarbons, solvents, explosives and fumigants)

CHEMICAL	Physical State		[2]Potential Vapor-Phase COPC?	[3]Henry's Law Constant (H')	[4]Target Drinking Water Concentration (Table F-1a)	Soil Gas Screening Level
				(unitless)	(ug/L)	(ug/m3)
HEXACHLOROCYCLOHEXANE (gamma) LINDANE	NV	S	No	-	-	-
HEXACHLOROETHANE	SV	S	No	-	-	-
HEXAZINONE	NV	S	No	-	-	-
INDENO(1,2,3-cd)PYRENE	NV	S	No	-	-	-
ISOPHORONE	NV	L	No	-	-	-
LEAD	NV	S	No	-	-	-
MERCURY	NV	S	No	-	-	-
METHOXYCHLOR	NV	S	No	-	-	-
METHYL ETHYL KETONE	V	L	Yes	2.30E-03	5.6E+03	2.6E+05
METHYL ISOBUTYL KETONE	V	L	Yes	5.60E-03	1.7E+02	1.9E+04
METHYL MERCURY	NV	S	No	-	-	-
METHYL TERT BUTYL ETHER	V	L	Yes	2.40E-02	5.0E+00	2.4E+03
METHYLENE CHLORIDE	V	L	Yes	1.30E-01	5.0E+00	1.3E+04
METHYLNAPHTHALENE, 1-	V	S	No	2.10E-02	2.1E+00	-
METHYLNAPHTHALENE, 2-	V	S	No	2.10E-02	4.7E+00	-
MOLYBDENUM	NV	S	No	-	-	-
NAPHTHALENE	V	S	Yes	1.80E-02	1.2E+01	4.3E+03
NICKEL	NV	S	No	-	-	-
NITROBENZENE	V	L	Yes	9.80E-04	1.4E-01	2.8E+00
NITROGLYCERIN	NV	L	No	-	-	-
NITROTOLUENE, 2-	V	S	Yes	5.10E-04	7.9E-02	8.1E-01
NITROTOLUENE, 3-	NV	S	Yes	-	-	-
NITROTOLUENE, 4-	NV	S	No	-	-	-
PENTACHLOROPHENOL	NV	S	No	-	-	-
PENTAERYTHRITOLTETRANITRATE (PETN)	NV	S	No	-	-	-
PERCHLORATE	NV	S	No	-	-	-
PHENANTHRENE	V	S	No	1.61E-03	4.6E+00	-
PHENOL	NV	S	No	-	-	-
POLYCHLORINATED BIPHENYLS (PCBs)	SV	S	No	-	-	-
PROPICONAZOLE	NV	L	No	-	-	-
PYRENE	V	S	No	4.90E-04	4.6E+00	-
SELENIUM	NV	S	No	-	-	-
SILVER	NV	S	No	-	-	-
SIMAZINE	NV	S	No	-	-	-
STYRENE	V	L	Yes	1.10E-01	1.0E+01	2.2E+04
TERBACIL	NV	S	No	-	-	-
tert-BUTYL ALCOHOL	V	L	Yes	4.80E-04	5.8E+00	5.6E+01
TETRACHLOROETHANE, 1,1,1,2-	V	L	Yes	1.00E-01	6.1E-01	1.2E+03
TETRACHLOROETHANE, 1,1,2,2-	V	L	Yes	1.50E-02	7.8E-02	2.3E+01
TETRACHLOROETHYLENE	V	L	Yes	7.20E-01	5.0E+00	7.2E+04
TETRACHLOROPHENOL, 2,3,4,6-	NV	S	No	-	-	-
TETRANITRO-1,3,5,7-TETRAAZOCYCLOOCTANE (HMX)	NV	S	No	-	-	-
THALLIUM	NV	S	No	-	-	-
TOLUENE	V	L	Yes	2.70E-01	9.8E+00	5.3E+04

TABLE G-2. [1]SOIL GAS SCREENING LEVELS FOR EVALUATION OF VADOSE-ZONE LEACHATE AND PROTECTION OF DRINKING WATER AQUIFERS

([2]volatile hydrocarbons, solvents, explosives and fumigants)

CHEMICAL	Physical State		[2]Potential Vapor-Phase COPC?	[3]Henry's Law Constant (H')	[4]Target Drinking Water Concentration (Table F-1a)	Soil Gas Screening Level
				(unitless)	(ug/L)	(ug/m3)
TOXAPHENE	NV	S	No	-	-	-
TPH (gasolines)	V	L	Yes	3.22E+01	1.0E+02	6.4E+07
TPH (middle distillates)	V	L	Yes	2.32E+01	1.0E+02	4.6E+07
TPH (residual fuels)	NV	L	No	-	-	-
TRICHLOROBENZENE, 1,2,4-	V	S	Yes	5.80E-02	7.0E+01	8.1E+04
TRICHLOROETHANE, 1,1,1-	V	L	Yes	7.00E-01	1.1E+01	1.5E+05
TRICHLOROETHANE, 1,1,2-	V	L	Yes	3.40E-02	5.0E+00	3.4E+03
TRICHLOROETHYLENE	V	L	Yes	4.00E-01	5.0E+00	4.0E+04
TRICHLOROPHENOL, 2,4,5-	NV	S	No	-	-	-
TRICHLOROPHENOL, 2,4,6-	NV	S	No	-	-	-
TRICHLOROPHENOXYACETIC ACID, 2,4,5- (2,4,5-T)	NV	S	No	-	-	-
TRICHLOROPHENOXYPROPIONIC ACID, 2,4,5- (2,4,5-TP)	NV	S	No	-	-	-
TRICHLOROPROPANE, 1,2,3-	V	L	Yes	1.40E-02	2.0E-04	5.5E-02
TRICHLOROPROPENE, 1,2,3-	V	L	Yes	7.20E-01	6.2E-01	8.9E+03
TRIFLURALIN	SV	S	No	-	-	-
TRINITROBENZENE, 1,3,5-	NV	S	No	-	-	-
TRINITROPHENYLMETHYLNITRAMINE, 2,4,6- (TETRYL)	NV	S	No	-	-	-
TRINITROTOLUENE, 2,4,6- (TNT)	NV	S	No	-	-	-
VANADIUM	NV	S	No	-	-	-
VINYL CHLORIDE	V	G	Yes	1.10E+00	2.0E+00	4.4E+04
XYLENES	V	L	Yes	2.70E-01	1.3E+01	7.0E+04
ZINC	NV	S	No	-	-	-

Notes:

1. Equivalent concentration of VOC in vadose-zone, soil gas when concentration in pore water/leachate is equal to drinking water screening level times a default dilution-attenuation factor of twenty; see Section 3.5 in text).

2. Common petroleum, chlorinated solvent or agricultural fumigant volatile chemicals of potential concern or related breakdown products (refer also to Section 9 of the Hawai'i DOH Technical Guidance Manual (HDOH 2009). Petroleum VOCs focus on BTEX, naphthalene, TPHg and TPHmd.

3. Physio-Chemical constants for chemicals from USEPA Region IX (USEPA 2012) or Ontario MOEE (MOEE 1996) when not available (see Table J).

4. Lowest of drinking water goals based on toxicity and taste and odors (see Table F-1a).

TPH -Total Petroleum Hydrocarbons. See Appendix 1, Section 6 for discussion of different TPH categories.

TABLE H-1. CRITERIA FOR ASSIGNMENT OF SOIL GROSS CONTAMINATION ACTION LEVELS

Soil Category	Criteria	Gross Contamination Action Level (mg/kg)
Surface Soils		
Unrestricted Land Use (includes Residential, Schools, Parkland, etc.)	Odor Index ≥ 100 OR no Odor Index and Vapor Pressure ≥ 1 Torr OR no data	100
	0.1 ≤ Odor Index < 100 OR no Odor Index and Vapor Pressure < 1 Torr	500
	Odor Index < 0.1 OR non-odorous chemical	1000
Industrial/Commercial Land Use Only	Odor Index ≥ 100 OR no Odor Index and Vapor Pressure ≥ 1 Torr OR no data	500
	0.1 ≤ Odor Index < 100 OR no Odor Index and Vapor Pressure < 1 Torr	1000
	Odor Index < 0.1 OR non-odorous chemical	2500
Subsurface Soils		
Unrestricted Land Use (includes Residential, Schools, Parkland, etc.)	Odor Index ≥ 100 OR no Odor Index and Vapor Pressure ≥ 1 Torr OR no data	500
	0.1 ≤ Odor Index < 100 OR no Odor Index and Vapor Pressure < 1 Torr	1000
	Odor Index < 0.1 OR non-odorous chemical	2500
Industrial/Commercial Land Use Only	Odor Index ≥ 100 OR no Odor Index and Vapor Pressure ≥ 1 Torr OR no data	1000
	0.1 ≤ Odor Index < 100 OR no Odor Index and Vapor Pressure < 1 Torr	2500
	Odor Index < 0.1 OR non-odorous chemical	5000

Modified from Ontario Ministry of Environment and Energy (MOEE 1996) and Massachusetts Department of Environmental Protection (MADEP 1994).

TABLE H-2. GROSS CONTAMINATION SCREENING LEVELS FOR [1]EXPOSED OR POTENTIALLY EXPOSED SOIL (mg/kg)

CONTAMINANT	[2]Final Unrestricted Land Use Screening Level	Final Industrial/ Commercial Land Use Screening Level	[2]Raw Unrestricted Screening Level	Raw Industrial/ Commercial Screening Level	Soil Saturation Limit (mg/kg)	Vapor Pressure (VP) (Torr @ 20-30 °C)	50 Percentile Odor Recognition Threshold (ORT) (ug/m^3)	50 Percentile Odor Recognition Threshold (ORT) (ppm-v)	Odor Index
ACENAPHTHENE	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	4.50E-03	5.13E+02	8.00E-02	5.63E-02
ACENAPHTHYLENE	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	2.90E-02	-	-	-
ACETONE	5.0E+02	1.0E+03	5.0E+02	1.0E+03	1.1E+05	2.70E+02	3.09E+04	1.30E+01	2.08E+01
ALDRIN	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	2.30E-05	2.63E+02	1.70E-02	1.35E-03
AMETRYN	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	2.74E-06	-	-	-
AMINO,2- DINITROTOLUENE,4,6-	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	1.07E-04	-	-	-
AMINO,4- DINITROTOLUENE,2,6-	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	1.07E-04	-	-	-
ANTHRACENE	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	1.70E-05	-	-	-
ANTIMONY	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	-	-	-	-
ARSENIC	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	-	-	-	-
ATRAZINE	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	2.89E-07	-	-	-
BARIUM	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	-	-	-	-
BENOMYL	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	-	-	-	-
BENZENE	5.0E+02	1.0E+03	5.0E+02	1.0E+03	1.9E+03	9.50E+01	4.89E+03	1.50E+00	6.33E+01
BENZO(a)ANTHRACENE	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	2.20E-08	-	-	-
BENZO(a)PYRENE	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	5.60E-09	-	-	-
BENZO(b)FLUORANTHENE	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	5.00E-07	-	-	-
BENZO(g,h,i)PERYLENE	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	1.10E-10	-	-	-
BENZO(k)FLUORANTHENE	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	9.60E-11	-	-	-
BERYLLIUM	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	-	-	-	-
BIPHENYL, 1,1-	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	5.00E-03	6.00E+01	9.50E-03	5.26E-01
BIS(2-CHLOROETHYL)ETHER	5.0E+02	1.0E+03	5.0E+02	1.0E+03	5.0E+03	7.10E-01	2.87E+02	4.90E-02	1.45E+01
BIS(2-CHLORO-1-METHYLETHYL)ETHER	5.0E+02	7.9E+02	5.0E+02	1.0E+03	7.9E+02	8.50E-01	2.24E+03	3.20E-01	2.66E+00
BIS(2-ETHYLHEXYL)PHTHALATE	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	6.20E-08	-	-	-
BORON	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	-	-	-	-
BROMODICHLOROMETHANE	9.3E+02	9.3E+02	1.0E+03	2.5E+03	9.3E+02	5.00E+01	1.10E+07	1.68E+03	2.98E-02
BROMOFORM	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	5.60E+00	1.35E+04	1.30E+00	4.31E+00
BROMOMETHANE	5.0E+02	1.0E+03	5.0E+02	1.0E+03	3.6E+03	1.42E+03	8.00E+04	2.00E+01	7.10E+01
CADMIUM	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	-	-	-	-
CARBON TETRACHLORIDE	4.5E+02	4.5E+02	5.0E+02	1.0E+03	4.5E+02	1.13E+02	6.30E+04	1.00E+01	1.13E+01
CHLORDANE (TECHNICAL)	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	1.00E-05	8.40E+00	4.92E-04	2.03E-02
CHLOROANILINE, p-	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	1.00E-05	-	-	-
CHLOROBENZENE	5.0E+02	7.6E+02	5.0E+02	1.0E+03	7.6E+02	1.18E+01	1.00E+03	2.20E-01	5.36E+01
CHLOROETHANE	5.0E+02	1.0E+03	5.0E+02	1.0E+03	2.1E+03	1.01E+03	3.80E+05	1.40E+02	7.20E+00
CHLOROFORM	5.0E+02	1.0E+03	5.0E+02	1.0E+03	2.5E+03	1.60E+02	4.22E+05	8.50E+01	1.88E+00
CHLOROMETHANE	1.0E+02	5.0E+02	1.0E+02	5.0E+02	1.3E+03	4.30E+03	-	-	-
CHLOROPHENOL, 2-	1.0E+02	5.0E+02	1.0E+02	5.0E+02	2.7E+04	1.42E+00	1.90E+01	3.60E-03	3.94E+02
CHROMIUM (Total)	-	-	-	-	-	-	-	-	-
CHROMIUM III	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	-	-	-	-
CHROMIUM VI	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	-	-	-	-
CHRYSENE	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	6.30E-07	-	-	-
COBALT	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	-	-	-	-
COPPER	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	-	-	-	-
CYANIDE (Free)	1.0E+02	5.0E+02	1.0E+02	5.0E+02	NA	6.20E+02	6.52E+02	5.80E-01	1.07E+03
CYCLO-1,3,5-TRIMETHYLENE-2,4,6-TRINITRAMINE (RDX)	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	4.10E-09	-	-	-
DALAPON	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	6.70E-01	-	-	-
DIBENZO(a,h)ANTHTRACENE	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	1.00E-10	-	-	-

TABLE H-2. GROSS CONTAMINATION SCREENING LEVELS FOR [1]EXPOSED OR POTENTIALLY EXPOSED SOIL (mg/kg)

CONTAMINANT	[2]Final Unrestricted Land Use Screening Level	Final Industrial/ Commercial Land Use Screening Level	[2]Raw Unrestricted Screening Level	Raw Industrial/ Commercial Screening Level	Soil Saturation Limit (mg/kg)	Vapor Pressure (VP) (Torr @ 20-30 °C)	50 Percentile Odor Recognition Threshold (ORT) (ug/m^3)	50 Percentile Odor Recognition Threshold (ORT) (ppm-v)	Odor Index
DIBROMO-3-CHLOROPROPANE, 1,2-	5.0E+02	9.8E+02	5.0E+02	1.0E+03	9.8E+02	8.00E-01	-	-	-
DIBROMOCHLOROMETHANE	1.0E+02	5.0E+02	1.0E+02	5.0E+02	NA	7.60E+01	-	-	-
DIBROMOETHANE, 1,2-	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	1.20E+01	2.00E+05	2.60E+01	4.62E-01
DICHLOROBENZENE, 1,2-	3.8E+02	3.8E+02	1.0E+03	2.5E+03	3.8E+02	1.50E+00	3.05E+05	5.00E+01	3.00E-02
DICHLOROBENZENE, 1,3-	1.0E+02	5.0E+02	1.0E+02	5.0E+02	6.0E+02	2.30E+00	-	-	-
DICHLOROBENZENE, 1,4-	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	1.80E+00	1.10E+03	1.80E-01	1.00E+01
DICHLOROBENZIDINE, 3,3-	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	4.50E-09	-	-	-
DICHLORODIPHENYLDICHLOROETHANE (DDD)	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	1.00E-06	-	-	-
DICHLORODIPHENYLDICHLOROETHYLENE (DDE)	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	6.50E-06	-	-	-
DICHLORODIPHENYLTRICHLOROETHANE (DDT)	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	5.50E-06	-	-	-
DICHLOROETHANE, 1,1-	5.0E+02	1.0E+03	5.0E+02	1.0E+03	1.7E+03	2.34E+02	1.25E+05	3.00E+01	7.80E+00
DICHLOROETHANE, 1,2-	5.0E+02	1.0E+03	5.0E+02	1.0E+03	3.0E+03	7.90E+01	2.42E+03	5.90E-01	1.34E+02
DICHLOROETHYLENE, 1,1-	5.0E+02	1.0E+03	5.0E+02	1.0E+03	1.2E+03	5.91E+02	2.00E+06	5.00E+02	1.18E+00
DICHLOROETHYLENE, Cis 1,2-	1.0E+02	5.0E+02	1.0E+02	5.0E+02	2.4E+03	2.15E+02	-	-	-
DICHLOROETHYLENE, Trans 1,2-	5.0E+02	1.0E+03	5.0E+02	1.0E+03	1.9E+03	3.31E+02	6.73E+04	1.70E+01	1.95E+01
DICHLOROPHENOL, 2,4-	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	6.70E-02	1.40E+03	2.10E-01	3.19E-01
DICHLOROPHENOXYACETIC ACID (2,4-D)	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	8.25E-05	-	-	-
DICHLOROPROPANE, 1,2-	1.0E+02	5.0E+02	1.0E+02	5.0E+02	1.4E+03	4.20E+01	1.19E+03	2.50E-01	1.68E+02
DICHLOROPROPENE, 1,3-	5.0E+02	1.0E+03	5.0E+02	1.0E+03	1.6E+03	4.30E+01	4.16E+03	1.00E+00	4.30E+01
DIELDRIN	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	1.80E-08	-	-	-
DIETHYLPHTHALATE	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	3.50E-04	-	-	-
DIMETHYLPHENOL, 2,4-	1.0E+02	5.0E+02	1.0E+02	5.0E+02	NA	9.80E-02	1.00E+00	1.97E-04	4.97E+02
DIMETHYLPHTHALATE	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	1.70E-03	-	-	-
DINITROBENZENE, 1,3-	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	9.00E-04	-	-	-
DINITROPHENOL, 2,4-	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	1.50E-05	-	-	-
DINITROTOLUENE, 2,4- (2,4-DNT)	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	1.47E-04	-	-	-
DINITROTOLUENE, 2,6- (2,6-DNT)	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	5.67E-04	-	-	-
DIOXANE, 1,4-	5.0E+02	1.0E+03	5.0E+02	1.0E+03	1.2E+05	3.70E+01	6.12E+05	1.70E+02	2.18E-01
DIOXINS (TEQ)	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	1.50E-09	-	-	-
DIURON	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	6.90E-08	-	-	-
ENDOSULFAN	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	1.00E-05	-	-	-
ENDRIN	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	2.00E-07	-	-	-
ETHANOL	5.0E+02	1.0E+03	5.0E+02	1.0E+03	1.0E+05	5.65E+01	1.92E+04	1.00E+01	5.65E+00
ETHYLBENZENE	4.8E+02	4.8E+02	5.0E+02	1.0E+03	4.8E+02	1.00E+01	2.00E+03	4.50E-01	2.22E+01
FLUORANTHENE	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	5.00E-06	-	-	-
FLUORENE	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	3.20E-04	-	-	-
GLYPHOSATE	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	4.30E-10	-	-	-
HEPTACHLOR	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	3.00E-04	3.00E+02	2.00E-02	1.50E-02
HEPTACHLOR EPOXIDE	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	2.60E-06	3.00E+02	1.90E-02	1.37E-04
HEXACHLOROBENZENE	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	1.10E-05	-	-	-
HEXACHLOROBUTADIENE	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	1.50E-01	1.20E+04	1.10E+00	1.36E-01
HEXACHLOROCYCLOHEXANE (gamma) LINDANE	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	9.40E-06	-	-	-
HEXACHLOROETHANE	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	2.10E-01	-	-	-
HEXAZINONE	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	2.25E-07	-	-	-
INDENO(1,2,3-cd)PYRENE	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	1.00E-06	-	-	-
ISOPHORONE	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	4.38E-01	-	-	-
LEAD	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	-	-	-	-

TABLE H-2. GROSS CONTAMINATION SCREENING LEVELS FOR [1]EXPOSED OR POTENTIALLY EXPOSED SOIL (mg/kg)

CONTAMINANT	[2]Final Unrestricted Land Use Screening Level	Final Industrial/ Commercial Land Use Screening Level	[2]Raw Unrestricted Screening Level	Raw Industrial/ Commercial Screening Level	Soil Saturation Limit (mg/kg)	Vapor Pressure (VP) (Torr @ 20-30 °C)	50 Percentile Odor Recognition Threshold (ORT) (ug/m^3)	50 Percentile Odor Recognition Threshold (ORT) (ppm-v)	Odor Index
MERCURY	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	2.00E-03	-	-	-
METHOXYCHLOR	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	1.40E-06	-	-	-
METHYL ETHYL KETONE	5.0E+02	1.0E+03	5.0E+02	1.0E+03	2.8E+04	1.00E+02	3.20E+04	1.10E+01	9.09E+00
METHYL ISOBUTYL KETONE	1.0E+02	5.0E+02	1.0E+02	5.0E+02	3.4E+03	1.00E+01	4.20E+02	1.00E-01	1.00E+02
METHYL MERCURY	1.0E+02	5.0E+02	1.0E+02	5.0E+02	NA	-	-	-	-
METHYL TERT BUTYL ETHER	1.0E+02	5.0E+02	1.0E+02	5.0E+02	8.9E+03	2.45E+02	5.30E+02	1.30E-01	1.88E+03
METHYLENE CHLORIDE	5.0E+02	1.0E+03	5.0E+02	1.0E+03	3.3E+03	4.29E+02	5.60E+05	1.60E+02	2.68E+00
METHYLNAPHTHALENE, 1-	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	6.80E-02	6.80E+01	1.15E-02	5.91E+00
METHYLNAPHTHALENE, 2-	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	6.80E-02	6.80E+01	1.15E-02	5.91E+00
MOLYBDENUM	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	-	-	-	-
NAPHTHALENE	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	8.20E-02	4.40E+02	8.40E-02	9.76E-01
NICKEL	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	-	-	-	-
NITROBENZENE	5.0E+02	1.0E+03	5.0E+02	1.0E+03	3.0E+03	2.45E-01	-	-	-
NITROGLYCERIN	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	4.00E-02	-	-	-
NITROTOLUENE, 2-	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	2.09E-01	-	-	-
NITROTOLUENE, 3-	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	2.04E-01	-	-	-
NITROTOLUENE, 4-	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	4.90E-03	-	-	-
PENTACHLOROPHENOL	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	1.10E-04	-	-	-
PENTAERYTHRITOLTETRANITRATE (PETN)	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	8.38E-04	-	-	-
PERCHLORATE	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	-	-	-	-
PHENANTHRENE	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	9.60E-04	5.50E+01	7.42E-03	1.29E-01
PHENOL	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	3.50E-01	1.56E+02	4.00E-02	8.75E+00
POLYCHLORINATED BIPHENYLS (PCBs)	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	6.70E-03	-	-	-
PROPICONAZOLE	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	1.00E-06	-	-	-
PYRENE	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	2.50E-06	-	-	-
SELENIUM	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	-	-	-	-
SILVER	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	-	-	-	-
SIMAZINE	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	2.21E-08	-	-	-
STYRENE	5.0E+02	8.7E+02	5.0E+02	1.0E+03	8.7E+02	5.00E+00	1.36E+03	3.00E-01	1.67E+01
TERBACIL	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	2.76E-07	-	-	-
tert-BUTYL ALCOHOL	1.0E+02	5.0E+02	1.0E+02	5.0E+02	3.2E+05	4.20E+01	-	-	-
TETRACHLOROETHANE, 1,1,1,2-	1.0E+02	5.0E+02	1.0E+02	5.0E+02	6.8E+02	1.20E+01	-	-	-
TETRACHLOROETHANE, 1,1,2,2-	5.0E+02	1.0E+03	5.0E+02	1.0E+03	1.9E+03	4.00E+00	1.05E+04	1.50E+00	2.67E+00
TETRACHLOROETHYLENE	1.7E+02	1.7E+02	5.0E+02	1.0E+03	1.7E+02	1.90E+01	3.17E+04	4.68E+00	4.06E+00
TETRACHLOROPHENOL, 2,3,4,6-	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	6.66E-04	-	-	-
TETRANITRO-1,3,5,7-TETRAAZOCYCLOOCTANE (HMX)	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	2.41E-08	-	-	-
THALLIUM	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	-	-	-	-
TOLUENE	5.0E+02	8.2E+02	5.0E+02	1.0E+03	8.2E+02	2.80E+01	3.00E+04	8.00E+00	3.50E+00
TOXAPHENE	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	4.00E-01	-	-	-
TPH (gasolines)	1.0E+02	5.0E+02	1.0E+02	5.0E+02	5.4E+03	3.00E+02	1.10E+03	2.50E-01	1.20E+03
TPH (middle distillates)	5.0E+02	5.0E+02	5.0E+02	1.0E+03	5.0E+02	1.00E+00	5.00E+03	7.00E-01	1.43E+00
TPH (residual fuels)	5.0E+02	2.5E+03	5.0E+02	2.5E+03	NA	-	-	-	-
TRICHLOROBENZENE, 1,2,4-	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	2.90E-01	2.20E+04	2.96E+00	9.80E-02
TRICHLOROETHANE, 1,1,1-	5.0E+02	6.4E+02	5.0E+02	1.0E+03	6.4E+02	1.00E+02	6.51E+04	1.20E+01	8.33E+00
TRICHLOROETHANE, 1,1,2-	1.0E+02	5.0E+02	1.0E+02	5.0E+02	2.2E+03	2.25E+01	-	-	-
TRICHLOROETHYLENE	5.0E+02	6.9E+02	5.0E+02	2.5E+03	6.9E+02	7.70E+01	1.36E+06	2.49E+02	3.09E-01
TRICHLOROPHENOL, 2,4,5-	1.0E+02	5.0E+02	1.0E+02	5.0E+02	NA	-	-	-	-

TABLE H-2. GROSS CONTAMINATION SCREENING LEVELS FOR [1]EXPOSED OR POTENTIALLY EXPOSED SOIL (mg/kg)

CONTAMINANT	[2]Final Unrestricted Land Use Screening Level	Final Industrial/ Commercial Land Use Screening Level	[2]Raw Unrestricted Screening Level	Raw Industrial/ Commercial Screening Level	Soil Saturation Limit (mg/kg)	Vapor Pressure (VP) (Torr @ 20-30 °C)	50 Percentile Odor Recognition Threshold (ORT) (ug/m^3)	50 Percentile Odor Recognition Threshold (ORT) (ppm-v)	Odor Index
TRICHLOROPHENOL, 2,4,6-	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	1.20E-02	3.00E-01	3.60E-05	3.33E+02
TRICHLOROPHENOXYACETIC ACID, 2,4,5- (2,4,5-T)	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	3.75E-05	-	-	-
TRICHLOROPHENOXYPROPIONIC ACID, 2,4,5- (2,4,5-TP)	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	2.58E-06	-	-	-
TRICHLOROPROPANE, 1,2,3-	1.0E+02	5.0E+02	1.0E+02	5.0E+02	1.4E+03	3.69E+00	-	-	-
TRICHLOROPROPENE, 1,2,3-	1.0E+02	3.1E+02	1.0E+02	5.0E+02	3.1E+02	4.40E+00	-	-	-
TRIFLURALIN	1.0E+02	5.0E+02	1.0E+02	5.0E+02	NA	4.58E-05	-	-	-
TRINITROBENZENE, 1,3,5-	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	6.40E-06	-	-	-
TRINITROPHENYLMETHYLNITRAMINE, 2,4,6- (TETRYL)	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	1.17E-07	-	-	-
TRINITROTOLUENE, 2,4,6- (TNT)	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	8.02E-06	-	-	-
VANADIUM	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	-	-	-	-
VINYL CHLORIDE	5.0E+02	1.0E+03	5.0E+02	1.0E+03	3.9E+03	2.58E+03	7.71E+05	2.94E+02	8.78E+00
XYLENES	2.6E+02	2.6E+02	5.0E+02	1.0E+03	2.6E+02	6.00E+00	4.41E+02	1.00E-01	6.00E+01
ZINC	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	-	-	-	-

Notes:
1. Default 0-3m below ground surface for residential settings and 0-1m below ground surface for commercial/industrial settings.
2. Based on unrestricted current or future land use. Considered adequate for residential housing, schools, medical facilities, day-care centers and other sensitive uses.
3. Referred to as "ceiling levels" in original MADEP guidance (MADEP 1994).

Odor Index = VP/ORT in ppm-v
Physio-chemical constants Ontario MOEE (MOEE 1996) except as noted.
Physio-chemical constants for cloroethane and chloromethane from ATSDR Toxicological Profiles (ATSDR 2001).
Odor Recognition Threshold in parts per million - volume (ppm-v = (concentration in mg/m3) x (24/molecular weight)).
TPH -Total Petroleum Hydrocarbons. See text for discussion of different TPH categories.
Ceiling Level: Based on comparison of vapor pressure and odor index to Table F-1 or saturation limit, if lower.
Saturation limits calculated using equation in USEPA RSL guidance (USEPA 2008a) for chemicals that are liquid at ambient temperatures and pressures (refer to Appendix 2).
50% ORT of 0.13 ppm-v for MTBE from information in CaEPA Public Health Goal for MTBE (CalEPA 1999).
TPH VP values and ORTs from New Jersey Dept of Health (NJDPH 2008, 2010); ORTs for TPHg (0.25ppm) and TPHmd (0.7ppm) adjusted to ug/m3 based assumed MWs noted for TPHg and TPHd in Table J.

References for vapor pressure and odor threshold data (in order of use, see USEPA (1992) for additiona ORT values):
1. Ontario Ministry of Environment and Energy (MOEE 1996).
2. Massachusetts Department of Environmental Protection (MADEP 1994).
3. Agency for Toxic Substances and Disease Registry (ATSDR 2001).
4. Vapor Pressure for 1,4 Dioxane from "Solvent Stabilizers - White Paper" (Mohr 2001). Odor Threshold from US Department of Health and Human Services, National Toxicology Program (USDHHS, 2001).
5. Military range Database (ARAMS), U.S. Army Corps of Engineers, Engineer Research and Development Center, http://el.erdc.usace.army.mil/arams/databases.html (used for explosive-related contaminants

TABLE H-3. GROSS CONTAMINATION SCREENING LEVELS FOR [1]DEEP OR OTHERWISE ISOLATED SOILS (mg/kg)

CONTAMINANT	[2]Final Unrestricted Land Use Screening Level	Final Industrial/ Commercial Land Use Screening Level	[2]Raw Unrestricted Screening Level	Raw Industrial/ Commercial Screening Level	Soil Saturation Limit (mg/kg)	Vapor Pressure (VP) (Torr @ 20-30 °C)	50 Percentile Odor Recognition Threshold (ORT) (ug/m^3)	50 Percentile Odor Recognition Threshold (ORT) (ppm-v)	Odor Index
ACENAPHTHENE	2.5E+03	5.0E+03	2.5E+03	5.0E+03	NA	4.50E-03	5.13E+02	8.00E-02	5.63E-02
ACENAPHTHYLENE	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	2.90E-02	-	-	-
ACETONE	1.0E+03	2.5E+03	1.0E+03	2.5E+03	1.1E+05	2.70E+02	3.09E+04	1.30E+01	2.08E+01
ALDRIN	2.5E+03	5.0E+03	2.5E+03	5.0E+03	NA	2.30E-05	2.63E+02	1.70E-02	1.35E-03
AMETRYN	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	2.74E-06	-	-	-
AMINO,2- DINITROTOLUENE,4,6-	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	1.07E-04	-	-	-
AMINO,4- DINITROTOLUENE,2,6-	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	1.07E-04	-	-	-
ANTHRACENE	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	1.70E-05	-	-	-
ANTIMONY	2.5E+03	5.0E+03	2.5E+03	5.0E+03	NA	-	-	-	-
ARSENIC	2.5E+03	5.0E+03	2.5E+03	5.0E+03	NA	-	-	-	-
ATRAZINE	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	2.89E-07	-	-	-
BARIUM	2.5E+03	5.0E+03	2.5E+03	5.0E+03	NA	-	-	-	-
BENOMYL	2.5E+03	5.0E+03	2.5E+03	5.0E+03	NA	-	-	-	-
BENZENE	1.0E+03	1.9E+03	1.0E+03	2.5E+03	1.9E+03	9.50E+01	4.89E+03	1.50E+00	6.33E+01
BENZO(a)ANTHRACENE	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	2.20E-08	-	-	-
BENZO(a)PYRENE	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	5.60E-09	-	-	-
BENZO(b)FLUORANTHENE	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	5.00E-07	-	-	-
BENZO(g,h,i)PERYLENE	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	1.10E-10	-	-	-
BENZO(k)FLUORANTHENE	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	9.60E-11	-	-	-
BERYLLIUM	2.5E+03	5.0E+03	2.5E+03	5.0E+03	NA	-	-	-	-
BIPHENYL, 1,1-	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	5.00E-03	6.00E+01	9.50E-03	5.26E-01
BIS(2-CHLOROETHYL)ETHER	1.0E+03	2.5E+03	1.0E+03	2.5E+03	5.0E+03	7.10E-01	2.87E+02	4.90E-02	1.45E+01
BIS(2-CHLORO-1-METHYLETHYL)ETHER	7.9E+02	7.9E+02	1.0E+03	2.5E+03	7.9E+02	8.50E-01	2.24E+03	3.20E-01	2.66E+00
BIS(2-ETHYLHEXYL)PHTHALATE	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	6.20E-08	-	-	-
BORON	2.5E+03	5.0E+03	2.5E+03	5.0E+03	NA	-	-	-	-
BROMODICHLOROMETHANE	9.3E+02	9.3E+02	2.5E+03	5.0E+03	9.3E+02	5.00E+01	1.10E+07	1.68E+03	2.98E-02
BROMOFORM	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	5.60E+00	1.35E+04	1.30E+00	4.31E+00
BROMOMETHANE	1.0E+03	2.5E+03	1.0E+03	2.5E+03	3.6E+03	1.42E+03	8.00E+04	2.00E+01	7.10E+01
CADMIUM	2.5E+03	5.0E+03	2.5E+03	5.0E+03	NA	-	-	-	-
CARBON TETRACHLORIDE	4.5E+02	4.5E+02	1.0E+03	2.5E+03	4.5E+02	1.13E+02	6.30E+04	1.00E+01	1.13E+01
CHLORDANE (TECHNICAL)	2.5E+03	5.0E+03	2.5E+03	5.0E+03	NA	1.00E-05	8.40E+00	4.92E-04	2.03E-02
CHLOROANILINE, p-	2.5E+03	5.0E+03	2.5E+03	5.0E+03	NA	1.00E-05	-	-	-
CHLOROBENZENE	7.6E+02	7.6E+02	1.0E+03	2.5E+03	7.6E+02	1.18E+01	1.00E+03	2.20E-01	5.36E+01
CHLOROETHANE	1.0E+03	2.1E+03	1.0E+03	2.5E+03	2.1E+03	1.01E+03	3.80E+05	1.40E+02	7.20E+00
CHLOROFORM	1.0E+03	2.5E+03	1.0E+03	2.5E+03	2.5E+03	1.60E+02	4.22E+05	8.50E+01	1.88E+00
CHLOROMETHANE	5.0E+02	1.0E+03	5.0E+02	1.0E+03	1.3E+03	4.30E+03	-	-	-
CHLOROPHENOL, 2-	5.0E+02	1.0E+03	5.0E+02	1.0E+03	2.7E+04	1.42E+00	1.90E+01	3.60E-03	3.94E+02
CHROMIUM (Total)	-	-	-	-	-	-	-	-	-
CHROMIUM III	2.5E+03	5.0E+03	2.5E+03	5.0E+03	NA	-	-	-	-
CHROMIUM VI	2.5E+03	5.0E+03	2.5E+03	5.0E+03	NA	-	-	-	-
CHRYSENE	2.5E+03	5.0E+03	2.5E+03	5.0E+03	NA	6.30E-07	-	-	-
COBALT	2.5E+03	5.0E+03	2.5E+03	5.0E+03	NA	-	-	-	-
COPPER	2.5E+03	5.0E+03	2.5E+03	5.0E+03	NA	-	-	-	-
CYANIDE (Free)	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	6.20E+02	6.52E+02	5.80E-01	1.07E+03
CYCLO-1,3,5-TRIMETHYLENE-2,4,6-TRINITRAMINE (RDX)	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	4.10E-09	-	-	-
DALAPON	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	6.70E-01	-	-	-
DIBENZO(a,h)ANTHTRACENE	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	1.00E-10	-	-	-
DIBROMO-3-CHLOROPROPANE, 1,2-	9.8E+02	9.8E+02	1.0E+03	2.5E+03	9.8E+02	8.00E-01	-	-	-

