ECF-HANFORD-10-0454
Revision 1

Calculation of Inhalation Pathway Preliminary Remediation Goals Using Standard Method C Air Cleanup Levels for the 100 Areas and 300 Area Remedial Investigation/Feasibility Study Reports

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

Contractor for the U.S. Department of Energy
under Contract DE-AC06-08RL14788

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P.O. Box 1600
Richland, Washington 99352

**Approved for Public Release;
Further Dissemination Unlimited**

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Freestone Environmental, Inc.

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Environmental Calculation Cover Page

Part 1: Completed by the Responsible Manager

Project: 100 and 300 Area RI/FS **Date: March 26, 2012**

Calculation Title & Description: Calculation of Standard Method C Direct Contact Soil Cleanup Levels for Industrial Land Use for the 100 Areas and 300 Area Remedial Investigation/Feasibility Study Reports

Determine nonradiological soil preliminary remediation goals that will be used to support the 100 Areas and 300 Area Remedial Investigation/ Feasibility Study Reports.

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Environmental Calculation Cover Page

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Contents

1 Purpose **1**

2 Background **1**

3 Methodology **1**

3.1 Standard Method C Air Cleanup Levels 2

3.1.1 Noncarcinogens 3

3.1.2 Carcinogens 3

3.2 Particulate Emission Factor and Volatilization Factors 5

3.2.1 Particulate Emission Factor 5

3.2.2 Volatilization Factors 8

3.3 Inhalation Pathway Preliminary Remediation Goals 12

3.3.1 Nonvolatile Contaminants 12

3.3.2 Volatile Contaminants 12

4 Assumptions and Inputs **13**

4.1 Exposure Factors 13

4.2 Toxicity Values 27

5 Software Applications **40**

6 Calculation **40**

7 Results/Conclusions **40**

8 References **72**

Terms

ATSDR	Agency for Toxic Substances and Disease Registry
CalEPA	California Environmental Protection Agency
COPC	contaminant of potential concern
CLARC	Cleanup Levels and Risk Calculations
ECF	environmental calculation file
EPA	Environmental Protection Agency
HEAST	Health Effects Assessment Summary Tables
HQ	hazard quotient
IAROD	Interim Action Records of Decision
IRIS	Integrated Risk Information System
NJDEP	New Jersey Department of Environmental Protection
NCEA	National Center for Environmental Assessment
OEHHA	Office of Environmental Health Hazard Assessment
PEF	Particulate Emission Factor
PPRTVs	Provisional Peer Reviewed Toxicity Values
PRG	Preliminary Remediation Goal
RAIS	Risk Assessment Information System
RAO	Remedial Action Objective
RDR/RAWP	Remedial Design Report/Remedial Action Work Plan
RfD	reference dose
RI/FS	Remedial Investigation/Feasibility Study
VF	Volatility Factor
WAC	Washington Administrative Code

1 Purpose

This Environmental Calculation documents the methods and assumptions for development of non-radiological soil Preliminary Remediation Goals (PRGs) that will be used to support the 100 Areas and 300 Area Remedial Investigation/Feasibility Study (RI/FS) Reports. PRGs are concentration goals for a specific medium that are intended to protect specified receptors from exposure to contaminants through identified exposure pathways.

The PRGs described in the Environmental Calculation represent soil concentrations that are protective of the inhalation pathway using Standard Method C air cleanup levels as defined in the Washington Administrative Code (WAC) Section 173-340-750, "Cleanup Standards to Protect Air Quality." Inhalation pathway PRGs in soil are developed by calculating chemical-specific Standard Method C air cleanup levels for a suite of target analytes and then applying a site-specific soil-to-air particulate emission factor (PEF) and chemical-specific volatilization factors (VFs) to derive soil concentrations that correspond to the air concentrations.

2 Background

As described in DOE/RL-46, *Integrated 100 Area Remedial Investigation/Feasibility Study Work Plan* (DOE/RL-2008-46, Revision 0)) and the 3*00 Area Remedial Investigation/Feasibility Study Work Plan for the 300-FF-1, 300-FF-2, and 300-FF-5 Operable Units*, the 100 Areas and 300 Area contains multiple source and groundwater operable units (OUs), that are part of the Hanford Site River Corridor, which encompasses approximately 570 km^2 (220 mi^2) adjacent to the Columbia River. To date, waste sites within the River Corridor have been remediated to both unrestricted and industrial land use levels. This calculation focuses on cleanup levels corresponding to industrial land use. Cleanup levels corresponding to industrial land use in the River Corridor have been calculated in DOE/RL-2001-47, *Remedial Design Report/Remedial Action Work Plan for the 300 Area*. For the purposes of developing nonradiological PRGs within this Environmental Calculation document, the following target objective is used:

- Prevent unacceptable risk to human health from inhalation of dust and vapors from soils and/or debris contaminated with nonradiological contaminants less than 4.6 m (15 ft) below ground surface (bgs). PRGs that achieve this objective are based on State of Washington Method C standards (WAC 173-340-750). Standard Method C air cleanup levels for individual carcinogenic substances correspond to an upper bound of the estimated excess lifetime cancer risk of one in one hundred thousand (1×10^{-5}). Standard Method C air cleanup levels for individual noncarcinogenic substances are set at concentrations that are anticipated to result in no acute or chronic toxic effects on human health; this level corresponds to a Hazard Quotient (HQ) of one.

This target objective has been developed only for the purpose of calculating PRGs that are presented in this Environmental Calculation. This target objective is not intended to supersede Remedial Action Objectives (RAOs) being developed as part of the 100 Areas or 300 Area RI/FS Reports. This Environmental Calculation document will be revised as needed to incorporate updates to these PRGs that may result from changes in RAOs occurring during development of the 100 Areas and 300 Area RI/FS Reports.

3 Methodology

The methodology used to determine Standard Method C air cleanup levels is described in WAC 173-340-750(4)(b), "Method C Air Cleanup Levels," "Standard Method C Air Cleanup Levels." Air concentrations are subsequently converted to soil concentrations for the inhalation pathway through the

use of a site-specific PEF or chemical-specific VFs. The methodology used for these two steps are described below. .

3.1 Standard Method C Air Cleanup Levels

The methodology used to determine Standard Method C air cleanup levels is described in WAC 173-340-750(4)(b), "Method C Air Cleanup Levels," "Standard Method C Air Cleanup Levels." Air cleanup levels are calculated for noncarcinogens and carcinogens using Equation 750-1 and Equation 750-2, respectively. Default input parameters, specified in the equations, are used to provide air cleanup levels based on a hazard quotient of 1 for noncarcinogens or an acceptable cancer risk level of 1×10^{-5} for carcinogens.

Reference concentrations and cunit risk factors are obtained from the U.S. Environmental Protection Agency (EPA) "Regional Screening Levels for Chemical Contaminants at Superfund Sites" web site (EPA, 2012) (http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm/) or the Washington Department of Ecology (Ecology) "Cleanup Levels and Risk Calculations (CLARC)" web site (Ecology, 2013) (https://fortress.wa.gov/ecy/clarc/CLARCHome.aspx) . Further details on the selection of toxicity values are presented in Section 4 of this Environmental Calculation.

The following steps were used to calculate Standard Method C air cleanup levels:

1. Identify Equation 750-1 and Equation 750-2 from WAC 173-340-750(3)(b) for noncarcinogenic and carcinogenic Standard Method C air cleanup levels
2. Identify the exposure assumptions within Equation 750-1 and Equation 750-2 from WAC 173-340-750(4)(b).
3. Obtain unit risk factors and reference concentrations for each contaminant.
4. Convert unit risk factors to inhalation cancer potency factors.
5. Convert reference concentrations to inhalation reference dose.
6. Calculate air concentrations corresponding to a HQ of 1 or an acceptable cancer risk level of 1×10^{-5}.
7. Document exposure assumptions, chemical-specific parameters, and their primary sources in a summary table.

The WAC 173-340-750 Standard Method C air cleanup levels consider exposure through the inhalation pathway. The following subsections provide the equations used to calculate Standard Method C air cleanup levels for noncarcinogens and carcinogens. Input variables and default parameters for the equations are defined in Table 3-1. The calculated chemical-specific Standard Method C air cleanup levels are tabulated and presented in Section 7.

3.1.1 Equation 750-1 – Air Cleanup Levels for Noncarcinogens

For chemical noncarcinogens, the Standard Method C air cleanup levels are calculated using the equation below which is obtained from WAC 173-340-750(4)(b)(ii)(A).

$$Air\ Cleanup\ Level\left(\frac{\mu g}{m^3}\right) = \frac{RfD \times ABW \times UCF \times HQ \times AT}{BR \times ABS \times ED \times EF} \quad (1)$$

3.1.2 Equation 750-2 – Air Cleanup Levels for Carcinogens

For chemical carcinogens, the Standard Method C air cleanup levels are calculated using the equation below which is obtained from WAC 173-340-750(4)(b)(ii)(B).

$$Air\ Cleanup\ Level\left(\frac{\mu g}{m^3}\right) = \frac{RISK \times ABW \times AT \times UCF}{CPF \times BR \times ABS \times ED \times EF} \quad (2)$$

Table 3-1. Summary of Exposure Assumptions Used to Calculate Standard Method C Air Cleanup Levels

Exposure Factor	Symbol	Value	Units	Source
Inhalation Absorption Factor	ABS	1	unitless	WAC 173-340-750(4)(b)(ii)(A) Equation 750-1 and WAC 173-340-750(4)(b)(ii)(B) Equation 750-2
Average Body Weight	ABW	70	kg	WAC 173-340-750(4)(b)(ii)(A) Equation 750-1 and WAC 173-340-750(4)(b)(ii)(B) Equation 750-2
Averaging Time	AT	6	years	WAC 173-340-750(4)(b)(ii)(B) Equation 750-1
		75	years	WAC 173-340-750(4)(b)(ii)(A) Equation 750-2
Breathing Rate	BR	20	m^3/day	WAC 173-340-750(4)(b)(ii)(A) Equation 750-1 and WAC 173-340-750(4)(b)(ii)(B) Equation 750-2
Cancer Potency Factor	CPF	Chemical Specific	$(mg/kg\text{-}day)^{-1}$	See Table 4-2
Exposure Duration	ED	6	year	WAC 173-340-750(4)(b)(ii)(B) Equation 750-1
		30	year	WAC 173-340-750(4)(b)(ii)(A) Equation 750-2
Exposure Frequency	EF	1	unitless	WAC 173-340-750(4)(b)(ii)(A) Equation 750-1 and WAC 173-340-750(4)(b)(ii)(B) Equation 750-2
Hazard Quotient	HQ	1	unitless	WAC 173-340-750(4)(b)(ii)(A) Equation 750-1
Reference Dose	RfD	Chemical Specific	(mg/kg-day)	See Table 4-2
Acceptable Cancer Risk Level	RISK	1 in 100,000	unitless	WAC 173-340-750(4)(b)(ii)(B) Equation 750-2
Unit Conversion Factor	UCF	1000	µg/mg	WAC 173-340-750(4)(b)(ii)(A) Equation 750-1 and WAC 173-340-750(4)(b)(ii)(B) Equation 750-2

Notes:

WAC 173-340-750(4)(b)(ii)(A), "Model Toxics Control Act—Cleanup, Cleanup Standards to Protect Air Quality, Method C Air Cleanup Levels, Standard Method C Air Cleanup Levels, Human Health Protection, Noncarcinogens."

WAC 173-340-750(4)(b)(ii)(B) , "Model Toxics Control Act—Cleanup, Cleanup Standards to Protect Air Quality, Method C Air Cleanup Levels, Standard Method C Air Cleanup Levels, Human Health Protection, Carcinogens."

3.2 Particulate Emission Factor and Volatilization Factors

Inhalation pathway PRGs in soil are calculated by converting the Method C air cleanup levels into corresponding soil concentrations using a site-specific soil-to-air PEF and chemical-specific VFs. The PEF and VFs provide the relationship between a contaminant's concentration in the soil and its concentration in the air. The PEF addresses fugitive dust emissions caused by wind and is applied to all contaminants; the VFs address soil vapor emissions from volatiles and are applied only to volatile contaminants. The PEF and VFs are developed using EPA guidance provided in OSWER 9355.4-24, *Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites*. The methodology for developing the PEF and VFs is described in the following subsections.

3.2.1 Particulate Emission Factor

The airborne concentration of a contaminant adhered to particulate matter with an aerodynamic particle diameter of less than 10 microns (PM10) is assessed using a site-specific PEF. The PEF relates the contaminant concentration in soil with the concentration of respirable particles in the air due to fugitive dust emissions.

The following steps were used to calculate a site-specific PEF:

1. Identify the applicable equations.
    a. Equation 4-5 from OSWER 9355.4-24 for the PEF,
    b. Equation D-1 from OSWER 9355.4-24 for the inverse of the ratio of the geometric mean air concentration to the emission flux at the center of the source or at the boundary of the source (Q/C),
    c. Equations found on page B-2 of EPA/600/8-85/002, *Rapid Assessment of Exposure to Particulate Emissions from Surface Contamination Sites* for the wind speed distribution function [F(x)].
2. Identify the default and site-specific factors for use in calculating PEF, Q/C, x, and F(x).
3. Calculate the site-specific PEF.
4. Document the default and site-specific assumptions, and their primary sources in a summary table.

The equations used to calculate the PEF are as follows:

$$PEF = \frac{Q}{C} \times \frac{3{,}600}{0.036 \times (1-V) \times \left(\frac{u_m}{u_t}\right)^3 \times F(x)} \quad (3)$$

Where:

$$\frac{Q}{C} = A \times \exp\left[\frac{(\ln[A_s] - B)^2}{C}\right] \quad (4)$$

And:

$$F(x) = 0.18(8x^3 + 12x)\exp(-x^2) \quad (5)$$

And:

$$x = 0.886 \left(\frac{u_t}{u_m} \right) \quad (6)$$

Input variables for the PEF equations are defined in Table 3-2. The calculated value for the PEF is 7.30E+10 m^3/kg.