TABLE H-3. GROSS CONTAMINATION SCREENING LEVELS FOR [1]DEEP OR OTHERWISE ISOLATED SOILS (mg/kg)

CONTAMINANT	[2]Final Unrestricted Land Use Screening Level	Final Industrial/ Commercial Land Use Screening Level	[2]Raw Unrestricted Screening Level	Raw Industrial/ Commercial Screening Level	Soil Saturation Limit (mg/kg)	Vapor Pressure (VP) (Torr @ 20-30 °C)	50 Percentile Odor Recognition Threshold (ORT) (ug/m^3)	50 Percentile Odor Recognition Threshold (ORT) (ppm-v)	Odor Index
DIBROMOCHLOROMETHANE	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	7.60E+01	-	-	-
DIBROMOETHANE, 1,2-	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	1.20E+01	2.00E+05	2.60E+01	4.62E-01
DICHLOROBENZENE, 1,2-	3.8E+02	3.8E+02	2.5E+03	5.0E+03	3.8E+02	1.50E+00	3.05E+05	5.00E+01	3.00E-02
DICHLOROBENZENE, 1,3-	5.0E+02	6.0E+02	5.0E+02	1.0E+03	6.0E+02	2.30E+00	-	-	-
DICHLOROBENZENE, 1,4-	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	1.80E+00	1.10E+03	1.80E-01	1.00E+01
DICHLOROBENZIDINE, 3,3-	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	4.50E-09	-	-	-
DICHLORODIPHENYLDICHLOROETHANE (DDD)	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	1.00E-06	-	-	-
DICHLORODIPHENYLDICHLOROETHYLENE (DDE)	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	6.50E-06	-	-	-
DICHLORODIPHENYLTRICHLOROETHANE (DDT)	2.5E+03	5.0E+03	2.5E+03	5.0E+03	NA	5.50E-06	-	-	-
DICHLOROETHANE, 1,1-	1.0E+03	1.7E+03	1.0E+03	2.5E+03	1.7E+03	2.34E+02	1.25E+05	3.00E+01	7.80E+00
DICHLOROETHANE, 1,2-	1.0E+03	2.5E+03	1.0E+03	2.5E+03	3.0E+03	7.90E+01	2.42E+03	5.90E-01	1.34E+02
DICHLOROETHYLENE, 1,1-	1.0E+03	1.2E+03	1.0E+03	2.5E+03	1.2E+03	5.91E+02	2.00E+06	5.00E+02	1.18E+00
DICHLOROETHYLENE, Cis 1,2-	5.0E+02	1.0E+03	5.0E+02	1.0E+03	2.4E+03	2.15E+02	-	-	-
DICHLOROETHYLENE, Trans 1,2-	1.0E+03	1.9E+03	1.0E+03	2.5E+03	1.9E+03	3.31E+02	6.73E+04	1.70E+01	1.95E+01
DICHLOROPHENOL, 2,4-	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	6.70E-02	1.40E+03	2.10E-01	3.19E-01
DICHLOROPHENOXYACETIC ACID (2,4-D)	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	8.25E-05	-	-	-
DICHLOROPROPANE, 1,2-	5.0E+02	1.0E+03	5.0E+02	1.0E+03	1.4E+03	4.20E+01	1.19E+03	2.50E-01	1.68E+02
DICHLOROPROPENE, 1,3-	1.0E+03	1.6E+03	1.0E+03	2.5E+03	1.6E+03	4.30E+01	4.16E+03	1.00E+00	4.30E+01
DIELDRIN	2.5E+03	5.0E+03	2.5E+03	5.0E+03	NA	1.80E-08	-	-	-
DIETHYLPHTHALATE	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	3.50E-04	-	-	-
DIMETHYLPHENOL, 2,4-	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	9.80E-02	1.00E+00	1.97E-04	4.97E+02
DIMETHYLPHTHALATE	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	1.70E-03	-	-	-
DINITROBENZENE, 1,3-	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	9.00E-04	-	-	-
DINITROPHENOL, 2,4-	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	1.50E-05	-	-	-
DINITROTOLUENE, 2,4- (2,4-DNT)	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	1.47E-04	-	-	-
DINITROTOLUENE, 2,6- (2,6-DNT)	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	5.67E-04	-	-	-
DIOXANE, 1,4-	1.0E+03	2.5E+03	1.0E+03	2.5E+03	1.2E+05	3.70E+01	6.12E+05	1.70E+02	2.18E-01
DIOXINS (TEQ)	2.5E+03	5.0E+03	2.5E+03	5.0E+03	NA	1.50E-09	-	-	-
DIURON	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	6.90E-08	-	-	-
ENDOSULFAN	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	1.00E-05	-	-	-
ENDRIN	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	2.00E-07	-	-	-
ETHANOL	1.0E+03	2.5E+03	1.0E+03	2.5E+03	1.0E+05	5.65E+01	1.92E+04	1.00E+01	5.65E+00
ETHYLBENZENE	4.8E+02	4.8E+02	1.0E+03	2.5E+03	4.8E+02	1.00E+01	2.00E+03	4.50E-01	2.22E+01
FLUORANTHENE	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	5.00E-06	-	-	-
FLUORENE	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	3.20E-04	-	-	-
GLYPHOSATE	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	4.30E-10	-	-	-
HEPTACHLOR	2.5E+03	5.0E+03	2.5E+03	5.0E+03	NA	3.00E-04	3.00E+02	2.00E-02	1.50E-02
HEPTACHLOR EPOXIDE	2.5E+03	5.0E+03	2.5E+03	5.0E+03	NA	2.60E-06	3.00E+02	1.90E-02	1.37E-04
HEXACHLOROBENZENE	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	1.10E-05	-	-	-
HEXACHLOROBUTADIENE	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	1.50E-01	1.20E+04	1.10E+00	1.36E-01
HEXACHLOROCYCLOHEXANE (gamma) LINDANE	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	9.40E-06	-	-	-
HEXACHLOROETHANE	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	2.10E-01	-	-	-
HEXAZINONE	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	2.25E-07	-	-	-
INDENO(1,2,3-cd)PYRENE	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	1.00E-06	-	-	-
ISOPHORONE	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	4.38E-01	-	-	-
LEAD	2.5E+03	5.0E+03	2.5E+03	5.0E+03	NA	-	-	-	-
MERCURY	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	2.00E-03	-	-	-
METHOXYCHLOR	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	1.40E-06	-	-	-

TABLE H-3. GROSS CONTAMINATION SCREENING LEVELS FOR [1]DEEP OR OTHERWISE ISOLATED SOILS (mg/kg)

CONTAMINANT	[2]Final Unrestricted Land Use Screening Level	Final Industrial/ Commercial Land Use Screening Level	[2]Raw Unrestricted Screening Level	Raw Industrial/ Commercial Screening Level	Soil Saturation Limit (mg/kg)	Vapor Pressure (VP) (Torr @ 20-30 °C)	50 Percentile Odor Recognition Threshold (ORT) (ug/m^3)	50 Percentile Odor Recognition Threshold (ORT) (ppm-v)	Odor Index
METHYL ETHYL KETONE	1.0E+03	2.5E+03	1.0E+03	2.5E+03	2.8E+04	1.00E+02	3.20E+04	1.10E+01	9.09E+00
METHYL ISOBUTYL KETONE	5.0E+02	1.0E+03	5.0E+02	1.0E+03	3.4E+03	1.00E+01	4.20E+02	1.00E-01	1.00E+02
METHYL MERCURY	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	-	-	-	-
METHYL TERT BUTYL ETHER	5.0E+02	1.0E+03	5.0E+02	1.0E+03	8.9E+03	2.45E+02	5.30E+02	1.30E-01	1.88E+03
METHYLENE CHLORIDE	1.0E+03	2.5E+03	1.0E+03	2.5E+03	3.3E+03	4.29E+02	5.60E+05	1.60E+02	2.68E+00
METHYLNAPHTHALENE, 1-	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	6.80E-02	6.80E+01	1.15E-02	5.91E+00
METHYLNAPHTHALENE, 2-	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	6.80E-02	6.80E+01	1.15E-02	5.91E+00
MOLYBDENUM	2.5E+03	5.0E+03	2.5E+03	5.0E+03	NA	-	-	-	-
NAPHTHALENE	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	8.20E-02	4.40E+02	8.40E-02	9.76E-01
NICKEL	2.5E+03	5.0E+03	2.5E+03	5.0E+03	NA	-	-	-	-
NITROBENZENE	1.0E+03	2.5E+03	1.0E+03	2.5E+03	3.0E+03	2.45E-01	-	-	-
NITROGLYCERIN	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	4.00E-02	-	-	-
NITROTOLUENE, 2-	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	2.09E-01	-	-	-
NITROTOLUENE, 3-	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	2.04E-01	-	-	-
NITROTOLUENE, 4-	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	4.90E-03	-	-	-
PENTACHLOROPHENOL	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	1.10E-04	-	-	-
PENTAERYTHRITOLTETRANITRATE (PETN)	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	8.38E-04	-	-	-
PERCHLORATE	2.5E+03	5.0E+03	2.5E+03	5.0E+03	NA	-	-	-	-
PHENANTHRENE	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	9.60E-04	5.50E+01	7.42E-03	1.29E-01
PHENOL	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	3.50E-01	1.56E+02	4.00E-02	8.75E+00
POLYCHLORINATED BIPHENYLS (PCBs)	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	6.70E-03	-	-	-
PROPICONAZOLE	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	1.00E-06	-	-	-
PYRENE	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	2.50E-06	-	-	-
SELENIUM	2.5E+03	5.0E+03	2.5E+03	5.0E+03	NA	-	-	-	-
SILVER	2.5E+03	5.0E+03	2.5E+03	5.0E+03	NA	-	-	-	-
SIMAZINE	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	2.21E-08	-	-	-
STYRENE	8.7E+02	8.7E+02	1.0E+03	2.5E+03	8.7E+02	5.00E+00	1.36E+03	3.00E-01	1.67E+01
TERBACIL	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	2.76E-07	-	-	-
tert-BUTYL ALCOHOL	5.0E+02	1.0E+03	5.0E+02	1.0E+03	3.2E+05	4.20E+01	-	-	-
TETRACHLOROETHANE, 1,1,1,2-	5.0E+02	6.8E+02	5.0E+02	1.0E+03	6.8E+02	1.20E+01	-	-	-
TETRACHLOROETHANE, 1,1,2,2-	1.0E+03	1.9E+03	1.0E+03	2.5E+03	1.9E+03	4.00E+00	1.05E+04	1.50E+00	2.67E+00
TETRACHLOROETHYLENE	1.7E+02	1.7E+02	1.0E+03	2.5E+03	1.7E+02	1.90E+01	3.17E+04	4.68E+00	4.06E+00
TETRACHLOROPHENOL, 2,3,4,6-	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	6.66E-04	-	-	-
TETRANITRO-1,3,5,7-TETRAAZOCYCLOOCTANE (HMX)	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	2.41E-08	-	-	-
THALLIUM	2.5E+03	5.0E+03	2.5E+03	5.0E+03	NA	-	-	-	-
TOLUENE	8.2E+02	8.2E+02	1.0E+03	2.5E+03	8.2E+02	2.80E+01	3.00E+04	8.00E+00	3.50E+00
TOXAPHENE	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	4.00E-01	-	-	-
TPH (gasolines)	5.0E+03	5.0E+03	5.0E+03	5.0E+03	5.4E+03	3.00E+02	1.00E+03	2.00E-01	1.50E+03
TPH (middle distillates)	5.0E+03	5.0E+03	5.0E+03	5.0E+03	NA	5.00E+00	1.00E+03	1.41E-01	3.55E+01
TPH (residual fuels)	5.0E+03	5.0E+03	5.0E+03	5.0E+03	NA	-	-	-	-
TRICHLOROBENZENE, 1,2,4-	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	2.90E-01	2.20E+04	2.96E+00	9.80E-02
TRICHLOROETHANE, 1,1,1-	6.4E+02	6.4E+02	1.0E+03	2.5E+03	6.4E+02	1.00E+02	6.51E+04	1.20E+01	8.33E+00
TRICHLOROETHANE, 1,1,2-	5.0E+02	1.0E+03	5.0E+02	1.0E+03	2.2E+03	2.25E+01	-	-	-
TRICHLOROETHYLENE	6.9E+02	6.9E+02	2.5E+03	5.0E+03	6.9E+02	7.70E+01	1.36E+06	2.49E+02	3.09E-01
TRICHLOROPHENOL, 2,4,5-	5.0E+02	1.0E+03	5.0E+02	1.0E+03	NA	-	-	-	-
TRICHLOROPHENOL, 2,4,6-	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	1.20E-02	3.00E-01	3.60E-05	3.33E+02
TRICHLOROPHENOXYACETIC ACID, 2,4,5- (2,4,5-T)	2.5E+03	5.0E+03	2.5E+03	5.0E+03	NA	3.75E-05	-	-	-
TRICHLOROPHENOXYPROPIONIC ACID, 2,4,5- (2,4,5-TP)	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	2.58E-06	-	-	-

TABLE H-3. GROSS CONTAMINATION SCREENING LEVELS FOR [1]DEEP OR OTHERWISE ISOLATED SOILS (mg/kg)

CONTAMINANT	[2]Final Unrestricted Land Use Screening Level	Final Industrial/ Commercial Land Use Screening Level	[2]Raw Unrestricted Screening Level	Raw Industrial/ Commercial Screening Level	Soil Saturation Limit (mg/kg)	Vapor Pressure (VP) (Torr @ 20-30 °C)	50 Percentile Odor Recognition Threshold (ORT) (ug/m^3)	50 Percentile Odor Recognition Threshold (ORT) (ppm-v)	Odor Index
TRICHLOROPROPANE, 1,2,3-	5.0E+02	1.0E+03	5.0E+02	1.0E+03	1.4E+03	3.69E+00	-	-	-
TRICHLOROPROPENE, 1,2,3-	3.1E+02	3.1E+02	5.0E+02	1.0E+03	3.1E+02	4.40E+00	-	-	-
TRIFLURALIN	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	4.58E-05	-	-	-
TRINITROBENZENE, 1,3,5-	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	6.40E-06	-	-	-
TRINITROPHENYLMETHYLNITRAMINE, 2,4,6- (TETRYL)	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	1.17E-07	-	-	-
TRINITROTOLUENE, 2,4,6- (TNT)	1.0E+03	2.5E+03	1.0E+03	2.5E+03	NA	8.02E-06	-	-	-
VANADIUM	2.5E+03	5.0E+03	2.5E+03	5.0E+03	NA	-	-	-	-
VINYL CHLORIDE	1.0E+03	2.5E+03	1.0E+03	2.5E+03	3.9E+03	2.58E+03	7.71E+05	2.94E+02	8.78E+00
XYLENES	2.6E+02	2.6E+02	1.0E+03	2.5E+03	2.6E+02	6.00E+00	4.41E+02	1.00E-01	6.00E+01
ZINC	2.5E+03	5.0E+03	2.5E+03	5.0E+03	NA	-	-	-	-

Notes:

1. Default >3m below ground surface for residential settings and >1m below unpaved ground surface for commercial/industrial settings.
2. Based on unrestricted current or future land use. Considered adequate for residential housing, schools, medical facilities, day-care centers and other sensitive uses.
3. Referred to as "ceiling levels" in original MADEP guidance (MADEP 1994).

Odor Index = VP/ORT in ppm-v
Physio-chemical constants Ontario MOEE (MOEE 1996) except as noted.
Physio-chemical constants for cloroethane and chloromethane from ATSDR Toxicological Profiles (ATSDR 2001).
Odor Recognition Threshold in parts per million - volume (ppm-v = (concentration in mg/m3) x (24/molecular weight)).
TPH -Total Petroleum Hydrocarbons. See text for discussion of different TPH categories.
Ceiling Level: Based on comparison of vapor pressure and odor index to Table F-1 or saturation limit, if lower.
Saturation limits calculated using equation in USEPA Region IX PRG guidance (for chemicals that are liquid at ambient temperatures and pressures; refer to Appendix 2).
Ceiling Levels for TPH after guidance from Massachusetts Department of Environmental Protection (MADEP 1997a).
50% ORT of 0.13 ppm-v for MTBE from information in CaEPA Public Health Goal for MTBE (CalEPA 1999).
TPH VP values from NIOSH (2002); TPHd ORT value from ATSDR (2001a). TPHg ORT based on threshold of 0.2ppm (AHC 2004; worst-case gasolne with TAME) and assumed MW of 108 (refer to Table J); ORT in ug/m^3 = 200 ppbv x (104/24)= 900; rounded to 1,000 ug/m^3.
TPH(middle distillate fuels) gross contamination action level for isolated soils at commercial/industrial sites set at 5,000 mg/kg, based on profession judgement.

References for vapor pressure and odor threshold data (in order of use):

1. Ontario Ministry of Environment and Energy (MOEE 1996).
2. Massachusetts Department of Environmental Protection (MADEP 1994).
3. Agency for Toxic Substances and Disease Registry (ATSDR 2001).
4. National Library of Medicine, Hazardous Substances Data Bank (NLM 2000).
5. U.S. Department of Health and Human Services (NIOSH 2000).

TABLE I-1. GROUNDWATER GROSS CONTAMINATION SCREENING LEVELS
(groundwater IS a current or potential source of drinking water)
(ug/L)

CHEMICAL PARAMETER	Final Screening Level	Basis	Solubility (1/2)	Taste And Odor Threshold	Basis	Upper Limit
ACENAPHTHENE	2.0E+01	Taste & Odors	2.0E+03	2.0E+01	Ontario MOEE	5.0E+04
ACENAPHTHYLENE	2.0E+03	Solubility	2.0E+03	-	-	5.0E+04
ACETONE	2.0E+04	Taste & Odors	5.0E+08	2.0E+04	Amoore & Hautala	5.0E+04
ALDRIN	8.5E+00	Solubility	8.5E+00	1.7E+01	Ontario MOEE	5.0E+04
AMETRYN	5.0E+04	Upper Limit	1.0E+05	-	-	5.0E+04
AMINO,2- DINITROTOLUENE,4,6-	5.0E+04	Upper Limit	6.1E+05	-	-	5.0E+04
AMINO,4- DINITROTOLUENE,2,6-	5.0E+04	Upper Limit	6.1E+05	-	-	5.0E+04
ANTHRACENE	2.2E+01	Solubility	2.2E+01	-	-	5.0E+04
ANTIMONY	5.0E+04	Upper Limit		-	-	5.0E+04
ARSENIC	5.0E+04	Upper Limit		-	-	5.0E+04
ATRAZINE	1.8E+04	Solubility	1.8E+04	-	-	5.0E+04
BARIUM	5.0E+04	Upper Limit		-	-	5.0E+04
BENOMYL	1.9E+03	Solubility	1.9E+03	-	-	5.0E+04
BENZENE	1.7E+02	Taste & Odors	9.0E+05	1.7E+02	Amoore & Hautala	5.0E+04
BENZO(a)ANTHRACENE	4.7E+00	Solubility	4.7E+00	-	-	5.0E+04
BENZO(a)PYRENE	8.0E-01	Solubility	8.0E-01	-	-	5.0E+04
BENZO(b)FLUORANTHENE	7.5E-01	Solubility	7.5E-01	-	-	5.0E+04
BENZO(g,h,i)PERYLENE	1.3E-01	Solubility	1.3E-01	-	-	5.0E+04
BENZO(k)FLUORANTHENE	4.0E-01	Solubility	4.0E-01	-	-	5.0E+04
BERYLLIUM	5.0E+04	Upper Limit		-	-	5.0E+04
BIPHENYL, 1,1-	5.0E-01	Taste & Odors	3.7E+03	5.0E-01	Amoore & Hautala	5.0E+04
BIS(2-CHLOROETHYL)ETHER	3.6E+02	Taste & Odors	8.6E+06	3.6E+02	Amoore & Hautala	5.0E+04
BIS(2-CHLORO-1-METHYLETHYL)ETHER	3.2E+02	Taste & Odors	8.5E+05	3.2E+02	Ontario MOEE	5.0E+04
BIS(2-ETHYLHEXYL)PHTHALATE	1.4E+02	Solubility	1.4E+02	-	-	5.0E+04
BORON	5.0E+04	Upper Limit		-	-	5.0E+04
BROMODICHLOROMETHANE	5.0E+04	Upper Limit	1.5E+06	-	-	5.0E+04
BROMOFORM	5.1E+02	Taste & Odors	1.6E+06	5.1E+02	Amoore & Hautala	5.0E+04
BROMOMETHANE	5.0E+04	Upper Limit	7.6E+06	-	-	5.0E+04
CADMIUM	5.0E+04	Upper Limit		-	-	5.0E+04
CARBON TETRACHLORIDE	5.2E+02	Taste & Odors	4.0E+05	5.2E+02	Amoore & Hautala	5.0E+04
CHLORDANE (TECHNICAL)	2.5E+00	Taste & Odors	2.8E+01	2.5E+00	Ontario MOEE	5.0E+04
CHLOROANILINE, p-	5.0E+04	Upper Limit	2.0E+06	-	-	5.0E+04
CHLOROBENZENE	5.0E+01	Taste & Odors	2.5E+05	5.0E+01	Amoore & Hautala	5.0E+04
CHLOROETHANE	1.6E+01	Taste & Odors	3.4E+06	1.6E+01	Amoore & Hautala	5.0E+04
CHLOROFORM	2.4E+03	Taste & Odors	4.0E+06	2.4E+03	Amoore & Hautala	5.0E+04
CHLOROMETHANE	5.0E+04	Upper Limit	2.7E+06		-	5.0E+04
CHLOROPHENOL, 2-	1.8E-01	Taste & Odors	5.7E+06	1.8E-01	Ontario MOEE	5.0E+04
CHROMIUM (Total)	5.0E+04	Upper Limit		-	-	5.0E+04
CHROMIUM III	5.0E+04	Upper Limit		-	-	5.0E+04
CHROMIUM VI	5.0E+04	Upper Limit	8.5E+08	-	-	5.0E+04
CHRYSENE	1.0E+00	Solubility	1.0E+00	-	-	5.0E+04
COBALT	5.0E+04	Upper Limit		-	-	5.0E+04
COPPER	1.0E+03	Taste & Odors		1.0E+03	CalDHS 2nd MCL	5.0E+04
CYANIDE (Free)	1.7E+02	Taste & Odors	4.8E+07	1.7E+02	Amoore & Hautala	5.0E+04

TABLE I-1. GROUNDWATER GROSS CONTAMINATION SCREENING LEVELS
(groundwater IS a current or potential source of drinking water)
(ug/L)

CHEMICAL PARAMETER	Final Screening Level	Basis	Solubility (1/2)	Taste And Odor Threshold	Basis	Upper Limit
CYCLO-1,3,5-TRIMETHYLENE-2,4,6-TRINITRAMINE (RDX)	3.0E+04	Solubility	3.0E+04	-	-	5.0E+04
DALAPON	5.0E+04	Upper Limit	2.5E+08	-	-	5.0E+04
DIBENZO(a,h)ANTHTRACENE	1.3E+00	Solubility	1.3E+00	-	-	5.0E+04
DIBROMO,1,2- CHLOROPROPANE,3-	1.0E+01	Taste & Odors	6.2E+05	1.0E+01	Amoore & Hautala	5.0E+04
DIBROMOCHLOROMETHANE	5.0E+04	Upper Limit	1.4E+06	-	-	5.0E+04
DIBROMOETHANE, 1,2-	5.0E+04	Upper Limit	2.0E+06	-	-	5.0E+04
DICHLOROBENZENE, 1,2-	1.0E+01	Taste & Odors	7.8E+04	1.0E+01	USEPA 2nd MCL	5.0E+04
DICHLOROBENZENE, 1,3-	5.0E+04	Upper Limit	7.8E+04	-	-	5.0E+04
DICHLOROBENZENE, 1,4-	5.0E+00	Taste & Odors	4.1E+04	5.0E+00	USEPA 2nd MCL	5.0E+04
DICHLOROBENZIDINE, 3,3-	1.6E+03	Solubility	1.6E+03	-	-	5.0E+04
DICHLORODIPHENYLDICHLOROETHANE (DDD)	4.5E+01	Solubility	4.5E+01	-	-	5.0E+04
DICHLORODIPHENYLDICHLOROETHYLENE (DDE)	2.0E+01	Solubility	2.0E+01	-	-	5.0E+04
DICHLORODIPHENYLTRICHLOROETHANE (DDT)	2.8E+00	Solubility	2.8E+00	3.5E+02	Ontario MOEE	5.0E+04
DICHLOROETHANE, 1,1-	5.0E+04	Upper Limit	2.5E+06	-	-	5.0E+04
DICHLOROETHANE, 1,2-	7.0E+03	Taste & Odors	4.3E+06	7.0E+03	Amoore & Hautala	5.0E+04
DICHLOROETHYLENE, 1,1-	1.5E+03	Taste & Odors	1.2E+06	1.5E+03	Amoore & Hautala	5.0E+04
DICHLOROETHYLENE, Cis 1,2-	5.0E+04	Upper Limit	3.2E+06	-	-	5.0E+04
DICHLOROETHYLENE, Trans 1,2-	2.6E+02	Taste & Odors	2.3E+06	2.6E+02	Amoore & Hautala	5.0E+04
DICHLOROPHENOL, 2,4-	3.0E-01	Taste & Odors	2.8E+06	3.0E-01	Ontario MOEE	5.0E+04
DICHLOROPHENOXYACETIC ACID (2,4-D)	5.0E+04	Upper Limit	3.4E+05	-	-	5.0E+04
DICHLOROPROPANE, 1,2-	1.0E+01	Taste & Odors	1.4E+06	1.0E+01	Ontario MOEE	5.0E+04
DICHLOROPROPENE, 1,3-	5.0E+04	Upper Limit	1.4E+06	-	-	5.0E+04
DIELDRIN	4.1E+01	Taste & Odors	9.8E+01	4.1E+01	Ontario MOEE	5.0E+04
DIETHYLPHTHALATE	5.0E+04	Upper Limit	5.4E+05	-	-	5.0E+04
DIMETHYLPHENOL, 2,4-	4.0E+02	Taste & Odors	3.9E+06	4.0E+02	Cal DHS AL	5.0E+04
DIMETHYLPHTHALATE	5.0E+04	Upper Limit	2.5E+06	-	-	5.0E+04
DINITROBENZENE, 1,3-	5.0E+04	Upper Limit	2.7E+05	-	-	5.0E+04
DINITROPHENOL, 2,4-	5.0E+04	Upper Limit	1.4E+06	-	-	5.0E+04
DINITROTOLUENE, 2,4- (2,4-DNT)	5.0E+04	Upper Limit	1.0E+05	-	-	5.0E+04
DINITROTOLUENE, 2,6- (2,6-DNT)	5.0E+04	Upper Limit	9.1E+04	-	-	5.0E+04
DIOXANE, 1,4-	5.0E+04	Upper Limit	5.0E+08	2.3E+05	Amoore & Hautala	5.0E+04
DIOXINS (TEQ)	1.0E-01	Solubility	1.0E-01	-	-	5.0E+04
DIURON	2.1E+04	Solubility	2.1E+04	-	-	5.0E+04
ENDOSULFAN	1.6E+02	Solubility	1.6E+02	-	-	5.0E+04
ENDRIN	4.1E+01	Taste & Odors	1.3E+02	4.1E+01	Ontario MOEE	5.0E+04
ETHANOL	5.0E+04	Upper Limit	5.0E+08	7.6E+05	Amoore & Hautala	5.0E+04
ETHYLBENZENE	3.0E+01	Taste & Odors	8.5E+04	3.0E+01	USEPA 2nd MCL	5.0E+04
FLUORANTHENE	1.3E+02	Solubility	1.3E+02	-	-	5.0E+04
FLUORENE	8.5E+02	Solubility	8.5E+02	-	-	5.0E+04
GLYPHOSATE	5.0E+04	Upper Limit	5.3E+06	-	-	5.0E+04
HEPTACHLOR	2.0E+01	Taste & Odors	9.0E+01	2.0E+01	Ontario MOEE	5.0E+04
HEPTACHLOR EPOXIDE	1.0E+02	Solubility	1.0E+02	-	-	5.0E+04
HEXACHLOROBENZENE	3.1E+00	Solubility	3.1E+00	3.0E+03	Ontario MOEE	5.0E+04
HEXACHLOROBUTADIENE	6.0E+00	Taste & Odors	1.6E+03	6.0E+00	Ontario MOEE	5.0E+04

TABLE I-1. GROUNDWATER GROSS CONTAMINATION SCREENING LEVELS
(groundwater IS a current or potential source of drinking water)
(ug/L)

CHEMICAL PARAMETER	Final Screening Level	Basis	Solubility (1/2)	Taste And Odor Threshold	Basis	Upper Limit
HEXACHLOROCYCLOHEXANE (gamma) LINDANE	3.7E+03	Solubility	3.7E+03	1.2E+04	Ontario MOEE	5.0E+04
HEXACHLOROETHANE	1.0E+01	Taste & Odors	2.5E+04	1.0E+01	Amoore & Hautala	5.0E+04
HEXAZINONE	5.0E+04	Upper Limit	1.7E+07	-	-	5.0E+04
INDENO(1,2,3-cd)PYRENE	9.5E-02	Solubility	9.5E-02	-	-	5.0E+04
ISOPHORONE	5.0E+04	Upper Limit	6.0E+06	-	-	5.0E+04
LEAD	5.0E+04	Upper Limit		-	-	5.0E+04
MERCURY	0.0E+00	Solubility	0.0E+00	-	-	5.0E+04
METHOXYCHLOR	5.0E+01	Solubility	5.0E+01	4.7E+03	Amoore & Hautala	5.0E+04
METHYL ETHYL KETONE	8.4E+03	Taste & Odors	1.1E+08	8.4E+03	Amoore & Hautala	5.0E+04
METHYL ISOBUTYL KETONE	1.3E+03	Taste & Odors	9.5E+06	1.3E+03	Amoore & Hautala	5.0E+04
METHYL MERCURY	5.0E+04	Upper Limit		-	-	5.0E+04
METHYL TERT BUTYL ETHER	5.0E+00	Taste & Odors	2.6E+07	5.0E+00	Cal DHS 2nd MCL	5.0E+04
METHYLENE CHLORIDE	9.1E+03	Taste & Odors	6.5E+06	9.1E+03	Ontario MOEE	5.0E+04
METHYLNAPHTHALENE, 1-	1.0E+01	Taste & Odors	1.3E+04	1.0E+01	Ontario MOEE	5.0E+04
METHYLNAPHTHALENE, 2-	1.0E+01	Taste & Odors	1.2E+04	1.0E+01	Ontario MOEE	5.0E+04
MOLYBDENUM	5.0E+04	Upper Limit		-	-	5.0E+04
NAPHTHALENE	2.1E+01	Taste & Odors	1.6E+04	2.1E+01	Amoore & Hautala	5.0E+04
NICKEL	5.0E+04	Upper Limit		-	-	5.0E+04
NITROBENZENE	5.0E+04	Upper Limit	1.0E+06	-	-	5.0E+04
NITROGLYCERIN	5.0E+04	Upper Limit	6.9E+05	-	-	5.0E+04
NITROTOLUENE, 2-	5.0E+04	Upper Limit	3.3E+05	-	-	5.0E+04
NITROTOLUENE, 3-	5.0E+04	Upper Limit	2.5E+05	-	-	5.0E+04
NITROTOLUENE, 4-	5.0E+04	Upper Limit	2.2E+05	-	-	5.0E+04
PENTACHLOROPHENOL	3.0E+01	Taste & Odors	7.0E+03	3.0E+01	Amoore & Hautala	5.0E+04
PENTAERYTHRITOLTETRANITRATE (PETN)	2.2E+04	Solubility	2.2E+04	-	-	5.0E+04
PERCHLORATE	5.0E+04	Upper Limit	1.2E+08	-	-	5.0E+04
PHENANTHRENE	4.1E+02	Solubility	4.1E+02	1.0E+03	Ontario MOEE	5.0E+04
PHENOL	5.0E+00	Taste & Odors	4.1E+07	5.0E+00	Cal DHS AL	5.0E+04
POLYCHLORINATED BIPHENYLS (PCBs)	2.2E+01	Solubility	2.2E+01	-	-	5.0E+04
PROPICONAZOLE	5.0E+04	Upper Limit	5.5E+04	-	-	5.0E+04
PYRENE	6.8E+01	Solubility	6.8E+01	-	-	5.0E+04
SELENIUM	5.0E+04	Upper Limit		-	-	5.0E+04
SILVER	1.0E+02	Taste & Odors		1.0E+02	Cal DHS 2nd MCL	5.0E+04
SIMAZINE	3.1E+03	Solubility	3.1E+03	-	-	5.0E+04
STYRENE	1.0E+01	Taste & Odors	1.6E+05	1.0E+01	USEPA 2nd MCL	5.0E+04
TERBACIL	5.0E+04	Upper Limit	3.6E+05	-	-	5.0E+04
tert-BUTYL ALCOHOL	5.0E+04	Upper Limit	5.0E+08	-	-	5.0E+04
TETRACHLOROETHANE, 1,1,1,2-	5.0E+04	Upper Limit	5.4E+05	-	-	5.0E+04
TETRACHLOROETHANE, 1,1,2,2-	5.0E+02	Taste & Odors	1.4E+06	5.0E+02	Amoore & Hautala	5.0E+04
TETRACHLOROETHYLENE	1.7E+02	Taste & Odors	1.0E+05	1.7E+02	Amoore & Hautala	5.0E+04
TETRACHLOROPHENOL, 2,3,4,6-	1.2E+04	Solubility	1.2E+04	-	-	5.0E+04
TETRANITRO-1,3,5,7-TETRAAZOCYCLOOCTANE (HMX)	2.5E+03	Solubility	2.5E+03	-	-	5.0E+04
THALLIUM	5.0E+04	Upper Limit		-	-	5.0E+04
TOLUENE	4.0E+01	Taste & Odors	2.6E+05	4.0E+01	USEPA 2nd MCL	5.0E+04

TABLE I-1. GROUNDWATER GROSS CONTAMINATION SCREENING LEVELS
(groundwater IS a current or potential source of drinking water)
(ug/L)

CHEMICAL PARAMETER	Final Screening Level	Basis	Solubility (1/2)	Taste And Odor Threshold	Basis	Upper Limit
TOXAPHENE	1.4E+02	Taste & Odors	2.8E+02	1.4E+02	USEPA 2nd MCL	5.0E+04
TPH (gasolines)	1.0E+02	Taste & Odors	7.5E+04	1.0E+02	USEPA SNARL	5.0E+04
TPH (middle distillates)	1.0E+02	Taste & Odors	2.5E+03	1.0E+02	USEPA SNARL	5.0E+04
TPH (residual fuels)	1.0E+02	Taste & Odors	2.5E+03	1.0E+02	USEPA SNARL	5.0E+04
TRICHLOROBENZENE, 1,2,4-	3.0E+03	Taste & Odors	2.5E+04	3.0E+03	USEPA (1995)	5.0E+04
TRICHLOROETHANE, 1,1,1-	9.7E+02	Taste & Odors	6.5E+05	9.7E+02	Amoore & Hautala	5.0E+04
TRICHLOROETHANE, 1,1,2-	5.0E+04	Upper Limit	2.3E+06	-	-	5.0E+04
TRICHLOROETHYLENE	3.1E+02	Taste & Odors	6.4E+05	3.1E+02	Amoore & Hautala	5.0E+04
TRICHLOROPHENOL, 2,4,5-	2.0E+02	Taste & Odors	6.0E+05	2.0E+02	Ontario MOEE	5.0E+04
TRICHLOROPHENOL, 2,4,6-	1.0E+02	Taste & Odors	4.0E+05	1.0E+02	Ontario MOEE	5.0E+04
TRICHLOROPHENOXYACETIC ACID, 2,4,5- (2,4,5-T)	5.0E+04	Upper Limit	1.4E+05	-	-	5.0E+04
TRICHLOROPHENOXYPROPIONIC ACID, 2,4,5- (2,4,5-TP)	3.6E+04	Solubility	3.6E+04	-	-	5.0E+04
TRICHLOROPROPANE, 1,2,3-	5.0E+04	Upper Limit	8.8E+05	-	-	5.0E+04
TRICHLOROPROPENE, 1,2,3-	5.0E+04	Upper Limit	1.7E+05	-	-	5.0E+04
TRIFLURALIN	9.0E+01	Solubility	9.0E+01	-	-	5.0E+04
TRINITROBENZENE, 1,3,5-	5.0E+04	Upper Limit	1.4E+05	-	-	5.0E+04
TRINITROPHENYLMETHYLNITRAMINE, 2,4,6- (TETRYL)	3.7E+04	Solubility	3.7E+04	-	-	5.0E+04
TRINITROTOLUENE, 2,4,6- (TNT)	5.0E+04	Upper Limit	5.8E+04	-	-	5.0E+04
VANADIUM	5.0E+04	Upper Limit		-	-	5.0E+04
VINYL CHLORIDE	3.4E+03	Taste & Odors	4.4E+06	3.4E+03	Amoore & Hautala	5.0E+04
XYLENES	2.0E+01	Taste & Odors	5.3E+04	2.0E+01	USEPA 2nd MCL	5.0E+04
ZINC	5.0E+03	Taste & Odors		5.0E+03	Cal DHS 2nd MCL	5.0E+04

References:
Unless otherwise noted, criteria for drinking water taste and odor threshhold from summary in *A Compilation of Water Quality Goals* (RWQCBCV 2007) or Ontario MOEE if not available (MOEE 1996).
Upper limit of 50000 ug/L intended to limit general groundwater resource degradation (MOEE 1996).
1/2 solubility based on solubility constants in USEPA RSL guidance (USEPA 2008a) or Ontario MOEE (MOEE 1996) if not available.
Notes:
Ceiling Level: lowest of 1/2 solubility, taste and odor threshhold and 50000 ug/L maximum level
TPH -Total Petroleum Hydrocarbons. See text for discussion of different TPH categories.
TPH ceiling levels after Massachusetts DEP (MADEP 1997a).
TPH Taste and Odor Thresholds based on USEPA Suggested-No-Adverse-reaction (SNARL) level for TPH diesel.