Table 3-2. Summary of Input Parameters Used to Calculate Wind Particulate Emission Factor. (1 Page)

Input Parameter	Symbol	Value	Units	Source
A Constant	A	11.3161	unitless	OSWER Directive 9355.4-24; Exhibit D-2 for Boise Idaho.
Site Area	A_s	0.5	acres	OSWER Directive 9355.4-24
B Constant	B	19.6437	unitless	OSWER Directive 9355.4-24; Exhibit D-2 for Boise Idaho.
C Constant	C	224.8172	unitless	OSWER Directive 9355.4-24; Exhibit D-2 for Boise Idaho.
Wind speed distribution function	F(x)	7.21E-03	unitless	Equation 5
Particulate Emission Factor	PEF	7.30E+10	m^3/kg	Equation 3
Inverse of mean concentration at center of a source	Q/C	71.22808	g/m^2-s per kg/m^3	Equation 4
Annual average wind speed	u_m	3.4	m/s	PNNL-15160, Table 5.1
Wind speed at anemometer height equivalent to corrected threshold friction velocity	u_t	11.32	m/s	OSWER Directive 9355.4-24
Fraction of vegetative cover	V	0.5	unitless	OSWER Directive 9355.4-24
	x	2.95E+00	unitless	Equation 6

Notes:

OSWER 9355.4-24, *Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites*.

PNNL-15160, 2005, *Hanford Site Climatological Summary 2004 with Historical Data*.

3.2.2 Volatilization Factors

A VF is used to define the relationship between the concentration of a contaminant in soil and the flux of the volatilized contaminant to air. The VF is calculated using chemical-specific properties and either site-specific or default values for soil moisture, dry bulk density, and fraction of organic carbon in soil.

The following steps were used to calculate chemical-specific VFs for volatile contaminants:

1. Identify the applicable equations.
   a. Equation 4-8 from OSWER 9355.4-24 for VF and apparent diffusivity (D_A),
   b. Equation D-1 from OSWER 9355.4-24 for Q/C.
2. Identify default and site-specific factors for use in calculating VF, D_A, and Q/C.
3. Identify chemical-specific values for diffusivity in air (D_i), diffusivity in water (D_w), Henry's Law Constant (H'), soil-carbon partition coefficient (K_{oc}), and soil-water distribution coefficient (K_d). These chemical-specific parameters were obtained from the following sources in order of preference:
   a. DOE/RL-96-17.
   b. The Ecology CLARC database (Ecology2013).
   c. The EPA Regional Screening Levels (EPA 2012).
   d. The Oak Ridge National Laboratory (ORNL) Risk Assessment information database (RAIS) (ORNL 2013) (http://rais.ornl.gov/).
4. Calculate the chemical-specific VFs.
5. Document the default and site-specific assumptions, and their primary sources in a summary table.

The equations used to calculate chemical-specific VFs for volatile contaminants are as follows:

$$VF = \frac{\frac{Q}{C} \times \left(3.14 \times D_A \times T\right)^{\frac{1}{2}} \times 10^{-4} \left(\frac{m^2}{cm^2}\right)}{2 \times \rho_b \times D_A} \quad (7)$$

Where:

$$\frac{Q}{C} = A \times \exp\left[\frac{\left(\ln\left[A_s\right] - B\right)^2}{C}\right] \quad (8)$$

And:

$$D_A = \left[\frac{\left(\theta_a^{\frac{10}{3}} \times D_i \times H' + \theta_w^{\frac{10}{3}} \times D_w \right)}{n^2} \over \rho_b \times K_d + \theta_w + \theta_a \times H' \right] \quad (9)$$

Input variables for the VF equations are defined in Table 3-3. The calculated values for the chemical-specific VFs are tabulated and presented in Section 4.

Table 3-3. Summary of Input Parameters Used to Calculate Volatilization Factors. (2 Pages)

Input Parameter	Symbol	Value	Units	Source
A Constant	A	11.3161	unitless	OSWER Directive 9355.4-24; Exhibit D-3 for Boise Idaho.
Site Area	A_s	0.5	acres	OSWER Directive 9355.4-24
B Constant	B	19.6437	unitless	OSWER Directive 9355.4-24; Exhibit D-3 for Boise Idaho.
C Constant	C	224.8172	unitless	OSWER Directive 9355.4-24; Exhibit D-3 for Boise Idaho.
Apparent diffusivity	D_A	Chemical-Specific	cm^2/s	Equation 9
Diffusivity in air	D_i	Chemical-Specific	cm^2/s	see Table 4-1
Diffusivity in water	D_w	Chemical-Specific	cm^2/s	see Table 4-1
Fraction organic carbon in soil	f_{oc}	0.001	g/g	DOE/RL-96-17
Henry's law constant	H'	Chemical-Specific	dimensionless	see Table 4-1
Soil-water partition coefficient	K_d	Chemical-Specific	L/kg	= DOE/RL-96-17 for the primary source of K_d values. For all other contaminants, the following methodology is used: For organic contaminants $K_d=f_{oc}$ x K_{oc}, for inorganic contaminants, the inorganic K_d is used
Soil organic carbon/water partition coefficient	K_{oc}	Chemical-Specific	L/kg	see Table 4-1
Soil porosity	n	0.434	unitless	= 1 – (ρ_b/ρ_s); OSWER Directive 9355.4-24
Inverse of mean concentration at center of a source	Q/C	71.22808	g/m^2-s per kg/m^3	Equation 8
Exposure Time	T	9.50E+08	s	OSWER Directive 9355.4-24

Table 3-3. Summary of Input Parameters Used to Calculate Volatilization Factors. (2 Pages)

Input Parameter	Symbol	Value	Units	Source
Volatilization Factor	VF	Chemical-Specific	m^3/kg	Equation 7
Air-filled soil porosity	Θ_a	0.284	L_{air}/L_{soil}	OSWER Directive 9355.4-24; $=n-\Theta_w$
Water-filled soil porosity	Θ_w	0.15	L_{water}/L_{soil}	OSWER Directive 9355.4-24
Dry soil bulk density	ρ_b	1.5	kg/L	OSWER Directive 9355.4-24
Soil Particle Density	ρ_s	2.65	kg/L	OSWER Directive 9355.4-24

Notes:

DOE/RL-96-17, *Remedial Design Report/Remedial Action Work Plan for the 100 Area*.

OSWER 9355.4-24, *Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites*, *Solid Waste and Emergency Response*

3.3 Inhalation Pathway Preliminary Remediation Goals

The following subsections present the equations used to derive soil concentrations corresponding to the Standard Method C air cleanup levels. The inhalation pathway PRGs in soil are derived from the air concentrations by applying the site-specific PEF to all contaminants and chemical-specific VFs to volatile contaminants. The methodology used is consistent with EPA guidance for calculating soil PRGs protective of ambient air provided in EPA/540/R-92/003, *Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part B, Development of Risk-Based Preliminary Remediation Goals)*. The following steps were taken to convert Standard Method B air cleanup levels to inhalation pathway PRGs.

1. Calculate air concentrations corresponding to a HQ of 1 or an acceptable cancer risk level of 1×10^{-6}.
2. Calculate a soil concentration for each non-volatile contaminant by applying the site-specific PEF to the calculated air cleanup level.
3. Calculate a soil concentration for each volatile contaminant by applying a site-specific VF to the calculated air cleanup level.
4. For contaminants with both noncarinogenic and carcinogenic effects, use the lower of the two soil PRGs; the lower value is protective of both effects.
5. Document exposure assumptions, chemical-specific parameters, and their primary sources in a summary table.

3.3.1 Nonvolatile Contaminants

For nonvolatile contaminants, inhalation pathway PRGs are calculated as follows:

$$Soil\ Cleanup\ Level\left(\frac{mg}{kg}\right) = \frac{Air\ Cleanup\ Level\left(\frac{\mu g}{m^3}\right)}{\left(\frac{1}{PEF\left(\frac{m^3}{kg}\right)}\right)} \times 0.001\left(\frac{mg}{\mu g}\right) \quad (10)$$

3.3.2 Volatile Contaminants

For volatile contaminants, inhalation pathway PRGs protective of Standard Method C air cleanup levels are calculated as follows:

$$Soil\ Cleanup\ Level\left(\frac{mg}{kg}\right) = \frac{Air\ Cleanup\ Level\left(\frac{\mu g}{m^3}\right)}{\left(\left(\frac{1}{PEF\left(\frac{m^3}{kg}\right)}\right) + \left(\frac{1}{VF\left(\frac{m^3}{kg}\right)}\right)\right)} \times 0.001\left(\frac{mg}{\mu g}\right) \quad (11)$$

4 Assumptions and Inputs

Assumptions and inputs associated with the calculation of inhalation pathway PRGs using Standard Method C air cleanup levels are described below.

4.1 Exposure Factors

The assumptions and inputs used to quantify inhalation pathway exposures to dust and volatiles from soil are presented in Tables 3-1 through 3-3 and Table 4-1. Other key assumptions are as follows:

- The exposure route included in the Standard Method C air cleanup levels is inhalation of fugitive dust and volatiles from soil.
- Exposure assumptions used to calculate Standard Method C air cleanup levels for noncarcinogens and carcinogens are in Table 3-1, along with the sources for each assumption.
- An inhalation absorption fraction of 1.0 is used for all contaminants.
- Input parameters used to calculate a site-specific PEF for fugitive dust emissions are listed in Table 3-2. These parameters include a site-specific average wind speed as well as standard EPA default values. The sources for each of the parameters are listed in Table 3-2.
- Input parameters used to calculate chemical-specific VFs for vapor emissions are listed in Table 3-3, along with the sources for each of the parameters. The parameters listed in Table 3-3 are a combination of site-specific values, default values where site-specific values were not available, and chemical specific values. Chemical-specific values are provided Table 4-1, along with the source for each value. Contaminants identified as volatile in Table 4-1 meet the definition of a volatile organic compound in WAC 173-340-200, “Definitions,” and were identified from the Ecology CLARC database (Ecology 2013). The calculated VFs for all contaminants defined as volatile are presented in Table 4-1.

Table 4-1. Summary of Contaminant-Specific Input Parameters and Volatilization Factors

CAS#	Contaminant	Diffusivity in Air[a] (cm^2/s) (D_i)	Source	Diffusivity in Water[a] (cm^2/s) (D_w)	Source	Dimensionless Henry's Law Constant[a] (H')	Source	Soil-Carbon Partition Coefficient[a] (L/kg) (K_{oc})	Soil/Water Distribution Coefficient K_d Organic (L/kg) = K_{oc} x f_{oc}	Source	Inorganic K_d [a] (cm^3/g)	Source	RDR/RAWP Soil/Water Distribution Coefficient [b] (K_d) DOE/RL-96-17	Final K_d[c] (cm^3/g)	Source	Apparent Diffusivity (cm^2/s) (D_A)	Volatile?[d]	Volatilization Factor (m^3/kg) (VF)
630-20-6	1,1,1,2-Tetrachloroethane	0.048	EPA 2012	9.10E-06	EPA 2012	0.10	EPA 2012	86	0.086	EPA 2012	--	--	--	0.086	EPA 2012	0.0013	V	3,628
71-55-6	1,1,1-Trichloroethane	0.065	EPA 2012	9.60E-06	EPA 2012	0.71	CLARC 2013	135	0.14	CLARC 2013	--	--	--	0.14	CLARC 2013	0.0066	V	1,595
79-34-5	1,1,2,2-Tetrachloroethane	0.049	EPA 2012	9.29E-06	EPA 2012	0.014	CLARC 2013	79	0.079	CLARC 2013	--	--	--	0.079	CLARC 2013	2.03E-04	V	9,110
79-00-5	1,1,2-Trichloroethane	0.067	EPA 2012	1.00E-05	EPA 2012	0.037	CLARC 2013	75	0.075	CLARC 2013	--	--	--	0.075	CLARC 2013	7.32E-04	V	4,792
75-34-3	1,1-Dichloroethane	0.084	EPA 2012	1.06E-05	EPA 2012	0.23	CLARC 2013	53	0.053	CLARC 2013	--	--	--	0.053	CLARC 2013	0.0052	V	1,796
75-35-4	1,1-Dichloroethene	0.086	EPA 2012	1.10E-05	EPA 2012	1.1	CLARC 2013	65	0.065	CLARC 2013	--	--	--	0.065	CLARC 2013	0.013	V	1,121
96-18-4	1,2,3-Trichloropropane	0.057	EPA 2012	9.24E-06	EPA 2012	0.014	EPA 2012	116	0.12	EPA 2012	--	--	--	0.12	EPA 2012	1.97E-04	V	9,244
95-94-3	1,2,4,5-Tetrachlorobenzene	0.032	EPA 2012	8.75E-06	EPA 2012	0.041	EPA 2012	2,220	2.2	EPA 2012	--	--	--	2.2	EPA 2012	2.99E-05	--	--
120-82-1	1,2,4-Trichlorobenzene	0.040	EPA 2012	8.40E-06	EPA 2012	0.058	CLARC 2013	1,659	1.7	CLARC 2013	--	--	1.7	1.7	DOE/RL-96-17	6.94E-05	V	15,570
96-12-8	1,2-Dibromo-3-chloropropane	0.032	EPA 2012	8.90E-06	EPA 2012	0.0060	EPA 2012	116	0.12	EPA 2012	--	--	--	0.12	EPA 2012	4.77E-05	V	18,778
106-93-4	1,2-Dibromoethane	0.043	EPA 2012	1.04E-05	EPA 2012	0.027	EPA 2012	66	0.066	CLARC 2013	--	--	--	0.066	CLARC 2013	3.57E-04	V	6,867
95-50-1	1,2-Dichlorobenzene	0.056	EPA 2012	8.92E-06	EPA 2012	0.078	CLARC 2013	379	0.38	CLARC 2013	--	--	0.38	0.38	DOE/RL-96-17	4.72E-04	V	5,967
107-06-2	1,2-Dichloroethane	0.086	EPA 2012	1.10E-05	EPA 2012	0.040	CLARC 2013	38	0.038	CLARC 2013	--	--	--	0.038	CLARC 2013	0.0013	V	3,656
540-59-0	1,2-Dichloroethene (Total)	0.088	EPA 2012	1.12E-05	EPA 2012	0.17	EPA 2012	40	0.040	EPA 2012	--	--	--	0.040	EPA 2012	0.0046	V	1,920
78-87-5	1,2-Dichloropropane	0.073	EPA 2012	9.73E-06	EPA 2012	0.12	CLARC 2013	47	0.047	CLARC 2013	--	--	--	0.047	CLARC 2013	0.0027	V	2,513
541-73-1	1,3-Dichlorobenzene	0.056	ORNL 2013	8.85E-06	ORNL 2013	0.11	ORNL 2013	375	0.38	ORNL 2013	--	--	0.43	0.43	DOE/RL-96-17	5.79E-04	V	5,388
106-46-7	1,4-Dichlorobenzene	0.055	EPA 2012	8.68E-06	EPA 2012	0.100	CLARC 2013	616	0.62	CLARC 2013	--	--	0.62	0.62	DOE/RL-96-17	3.98E-04	V	6,504
123-91-1	1,4-Dioxane	0.087	EPA 2012	1.05E-05	EPA 2012	1.96E-04	EPA 2012	2.6	0.0026	EPA 2012	--	--	--	0.0026	EPA 2012	9.54E-06	V	41,974
71-36-3	1-Butanol	0.090	EPA 2012	1.01E-05	EPA 2012	3.61E-04	CLARC 2013	6.9	0.0069	CLARC 2013	--	--	--	0.0069	CLARC 2013	1.68E-05	V	31,651
71-23-8	1-Propanol	0.10	ORNL 2013	1.14E-05	ORNL 2013	3.03E-04	ORNL 2013	1.9	0.0019	ORNL 2013	--	--	--	0.0019	ORNL 2013	1.72E-05	V	31,289
93-65-2	2-(2-methyl-4-chlorophenoxy) propionic acid	0.053	EPA 2012	6.19E-06	EPA 2012	3.66E-08	EPA 2012	49	0.049	EPA 2012	--	--	--	0.049	EPA 2012	2.65E-07	--	--
39635-31-9	2,3,3',4,4',5,5'-Heptachlorobiphenyl	0.035	EPA 2012	4.12E-06	EPA 2012	0.0056	EPA 2012	349,700	350	EPA 2012	--	--	--	350	EPA 2012	3.04E-08	--	--
69782-90-7	2,3,3',4,4',5'-Hexachlorobiphenyl	0.037	EPA 2012	4.38E-06	EPA 2012	0.0066	EPA 2012	213,600	214	EPA 2012	--	--	--	214	EPA 2012	6.20E-08	--	--
38380-08-4	2,3,3',4,4',5-Hexachlorobiphenyl	0.037	EPA 2012	4.38E-06	EPA 2012	0.0058	EPA 2012	213,600	214	EPA 2012	--	--	--	214	EPA 2012	5.48E-08	--	--

Table 4-1. Summary of Contaminant-Specific Input Parameters and Volatilization Factors

CAS#	Contaminant	Diffusivity in Air[a] (cm^2/s) (D_i)	Source	Diffusivity in Water[a] (cm^2/s) (D_w)	Source	Dimensionless Henry's Law Constant[a] (H')	Source	Soil-Carbon Partition Coefficient[a] (L/kg) (K_{oc})	Soil/Water Distribution Coefficient K_d Organic (L/kg) = K_{oc} x f_{oc}	Source	Inorganic K_d [a] (cm^3/g)	Source	RDR/RAWP Soil/Water Distribution Coefficient [b] (K_d) DOE/RL-96-17	Final K_d[c] (cm^3/g)	Source	Apparent Diffusivity (cm^2/s) (D_A)	Volatile?[d]	Volatilization Factor (m^3/kg) (VF)
32598-14-4	2,3,3',4,4'-Pentachlorobiphenyl	0.040	EPA 2012	4.68E-06	EPA 2012	0.012	EPA 2012	130,500	131	EPA 2012	--	--	--	131	EPA 2012	1.89E-07	--	--
52663-72-6	2,3',4,4',5,5'-Hexachlorobiphenyl	0.037	EPA 2012	4.38E-06	EPA 2012	0.0066	EPA 2012	209,300	209	EPA 2012	--	--	--	209	EPA 2012	6.33E-08	--	--
74472-37-0	2,3,4,4',5-Pentachlorobiphenyl	0.040	EPA 2012	4.68E-06	EPA 2012	0.0078	EPA 2012	130,500	131	EPA 2012	--	--	--	131	EPA 2012	1.27E-07	--	--
65510-44-3	2',3,4,4',5-Pentachlorobiphenyl	0.040	EPA 2012	4.68E-06	EPA 2012	0.0078	EPA 2012	130,500	131	EPA 2012	--	--	--	131	EPA 2012	1.27E-07	--	--
31508-00-6	2,3',4,4',5-Pentachlorobiphenyl	0.040	EPA 2012	4.68E-06	EPA 2012	0.012	EPA 2012	127,900	128	EPA 2012	--	--	--	128	EPA 2012	1.97E-07	--	--
58-90-2	2,3,4,6-Tetrachlorophenol	0.050	EPA 2012	5.88E-06	EPA 2012	3.61E-04	EPA 2012	280	0.28	CLARC 2013	--	--	--	0.28	CLARC 2013	2.65E-06	--	--
93-76-5	2,4,5-T(2,4,5-Trichlorophenoxyacetic acid)	0.047	EPA 2012	5.51E-06	EPA 2012	1.91E-06	EPA 2012	107	0.11	EPA 2012	--	--	0.049	0.049	DOE/RL-96-17	2.67E-07	--	--
93-72-1	2,4,5-TP(2-(2,4,5-Trichlorophenoxy)propionic acid)Silvex	0.046	EPA 2012	5.32E-06	EPA 2012	3.70E-07	EPA 2012	175	0.18	EPA 2012	--	--	0.080	0.080	DOE/RL-96-17	1.93E-07	--	--
95-95-4	2,4,5-Trichlorophenol	0.031	EPA 2012	8.09E-06	EPA 2012	1.78E-04	CLARC 2013	1,597	1.6	CLARC 2013	--	--	1.6	1.6	DOE/RL-96-17	2.05E-07	V	286,174
88-06-2	2,4,6-Trichlorophenol	0.031	EPA 2012	8.09E-06	EPA 2012	3.19E-04	CLARC 2013	381	0.38	CLARC 2013	--	--	0.38	0.38	DOE/RL-96-17	1.22E-06	V	117,600
94-75-7	2,4-D(2,4-Dichlorophenoxyacetic acid)	0.052	EPA 2012	6.07E-06	EPA 2012	1.45E-06	EPA 2012	30	0.030	EPA 2012	--	--	0.029	0.029	DOE/RL-96-17	3.29E-07	--	--
94-82-6	2,4-DB(4-(2,4-Dichlorophenoxy)butanoic acid)	0.048	EPA 2012	5.61E-06	EPA 2012	2.40E-07	EPA 2012	98	0.098	EPA 2012	--	--	0.10	0.10	DOE/RL-96-17	1.81E-07	--	--
120-83-2	2,4-Dichlorophenol	0.049	EPA 2012	8.68E-06	EPA 2012	1.30E-04	CLARC 2013	147	0.15	CLARC 2013	--	--	0.15	0.15	DOE/RL-96-17	1.59E-06	V	103,001
105-67-9	2,4-Dimethylphenol	0.062	EPA 2012	8.31E-06	EPA 2012	8.20E-05	CLARC 2013	209	0.21	CLARC 2013	--	--	0.21	0.21	DOE/RL-96-17	1.05E-06	V	126,503
51-28-5	2,4-Dinitrophenol	0.041	EPA 2012	9.08E-06	EPA 2012	1.82E-05	CLARC 2013	0.010	1.00E-05	CLARC 2013	--	--	1.00E-05	1.00E-05	DOE/RL-96-17	9.70E-07	--	--
121-14-2	2,4-Dinitrotoluene	0.038	EPA 2012	7.90E-06	EPA 2012	3.80E-06	CLARC 2013	96	0.096	CLARC 2013	--	--	0.096	0.096	DOE/RL-96-17	2.95E-07	--	--
606-20-2	2,6-Dinitrotoluene	0.037	EPA 2012	7.76E-06	EPA 2012	3.06E-05	CLARC 2013	69	0.069	CLARC 2013	--	--	0.069	0.069	DOE/RL-96-17	6.48E-07	--	--
53-96-3	2-Acetylaminofluorene	0.052	EPA 2012	6.03E-06	EPA 2012	7.85E-09	EPA 2012	2,206	2.2	EPA 2012	--	--	--	2.2	EPA 2012	1.66E-08	--	--
78-93-3	2-Butanone	0.091	EPA 2012	1.02E-05	EPA 2012	0.0023	EPA 2012	4.5	0.0045	EPA 2012	--	--	--	0.0045	EPA 2012	1.09E-04	V	12,443
111-76-2	2-Butoxyethanol	0.063	EPA 2012	8.14E-06	EPA 2012	6.54E-05	EPA 2012	2.8	0.0028	EPA 2012	--	--	--	0.0028	EPA 2012	2.62E-06	V	80,048
91-58-7	2-Chloronaphthalene	0.045	EPA 2012	7.73E-06	EPA 2012	0.013	EPA 2012	2,478	2.5	EPA 2012	--	--	3.0	3.0	DOE/RL-96-17	1.01E-05	V	40,760
95-57-8	2-Chlorophenol	0.066	EPA 2012	9.48E-06	EPA 2012	0.016	CLARC 2013	388	0.39	CLARC 2013	--	--	0.39	0.39	DOE/RL-96-17	1.15E-04	V	12,097
591-78-6	2-Hexanone	0.070	EPA 2012	8.44E-06	EPA 2012	0.0038	EPA 2012	15	0.015	EPA 2012	--	--	--	0.015	EPA 2012	1.24E-04	V	11,650
94-74-6	2-Methyl-4 chlorophenoxyacetic acid	0.055	EPA 2012	6.48E-06	EPA 2012	5.44E-08	EPA 2012	30	0.030	EPA 2012	--	--	--	0.030	EPA 2012	3.18E-07	--	--

Table 4-1. Summary of Contaminant-Specific Input Parameters and Volatilization Factors