TABLE I-2. GROUNDWATER GROSS CONTAMINATION SCREENING LEVELS
(groundwater IS NOT a current or potential source of drinking water)
(ug/L)

CHEMICAL PARAMETER	Final Screening Level	Basis	Solubility (1/2)	Nuisance Odor Threshold	Basis	Upper Limit
ACENAPHTHENE	2.0E+02	Nuisance Odors	2.0E+03	2.0E+02	Ontario MOEE	5.0E+04
ACENAPHTHYLENE	2.0E+03	Solubility	2.0E+03	-	-	5.0E+04
ACETONE	5.0E+04	Upper Limit	5.0E+08	2.0E+05	Ontario MOEE	5.0E+04
ALDRIN	8.5E+00	Solubility	8.5E+00	1.7E+02	Ontario MOEE	5.0E+04
AMETRYN	5.0E+04	Upper Limit	1.0E+05	-	-	5.0E+04
AMINO,2- DINITROTOLUENE,4,6-	5.0E+04	Upper Limit	6.1E+05	-	-	5.0E+04
AMINO,4- DINITROTOLUENE,2,6-	5.0E+04	Upper Limit	6.1E+05	-	-	5.0E+04
ANTHRACENE	2.2E+01	Solubility	2.2E+01	-	-	5.0E+04
ANTIMONY	5.0E+04	Upper Limit			-	5.0E+04
ARSENIC	5.0E+04	Upper Limit		-	-	5.0E+04
ATRAZINE	1.8E+04	Solubility	1.8E+04	-	-	5.0E+04
BARIUM	5.0E+04	Upper Limit		-	-	5.0E+04
BENOMYL	1.9E+03	Solubility	1.9E+03	-	-	5.0E+04
BENZENE	2.0E+04	Nuisance Odors	9.0E+05	2.0E+04	Ontario MOEE	5.0E+04
BENZO(a)ANTHRACENE	4.7E+00	Solubility	4.7E+00	-	-	5.0E+04
BENZO(a)PYRENE	8.0E-01	Solubility	8.0E-01	-	-	5.0E+04
BENZO(b)FLUORANTHENE	7.5E-01	Solubility	7.5E-01	-	-	5.0E+04
BENZO(g,h,i)PERYLENE	1.3E-01	Solubility	1.3E-01	-	-	5.0E+04
BENZO(k)FLUORANTHENE	4.0E-01	Solubility	4.0E-01	-	-	5.0E+04
BERYLLIUM	5.0E+04	Upper Limit		-	-	5.0E+04
BIPHENYL, 1,1-	5.0E+00	Nuisance Odors	3.7E+03	5.0E+00	Amoore & Hautala	5.0E+04
BIS(2-CHLOROETHYL)ETHER	3.6E+03	Nuisance Odors	8.6E+06	3.6E+03	Amoore & Hautala	5.0E+04
BIS(2-CHLORO-1-METHYLETHYL)ETHER	3.2E+03	Nuisance Odors	8.5E+05	3.2E+03	Ontario MOEE	5.0E+04
BIS(2-ETHYLHEXYL)PHTHALATE	1.4E+02	Solubility	1.4E+02	-	-	5.0E+04
BORON	5.0E+04	Upper Limit		-	-	5.0E+04
BROMODICHLOROMETHANE	5.0E+04	Upper Limit	1.5E+06	-	-	5.0E+04
BROMOFORM	5.1E+03	Nuisance Odors	1.6E+06	5.1E+03	Ontario MOEE	5.0E+04
BROMOMETHANE	5.0E+04	Upper Limit	7.6E+06	-	-	5.0E+04
CADMIUM	5.0E+04	Upper Limit		-	-	5.0E+04
CARBON TETRACHLORIDE	5.2E+03	Nuisance Odors	4.0E+05	5.2E+03	Ontario MOEE	5.0E+04
CHLORDANE (TECHNICAL)	2.5E+01	Nuisance Odors	2.8E+01	2.5E+01	Ontario MOEE	5.0E+04
CHLOROANILINE, p-	5.0E+04	Upper Limit	2.0E+06	-	-	5.0E+04
CHLOROBENZENE	5.0E+02	Nuisance Odors	2.5E+05	5.0E+02	Ontario MOEE	5.0E+04
CHLOROETHANE	1.6E+02	Nuisance Odors	3.4E+06	1.6E+02	Amoore & Hautala	5.0E+04
CHLOROFORM	2.4E+04	Nuisance Odors	4.0E+06	2.4E+04	Ontario MOEE	5.0E+04
CHLOROMETHANE	5.0E+04	Upper Limit	2.7E+06	-	-	5.0E+04
CHLOROPHENOL, 2-	1.8E+00	Nuisance Odors	5.7E+06	1.8E+00	Ontario MOEE	5.0E+04
CHROMIUM (Total)	5.0E+04	Upper Limit		-	-	5.0E+04
CHROMIUM III	5.0E+04	Upper Limit		-	-	5.0E+04
CHROMIUM VI	5.0E+04	Upper Limit	8.5E+08	-	-	5.0E+04
CHRYSENE	1.0E+00	Solubility	1.0E+00	-	-	5.0E+04
COBALT	5.0E+04	Upper Limit		-	-	5.0E+04
COPPER	5.0E+04	Upper Limit		-	-	5.0E+04
CYANIDE (Free)	1.7E+03	Nuisance Odors	4.8E+07	1.7E+03	Ontario MOEE	5.0E+04

TABLE I-2. GROUNDWATER GROSS CONTAMINATION SCREENING LEVELS
(groundwater IS NOT a current or potential source of drinking water)
(ug/L)

CHEMICAL PARAMETER	Final Screening Level	Basis	Solubility (1/2)	Nuisance Odor Threshold	Basis	Upper Limit
CYCLO-1,3,5-TRIMETHYLENE-2,4,6-TRINITRAMINE (RDX)	3.0E+04	Solubility	3.0E+04	-	-	5.0E+04
DALAPON	5.0E+04	Upper Limit	2.5E+08	-	-	5.0E+04
DIBENZO(a,h)ANTHTRACENE	1.3E+00	Solubility	1.3E+00	-	-	5.0E+04
DIBROMO,1,2- CHLOROPROPANE,3-	1.0E+02	Nuisance Odors	6.2E+05	1.0E+02	Amoore & Hautala	5.0E+04
DIBROMOCHLOROMETHANE	5.0E+04	Upper Limit	1.4E+06	-	-	5.0E+04
DIBROMOETHANE, 1,2-	5.0E+04	Upper Limit	2.0E+06	-	-	5.0E+04
DICHLOROBENZENE, 1,2-	1.0E+02	Nuisance Odors	7.8E+04	1.0E+02	Ontario MOEE	5.0E+04
DICHLOROBENZENE, 1,3-	5.0E+04	Upper Limit	7.8E+04	-	-	5.0E+04
DICHLOROBENZENE, 1,4-	1.1E+02	Nuisance Odors	4.1E+04	1.1E+02	Ontario MOEE	5.0E+04
DICHLOROBENZIDINE, 3,3-	1.6E+03	Solubility	1.6E+03	-	-	5.0E+04
DICHLORODIPHENYLDICHLOROETHANE (DDD)	4.5E+01	Solubility	4.5E+01	-	-	5.0E+04
DICHLORODIPHENYLDICHLOROETHYLENE (DDE)	2.0E+01	Solubility	2.0E+01	-	-	5.0E+04
DICHLORODIPHENYLTRICHLOROETHANE (DDT)	2.8E+00	Solubility	2.8E+00	3.5E+03	Ontario MOEE	5.0E+04
DICHLOROETHANE, 1,1-	5.0E+04	Upper Limit	2.5E+06	-	-	5.0E+04
DICHLOROETHANE, 1,2-	5.0E+04	Upper Limit	4.3E+06	2.0E+05	Ontario MOEE	5.0E+04
DICHLOROETHYLENE, 1,1-	1.5E+04	Nuisance Odors	1.2E+06	1.5E+04	Amoore & Hautala	5.0E+04
DICHLOROETHYLENE, Cis 1,2-	5.0E+04	Upper Limit	3.2E+06	-	-	5.0E+04
DICHLOROETHYLENE, Trans 1,2-	2.6E+03	Nuisance Odors	2.3E+06	2.6E+03	Ontario MOEE	5.0E+04
DICHLOROPHENOL, 2,4-	3.0E+00	Nuisance Odors	2.8E+06	3.0E+00	Ontario MOEE	5.0E+04
DICHLOROPHENOXYACETIC ACID (2,4-D)	5.0E+04	Upper Limit	3.4E+05	-	-	5.0E+04
DICHLOROPROPANE, 1,2-	1.0E+02	Nuisance Odors	1.4E+06	1.0E+02	Ontario MOEE	5.0E+04
DICHLOROPROPENE, 1,3-	5.0E+04	Upper Limit	1.4E+06	-	-	5.0E+04
DIELDRIN	9.8E+01	Solubility	9.8E+01	4.1E+02	Ontario MOEE	5.0E+04
DIETHYLPHTHALATE	5.0E+04	Upper Limit	5.4E+05	-	-	5.0E+04
DIMETHYLPHENOL, 2,4-	4.0E+03	Nuisance Odors	3.9E+06	4.0E+03	Ontario MOEE	5.0E+04
DIMETHYLPHTHALATE	5.0E+04	Upper Limit	2.5E+06	-	-	5.0E+04
DINITROBENZENE, 1,3-	5.0E+04	Upper Limit	2.7E+05	-	-	5.0E+04
DINITROPHENOL, 2,4-	5.0E+04	Upper Limit	1.4E+06	-	-	5.0E+04
DINITROTOLUENE, 2,4- (2,4-DNT)	5.0E+04	Upper Limit	1.0E+05	-	-	5.0E+04
DINITROTOLUENE, 2,6- (2,6-DNT)	5.0E+04	Upper Limit	9.1E+04	-	-	5.0E+04
DIOXANE, 1,4-	5.0E+04	Upper Limit	5.0E+08	-	-	5.0E+04
DIOXINS (TEQ)	1.0E-01	Solubility	1.0E-01	-	-	5.0E+04
DIURON	2.1E+04	Solubility	2.1E+04	-	-	5.0E+04
ENDOSULFAN	1.6E+02	Solubility	1.6E+02	-	-	5.0E+04
ENDRIN	1.3E+02	Solubility	1.3E+02	4.1E+02	Ontario MOEE	5.0E+04
ETHANOL	5.0E+04	Upper Limit	5.0E+08	7.6E+05	Amoore & Hautala	5.0E+04
ETHYLBENZENE	3.0E+02	Nuisance Odors	8.5E+04	3.0E+02	USEPA 2nd MCL	5.0E+04
FLUORANTHENE	1.3E+02	Solubility	1.3E+02	-	-	5.0E+04
FLUORENE	8.5E+02	Solubility	8.5E+02	-	-	5.0E+04
GLYPHOSATE	5.0E+04	Upper Limit	5.3E+06	-	-	5.0E+04
HEPTACHLOR	9.0E+01	Solubility	9.0E+01	2.0E+02	Ontario MOEE	5.0E+04
HEPTACHLOR EPOXIDE	1.0E+02	Solubility	1.0E+02	-	-	5.0E+04
HEXACHLOROBENZENE	3.1E+00	Solubility	3.1E+00	3.0E+04	Ontario MOEE	5.0E+04
HEXACHLOROBUTADIENE	6.0E+01	Nuisance Odors	1.6E+03	6.0E+01	Ontario MOEE	5.0E+04

TABLE I-2. GROUNDWATER GROSS CONTAMINATION SCREENING LEVELS
(groundwater IS NOT a current or potential source of drinking water)
(ug/L)

CHEMICAL PARAMETER	Final Screening Level	Basis	Solubility (1/2)	Nuisance Odor Threshold	Basis	Upper Limit
HEXACHLOROCYCLOHEXANE (gamma) LINDANE	3.7E+03	Solubility	3.7E+03	1.2E+05	Ontario MOEE	5.0E+04
HEXACHLOROETHANE	1.0E+02	Nuisance Odors	2.5E+04	1.0E+02	Ontario MOEE	5.0E+04
HEXAZINONE	5.0E+04	Upper Limit	1.7E+07	-	-	5.0E+04
INDENO(1,2,3-cd)PYRENE	9.5E-02	Solubility	9.5E-02	-	-	5.0E+04
ISOPHORONE	5.0E+04	Upper Limit	6.0E+06	-	-	5.0E+04
LEAD	5.0E+04	Upper Limit		-	-	5.0E+04
MERCURY	0.0E+00	Solubility	0.0E+00	-	-	5.0E+04
METHOXYCHLOR	5.0E+01	Solubility	5.0E+01	4.7E+04	Ontario MOEE	5.0E+04
METHYL ETHYL KETONE	5.0E+04	Upper Limit	1.1E+08	8.4E+04	Amoore & Hautala	5.0E+04
METHYL ISOBUTYL KETONE	1.3E+04	Nuisance Odors	9.5E+06	1.3E+04	Amoore & Hautala	5.0E+04
METHYL MERCURY	5.0E+04	Upper Limit		-	-	5.0E+04
METHYL TERT BUTYL ETHER	1.8E+03	Nuisance Odors	2.6E+07	1.8E+03	CalDHS	5.0E+04
METHYLENE CHLORIDE	5.0E+04	Upper Limit	6.5E+06	9.1E+04	Ontario MOEE	5.0E+04
METHYLNAPHTHALENE, 1-	1.0E+02	Nuisance Odors	1.3E+04	1.0E+02	Ontario MOEE	5.0E+04
METHYLNAPHTHALENE, 2-	1.0E+02	Nuisance Odors	1.2E+04	1.0E+02	Ontario MOEE	5.0E+04
MOLYBDENUM	5.0E+04	Upper Limit		-	-	5.0E+04
NAPHTHALENE	2.1E+02	Nuisance Odors	1.6E+04	2.1E+02	Ontario MOEE	5.0E+04
NICKEL	5.0E+04	Upper Limit		-	-	5.0E+04
NITROBENZENE	5.0E+04	Upper Limit	1.0E+06	-	-	5.0E+04
NITROGLYCERIN	5.0E+04	Upper Limit	6.9E+05	-	-	5.0E+04
NITROTOLUENE, 2-	5.0E+04	Upper Limit	3.3E+05	-	-	5.0E+04
NITROTOLUENE, 3-	5.0E+04	Upper Limit	2.5E+05	-	-	5.0E+04
NITROTOLUENE, 4-	5.0E+04	Upper Limit	2.2E+05	-	-	5.0E+04
PENTACHLOROPHENOL	5.9E+03	Nuisance Odors	7.0E+03	5.9E+03	Ontario MOEE	5.0E+04
PENTAERYTHRITOLTETRANITRATE (PETN)	2.2E+04	Solubility	2.2E+04	-	-	5.0E+04
PERCHLORATE	5.0E+04	Upper Limit	1.2E+08	-	-	5.0E+04
PHENANTHRENE	4.1E+02	Solubility	4.1E+02	1.0E+04	Ontario MOEE	5.0E+04
PHENOL	5.0E+04	Upper Limit	4.1E+07	7.9E+04	Ontario MOEE	5.0E+04
POLYCHLORINATED BIPHENYLS (PCBs)	2.2E+01	Solubility	2.2E+01	-	-	5.0E+04
PROPICONAZOLE	5.0E+04	Upper Limit	5.5E+04	-	-	5.0E+04
PYRENE	6.8E+01	Solubility	6.8E+01	-	-	5.0E+04
SELENIUM	5.0E+04	Upper Limit		-	-	5.0E+04
SILVER	5.0E+04	Upper Limit		-	-	5.0E+04
SIMAZINE	3.1E+03	Solubility	3.1E+03	-	-	5.0E+04
STYRENE	1.1E+02	Nuisance Odors	1.6E+05	1.1E+02	Ontario MOEE	5.0E+04
TERBACIL	5.0E+04	Upper Limit	3.6E+05	-	-	5.0E+04
tert-BUTYL ALCOHOL	5.0E+04	Upper Limit	5.0E+08	-	-	5.0E+04
TETRACHLOROETHANE, 1,1,1,2-	5.0E+04	Upper Limit	5.4E+05	-	-	5.0E+04
TETRACHLOROETHANE, 1,1,2,2-	5.0E+03	Nuisance Odors	1.4E+06	5.0E+03	Ontario MOEE	5.0E+04
TETRACHLOROETHYLENE	3.0E+03	Nuisance Odors	1.0E+05	3.0E+03	Ontario MOEE	5.0E+04
TETRACHLOROPHENOL, 2,3,4,6-	1.2E+04	Solubility	1.2E+04	-	-	5.0E+04
TETRANITRO-1,3,5,7-TETRAAZOCYCLOOCTANE (HMX)	2.5E+03	Solubility	2.5E+03	-	-	5.0E+04
THALLIUM	5.0E+04	Upper Limit		-	-	5.0E+04
TOLUENE	4.0E+02	Nuisance Odors	2.6E+05	4.0E+02	Ontario MOEE	5.0E+04

TABLE I-2. GROUNDWATER GROSS CONTAMINATION SCREENING LEVELS
(groundwater IS NOT a current or potential source of drinking water)
(ug/L)

CHEMICAL PARAMETER	Final Screening Level	Basis	Solubility (1/2)	Nuisance Odor Threshold	Basis	Upper Limit
TOXAPHENE	1.4E+02	Nuisance Odors	2.8E+02	1.4E+02	USEPA 2nd MCL	5.0E+04
TPH (gasolines)	5.0E+03	Nuisance Odors	7.5E+04	5.0E+03	MADEP	5.0E+04
TPH (middle distillates)	2.5E+03	Solubility	2.5E+03	5.0E+03	MADEP	5.0E+04
TPH (residual fuels)	2.5E+03	Solubility	2.5E+03	5.0E+03	MADEP	5.0E+04
TRICHLOROBENZENE, 1,2,4-	2.5E+04	Solubility	2.5E+04	3.0E+04	USEPA (1995)	5.0E+04
TRICHLOROETHANE, 1,1,1-	5.0E+04	Upper Limit	6.5E+05	5.0E+05	Ontario MOEE	5.0E+04
TRICHLOROETHANE, 1,1,2-	5.0E+04	Upper Limit	2.3E+06	-	-	5.0E+04
TRICHLOROETHYLENE	5.0E+04	Upper Limit	6.4E+05	1.0E+05	Ontario MOEE	5.0E+04
TRICHLOROPHENOL, 2,4,5-	2.0E+03	Nuisance Odors	6.0E+05	2.0E+03	Ontario MOEE	5.0E+04
TRICHLOROPHENOL, 2,4,6-	1.0E+03	Nuisance Odors	4.0E+05	1.0E+03	Ontario MOEE	5.0E+04
TRICHLOROPHENOXYACETIC ACID, 2,4,5- (2,4,5-T)	5.0E+04	Upper Limit	1.4E+05	-	-	5.0E+04
TRICHLOROPHENOXYPROPIONIC ACID, 2,4,5- (2,4,5-TP)	3.6E+04	Solubility	3.6E+04	-	-	5.0E+04
TRICHLOROPROPANE, 1,2,3-	5.0E+04	Upper Limit	8.8E+05	-	-	5.0E+04
TRICHLOROPROPENE, 1,2,3-	5.0E+04	Upper Limit	1.7E+05	-	-	5.0E+04
TRIFLURALIN	9.0E+01	Solubility	9.0E+01	-	-	5.0E+04
TRINITROBENZENE, 1,3,5-	5.0E+04	Upper Limit	1.4E+05	-	-	5.0E+04
TRINITROPHENYLMETHYLNITRAMINE, 2,4,6- (TETRYL)	3.7E+04	Solubility	3.7E+04	-	-	5.0E+04
TRINITROTOLUENE, 2,4,6- (TNT)	5.0E+04	Upper Limit	5.8E+04	-	-	5.0E+04
VANADIUM	5.0E+04	Upper Limit		-	-	5.0E+04
VINYL CHLORIDE	3.4E+04	Nuisance Odors	4.4E+06	3.4E+04	Ontario MOEE	5.0E+04
XYLENES	5.3E+03	Nuisance Odors	5.3E+04	5.3E+03	Ontario MOEE	5.0E+04
ZINC	5.0E+04	Upper Limit		-	-	5.0E+04

References:
Unless otherwise noted, criteria for nuisance odor threshhold from Ontario MOEE (MOEE 1996) OR data from Amoore and Hautala (1983) as presented in *A Compilation of Water Quality Goals* if not available *(RWQCBCV 2007).*
Upper limit of 50000 ug/L intended to limit general groundwater resource degradation (MOEE 1996).
1/2 solubility based on solubility constants in USEPA RSL guidance (USEPA 2008a) or Ontario MOEE (MOEE 1996) if not available.
Odor threshold for MTBE based on average, upper range at which most subjects could smell MTBE in water (CalEPA 1999).
Vapor Pressure for ethanol from *Fate and Transport of Ethanol-Blended Gasoline in the Environment* (Ulrich 1999). Odor threshold from

Notes:
Nuisance Odor Thresholds assume ten-fold attenuation/dilution of chemical in groundwater upon discharge to surface water.
Ceiling Level: lowest of 1/2 solubility, odor/taste threshhold and 50000 ug/L maximum level (intended to limit general groundwater resource degradation).
TPH -Total Petroleum Hydrocarbons. See text for discussion of different TPH categories.
TPH ceiling level after Massachusetts DEP (MADEP 1997a).

TABLE I-3. SURFACE WATER GROSS CONTAMINATION SCREENING LEVELS
(surface water IS a current or potential source of drinking water)
(ug/L)

CHEMICAL PARAMETER	Final Screening Level	Basis	Solubility (1/2)	Taste And Odor Threshold	Basis	Upper Limit
ACENAPHTHENE	2.0E+01	Taste & Odors	2.0E+03	2.0E+01	Ontario MOEE	5.0E+04
ACENAPHTHYLENE	2.0E+03	Solubility	2.0E+03	-	-	5.0E+04
ACETONE	2.0E+04	Taste & Odors	5.0E+08	2.0E+04	Amoore & Hautala	5.0E+04
ALDRIN	8.5E+00	Solubility	8.5E+00	1.7E+01	Ontario MOEE	5.0E+04
AMETRYN	5.0E+04	Upper Limit	1.0E+05	-	-	5.0E+04
AMINO,2- DINITROTOLUENE,4,6-	5.0E+04	Upper Limit	6.1E+05	-	-	5.0E+04
AMINO,4- DINITROTOLUENE,2,6-	5.0E+04	Upper Limit	6.1E+05	-	-	5.0E+04
ANTHRACENE	2.2E+01	Solubility	2.2E+01	-	-	5.0E+04
ANTIMONY	5.0E+04	Upper Limit		-	-	5.0E+04
ARSENIC	5.0E+04	Upper Limit		-	-	5.0E+04
ATRAZINE	1.8E+04	Solubility	1.8E+04	-	-	5.0E+04
BARIUM	5.0E+04	Upper Limit		-	-	5.0E+04
BENOMYL	1.9E+03	Solubility	1.9E+03	-	-	5.0E+04
BENZENE	1.7E+02	Taste & Odors	9.0E+05	1.7E+02	Amoore & Hautala	5.0E+04
BENZO(a)ANTHRACENE	4.7E+00	Solubility	4.7E+00	-	-	5.0E+04
BENZO(a)PYRENE	8.0E-01	Solubility	8.0E-01	-	-	5.0E+04
BENZO(b)FLUORANTHENE	7.5E-01	Solubility	7.5E-01	-	-	5.0E+04
BENZO(g,h,i)PERYLENE	1.3E-01	Solubility	1.3E-01	-	-	5.0E+04
BENZO(k)FLUORANTHENE	4.0E-01	Solubility	4.0E-01	-	-	5.0E+04
BERYLLIUM	5.0E+04	Upper Limit		-	-	5.0E+04
BIPHENYL, 1,1-	5.0E-01	Taste & Odors	3.7E+03	5.0E-01	Amoore & Hautala	5.0E+04
BIS(2-CHLOROETHYL)ETHER	3.6E+02	Taste & Odors	8.6E+06	3.6E+02	Amoore & Hautala	5.0E+04
BIS(2-CHLORO-1-METHYLETHYL)ETHER	3.2E+02	Taste & Odors	8.5E+05	3.2E+02	Ontario MOEE	5.0E+04
BIS(2-ETHYLHEXYL)PHTHALATE	1.4E+02	Solubility	1.4E+02	-	-	5.0E+04
BORON	5.0E+04	Upper Limit		-	-	5.0E+04
BROMODICHLOROMETHANE	5.0E+04	Upper Limit	1.5E+06	-	-	5.0E+04
BROMOFORM	5.1E+02	Taste & Odors	1.6E+06	5.1E+02	Amoore & Hautala	5.0E+04
BROMOMETHANE	5.0E+04	Upper Limit	7.6E+06	-	-	5.0E+04
CADMIUM	5.0E+04	Upper Limit		-	-	5.0E+04
CARBON TETRACHLORIDE	5.2E+02	Taste & Odors	4.0E+05	5.2E+02	Amoore & Hautala	5.0E+04
CHLORDANE (TECHNICAL)	2.5E+00	Taste & Odors	2.8E+01	2.5E+00	Ontario MOEE	5.0E+04
CHLOROANILINE, p-	5.0E+04	Upper Limit	2.0E+06	-	-	5.0E+04
CHLOROBENZENE	5.0E+01	Taste & Odors	2.5E+05	5.0E+01	Amoore & Hautala	5.0E+04
CHLOROETHANE	1.6E+01	Taste & Odors	3.4E+06	1.6E+01	Amoore & Hautala	5.0E+04
CHLOROFORM	2.4E+03	Taste & Odors	4.0E+06	2.4E+03	Amoore & Hautala	5.0E+04
CHLOROMETHANE	5.0E+04	Upper Limit	2.7E+06		-	5.0E+04
CHLOROPHENOL, 2-	1.8E-01	Taste & Odors	5.7E+06	1.8E-01	Ontario MOEE	5.0E+04
CHROMIUM (Total)	5.0E+04	Upper Limit		-	-	5.0E+04
CHROMIUM III	5.0E+04	Upper Limit		-	-	5.0E+04
CHROMIUM VI	5.0E+04	Upper Limit	8.5E+08	-	-	5.0E+04
CHRYSENE	1.0E+00	Solubility	1.0E+00	-	-	5.0E+04
COBALT	5.0E+04	Upper Limit		-	-	5.0E+04
COPPER	1.0E+03	Taste & Odors		1.0E+03	CalDHS 2nd MCL	5.0E+04
CYANIDE (Free)	1.7E+02	Taste & Odors	4.8E+07	1.7E+02	Amoore & Hautala	5.0E+04

TABLE I-3. SURFACE WATER GROSS CONTAMINATION SCREENING LEVELS
(surface water IS a current or potential source of drinking water)
(ug/L)

CHEMICAL PARAMETER	Final Screening Level	Basis	Solubility (1/2)	Taste And Odor Threshold	Basis	Upper Limit
CYCLO-1,3,5-TRIMETHYLENE-2,4,6-TRINITRAMINE (RDX)	3.0E+04	Solubility	3.0E+04	-	-	5.0E+04
DALAPON	5.0E+04	Upper Limit	2.5E+08	-	-	5.0E+04
DIBENZO(a,h)ANTHTRACENE	1.3E+00	Solubility	1.3E+00	-	-	5.0E+04
DIBROMO,1,2- CHLOROPROPANE,3-	1.0E+01	Taste & Odors	6.2E+05	1.0E+01	Amoore & Hautala	5.0E+04
DIBROMOCHLOROMETHANE	5.0E+04	Upper Limit	1.4E+06	-	-	5.0E+04
DIBROMOETHANE, 1,2-	5.0E+04	Upper Limit	2.0E+06	-	-	5.0E+04
DICHLOROBENZENE, 1,2-	1.0E+01	Taste & Odors	7.8E+04	1.0E+01	USEPA 2nd MCL	5.0E+04
DICHLOROBENZENE, 1,3-	5.0E+04	Upper Limit	7.8E+04	-	-	5.0E+04
DICHLOROBENZENE, 1,4-	5.0E+00	Taste & Odors	4.1E+04	5.0E+00	USEPA 2nd MCL	5.0E+04
DICHLOROBENZIDINE, 3,3-	1.6E+03	Solubility	1.6E+03	-	-	5.0E+04
DICHLORODIPHENYLDICHLOROETHANE (DDD)	4.5E+01	Solubility	4.5E+01	-	-	5.0E+04
DICHLORODIPHENYLDICHLOROETHYLENE (DDE)	2.0E+01	Solubility	2.0E+01	-	-	5.0E+04
DICHLORODIPHENYLTRICHLOROETHANE (DDT)	2.8E+00	Solubility	2.8E+00	3.5E+02	Ontario MOEE	5.0E+04
DICHLOROETHANE, 1,1-	5.0E+04	Upper Limit	2.5E+06	-	-	5.0E+04
DICHLOROETHANE, 1,2-	7.0E+03	Taste & Odors	4.3E+06	7.0E+03	Amoore & Hautala	5.0E+04
DICHLOROETHYLENE, 1,1-	1.5E+03	Taste & Odors	1.2E+06	1.5E+03	Amoore & Hautala	5.0E+04
DICHLOROETHYLENE, Cis 1,2-	5.0E+04	Upper Limit	3.2E+06	-	-	5.0E+04
DICHLOROETHYLENE, Trans 1,2-	2.6E+02	Taste & Odors	2.3E+06	2.6E+02	Amoore & Hautala	5.0E+04
DICHLOROPHENOL, 2,4-	3.0E-01	Taste & Odors	2.8E+06	3.0E-01	Ontario MOEE	5.0E+04
DICHLOROPHENOXYACETIC ACID (2,4-D)	5.0E+04	Upper Limit	3.4E+05	-	-	5.0E+04
DICHLOROPROPANE, 1,2-	1.0E+01	Taste & Odors	1.4E+06	1.0E+01	Ontario MOEE	5.0E+04
DICHLOROPROPENE, 1,3-	5.0E+04	Upper Limit	1.4E+06	-	-	5.0E+04
DIELDRIN	4.1E+01	Taste & Odors	9.8E+01	4.1E+01	Ontario MOEE	5.0E+04
DIETHYLPHTHALATE	5.0E+04	Upper Limit	5.4E+05	-	-	5.0E+04
DIMETHYLPHENOL, 2,4-	4.0E+02	Taste & Odors	3.9E+06	4.0E+02	Cal DHS AL	5.0E+04
DIMETHYLPHTHALATE	5.0E+04	Upper Limit	2.5E+06	-	-	5.0E+04
DINITROBENZENE, 1,3-	5.0E+04	Upper Limit	2.7E+05	-	-	5.0E+04
DINITROPHENOL, 2,4-	5.0E+04	Upper Limit	1.4E+06	-	-	5.0E+04
DINITROTOLUENE, 2,4- (2,4-DNT)	5.0E+04	Upper Limit	1.0E+05	-	-	5.0E+04
DINITROTOLUENE, 2,6- (2,6-DNT)	5.0E+04	Upper Limit	9.1E+04	-	-	5.0E+04
DIOXANE, 1,4-	5.0E+04	Upper Limit	5.0E+08	2.3E+05	Amoore & Hautala	5.0E+04
DIOXINS (TEQ)	1.0E-01	Solubility	1.0E-01	-	-	5.0E+04
DIURON	2.1E+04	Solubility	2.1E+04	-	-	5.0E+04
ENDOSULFAN	1.6E+02	Solubility	1.6E+02	-	-	5.0E+04
ENDRIN	4.1E+01	Taste & Odors	1.3E+02	4.1E+01	Ontario MOEE	5.0E+04
ETHANOL	5.0E+04	Upper Limit	5.0E+08	7.6E+05	Amoore & Hautala	5.0E+04
ETHYLBENZENE	3.0E+01	Taste & Odors	8.5E+04	3.0E+01	USEPA 2nd MCL	5.0E+04
FLUORANTHENE	1.3E+02	Solubility	1.3E+02	-	-	5.0E+04
FLUORENE	8.5E+02	Solubility	8.5E+02	-	-	5.0E+04
GLYPHOSATE	5.0E+04	Upper Limit	5.3E+06	-	-	5.0E+04
HEPTACHLOR	2.0E+01	Taste & Odors	9.0E+01	2.0E+01	Ontario MOEE	5.0E+04
HEPTACHLOR EPOXIDE	1.0E+02	Solubility	1.0E+02	-	-	5.0E+04
HEXACHLOROBENZENE	3.1E+00	Solubility	3.1E+00	3.0E+03	Ontario MOEE	5.0E+04
HEXACHLOROBUTADIENE	6.0E+00	Taste & Odors	1.6E+03	6.0E+00	Ontario MOEE	5.0E+04

TABLE I-3. SURFACE WATER GROSS CONTAMINATION SCREENING LEVELS
(surface water IS a current or potential source of drinking water)
(ug/L)

CHEMICAL PARAMETER	Final Screening Level	Basis	Solubility (1/2)	Taste And Odor Threshold	Basis	Upper Limit
HEXACHLOROCYCLOHEXANE (gamma) LINDANE	3.7E+03	Solubility	3.7E+03	1.2E+04	Ontario MOEE	5.0E+04
HEXACHLOROETHANE	1.0E+01	Taste & Odors	2.5E+04	1.0E+01	Amoore & Hautala	5.0E+04
HEXAZINONE	5.0E+04	Upper Limit	1.7E+07	-	-	5.0E+04
INDENO(1,2,3-cd)PYRENE	9.5E-02	Solubility	9.5E-02	-	-	5.0E+04
ISOPHORONE	5.0E+04	Upper Limit	6.0E+06	-	-	5.0E+04
LEAD	5.0E+04	Upper Limit		-	-	5.0E+04
MERCURY	0.0E+00	Solubility	0.0E+00	-	-	5.0E+04
METHOXYCHLOR	5.0E+01	Solubility	5.0E+01	4.7E+03	Amoore & Hautala	5.0E+04
METHYL ETHYL KETONE	8.4E+03	Taste & Odors	1.1E+08	8.4E+03	Amoore & Hautala	5.0E+04
METHYL ISOBUTYL KETONE	1.3E+03	Taste & Odors	9.5E+06	1.3E+03	Amoore & Hautala	5.0E+04
METHYL MERCURY	5.0E+04	Upper Limit		-	-	5.0E+04
METHYL TERT BUTYL ETHER	5.0E+00	Taste & Odors	2.6E+07	5.0E+00	Cal DHS 2nd MCL	5.0E+04
METHYLENE CHLORIDE	9.1E+03	Taste & Odors	6.5E+06	9.1E+03	Ontario MOEE	5.0E+04
METHYLNAPHTHALENE, 1-	1.0E+01	Taste & Odors	1.3E+04	1.0E+01	Ontario MOEE	5.0E+04
METHYLNAPHTHALENE, 2-	1.0E+01	Taste & Odors	1.2E+04	1.0E+01	Ontario MOEE	5.0E+04
MOLYBDENUM	5.0E+04	Upper Limit		-	-	5.0E+04
NAPHTHALENE	2.1E+01	Taste & Odors	1.6E+04	2.1E+01	Amoore & Hautala	5.0E+04
NICKEL	5.0E+04	Upper Limit		-	-	5.0E+04
NITROBENZENE	5.0E+04	Upper Limit	1.0E+06	-	-	5.0E+04
NITROGLYCERIN	5.0E+04	Upper Limit	6.9E+05	-	-	5.0E+04
NITROTOLUENE, 2-	5.0E+04	Upper Limit	3.3E+05	-	-	5.0E+04
NITROTOLUENE, 3-	5.0E+04	Upper Limit	2.5E+05	-	-	5.0E+04
NITROTOLUENE, 4-	5.0E+04	Upper Limit	2.2E+05	-	-	5.0E+04
PENTACHLOROPHENOL	3.0E+01	Taste & Odors	7.0E+03	3.0E+01	Amoore & Hautala	5.0E+04
PENTAERYTHRITOLTETRANITRATE (PETN)	2.2E+04	Solubility	2.2E+04	-	-	5.0E+04
PERCHLORATE	5.0E+04	Upper Limit	1.2E+08	-	-	5.0E+04
PHENANTHRENE	4.1E+02	Solubility	4.1E+02	1.0E+03	Ontario MOEE	5.0E+04
PHENOL	5.0E+00	Taste & Odors	4.1E+07	5.0E+00	Cal DHS AL	5.0E+04
POLYCHLORINATED BIPHENYLS (PCBs)	2.2E+01	Solubility	2.2E+01	-	-	5.0E+04
PROPICONAZOLE	5.0E+04	Upper Limit	5.5E+04	-	-	5.0E+04
PYRENE	6.8E+01	Solubility	6.8E+01	-	-	5.0E+04
SELENIUM	5.0E+04	Upper Limit		-	-	5.0E+04
SILVER	1.0E+02	Taste & Odors		1.0E+02	Cal DHS 2nd MCL	5.0E+04
SIMAZINE	3.1E+03	Solubility	3.1E+03	-	-	5.0E+04
STYRENE	1.0E+01	Taste & Odors	1.6E+05	1.0E+01	USEPA 2nd MCL	5.0E+04
TERBACIL	5.0E+04	Upper Limit	3.6E+05	-	-	5.0E+04
tert-BUTYL ALCOHOL	5.0E+04	Upper Limit	5.0E+08	-	-	5.0E+04
TETRACHLOROETHANE, 1,1,1,2-	5.0E+04	Upper Limit	5.4E+05	-	-	5.0E+04
TETRACHLOROETHANE, 1,1,2,2-	5.0E+02	Taste & Odors	1.4E+06	5.0E+02	Amoore & Hautala	5.0E+04
TETRACHLOROETHYLENE	1.7E+02	Taste & Odors	1.0E+05	1.7E+02	Amoore & Hautala	5.0E+04
TETRACHLOROPHENOL, 2,3,4,6-	1.2E+04	Solubility	1.2E+04	-	-	5.0E+04
TETRANITRO-1,3,5,7-TETRAAZOCYCLOOCTANE (HMX)	2.5E+03	Solubility	2.5E+03	-	-	5.0E+04
THALLIUM	5.0E+04	Upper Limit		-	-	5.0E+04
TOLUENE	4.0E+01	Taste & Odors	2.6E+05	4.0E+01	USEPA 2nd MCL	5.0E+04

TABLE I-3. SURFACE WATER GROSS CONTAMINATION SCREENING LEVELS
(surface water IS a current or potential source of drinking water)
(ug/L)

CHEMICAL PARAMETER	Final Screening Level	Basis	Solubility (1/2)	Taste And Odor Threshold	Basis	Upper Limit
TOXAPHENE	1.4E+02	Taste & Odors	2.8E+02	1.4E+02	USEPA 2nd MCL	5.0E+04
TPH (gasolines)	1.0E+02	Taste & Odors	7.5E+04	1.0E+02	USEPA SNARL	5.0E+04
TPH (middle distillates)	1.0E+02	Taste & Odors	2.5E+03	1.0E+02	USEPA SNARL	5.0E+04
TPH (residual fuels)	1.0E+02	Taste & Odors	2.5E+03	1.0E+02	USEPA SNARL	5.0E+04
TRICHLOROBENZENE, 1,2,4-	3.0E+03	Taste & Odors	2.5E+04	3.0E+03	USEPA (1995)	5.0E+04
TRICHLOROETHANE, 1,1,1-	9.7E+02	Taste & Odors	6.5E+05	9.7E+02	Amoore & Hautala	5.0E+04
TRICHLOROETHANE, 1,1,2-	5.0E+04	Upper Limit	2.3E+06	-	-	5.0E+04
TRICHLOROETHYLENE	3.1E+02	Taste & Odors	6.4E+05	3.1E+02	Amoore & Hautala	5.0E+04
TRICHLOROPHENOL, 2,4,5-	2.0E+02	Taste & Odors	6.0E+05	2.0E+02	Ontario MOEE	5.0E+04
TRICHLOROPHENOL, 2,4,6-	1.0E+02	Taste & Odors	4.0E+05	1.0E+02	Ontario MOEE	5.0E+04
TRICHLOROPHENOXYACETIC ACID, 2,4,5- (2,4,5-T)	5.0E+04	Upper Limit	1.4E+05	-	-	5.0E+04
TRICHLOROPHENOXYPROPIONIC ACID, 2,4,5- (2,4,5-TP)	3.6E+04	Solubility	3.6E+04	-	-	5.0E+04
TRICHLOROPROPANE, 1,2,3-	5.0E+04	Upper Limit	8.8E+05	-	-	5.0E+04
TRICHLOROPROPENE, 1,2,3-	5.0E+04	Upper Limit	1.7E+05	-	-	5.0E+04
TRIFLURALIN	9.0E+01	Solubility	9.0E+01	-	-	5.0E+04
TRINITROBENZENE, 1,3,5-	5.0E+04	Upper Limit	1.4E+05	-	-	5.0E+04
TRINITROPHENYLMETHYLNITRAMINE, 2,4,6- (TETRYL)	3.7E+04	Solubility	3.7E+04	-	-	5.0E+04
TRINITROTOLUENE, 2,4,6- (TNT)	5.0E+04	Upper Limit	5.8E+04	-	-	5.0E+04
VANADIUM	5.0E+04	Upper Limit		-	-	5.0E+04
VINYL CHLORIDE	3.4E+03	Taste & Odors	4.4E+06	3.4E+03	Amoore & Hautala	5.0E+04
XYLENES	2.0E+01	Taste & Odors	5.3E+04	2.0E+01	USEPA 2nd MCL	5.0E+04
ZINC	5.0E+03	Taste & Odors		5.0E+03	Cal DHS 2nd MCL	5.0E+04

References:
Unless otherwise noted, criteria for drinking water taste and odor threshhold from summary in *A Compilation of Water Quality Goals* (RWQCBCV 2007) or Ontario MOEE if not available (MOEE 1996).
Upper limit of 50000 ug/L intended to limit general groundwater resource degradation (MOEE 1996).
1/2 solubility based on solubility constants in USEPA RSL guidance (USEPA 2008a) or Ontario MOEE (MOEE 1996) if not available.
Notes:
Ceiling Level: lowest of 1/2 solubility, taste and odor threshhold and 50000 ug/L maximum level
TPH -Total Petroleum Hydrocarbons. See text for discussion of different TPH categories.
TPH ceiling levels after Massachusetts DEP (MADEP 1997a).
TPH Taste and Odor Thresholds based on USEPA Suggested-No-Adverse-reaction (SNARL) level for TPH diesel.

TABLE I-4. SURFACE WATER GROSS CONTAMINATION SCREENING LEVELS
(surface water IS NOT a current or potential source of drinking water)
(ug/L)

CHEMICAL PARAMETER	Final Screening Level	Basis	Solubility (1/2)	Nuisance Odor Threshold	Basis	Upper Limit
ACENAPHTHENE	2.0E+01	Nuisance Odors	2.0E+03	2.0E+01	Ontario MOEE	5.0E+04
ACENAPHTHYLENE	2.0E+03	Solubility	2.0E+03	-	-	5.0E+04
ACETONE	2.0E+04	Nuisance Odors	5.0E+08	2.0E+04	Ontario MOEE	5.0E+04
ALDRIN	8.5E+00	Solubility	8.5E+00	1.7E+01	Ontario MOEE	5.0E+04
AMETRYN	5.0E+04	Upper Limit	1.0E+05	-	-	5.0E+04
AMINO,2- DINITROTOLUENE,4,6-	5.0E+04	Upper Limit	6.1E+05	-	-	5.0E+04
AMINO,4- DINITROTOLUENE,2,6-	5.0E+04	Upper Limit	6.1E+05	-	-	5.0E+04
ANTHRACENE	2.2E+01	Solubility	2.2E+01	-	-	5.0E+04
ANTIMONY	5.0E+04	Upper Limit		-	-	5.0E+04
ARSENIC	5.0E+04	Upper Limit		-	-	5.0E+04
ATRAZINE	1.8E+04	Solubility	1.8E+04	-	-	5.0E+04
BARIUM	5.0E+04	Upper Limit		-	-	5.0E+04
BENOMYL	1.9E+03	Solubility	1.9E+03	-	-	5.0E+04
BENZENE	2.0E+03	Nuisance Odors	9.0E+05	2.0E+03	Ontario MOEE	5.0E+04
BENZO(a)ANTHRACENE	4.7E+00	Solubility	4.7E+00	-	-	5.0E+04
BENZO(a)PYRENE	8.0E-01	Solubility	8.0E-01	-	-	5.0E+04
BENZO(b)FLUORANTHENE	7.5E-01	Solubility	7.5E-01	-	-	5.0E+04
BENZO(g,h,i)PERYLENE	1.3E-01	Solubility	1.3E-01	-	-	5.0E+04
BENZO(k)FLUORANTHENE	4.0E-01	Solubility	4.0E-01	-	-	5.0E+04
BERYLLIUM	5.0E+04	Upper Limit		-	-	5.0E+04
BIPHENYL, 1,1-	5.0E-01	Nuisance Odors	3.7E+03	5.0E-01	Amoore & Hautala	5.0E+04
BIS(2-CHLOROETHYL)ETHER	3.6E+02	Nuisance Odors	8.6E+06	3.6E+02	Amoore & Hautala	5.0E+04
BIS(2-CHLORO-1-METHYLETHYL)ETHER	3.2E+02	Nuisance Odors	8.5E+05	3.2E+02	Ontario MOEE	5.0E+04
BIS(2-ETHYLHEXYL)PHTHALATE	1.4E+02	Solubility	1.4E+02	-	-	5.0E+04
BORON	5.0E+04	Upper Limit		-	-	5.0E+04
BROMODICHLOROMETHANE	5.0E+04	Upper Limit	1.5E+06	-	-	5.0E+04
BROMOFORM	5.1E+02	Nuisance Odors	1.6E+06	5.1E+02	Ontario MOEE	5.0E+04
BROMOMETHANE	5.0E+04	Upper Limit	7.6E+06	-	-	5.0E+04
CADMIUM	5.0E+04	Upper Limit		-	-	5.0E+04
CARBON TETRACHLORIDE	5.2E+02	Nuisance Odors	4.0E+05	5.2E+02	Ontario MOEE	5.0E+04
CHLORDANE (TECHNICAL)	2.5E+00	Nuisance Odors	2.8E+01	2.5E+00	Ontario MOEE	5.0E+04
CHLOROANILINE, p-	5.0E+04	Upper Limit	2.0E+06	-	-	5.0E+04
CHLOROBENZENE	5.0E+01	Nuisance Odors	2.5E+05	5.0E+01	Ontario MOEE	5.0E+04
CHLOROETHANE	1.6E+01	Nuisance Odors	3.4E+06	1.6E+01	Amoore & Hautala	5.0E+04
CHLOROFORM	2.4E+03	Nuisance Odors	4.0E+06	2.4E+03	Ontario MOEE	5.0E+04
CHLOROMETHANE	5.0E+04	Upper Limit	2.7E+06	-	-	5.0E+04
CHLOROPHENOL, 2-	1.8E-01	Nuisance Odors	5.7E+06	1.8E-01	Ontario MOEE	5.0E+04
CHROMIUM (Total)	5.0E+04	Upper Limit		-	-	5.0E+04
CHROMIUM III	5.0E+04	Upper Limit		-	-	5.0E+04
CHROMIUM VI	5.0E+04	Upper Limit	8.5E+08	-	-	5.0E+04
CHRYSENE	1.0E+00	Solubility	1.0E+00	-	-	5.0E+04
COBALT	5.0E+04	Upper Limit		-	-	5.0E+04
COPPER	5.0E+04	Upper Limit		-	-	5.0E+04
CYANIDE (Free)	1.7E+02	Nuisance Odors	4.8E+07	1.7E+02	Ontario MOEE	5.0E+04

TABLE I-4. SURFACE WATER GROSS CONTAMINATION SCREENING LEVELS
(surface water IS NOT a current or potential source of drinking water)
(ug/L)

CHEMICAL PARAMETER	Final Screening Level	Basis	Solubility (1/2)	Nuisance Odor Threshold	Basis	Upper Limit
CYCLO-1,3,5-TRIMETHYLENE-2,4,6-TRINITRAMINE (RDX)	3.0E+04	Solubility	3.0E+04	-	-	5.0E+04
DALAPON	5.0E+04	Upper Limit	2.5E+08	-	-	5.0E+04
DIBENZO(a,h)ANTHTRACENE	1.3E+00	Solubility	1.3E+00	-	-	5.0E+04
DIBROMO,1,2- CHLOROPROPANE,3-	1.0E+01	Nuisance Odors	6.2E+05	1.0E+01	Amoore & Hautala	5.0E+04
DIBROMOCHLOROMETHANE	5.0E+04	Upper Limit	1.4E+06	-	-	5.0E+04
DIBROMOETHANE, 1,2-	5.0E+04	Upper Limit	2.0E+06	-	-	5.0E+04
DICHLOROBENZENE, 1,2-	1.0E+01	Nuisance Odors	7.8E+04	1.0E+01	Ontario MOEE	5.0E+04
DICHLOROBENZENE, 1,3-	5.0E+04	Upper Limit	7.8E+04	-	-	5.0E+04
DICHLOROBENZENE, 1,4-	1.1E+01	Nuisance Odors	4.1E+04	1.1E+01	Ontario MOEE	5.0E+04
DICHLOROBENZIDINE, 3,3-	1.6E+03	Solubility	1.6E+03	-	-	5.0E+04
DICHLORODIPHENYLDICHLOROETHANE (DDD)	4.5E+01	Solubility	4.5E+01	-	-	5.0E+04
DICHLORODIPHENYLDICHLOROETHYLENE (DDE)	2.0E+01	Solubility	2.0E+01	-	-	5.0E+04
DICHLORODIPHENYLTRICHLOROETHANE (DDT)	2.8E+00	Solubility	2.8E+00	3.5E+02	Ontario MOEE	5.0E+04
DICHLOROETHANE, 1,1-	5.0E+04	Upper Limit	2.5E+06	-	-	5.0E+04
DICHLOROETHANE, 1,2-	2.0E+04	Nuisance Odors	4.3E+06	2.0E+04	Ontario MOEE	5.0E+04
DICHLOROETHYLENE, 1,1-	1.5E+03	Nuisance Odors	1.2E+06	1.5E+03	Amoore & Hautala	5.0E+04
DICHLOROETHYLENE, Cis 1,2-	5.0E+04	Upper Limit	3.2E+06	-	-	5.0E+04
DICHLOROETHYLENE, Trans 1,2-	2.6E+02	Nuisance Odors	2.3E+06	2.6E+02	Ontario MOEE	5.0E+04
DICHLOROPHENOL, 2,4-	3.0E-01	Nuisance Odors	2.8E+06	3.0E-01	Ontario MOEE	5.0E+04
DICHLOROPHENOXYACETIC ACID (2,4-D)	5.0E+04	Upper Limit	3.4E+05	-	-	5.0E+04
DICHLOROPROPANE, 1,2-	1.0E+01	Nuisance Odors	1.4E+06	1.0E+01	Ontario MOEE	5.0E+04
DICHLOROPROPENE, 1,3-	5.0E+04	Upper Limit	1.4E+06	-	-	5.0E+04
DIELDRIN	4.1E+01	Nuisance Odors	9.8E+01	4.1E+01	Ontario MOEE	5.0E+04
DIETHYLPHTHALATE	5.0E+04	Upper Limit	5.4E+05	-	-	5.0E+04
DIMETHYLPHENOL, 2,4-	4.0E+02	Nuisance Odors	3.9E+06	4.0E+02	Ontario MOEE	5.0E+04
DIMETHYLPHTHALATE	5.0E+04	Upper Limit	2.5E+06	-	-	5.0E+04
DINITROBENZENE, 1,3-	5.0E+04	Upper Limit	2.7E+05	-	-	5.0E+04
DINITROPHENOL, 2,4-	5.0E+04	Upper Limit	1.4E+06	-	-	5.0E+04
DINITROTOLUENE, 2,4- (2,4-DNT)	5.0E+04	Upper Limit	1.0E+05	-	-	5.0E+04
DINITROTOLUENE, 2,6- (2,6-DNT)	5.0E+04	Upper Limit	9.1E+04	-	-	5.0E+04
DIOXANE, 1,4-	5.0E+04	Upper Limit	5.0E+08	-	-	5.0E+04
DIOXINS (TEQ)	1.0E-01	Solubility	1.0E-01	-	-	5.0E+04
DIURON	2.1E+04	Solubility	2.1E+04	-	-	5.0E+04
ENDOSULFAN	1.6E+02	Solubility	1.6E+02	-	-	5.0E+04
ENDRIN	4.1E+01	Nuisance Odors	1.3E+02	4.1E+01	Ontario MOEE	5.0E+04
ETHANOL	5.0E+04	Upper Limit	5.0E+08	7.6E+05	Amoore & Hautala	5.0E+04
ETHYLBENZENE	3.0E+01	Nuisance Odors	8.5E+04	3.0E+01	USEPA 2nd MCL	5.0E+04
FLUORANTHENE	1.3E+02	Solubility	1.3E+02	-	-	5.0E+04
FLUORENE	8.5E+02	Solubility	8.5E+02	-	-	5.0E+04
GLYPHOSATE	5.0E+04	Upper Limit	5.3E+06	-	-	5.0E+04
HEPTACHLOR	2.0E+01	Nuisance Odors	9.0E+01	2.0E+01	Ontario MOEE	5.0E+04
HEPTACHLOR EPOXIDE	1.0E+02	Solubility	1.0E+02	-	-	5.0E+04
HEXACHLOROBENZENE	3.1E+00	Solubility	3.1E+00	3.0E+03	Ontario MOEE	5.0E+04
HEXACHLOROBUTADIENE	6.0E+00	Nuisance Odors	1.6E+03	6.0E+00	Ontario MOEE	5.0E+04

TABLE I-4. SURFACE WATER GROSS CONTAMINATION SCREENING LEVELS
(surface water IS NOT a current or potential source of drinking water)
(ug/L)

CHEMICAL PARAMETER	Final Screening Level	Basis	Solubility (1/2)	Nuisance Odor Threshold	Basis	Upper Limit
HEXACHLOROCYCLOHEXANE (gamma) LINDANE	3.7E+03	Solubility	3.7E+03	1.2E+04	Ontario MOEE	5.0E+04
HEXACHLOROETHANE	1.0E+01	Nuisance Odors	2.5E+04	1.0E+01	Ontario MOEE	5.0E+04
HEXAZINONE	5.0E+04	Upper Limit	1.7E+07	-	-	5.0E+04
INDENO(1,2,3-cd)PYRENE	9.5E-02	Solubility	9.5E-02	-	-	5.0E+04
ISOPHORONE	5.0E+04	Upper Limit	6.0E+06	-	-	5.0E+04
LEAD	5.0E+04	Upper Limit		-	-	5.0E+04
MERCURY	0.0E+00	Solubility	0.0E+00	-	-	5.0E+04
METHOXYCHLOR	5.0E+01	Solubility	5.0E+01	4.7E+03	Ontario MOEE	5.0E+04
METHYL ETHYL KETONE	8.4E+03	Nuisance Odors	1.1E+08	8.4E+03	Amoore & Hautala	5.0E+04
METHYL ISOBUTYL KETONE	1.3E+03	Nuisance Odors	9.5E+06	1.3E+03	Amoore & Hautala	5.0E+04
METHYL MERCURY	5.0E+04	Upper Limit		-	-	5.0E+04
METHYL TERT BUTYL ETHER	1.8E+02	Nuisance Odors	2.6E+07	1.8E+02	CalDHS	5.0E+04
METHYLENE CHLORIDE	9.1E+03	Nuisance Odors	6.5E+06	9.1E+03	Ontario MOEE	5.0E+04
METHYLNAPHTHALENE, 1-	1.0E+01	Nuisance Odors	1.3E+04	1.0E+01	Ontario MOEE	5.0E+04
METHYLNAPHTHALENE, 2-	1.0E+01	Nuisance Odors	1.2E+04	1.0E+01	Ontario MOEE	5.0E+04
MOLYBDENUM	5.0E+04	Upper Limit		-	-	5.0E+04
NAPHTHALENE	2.1E+01	Nuisance Odors	1.6E+04	2.1E+01	Ontario MOEE	5.0E+04
NICKEL	5.0E+04	Upper Limit		-	-	5.0E+04
NITROBENZENE	5.0E+04	Upper Limit	1.0E+06	-	-	5.0E+04
NITROGLYCERIN	5.0E+04	Upper Limit	6.9E+05	-	-	5.0E+04
NITROTOLUENE, 2-	5.0E+04	Upper Limit	3.3E+05	-	-	5.0E+04
NITROTOLUENE, 3-	5.0E+04	Upper Limit	2.5E+05	-	-	5.0E+04
NITROTOLUENE, 4-	5.0E+04	Upper Limit	2.2E+05	-	-	5.0E+04
PENTACHLOROPHENOL	5.9E+02	Nuisance Odors	7.0E+03	5.9E+02	Ontario MOEE	5.0E+04
PENTAERYTHRITOLTETRANITRATE (PETN)	2.2E+04	Solubility	2.2E+04	-	-	5.0E+04
PERCHLORATE	5.0E+04	Upper Limit	1.2E+08	-	-	5.0E+04
PHENANTHRENE	4.1E+02	Solubility	4.1E+02	1.0E+03	Ontario MOEE	5.0E+04
PHENOL	7.9E+03	Nuisance Odors	4.1E+07	7.9E+03	Ontario MOEE	5.0E+04
POLYCHLORINATED BIPHENYLS (PCBs)	2.2E+01	Solubility	2.2E+01	-	-	5.0E+04
PROPICONAZOLE	5.0E+04	Upper Limit	5.5E+04	-	-	5.0E+04
PYRENE	6.8E+01	Solubility	6.8E+01	-	-	5.0E+04
SELENIUM	5.0E+04	Upper Limit		-	-	5.0E+04
SILVER	5.0E+04	Upper Limit		-	-	5.0E+04
SIMAZINE	3.1E+03	Solubility	3.1E+03	-	-	5.0E+04
STYRENE	1.1E+01	Nuisance Odors	1.6E+05	1.1E+01	Ontario MOEE	5.0E+04
TERBACIL	5.0E+04	Upper Limit	3.6E+05	-	-	5.0E+04
tert-BUTYL ALCOHOL	5.0E+04	Upper Limit	5.0E+08	-	-	5.0E+04
TETRACHLOROETHANE, 1,1,1,2-	5.0E+04	Upper Limit	5.4E+05	-	-	5.0E+04
TETRACHLOROETHANE, 1,1,2,2-	5.0E+02	Nuisance Odors	1.4E+06	5.0E+02	Ontario MOEE	5.0E+04
TETRACHLOROETHYLENE	3.0E+02	Nuisance Odors	1.0E+05	3.0E+02	Ontario MOEE	5.0E+04
TETRACHLOROPHENOL, 2,3,4,6-	1.2E+04	Solubility	1.2E+04	-	-	5.0E+04
TETRANITRO-1,3,5,7-TETRAAZOCYCLOOCTANE (HMX)	2.5E+03	Solubility	2.5E+03	-	-	5.0E+04
THALLIUM	5.0E+04	Upper Limit		-	-	5.0E+04
TOLUENE	4.0E+01	Nuisance Odors	2.6E+05	4.0E+01	Ontario MOEE	5.0E+04

TABLE I-4. SURFACE WATER GROSS CONTAMINATION SCREENING LEVELS
(surface water IS NOT a current or potential source of drinking water)
(ug/L)

CHEMICAL PARAMETER	Final Screening Level	Basis	Solubility (1/2)	Nuisance Odor Threshold	Basis	Upper Limit
TOXAPHENE	1.4E+02	Nuisance Odors	2.8E+02	1.4E+02	USEPA 2nd MCL	5.0E+04
TPH (gasolines)	5.0E+03	Nuisance Odors	7.5E+04	5.0E+03	MADEP	5.0E+04
TPH (middle distillates)	2.5E+03	Solubility	2.5E+03	5.0E+03	MADEP	5.0E+04
TPH (residual fuels)	2.5E+03	Solubility	2.5E+03	5.0E+03	MADEP	5.0E+04
TRICHLOROBENZENE, 1,2,4-	3.0E+03	Nuisance Odors	2.5E+04	3.0E+03	USEPA (1995)	5.0E+04
TRICHLOROETHANE, 1,1,1-	5.0E+04	Nuisance Odors	6.5E+05	5.0E+04	Ontario MOEE	5.0E+04
TRICHLOROETHANE, 1,1,2-	5.0E+04	Upper Limit	2.3E+06	-	-	5.0E+04
TRICHLOROETHYLENE	1.0E+04	Nuisance Odors	6.4E+05	1.0E+04	Ontario MOEE	5.0E+04
TRICHLOROPHENOL, 2,4,5-	2.0E+02	Nuisance Odors	6.0E+05	2.0E+02	Ontario MOEE	5.0E+04
TRICHLOROPHENOL, 2,4,6-	1.0E+02	Nuisance Odors	4.0E+05	1.0E+02	Ontario MOEE	5.0E+04
TRICHLOROPHENOXYACETIC ACID, 2,4,5- (2,4,5-T)	5.0E+04	Upper Limit	1.4E+05	-	-	5.0E+04
TRICHLOROPHENOXYPROPIONIC ACID, 2,4,5- (2,4,5-TP)	3.6E+04	Solubility	3.6E+04	-	-	5.0E+04
TRICHLOROPROPANE, 1,2,3-	5.0E+04	Upper Limit	8.8E+05	-	-	5.0E+04
TRICHLOROPROPENE, 1,2,3-	5.0E+04	Upper Limit	1.7E+05	-	-	5.0E+04
TRIFLURALIN	9.0E+01	Solubility	9.0E+01	-	-	5.0E+04
TRINITROBENZENE, 1,3,5-	5.0E+04	Upper Limit	1.4E+05	-	-	5.0E+04
TRINITROPHENYLMETHYLNITRAMINE, 2,4,6- (TETRYL)	3.7E+04	Solubility	3.7E+04	-	-	5.0E+04
TRINITROTOLUENE, 2,4,6- (TNT)	2.0E+01	Nuisance Odors	5.8E+04	2.0E+01	Ontario MOEE	5.0E+04
VANADIUM	5.0E+04	Upper Limit		-	-	5.0E+04
VINYL CHLORIDE	3.4E+03	Nuisance Odors	4.4E+06	3.4E+03	Ontario MOEE	5.0E+04
XYLENES	5.3E+02	Nuisance Odors	5.3E+04	5.3E+02	Ontario MOEE	5.0E+04
ZINC	5.0E+04	Upper Limit		-	-	5.0E+04

References:
Unless otherwise noted, criteria for nuisance odor threshhold from Ontario MOEE (MOEE 1996, minus groundwater-to-surface water dilution factor) OR data from Amoore and Hautala (1983) as presented in *A Compilation of Water Quality Goals* if not available (RWQCBCV 2007).
Upper limit of 50000 ug/L intended to limit general groundwater resource degradation (MOEE 1996).
1/2 solubility based on solubility constants in USEPA RSL guidance (USEPA 2008a) or Ontario MOEE (MOEE 1996) if not available.
Odor threshold for MTBE based on average, upper range at which most subjects could smell MTBE in water (CalEPA 1999).
Notes:
Nuisance Odor Thresholds assume no attenuation/dilution of chemical in surface water.
Ceiling Level: lowest of 1/2 solubility, odor/taste threshhold and 50000 ug/L maximum level (intended to limit general groundwater resource degradation).
TPH -Total Petroleum Hydrocarbons. See text for discussion of different TPH categories.
TPH ceiling level after Massachusetts DEP (MADEP 1997a).

TABLE J. PHYSIO-CHEMICAL AND TOXICITY CONSTANTS USED IN MODELS.