CAS#	Contaminant	Diffusivity in Air[a] (cm^2/s) (D_i)	Source	Diffusivity in Water[a] (cm^2/s) (D_w)	Source	Dimensionless Henry's Law Constant[a] (H')	Source	Soil-Carbon Partition Coefficient[a] (L/kg) (K_{oc})	Soil/Water Distribution Coefficient K_d Organic (L/kg) = K_{oc} x f_{oc}	Source	Inorganic K_d [a] (cm^3/g)	Source	RDR/RAWP Soil/Water Distribution Coefficient [b] (K_d) DOE/RL-96-17	Final K_d[c] (cm^3/g)	Source	Apparent Diffusivity (cm^2/s) (D_A)	Volatile?[d]	Volatilization Factor (m^3/kg) (VF)
91-57-6	2-methylnaphthalene	0.052	EPA 2012	7.78E-06	EPA 2012	0.021	EPA 2012	2,478	2.5	EPA 2012	--	--	3.0	3.0	DOE/RL-96-17	1.92E-05	V	29,596
95-48-7	2-Methylphenol (cresol, o-)	0.073	EPA 2012	9.32E-06	EPA 2012	4.92E-05	CLARC 2013	91	0.091	CLARC 2013	--	--	0.43	0.43	DOE/RL-96-17	4.68E-07	V	189,499
91-59-8	2-Naphthylamine	0.064	EPA 2012	1.04E-05	EPA 2012	3.31E-06	EPA 2012	2,478	2.5	EPA 2012	--	--	--	2.5	EPA 2012	3.00E-08	--	--
88-74-4	2-Nitroaniline	0.052	EPA 2012	7.41E-06	EPA 2012	2.41E-06	EPA 2012	111	0.11	EPA 2012	--	--	0.053	0.053	DOE/RL-96-17	3.52E-07	--	--
88-75-5	2-Nitrophenol	0.061	ORNL 2013	9.17E-06	ORNL 2013	5.23E-04	ORNL 2013	297	0.30	ORNL 2013	--	--	0.31	0.31	DOE/RL-96-17	4.26E-06	--	--
108-10-1	2-Pentanone, 4-Methyl	0.070	EPA 2012	8.35E-06	EPA 2012	0.0056	EPA 2012	13	0.013	EPA 2012	--	--	--	0.013	EPA 2012	1.85E-04	V	9,534
32774-16-6	3,3',4,4',5,5'-Hexachlorobiphenyl	0.037	EPA 2012	4.38E-06	EPA 2012	0.0066	EPA 2012	209,300	209	EPA 2012	--	--	--	209	EPA 2012	6.33E-08	--	--
57465-28-8	3,3',4,4',5-Pentachlorobiphenyl	0.040	EPA 2012	4.68E-06	EPA 2012	0.0078	EPA 2012	127,900	128	EPA 2012	--	--	--	128	EPA 2012	1.30E-07	--	--
32598-13-3	3,3',4,4'-Tetrachlorobiphenyl	0.043	EPA 2012	5.04E-06	EPA 2012	3.84E-04	EPA 2012	78,100	78	EPA 2012	--	--	--	78	EPA 2012	1.17E-08	--	--
91-94-1	3,3'-Dichlorobenzidine	0.047	EPA 2012	5.55E-06	EPA 2012	1.64E-07	CLARC 2013	724	0.72	CLARC 2013	--	--	0.72	0.72	DOE/RL-96-17	4.32E-08	--	--
119-93-7	3,3'-Dimethylbenzidine	0.053	EPA 2012	6.24E-06	EPA 2012	3.31E-09	EPA 2012	3,190	3.2	EPA 2012	--	--	--	3.2	EPA 2012	1.20E-08	--	--
70362-50-4	3,4,4',5- Tetrachlorobiphenyl	0.043	EPA 2012	5.04E-06	EPA 2012	0.0091	EPA 2012	78,100	78	EPA 2012	--	--	--	78	EPA 2012	2.69E-07	--	--
65794-96-9	3+4 Methylphenol (cresol, m+p)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
56-49-5	3-Methylcholanthrene	0.024	EPA 2012	6.14E-06	EPA 2012	2.14E-04	EPA 2012	961,600	962	EPA 2012	--	--	--	962	EPA 2012	3.26E-10	--	--
99-09-2	3-Nitroaniline	0.052	ORNL 2013	7.41E-06	ORNL 2013	3.23E-07	ORNL 2013	109	0.11	ORNL 2013	--	--	0.052	0.052	DOE/RL-96-17	3.16E-07	--	--
72-54-8	4,4'-DDD (Dichlorodiphenyldichloroethane)	0.041	EPA 2012	4.74E-06	EPA 2012	1.64E-04	CLARC 2013	45,800	46	CLARC 2013	--	--	46	46	DOE/RL-96-17	8.39E-09	--	--
72-55-9	4,4'-DDE (Dichlorodiphenyldichloroethylene)	0.041	EPA 2012	4.76E-06	EPA 2012	8.61E-04	CLARC 2013	86,405	86	CLARC 2013	--	--	86	86	DOE/RL-96-17	2.20E-08	--	--
50-29-3	4,4'-DDT (Dichlorodiphenyltrichloroethane)	0.038	EPA 2012	4.43E-06	EPA 2012	3.32E-04	CLARC 2013	677,934	678	CLARC 2013	--	--	678	678	DOE/RL-96-17	1.03E-09	--	--
534-52-1	4,6-Dinitro-2-methylphenol	0.056	EPA 2012	6.53E-06	EPA 2012	5.72E-05	EPA 2012	754	0.75	EPA 2012	--	--	0.60	0.60	DOE/RL-96-17	3.02E-07	--	--
1918-02-1	4-Amino-3,5,6-trichloropicolinic acid	0.049	EPA 2012	5.73E-06	EPA 2012	2.18E-12	EPA 2012	39	0.039	EPA 2012	--	--	--	0.039	EPA 2012	2.62E-07	--	--
92-67-1	4-Aminobiphenyl	0.062	EPA 2012	7.26E-06	EPA 2012	7.07E-06	EPA 2012	2,471	2.5	EPA 2012	--	--	--	2.5	EPA 2012	2.70E-08	--	--
101-55-3	4-Bromophenylphenyl ether	0.028	ORNL 2013	7.37E-06	ORNL 2013	0.0048	ORNL 2013	3,080	3.1	ORNL 2013	--	--	4.2	4.2	DOE/RL-96-17	1.67E-06	--	--
59-50-7	4-Chloro-3-methylphenol	0.070	EPA 2012	8.13E-06	EPA 2012	1.00E-04	EPA 2012	492	0.49	EPA 2012	--	--	--	0.49	EPA 2012	7.15E-07	--	--
106-47-8	4-Chloroaniline	0.070	EPA 2012	1.03E-05	EPA 2012	1.36E-05	CLARC 2013	66	0.066	CLARC 2013	--	--	0.073	0.073	DOE/RL-96-17	6.75E-07	V	157,873

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CAS#	Contaminant	Diffusivity in Air[a] (cm^2/s) (D_i)	Source	Diffusivity in Water[a] (cm^2/s) (D_w)	Source	Dimensionless Henry's Law Constant[a] (H')	Source	Soil-Carbon Partition Coefficient[a] (L/kg) (K_{oc})	Soil/Water Distribution Coefficient K_d Organic (L/kg) = K_{oc} x f_{oc}	Source	Inorganic K_d [a] (cm^3/g)	Source	RDR/RAWP Soil/Water Distribution Coefficient [b] (K_d) DOE/RL-96-17	Final K_d[c] (cm^3/g)	Source	Apparent Diffusivity (cm^2/s) (D_A)	Volatile?[d]	Volatilization Factor (m^3/kg) (VF)
7005-72-3	4-Chlorophenylphenyl ether	0.027	ORNL 2013	6.96E-06	ORNL 2013	0.0098	ORNL 2013	3,080	3.1	ORNL 2013	--	--	--	3.1	ORNL 2013	4.41E-06	--	--
106-44-5	4-Methylphenol (cresol, p-)	0.072	EPA 2012	9.24E-06	EPA 2012	4.09E-05	EPA 2012	300	0.30	EPA 2012	--	--	0.43	0.43	DOE/RL-96-17	4.05E-07	V	203,704
100-01-6	4-Nitroaniline	0.064	EPA 2012	9.75E-06	EPA 2012	5.15E-08	EPA 2012	109	0.11	EPA 2012	--	--	0.052	0.052	DOE/RL-96-17	4.10E-07	--	--
100-02-7	4-Nitrophenol	0.064	ORNL 2013	9.94E-06	ORNL 2013	1.70E-08	ORNL 2013	291	0.29	ORNL 2013	--	--	0.31	0.31	DOE/RL-96-17	1.54E-07	--	--
99-55-8	5-Nitro-o-toluidine	0.067	EPA 2012	7.79E-06	EPA 2012	7.93E-07	EPA 2012	179	0.18	EPA 2012	--	--	--	0.18	EPA 2012	1.88E-07	--	--
83-32-9	Acenaphthene	0.051	EPA 2012	8.33E-06	EPA 2012	0.0064	CLARC 2013	4,898	4.9	CLARC 2013	--	--	4.9	4.9	DOE/RL-96-17	3.44E-06	V	69,918
208-96-8	Acenaphthylene	0.045	ORNL 2013	6.98E-06	ORNL 2013	0.0047	ORNL 2013	5,030	5.0	ORNL 2013	--	--	6.1	6.1	DOE/RL-96-17	1.80E-06	--	--
67-64-1	Acetone	0.11	EPA 2012	1.15E-05	EPA 2012	0.0016	CLARC 2013	0.58	5.75E-04	CLARC 2013	--	--	6.00E-04	6.00E-04	DOE/RL-96-17	8.97E-05	V	13,696
75-05-8	Acetonitrile	0.13	EPA 2012	1.41E-05	EPA 2012	0.0014	EPA 2012	4.7	0.0047	EPA 2012	--	--	--	0.0047	EPA 2012	9.68E-05	V	13,179
98-86-2	Acetophenone	0.065	EPA 2012	8.72E-06	EPA 2012	4.25E-04	EPA 2012	52	0.052	EPA 2012	--	--	--	0.052	EPA 2012	1.01E-05	V	40,825
107-02-8	Acrolein	0.11	EPA 2012	1.22E-05	EPA 2012	0.0050	EPA 2012	1.0	0.0010	EPA 2012	--	--	--	0.0010	EPA 2012	2.92E-04	V	7,590
79-06-1	Acrylamide	0.11	EPA 2012	1.33E-05	EPA 2012	6.95E-08	EPA 2012	5.7	0.0057	EPA 2012	--	--	--	0.0057	EPA 2012	8.03E-07	V	144,739
107-13-1	Acrylonitrile	0.11	EPA 2012	1.23E-05	EPA 2012	0.0056	EPA 2012	8.5	0.0085	EPA 2012	--	--	--	0.0085	EPA 2012	3.13E-04	V	7,335
309-00-2	Aldrin	0.037	EPA 2012	4.35E-06	EPA 2012	0.0070	CLARC 2013	48,685	49	CLARC 2013	--	--	49	49	DOE/RL-96-17	2.84E-07	V	243,468
107-05-1	Allyl chloride	0.094	EPA 2012	1.08E-05	EPA 2012	0.45	EPA 2012	40	0.040	EPA 2012	--	--	--	0.040	EPA 2012	0.0100	V	1,298
319-84-6	Alpha-BHC	0.043	EPA 2012	5.06E-06	EPA 2012	4.35E-04	CLARC 2013	1,762	1.8	CLARC 2013	--	--	1.8	1.8	DOE/RL-96-17	5.57E-07	--	--
5103-71-9	Alpha-Chlordane	0.034	EPA 2012	4.02E-06	EPA 2012	0.0020	CLARC 2013	51,310	51	CLARC 2013	--	--	51	51	DOE/RL-96-17	7.20E-08	--	--
7429-90-5	Aluminum	--	--	--	--	0	CLARC 2013	--	--	--	1.50E+03	ORNL 2013	--	1.50E+03	ORNL 2013	--	--	--
62-53-3	Aniline	0.083	EPA 2012	1.01E-05	EPA 2012	8.26E-05	EPA 2012	70	0.070	EPA 2012	--	--	--	0.070	EPA 2012	2.52E-06	V	81,649
120-12-7	Anthracene	0.039	EPA 2012	7.85E-06	EPA 2012	0.0027	CLARC 2013	23,493	23	CLARC 2013	--	--	24	24	DOE/RL-96-17	2.37E-07	V	266,357
7440-36-0	Antimony	--	--	--	--	0	CLARC 2013	--	--	--	45	CLARC 2013	3.8	3.8	DOE/RL-96-17	--	--	--
140-57-8	Aramite	0.020	EPA 2012	5.03E-06	EPA 2012	7.77E-06	EPA 2012	5,550	5.6	EPA 2012	--	--	--	5.6	EPA 2012	7.13E-09	--	--
12674-11-2	Aroclor-1016	0.047	EPA 2012	5.48E-06	EPA 2012	0.0082	EPA 2012	107,300	107	CLARC 2013	--	--	107	107	DOE/RL-96-17	1.91E-07	--	--
11104-28-2	Aroclor-1221	0.058	EPA 2012	6.75E-06	EPA 2012	0.030	EPA 2012	8,397	8.4	EPA 2012	--	--	10	10	DOE/RL-96-17	8.90E-06	V	43,460

Table 4-1. Summary of Contaminant-Specific Input Parameters and Volatilization Factors

CAS#	Contaminant	Diffusivity in Air[a] (cm^2/s) (D_i)	Source	Diffusivity in Water[a] (cm^2/s) (D_w)	Source	Dimensionless Henry's Law Constant[a] (H')	Source	Soil-Carbon Partition Coefficient[a] (L/kg) (K_{oc})	Soil/Water Distribution Coefficient K_d Organic (L/kg) = K_{oc} x f_{oc}	Source	Inorganic K_d [a] (cm^3/g)	Source	RDR/RAWP Soil/Water Distribution Coefficient [b] (K_d) DOE/RL-96-17	Final K_d[c] (cm^3/g)	Source	Apparent Diffusivity (cm^2/s) (D_A)	Volatile?[d]	Volatilization Factor (m^3/kg) (VF)
11141-16-5	Aroclor-1232	0.058	EPA 2012	6.75E-06	EPA 2012	0.030	EPA 2012	8,397	8.4	EPA 2012	--	--	10	10	DOE/RL-96-17	8.90E-06	V	43,460
53469-21-9	Aroclor-1242	0.043	EPA 2012	5.04E-06	EPA 2012	0.0078	EPA 2012	78,100	78	EPA 2012	--	--	45	45	DOE/RL-96-17	3.99E-07	--	--
12672-29-6	Aroclor-1248	0.043	EPA 2012	5.04E-06	EPA 2012	0.018	EPA 2012	76,530	77	EPA 2012	--	--	44	44	DOE/RL-96-17	9.41E-07	--	--
11097-69-1	Aroclor-1254	0.040	EPA 2012	4.68E-06	EPA 2012	0.012	EPA 2012	130,500	131	EPA 2012	--	--	76	76	DOE/RL-96-17	3.27E-07	--	--
11096-82-5	Aroclor-1260	0.035	EPA 2012	4.12E-06	EPA 2012	0.014	EPA 2012	822,400	822	CLARC 2013	--	--	822	822	DOE/RL-96-17	3.14E-08	--	--
37324-23-5	Aroclor-1262	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
11100-14-4	Aroclor-1268	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
7440-38-2	Arsenic	--	--	--	--	0	CLARC 2013	--	--	--	29	CLARC 2013	3.0	29	CLARC 2013	--	--	--
103-33-3	Azobenzene	0.036	EPA 2012	7.47E-06	EPA 2012	5.52E-04	EPA 2012	3,759	3.8	EPA 2012	--	--	--	3.8	EPA 2012	2.86E-07	V	242,531
7440-39-3	Barium	--	--	--	--	0	CLARC 2013	--	--	--	41	CLARC 2013	25	25	DOE/RL-96-17	--	--	--
71-43-2	Benzene	0.090	EPA 2012	1.03E-05	EPA 2012	0.23	CLARC 2013	62	0.062	CLARC 2013	--	--	--	0.062	CLARC 2013	0.0053	V	1,781
56-55-3	Benzo(a)anthracene	0.051	EPA 2012	5.94E-06	EPA 2012	1.37E-04	CLARC 2013	357,537	358	CLARC 2013	--	--	360	360	DOE/RL-96-17	1.14E-09	--	--
50-32-8	Benzo(a)pyrene	0.048	EPA 2012	5.56E-06	EPA 2012	4.63E-05	CLARC 2013	968,774	969	CLARC 2013	--	--	5,500	5,500	DOE/RL-96-17	2.78E-11	--	--
205-99-2	Benzo(b)fluoranthene	0.048	EPA 2012	5.56E-06	EPA 2012	0.0046	CLARC 2013	1.23E+06	1,230	CLARC 2013	--	--	803	803	DOE/RL-96-17	1.44E-08	--	--
191-24-2	Benzo(g,h,i)perylene	0.045	ORNL 2013	5.23E-06	ORNL 2013	1.35E-05	ORNL 2013	1.95E+06	1,950	ORNL 2013	--	--	2,680	2,680	DOE/RL-96-17	2.44E-11	--	--
207-08-9	Benzo(k)fluoranthene	0.048	EPA 2012	5.56E-06	EPA 2012	3.40E-05	CLARC 2013	1.23E+06	1,230	CLARC 2013	--	--	1,230	1,230	DOE/RL-96-17	9.88E-11	--	--
65-85-0	Benzoic acid	0.070	EPA 2012	9.79E-06	EPA 2012	6.31E-05	CLARC 2013	0.60	6.00E-04	CLARC 2013	--	--	--	6.00E-04	CLARC 2013	2.96E-06	--	--
100-51-6	Benzyl alcohol	0.073	EPA 2012	9.37E-06	EPA 2012	1.38E-05	EPA 2012	21	0.021	EPA 2012	--	--	--	0.021	EPA 2012	9.32E-07	V	134,314
7440-41-7	Beryllium	--	--	--	--	0	CLARC 2013	--	--	--	790	CLARC 2013	790	790	DOE/RL-96-17	--	--	--
319-85-7	beta-1,2,3,4,5,6-Hexachlorocyclohexane (beta-BHC)	0.028	EPA 2012	7.40E-06	EPA 2012	3.05E-05	CLARC 2013	2,139	2.1	CLARC 2013	--	--	2.1	2.1	DOE/RL-96-17	4.10E-08	--	--
108-60-1	Bis(2-chloro-1-methylethyl)ether	0.040	EPA 2012	7.36E-06	EPA 2012	0.0030	EPA 2012	83	0.083	EPA 2012	--	--	0.039	0.039	DOE/RL-96-17	4.65E-05	V	19,025
111-91-1	Bis(2-Chloroethoxy)methane	0.061	EPA 2012	7.15E-06	EPA 2012	1.57E-04	EPA 2012	14	0.014	EPA 2012	--	--	0.0028	0.0028	DOE/RL-96-17	5.43E-06	--	--
111-44-4	Bis(2-chloroethyl) ether	0.057	EPA 2012	8.71E-06	EPA 2012	7.38E-04	CLARC 2013	76	0.076	CLARC 2013	--	--	0.076	0.076	DOE/RL-96-17	1.30E-05	V	36,000
117-81-7	Bis(2-ethylhexyl) phthalate	0.017	EPA 2012	4.18E-06	EPA 2012	4.18E-06	CLARC 2013	111,123	111	CLARC 2013	--	--	110	110	DOE/RL-96-17	2.76E-10	--	--
7440-69-9	Bismuth	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table 4-1. Summary of Contaminant-Specific Input Parameters and Volatilization Factors

CAS#	Contaminant	Diffusivity in Air[a] (cm^2/s) (D_i)	Source	Diffusivity in Water[a] (cm^2/s) (D_w)	Source	Dimensionless Henry's Law Constant[a] (H')	Source	Soil-Carbon Partition Coefficient[a] (L/kg) (K_{oc})	Soil/Water Distribution Coefficient K_d Organic (L/kg) = K_{oc} x f_{oc}	Source	Inorganic K_d [a] (cm^3/g)	Source	RDR/RAWP Soil/Water Distribution Coefficient [b] (K_d) DOE/RL-96-17	Final K_d[c] (cm^3/g)	Source	Apparent Diffusivity (cm^2/s) (D_A)	Volatile?[d]	Volatilization Factor (m^3/kg) (VF)
7440-42-8	Boron	--	--	--	--	0	CLARC 2013	--	--	--	3.00E+00	ORNL 2013	3.0	3.0	DOE/RL-96-17	--	--	--
24959-67-9	Bromide	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
75-27-4	Bromodichloromethane	0.056	EPA 2012	1.07E-05	EPA 2012	0.066	CLARC 2013	55	0.055	CLARC 2013	--	--	--	0.055	CLARC 2013	0.0012	V	3,783
75-25-2	Bromoform	0.036	EPA 2012	1.04E-05	EPA 2012	0.022	CLARC 2013	126	0.13	CLARC 2013	--	--	--	0.13	CLARC 2013	1.81E-04	V	9,627
74-83-9	Bromomethane	0.10	EPA 2012	1.35E-05	EPA 2012	0.26	CLARC 2013	9.0	0.0090	CLARC 2013	--	--	--	0.0090	CLARC 2013	0.0087	V	1,390
85-68-7	Butylbenzylphthalate	0.021	EPA 2012	5.17E-06	EPA 2012	5.17E-05	CLARC 2013	13,746	14	CLARC 2013	--	--	14	14	DOE/RL-96-17	6.49E-09	--	--
7440-43-9	Cadmium	--	--	--	--	0	CLARC 2013	--	--	--	75	ORNL 2013	30	30	DOE/RL-96-17	--	--	--
7440-70-2	Calcium	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
86-74-8	Carbazole	0.042	ORNL 2013	7.45E-06	ORNL 2013	6.26E-07	CLARC 2013	3,390	3.4	CLARC 2013	--	--	3.4	3.4	DOE/RL-96-17	1.39E-08	--	--
75-15-0	Carbon disulfide	0.11	EPA 2012	1.30E-05	EPA 2012	1.2	CLARC 2013	46	0.046	CLARC 2013	--	--	--	0.046	CLARC 2013	0.018	V	954
56-23-5	Carbon tetrachloride	0.057	EPA 2012	9.78E-06	EPA 2012	1.3	CLARC 2013	152	0.15	CLARC 2013	--	--	0.15	0.15	DOE/RL-96-17	0.0078	V	1,469
57-74-9	Chlordane	0.034	EPA 2012	4.02E-06	EPA 2012	0.0020	CLARC 2013	51,310	51	CLARC 2013	--	--	51	51	DOE/RL-96-17	7.20E-08	--	--
16887-00-6	Chloride	--	--	--	--	--	--	--	--	--	--	--	0	0	DOE/RL-96-17	--	--	--
108-90-7	Chlorobenzene	0.072	EPA 2012	9.48E-06	EPA 2012	0.15	CLARC 2013	224	0.22	CLARC 2013	--	--	--	0.22	CLARC 2013	0.0017	V	3,187
510-15-6	Chlorobenzilate	0.022	EPA 2012	5.48E-06	EPA 2012	2.96E-06	EPA 2012	1,539	1.5	EPA 2012	--	--	--	1.5	EPA 2012	2.33E-08	--	--
75-00-3	Chloroethane	0.10	EPA 2012	1.16E-05	EPA 2012	0.45	EPA 2012	22	0.022	EPA 2012	--	--	--	0.022	EPA 2012	0.012	V	1,180
67-66-3	Chloroform	0.077	EPA 2012	1.09E-05	EPA 2012	0.15	CLARC 2013	53	0.053	CLARC 2013	--	--	--	0.053	CLARC 2013	0.0034	V	2,227
74-87-3	Chloromethane	0.12	EPA 2012	1.36E-05	EPA 2012	0.36	EPA 2012	6.0	0.0060	CLARC 2013	--	--	--	0.0060	CLARC 2013	0.014	V	1,109
126-99-8	Chloroprene	0.084	EPA 2012	1.00E-05	EPA 2012	2.3	EPA 2012	61	0.061	EPA 2012	--	--	--	0.061	EPA 2012	0.017	V	987
7440-47-3	Chromium	--	--	--	--	0	CLARC 2013	--	--	--	1.80E+06	ORNL 2013	200	200	DOE/RL-96-17	--	--	--
218-01-9	Chrysene	0.026	EPA 2012	6.75E-06	EPA 2012	0.0039	CLARC 2013	398,000	398	CLARC 2013	--	--	200	200	DOE/RL-96-17	2.72E-08	--	--
156-59-2	cis-1,2-Dichloroethylene	0.088	EPA 2012	1.13E-05	EPA 2012	0.17	CLARC 2013	36	0.036	CLARC 2013	--	--	--	0.036	CLARC 2013	0.0047	V	1,890
10061-01-5	cis-1,3-Dichloropropene	0.076	EPA 2012	1.01E-05	EPA 2012	0.73	CLARC 2013	27	0.027	CLARC 2013	--	--	--	0.027	CLARC 2013	0.011	V	1,228
7440-48-4	Cobalt	--	--	--	--	--	--	--	--	--	45	ORNL 2013	50	50	DOE/RL-96-17	--	--	--
PCB1242/1016	Co-elution of Aroclor 1242 and Aroclor 1016	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table 4-1. Summary of Contaminant-Specific Input Parameters and Volatilization Factors

CAS#	Contaminant	Diffusivity in Air[a] (cm^2/s) (D_i)	Source	Diffusivity in Water[a] (cm^2/s) (D_w)	Source	Dimensionless Henry's Law Constant[a] (H')	Source	Soil-Carbon Partition Coefficient[a] (L/kg) (K_{oc})	Soil/Water Distribution Coefficient K_d Organic (L/kg) = K_{oc} x f_{oc}	Source	Inorganic K_d [a] (cm^3/g)	Source	RDR/RAWP Soil/Water Distribution Coefficient [b] (K_d) DOE/RL-96-17	Final K_d[c] (cm^3/g)	Source	Apparent Diffusivity (cm^2/s) (D_A)	Volatile?[d]	Volatilization Factor (m^3/kg) (VF)
7440-50-8	Copper	--	--	--	--	0	CLARC 2013	--	--	--	22	CLARC 2013	22	22	DOE/RL-96-17	--	--	--
57-12-5	Cyanide	0.21	EPA 2012	2.46E-05	EPA 2012	0.0054	EPA 2012	--	--	--	9.90E+00	ORNL 2013	9.9	9.9	DOE/RL-96-17	6.13E-06	V	52,392
110-82-7	Cyclohexane	0.080	EPA 2012	9.11E-06	EPA 2012	6.1	EPA 2012	146	0.15	EPA 2012	--	--	--	0.15	EPA 2012	0.019	V	951
108-94-1	Cyclohexanone	0.077	EPA 2012	9.38E-06	EPA 2012	3.68E-04	EPA 2012	17	0.017	EPA 2012	--	--	--	0.017	EPA 2012	1.33E-05	V	35,535
75-99-0	Dalapon	0.060	EPA 2012	9.41E-06	EPA 2012	2.31E-06	EPA 2012	3.2	0.0032	EPA 2012	--	--	0.0027	0.0027	DOE/RL-96-17	6.54E-07	V	160,383
124-18-5	Decane	0.045	ORNL 2013	6.40E-06	ORNL 2013	211	ORNL 2013	1,450	1.5	ORNL 2013	--	--	--	1.5	ORNL 2013	0.012	--	--
319-86-8	Delta-BHC	0.043	ORNL 2013	5.06E-06	ORNL 2013	2.10E-04	ORNL 2013	2,810	2.8	ORNL 2013	--	--	3.4	3.4	DOE/RL-96-17	1.48E-07	--	--
2303-16-4	Diallate	0.045	EPA 2012	5.31E-06	EPA 2012	1.55E-04	EPA 2012	644	0.64	EPA 2012	--	--	--	0.64	EPA 2012	5.51E-07	--	--
53-70-3	Dibenz[a,h]anthracene	0.045	EPA 2012	5.21E-06	EPA 2012	6.03E-07	CLARC 2013	1.79E+06	1,789	CLARC 2013	--	--	1,790	1,790	DOE/RL-96-17	1.93E-11	--	--
132-64-9	Dibenzofuran	0.041	EPA 2012	7.38E-06	EPA 2012	0.0087	EPA 2012	9,161	9.2	EPA 2012	--	--	11	11	DOE/RL-96-17	1.67E-06	V	100,212
124-48-1	Dibromochloromethane	0.037	EPA 2012	1.06E-05	EPA 2012	0.032	CLARC 2013	63	0.063	CLARC 2013	--	--	--	0.063	CLARC 2013	3.71E-04	V	6,735
74-95-3	Dibromomethane	0.055	EPA 2012	1.19E-05	EPA 2012	0.034	EPA 2012	22	0.022	EPA 2012	--	--	--	0.022	EPA 2012	7.71E-04	V	4,669
1918-00-9	Dicamba	0.029	EPA 2012	7.80E-06	EPA 2012	8.91E-08	EPA 2012	29	0.029	EPA 2012	--	--	0.029	0.029	DOE/RL-96-17	3.86E-07	--	--
75-71-8	Dichlorodifluoromethane	0.076	EPA 2012	1.08E-05	EPA 2012	14	EPA 2012	44	0.044	EPA 2012	--	--	--	0.044	EPA 2012	0.020	V	910
120-36-5	Dichloroprop	0.050	ORNL 2013	5.83E-06	ORNL 2013	4.99E-07	ORNL 2013	49	0.049	ORNL 2013	--	--	0.029	0.029	DOE/RL-96-17	2.96E-07	--	--
60-57-1	Dieldrin	0.023	EPA 2012	6.01E-06	EPA 2012	6.19E-04	CLARC 2013	25,546	26	CLARC 2013	--	--	26	26	DOE/RL-96-17	3.14E-08	--	--
60-29-7	Diethyl ether	0.085	EPA 2012	9.36E-06	EPA 2012	0.050	EPA 2012	9.7	0.0097	EPA 2012	--	--	--	0.0097	EPA 2012	0.0019	V	2,962
84-66-2	Diethylphthalate	0.026	EPA 2012	6.72E-06	EPA 2012	1.85E-05	CLARC 2013	82	0.082	CLARC 2013	--	--	0.082	0.082	DOE/RL-96-17	3.76E-07	--	--
60-51-5	Dimethoate	0.026	EPA 2012	6.74E-06	EPA 2012	9.93E-09	EPA 2012	13	0.013	EPA 2012	--	--	--	0.013	EPA 2012	3.80E-07	--	--
131-11-3	Dimethyl phthalate	0.030	ORNL 2013	7.14E-06	ORNL 2013	8.05E-06	ORNL 2013	32	0.032	ORNL 2013	--	--	0.037	0.037	DOE/RL-96-17	4.24E-07	--	--
84-74-2	Di-n-butylphthalate	0.021	EPA 2012	5.33E-06	EPA 2012	3.85E-08	CLARC 2013	1,567	1.6	CLARC 2013	--	--	1.6	1.6	DOE/RL-96-17	2.03E-08	--	--
117-84-0	Di-n-octylphthalate	0.036	EPA 2012	4.15E-06	EPA 2012	0.0027	CLARC 2013	8.32E+07	83,200	CLARC 2013	--	--	83,200	83,200	DOE/RL-96-17	6.27E-11	--	--
88-85-7	Dinoseb(2-secButyl-4,6-dinitrophenol)	0.025	EPA 2012	6.52E-06	EPA 2012	1.86E-05	EPA 2012	4,294	4.3	EPA 2012	--	--	3.5	3.5	DOE/RL-96-17	1.83E-08	--	--
298-04-4	Disulfoton	0.023	EPA 2012	5.67E-06	EPA 2012	8.83E-05	EPA 2012	838	0.84	EPA 2012	--	--	--	0.84	EPA 2012	1.51E-07	--	--