CHEMICAL PARAMETER	Physical State		Molecular Weight	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Pure component water solubility, S (mg/L)	Vapor Pressure (mm Hg)	Henry's Law constant H (atm-m^3/mol)	Henry's Law constant H' (unitless)	GI Absorption Factor GIABS (unitless)	Skin Absorption Factor ABS (unitless)	Cancer Slope Factor Oral CSFo ($(mg/kg\text{-}d)^{-1}$)	Cancer Unit Risk Factor (Inhalation) IUR ($(ug/m^3)^{-1}$)	Reference Dose Oral RfDo (mg/kg-d)	Reference Concentration (Inhalation) RfC (mg/m^3)
ACENAPHTHENE	V	S	154	5.03E+03	5.10E-02	8.30E-06	3.90E+00	2.20E-03	1.80E-04	7.50E-03	1.0	0.13			6.0E-02	2.4E-01
ACENAPHTHYLENE	V	S	152	2.50E+03	6.08E-02	7.88E-06	3.93E+00	9.12E-04	1.45E-03	5.95E-02	1.0	0.13			4.0E-02	1.6E-01
ACETONE	V	L	58	2.40E+00	1.10E-01	1.20E-05	1.00E+06	2.32E+02	3.50E-05	1.40E-03	1.0				9.0E-01	3.1E+01
ALDRIN	SV	S	365	8.20E+04	2.30E-02	5.80E-06	1.70E-02	1.20E-04	4.40E-05	1.80E-03	1.0		3.4E+00	8.5E-04	1.0E-04	4.0E-04
AMETRYN	NV	S	227	4.28E+02	5.10E-02	6.00E-06	2.09E+02	2.70E-06	2.40E-09	9.90E-08	1.0	0.1			9.0E-03	
AMINO,2- DINITROTOLUENE,4,6-	NV	S	197	2.83E+02	5.60E-02	6.60E-06	1.22E+03	1.10E-05	3.30E-11	1.30E-09	1.0	0.006			2.0E-03	
AMINO,4- DINITROTOLUENE,2,6-	NV	S	197	2.83E+02	5.60E-02	6.60E-06	1.22E+03	1.10E-05	3.30E-11	1.30E-09	1.0	0.009			2.0E-03	
ANTHRACENE	V	S	178	1.64E+04	3.90E-02	7.90E-06	4.30E-02	6.50E-06	5.60E-05	2.30E-03	1.0	0.13			3.0E-01	1.2E+00
ANTIMONY	NV	S	122								0.15				4.0E-04	
ARSENIC	NV	S	75								1.0	0.03	1.5E+00	4.3E-03	3.0E-04	1.5E-05
ATRAZINE	NV	S	216	2.25E+02	2.60E-02	6.80E-06	3.50E+01	2.90E-07	2.40E-09	9.60E-08	1.0	0.1	2.3E-01		3.5E-02	
BARIUM	NV	S	137								0.07				2.0E-01	5.0E-04
BENOMYL	NV	S	230	3.36E+02	4.33E-02	5.06E-06	3.80E+00	3.70E-09	4.93E-12	2.16E-10	1	0.1			5.0E-02	
BENZENE	V	L	78	1.50E+02	9.00E-02	1.00E-05	1.79E+03	9.48E+01	5.60E-03	2.30E-01	1.0		5.5E-02	7.8E-06	4.0E-03	3.0E-02
BENZO(a)ANTHRACENE	SV	S	228	1.77E+05	2.60E-02	6.70E-06	9.40E-03	2.10E-07	1.20E-05	4.90E-04	1.0	0.13	7.3E-01	1.1E-04		
BENZO(a)PYRENE	NV	S	252	5.87E+05	4.80E-02	5.60E-06	1.60E-03	5.50E-09	4.60E-07	1.90E-05	1.0	0.13	7.3E+00	1.1E-03		
BENZO(b)FLUORANTHENE	NV	S	252	5.99E+05	4.80E-02	5.60E-06	1.50E-03	5.00E-07	6.60E-07	2.70E-05	1.0	0.13	7.3E-01	1.1E-04		
BENZO(g,h,i)PERYLENE	NV	S	276	1.60E+06	4.80E-02	5.60E-06	2.60E-04	1.00E-10	1.44E-07	5.90E-06	1.0	0.13			4.0E-02	
BENZO(k)FLUORANTHENE	NV	S	252	5.87E+05	4.80E-02	5.60E-06	8.00E-04	9.70E-10	5.80E-07	2.40E-05	1.0	0.13	7.3E-02	1.1E-04		
BERYLLIUM	NV	S	9								0.007			2.4E-03	2.0E-03	2.0E-05
BIPHENYL, 1,1-	V	S	154	5.13E+03	4.70E-02	7.60E-06	7.48E+00	8.90E-03	3.10E-04	1.30E-02	1.0		8.0E-03	2.0E-06	5.0E-01	4.0E-04
BIS(2-CHLOROETHYL)ETHER	V	L	143	3.22E+01	5.70E-02	8.70E-06	1.72E+04	1.55E+00	1.70E-05	7.00E-04	1.0		1.1E+00	3.3E-04		
BIS(2-CHLORO-1-METHYLETHYL)ETHER	V	L	171	6.10E+01	6.31E-02	6.40E-06	1.70E+03	5.30E-01	1.13E-04	4.63E-03	1.0		7.0E-02	1.0E-05	4.00E-02	1.40E-01
BIS(2-ETHYLHEXYL)PHTHALATE	NV	S	391	1.20E+05	1.70E-02	4.20E-06	2.70E-01	1.40E-07	2.70E-07	1.10E-05	1.0	0.1	1.4E-02	2.4E-06	2.0E-02	
BORON	NV	S	14								1.0				2.0E-01	2.0E-02
BROMODICHLOROMETHANE	V	L	164	3.18E+01	5.60E-02	1.10E-05	3.03E+03	5.00E+01	2.10E-03	8.70E-02	1.0		6.2E-02	3.7E-05	2.0E-02	8.0E-02
BROMOFORM	SV	S	253	3.18E+01	3.60E-02	1.00E-05	3.10E+03	5.40E+00	5.40E-04	2.20E-02	1.0		7.9E-03	1.1E-06	2.0E-02	
BROMOMETHANE	V	G	95	1.32E+01	1.00E-01	1.40E-05	1.52E+04	1.62E+03	7.30E-03	3.00E-01	1.0				1.4E-03	5.0E-03
CADMIUM	NV	S	112								0.05	0.001		1.8E-03	5.0E-04	1.0E-05
CARBON TETRACHLORIDE	V	L	154	4.39E+01	5.70E-02	9.80E-06	7.93E+02	1.15E+02	2.80E-02	1.10E+00	1.0		7.0E-02	6.0E-06	4.0E-03	1.0E-01
CHLORDANE (TECHNICAL)	SV	S	410	6.75E+04	2.10E-02	5.40E-06	5.60E-02	1.00E-05	4.90E-05	2.00E-03	1.0	0.04	3.5E-01	1.0E-04	3.0E-04	7.0E-04
CHLOROANILINE, p-	NV	S	128	1.13E+02	7.00E-02	1.00E-05	3.90E+03	2.70E-02	1.20E-06	4.70E-05	1.0	0.1	2.0E-01		4.0E-03	
CHLOROBENZENE	V	L	113	2.34E+02	7.20E-02	9.50E-06	4.98E+02	1.20E+01	3.10E-03	1.30E-01	1.0				2.0E-02	5.0E-02
CHLOROETHANE	V	G	65	2.17E+01	1.00E-01	1.20E-05	6.71E+03	1.01E+03	1.10E-02	4.50E-01	1.0					1.0E+01
CHLOROFORM	V	L	119	3.18E+01	7.70E-02	1.10E-05	7.95E+03	1.97E+02	3.70E-03	1.50E-01	1.0		3.1E-02	2.3E-05	1.0E-02	9.8E-02
CHLOROMETHANE	V	G	50	1.32E+01	1.20E-01	1.40E-05	5.32E+03	4.30E+03	8.80E-03	3.60E-01	1.0					9.0E-02
CHLOROPHENOL, 2-	V	L	129	3.88E+02	6.60E-02	9.50E-06	1.13E+04	2.50E+00	1.10E-05	4.60E-04	1.0				5.0E-03	2.0E-02
CHROMIUM (Total)	NV	S	52								0.0					
CHROMIUM III	NV	S	52								0.013				1.5E+00	
CHROMIUM VI	NV	S	52				1.69E+06				0.025		5.0E-01	8.4E-02	3.0E-03	1.0E-04
CHRYSENE	NV	S	228	1.81E+05	2.60E-02	6.70E-06	2.00E-03	6.20E-09	5.20E-06	2.10E-04	1.0	0.13	7.3E-03	1.1E-05		
COBALT	NV	S	59								1.0			9.0E-03	3.00E-04	6.00E-06
COPPER	NV	S	64								1.0				4.0E-02	
CYANIDE (Free)	V	S	27		2.11E-01	2.46E-05	9.54E+04	3.08E+02	1.01E-04	4.15E-03	1.0				6.0E-04	8.00E-04
CYCLO-1,3,5-TRIMETHYLENE-2,4,6-TRINITRAMINE (RDX)	NV	S	222	8.91E+01	3.10E-02	8.50E-06	5.97E+01	4.10E-09	2.00E-11	8.20E-10	1.0	0.015	1.1E-01		3.0E-03	
DALAPON	NV	L	143	3.20E+00	6.00E-02	9.40E-06	5.02E+05	1.50E-01	5.70E-08	2.30E-06	1.0	0.1			3.0E-02	
DIBENZO(a,h)ANTHTRACENE	NV	S	278	1.91E+06	4.50E-02	5.20E-06	2.50E-03	9.60E-10	1.40E-07	5.80E-06	1.0	0.13	7.3E+00	1.2E-03		
DIBROMO,1,2- CHLOROPROPANE,3-	V	L	236	1.16E+02	3.20E-02	8.90E-06	1.23E+03	5.80E-01	1.50E-04	6.00E-03	1.0		8.0E-01	6.0E-03	2.0E-04	2.0E-04
DIBROMOCHLOROMETHANE	V	S	208	3.18E+01	3.70E-02	1.10E-05	2.70E+03	5.54E+00	7.80E-04	3.20E-02	1.0		8.4E-02	2.1E-05	2.0E-02	8.0E-02
DIBROMOETHANE, 1,2-	V	S	188	3.96E+01	4.30E-02	1.00E-05	3.91E+03	1.12E+01	6.50E-04	2.70E-02	1.0		2.0E+00	6.0E-04	9.0E-03	9.0E-03
DICHLOROBENZENE, 1,2-	V	L	147	3.83E+02	5.60E-02	8.90E-06	1.56E+02	1.36E+00	1.90E-03	7.80E-02	1.0				9.0E-02	2.0E-01

TABLE J. PHYSIO-CHEMICAL AND TOXICITY CONSTANTS USED IN MODELS.

CHEMICAL PARAMETER	Physical State		Molecular Weight	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Pure component water solubility, S (mg/L)	Vapor Pressure (mm Hg)	Henry's Law constant H ($atm\text{-}m^3/mol$)	Henry's Law constant H' (unitless)	GI Absorption Factor GIABS (unitless)	Skin Absorption Factor ABS (unitless)	Cancer Slope Factor Oral CSFo $(mg/kg\text{-}d)^{-1}$	Cancer Unit Risk Factor (Inhalation) IUR $(ug/m^3)^{-1}$	Reference Dose Oral RfDo (mg/kg-d)	Reference Concentration (Inhalation) RfC (mg/m^3)
DICHLOROBENZENE, 1,3-	V	L	147	6.17E+02	6.90E-02	7.90E-06	1.56E+02	2.15E+00	1.90E-03	7.79E-02	1.0				3.00E-02	1.2E-01
DICHLOROBENZENE, 1,4-	V	S	147	3.75E+02	5.50E-02	8.70E-06	8.13E+01	1.74E+00	2.40E-03	9.90E-02	1.0		5.4E-03	1.1E-05	7.0E-02	8.0E-01
DICHLOROBENZIDINE, 3,3-	NV	S	253	3.19E+03	4.70E-02	5.50E-06	3.10E+00	2.60E-07	2.80E-11	1.20E-09	1.0	0.1	4.5E-01	3.4E-04		
DICHLORODIPHENYLDICHLOROETHANE (DDD)	NV	S	320	1.18E+05	4.10E-02	4.70E-06	9.00E-02	1.40E-06	6.60E-06	2.70E-04	1.0	0.1	2.4E-01	6.9E-05		
DICHLORODIPHENYLDICHLOROETHYLENE (DDE)	SV	S	318	1.18E+05	2.30E-02	5.90E-06	4.00E-02	6.00E-06	4.20E-05	1.70E-03	1.0		3.4E-01	9.7E-05		
DICHLORODIPHENYLTRICHLOROETHANE (DDT)	NV	S	354	1.69E+05	3.80E-02	4.40E-06	5.50E-03	1.60E-07	8.30E-06	3.40E-04	1.0	0.03	3.4E-01	9.7E-05	5.0E-04	
DICHLOROETHANE, 1,1-	V	L	99	3.18E+01	8.40E-02	1.10E-05	5.04E+03	2.27E+02	5.60E-03	2.30E-01	1.0		5.7E-03	1.6E-06	2.0E-01	8.0E-01
DICHLOROETHANE, 1,2-	V	L	99	3.96E+01	8.60E-02	1.10E-05	8.60E+03	7.90E+01	1.20E-03	4.80E-02	1.0		9.1E-02	2.6E-05	6.0E-03	7.0E-03
DICHLOROETHYLENE, 1,1-	V	L	97	3.18E+01	8.60E-02	1.10E-05	2.42E+03	6.00E+02	2.60E-02	1.10E+00	1.0				5.0E-02	2.0E-01
DICHLOROETHYLENE, Cis 1,2-	V	L	97	3.96E+01	8.80E-02	1.10E-05	6.41E+03	2.00E+02	4.10E-03	1.70E-01	1.0				2.0E-03	8.0E-03
DICHLOROETHYLENE, Trans 1,2-	V	L	97	3.96E+01	8.80E-02	1.10E-05	4.52E+03	3.31E+02	9.40E-03	3.80E-01	1.0				2.0E-02	8.0E-02
DICHLOROPHENOL, 2,4-	NV	S	163	1.47E+02	4.90E-02	8.70E-06	5.55E+03	9.00E-02	4.30E-06	1.80E-04	1.0	0.1			3.0E-03	
DICHLOROPHENOXYACETIC ACID (2,4-D)	NV	S	221	2.96E+01	2.80E-02	7.30E-06	6.77E+02	8.30E-05	3.50E-08	1.40E-06	1.0	0.05			1.0E-02	
DICHLOROPROPANE, 1,2-	V	L	113	6.07E+01	7.30E-02	9.70E-06	2.80E+03	5.33E+01	2.80E-03	1.20E-01	1.0		3.6E-02	1.0E-05	9.0E-02	4.0E-03
DICHLOROPROPENE, 1,3-	V	L	111	7.22E+01	7.60E-02	1.00E-05	2.80E+03	3.40E+01	3.60E-03	1.50E-01	1.0		1.0E-01	4.0E-06	3.0E-02	2.0E-02
DIELDRIN	NV	S	381	2.01E+04	2.30E-02	6.00E-06	1.95E-01	5.90E-06	1.00E-05	4.10E-04	1.0	0.1	7.0E+00	1.8E-03	8.0E-05	3.2E-04
DIETHYLPHTHALATE	NV	S	222	1.05E+02	2.60E-02	6.70E-06	1.08E+03	2.10E-03	6.10E-07	2.50E-05	1.0	0.1			8.0E-01	
DIMETHYLPHENOL, 2,4-	NV	S	122	4.92E+02	6.20E-02	8.30E-06	7.87E+03	1.00E-01	9.50E-07	3.90E-05	1.0	0.1			2.0E-02	8.0E-02
DIMETHYLPHTHALATE	NV	S	194	1.40E+02			5.00E+03	3.08E-01	1.05E-07	4.31E-06	1.0	0.10			1.00E+01	
DINITROBENZENE, 1,3-	NV	S	168	3.52E+02	4.80E-02	9.20E-06	5.33E+02	9.00E-04	4.90E-08	2.00E-06	1.0	0.1			1.0E-04	
DINITROPHENOL, 2,4-	NV	S	184	4.61E+02	4.10E-02	9.10E-06	2.79E+03	3.90E-04	8.60E-08	3.50E-06	1.0	0.1			2.0E-03	
DINITROTOLUENE, 2,4- (2,4-DNT)	NV	S	182	5.76E+02	3.80E-02	7.90E-06	2.00E+02	1.50E-04	5.40E-08	2.20E-06	1.0	0.102	3.1E-01	8.9E-05	2.0E-03	
DINITROTOLUENE, 2,6- (2,6-DNT)	NV	S	182	5.87E+02	3.70E-02	7.80E-06	1.82E+02	5.70E-04	7.50E-07	3.10E-05	1.0	0.099	1.5E+00		3.0E-04	
DIOXANE, 1,4-	V	L	88	2.60E+00	8.70E-02	1.10E-05	1.00E+06	3.80E+01	4.80E-06	2.00E-04	1.0		1.0E-01	5.0E-06	3.0E-02	3.0E-02
DIOXINS (TEQ)	SV	S	356	2.49E+05	4.70E-02	6.80E-06	2.00E-04	1.50E-09	5.00E-05	2.00E-03	1.0	0.03	1.3E+05	3.8E+01	7.0E-10	4.0E-08
DIURON	NV	S	233	1.09E+02	5.00E-02	5.90E-06	4.20E+01	6.90E-08	5.00E-10	2.10E-08	1.0	0.1			2.0E-03	
ENDOSULFAN	SV	S	407	6.76E+03	2.20E-02	5.80E-06	3.25E-01	1.70E-07	6.50E-05	2.70E-03	1.0				6.0E-03	
ENDRIN	NV	S	381	2.01E+04	3.60E-02	4.20E-06	2.50E-01	3.00E-06	6.40E-06	2.60E-04	1.0	0.1			3.0E-04	
ETHANOL	V	L	46	3.09E-01			1.00E+06	5.30E+01	6.29E-06	2.58E-04	1.0					
ETHYLBENZENE	V	L	106	4.46E+02	6.80E-02	8.50E-06	1.69E+02	9.60E+00	7.90E-03	3.20E-01	1.0		1.1E-02	2.5E-06	1.0E-01	1.0E+00
FLUORANTHENE	NV	S	202	5.55E+04	2.80E-02	7.20E-06	2.60E-01	9.20E-06	8.90E-06	3.60E-04	1.0	0.13			4.0E-02	
FLUORENE	V	S	166	9.16E+03	4.40E-02	7.90E-06	1.69E+00	6.00E-04	9.60E-05	3.90E-03	1.0	0.13			4.0E-02	1.6E-01
GLYPHOSATE	NV	S	169	2.10E+03	6.20E-02	7.30E-06	1.05E+04	9.80E-08	2.10E-12	8.60E-11	1.0	0.1			1.0E-01	
HEPTACHLOR	SV	S	373	4.13E+04	2.20E-02	5.70E-06	1.80E-01	4.00E-04	2.90E-04	1.20E-02	1.0		4.5E+00	1.3E-03	5.0E-04	
HEPTACHLOR EPOXIDE	SV	S	389	1.01E+04	2.40E-02	6.20E-06	2.00E-01	2.00E-05	2.10E-05	8.60E-04	1.0		9.1E+00	2.6E-03	1.3E-05	
HEXACHLOROBENZENE	SV	S	285	6.20E+03	2.90E-02	7.80E-06	6.20E-03	1.80E-05	1.70E-03	7.00E-02	1.0		1.6E+00	4.6E-04	8.0E-04	
HEXACHLOROBUTADIENE	SV	S	261	8.45E+02	2.70E-02	7.00E-06	3.20E+00	2.20E-01	1.00E-02	4.20E-01	1.0		7.8E-02	2.2E-05	1.0E-03	
HEXACHLOROCYCLOHEXANE (gamma) LINDANE	NV	S	291	2.81E+03	4.30E-02	5.10E-06	7.30E+00	4.20E-05	5.10E-06	2.10E-04	1.0	0.04	1.1E+00	3.1E-04	3.0E-04	
HEXACHLOROETHANE	SV	S	237	1.97E+02	3.20E-02	8.90E-06	5.00E+01	2.10E-01	3.90E-03	1.60E-01	1.0		4.0E-02	1.1E-05	7.0E-04	3.0E-02
HEXAZINONE	NV	S	252	1.29E+02	2.50E-02	6.30E-06	3.30E+04	2.30E-07	2.30E-12	9.20E-11	1.0	0.1			3.3E-02	
INDENO(1,2,3-cd)PYRENE	NV	S	276	1.95E+06	4.50E-02	5.20E-06	1.90E-04	1.30E-10	3.50E-07	1.40E-05	1.0	0.13	7.3E-01	1.1E-04		
ISOPHORONE	NV	L	138	6.50E+01	5.30E-02	7.50E-06	1.20E+04	4.40E-01	6.60E-06	2.70E-04	1.0	0.1	9.5E-04		2.0E-01	2.0E+00
LEAD	NV	S	207								1.0					
MERCURY	NV	S	201								1.0				3.0E-04	3.0E-04
METHOXYCHLOR	NV	S	346	2.69E+04	2.20E-02	5.60E-06	1.00E-01	2.60E-06	2.00E-07	8.30E-06	1.0	0.1			5.0E-03	
METHYL ETHYL KETONE	V	L	72	4.51E+00	9.10E-02	1.00E-05	2.23E+05	9.06E+01	5.70E-05	2.30E-03	1.0				6.0E-01	5.0E+00
METHYL ISOBUTYL KETONE	V	L	100	1.26E+01	7.00E-02	8.30E-06	1.90E+04	1.99E+01	1.40E-04	5.60E-03	1.0					3.0E+00
METHYL MERCURY	NV	S	216								1.0				1.0E-04	
METHYL TERT BUTYL ETHER	V	L	88	1.16E+01	7.50E-02	8.60E-06	5.10E+04	2.50E+02	5.90E-04	2.40E-02	1.0		1.8E-03	2.6E-07		3.0E+00
METHYLENE CHLORIDE	V	L	85	2.17E+01	1.00E-01	1.30E-05	1.30E+04	4.35E+02	3.30E-03	1.30E-01	1.0		2.0E-03	1.0E-08	6.0E-03	6.0E-01
METHYLNAPHTHALENE, 1-	V	S	142	2.53E+03	5.30E-02	7.80E-06	2.58E+01	6.70E-02	5.10E-04	2.10E-02	1.0	0.13	2.9E-02	7.3E-06	7.0E-02	2.8E-01
METHYLNAPHTHALENE, 2-	V	S	142	2.48E+03	5.20E-02	7.80E-06	2.46E+01	5.50E-02	5.20E-04	2.10E-02	1.0	0.13			4.0E-03	1.6E-02
MOLYBDENUM	NV	S	96								1.0				5.0E-03	

TABLE J. PHYSIO-CHEMICAL AND TOXICITY CONSTANTS USED IN MODELS.

CHEMICAL PARAMETER	Physical State		Molecular Weight	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Pure component water solubility, S (mg/L)	Vapor Pressure (mm Hg)	Henry's Law constant H (atm-m^3/mol)	Henry's Law constant H' (unitless)	GI Absorption Factor GIABS (unitless)	Skin Absorption Factor ABS (unitless)	Cancer Slope Factor Oral CSFo (mg/kg-d)$^{-1}$	Cancer Unit Risk Factor (Inhalation) IUR (ug/m^3)$^{-1}$	Reference Dose Oral RfDo (mg/kg-d)	Reference Concentration (Inhalation) RfC (mg/m^3)
NAPHTHALENE	V	S	128	1.54E+03	6.00E-02	8.40E-06	3.10E+01	8.50E-02	4.40E-04	1.80E-02	1.0	0.13		3.4E-05	2.0E-02	3.0E-03
NICKEL	NV	S	59								0.04				2.0E-02	9.0E-05
NITROBENZENE	V	L	123	2.26E+02	6.80E-02	9.40E-06	2.09E+03	2.45E-01	2.40E-05	9.80E-04	1.0			4.0E-05	2.0E-03	9.0E-03
NITROGLYCERIN	NV	L	227	1.16E+02	2.90E-02	7.70E-06	1.38E+03	4.00E-04	8.70E-08	3.50E-06	1.0	0.1	1.7E-02		1.0E-04	
NITROTOLUENE, 2-	V	S	137	3.71E+02	5.90E-02	8.70E-06	6.50E+02	1.90E-01	1.30E-05	5.10E-04	1.0		2.2E-01	5.5E-05	9.0E-04	3.6E-03
NITROTOLUENE, 3-	NV	S	137	3.63E+02	5.90E-02	8.70E-06	5.00E+02	2.05E-01	9.30E-06	3.80E-04	1.0	0.10			1.00E-04	4.0E-04
NITROTOLUENE, 4-	NV	S	137	3.63E+02	5.70E-02	8.40E-06	4.42E+02	1.60E-02	5.60E-06	2.30E-04	1.0	0.1	1.6E-02		4.0E-03	
PENTACHLOROPHENOL	NV	S	266	5.92E+02	3.00E-02	8.00E-06	1.40E+01	1.10E-04	2.50E-08	1.00E-06	1.0	0.25	4.0E-01	5.1E-06	5.0E-03	
PENTAERYTHRITOLTETRANITRATE (PETN)	NV	S	316	6.48E+02	2.60E-02	6.80E-06	4.30E+01	5.50E-09	1.30E-09	5.40E-08	1.0	0.1	4.0E-03		2.0E-03	
PERCHLORATE	NV	S	117				2.45E+05				1.0				7.0E-04	
PHENANTHRENE	V	S	178	1.40E+04	6.08E-02	7.88E-06	8.16E-01		3.93E-05	1.61E-03	1.0	0.13			4.0E-02	1.6E-01
PHENOL	NV	S	94	1.87E+02	8.30E-02	1.00E-05	8.28E+04	3.50E-01	3.30E-07	1.40E-05	1.0	0.1			3.0E-01	2.0E-01
POLYCHLORINATED BIPHENYLS (PCBs)	SV	S	326	1.31E+05	2.37E-02	6.10E-06	4.30E-02	7.70E-05	2.83E-04	1.16E-02	1.0	0.14	2.0E+00	5.7E-04	2.0E-05	
PROPICONAZOLE	NV	L	342	1.56E+03	2.10E-02	5.30E-06	1.10E+02	4.20E-07	1.70E-09	7.00E-08	1.0	0.1			1.3E-02	
PYRENE	V	S	202	5.43E+04	2.80E-02	7.20E-06	1.35E-01	4.50E-06	1.20E-05	4.90E-04	1.0	0.13			3.0E-02	1.2E-01
SELENIUM	NV	S	81					1.40E-10			1.0				5.0E-03	2.0E-02
SILVER	NV	S	108								0.04				5.0E-03	
SIMAZINE	NV	S	202	1.47E+02	2.80E-02	7.40E-06	6.20E+00	2.20E-08	9.40E-10	3.90E-08	1.0	0.1	1.2E-01		5.0E-03	
STYRENE	V	L	104	4.46E+02	7.10E-02	8.80E-06	3.10E+02	6.40E+00	2.80E-03	1.10E-01	1.0				2.0E-01	1.0E+00
TERBACIL	NV	S	217	5.01E+01	2.70E-02	7.20E-06	7.10E+02	4.70E-07	1.20E-10	4.90E-09	1.0	0.1			1.3E-02	
tert-BUTYL ALCOHOL	V	L	74	3.70E+01	9.00E-02	9.10E-06	1.00E+06	4.07E+01	1.17E-05	4.80E-04	1.0		3.0E-03	7.5E-07		
TETRACHLOROETHANE, 1,1,1,2-	V	L	168	8.60E+01	4.80E-02	9.10E-06	1.07E+03	1.20E+01	2.50E-03	1.00E-01	1.0		2.6E-02	7.4E-06	3.0E-02	1.2E-01
TETRACHLOROETHANE, 1,1,2,2-	V	L	168	9.49E+01	4.90E-02	9.30E-06	2.83E+03	4.62E+00	3.70E-04	1.50E-02	1.0		2.0E-01	5.8E-05	2.0E-02	
TETRACHLOROETHYLENE	V	L	166	9.49E+01	5.00E-02	9.50E-06	2.06E+02	1.85E+01	1.80E-02	7.20E-01	1.0		2.1E-03	6.1E-06	6.0E-03	4.0E-02
TETRACHLOROPHENOL, 2,3,4,6-	NV	S	232	2.80E+02	5.00E-02	5.90E-06	2.30E+01	6.70E-04	8.80E-06	3.60E-04	1.0	0.1			3.0E-02	
TETRANITRO-1,3,5,7-TETRAAZOCYCLOOCTANE (HMX)	NV	S	296	5.32E+02	4.30E-02	5.00E-06	5.00E+00	3.30E-14	8.70E-10	3.50E-08	1.0	0.006			5.0E-02	
THALLIUM	NV	S	204								1.0				1.0E-05	
TOLUENE	V	L	92	2.34E+02	7.80E-02	9.20E-06	5.26E+02	2.84E+01	6.60E-03	2.70E-01	1.0				8.0E-02	5.0E+00
TOXAPHENE	NV	S	414	7.72E+04	3.20E-02	3.80E-06	5.50E-01	6.70E-06	6.00E-06	2.50E-04	1.0	0.1	1.1E+00	3.2E-04		
TPH (gasolines)	V	L	119	5.00E+03	7.00E-02	1.00E-05	1.50E+02	3.00E+02	7.86E-01	3.22E+01	1.0	0.10			3.00E-02	2.81E-01
TPH (middle distillates)	V	L	201	5.00E+03	7.00E-02	1.00E-05	5.00E+00	1.00E+00	5.65E-01	2.32E+01	1.0	0.10			2.00E-02	1.26E-01
TPH (residual fuels)	NV	L	236				5.00E+00				1.0				1.20E-01	
TRICHLOROBENZENE, 1,2,4-	V	S	181	1.36E+03	4.00E-02	8.40E-06	4.90E+01	4.60E-01	1.40E-03	5.80E-02	1.0		2.9E-02	7.3E-06	1.0E-02	2.0E-03
TRICHLOROETHANE, 1,1,1-	V	L	133	4.39E+01	6.50E-02	9.60E-06	1.29E+03	1.24E+02	1.70E-02	7.00E-01	1.0				2.0E+00	5.0E+00
TRICHLOROETHANE, 1,1,2-	V	L	133	6.07E+01	6.70E-02	1.00E-05	4.59E+03	2.30E+01	8.20E-04	3.40E-02	1.0		5.7E-02	1.6E-05	4.0E-03	2.0E-04
TRICHLOROETHYLENE	V	L	131	6.07E+01	6.90E-02	1.00E-05	1.28E+03	6.90E+01	9.90E-03	4.00E-01	1.0		4.6E-02	4.1E-06	5.0E-04	2.0E-03
TRICHLOROPHENOL, 2,4,5-	NV	S	198	1.60E+03	3.10E-02	8.10E-06	1.20E+03	7.50E-03	1.60E-06	6.60E-05	1.0	0.1			1.0E-01	4.0E-01
TRICHLOROPHENOL, 2,4,6-	NV	S	198	3.81E+02	3.10E-02	8.10E-06	8.00E+02	8.00E-03	2.60E-06	1.10E-04	1.0	0.1	1.1E-02	3.1E-06	1.0E-03	
TRICHLOROPHENOXYACETIC ACID, 2,4,5- (2,4,5-T)	NV	S	255	1.07E+02	2.90E-02	7.80E-06	2.78E+02	3.80E-05	8.70E-09	3.50E-07	1.0	0.1			1.0E-02	
TRICHLOROPHENOXYPROPIONIC ACID, 2,4,5- (2,4,5-TP)	NV	S	270	1.75E+02	2.30E-02	5.90E-06	7.10E+01	1.00E-05	9.10E-09	3.70E-07	1.0	0.1			8.0E-03	
TRICHLOROPROPANE, 1,2,3-	V	L	147	1.16E+02	5.70E-02	9.20E-06	1.75E+03	3.69E+00	3.40E-04	1.40E-02	1.0		3.0E+01	7.5E-03	4.0E-03	3.0E-04
TRICHLOROPROPENE, 1,2,3-	V	L	145	1.16E+02	5.90E-02	9.40E-06	3.34E+02	4.40E+00	1.80E-02	7.20E-01	1.0				3.00E-03	3.0E-04
TRIFLURALIN	SV	S	335	1.64E+04	2.20E-02	5.60E-06	1.80E-01	4.60E-05	1.00E-04	4.20E-03	1.0		7.7E-03		7.5E-03	
TRINITROBENZENE, 1,3,5-	NV	S	213	1.68E+03	2.90E-02	7.70E-06	2.78E+02	6.40E-06	6.50E-09	2.70E-07	1.0	0.019			3.0E-02	
TRINITROPHENYLMETHYLNITRAMINE, 2,4,6- (TETRYL)	NV	S	287	4.61E+03	2.60E-02	6.70E-06	7.40E+01	5.70E-08	2.70E-09	1.10E-07	1.0	0.00065			2.0E-03	
TRINITROTOLUENE, 2,4,6- (TNT)	NV	S	227	2.81E+03	3.00E-02	7.90E-06	1.15E+02	8.00E-06	2.10E-08	8.50E-07	1.0	0.032	3.0E-02		5.0E-04	
VANADIUM	NV	S	51								0.026				5.0E-03	1.0E-04

TABLE J. PHYSIO-CHEMICAL AND TOXICITY CONSTANTS USED IN MODELS.

CHEMICAL PARAMETER	Physical State		Molecular Weight	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Pure component water solubility, S (mg/L)	Vapor Pressure (mm Hg)	Henry's Law constant H (atm-m^3/mol)	Henry's Law constant H' (unitless)	GI Absorption Factor GIABS (unitless)	Skin Absorption Factor ABS (unitless)	Cancer Slope Factor Oral CSFo ($(mg/kg\text{-}d)^{-1}$)	Cancer Unit Risk Factor (Inhalation) IUR ($(ug/m^3)^{-1}$)	Reference Dose Oral RfDo (mg/kg-d)	Reference Concentration (Inhalation) RfC (mg/m^3)
VINYL CHLORIDE	V	G	63	2.17E+01	1.10E-01	1.20E-05	8.80E+03	2.98E+03	2.80E-02	1.10E+00	1.0		7.2E-01	4.4E-06	3.0E-03	1.0E-01
XYLENES	V	L	106	3.83E+02	6.90E-02	8.50E-06	1.06E+02	8.00E+00	6.60E-03	2.70E-01	1.0				2.0E-01	1.0E-01
ZINC	NV	S	67								1.0				3.0E-01	

General Notes:

Physical state of chemical at ambient conditions (V - volatile, NV - nonvolatile, SV-semivolatile, S - solid, L - liquid, G - gas).

Chemical considered to be "volatile" if Henry's number (atm m3/mole) >0.00001 or VP >1 mm Hg and molecular weight <200, and "semi-volatile" if molecular weight >200.

Physio-chemical constants and toxicity factors primarily from USEPA RSL guidance (USEPA 2016). Other references include: National Library of Medicine Toxnet database (NLM 2008a), NLM ChemID Plus (NLM 2008b), ATSDR Toxprofiles (ATSDR 2006) and USDOE RAIS database (USDOE 2006), in that order or preference, unless otherwise noted.

Nonvolatile pesticides Koc and Diffusivity constants primarily from ORNL RAIS database (ORNL 2006).

Inhalation Unit Risk (IUR) factor volatile carcinogens calculated based on oral slope factor if not provided in USEPA RSL guidance (IUR=CSFo x 20m3/day x (1/80kg) x (1mg/1,000ug). Resulting action levels may differ from those presented in the USEPA RSL guidance. Includes: 1,1 biphenyl, dibromochloromethane; 1-methylnaphthalene, 2-nitrotoluene, tert-butyl alcohol, 1,2,4-trichlorobenzene, 1,2,3-trichloropropane.

Reference Concentration (RfC) for volatile noncarcinogens calculated based on oral reference dose if not available in USEPA RSL guidance (USEPA 2004, RfC = RfD x 80kg x (1/20m3-d). Resulting action levels may differ from those presented in the USEPA RSL guidance. Includes: acenaphthalene, acenaphthylene, anthracene, 2-chlorophenol, bromodichloromethane, dibromochloromethane, dibromomethane, 1,3 dichlorobenzene, 1,1 dichloroethane, cis 1,2-dichloroethylene, trans 1,2-dichloroethylene, 2,4-dimethylphenol, fluorene, 1 & 2-methylnaphthalene, 2-nitrotoluene, 3-nitrotoluene, phenanthrene, pyrene, 1,1,1,2-tetrachloroethane, 2,4,5-trichlorophenol.

Notes on Individual Chemicals

Amino,2- dinitrotoluene,3,6- constants and toxicity factors based on Amino,2- dinitrotoluene,3,6-.

Antimony toxicty factors based on metallic forms.

Total Chromium action levels based assumed background (refer to Section 2.8 in Volume 1).

CrVI toxicity factors based on particulates.

Dibromochloromethane, dibromochloropropane and pyrene considered volatile for purposes of modeling (USEPA 2004). (Molecular weight adjusted to 199 in column E (hidden) to permit generation of volatilization factor in soil direct-exposure models.)

2,4 dimethylphenol Henry's constant and koc values and solubilities for nitrotoluenes from Syracuse Research Corporation (SRC 2005).

1,4 Dioxane physio-chemical constants from "Solvent Stabilizers - White Paper" (Mohr 2001).

Dioxin, polychlorinated biphenyls and toxaphene physio-chemical constants from ATSDR 2001a. PCB solubility from MOEE (1996).

Dioxins TEQ cancer slope factors based on 2,3,7,8-PeCDD (most stringent of dioxin-furan congeners)

Ethanol toxicity factors not available (refer to Section 5.3.3 in Appendix 1.

Mercury toxicity factors based on elemental mercury.

Methylnaphthalene (tolal 1,2) toxicity factors based on 1-methylnaphthalene. Diffusivity constants presented based on naphthalene.

Nickel toxicity factors based on soluble salts.

Nitrotoluenes, nitrobenzenes and other nonvolatile, explosives-related chemicals physiochemical constants from US Army Corps of Engineers *Military Range Chemical Database* (Zakikhani et al., 2002; primarily data from FRAMES database).

PCB constants and toxicity factors based on Arochlor 1254. PCB solubility based on value presented in 2004 USEPA IX PRGs (USEPA 2004).

PETN physiochemical constants from National Library of Medicine ChemID Plus database (NLM 2008b). Koc estimated from Kow based on equation for miscellaneous organics in Fetter 1993. Toxicity factors not available; RDX used as surrogate based on similar chemical structure (after UTDEQ 2008).

Thallium toxicity factors based on soluble salts.

TBA physio-chemical constants from *Assessment and Management of MtBE Impacted Sites* (RWQCB 2001). Oral cancer slope factor from California EPA (CalEPA 1999b). URF for TBA based on conversion of oral CSF (URF = CSF x (70kg/20m3-day)).

Tetrachloroethylene - Cancer-based toxicity factors from CalEPA 2016; noncancer toxicity factors from USEPA 2016.

TPH -Total Petroleum Hydrocarbons. See text for discussion of different TPH categories. Molecular weights form ATSDR (gasolines) and NIOSH (middle distillates). TPH physiochemical constants based on assumed carbon range makeup of fuel type and constants for carbon ranges published in MADEP 2002. See Section 6 of Appendix 1.

TPHg and TPHmd solubilities from USACE 1998. TPH as gasolines and middle distillates diffusivity constants based on xylenes. Required for direct exposure models - Does not significantly affect action levels. See Chapter 5 of Appendix 1.