Table 4-1. Summary of Contaminant-Specific Input Parameters and Volatilization Factors

CAS#	Contaminant	Diffusivity in Air[a] (cm^2/s) (D_i)	Source	Diffusivity in Water[a] (cm^2/s) (D_w)	Source	Dimensionless Henry's Law Constant[a] (H')	Source	Soil-Carbon Partition Coefficient[a] (L/kg) (K_{oc})	Soil/Water Distribution Coefficient K_d Organic (L/kg) = K_{oc} x f_{oc}	Source	Inorganic K_d [a] (cm^3/g)	Source	RDR/RAWP Soil/Water Distribution Coefficient [b] (K_d) DOE/RL-96-17	Final K_d[c] (cm^3/g)	Source	Apparent Diffusivity (cm^2/s) (D_A)	Volatile?[d]	Volatilization Factor (m^3/kg) (VF)
959-98-8	Endosulfan I	0.022	EPA 2012	5.76E-06	EPA 2012	4.59E-04	CLARC 2013	2,040	2.0	CLARC 2013	--	--	2.0	2.0	DOE/RL-96-17	2.74E-07	--	--
33213-65-9	Endosulfan II	0.022	EPA 2012	5.76E-06	EPA 2012	4.59E-04	CLARC 2013	2,040	2.0	CLARC 2013	--	--	2.0	2.0	DOE/RL-96-17	2.74E-07	--	--
1031-07-8	Endosulfan sulfate	0.034	ORNL 2013	3.94E-06	ORNL 2013	1.33E-05	ORNL 2013	9,850	9.9	ORNL 2013	--	--	2.0	2.0	DOE/RL-96-17	2.28E-08	--	--
72-20-8	Endrin	0.036	EPA 2012	4.22E-06	EPA 2012	3.08E-04	CLARC 2013	10,811	11	CLARC 2013	--	--	11	11	DOE/RL-96-17	5.69E-08	--	--
7421-93-4	Endrin Aldehyde	0.036	ORNL 2013	4.22E-06	ORNL 2013	1.71E-04	ORNL 2013	3,270	3.3	ORNL 2013	--	--	11	11	DOE/RL-96-17	3.27E-08	--	--
53494-70-5	Endrin ketone	0.036	ORNL 2013	4.22E-06	ORNL 2013	8.26E-07	ORNL 2013	9.72E+03	9.7	ORNL 2013	--	--	11	11	DOE/RL-96-17	2.60E-09	--	--
64-17-5	Ethanol	0.12	ORNL 2013	1.32E-05	ORNL 2013	2.04E-04	ORNL 2013	1.05E+00	0.0011	ORNL 2013	--	--	--	0.0011	ORNL 2013	1.42E-05	V	34,460
141-78-6	Ethyl acetate	0.082	EPA 2012	9.70E-06	EPA 2012	0.0055	EPA 2012	5.6	0.0056	EPA 2012	--	--	--	0.0056	EPA 2012	2.26E-04	V	8,628
97-63-2	Ethyl methacrylate	0.065	EPA 2012	8.38E-06	EPA 2012	0.023	EPA 2012	17	0.017	EPA 2012	--	--	--	0.017	EPA 2012	6.74E-04	V	4,995
100-41-4	Ethylbenzene	0.068	EPA 2012	8.46E-06	EPA 2012	0.32	CLARC 2013	204	0.20	CLARC 2013	--	--	--	0.20	CLARC 2013	0.0032	V	2,283
107-21-1	Ethylene glycol	0.12	EPA 2012	1.36E-05	EPA 2012	2.45E-06	EPA 2012	1.0	0.0010	EPA 2012	--	--	0.0010	0.0010	DOE/RL-96-17	1.01E-06	V	129,283
206-44-0	Fluoranthene	0.028	EPA 2012	7.18E-06	EPA 2012	6.60E-04	CLARC 2013	49,096	49	CLARC 2013	--	--	49	49	DOE/RL-96-17	2.06E-08	--	--
86-73-7	Fluorene	0.044	EPA 2012	7.89E-06	EPA 2012	0.0026	CLARC 2013	7,707	7.7	CLARC 2013	--	--	7.7	7.7	DOE/RL-96-17	7.89E-07	V	145,960
16984-48-8	Fluoride	--	--	--	--	--	--	--	--	--	1.50E+02	ORNL 2013	150	150	DOE/RL-96-17	--	--	--
58-89-9	Gamma-BHC (Lindane)	0.043	EPA 2012	5.06E-06	EPA 2012	5.74E-04	CLARC 2013	1,352	1.4	CLARC 2013	--	--	1.4	1.4	DOE/RL-96-17	9.35E-07	--	--
5566-34-7	Gamma-Chlordane	0.034	EPA 2012	4.02E-06	EPA 2012	0.0020	CLARC 2013	51,310	51	CLARC 2013	--	--	51	51	DOE/RL-96-17	7.20E-08	--	--
76-44-8	Heptachlor	0.022	EPA 2012	5.70E-06	EPA 2012	0.045	CLARC 2013	9,528	9.5	CLARC 2013	--	--	9.5	9.5	DOE/RL-96-17	5.52E-06	--	--
1024-57-3	Heptachlor epoxide	0.036	EPA 2012	4.16E-06	EPA 2012	3.90E-04	CLARC 2013	83,200	83	CLARC 2013	--	--	83	83	DOE/RL-96-17	9.21E-09	V	1.35E+06
118-74-1	Hexachlorobenzene	0.029	EPA 2012	7.85E-06	EPA 2012	0.054	CLARC 2013	80,000	80	CLARC 2013	--	--	80	80	DOE/RL-96-17	1.04E-06	--	--
87-68-3	Hexachlorobutadiene	0.027	EPA 2012	7.03E-06	EPA 2012	0.33	CLARC 2013	53,700	54	CLARC 2013	--	--	54	54	DOE/RL-96-17	8.84E-06	V	43,624
77-47-4	Hexachlorocyclopentadiene	0.027	EPA 2012	7.22E-06	EPA 2012	1.1	CLARC 2013	200,000	200	CLARC 2013	--	--	200	200	DOE/RL-96-17	8.04E-06	V	45,728
67-72-1	Hexachloroethane	0.032	EPA 2012	8.89E-06	EPA 2012	0.16	CLARC 2013	1,780	1.8	CLARC 2013	--	--	1.8	1.8	DOE/RL-96-17	1.42E-04	V	10,868
70-30-4	Hexachlorophene	0.035	EPA 2012	4.04E-06	EPA 2012	2.24E-11	EPA 2012	668,600	669	EPA 2012	--	--	--	669	EPA 2012	3.84E-11	--	--
110-54-3	Hexane	0.073	EPA 2012	8.17E-06	EPA 2012	74	CLARC 2013	3,410	3.4	CLARC 2013	--	--	--	3.4	CLARC 2013	0.016	V	1,011

Table 4-1. Summary of Contaminant-Specific Input Parameters and Volatilization Factors

CAS#	Contaminant	Diffusivity in Air[a] (cm^2/s) (D_i)	Source	Diffusivity in Water[a] (cm^2/s) (D_w)	Source	Dimensionless Henry's Law Constant[a] (H')	Source	Soil-Carbon Partition Coefficient[a] (L/kg) (K_{oc})	Soil/Water Distribution Coefficient K_d Organic (L/kg) = K_{oc} x f_{oc}	Source	Inorganic K_d [a] (cm^3/g)	Source	RDR/RAWP Soil/Water Distribution Coefficient [b] (K_d) DOE/RL-96-17	Final K_d[c] (cm^3/g)	Source	Apparent Diffusivity (cm^2/s) (D_A)	Volatile?[d]	Volatilization Factor (m^3/kg) (VF)
18540-29-9	Hexavalent Chromium	--	--	--	--	0	CLARC 2013	--	--	--	19	CLARC 2013	0	0.80	ECF-Hanford-11-0165	--	--	--
302-01-2	Hydrazine	--	--	--	--	--	--	--	--	--	--	--	0.014	0.014	DOE/RL-96-17	--	V	--
193-39-5	Indeno(1,2,3-cd)pyrene	0.045	EPA 2012	5.23E-06	EPA 2012	6.56E-05	CLARC 2013	3.47E+06	3,470	CLARC 2013	--	--	3,470	3,470	DOE/RL-96-17	5.47E-11	--	--
7439-89-6	Iron	--	--	--	--	0	CLARC 2013	--	--	--	2.50E+01	ORNL 2013	--	2.50E+01	ORNL 2013	--	--	--
78-83-1	Isobutyl alcohol	0.090	EPA 2012	1.00E-05	EPA 2012	4.00E-04	EPA 2012	2.9	0.0029	EPA 2012	--	--	--	0.0029	EPA 2012	1.92E-05	V	29,624
78-59-1	Isophorone	0.053	EPA 2012	7.53E-06	EPA 2012	2.72E-04	CLARC 2013	47	0.047	CLARC 2013	--	--	0.047	0.047	DOE/RL-96-17	5.51E-06	V	55,260
98-82-8	Isopropylbenzene	0.060	EPA 2012	7.86E-06	EPA 2012	0.47	EPA 2012	698	0.70	EPA 2012	--	--	--	0.70	EPA 2012	0.0017	V	3,142
143-50-0	Kepone	0.020	EPA 2012	4.91E-06	EPA 2012	2.20E-06	EPA 2012	17,500	18	EPA 2012	--	--	--	18	EPA 2012	1.90E-09	--	--
7439-92-1	Lead	--	--	--	--	0	CLARC 2013	--	--	--	10,000	CLARC 2013	30	30	DOE/RL-96-17	--	--	--
7439-93-2	Lithium	--	--	--	--	--	--	--	--	--	3.00E+02	ORNL 2013	50	50	DOE/RL-96-17	--	--	--
7439-95-4	Magnesium	--	--	--	--	--	--	--	--	--	4.50E+00	ORNL 2013	--	4.50E+00	ORNL 2013	--	--	--
7439-96-5	Manganese	--	--	--	--	0	CLARC 2013	--	--	--	65	ORNL 2013	50	50	DOE/RL-96-17	--	--	--
99-65-0	m-Dinitrobenzene	0.048	EPA 2012	9.21E-06	EPA 2012	2.00E-06	EPA 2012	352	0.35	EPA 2012	--	--	--	0.35	EPA 2012	1.41E-07	--	--
7439-97-6	Mercury	--	--	--	--	--	--	--	--	--	52	CLARC 2013	30	30	DOE/RL-96-17	--	--	--
126-98-7	Methacrylonitrile	0.096	EPA 2012	1.06E-05	EPA 2012	0.010	EPA 2012	13	0.013	EPA 2012	--	--	--	0.013	EPA 2012	4.52E-04	V	6,100
67-56-1	Methanol	0.16	EPA 2012	1.65E-05	EPA 2012	1.86E-04	EPA 2012	1.0	0.0010	EPA 2012	--	--	--	0.0010	EPA 2012	1.66E-05	V	31,865
72-43-5	Methoxychlor	0.022	EPA 2012	5.59E-06	EPA 2012	6.48E-04	CLARC 2013	80,000	80	CLARC 2013	--	--	80	80	DOE/RL-96-17	9.96E-09	--	--
80-62-6	Methyl methacrylate	0.075	EPA 2012	9.21E-06	EPA 2012	0.013	EPA 2012	9.1	0.0091	EPA 2012	--	--	--	0.0091	EPA 2012	4.68E-04	V	5,996
66-27-3	Methyl methanesulfonate	0.079	EPA 2012	1.06E-05	EPA 2012	1.65E-04	EPA 2012	4.3	0.0043	EPA 2012	--	--	--	0.0043	EPA 2012	7.28E-06	--	--
298-00-0	Methyl parathion	0.025	EPA 2012	6.44E-06	EPA 2012	4.09E-06	EPA 2012	729	0.73	EPA 2012	--	--	--	0.73	EPA 2012	5.59E-08	--	--
75-09-2	Methylene chloride	0.100	EPA 2012	1.25E-05	EPA 2012	0.090	CLARC 2013	10	0.010	CLARC 2013	--	--	0.010	0.010	DOE/RL-96-17	0.0038	V	2,113
7439-98-7	Molybdenum	--	--	--	--	0	CLARC 2013	--	--	--	2.00E+01	ORNL 2013	20	20	DOE/RL-96-17	--	--	--
108-38-3	m-Xylene	0.068	EPA 2012	8.44E-06	EPA 2012	0.30	CLARC 2013	196	0.20	CLARC 2013	--	--	--	0.20	CLARC 2013	0.0031	V	2,327
91-20-3	Naphthalene	0.060	EPA 2012	8.38E-06	EPA 2012	0.020	CLARC	1,191	1.2	CLARC 2013	--	--	1.2	1.2	DOE/RL-	4.94E-05	V	18,455

Table 4-1. Summary of Contaminant-Specific Input Parameters and Volatilization Factors

CAS#	Contaminant	Diffusivity in Air[a] (cm^2/s) (D_i)	Source	Diffusivity in Water[a] (cm^2/s) (D_w)	Source	Dimensionless Henry's Law Constant[a] (H')	Source	Soil-Carbon Partition Coefficient[a] (L/kg) (K_{oc})	Soil/Water Distribution Coefficient K_d Organic (L/kg) = K_{oc} x f_{oc}	Source	Inorganic K_d [a] (cm^3/g)	Source	RDR/RAWP Soil/Water Distribution Coefficient [b] (K_d) DOE/RL-96-17	Final K_d[c] (cm^3/g)	Source	Apparent Diffusivity (cm^2/s) (D_A)	Volatile?[d]	Volatilization Factor (m^3/kg) (VF)
							2013								96-17			
104-51-8	n-Butylbenzene	0.053	EPA 2012	7.33E-06	EPA 2012	0.65	EPA 2012	1,482	1.5	EPA 2012	--	--	--	1.5	EPA 2012	0.0011	V	3,961
7440-02-0	Nickel	--	--	--	--	0	CLARC 2013	--	--	--	65	CLARC 2013	65	65	DOE/RL-96-17	--	--	--
14797-55-8	Nitrate	--	--	--	--	--	--	--	--	--	--	--	0	0	DOE/RL-96-17	--	--	--
14797-65-0	Nitrite	--	--	--	--	--	--	--	--	--	--	--	0	0	DOE/RL-96-17	--	--	--
98-95-3	Nitrobenzene	0.068	EPA 2012	9.45E-06	EPA 2012	9.84E-04	CLARC 2013	119	0.12	CLARC 2013	--	--	0.12	0.12	DOE/RL-96-17	1.66E-05	V	31,875
NO3-N	Nitrogen in Nitrate	--	--	--	--	--	--	--	--	--	--	--	0	0	DOE/RL-96-17	--	--	--
NO2-N	Nitrogen in Nitrite	--	--	--	--	--	--	--	--	--	--	--	0	0	DOE/RL-96-17	--	--	--
NO2+NO3-N	Nitrogen in Nitrite and Nitrate	--	--	--	--	--	--	--	--	--	--	--	0	0	DOE/RL-96-17	--	--	--
930-55-2	Nitrosopyrrolidine	0.080	EPA 2012	1.01E-05	EPA 2012	2.00E-06	EPA 2012	92	0.092	EPA 2012	--	--	--	0.092	EPA 2012	3.78E-07	V	210,784
55-18-5	n-Nitrosodiethylamine	0.074	EPA 2012	9.13E-06	EPA 2012	1.48E-04	EPA 2012	83	0.083	EPA 2012	--	--	--	0.083	EPA 2012	3.51E-06	V	69,238
62-75-9	n-Nitrosodimethylamine	0.099	EPA 2012	1.15E-05	EPA 2012	7.44E-05	EPA 2012	23	0.023	EPA 2012	--	--	--	0.023	EPA 2012	3.78E-06	V	66,675
924-16-3	n-Nitrosodi-n-butylamine	0.065	EPA 2012	7.59E-06	EPA 2012	5.40E-04	EPA 2012	915	0.91	EPA 2012	--	--	--	0.91	EPA 2012	1.89E-06	V	94,382
621-64-7	n-Nitrosodi-n-dipropylamine	0.056	EPA 2012	7.76E-06	EPA 2012	9.23E-05	CLARC 2013	24	0.024	CLARC 2013	--	--	0.024	0.024	DOE/RL-96-17	2.64E-06	--	--
86-30-6	n-Nitrosodiphenylamine	0.056	EPA 2012	6.53E-06	EPA 2012	2.05E-04	CLARC 2013	1,290	1.3	CLARC 2013	--	--	1.3	1.3	DOE/RL-96-17	4.69E-07	--	--
10595-95-6	n-Nitrosomethylethylamine	0.096	EPA 2012	1.12E-05	EPA 2012	5.89E-05	EPA 2012	43	0.043	EPA 2012	--	--	--	0.043	EPA 2012	2.59E-06	--	--
59-89-2	n-Nitrosomorpholine	0.080	EPA 2012	9.33E-06	EPA 2012	1.00E-06	EPA 2012	23	0.023	EPA 2012	--	--	--	0.023	EPA 2012	5.18E-07	--	--
100-75-4	n-Nitrosopiperidine	0.070	EPA 2012	9.18E-06	EPA 2012	3.45E-05	EPA 2012	168	0.17	EPA 2012	--	--	--	0.17	EPA 2012	6.98E-07	--	--
95-47-6	o-Xylene	0.069	EPA 2012	8.53E-06	EPA 2012	0.21	CLARC 2013	241	0.24	CLARC 2013	--	--	--	0.24	CLARC 2013	0.0021	V	2,863
56-38-2	Parathion	0.023	EPA 2012	5.82E-06	EPA 2012	1.22E-05	EPA 2012	2,422	2.4	EPA 2012	--	--	--	2.4	EPA 2012	2.06E-08	--	--
60-11-7	p-Dimethylaminoazobenzene	0.051	EPA 2012	6.00E-06	EPA 2012	9.57E-06	EPA 2012	2,028	2.0	EPA 2012	--	--	--	2.0	EPA 2012	3.02E-08	--	--
608-93-5	Pentachlorobenzene	0.029	EPA 2012	7.95E-06	EPA 2012	0.029	EPA 2012	32,148	32	CLARC 2013	--	--	--	32	CLARC 2013	1.40E-06	--	--
76-01-7	Pentachloroethane	0.032	EPA 2012	8.57E-06	EPA 2012	0.079	EPA 2012	136	0.14	EPA 2012	--	--	--	0.14	EPA 2012	5.30E-04	V	5,631
82-68-8	Pentachloronitrobenzene (PCNB)	0.026	EPA 2012	6.92E-06	EPA 2012	0.0018	EPA 2012	5,996	6.0	EPA 2012	--	--	--	6.0	EPA 2012	4.22E-07	--	--

Table 4-1. Summary of Contaminant-Specific Input Parameters and Volatilization Factors

CAS#	Contaminant	Diffusivity in Air[a] (cm^2/s) (D_i)	Source	Diffusivity in Water[a] (cm^2/s) (D_w)	Source	Dimensionless Henry's Law Constant[a] (H')	Source	Soil-Carbon Partition Coefficient[a] (L/kg) (K_{oc})	Soil/Water Distribution Coefficient K_d Organic (L/kg) = K_{oc} x f_{oc}	Source	Inorganic K_d [a] (cm^3/g)	Source	RDR/RAWP Soil/Water Distribution Coefficient [b] (K_d) DOE/RL-96-17	Final K_d[c] (cm^3/g)	Source	Apparent Diffusivity (cm^2/s) (D_A)	Volatile?[d]	Volatilization Factor (m^3/kg) (VF)
87-86-5	Pentachlorophenol	0.030	EPA 2012	8.01E-06	EPA 2012	1.00E-06	CLARC 2013	592	0.59	CLARC 2013	--	--	0.59	0.59	DOE/RL-96-17	7.58E-08	--	--
62-44-2	Phenacetin	0.060	EPA 2012	6.98E-06	EPA 2012	8.71E-09	EPA 2012	41	0.041	EPA 2012	--	--	--	0.041	EPA 2012	3.15E-07	--	--
85-01-8	Phenanthrene	0.035	ORNL 2013	6.69E-06	ORNL 2013	0.0017	ORNL 2013	16,700	17	ORNL 2013	--	--	24	24	DOE/RL-96-17	1.37E-07	V	350,939
108-95-2	Phenol	0.083	EPA 2012	1.03E-05	EPA 2012	1.63E-05	CLARC 2013	29	0.029	CLARC 2013	--	--	0.029	0.029	DOE/RL-96-17	1.07E-06	V	125,365
298-02-2	Phorate	0.023	EPA 2012	5.90E-06	EPA 2012	1.79E-04	EPA 2012	460	0.46	EPA 2012	--	--	--	0.46	EPA 2012	4.64E-07	--	--
14265-44-2	Phosphate	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
7723-14-0	Phosphorus	--	--	--	--	--	--	--	--	--	3.50E+00	ORNL 2013	--	3.50E+00	ORNL 2013	--	--	--
PO4-P	Phosphorus in phosphate	--	--	--	--	--	--	--	--	--	3.50E+00	ORNL 2013	--	3.50E+00	ORNL 2013	--	--	--
7440-09-7	Potassium	--	--	--	--	--	--	--	--	--	5.50E+00	ORNL 2013	--	5.50E+00	ORNL 2013	--	--	--
106-50-3	p-Phenylenediamine	0.084	EPA 2012	9.78E-06	EPA 2012	3.63E-08	EPA 2012	34	0.034	EPA 2012	--	--	--	0.034	EPA 2012	4.65E-07	--	--
23950-58-5	Pronamide	0.047	EPA 2012	5.50E-06	EPA 2012	3.99E-07	EPA 2012	405	0.40	EPA 2012	--	--	--	0.40	EPA 2012	7.12E-08	--	--
129-00-0	Pyrene	0.028	EPA 2012	7.25E-06	EPA 2012	4.51E-04	CLARC 2013	67,992	68	CLARC 2013	--	--	68	68	DOE/RL-96-17	1.05E-08	V	1.27E+06
110-86-1	Pyridine	0.093	EPA 2012	1.09E-05	EPA 2012	4.50E-04	EPA 2012	72	0.072	EPA 2012	--	--	--	0.072	EPA 2012	1.34E-05	V	35,445
94-59-7	Safrol	0.044	EPA 2012	7.59E-06	EPA 2012	3.71E-04	EPA 2012	207	0.21	EPA 2012	--	--	--	0.21	EPA 2012	3.00E-06	--	--
7782-49-2	Selenium	--	--	--	--	0	CLARC 2013	--	--	--	5.0	CLARC 2013	5.0	5.0	DOE/RL-96-17	--	--	--
7440-21-3	Silicon	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
7440-22-4	Silver	--	--	--	--	0	CLARC 2013	--	--	--	8.3	CLARC 2013	90	90	DOE/RL-96-17	--	--	--
7440-23-5	Sodium	--	--	--	--	--	--	--	--	--	1.00E+02	ORNL 2013	--	1.00E+02	ORNL 2013	--	--	--
7440-24-6	Strontium	--	--	--	--	0	CLARC 2013	--	--	--	35	ORNL 2013	25	25	DOE/RL-96-17	--	--	--
100-42-5	Styrene	0.071	EPA 2012	8.78E-06	EPA 2012	0.11	CLARC 2013	912	0.91	CLARC 2013	--	--	--	0.91	CLARC 2013	4.14E-04	V	6,371
14808-79-8	Sulfate	--	--	--	--	--	--	--	--	--	--	--	0	0	DOE/RL-96-17	--	--	--
18496-25-8	Sulfide	--	--	--	--	--	--	--	--	--	--	--	0	0	DOE/RL-96-17	--	--	--
99-35-4	sym-Trinitrobenzene	0.029	EPA 2012	7.69E-06	EPA 2012	2.66E-07	EPA 2012	1,683	1.7	EPA 2012	--	--	--	1.7	EPA 2012	2.76E-08	--	--
127-18-4	Tetrachloroethene	0.050	EPA 2012	9.46E-06	EPA 2012	0.75	CLARC 2013	265	0.27	CLARC 2013	--	--	--	0.27	CLARC 2013	0.0040	V	2,052
3689-24-5	Tetraethyl dithiopyrophosphate (Sulfotepp)	0.021	EPA 2012	5.28E-06	EPA 2012	1.82E-04	EPA 2012	266	0.27	EPA 2012	--	--	--	0.27	EPA	6.53E-07	--	--

Table 4-1. Summary of Contaminant-Specific Input Parameters and Volatilization Factors