TPH toxicity factors discussed in Appendix 1, Chapter 5.

1,2,3 Trichloropropene diffusivity coefficients not available. Constants noted based on 1,2,3 Trichloropropane.

Xylenes physio-chemical and toxicity constants based on m-xylene.

Explosives-related compounds physio-chemical constants primarily from USACE ARAMS database (Zakikhani et al, 2002); National Library of Medicine ChemIDplus Advanced database (NLM 2008b) and DOE RAIS database (DOE 2005).

PAHs acenaphthylene and phenanthrene RfDs based on fluorene; RfDs for benzo(g,h,i)perylene based on fluoranthene (after MADEP 1994). Diffusivities for acenaphthylene, and phenanthrene based on fluorene.

Vanadium toxicity factors based on metallic forms.

Zinc toxicity factors based on metallic forms.

TABLE K-1. DIRECT-EXPOSURE SCREENING LEVELS
[1]UNRESTRICTED LAND USE SCENARIO

CHEMICAL	Final Screening Level (mg/kg)	Basis	[2]Carcinogens (Risk = 10^{-6}) (mg/kg)	[2]Mutagens (Risk = 10^{-6}) (mg/kg)	[3]Noncarcinogens (Final) (mg/kg)	[3]Noncarcinogens (HQ = 1.0) (mg/kg)	Saturation (mg/kg)
ACENAPHTHENE	6.6E+02	noncarcinogenic effects			6.6E+02	3.3E+03	NA
ACENAPHTHYLENE	3.4E+02	noncarcinogenic effects			3.4E+02	1.7E+03	NA
ACETONE	1.2E+04	noncarcinogenic effects			1.2E+04	6.1E+04	1.1E+05
ALDRIN	3.9E+00	noncarcinogenic effects	2.0E+01		3.9E+00	7.7E+00	NA
AMETRYN	1.1E+02	noncarcinogenic effects			1.1E+02	5.7E+02	NA
AMINO,2- DINITROTOLUENE,4,6-	3.1E+01	noncarcinogenic effects			3.1E+01	1.5E+02	NA
AMINO,4- DINITROTOLUENE,2,6-	3.1E+01	noncarcinogenic effects			3.1E+01	1.5E+02	NA
ANTHRACENE	3.5E+03	noncarcinogenic effects			3.5E+03	1.7E+04	NA
ANTIMONY	6.3E+00	noncarcinogenic effects			6.3E+00	3.1E+01	NA
ARSENIC	2.1E+01	carcinogenic effects	2.1E+01		2.2E+01	2.2E+01	NA
ATRAZINE	2.4E+00	carcinogenic effects	2.4E+00		4.4E+02	2.2E+03	NA
BARIUM	3.1E+03	noncarcinogenic effects			3.1E+03	1.5E+04	NA
BENOMYL	6.3E+02	noncarcinogenic effects			6.3E+02	3.2E+03	NA
BENZENE	1.2E+00	carcinogenic effects	1.2E+00		1.7E+01	8.7E+01	1.9E+03
BENZO(a)ANTHRACENE	1.6E+01	mutagenic effects	6.9E+01	1.6E+01			NA
BENZO(a)PYRENE	1.6E+00	mutagenic effects	7.0E+00	1.6E+00			NA
BENZO(b)FLUORANTHENE	1.6E+01	mutagenic effects	7.0E+01	1.6E+01			NA
BENZO(g,h,i)PERYLENE	4.8E+02	noncarcinogenic effects			4.8E+02	2.4E+03	NA
BENZO(k)FLUORANTHENE	1.6E+02	mutagenic effects	7.0E+02	1.6E+02			NA
BERYLLIUM	3.1E+01	noncarcinogenic effects	1.6E+03		3.1E+01	1.6E+02	NA
BIPHENYL, 1,1-	1.0E+01	noncarcinogenic effects	5.8E+01		1.0E+01	5.1E+01	NA
BIS(2-CHLOROETHYL)ETHER	2.4E-01	carcinogenic effects	2.4E-01				5.0E+03
BIS(2-CHLORO-1-METHYLETHYL)ETHER	3.8E+00	carcinogenic effects	3.8E+00		3.1E+02	1.6E+03	7.9E+02
BIS(2-ETHYLHEXYL)PHTHALATE	3.9E+01	carcinogenic effects	3.9E+01		2.5E+02	1.3E+03	NA
BORON	3.1E+03	noncarcinogenic effects			3.1E+03	1.6E+04	NA
BROMODICHLOROMETHANE	3.2E-01	carcinogenic effects	3.2E-01		5.8E+01	2.9E+02	9.3E+02
BROMOFORM	2.0E+01	carcinogenic effects	2.0E+01		3.1E+02	1.6E+03	NA
BROMOMETHANE	1.5E+00	noncarcinogenic effects			1.5E+00	7.4E+00	3.6E+03
CADMIUM	7.4E+00	noncarcinogenic effects	2.1E+03		7.4E+00	3.7E+01	NA
CARBON TETRACHLORIDE	7.1E-01	carcinogenic effects	7.1E-01		2.2E+01	1.1E+02	4.5E+02
CHLORDANE (TECHNICAL)	1.7E+01	carcinogenic effects	1.7E+01		2.1E+01	2.1E+01	NA
CHLOROANILINE, p-	2.7E+00	carcinogenic effects	2.7E+00		5.1E+01	2.5E+02	NA
CHLOROBENZENE	5.9E+01	noncarcinogenic effects			5.9E+01	2.9E+02	7.6E+02
CHLOROETHANE	2.1E+03	saturation limit			3.0E+03	1.5E+04	2.1E+03
CHLOROFORM	3.4E-01	carcinogenic effects	3.4E-01		4.2E+01	2.1E+02	2.5E+03
CHLOROMETHANE	2.4E+01	noncarcinogenic effects			2.4E+01	1.2E+02	1.3E+03
CHLOROPHENOL, 2-	7.0E+01	noncarcinogenic effects			7.0E+01	3.5E+02	2.7E+04
CHROMIUM (Total)		not available					
CHROMIUM III	2.3E+04	noncarcinogenic effects			2.3E+04	1.2E+05	NA
CHROMIUM VI	3.0E+01	mutagenic effects	1.3E+02	3.0E+01	4.7E+01	2.3E+02	NA
CHRYSENE	1.6E+03	mutagenic effects	7.0E+03	1.6E+03			NA
COBALT	4.7E+00	noncarcinogenic effects	4.2E+02		4.7E+00	2.3E+01	NA
COPPER	6.3E+02	noncarcinogenic effects			6.3E+02	3.1E+03	NA
CYANIDE (Free)	4.8E+00	noncarcinogenic effects			4.8E+00	2.4E+01	NA
CYCLO-1,3,5-TRIMETHYLENE-2,4,6-TRINITRAMINE (RDX)	6.1E+00	carcinogenic effects	6.1E+00		4.5E+01	2.3E+02	NA
DALAPON	3.8E+02	noncarcinogenic effects			3.8E+02	1.9E+03	NA
DIBENZO(a,h)ANTHTRACENE	1.6E+00	mutagenic effects	7.0E+00	1.6E+00			NA

TABLE K-1. DIRECT-EXPOSURE SCREENING LEVELS
[1]UNRESTRICTED LAND USE SCENARIO

CHEMICAL	Final Screening Level (mg/kg)	Basis	[2]Carcinogens (Risk = 10^{-6}) (mg/kg)	[2]Mutagens (Risk = 10^{-6}) (mg/kg)	[3]Noncarcinogens (Final) (mg/kg)	[3]Noncarcinogens (HQ = 1.0) (mg/kg)	Saturation (mg/kg)
DIBROMO,1,2- CHLOROPROPANE,3-	5.7E-03	mutagenic effects	1.6E-02	5.7E-03	9.9E-01	5.0E+00	9.8E+02
DIBROMOCHLOROMETHANE	1.0E+00	carcinogenic effects	1.0E+00		9.8E+01	4.9E+02	NA
DIBROMOETHANE, 1,2-	3.9E-02	carcinogenic effects	3.9E-02		1.6E+01	7.8E+01	NA
DICHLOROBENZENE, 1,2-	3.8E+02	saturation limit			3.9E+02	1.9E+03	3.8E+02
DICHLOROBENZENE, 1,3-	2.0E+02	noncarcinogenic effects			2.0E+02	1.0E+03	6.0E+02
DICHLOROBENZENE, 1,4-	2.8E+00	carcinogenic effects	2.8E+00		6.9E+02	3.5E+03	NA
DICHLOROBENZIDINE, 3,3-	1.2E+00	carcinogenic effects	1.2E+00				NA
DICHLORODIPHENYLDICHLOROETHANE (DDD)	2.3E+00	carcinogenic effects	2.3E+00				NA
DICHLORODIPHENYLDICHLOROETHYLENE (DDE)	2.0E+00	carcinogenic effects	2.0E+00				NA
DICHLORODIPHENYLTRICHLOROETHANE (DDT)	1.9E+00	carcinogenic effects	1.9E+00		7.3E+00	3.7E+01	NA
DICHLOROETHANE, 1,1-	3.8E+00	carcinogenic effects	3.8E+00		3.4E+02	1.7E+03	1.7E+03
DICHLOROETHANE, 1,2-	5.0E-01	carcinogenic effects	5.0E-01		6.7E+00	3.4E+01	3.0E+03
DICHLOROETHYLENE, 1,1-	4.9E+01	noncarcinogenic effects			4.9E+01	2.4E+02	1.2E+03
DICHLOROETHYLENE, Cis 1,2-	3.9E+00	noncarcinogenic effects			3.9E+00	2.0E+01	2.4E+03
DICHLOROETHYLENE, Trans 1,2-	2.9E+01	noncarcinogenic effects			2.9E+01	1.4E+02	1.9E+03
DICHLOROPHENOL, 2,4-	3.8E+01	noncarcinogenic effects			3.8E+01	1.9E+02	NA
DICHLOROPHENOXYACETIC ACID (2,4-D)	1.4E+02	noncarcinogenic effects			1.4E+02	7.0E+02	NA
DICHLOROPROPANE, 1,2-	1.1E+00	carcinogenic effects	1.1E+00		3.4E+00	1.7E+01	1.4E+03
DICHLOROPROPENE, 1,3-	1.9E+00	carcinogenic effects	1.9E+00		1.5E+01	7.7E+01	1.6E+03
DIELDRIN	2.5E+00	noncarcinogenic effects	7.8E+00		2.5E+00	5.1E+00	NA
DIETHYLPHTHALATE	1.0E+04	noncarcinogenic effects			1.0E+04	5.1E+04	NA
DIMETHYLPHENOL, 2,4-	2.5E+02	noncarcinogenic effects			2.5E+02	1.3E+03	NA
DIMETHYLPHTHALATE	1.3E+05	noncarcinogenic effects			1.3E+05	6.3E+05	NA
DINITROBENZENE, 1,3-	1.3E+00	noncarcinogenic effects			1.3E+00	6.3E+00	NA
DINITROPHENOL, 2,4-	2.5E+01	noncarcinogenic effects			2.5E+01	1.3E+02	NA
DINITROTOLUENE, 2,4- (2,4-DNT)	1.7E+00	carcinogenic effects	1.7E+00		2.5E+01	1.3E+02	NA
DINITROTOLUENE, 2,6- (2,6-DNT)	3.6E-01	carcinogenic effects	3.6E-01		3.8E+00	1.9E+01	NA
DIOXANE, 1,4-	5.4E+00	carcinogenic effects	5.4E+00		1.7E+02	8.5E+02	1.2E+05
DIOXINS (TEQ)	1.0E-04	noncarcinogenic effects	9.6E-04		1.0E-04	1.0E-04	NA
DIURON	2.5E+01	noncarcinogenic effects			2.5E+01	1.3E+02	NA
ENDOSULFAN	9.4E+01	noncarcinogenic effects			9.4E+01	4.7E+02	NA
ENDRIN	3.8E+00	noncarcinogenic effects			3.8E+00	1.9E+01	NA
ETHANOL		not available					
ETHYLBENZENE	6.3E+01	carcinogenic effects	6.3E+01		7.1E+02	3.5E+03	4.8E+02
FLUORANTHENE	4.8E+02	noncarcinogenic effects			4.8E+02	2.4E+03	NA
FLUORENE	4.6E+02	noncarcinogenic effects			4.6E+02	2.3E+03	NA
GLYPHOSATE	1.3E+03	noncarcinogenic effects			1.3E+03	6.3E+03	NA
HEPTACHLOR	1.4E-01	carcinogenic effects	1.4E-01		7.8E+00	3.9E+01	NA
HEPTACHLOR EPOXIDE	7.1E-02	carcinogenic effects	7.1E-02		2.0E-01	1.0E+00	NA
HEXACHLOROBENZENE	2.2E-01	carcinogenic effects	2.2E-01		1.3E+01	6.3E+01	NA
HEXACHLOROBUTADIENE	1.3E+00	carcinogenic effects	1.3E+00		1.6E+01	7.8E+01	NA
HEXACHLOROCYCLOHEXANE (gamma) LINDANE	5.7E-01	carcinogenic effects	5.7E-01		4.3E+00	2.1E+01	NA
HEXACHLOROETHANE	2.0E+00	carcinogenic effects	2.0E+00		9.1E+00	4.6E+01	NA
HEXAZINONE	4.2E+02	noncarcinogenic effects			4.2E+02	2.1E+03	NA
INDENO(1,2,3-cd)PYRENE	1.6E+01	mutagenic effects	7.0E+01	1.6E+01			NA
ISOPHORONE	5.7E+02	carcinogenic effects	5.7E+02		2.5E+03	1.3E+04	NA
LEAD	4.0E+02	noncarcinogenic effects					NA

TABLE K-1. DIRECT-EXPOSURE SCREENING LEVELS
[1]UNRESTRICTED LAND USE SCENARIO

CHEMICAL	Final Screening Level (mg/kg)	Basis	[2]Carcinogens (Risk = 10^{-6}) (mg/kg)	[2]Mutagens (Risk = 10^{-6}) (mg/kg)	[3]Noncarcinogens (Final) (mg/kg)	[3]Noncarcinogens (HQ = 1.0) (mg/kg)	Saturation (mg/kg)
MERCURY	4.7E+00	noncarcinogenic effects			4.7E+00	2.3E+01	NA
METHOXYCHLOR	6.3E+01	noncarcinogenic effects			6.3E+01	3.2E+02	NA
METHYL ETHYL KETONE	5.6E+03	noncarcinogenic effects			5.6E+03	2.8E+04	2.8E+04
METHYL ISOBUTYL KETONE	3.4E+03	saturation limit			7.2E+03	3.6E+04	3.4E+03
METHYL MERCURY	1.6E+00	noncarcinogenic effects			1.6E+00	7.8E+00	NA
METHYL TERT BUTYL ETHER	5.0E+01	carcinogenic effects	5.0E+01		3.3E+03	1.7E+04	8.9E+03
METHYLENE CHLORIDE	5.8E+01	mutagenic effects	2.3E+02	5.8E+01	7.2E+01	3.6E+02	3.3E+03
METHYLNAPHTHALENE, 1-	1.0E+02	carcinogenic effects	1.0E+02		6.8E+02	3.4E+03	NA
METHYLNAPHTHALENE, 2-	3.9E+01	noncarcinogenic effects			3.9E+01	2.0E+02	NA
MOLYBDENUM	7.8E+01	noncarcinogenic effects			7.8E+01	3.9E+02	NA
NAPHTHALENE	2.8E+01	noncarcinogenic effects	4.2E+01		2.8E+01	1.4E+02	NA
NICKEL	3.1E+02	noncarcinogenic effects			3.1E+02	1.5E+03	NA
NITROBENZENE	5.6E+00	carcinogenic effects	5.6E+00		2.6E+01	1.3E+02	3.0E+03
NITROGLYCERIN	1.3E+00	noncarcinogenic effects	3.2E+01		1.3E+00	6.3E+00	NA
NITROTOLUENE, 2-	2.2E+00	carcinogenic effects	2.2E+00		1.2E+01	6.2E+01	NA
NITROTOLUENE, 3-	1.3E+00	noncarcinogenic effects			1.3E+00	6.3E+00	NA
NITROTOLUENE, 4-	3.4E+01	carcinogenic effects	3.4E+01		5.1E+01	2.5E+02	NA
PENTACHLOROPHENOL	1.0E+00	carcinogenic effects	1.0E+00		4.9E+01	2.5E+02	NA
PENTAERYTHRITOLTETRANITRATE (PETN)	2.5E+01	noncarcinogenic effects	1.4E+02		2.5E+01	1.3E+02	NA
PERCHLORATE	1.1E+01	noncarcinogenic effects			1.1E+01	5.5E+01	NA
PHENANTHRENE	4.6E+02	noncarcinogenic effects			4.6E+02	2.3E+03	NA
PHENOL	3.8E+03	noncarcinogenic effects			3.8E+03	1.9E+04	NA
POLYCHLORINATED BIPHENYLS (PCBs)	1.2E+00	noncarcinogenic effects	2.4E+00		1.2E+00	1.2E+00	NA
PROPICONAZOLE	1.6E+02	noncarcinogenic effects			1.6E+02	8.2E+02	NA
PYRENE	3.6E+02	noncarcinogenic effects			3.6E+02	1.8E+03	NA
SELENIUM	7.8E+01	noncarcinogenic effects			7.8E+01	3.9E+02	NA
SILVER	7.8E+01	noncarcinogenic effects			7.8E+01	3.9E+02	NA
SIMAZINE	4.5E+00	carcinogenic effects	4.5E+00		6.3E+01	3.2E+02	NA
STYRENE	8.7E+02	saturation limit			1.3E+03	6.4E+03	8.7E+02
TERBACIL	1.6E+02	noncarcinogenic effects			1.6E+02	8.2E+02	NA
tert-BUTYL ALCOHOL	9.9E+01	carcinogenic effects	9.9E+01				3.2E+05
TETRACHLOROETHANE, 1,1,1,2-	2.2E+00	carcinogenic effects	2.2E+00		1.2E+02	5.9E+02	6.8E+02
TETRACHLOROETHANE, 1,1,2,2-	6.5E-01	carcinogenic effects	6.5E-01		3.1E+02	1.6E+03	1.9E+03
TETRACHLOROETHYLENE	1.2E+00	carcinogenic effects	1.2E+00		1.7E+01	8.7E+01	1.7E+02
TETRACHLOROPHENOL, 2,3,4,6-	3.8E+02	noncarcinogenic effects			3.8E+02	1.9E+03	NA
TETRANITRO-1,3,5,7-TETRAAZOCYCLOOCTANE (HMX)	7.7E+02	noncarcinogenic effects			7.7E+02	3.9E+03	NA
THALLIUM	7.8E-01	noncarcinogenic effects			7.8E-01	7.8E-01	NA
TOLUENE	8.2E+02	saturation limit			1.0E+03	5.0E+03	8.2E+02
TOXAPHENE	4.9E-01	carcinogenic effects	4.9E-01				NA
TPH (gasolines)	4.8E+02	noncarcinogenic effects			4.8E+02	4.8E+02	5.4E+03
TPH (middle distillates)	2.6E+02	noncarcinogenic effects			2.6E+02	2.6E+02	5.0E+02
TPH (residual fuels)	9.4E+03	noncarcinogenic effects			9.4E+03	9.4E+03	NA
TRICHLOROBENZENE, 1,2,4-	8.2E+00	carcinogenic effects	8.2E+00		1.2E+01	6.2E+01	NA
TRICHLOROETHANE, 1,1,1-	6.4E+02	saturation limit			1.8E+03	8.8E+03	6.4E+02
TRICHLOROETHANE, 1,1,2-	3.2E-01	noncarcinogenic effects	1.2E+00		3.2E-01	1.6E+00	2.2E+03
TRICHLOROETHYLENE	8.9E-01	noncarcinogenic effects	-	9.4E-01	8.9E-01	4.4E+00	6.9E+02
TRICHLOROPHENOL, 2,4,5-	1.3E+03	noncarcinogenic effects			1.3E+03	6.3E+03	NA

TABLE K-1. DIRECT-EXPOSURE SCREENING LEVELS
[1]UNRESTRICTED LAND USE SCENARIO

CHEMICAL	Final Screening Level (mg/kg)	Basis	[2]Carcinogens (Risk = 10^{-6}) (mg/kg)	[2]Mutagens (Risk = 10^{-6}) (mg/kg)	[3]Noncarcinogens (Final) (mg/kg)	[3]Noncarcinogens (HQ = 1.0) (mg/kg)	Saturation (mg/kg)
TRICHLOROPHENOL, 2,4,6-	1.3E+01	noncarcinogenic effects	4.9E+01		1.3E+01	6.3E+01	NA
TRICHLOROPHENOXYACETIC ACID, 2,4,5- (2,4,5-T)	1.3E+02	noncarcinogenic effects			1.3E+02	6.3E+02	NA
TRICHLOROPHENOXYPROPIONIC ACID, 2,4,5- (2,4,5-TP)	1.0E+02	noncarcinogenic effects			1.0E+02	5.1E+02	NA
TRICHLOROPROPANE, 1,2,3-	1.6E-03	mutagenic effects	5.0E-03	1.6E-03	1.1E+00	5.3E+00	1.4E+03
TRICHLOROPROPENE, 1,2,3-	1.6E-01	noncarcinogenic effects			1.6E-01	7.9E-01	3.1E+02
TRIFLURALIN	9.0E+01	carcinogenic effects	9.0E+01		1.2E+02	5.9E+02	NA
TRINITROBENZENE, 1,3,5-	4.5E+02	noncarcinogenic effects			4.5E+02	2.2E+03	NA
TRINITROPHENYLMETHYLNITRAMINE, 2,4,6- (TETRYL)	3.1E+01	noncarcinogenic effects			3.1E+01	1.6E+02	NA
TRINITROTOLUENE, 2,4,6- (TNT)	7.3E+00	noncarcinogenic effects	2.1E+01		7.3E+00	3.6E+01	NA
VANADIUM	7.8E+01	noncarcinogenic effects			7.8E+01	3.9E+02	NA
VINYL CHLORIDE	5.9E-02	mutagenic effects	-	5.9E-02	1.5E+01	7.4E+01	3.9E+03
XYLENES	1.2E+02	noncarcinogenic effects			1.2E+02	6.2E+02	2.6E+02
ZINC	4.7E+03	noncarcinogenic effects			4.7E+03	2.3E+04	NA

Primary source: USEPA Regional Screening Levels (USEPA 2016), modified as noted below and described in Appendix 1, Section 3.2.

Notes:

1. Based on assumed residential exposure scenario. Considered adequate for residential housing, schools, medical facilities, day-care centers, parks and other sensitive uses.

2. Carcinogens: Default target excess cancer risk = 10^{-6} unless otherwise noted (see Section 3). Target risk of 5^{-5} applied to arsenic. Target ECR of 10^{-5} used for Technical Chlordane an PCBs. Target risk of 10^{-4} applied to aldrin, dieldrin, TEQ dioxins, hexavalent chromium and nonvolatile, carcinogenic PAHs action levels to reflect on higher confidence in noncancer toxicity factors and/or background and other factors.

3. Noncarcinogens: Final action level based on default target hazard quotient = 0.2 unless otherwise noted. TEQ Dioxing HQ = 1.0. TPH action levels based on HQ of 1.0 (see Section 3.2 in text). Action levels for Technical Chlordane based on HQ of 1.0. Action levels for aldrin and dieldrin (breakdown product of aldrin) based on HQ of 0.5. All chemicals - Screening levels based on hazard quotient of 1.0 provided for reference.

4. Arsenic direct exposure soil action levels: See text; refer to *Update to Soil Action Levels for Inorganic Arsenic and Recommended Soil Management Practices* , HEER office Technical Memorandum (HDOH 2011b).

5. TEQ dioxin action levels: Based on noncancer RfD of 0.7 pg/kg-day, target HQ of 1.0 and assumed bioavailability in soil of 50% for the ingestion route (refer to text).

See text for equations and assumptions used in models.

Final action level is lowest of individual screening levels for carcinogenic effects and noncarcinogenic effects or action level for construction/trench workers if lower (see Table K-3). Saturation limit used as upper limit for volatile organic compounds that are liquid at ambient conditions (see text).

Saturation: Theoretical soil saturation level in the absence of free product; calculated for volatile organic compounds that are liquids under ambient conditions (refer to Table G-1a).

TPH:Total Petroleum Hydrocarbons. See Chapter 6 of Appendix 1for discussion of different TPH categories and development of action levels.

TPHmd saturation level set to 500 mg/kg vs model-derived 150 mg/kg to address low confidence in direct exposure, vapor emission model (see Chapter 6). Direct-exposure action level rounded to 500mg/kg from 460 mg/kg.

Ethanol: Human health toxicity data not available. Environmental concerns driven by gross contamination/nuisance concerns.

Direct-exposure screening level for lead based on USEPA RSLs (USEPA 2016).

TABLE K-2. DIRECT-EXPOSURE SCREENING LEVELS
COMMERCIAL/INDUSTRIAL LAND USE SCENARIO

CHEMICAL	Final Screening Level (mg/kg)	Basis	[1]Carcinogens (Risk = 10^{-6}) (mg/kg)	[2]Noncarcinogens (Final) (mg/kg)	[2]Noncarcinogens (HQ = 1.0) (mg/kg)	Saturation (mg/kg)
ACENAPHTHENE	7.1E+03	noncarcinogenic effects		7.1E+03	3.5E+04	NA
ACENAPHTHYLENE	2.7E+03	noncarcinogenic effects		2.7E+03	1.4E+04	NA
ACETONE	1.1E+05	saturation limit		1.4E+05	6.9E+05	1.1E+05
ALDRIN	5.6E+01	noncarcinogenic effects	9.3E+01	5.6E+01	1.1E+02	NA
AMETRYN	1.5E+03	noncarcinogenic effects		1.5E+03	7.4E+03	NA
AMINO,2- DINITROTOLUENE,4,6-	4.6E+02	noncarcinogenic effects		4.6E+02	2.3E+03	NA
AMINO,4- DINITROTOLUENE,2,6-	4.5E+02	noncarcinogenic effects		4.5E+02	2.3E+03	NA
ANTHRACENE	4.2E+04	noncarcinogenic effects		4.2E+04	2.1E+05	NA
ANTIMONY	9.3E+01	noncarcinogenic effects		9.3E+01	4.7E+02	NA
ARSENIC	9.7E+01	carcinogenic effects	9.7E+01	3.1E+02	3.1E+02	NA
ATRAZINE	1.0E+01	carcinogenic effects	1.0E+01	5.7E+03	2.9E+04	NA
BARIUM	4.3E+03	trench/construction worker		4.3E+04	2.2E+05	NA
BENOMYL	8.2E+03	noncarcinogenic effects		8.2E+03	4.1E+04	NA
BENZENE	5.5E+00	carcinogenic effects	5.5E+00	9.1E+01	4.6E+02	1.9E+03
BENZO(a)ANTHRACENE	2.9E+01	carcinogenic effects	2.9E+01			NA
BENZO(a)PYRENE	2.9E+00	carcinogenic effects	2.9E+00			NA
BENZO(b)FLUORANTHENE	2.9E+01	carcinogenic effects	2.9E+01			NA
BENZO(g,h,i)PERYLENE	6.0E+03	noncarcinogenic effects		6.0E+03	3.0E+04	NA
BENZO(k)FLUORANTHENE	2.9E+02	carcinogenic effects	2.9E+02			NA
BERYLLIUM	1.5E+02	trench/construction worker	6.9E+03	4.6E+02	2.3E+03	NA
BIPHENYL, 1,1-	4.3E+01	noncarcinogenic effects	2.6E+02	4.3E+01	2.1E+02	NA
BIS(2-CHLOROETHYL)ETHER	1.1E+00	carcinogenic effects	1.1E+00			5.0E+03
BIS(2-CHLORO-1-METHYLETHYL)ETHER	1.7E+01	carcinogenic effects	1.7E+01	2.1E+03	1.0E+04	7.9E+02
BIS(2-ETHYLHEXYL)PHTHALATE	1.6E+02	carcinogenic effects	1.6E+02	3.3E+03	1.6E+04	NA
BORON	4.7E+04	noncarcinogenic effects		4.7E+04	2.3E+05	NA
BROMODICHLOROMETHANE	1.4E+00	carcinogenic effects	1.4E+00	2.8E+02	1.4E+03	9.3E+02
BROMOFORM	9.1E+01	carcinogenic effects	9.1E+01	4.7E+03	2.3E+04	NA
BROMOMETHANE	6.5E+00	noncarcinogenic effects		6.5E+00	3.3E+01	3.6E+03
CADMIUM	6.5E+01	trench/construction worker	9.3E+03	1.1E+02	5.3E+02	NA
CARBON TETRACHLORIDE	3.1E+00	carcinogenic effects	3.1E+00	1.2E+02	6.2E+02	4.5E+02
CHLORDANE (TECHNICAL)	7.7E+01	carcinogenic effects	7.7E+01	2.8E+02	2.8E+02	NA
CHLOROANILINE, p-	1.1E+01	carcinogenic effects	1.1E+01	6.6E+02	3.3E+03	NA
CHLOROBENZENE	2.9E+02	noncarcinogenic effects		2.9E+02	1.4E+03	7.6E+02
CHLOROETHANE	2.1E+03	saturation limit		1.3E+04	6.3E+04	2.1E+03
CHLOROFORM	1.5E+00	carcinogenic effects	1.5E+00	2.2E+02	1.1E+03	2.5E+03
CHLOROMETHANE	1.0E+02	noncarcinogenic effects		1.0E+02	5.1E+02	1.3E+03
CHLOROPHENOL, 2-	8.1E+02	noncarcinogenic effects		8.1E+02	4.0E+03	2.7E+04
CHROMIUM (Total)		not available				
CHROMIUM III	3.5E+05	noncarcinogenic effects		3.5E+05	1.8E+06	NA
CHROMIUM VI	4.8E+02	trench/construction worker	6.3E+02	7.0E+02	3.5E+03	NA
CHRYSENE	2.9E+03	carcinogenic effects	2.9E+03			NA
COBALT	4.0E+01	trench/construction worker	1.9E+03	6.9E+01	3.5E+02	NA
COPPER	9.3E+03	noncarcinogenic effects		9.3E+03	4.7E+04	NA
CYANIDE (Free)	3.1E+01	noncarcinogenic effects		3.1E+01	1.6E+02	NA
CYCLO-1,3,5-TRIMETHYLENE-2,4,6-TRINITRAMINE (RDX)	2.8E+01	carcinogenic effects	2.8E+01	6.6E+02	3.3E+03	NA
DALAPON	4.9E+03	noncarcinogenic effects		4.9E+03	2.5E+04	NA

TABLE K-2. DIRECT-EXPOSURE SCREENING LEVELS
COMMERCIAL/INDUSTRIAL LAND USE SCENARIO

CHEMICAL	Final Screening Level (mg/kg)	Basis	[1]Carcinogens (Risk = 10^{-6}) (mg/kg)	[2]Noncarcinogens (Final) (mg/kg)	[2]Noncarcinogens (HQ = 1.0) (mg/kg)	Saturation (mg/kg)
DIBENZO(a,h)ANTHTRACENE	2.9E+00	carcinogenic effects	2.9E+00			NA
DIBROMO,1,2- CHLOROPROPANE,3-	7.0E-02	carcinogenic effects	7.0E-02	5.4E+00	2.7E+01	9.8E+02
DIBROMOCHLOROMETHANE	4.4E+00	carcinogenic effects	4.4E+00	5.3E+02	2.7E+03	NA
DIBROMOETHANE, 1,2-	1.7E-01	carcinogenic effects	1.7E-01	7.1E+01	3.5E+02	NA
DICHLOROBENZENE, 1,2-	3.8E+02	saturation limit		2.0E+03	1.0E+04	3.8E+02
DICHLOROBENZENE, 1,3-	6.0E+02	saturation limit		1.2E+03	6.2E+03	6.0E+02
DICHLOROBENZENE, 1,4-	1.2E+01	carcinogenic effects	1.2E+01	5.3E+03	2.7E+04	NA
DICHLOROBENZIDINE, 3,3-	5.1E+00	carcinogenic effects	5.1E+00			NA
DICHLORODIPHENYLDICHLOROETHANE (DDD)	9.6E+00	carcinogenic effects	9.6E+00			NA
DICHLORODIPHENYLDICHLOROETHYLENE (DDE)	9.3E+00	carcinogenic effects	9.3E+00			NA
DICHLORODIPHENYLTRICHLOROETHANE (DDT)	8.5E+00	carcinogenic effects	8.5E+00	1.0E+02	5.2E+02	NA
DICHLOROETHANE, 1,1-	1.7E+01	carcinogenic effects	1.7E+01	1.5E+03	7.7E+03	1.7E+03
DICHLOROETHANE, 1,2-	2.2E+00	carcinogenic effects	2.2E+00	3.0E+01	1.5E+02	3.0E+03
DICHLOROETHYLENE, 1,1-	2.1E+02	noncarcinogenic effects		2.1E+02	1.1E+03	1.2E+03
DICHLOROETHYLENE, Cis 1,2-	1.8E+01	noncarcinogenic effects		1.8E+01	9.1E+01	2.4E+03
DICHLOROETHYLENE, Trans 1,2-	1.3E+02	noncarcinogenic effects		1.3E+02	6.5E+02	1.9E+03
DICHLOROPHENOL, 2,4-	4.9E+02	noncarcinogenic effects		4.9E+02	2.5E+03	NA
DICHLOROPHENOXYACETIC ACID (2,4-D)	1.9E+03	noncarcinogenic effects		1.9E+03	9.6E+03	NA
DICHLOROPROPANE, 1,2-	4.7E+00	carcinogenic effects	4.7E+00	1.4E+01	7.1E+01	1.4E+03
DICHLOROPROPENE, 1,3-	8.6E+00	carcinogenic effects	8.6E+00	6.6E+01	3.3E+02	1.6E+03
DIELDRIN	3.3E+01	carcinogenic effects	3.3E+01	3.3E+01	6.6E+01	NA
DIETHYLPHTHALATE	1.3E+05	noncarcinogenic effects		1.3E+05	6.6E+05	NA
DIMETHYLPHENOL, 2,4-	3.3E+03	noncarcinogenic effects		3.3E+03	1.6E+04	NA
DIMETHYLPHTHALATE	1.0E+06	maximum		1.6E+06	8.2E+06	NA
DINITROBENZENE, 1,3-	1.6E+01	noncarcinogenic effects		1.6E+01	8.2E+01	NA
DINITROPHENOL, 2,4-	3.3E+02	noncarcinogenic effects		3.3E+02	1.6E+03	NA
DINITROTOLUENE, 2,4- (2,4-DNT)	7.4E+00	carcinogenic effects	7.4E+00	3.3E+02	1.6E+03	NA
DINITROTOLUENE, 2,6- (2,6-DNT)	1.5E+00	carcinogenic effects	1.5E+00	4.9E+01	2.5E+02	NA
DIOXANE, 1,4-	2.5E+01	carcinogenic effects	2.5E+01	9.7E+02	4.8E+03	1.2E+05
DIOXINS (TEQ)	1.4E-03	noncarcinogenic effects	4.3E-03	1.4E-03	1.4E-03	NA
DIURON	3.3E+02	noncarcinogenic effects		3.3E+02	1.6E+03	NA
ENDOSULFAN	1.4E+03	noncarcinogenic effects		1.4E+03	7.0E+03	NA
ENDRIN	4.9E+01	noncarcinogenic effects		4.9E+01	2.5E+02	NA
ETHANOL		not available				
ETHYLBENZENE	1.5E+02	trench/construction worker	2.8E+02	4.4E+03	2.2E+04	4.8E+02
FLUORANTHENE	6.0E+03	noncarcinogenic effects		6.0E+03	3.0E+04	NA
FLUORENE	5.3E+03	noncarcinogenic effects		5.3E+03	2.6E+04	NA
GLYPHOSATE	1.6E+04	noncarcinogenic effects		1.6E+04	8.2E+04	NA
HEPTACHLOR	6.3E-01	carcinogenic effects	6.3E-01	1.2E+02	5.8E+02	NA
HEPTACHLOR EPOXIDE	3.3E-01	carcinogenic effects	3.3E-01	3.0E+00	1.5E+01	NA
HEXACHLOROBENZENE	1.0E+00	carcinogenic effects	1.0E+00	1.9E+02	9.3E+02	NA
HEXACHLOROBUTADIENE	5.6E+00	carcinogenic effects	5.6E+00	2.3E+02	1.2E+03	NA
HEXACHLOROCYCLOHEXANE (gamma) LINDANE	2.5E+00	carcinogenic effects	2.5E+00	6.0E+01	3.0E+02	NA
HEXACHLOROETHANE	8.7E+00	carcinogenic effects	8.7E+00	9.5E+01	4.8E+02	NA
HEXAZINONE	5.4E+03	noncarcinogenic effects		5.4E+03	2.7E+04	NA
INDENO(1,2,3-cd)PYRENE	2.9E+01	carcinogenic effects	2.9E+01			NA

TABLE K-2. DIRECT-EXPOSURE SCREENING LEVELS
COMMERCIAL/INDUSTRIAL LAND USE SCENARIO

CHEMICAL	Final Screening Level (mg/kg)	Basis	[1]Carcinogens (Risk = 10^{-6}) (mg/kg)	[2]Noncarcinogens (Final) (mg/kg)	[2]Noncarcinogens (HQ = 1.0) (mg/kg)	Saturation (mg/kg)
ISOPHORONE	2.4E+03	carcinogenic effects	2.4E+03	3.3E+04	1.6E+05	NA
LEAD	8.0E+02	commercial/industrial exposure				NA
MERCURY	7.0E+01	noncarcinogenic effects		7.0E+01	3.5E+02	NA
METHOXYCHLOR	8.2E+02	noncarcinogenic effects		8.2E+02	4.1E+03	NA
METHYL ETHYL KETONE	2.8E+04	saturation limit		4.1E+04	2.1E+05	2.8E+04
METHYL ISOBUTYL KETONE	3.4E+03	saturation limit		3.0E+04	1.5E+05	3.4E+03
METHYL MERCURY	2.3E+01	noncarcinogenic effects		2.3E+01	1.2E+02	NA
METHYL TERT BUTYL ETHER	2.2E+02	carcinogenic effects	2.2E+02	1.4E+04	7.0E+04	8.9E+03
METHYLENE CHLORIDE	6.6E+02	noncarcinogenic effects	1.1E+03	6.6E+02	3.3E+03	3.3E+03
METHYLNAPHTHALENE, 1-	2.7E+02	trench/construction worker	4.3E+02	6.3E+03	3.1E+04	NA
METHYLNAPHTHALENE, 2-	3.6E+02	noncarcinogenic effects		3.6E+02	1.8E+03	NA
MOLYBDENUM	1.2E+03	noncarcinogenic effects		1.2E+03	5.8E+03	NA
NAPHTHALENE	9.6E+01	trench/construction worker	1.8E+02	1.3E+02	6.4E+02	NA
NICKEL	7.5E+02	trench/construction worker		4.5E+03	2.2E+04	NA
NITROBENZENE	2.4E+01	carcinogenic effects	2.4E+01	2.7E+02	1.3E+03	3.0E+03
NITROGLYCERIN	1.6E+01	noncarcinogenic effects	1.4E+02	1.6E+01	8.2E+01	NA
NITROTOLUENE, 2-	1.0E+01	carcinogenic effects	1.0E+01	1.5E+02	7.3E+02	NA
NITROTOLUENE, 3-	1.6E+01	noncarcinogenic effects		1.6E+01	8.2E+01	NA
NITROTOLUENE, 4-	1.4E+02	carcinogenic effects	1.4E+02	6.6E+02	3.3E+03	NA
PENTACHLOROPHENOL	4.0E+00	carcinogenic effects	4.0E+00	5.7E+02	2.8E+03	NA
PENTAERYTHRITOLTETRANITRATE (PETN)	3.3E+02	noncarcinogenic effects	5.7E+02	3.3E+02	1.6E+03	NA
PERCHLORATE	1.6E+02	noncarcinogenic effects		1.6E+02	8.2E+02	NA
PHENANTHRENE	5.6E+03	noncarcinogenic effects		5.6E+03	2.8E+04	NA
PHENOL	4.9E+04	noncarcinogenic effects		4.9E+04	2.5E+05	NA
POLYCHLORINATED BIPHENYLS (PCBs)	9.8E+00	carcinogenic effects	9.8E+00	1.5E+01	1.5E+01	NA
PROPICONAZOLE	2.1E+03	noncarcinogenic effects		2.1E+03	1.1E+04	NA
PYRENE	4.4E+03	noncarcinogenic effects		4.4E+03	2.2E+04	NA
SELENIUM	1.2E+03	noncarcinogenic effects		1.2E+03	5.8E+03	NA
SILVER	1.2E+03	noncarcinogenic effects		1.2E+03	5.8E+03	NA
SIMAZINE	1.9E+01	carcinogenic effects	1.9E+01	8.2E+02	4.1E+03	NA
STYRENE	8.7E+02	saturation limit		7.5E+03	3.8E+04	8.7E+02
TERBACIL	2.1E+03	noncarcinogenic effects		2.1E+03	1.1E+04	NA
tert-BUTYL ALCOHOL	4.5E+02	carcinogenic effects	4.5E+02			3.2E+05
TETRACHLOROETHANE, 1,1,1,2-	9.6E+00	carcinogenic effects	9.6E+00	6.0E+02	3.0E+03	6.8E+02
TETRACHLOROETHANE, 1,1,2,2-	2.9E+00	carcinogenic effects	2.9E+00	4.7E+03	2.3E+04	1.9E+03
TETRACHLOROETHYLENE	5.1E+00	carcinogenic effects	5.1E+00	8.5E+01	4.2E+02	1.7E+02
TETRACHLOROPHENOL, 2,3,4,6-	4.9E+03	noncarcinogenic effects		4.9E+03	2.5E+04	NA
TETRANITRO-1,3,5,7-TETRAAZOCYCLOOCTANE (HMX)	1.1E+04	noncarcinogenic effects		1.1E+04	5.7E+04	NA
THALLIUM	1.2E+01	noncarcinogenic effects		1.2E+01	1.2E+01	NA
TOLUENE	8.2E+02	saturation limit		9.8E+03	4.9E+04	8.2E+02
TOXAPHENE	2.1E+00	carcinogenic effects	2.1E+00			NA
TPH (gasolines)	2.4E+03	noncarcinogenic effects		2.4E+03	2.4E+03	5.4E+03
TPH (middle distillates)	5.0E+02	saturation limit		1.3E+03	1.3E+03	5.0E+02
TPH (residual fuels)	1.4E+05	noncarcinogenic effects		1.4E+05	1.4E+05	NA
TRICHLOROBENZENE, 1,2,4-	3.7E+01	carcinogenic effects	3.7E+01	5.5E+01	2.8E+02	NA
TRICHLOROETHANE, 1,1,1-	6.4E+02	saturation limit		7.7E+03	3.9E+04	6.4E+02

TABLE K-2. DIRECT-EXPOSURE SCREENING LEVELS
COMMERCIAL/INDUSTRIAL LAND USE SCENARIO

CHEMICAL	Final Screening Level (mg/kg)	Basis	[1]Carcinogens (Risk = 10^{-6}) (mg/kg)	[2]Noncarcinogens (Final) (mg/kg)	[2]Noncarcinogens (HQ = 1.0) (mg/kg)	Saturation (mg/kg)
TRICHLOROETHANE, 1,1,2-	1.4E+00	noncarcinogenic effects	5.4E+00	1.4E+00	6.8E+00	2.2E+03
TRICHLOROETHYLENE	4.1E+00	noncarcinogenic effects	6.5E+00	4.1E+00	2.0E+01	6.9E+02
TRICHLOROPHENOL, 2,4,5-	1.6E+04	noncarcinogenic effects		1.6E+04	8.2E+04	NA
TRICHLOROPHENOL, 2,4,6-	1.6E+02	noncarcinogenic effects	2.1E+02	1.6E+02	8.2E+02	NA
TRICHLOROPHENOXYACETIC ACID, 2,4,5- (2,4,5-T)	1.6E+03	noncarcinogenic effects		1.6E+03	8.2E+03	NA
TRICHLOROPHENOXYPROPIONIC ACID, 2,4,5- (2,4,5-TP)	1.3E+03	noncarcinogenic effects		1.3E+03	6.6E+03	NA
TRICHLOROPROPANE, 1,2,3-	2.2E-02	carcinogenic effects	2.2E-02	4.5E+00	2.2E+01	1.4E+03
TRICHLOROPROPENE, 1,2,3-	6.7E-01	noncarcinogenic effects		6.7E-01	3.3E+00	3.1E+02
TRIFLURALIN	4.2E+02	carcinogenic effects	4.2E+02	1.8E+03	8.8E+03	NA
TRINITROBENZENE, 1,3,5-	6.5E+03	noncarcinogenic effects		6.5E+03	3.2E+04	NA
TRINITROPHENYLMETHYLNITRAMINE, 2,4,6- (TETRYL)	4.7E+02	noncarcinogenic effects		4.7E+02	2.3E+03	NA
TRINITROTOLUENE, 2,4,6- (TNT)	9.6E+01	carcinogenic effects	9.6E+01	1.0E+02	5.1E+02	NA
VANADIUM	6.6E+02	trench/construction worker		1.2E+03	5.8E+03	NA
VINYL CHLORIDE	1.8E+00	carcinogenic effects	1.8E+00	8.0E+01	4.0E+02	3.9E+03
XYLENES	2.6E+02	saturation limit		5.4E+02	2.7E+03	2.6E+02
ZINC	7.0E+04	noncarcinogenic effects		7.0E+04	3.5E+05	NA

Primary source: USEPA Regional Screening Levels (USEPA 2016), modified as noted below and described in Appendix 1, Section 3.2.

Notes:

1. Carcinogens: Default target excess cancer risk = 10^{-6} unless otherwise noted (see Section 3). Target risk of 5^{-5} applied to arsenic. Target ECR of 10^{-5} used for Technical Chlordane, PCBs and carcinogenic PAHs. Target risk of 10^{-4} applied to aldrin, dieldrin, TEQ dioxins and hexavalent chromium action levels to reflect on higher confidence in noncancer toxicity factors and/or background and other factors.

2. Noncarcinogens: Final action level based on default target hazard quotient = 0.2 unless otherwise noted. TPH action levels based on HQ of 1.0 (see Section 3.2 in text). Action levels for Technical Chlordane based on HQ of 1.0. Action levels for aldrin and dieldrin (breakdown product of aldrin) based on HQ of 0.5. All chemicals - Screening levels based on hazard quotient of 1.0 provided for reference.

3. Arsenic direct exposure soil action levels: See text; refer to *Update to Soil Action Levels for Inorganic Arsenic and Recommended Soil Management Practices*, HEER office Technical Memorandum (HDOH 2011a).

4. TEQ dioxin action levels: Based on noncancer RfD of 0.7 pg/kg-day, target HQ of 1.0 and assumed bioavailability in soil of 50% for the ingestion route (refer to text).

See text for equations and assumptions used in models.

Final action level is lowest of individual screening levels for carcinogenic effects and noncarcinogenic effects or action level for construction/trench workers if lower (see Table K-3). Saturation limit used as upper limit for volatile organic compounds that are liquid at ambient conditions (see text).

Saturation: Theoretical soil saturation level in the absence of free product; calculated for volatile organic compounds that are liquids under ambient conditions (refer to Table G-1a).

TPH:Total Petroleum Hydrocarbons. See Chapter 6 of Appendix 1for discussion of different TPH categories and development of action levels.

TPHmd saturation level set to 500 mg/kg vs model-derived 150 mg/kg to address low confidence in direct exposure, vapor emission model (see Chapter 6)

Ethanol: Human health toxicity data not available. Environmental concerns driven by gross contamination/nuisance concerns.

Direct-exposure screening level for lead from USEPA Regional Screening Levels (USEPA 2011).

TABLE K-3. DIRECT-EXPOSURE SCREENING LEVELS
CONSTRUCTION/TRENCH WORKER EXPOSURE SCENARIO

CHEMICAL	Final Screening Level (mg/kg)	Basis	[1]Carcinogens (Risk = 10^{-5}) (mg/kg)	[2]Noncarcinogens (Final) (mg/kg)	[2]Noncarcinogens (HQ = 1.0) (mg/kg)	Saturation (mg/kg)
ACENAPHTHENE	1.3E+04	noncarcinogenic effects		1.3E+04	6.5E+04	NA
ACENAPHTHYLENE	4.5E+03	noncarcinogenic effects		4.5E+03	2.3E+04	NA
ACETONE	1.1E+05	saturation limit		2.6E+05	1.3E+06	1.1E+05
ALDRIN	1.2E+02	noncarcinogenic effects	7.0E+02	1.2E+02	2.4E+02	NA
AMETRYN	3.0E+03	noncarcinogenic effects		3.0E+03	1.5E+04	NA
AMINO,2- DINITROTOLUENE,4,6-	9.8E+02	noncarcinogenic effects		9.8E+02	4.9E+03	NA
AMINO,4- DINITROTOLUENE,2,6-	9.7E+02	noncarcinogenic effects		9.7E+02	4.8E+03	NA
ANTHRACENE	8.1E+04	noncarcinogenic effects		8.1E+04	4.1E+05	NA
ANTIMONY	2.0E+02	noncarcinogenic effects		2.0E+02	1.0E+03	NA
ARSENIC	3.3E+02	noncarcinogenic effects	6.4E+02	3.3E+02	3.3E+02	NA
ATRAZINE	7.2E+02	carcinogenic effects	7.2E+02	1.2E+04	5.8E+04	NA
BARIUM	4.3E+03	noncarcinogenic effects		4.3E+03	2.2E+04	NA
BENOMYL	1.7E+04	noncarcinogenic effects		1.7E+04	8.3E+04	NA
BENZENE	3.0E+01	carcinogenic effects	3.0E+01	1.4E+02	7.0E+02	1.9E+03
BENZO(a)ANTHRACENE	2.0E+02	carcinogenic effects	2.0E+02			NA
BENZO(a)PYRENE	2.0E+01	carcinogenic effects	2.0E+01			NA
BENZO(b)FLUORANTHENE	2.0E+02	carcinogenic effects	2.0E+02			NA
BENZO(g,h,i)PERYLENE	1.2E+04	noncarcinogenic effects		1.2E+04	6.0E+04	NA
BENZO(k)FLUORANTHENE	2.0E+03	carcinogenic effects	2.0E+03			NA
BERYLLIUM	1.5E+02	noncarcinogenic effects	1.9E+03	1.5E+02	7.6E+02	NA
BIPHENYL, 1,1-	6.2E+01	noncarcinogenic effects	1.7E+03	6.2E+01	3.1E+02	NA
BIS(2-CHLOROETHYL)ETHER	6.5E+00	carcinogenic effects	6.5E+00			5.0E+03
BIS(2-CHLORO-1-METHYLETHYL)ETHER	1.0E+02	carcinogenic effects	1.0E+02	3.3E+03	1.6E+04	7.9E+02
BIS(2-ETHYLHEXYL)PHTHALATE	6.6E+03	noncarcinogenic effects	1.2E+04	6.6E+03	3.3E+04	NA
BORON	6.5E+04	noncarcinogenic effects		6.5E+04	3.2E+05	NA
BROMODICHLOROMETHANE	7.4E+00	carcinogenic effects	7.4E+00	4.3E+02	2.1E+03	9.3E+02
BROMOFORM	5.2E+03	carcinogenic effects	5.2E+03	1.0E+04	5.1E+04	NA
BROMOMETHANE	9.8E+00	noncarcinogenic effects		9.8E+00	4.9E+01	3.6E+03
CADMIUM	6.5E+01	noncarcinogenic effects	2.5E+03	6.5E+01	3.2E+02	NA
CARBON TETRACHLORIDE	1.7E+01	carcinogenic effects	1.7E+01	1.9E+02	9.6E+02	4.5E+02
CHLORDANE (TECHNICAL)	5.6E+02	carcinogenic effects	5.6E+02	5.7E+02	5.7E+02	NA
CHLOROANILINE, p-	8.3E+02	carcinogenic effects	8.3E+02	1.3E+03	6.6E+03	NA
CHLOROBENZENE	4.3E+02	noncarcinogenic effects		4.3E+02	2.2E+03	7.6E+02
CHLOROETHANE	2.1E+03	saturation limit		1.9E+04	9.3E+04	2.1E+03
CHLOROFORM	8.0E+00	carcinogenic effects	8.0E+00	3.4E+02	1.7E+03	2.5E+03
CHLOROMETHANE	1.5E+02	noncarcinogenic effects		1.5E+02	7.6E+02	1.3E+03
CHLOROPHENOL, 2-	1.5E+03	noncarcinogenic effects		1.5E+03	7.6E+03	2.7E+04
CHROMIUM (Total)		not available				
CHROMIUM III	7.6E+05	noncarcinogenic effects		7.6E+05	3.8E+06	NA
CHROMIUM VI	4.8E+02	carcinogenic effects	4.8E+02	5.7E+02	2.8E+03	NA
CHRYSENE	2.0E+04	carcinogenic effects	2.0E+04			NA
COBALT	4.0E+01	noncarcinogenic effects	5.0E+02	4.0E+01	2.0E+02	NA
COPPER	2.0E+04	noncarcinogenic effects		2.0E+04	1.0E+05	NA
CYANIDE (Free)	5.0E+01	noncarcinogenic effects		5.0E+01	2.5E+02	NA
CYCLO-1,3,5-TRIMETHYLENE-2,4,6-TRINITRAMINE (RDX)	1.4E+03	noncarcinogenic effects	2.1E+03	1.4E+03	7.0E+03	NA
DALAPON	9.9E+03	noncarcinogenic effects		9.9E+03	5.0E+04	NA
DIBENZO(a,h)ANTHTRACENE	2.0E+01	carcinogenic effects	2.0E+01			NA
DIBROMO,1,2- CHLOROPROPANE,3-	3.7E-01	carcinogenic effects	3.7E-01	8.3E+00	4.1E+01	9.8E+02

TABLE K-3. DIRECT-EXPOSURE SCREENING LEVELS
CONSTRUCTION/TRENCH WORKER EXPOSURE SCENARIO

CHEMICAL	Final Screening Level (mg/kg)	Basis	[1]Carcinogens (Risk = 10^{-5}) (mg/kg)	[2]Noncarcinogens (Final) (mg/kg)	[2]Noncarcinogens (HQ = 1.0) (mg/kg)	Saturation (mg/kg)
DIBROMOCHLOROMETHANE	2.4E+01	carcinogenic effects	2.4E+01	8.2E+02	4.1E+03	NA
DIBROMOETHANE, 1,2-	9.3E-01	carcinogenic effects	9.3E-01	1.1E+02	5.3E+02	NA
DICHLOROBENZENE, 1,2-	3.8E+02	saturation limit		3.1E+03	1.5E+04	3.8E+02
DICHLOROBENZENE, 1,3-	6.0E+02	saturation limit		2.0E+03	9.8E+03	6.0E+02
DICHLOROBENZENE, 1,4-	6.6E+01	carcinogenic effects	6.6E+01	8.8E+03	4.4E+04	NA
DICHLOROBENZIDINE, 3,3-	3.6E+02	carcinogenic effects	3.6E+02			NA
DICHLORODIPHENYLDICHLOROETHANE (DDD)	6.8E+02	carcinogenic effects	6.8E+02			NA
DICHLORODIPHENYLDICHLOROETHYLENE (DDE)	7.0E+02	carcinogenic effects	7.0E+02			NA
DICHLORODIPHENYLTRICHLOROETHANE (DDT)	2.2E+02	noncarcinogenic effects	6.3E+02	2.2E+02	1.1E+03	NA
DICHLOROETHANE, 1,1-	9.0E+01	carcinogenic effects	9.0E+01	2.3E+03	1.1E+04	1.7E+03
DICHLOROETHANE, 1,2-	1.2E+01	carcinogenic effects	1.2E+01	4.5E+01	2.2E+02	3.0E+03
DICHLOROETHYLENE, 1,1-	3.2E+02	noncarcinogenic effects		3.2E+02	1.6E+03	1.2E+03
DICHLOROETHYLENE, Cis 1,2-	2.7E+01	noncarcinogenic effects		2.7E+01	1.4E+02	2.4E+03
DICHLOROETHYLENE, Trans 1,2-	1.9E+02	noncarcinogenic effects		1.9E+02	9.7E+02	1.9E+03
DICHLOROPHENOL, 2,4-	9.9E+02	noncarcinogenic effects		9.9E+02	5.0E+03	NA
DICHLOROPHENOXYACETIC ACID (2,4-D)	4.0E+03	noncarcinogenic effects		4.0E+03	2.0E+04	NA
DICHLOROPROPANE, 1,2-	2.1E+01	noncarcinogenic effects	2.5E+01	2.1E+01	1.1E+02	1.4E+03
DICHLOROPROPENE, 1,3-	5.0E+01	carcinogenic effects	5.0E+01	9.8E+01	4.9E+02	1.6E+03
DIELDRIN	6.6E+01	noncarcinogenic effects	2.3E+02	6.6E+01	1.3E+02	NA
DIETHYLPHTHALATE	2.6E+05	noncarcinogenic effects		2.6E+05	1.3E+06	NA
DIMETHYLPHENOL, 2,4-	6.6E+03	noncarcinogenic effects		6.6E+03	3.3E+04	NA
DIMETHYLPHTHALATE	1.0E+06	maximum		3.3E+06	1.7E+07	NA
DINITROBENZENE, 1,3-	3.3E+01	noncarcinogenic effects		3.3E+01	1.7E+02	NA
DINITROPHENOL, 2,4-	6.6E+02	noncarcinogenic effects		6.6E+02	3.3E+03	NA
DINITROTOLUENE, 2,4- (2,4-DNT)	5.2E+02	carcinogenic effects	5.2E+02	6.6E+02	3.3E+03	NA
DINITROTOLUENE, 2,6- (2,6-DNT)	1.0E+02	noncarcinogenic effects	1.1E+02	1.0E+02	5.0E+02	NA
DIOXANE, 1,4-	1.5E+03	noncarcinogenic effects	1.7E+03	1.5E+03	7.5E+03	1.2E+05
DIOXINS (TEQ)	1.4E-03	commercial/industrial	3.2E-02	3.0E-03	3.0E-03	NA
DIURON	6.6E+02	noncarcinogenic effects		6.6E+02	3.3E+03	NA
ENDOSULFAN	3.0E+03	noncarcinogenic effects		3.0E+03	1.5E+04	NA
ENDRIN	9.9E+01	noncarcinogenic effects		9.9E+01	5.0E+02	NA
ETHANOL		not available				
ETHYLBENZENE	1.5E+02	carcinogenic effects	1.5E+02	6.9E+03	3.5E+04	4.8E+02
FLUORANTHENE	1.2E+04	noncarcinogenic effects		1.2E+04	6.0E+04	NA
FLUORENE	1.0E+04	noncarcinogenic effects		1.0E+04	5.0E+04	NA
GLYPHOSATE	3.3E+04	noncarcinogenic effects		3.3E+04	1.7E+05	NA
HEPTACHLOR	4.6E+01	carcinogenic effects	4.6E+01	2.5E+02	1.3E+03	NA
HEPTACHLOR EPOXIDE	6.6E+00	noncarcinogenic effects	2.4E+01	6.6E+00	3.3E+01	NA
HEXACHLOROBENZENE	6.2E+01	carcinogenic effects	6.2E+01	4.0E+02	2.0E+03	NA
HEXACHLOROBUTADIENE	3.1E+02	carcinogenic effects	3.1E+02	5.1E+02	2.5E+03	NA
HEXACHLOROCYCLOHEXANE (gamma) LINDANE	1.3E+02	noncarcinogenic effects	1.9E+02	1.3E+02	6.3E+02	NA
HEXACHLOROETHANE	1.7E+02	noncarcinogenic effects	4.7E+02	1.7E+02	8.7E+02	NA
HEXAZINONE	1.1E+04	noncarcinogenic effects		1.1E+04	5.5E+04	NA
INDENO(1,2,3-cd)PYRENE	2.0E+02	carcinogenic effects	2.0E+02			NA
ISOPHORONE	6.6E+04	noncarcinogenic effects	1.7E+05	6.6E+04	3.3E+05	NA
LEAD	8.0E+02	commercial/industrial exposure				NA
MERCURY	1.4E+02	noncarcinogenic effects		1.4E+02	7.2E+02	NA
METHOXYCHLOR	1.7E+03	noncarcinogenic effects		1.7E+03	8.3E+03	NA

TABLE K-3. DIRECT-EXPOSURE SCREENING LEVELS
CONSTRUCTION/TRENCH WORKER EXPOSURE SCENARIO

CHEMICAL	Final Screening Level (mg/kg)	Basis	[1]Carcinogens (Risk = 10^{-5}) (mg/kg)	[2]Noncarcinogens (Final) (mg/kg)	[2]Noncarcinogens (HQ = 1.0) (mg/kg)	Saturation (mg/kg)
METHYL ETHYL KETONE	2.8E+04	saturation limit		6.7E+04	3.4E+05	2.8E+04
METHYL ISOBUTYL KETONE	3.4E+03	saturation limit		4.5E+04	2.2E+05	3.4E+03
METHYL MERCURY	5.1E+01	noncarcinogenic effects		5.1E+01	2.5E+02	NA
METHYL TERT BUTYL ETHER	1.2E+03	carcinogenic effects	1.2E+03	2.1E+04	1.0E+05	8.9E+03
METHYLENE CHLORIDE	1.2E+03	noncarcinogenic effects	7.0E+03	1.2E+03	5.8E+03	3.3E+03
METHYLNAPHTHALENE, 1-	2.7E+02	carcinogenic effects	2.7E+02	1.1E+04	5.5E+04	NA
METHYLNAPHTHALENE, 2-	6.3E+02	noncarcinogenic effects		6.3E+02	3.1E+03	NA
MOLYBDENUM	2.5E+03	noncarcinogenic effects		2.5E+03	1.3E+04	NA
NAPHTHALENE	9.6E+01	carcinogenic effects	9.6E+01	1.9E+02	9.5E+02	NA
NICKEL	7.5E+02	noncarcinogenic effects		7.5E+02	3.8E+03	NA
NITROBENZENE	1.3E+02	carcinogenic effects	1.3E+02	4.8E+02	2.4E+03	3.0E+03
NITROGLYCERIN	3.3E+01	noncarcinogenic effects	9.7E+03	3.3E+01	1.7E+02	NA
NITROTOLUENE, 2-	6.9E+01	carcinogenic effects	6.9E+01	2.7E+02	1.4E+03	NA
NITROTOLUENE, 3-	3.3E+01	noncarcinogenic effects		3.3E+01	1.6E+02	NA
NITROTOLUENE, 4-	1.3E+03	noncarcinogenic effects	1.0E+04	1.3E+03	6.6E+03	NA
PENTACHLOROPHENOL	2.7E+02	carcinogenic effects	2.7E+02	1.1E+03	5.5E+03	NA
PENTAERYTHRITOLTETRANITRATE (PETN)	6.6E+02	noncarcinogenic effects	4.1E+04	6.6E+02	3.3E+03	NA
PERCHLORATE	3.5E+02	noncarcinogenic effects		3.5E+02	1.8E+03	NA
PHENANTHRENE	1.1E+04	noncarcinogenic effects		1.1E+04	5.3E+04	NA
PHENOL	9.4E+04	noncarcinogenic effects		9.4E+04	4.7E+05	NA
POLYCHLORINATED BIPHENYLS (PCBs)	2.9E+01	noncarcinogenic effects	6.7E+01	2.9E+01	2.9E+01	NA
PROPICONAZOLE	4.3E+03	noncarcinogenic effects		4.3E+03	2.2E+04	NA
PYRENE	8.7E+03	noncarcinogenic effects		8.7E+03	4.4E+04	NA
SELENIUM	2.5E+03	noncarcinogenic effects		2.5E+03	1.2E+04	NA
SILVER	2.5E+03	noncarcinogenic effects		2.5E+03	1.3E+04	NA
SIMAZINE	1.4E+03	carcinogenic effects	1.4E+03	1.7E+03	8.3E+03	NA
STYRENE	8.7E+02	saturation limit		1.2E+04	5.9E+04	8.7E+02
TERBACIL	4.3E+03	noncarcinogenic effects		4.3E+03	2.2E+04	NA
tert-BUTYL ALCOHOL	2.7E+03	carcinogenic effects	2.7E+03			3.2E+05
TETRACHLOROETHANE, 1,1,1,2-	5.2E+01	carcinogenic effects	5.2E+01	9.2E+02	4.6E+03	6.8E+02
TETRACHLOROETHANE, 1,1,2,2-	1.6E+01	carcinogenic effects	1.6E+01	1.0E+04	5.1E+04	1.9E+03
TETRACHLOROETHYLENE	2.7E+01	carcinogenic effects	2.7E+01	1.3E+02	6.4E+02	1.7E+02
TETRACHLOROPHENOL, 2,3,4,6-	9.9E+03	noncarcinogenic effects		9.9E+03	5.0E+04	NA
TETRANITRO-1,3,5,7-TETRAAZOCYCLOOCTANE (HMX)	2.5E+04	noncarcinogenic effects		2.5E+04	1.2E+05	NA
THALLIUM	2.5E+01	noncarcinogenic effects		2.5E+01	2.5E+01	NA
TOLUENE	8.2E+02	saturation limit		1.7E+04	8.7E+04	8.2E+02
TOXAPHENE	1.5E+02	carcinogenic effects	1.5E+02			NA
TPH (gasolines)	3.7E+03	noncarcinogenic effects		3.7E+03	3.7E+03	5.4E+03
TPH (middle distillates)	5.0E+02	saturation limit		1.9E+03	1.9E+03	5.0E+02
TPH (residual fuels)	3.0E+05	noncarcinogenic effects		3.0E+05	3.0E+05	NA
TRICHLOROBENZENE, 1,2,4-	8.2E+01	noncarcinogenic effects	2.2E+02	8.2E+01	4.1E+02	NA
TRICHLOROETHANE, 1,1,1-	6.4E+02	saturation limit		1.2E+04	5.8E+04	6.4E+02
TRICHLOROETHANE, 1,1,2-	2.0E+00	noncarcinogenic effects	3.0E+01	2.0E+00	1.0E+01	2.2E+03
TRICHLOROETHYLENE	6.1E+00	noncarcinogenic effects	3.6E+01	6.1E+00	3.0E+01	6.9E+02
TRICHLOROPHENOL, 2,4,5-	3.3E+04	noncarcinogenic effects		3.3E+04	1.6E+05	NA
TRICHLOROPHENOL, 2,4,6-	3.3E+02	noncarcinogenic effects	1.5E+04	3.3E+02	1.7E+03	NA
TRICHLOROPHENOXYACETIC ACID, 2,4,5- (2,4,5-T)	3.3E+03	noncarcinogenic effects		3.3E+03	1.7E+04	NA
TRICHLOROPHENOXYPROPIONIC ACID, 2,4,5- (2,4,5-TP)	2.6E+03	noncarcinogenic effects		2.6E+03	1.3E+04	NA

TABLE K-3. DIRECT-EXPOSURE SCREENING LEVELS
CONSTRUCTION/TRENCH WORKER EXPOSURE SCENARIO

CHEMICAL	Final Screening Level (mg/kg)	Basis	[1]Carcinogens (Risk = 10^{-5}) (mg/kg)	[2]Noncarcinogens (Final) (mg/kg)	[2]Noncarcinogens (HQ = 1.0) (mg/kg)	Saturation (mg/kg)
TRICHLOROPROPANE, 1,2,3-	1.3E-01	carcinogenic effects	1.3E-01	6.7E+00	3.3E+01	1.4E+03
TRICHLOROPROPENE, 1,2,3-	9.9E-01	noncarcinogenic effects		9.9E-01	5.0E+00	3.1E+02
TRIFLURALIN	3.8E+03	noncarcinogenic effects	3.3E+04	3.8E+03	1.9E+04	NA
TRINITROBENZENE, 1,3,5-	1.4E+04	noncarcinogenic effects		1.4E+04	6.9E+04	NA
TRINITROPHENYLMETHYLNITRAMINE, 2,4,6- (TETRYL)	1.0E+03	noncarcinogenic effects		1.0E+03	5.0E+03	NA
TRINITROTOLUENE, 2,4,6- (TNT)	2.2E+02	noncarcinogenic effects	7.2E+03	2.2E+02	1.1E+03	NA
VANADIUM	6.6E+02	noncarcinogenic effects		6.6E+02	3.3E+03	NA
VINYL CHLORIDE	1.1E+01	carcinogenic effects	1.1E+01	1.2E+02	6.2E+02	3.9E+03
XYLENES	2.6E+02	saturation limit		8.0E+02	4.0E+03	2.6E+02
ZINC	1.5E+05	noncarcinogenic effects		1.5E+05	7.6E+05	NA

Primary source: USEPA Regional Screening Levels (USEPA 2016), modified as noted below and described in Appendix 1, Section 3.2.

1. Carcinogens: Default target excess cancer risk = 10^{-5}. Target excess cancer risk of 10^{-6} used for volatile contaminants that are carcinogens. Target risk of 5^{-5} applied to arsenic. Target risk of 10^{-4} applied to aldrin, dieldrin, TEQ dioxins and hexavalent chromium action levels to reflect on higher confidence in noncancer toxicity factors and/or background and other factors.

2. Noncarcinogens: Final action level based on default target hazard quotient = 0.2 unless otherwise noted. TPH action levels based on HQ of 1.0 (see Section 3.2 in text). Action levels for Technical Chlordane based on HQ of 1.0. Action levels for aldrin and dieldrin (breakdown product of aldrin) based on HQ of 0.5. All chemicals - Screening levels based on hazard quotient of 1.0 provided for reference.

3. Arsenic direct exposure soil action levels: See text; refer to Update to Soil Action Levels for Inorganic Arsenic and Recommended Soil Management Practices, HEER office Technical Memorandum (HDOH 2011b).

4. Maximum dioxin screening level set equal to commercial/industrial screening level to address dietary contribution (see text).

Notes:

See text for equations and assumptions used in models.

Final action level is lowest of individual screening levels for carcinogenic effects and noncarcinogenic effects. Saturation limit used as upper limit for volatile organic compounds that are liquid at ambient conditions (see Table G-1a).

Action levels for volatile chemicals may not fully consider increased vapor emissions during excavation of contaminated soil or work in trenches with poor air flow. Include actions to minimize worker exposure to VOCs and other contaminants that exceed action levels for commercial/industrial workers in Table K-2 in a worker Health and Safety Plan (e.g., PPE, good hygene, etc.).

Saturation: Theoretical soil saturation level in the absence of free product; calculated for volatile organic compounds that are liquids under ambient conditions (refer to Table G-1a).

TPH:Total Petroleum Hydrocarbons. See Chapter 6 of Appendix 1for discussion of different TPH categories and development of action levels.

TPHmd saturation level set to 500 mg/kg vs model-derived 150 mg/kg to address low confidence in direct exposure, vapor emission model (see Chapter 6)

Ethanol: Human health toxicity data not available. Environmental concerns driven by gross contamination/nuisance concerns.

Direct-exposure screening level for lead based on USEPA Regional Screening Levels for commercial/industrial exposure scenarios (USEPA 2011).

TABLE L. TARGET ORGANS AND CHRONIC HEALTH EFFECTS
(For general reference only. May not be adequately comprehensive for some chemicals. Some noted effects may be insignificant. Refer to original documents for additional information.)

	Target Organs And Health Effects														
CHEMICAL PARAMETER	[a]Carcinogen	[b]Mutagen	[c]Alimentary Tract	Cardiovascular	Developmental	Endocrine	Eye	Hematologic	Immune	Kidney	Nervous	Reproductive	Respiratory	[d]Skin	Other
ACENAPHTHENE	D		4,5						3					3	
ACENAPHTHYLENE	D							4,5	3					3	= Fluorene
ACETONE	D		4,5					2		4,5					
ALDRIN	B2		5								2				
AMETRYN	D		5												
AMINO,2- DINITROTOLUENE,4,6-	D		2,6				2,3	2,6				6		2,3	No data, TNT data shown
AMINO,4- DINITROTOLUENE,2,6-	D		2,6				2,3	2,6				6		2,3	No data, TNT data shown
ANTHRACENE	D								3					3	
ANTIMONY	D			3			2,3	4,6				3	1,2,3		
ARSENIC	A		2,3,5	1,3	1,2,3			2,3,5			1,2,3			1,2,3,5	
ATRAZINE	C		2	5,7	3,4,5					2		7		2	
BARIUM	D			3				4		5		4			
BENOMYL	C				5										
BENZENE	A		2		1,3			1,2,3	2		1				
BENZO(a)ANTHRACENE	B2	M							3					3	No chronic toxicity factors.
BENZO(a)PYRENE	B2	M							3			2		3	No chronic toxicity factors.
BENZO(b)FLUORANTHENE	B2	M							3					3	No chronic toxicity factors.
BENZO(g,h,i)PERYLENE	D		4,5					4,5	3	4,5				3	= Fluoranthene
BENZO(k)FLUORANTHENE	B2	M							3					3	No chronic toxicity factors.
BERYLLIUM	B1		1,5						1				1,2,3,5	2	
BIPHENYL, 1,1-	D		2							5	2				
BIS(2-CHLOROETHYL)ETHER	B2										3	3			No chronic toxicity factors.
BIS(2-CHLORO-1-METHYLETHYL)ETHER	B2							5							
BIS(2-ETHYLHEXYL)PHTHALATE	?		6,7									7			No chronic toxicity factors.
BORON	D											3,5	4		
BROMODICHLOROMETHANE	B2		3							3,5					
BROMOFORM	B2		2,3,5							3	2,3				
BROMOMETHANE	D		1,2,4,5	2			1			1,2,3	2,3		2,3,4,5		
CADMIUM	B1/D									1,2,3,4,5			1,2,3		bone loss (1,3)
CARBON TETRACHLORIDE	B2		1,3,5		1					3	1				
CHLORDANE (TECHNICAL)	B2		2,3,5						2,4		3				
CHLOROANILINE, p-	?		2,5						4	2				2	
CHLOROBENZENE	D		1,2,4,5					2		1,2,3,4	2	1			
CHLOROETHANE	B		1		1,3										
CHLOROFORM	B2		1,2,3,5		1					1,2,3					
CHLOROMETHANE	C/D				3						2	2,3			
CHLOROPHENOL, 2-	D		1,3		1							1,4,5			
CHROMIUM (Total)	-														
CHROMIUM III	D							1					1	2	
CHROMIUM VI	A	M						1				1	1,5		
CHRYSENE	B2	M							3					3	No chronic toxicity factors.
COBALT	?			2									2	2	hearing (2)
COPPER	D		7										1,3	2	
CYANIDE (Free)	D			1,3		1,3,5		3			1,4,5		3		
CYCLO-1,3,5-TRIMETHYLENE-2,4,6-TRINITRAMINE (RDX)	C		3		3					3					
DALAPON	D									2,5,7					
DIBENZO(a,h)ANTHTRACENE	B2	M							3					2,3	
DIBROMO-3-CHLOROPROPANE, 1,2-	B2	M	1		1					2		1,2,3,4,5	1		
DIBROMOCHLOROMETHANE	C		5												
DIBROMOETHANE, 1,2-	B2				3							3	1,2		

TABLE L. TARGET ORGANS AND CHRONIC HEALTH EFFECTS
(For general reference only. May not be adequately comprehensive for some chemicals. Some noted effects may be insignificant. Refer to original documents for additional information.)

CHEMICAL PARAMETER	Target Organs And Health Effects														
	[a]Carcinogen	[b]Mutagen	[c]Alimentary Tract	Cardiovascular	Developmental	Endocrine	Eye	Hematologic	Immune	Kidney	Nervous	Reproductive	Respiratory	[d]Skin	Other
DICHLOROBENZENE, 1,2-	D		2							2				2	
DICHLOROBENZENE, 1,3-	D		2							2					
DICHLOROBENZENE, 1,4-	C		1,2,5					2		1,2	1,	5	1		
DICHLOROBENZIDINE, 3,3-	B2		2												No chronic toxicity factors.
DICHLORODIPHENYLDICHLOROETHANE (DDD)	B2														No chronic toxicity factors.
DICHLORODIPHENYLDICHLOROETHYLENE (DDE)	B2														No chronic toxicity factors.
DICHLORODIPHENYLTRICHLOROETHANE (DDT)	B2		2,3,5								2	2			
DICHLOROETHANE, 1,1-	C		2							2,3,4,6					
DICHLOROETHANE, 1,2-	B2		1,												
DICHLOROETHYLENE, 1,1-	C/D		1,2,3,4,5							2	3		3		
DICHLOROETHYLENE, Cis 1,2-	D		3					3,4,6							
DICHLOROETHYLENE, Trans 1,2-	D		3					4,5					3		
DICHLOROPHENOL, 2,4-	E								4						
DICHLOROPHENOXYACETIC ACID (2,4-D)	D		5,7			7		5		5,7					
DICHLOROPROPANE, 1,2-	B2		2					2					4		
DICHLOROPROPENE, 1,3-	B2		5										3		
DIELDRIN	B2		5								2				
DIETHYLPHTHALATE	D				5							3			
DIMETHYLPHENOL, 2,4-	?							4,5			4,5				
DIMETHYLPHTHALATE	D														Information not available
DINITROBENZENE, 1,3-	D		2		2		2	2	5		2	2			
DINITROPHENOL, 2,4-	?						2,5				2				
DINITROTOLUENE, 2,4- (2,4-DNT)	D		5,6	3				2,3,5,6			3,5,6	4,6			
DINITROTOLUENE, 2,6- (2,6-DNT)	D		6	3	2			2,3,6			3	2,6			
DIOXANE, 1,4-	B2		1	1						1					
DIOXIN (TEQ)	B1?		1,3		1,3	1,3		1	3			1,3	1,3	3	No chronic toxicity factors.
DIURON	D							5							
ENDOSULFAN	?		3		3,5			5	3	3,4,5	3,5	3			
ENDRIN	D		4,5		3					5	4				
ETHANOL	D														
ETHYLBENZENE	D		1,4,5		1,3,5	1				1,4,5	2	2		2	
FLUORANTHENE	D		4,5					4,5	3	4,5				3	
FLUORENE	D							4,5	3					3	
GLYPHOSATE	D									5,7		7			
HEPTACHLOR	B2		5								6				
HEPTACHLOR EPOXIDE	B2		5								6				
HEXACHLOROBENZENE	B2		1,2,3,5			3		3	3	3	2,3	2			bones (3)
HEXACHLOROBUTADIENE	C		3							3				2	
HEXACHLOROCYCLOHEXANE (gamma) LINDANE	B2		1							1,2,5					
HEXACHLOROETHANE	C		2,3							2,3,5					
HEXAZINONE	D				5										
INDENO(1,2,3-cd)PYRENE	B2	M							3					3	No chronic toxicity factors.
ISOPHORONE	C		1		1										
LEAD	B2		2,6	6	2,6			2,6	2,6	2,6	2,6	6			
MERCURY	D				3				1	1,2	1,2,4,5				
METHOXYCHLOR	D		2		5					2	2	2,4,5			
METHYL ETHYL KETONE	D				5							1,2			
METHYL ISOBUTYL KETONE	D										6				
METHYL MERCURY	C				5						1,5				
METHYL TERT BUTYL ETHER	?		1,5				1			1,5					

TABLE L. TARGET ORGANS AND CHRONIC HEALTH EFFECTS
(For general reference only. May not be adequately comprehensive for some chemicals. Some noted effects may be insignificant. Refer to original documents for additional information.)

	Target Organs And Health Effects														
CHEMICAL PARAMETER	[a]Carcinogen	[b]Mutagen	[c]Alimentary Tract	Cardiovascular	Developmental	Endocrine	Eye	Hematologic	Immune	Kidney	Nervous	Reproductive	Respiratory	[d]Skin	Other
METHYLENE CHLORIDE	B2	M	2,5	1						2	1				
METHYLNAPHTHALENE, 1-	C							4,5	3					3	= Fluorene
METHYLNAPHTHALENE, 2-	D							4,5	3					3	= Fluorene
MOLYBDENUM	D							5							
NAPHTHALENE	C						2	2	3				1,5	3	
NICKEL	A/D		1,5					1		5			1,2	2	
NITROBENZENE	D		1,2,3,4,5,6		2	4,5,6		2,3,4,5,6		4,5,6	1,6		2	6	
NITROGLYCERIN	?														Information not available
NITROTOLUENE, 2-	?		2					2				2			
NITROTOLUENE, 3-	D							2							
NITROTOLUENE, 4-	?		2					2				2			
PENTACHLOROPHENOL	B2		1,2,3,5		1,3			3	3	2,5	2,3	1	2,3		
PENTAERYTHRITOLTETRANITRATE (PETN)	?														Information not available
PERCHLORATE	D					7		2							
PHENANTHRENE	D							4,5	3					3	= Fluorene
PHENOL	D		1,2		3,5			1		1,2	1	4	1		
POLYCHLORINATED BIPHENYLS (PCBs)	B2		1,2,3		1,3	3	5	3	1,3,5			1,2,3		3	
PROPICONAZOLE	D		5												
PYRENE	D								3	4,5					
SELENIUM	D		1,2,5	1				5			1		1,2	2,3,5	Selenosis (3,5)
SILVER	D													2,3,5	
SIMAZINE	?				4,5			5,7						2	
STYRENE	C		3,4,5					4,5			1,2,4,5		2	2	
TERBACIL	D		5			5									
tert-BUTYL ALCOHOL	?														No chronic toxicity factors.
TETRACHLOROETHANE, 1,1,1,2-	C		5							5					
TETRACHLOROETHANE, 1,1,2,2-	C		2,3								2,3				
TETRACHLOROETHYLENE	C		1,2,5							1,2					
TETRACHLOROPHENOL, 2,3,4,6-	D		1		1							1			
TETRANITRO-1,3,5,7-TETRAAZOCYCLOOCTANE (HMX)	D														
THALLIUM	D		2	2			2	5			2,3	2,3		2	
TOLUENE	D		4,5		1,3					4,5	1,2,5	2	1,5		
TOXAPHENE	B2		3			3			3	3					
TPH (gasolines)	D		8					8		8	8				Decreased body weight
TPH (middle distillates)	D		8					8		8	8				Decreased body weight
TPH (residual fuels)	D		8					8		8	8				Decreased body weight
TRICHLOROBENZENE, 1,2,4-	D					4,5									
TRICHLOROETHANE, 1,1,1-	D		2,6	7							1				
TRICHLOROETHANE, 1,1,2-	C		5					6	7					2	
TRICHLOROETHYLENE	B2	M	2,3,6		3,6		1	3	6	2,3,6	1,2,3				
TRICHLOROPHENOL, 2,4,5-	D		1,2,4,5		1					2,4,5		1			
TRICHLOROPHENOL, 2,4,6-	B2		2												
TRICHLOROPHENOXYACETIC ACID, 2,4,5- (2,4,5-T)	D				2					5		2,5			
TRICHLOROPHENOXYPROPIONIC ACID, 2,4,5- (2,4,5-TP)	D		4,5,7												
TRICHLOROPROPANE, 1,2,3-	?	M	3					3,5		3			3		
TRICHLOROPROPENE, 1,2,3-	D														Information not available
TRIFLURALIN	C		5					5						2	
TRINITROPHENYLMETHYLNITRAMINE, 2,4,6- (TETRYL)	D		2					2		2			2	2	
TRINITROTOLUENE, 1,3,5-	?														Information not available
TRINITROTOLUENE, 2,4,6- (TNT)	C		2,5,6				2,3	2,6				6		2,3	

TABLE L. TARGET ORGANS AND CHRONIC HEALTH EFFECTS
(For general reference only. May not be adequately comprehensive for some chemicals. Some noted effects may be insignificant. Refer to original documents for additional information.)

CHEMICAL PARAMETER	Target Organs And Health Effects														
	[a]Carcinogen	[b]Mutagen	[c]Alimentary Tract	Cardiovascular	Developmental	Endocrine	Eye	Hematologic	Immune	Kidney	Nervous	Reproductive	Respiratory	[d]Skin	Other
VANADIUM	D		3							3			2,3		
VINYL CHLORIDE	A	M	1,2,3,5		1,3			2,3	3		3	1,3		2	No chronic toxicity factors.
XYLENES	D										1,2,3,4,5		1		
ZINC	D			1		3		1,3,4,5					1		

Notes:
a. Carcinogen type from RWQCBCV 2007; ORNL 2001 (see classification below).
b. Chemicals classified as mutagenic (M) in USEPA Regional Screening Levels guidance (USEPA 2008a).
c. Includes gastro-intestinal tract, liver, spleen, gall bladder, etc.
d. Includes skin sensitization but not general dermatitis or defatting of skin.

Carcinogen Classification
A: Human carcinogen
B: Probable human carcinogen (B1: limited human evidence; B2 Sufficient evidence in animals and inadequate or no evidence in humans)
C: Possible human carcinogen
D: Not classifiable as to human carcinogenicity
E: Evidence of noncarcinogenicity for humans
NA: Carcinogen classification information not available

References:

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2. CDC, 2007, International Chemical Safety Cards: International Programme on Chemical Safety: United Nations Environment Program, International Labour Office and World Health Organization (accessed December 2007); published through US Department of Health and Human Services, Centers for Disease Control and Prevention, http://www.cdc.gov/niosh/ipcs/icstart.html
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7. USEPA National Primary Drinking Water Standards (March 2001): U.S. Environmental Protection Agency, Office of Water, EPA 816-F-01-007, http://www.epa.gov/safewater/consumer/pdf/mcl.pdf (selectively used)
8. TPH whole product toxicity based review of TPH Working Group petroleum carbon fraction guidance (TPHWG 1998, Volume 4) and Massachusetts DEP VPH/EPH guidance (MADEP 2002a).
For additional online references, see also: Hazardous Substances (On-line) Database: U.S. National Library of Medicine, Toxicology Data Network, http://toxnet.nlm.nih.go\

TABLE M. NATURAL BACKGROUND CONCENTRATIONS OF METALS IN SOIL
(Hawai'i background sceening levels refered to for ESLs)

CHEMICAL PARAMETER	[1]Hawai'i Background Soil Data				[2]Guam Background Soil Data (mg/kg)
	Range (mg/kg)	[2]Upper Bound (mg/kg)	[3]Background Threshold Value (mg/kg)	[4]Selected Screening Level (mg/kg)	
ACENAPHTHENE					
ACENAPHTHYLENE					
ACETONE					
ALDRIN					
AMETRYN					
AMINO,2- DINITROTOLUENE,4,6-					
AMINO,4- DINITROTOLUENE,2,6-					
ANTHRACENE					
ANTIMONY	0.004-2.4	2.4E+00	2.4E+00	2.4E+00	4.5E+01
ARSENIC	0.3-50	2.4E+01	5.0E+01	2.4E+01	2.0E+01
ATRAZINE					
BARIUM	4.5-926	6.9E+02	9.3E+02	6.9E+02	
BENOMYL					
BENZENE					
BENZO(a)ANTHRACENE					
BENZO(a)PYRENE					
BENZO(b)FLUORANTHENE					
BENZO(g,h,i)PERYLENE					
BENZO(k)FLUORANTHENE					
BERYLLIUM	0.05-3.8	3.0E+00	3.8E+00	3.0E+00	3.0E+00
BIPHENYL, 1,1-					
BIS(2-CHLOROETHYL)ETHER					
BIS(2-CHLORO-1-METHYLETHYL)ETHER					
BIS(2-ETHYLHEXYL)PHTHALATE					
BORON					
BROMODICHLOROMETHANE					
BROMOFORM					
BROMOMETHANE					
CADMIUM	0.02-17	2.3E+00	1.7E+01	2.3E+00	1.5E+01
CARBON TETRACHLORIDE					
CHLORDANE (TECHNICAL)					
CHLOROANILINE, p-					
CHLOROBENZENE					
CHLOROETHANE					
CHLOROFORM					
CHLOROMETHANE					
CHLOROPHENOL, 2-					
CHROMIUM (Total)	8.52-3,180	1.1E+03	3.2E+03	1.1E+03	1.0E+03
CHROMIUM III					
CHROMIUM VI					
CHRYSENE					
COBALT	0.69-113	8.0E+01	1.1E+02	8.0E+01	
COPPER	2.4-450	2.5E+02	4.5E+02	2.5E+02	1.9E+02

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(Hawai'i background sceening levels refered to for ESLs)

CHEMICAL PARAMETER	[1]Hawai'i Background Soil Data				[2]Guam Background Soil Data (mg/kg)
	Range (mg/kg)	[2]Upper Bound (mg/kg)	[3]Background Threshold Value (mg/kg)	[4]Selected Screening Level (mg/kg)	
CYANIDE (Free)					
CYCLO-1,3,5-TRIMETHYLENE-2,4,6-TRINITRAMINE (RDX)					
DALAPON					
DIBENZO(a,h)ANTHTRACENE					
DIBROMO,1,2- CHLOROPROPANE,3-					
DIBROMOCHLOROMETHANE					
DIBROMOETHANE, 1,2-					
DICHLOROBENZENE, 1,2-					
DICHLOROBENZENE, 1,3-					
DICHLOROBENZENE, 1,4-					
DICHLOROBENZIDINE, 3,3-					
DICHLORODIPHENYLDICHLOROETHANE (DDD)					
DICHLORODIPHENYLDICHLOROETHYLENE (DDE)					
DICHLORODIPHENYLTRICHLOROETHANE (DDT)					
DICHLOROETHANE, 1,1-					
DICHLOROETHANE, 1,2-					
DICHLOROETHYLENE, 1,1-					
DICHLOROETHYLENE, Cis 1,2-					
DICHLOROETHYLENE, Trans 1,2-					
DICHLOROPHENOL, 2,4-					
DICHLOROPHENOXYACETIC ACID (2,4-D)					
DICHLOROPROPANE, 1,2-					
DICHLOROPROPENE, 1,3-					
DIELDRIN					
DIETHYLPHTHALATE					
DIMETHYLPHENOL, 2,4-					
DIMETHYLPHTHALATE					
DINITROBENZENE, 1,3-					
DINITROPHENOL, 2,4-					
DINITROTOLUENE, 2,4- (2,4-DNT)					
DINITROTOLUENE, 2,6- (2,6-DNT)					
DIOXANE, 1,4-					
DIOXINS (TEQ)				2.0E-05	
DIURON					
ENDOSULFAN					
ENDRIN					
ETHANOL					
ETHYLBENZENE					
FLUORANTHENE					
FLUORENE					
GLYPHOSATE					
HEPTACHLOR					
HEPTACHLOR EPOXIDE					
HEXACHLOROBENZENE					
HEXACHLOROBUTADIENE					

TABLE M. NATURAL BACKGROUND CONCENTRATIONS OF METALS IN SOIL
(Hawai'i background sceening levels refered to for ESLs)

CHEMICAL PARAMETER	[1]Hawai'i Background Soil Data				[2]Guam Background Soil Data (mg/kg)
	Range (mg/kg)	[2]Upper Bound (mg/kg)	[3]Background Threshold Value (mg/kg)	[4]Selected Screening Level (mg/kg)	
HEXACHLOROCYCLOHEXANE (gamma) LINDANE					
HEXACHLOROETHANE					
HEXAZINONE					
INDENO(1,2,3-cd)PYRENE					
ISOPHORONE					
LEAD	0.76-73	7.3E+01	7.3E+01	7.3E+01	5.0E+01
MERCURY	<0.017-1.4	7.2E-01	1.4E+00	7.2E-01	
METHOXYCHLOR					
METHYL ETHYL KETONE					
METHYL ISOBUTYL KETONE					
METHYL MERCURY					
METHYL TERT BUTYL ETHER					
METHYLENE CHLORIDE					
METHYLNAPHTHALENE, 1-					
METHYLNAPHTHALENE, 2-					
MOLYBDENUM	0.06-4.0	4.0E+00	4.0E+00	4.0E+00	
NAPHTHALENE					
NICKEL	2.1-767	4.1E+02	7.7E+02	4.1E+02	
NITROBENZENE					
NITROGLYCERIN					
NITROTOLUENE, 2-					
NITROTOLUENE, 3-					
NITROTOLUENE, 4-					
PENTACHLOROPHENOL					
PENTAERYTHRITOLTETRANITRATE (PETN)					
PERCHLORATE					
PHENANTHRENE					
PHENOL					
POLYCHLORINATED BIPHENYLS (PCBs)					
PROPICONAZOLE					
PYRENE					
SELENIUM	0.24-12	7.1E+00	1.2E+01	7.1E+00	
SILVER	0.02-1.5	1.5E+00	1.5E+00	1.5E+00	
SIMAZINE					
STYRENE					
TERBACIL					
tert-BUTYL ALCOHOL					
TETRACHLOROETHANE, 1,1,1,2-					
TETRACHLOROETHANE, 1,1,2,2-					
TETRACHLOROETHYLENE					
TETRACHLOROPHENOL, 2,3,4,6-					
TETRANITRO-1,3,5,7-TETRAAZOCYCLOOCTANE (HMX)					
THALLIUM	<0.25-15	2.5E-01	1.5E+01	2.5E-01	5.5E+00
TOLUENE					
TOXAPHENE					

TABLE M. NATURAL BACKGROUND CONCENTRATIONS OF METALS IN SOIL
(Hawai'i background sceening levels refered to for ESLs)

CHEMICAL PARAMETER	[1]Hawai'i Background Soil Data				[2]Guam Background Soil Data (mg/kg)
	Range (mg/kg)	[2]Upper Bound (mg/kg)	[3]Background Threshold Value (mg/kg)	[4]Selected Screening Level (mg/kg)	
TPH (gasolines)					
TPH (middle distillates)					
TPH (residual fuels)					
TRICHLOROBENZENE, 1,2,4-					
TRICHLOROETHANE, 1,1,1-					
TRICHLOROETHANE, 1,1,2-					
TRICHLOROETHYLENE					
TRICHLOROPHENOL, 2,4,5-					
TRICHLOROPHENOL, 2,4,6-					
TRICHLOROPHENOXYACETIC ACID, 2,4,5- (2,4,5-T)					
TRICHLOROPHENOXYPROPIONIC ACID, 2,4,5- (2,4,5-TP)					
TRICHLOROPROPANE, 1,2,3-					
TRICHLOROPROPENE, 1,2,3-					
TRIFLURALIN					
TRINITROBENZENE, 1,3,5-					
TRINITROPHENYLMETHYLNITRAMINE, 2,4,6- (TETRYL)					
TRINITROTOLUENE, 2,4,6- (TNT)					
VANADIUM	0.25-1,090	7.7E+02	1.1E+03	7.7E+02	
VINYL CHLORIDE					
XYLENES					
ZINC	3.6-1,200	3.5E+02	1.2E+03	3.5E+02	
Electrical Conductivity (mS/cm, USEPA Method 120.1 MOD)					
Sodium Adsorption Ratio					

Primary Reference: Evaluation of Background Metal Concentrations in Soils of the Hawaiian Islands (HDOH 2011a). Refer to Appendix 1, Section 4.7.

Notes:

1. Background Threshold Values selected for screening purposes.
2. Upper Bound concentration selected based on evaluation of univariate sample data plots.
3. Background Threshold Value set to maximum-reported concentration, excluding samples with suspected anthropogenic contamination.
4. Selected action level based on Upper Bound concentration unless otherwise noted.
5. BTV for arsenic based on profession judgment (widespread use as herbicide; clear break from anticipated, natural background not apparent on univariate graphs).
6. BTV for lead set equal to selected, Upper Bound concentration (common contamination of soil with leaded paint or auto exhaust from leaded gasoline; clear break from anticipated, natural background not apparent on univariate graphs).
7. TEQ dioxin background based on HEER office internal review of data across the state (see HDOH 2010). Could be higher in some areas.
8. Operable Unit-2, Basewide Remedial Investigation Report, NAS, Agana: Department of the Navy, Pacific Division, Naval Facilities Engineering Command, Hawai'I (USN 1996).

TABLE N. SOIL ECOTOXICITY SCREENING LEVELS

(Discontinued as of 2012 due to low confidence in use of published screening levels; site-specific assessment recommended as needed.)

	Terrestrial Ecotoxicity Criteria (mg/kg)	
CHEMICAL PARAMETER	Residential Areas	Commercial/ Industrial areas
ACENAPHTHENE	site-specific	site-specific
ACENAPHTHYLENE	site-specific	site-specific
ACETONE	site-specific	site-specific
ALDRIN	site-specific	site-specific
AMETRYN	site-specific	site-specific
AMINO,2- DINITROTOLUENE,4,6-	site-specific	site-specific
AMINO,4- DINITROTOLUENE,2,6-	site-specific	site-specific
ANTHRACENE	site-specific	site-specific
ANTIMONY	site-specific	site-specific
ARSENIC	site-specific	site-specific
ATRAZINE	site-specific	site-specific
BARIUM	site-specific	site-specific
BENOMYL	site-specific	site-specific
BENZENE	site-specific	site-specific
BENZO(a)ANTHRACENE	site-specific	site-specific
BENZO(a)PYRENE	site-specific	site-specific
BENZO(b)FLUORANTHENE	site-specific	site-specific
BENZO(g,h,i)PERYLENE	site-specific	site-specific
BENZO(k)FLUORANTHENE	site-specific	site-specific
BERYLLIUM	site-specific	site-specific
BIPHENYL, 1,1-	site-specific	site-specific
BIS(2-CHLOROETHYL)ETHER	site-specific	site-specific
BIS(2-CHLORO-1-METHYLETHYL)ETHER	site-specific	site-specific
BIS(2-ETHYLHEXYL)PHTHALATE	site-specific	site-specific
BORON	site-specific	site-specific
BROMODICHLOROMETHANE	site-specific	site-specific
BROMOFORM	site-specific	site-specific
BROMOMETHANE	site-specific	site-specific
CADMIUM	site-specific	site-specific
CARBON TETRACHLORIDE	site-specific	site-specific
CHLORDANE (TECHNICAL)	site-specific	site-specific
CHLOROANILINE, p-	site-specific	site-specific
CHLOROBENZENE	site-specific	site-specific
CHLOROETHANE	site-specific	site-specific
CHLOROFORM	site-specific	site-specific
CHLOROMETHANE	site-specific	site-specific
CHLOROPHENOL, 2-	site-specific	site-specific
CHROMIUM (Total)	site-specific	site-specific
CHROMIUM III	site-specific	site-specific
CHROMIUM VI	site-specific	site-specific
CHRYSENE	site-specific	site-specific
COBALT	site-specific	site-specific
COPPER	site-specific	site-specific
CYANIDE (Free)	site-specific	site-specific
CYCLO-1,3,5-TRIMETHYLENE-2,4,6-TRINITRAMINE (RDX)	site-specific	site-specific
DALAPON	site-specific	site-specific
DIBENZO(a,h)ANTHTRACENE	site-specific	site-specific
DIBROMO,1,2- CHLOROPROPANE,3-	site-specific	site-specific
DIBROMOCHLOROMETHANE	site-specific	site-specific
DIBROMOETHANE, 1,2-	site-specific	site-specific

TABLE N. SOIL ECOTOXICITY SCREENING LEVELS

(Discontinued as of 2012 due to low confidence in use of published screening levels; site-specific assessment recommended as needed.)

	Terrestrial Ecotoxicity Criteria (mg/kg)	
CHEMICAL PARAMETER	Residential Areas	Commercial/ Industrial areas
DICHLOROBENZENE, 1,2-	site-specific	site-specific
DICHLOROBENZENE, 1,3-	site-specific	site-specific
DICHLOROBENZENE, 1,4-	site-specific	site-specific
DICHLOROBENZIDINE, 3,3-	site-specific	site-specific
DICHLORODIPHENYLDICHLOROETHANE (DDD)	site-specific	site-specific
DICHLORODIPHENYLDICHLOROETHYLENE (DDE)	site-specific	site-specific
DICHLORODIPHENYLTRICHLOROETHANE (DDT)	site-specific	site-specific
DICHLOROETHANE, 1,1-	site-specific	site-specific
DICHLOROETHANE, 1,2-	site-specific	site-specific
DICHLOROETHYLENE, 1,1-	site-specific	site-specific
DICHLOROETHYLENE, Cis 1,2-	site-specific	site-specific
DICHLOROETHYLENE, Trans 1,2-	site-specific	site-specific
DICHLOROPHENOL, 2,4-	site-specific	site-specific
DICHLOROPHENOXYACETIC ACID (2,4-D)	site-specific	site-specific
DICHLOROPROPANE, 1,2-	site-specific	site-specific
DICHLOROPROPENE, 1,3-	site-specific	site-specific
DIELDRIN	site-specific	site-specific
DIETHYLPHTHALATE	site-specific	site-specific
DIMETHYLPHENOL, 2,4-	site-specific	site-specific
DIMETHYLPHTHALATE	site-specific	site-specific
DINITROBENZENE, 1,3-	site-specific	site-specific
DINITROPHENOL, 2,4-	site-specific	site-specific
DINITROTOLUENE, 2,4- (2,4-DNT)	site-specific	site-specific
DINITROTOLUENE, 2,6- (2,6-DNT)	site-specific	site-specific
DIOXANE, 1,4-	site-specific	site-specific
DIOXINS (TEQ)	site-specific	site-specific
DIURON	site-specific	site-specific
ENDOSULFAN	site-specific	site-specific
ENDRIN	site-specific	site-specific
ETHANOL	site-specific	site-specific
ETHYLBENZENE	site-specific	site-specific
FLUORANTHENE	site-specific	site-specific
FLUORENE	site-specific	site-specific
GLYPHOSATE	site-specific	site-specific
HEPTACHLOR	site-specific	site-specific
HEPTACHLOR EPOXIDE	site-specific	site-specific
HEXACHLOROBENZENE	site-specific	site-specific
HEXACHLOROBUTADIENE	site-specific	site-specific
HEXACHLOROCYCLOHEXANE (gamma) LINDANE	site-specific	site-specific
HEXACHLOROETHANE	site-specific	site-specific
HEXAZINONE	site-specific	site-specific
INDENO(1,2,3-cd)PYRENE	site-specific	site-specific
ISOPHORONE	site-specific	site-specific
LEAD	site-specific	site-specific
MERCURY	site-specific	site-specific
METHOXYCHLOR	site-specific	site-specific
METHYL ETHYL KETONE	site-specific	site-specific
METHYL ISOBUTYL KETONE	site-specific	site-specific
METHYL MERCURY	site-specific	site-specific
METHYL TERT BUTYL ETHER	site-specific	site-specific
METHYLENE CHLORIDE	site-specific	site-specific
METHYLNAPHTHALENE, 1-	site-specific	site-specific

TABLE N. SOIL ECOTOXICITY SCREENING LEVELS

(Discontinued as of 2012 due to low confidence in use of published screening levels; site-specific assessment recommended as needed.)

	Terrestrial Ecotoxicity Criteria (mg/kg)	
CHEMICAL PARAMETER	Residential Areas	Commercial/ Industrial areas
METHYLNAPHTHALENE, 2-	site-specific	site-specific
MOLYBDENUM	site-specific	site-specific
NAPHTHALENE	site-specific	site-specific
NICKEL	site-specific	site-specific
NITROBENZENE	site-specific	site-specific
NITROGLYCERIN	site-specific	site-specific
NITROTOLUENE, 2-	site-specific	site-specific
NITROTOLUENE, 3-	site-specific	site-specific
NITROTOLUENE, 4-	site-specific	site-specific
PENTACHLOROPHENOL	site-specific	site-specific
PENTAERYTHRITOLTETRANITRATE (PETN)	site-specific	site-specific
PERCHLORATE	site-specific	site-specific
PHENANTHRENE	site-specific	site-specific
PHENOL	site-specific	site-specific
POLYCHLORINATED BIPHENYLS (PCBs)	site-specific	site-specific
PROPICONAZOLE	site-specific	site-specific
PYRENE	site-specific	site-specific
SELENIUM	site-specific	site-specific
SILVER	site-specific	site-specific
SIMAZINE	site-specific	site-specific
STYRENE	site-specific	site-specific
TERBACIL	site-specific	site-specific
tert-BUTYL ALCOHOL	site-specific	site-specific
TETRACHLOROETHANE, 1,1,1,2-	site-specific	site-specific
TETRACHLOROETHANE, 1,1,2,2-	site-specific	site-specific
TETRACHLOROETHYLENE	site-specific	site-specific
TETRACHLOROPHENOL, 2,3,4,6-	site-specific	site-specific
TETRANITRO-1,3,5,7-TETRAAZOCYCLOOCTANE (HMX)	site-specific	site-specific
THALLIUM	site-specific	site-specific
TOLUENE	site-specific	site-specific
TOXAPHENE	site-specific	site-specific
TPH (gasolines)	site-specific	site-specific
TPH (middle distillates)	site-specific	site-specific
TPH (residual fuels)	site-specific	site-specific
TRICHLOROBENZENE, 1,2,4-	site-specific	site-specific
TRICHLOROETHANE, 1,1,1-	site-specific	site-specific
TRICHLOROETHANE, 1,1,2-	site-specific	site-specific
TRICHLOROETHYLENE	site-specific	site-specific
TRICHLOROPHENOL, 2,4,5-	site-specific	site-specific
TRICHLOROPHENOL, 2,4,6-	site-specific	site-specific
TRICHLOROPHENOXYACETIC ACID, 2,4,5- (2,4,5-T)	site-specific	site-specific
TRICHLOROPHENOXYPROPIONIC ACID, 2,4,5- (2,4,5-TP)	site-specific	site-specific
TRICHLOROPROPANE, 1,2,3-	site-specific	site-specific
TRICHLOROPROPENE, 1,2,3-	site-specific	site-specific
TRIFLURALIN	site-specific	site-specific
TRINITROBENZENE, 1,3,5-	site-specific	site-specific
TRINITROPHENYLMETHYLNITRAMINE, 2,4,6- (TETRYL)	site-specific	site-specific
TRINITROTOLUENE, 2,4,6- (TNT)	site-specific	site-specific
VANADIUM	site-specific	site-specific

TABLE N. SOIL ECOTOXICITY SCREENING LEVELS

(Discontinued as of 2012 due to low confidence in use of published screening levels; site-specific assessment recommended as needed.)

	Terrestrial Ecotoxicity Criteria (mg/kg)	
CHEMICAL PARAMETER	Residential Areas	Commercial/ Industrial areas
VINYL CHLORIDE	site-specific	site-specific
XYLENES	site-specific	site-specific
ZINC	site-specific	site-specific
Electrical Conductivity (mS/cm, USEPA Method 120.1 MOD)	-	-
Sodium Adsorption Ratio	-	-

Notes:

Discontinued in Fall 2012. Site-specific, ecological risk assessment recommended at sites where anthropogenic contamination identified and sensitive, terrestrial ecological habitats could be threatened.