CAS#	Contaminant	Diffusivity in Air[a] (cm^2/s) (D_i)	Source	Diffusivity in Water[a] (cm^2/s) (D_w)	Source	Dimensionless Henry's Law Constant[a] (H')	Source	Soil-Carbon Partition Coefficient[a] (L/kg) (K_{oc})	Soil/Water Distribution Coefficient K_d Organic (L/kg) = K_{oc} x f_{oc}	Source	Inorganic K_d [a] (cm^3/g)	Source	RDR/RAWP Soil/Water Distribution Coefficient [b] (K_d) DOE/RL-96-17	Final K_d [c] (cm^3/g)	Source	Apparent Diffusivity (cm^2/s) (D_A)	Volatile?[d]	Volatilization Factor (m^3/kg) (VF)
															2012			
7440-28-0	Thallium	--	--	--	--	0	CLARC 2013	--	--	--	71	CLARC 2013	--	71	CLARC 2013	--	--	--
7440-31-5	Tin	--	--	--	--	0	CLARC 2013	--	--	--	2.50E+02	ORNL 2013	130	130	DOE/RL-96-17	--	--	--
7440-32-6	Titanium	--	--	--	--	--	--	--	--	--	1,000	ORNL 2013	--	1,000	ORNL 2013	--	--	--
108-88-3	Toluene	0.078	EPA 2012	9.20E-06	EPA 2012	0.27	CLARC 2013	140	0.14	CLARC 2013	--	--	0.14	0.14	DOE/RL-96-17	0.0039	V	2,085
1336-36-3	Total PCBs	0.043	EPA 2012	5.04E-06	EPA 2012	0.0078	EPA 2012	309,000	309	CLARC 2013	--	--	309	309	DOE/RL-96-17	5.79E-08	--	--
TPH	Total Petroleum Hydrocarbons	--	--	--	--	--	--	--	--	--	--	--	50	50	DOE/RL-96-17	--	--	--
TPHDIESEL	Total petroleum hydrocarbons - diesel range	--	--	--	--	--	--	--	--	--	--	--	50	50	DOE/RL-96-17	--	--	--
TPHGASOLINE	Total petroleum hydrocarbons - gasoline range	--	--	--	--	--	--	--	--	--	--	--	50	50	DOE/RL-96-17	--	--	--
TPHKEROSENE	Total petroleum hydrocarbons - kerosene range	--	--	--	--	--	--	--	--	--	--	--	50	50	DOE/RL-96-17	--	--	--
TPH/OILH	Total petroleum hydrocarbons - motor oil (high boiling)	--	--	--	--	--	--	--	--	--	--	--	50	50	DOE/RL-96-17	--	--	--
TOTALPCB	Total Polychlorinated Biphenyls	0.043	EPA 2012	5.04E-06	EPA 2012	0.0078	EPA 2012	--	--	--	--	--	309	309	DOE/RL-96-17	5.79E-08	--	--
8001-35-2	Toxaphene	0.034	EPA 2012	4.00E-06	EPA 2012	2.46E-04	CLARC 2013	95,816	96	CLARC 2013	--	--	96	96	DOE/RL-96-17	4.94E-09	--	--
156-60-5	trans-1,2-Dichloroethylene	0.088	EPA 2012	1.12E-05	EPA 2012	0.39	CLARC 2013	38	0.038	CLARC 2013	--	--	--	0.038	CLARC 2013	0.0085	V	1,405
10061-02-6	trans-1,3-Dichloropropene	0.076	EPA 2012	1.01E-05	EPA 2012	0.73	CLARC 2013	27	0.027	CLARC 2013	--	--	--	0.027	CLARC 2013	0.011	V	1,228
5103-74-2	trans-Chlordane	0.034	EPA 2012	4.02E-06	EPA 2012	0.0020	CLARC 2013	51,310	51	CLARC 2013	--	--	51	51	DOE/RL-96-17	7.20E-08	--	--
126-73-8	Tributyl phosphate	0.021	EPA 2012	5.23E-06	EPA 2012	5.76E-05	EPA 2012	2,350	2.4	EPA 2012	--	--	1.9	1.9	DOE/RL-96-17	4.94E-08	--	--
79-01-6	Trichloroethene	0.069	EPA 2012	1.02E-05	EPA 2012	0.42	CLARC 2013	94	0.094	CLARC 2013	--	--	--	0.094	CLARC 2013	0.0056	V	1,727
75-69-4	Trichloromonofluoromethane	0.065	EPA 2012	1.00E-05	EPA 2012	4.0	EPA 2012	44	0.044	EPA 2012	--	--	--	0.044	EPA 2012	0.015	V	1,044
7440-61-1	Uranium	--	--	--	--	0	CLARC 2013	--	--	--	450	ORNL 2013	2.0	2.0	DOE/RL-96-17	--	--	--
7440-62-2	Vanadium	--	--	--	--	0	CLARC 2013	--	--	--	1,000	CLARC 2013	1,000	1,000	DOE/RL-96-17	--	--	--
108-05-4	Vinyl acetate	0.085	EPA 2012	1.00E-05	EPA 2012	0.021	CLARC 2013	5.3	0.0053	CLARC 2013	--	--	--	0.0053	CLARC 2013	8.70E-04	V	4,396
75-01-4	Vinyl chloride	0.11	EPA 2012	1.20E-05	EPA 2012	1.1	CLARC 2013	19	0.019	CLARC 2013	--	--	--	0.019	CLARC 2013	0.019	V	934
1330-20-7	Xylenes (total)	0.085	EPA 2012	9.90E-06	EPA 2012	0.28	CLARC 2013	233	0.23	CLARC 2013	--	--	0.23	0.23	DOE/RL-96-17	0.0033	V	2,269

Table 4-1. Summary of Contaminant-Specific Input Parameters and Volatilization Factors

CAS#	Contaminant	Diffusivity in Air[a] (cm^2/s) (D_i)	Source	Diffusivity in Water[a] (cm^2/s) (D_w)	Source	Dimensionless Henry's Law Constant[a] (H')	Source	Soil-Carbon Partition Coefficient[a] (L/kg) (K_{oc})	Soil/Water Distribution Coefficient K_d Organic (L/kg) = K_{oc} x f_{oc}	Source	Inorganic K_d [a] (cm^3/g)	Source	RDR/RAWP Soil/Water Distribution Coefficient [b] (K_d) DOE/RL-96-17	Final K_d [c] (cm^3/g)	Source	Apparent Diffusivity (cm^2/s) (D_A)	Volatile?[d]	Volatilization Factor (m^3/kg) (VF)
7440-66-6	Zinc	--	--	--	--	0	CLARC 2013	--	--	--	62	CLARC 2013	30	30	DOE/RL-96-17	--	--	--
7440-67-7	Zirconium	--	--	--	--	-	0	--	--	--	3,000	ORNL 2013	--	3,000	ORNL 2013	--	--	--

Notes:

DOE/RL-96-17 Rev. 6, Remedial Design Report/Remedial Action Work Plan (RDR/RAWP) for the 100 Area

Ecology, 2013 Cleanup Levels and Risk Calculations (CLARC) Database

EPA, 2012 “Regional Screening Levels for Chemical Contaminants at Superfund Sites”

ORNL, 2013 “Risk Assessment Information System”, housed at the Oak Ridge National Laboratory

a. Chemical-specific parameters (Diffusivity, Hcc, Kd, and Koc) were obtained from the following sources, in order of preference, as available:

1. Ecology, 2013 Cleanup Levels and Risk Calculations (CLARC) Database, Washington State Department of Ecology, Olympia, Washington, available on the internet at <https://fortress.wa.gov/ecy/clarc/CLARCHome.aspx>.
2. EPA, 2012 “Regional Screening Levels for Chemical Contaminants at Superfund Sites”, screening level/preliminary remediation goal website, updated November 2012
3. ORNL, 2013 Risk Assessment Information System, Oak Ridge National Laboratory, Oak Ridge, Tennessee, available on the internet at < http://rais.ornl.gov/ >.

b. Table E-2, DOE/RL-96-17 Rev. 6, Remedial Design Report/Remedial Action Work Plan (RDR/RAWP) for the 100 Area

c. Final Kd selected per the following order of preference: DOE/RL/96-17; Ecology, 2013; EPA 2012; ORNL, 2013

d. Is defined as volatile based on WAC 173-340-200 “Definitions” “Volatiles” or designated in the CLARC database (2013)

4.2 Toxicity Values

The chemical-specific reference dose (RfD) used in equation 750-1 for noncarcinogens and the chemical-specific carcinogenic potency factor (CPF) used in equation 750-2 for carcinogens are determined using the EPA recommended reference hierarchy as described in Cook, 2003, Human Health Toxicity Values in Superfund Risk Assessments (OSWER Directive 9285.7-53)The hierarchy is summarized below.

- Tier 1 – The EPA Integrated Risk Information System (IRIS)
- Tier 2 – The EPA Provisional Peer Reviewed Toxicity Values (PPRTVs)
- Tier 3 – Other Toxicity Values

Tier 1 – IRIS

The preferred source of toxicity data is EPA's IRIS database (http://www.epa.gov/iris/index.html). Expert toxicologists at EPA have derived the values in this database and most values have undergone a thorough review and validation both within and outside EPA. If a toxicity value is available in IRIS, that value is used in preference to any other value.

Tier 2 – PPRTVs

If a toxicity value is not available in IRIS, the next source is EPA's PPRTVs. This source includes toxicity values that have been developed by the Office of Research and Development/National Center for Environmental Assessment/Superfund Health Risk Technical Support Center (STSC). This database is not available to the general public, but is accessible to EPA risk assessors via EPA's intranet. These values are also published at the EPA's "Regional Screening Levels for Chemical Contaminants at Superfund Sites" website at http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm.

Tier 3 – Other Toxicity Values

Tier 3 toxicity values include additional EPA and non-EPA sources of toxicity information, including:

- The California EPA (CalEPA)'s Toxicity Criteria Database contains toxicity values that are peer reviewed and address both cancer and non-cancer effects.
- The Agency for Toxic Substances and Disease Registry (ATSDR)'s Minimal Risk Levels (MRLs) for Hazard Substances are peer-reviewed estimates of the daily human exposure to hazardous substances that is likely to be without appreciable risk of adverse non-cancer health effects over a specified duration of exposure.
- Toxicity values in EPA's Health Effects Assessment summary Tables (HEAST) (EPA/540/R-97/036, July 1997). The HEAST values for chemical contaminants are not currently available on an EPA internet site.
- When Tier 1, Tier 2, or Tier 3 toxicity values are not available for a contaminant the toxicity values from the National Center for Environmental Assessment (NCEA) are used. NCEA values can be found in the Oak Ridge National Laboratory Risk Assessment Information System (RAIS) available at http://rais.ornl.gov/.
- Toxicity equivalency factors (TEFs) from Table 708-2 of WAC 173-340-708(8), "Human Health Risk Assessment Procedures, Carcinogenic Potency Factors" are used to calculate toxicity values for carcinogenic polyaromatic hydrocarbons (PAHs), as described in WAC-173-340-708(8)(e), "Mixtures of Carcinogenic PAHs." TEFs from Table 708-4 of WAC 173-340-708(8) are used to calculate toxicity values for dioxin-like polychlorinated biphenyl (PCB) congeners, as described in

WAC-173-340-708(8)(f), "PCB Mixtures." Tables 708-2 and 708-4 are presented in WAC 173-340-900, "Tables."

The EPA has recently published guidance to address chemical inhalation exposures in EPA-540-R-070-002, *Risk Assessment Guidance for Superfund: Volume 1—Human Health Evaluation Manual (Part F, Supplemental Guidance for Inhalation Risk Assessment*). A methodology is provided to use the toxicity values which are currently derived by the EPA IRIS as concentrations (reference concentrations [RfC] for non-cancer effects and inhalation unit risk values [IUR] for cancer endpoints). These values now supersede the intake-based approach used by the inhalation component of EPA/540/1-89/002, *Risk Assessment Guidance for Superfund: Volume 1—Human Health Evaluation Manual, Part A, Interim Final*. The method described in WAC 170-340-750 for calculation of Standard Method C air cleanup levels uses the former EPA/540/1-89/002 approach of quantifying intake. Therefore, for the Standard Method C air cleanup values, the IUR and RfC values from the EPA toxicity tables (EPA 2012) were converted to CPF_i and RfD_i values following protocol documented in EPA/540/1-89/002. The following equations were used based on an assumed breathing rate of 20 m^3/day and body weight of 70 kg.

$$CPF_i\left(\frac{kg-day}{mg}\right) = IUR\left(\frac{m^3}{\mu g}\right) \times \frac{1}{20\frac{m^3}{day}} \times 70(kg) \times 1{,}000\,\frac{\mu g}{mg} \qquad (12)$$

$$RfD_i\left(\frac{mg}{kg-day}\right) = RfC\left(\frac{mg}{m^3}\right) \times 20\left(\frac{m^3}{day}\right) \times \frac{1}{70(kg)} \qquad (13)$$

The CPF_i and RfD_i values are used to calculate inhalation cancer risks and non-cancer hazards, respectively.

Table 4-2. Selection of Inhalation Toxicity Values

CAS	Contaminant Name	Inhalation Unit Risk (IUR)[a] (µg/m3)-1	Reference[b]	Inhalation Cancer Potency Factor (CPFi)[c] (mg/kg-day)-1	Reference[b]	Inhalation Reference Concentration (RfCi)a (mg/m3)	Reference[b]	Inhalation Reference Dose (RfDi)[d] (mg/kg-day)	Reference[b]	Volatile?[e]
630-20-6	1,1,1,2-Tetrachloroethane	7.40E-06	I	0.026	I	--	--	--	--	V
71-55-6	1,1,1-Trichloroethane	--	--	--	--	5.0	I	1.4	I	V
79-34-5	1,1,2,2-Tetrachloroethane	5.80E-05	C	0.20	C	--	--	--	--	V
79-00-5	1,1,2-Trichloroethane	1.60E-05	I	0.056	I	2.00E-04	X	5.71E-05	X	V
75-34-3	1,1-Dichloroethane	1.60E-06	C	0.0056	C	--	--	--	--	V
75-35-4	1,1-Dichloroethene	--	--	--	--	0.20	I	0.057	I	V
96-18-4	1,2,3-Trichloropropane	--	--	--	--	3.00E-04	I	8.57E-05	I	V
95-94-3	1,2,4,5-Tetrachlorobenzene	--	--	--	--	--	--	--	--	--
120-82-1	1,2,4-Trichlorobenzene	--	--	--	--	0.0020	P	5.71E-04	P	V
96-12-8	1,2-Dibromo-3-chloropropane	0.0060	P	21	P	2.00E-04	I	5.71E-05	I	V
106-93-4	1,2-Dibromoethane	6.00E-04	I	2.1	I	0.0090	I	0.0026	I	V
95-50-1	1,2-Dichlorobenzene	--	--	--	--	0.20	H	0.057	H	V
107-06-2	1,2-Dichloroethane	2.60E-05	I	0.091	I	0.0070	P	0.0020	P	V
540-59-0	1,2-Dichloroethene (Total)	--	--	--	--	--	--	--	--	V
78-87-5	1,2-Dichloropropane	1.00E-05	C	0.035	C	0.0040	I	0.0011	I	V
541-73-1	1,3-Dichlorobenzene	--	--	--	--	--	--	--	--	V
106-46-7	1,4-Dichlorobenzene	1.10E-05	C	0.039	C	0.80	I	0.23	I	V
123-91-1	1,4-Dioxane	7.70E-06	C	0.027	C	3.0	C	0.86	C	V
71-36-3	1-Butanol	--	--	--	--	--	--	--	--	V
93-65-2	2-(2-methyl-4-chlorophenoxy) propionic acid	--	--	--	--	--	--	--	--	--
39635-31-9	2,3,3',4,4',5,5'-Heptachlorobiphenyl	0.0011	WAC	4.0	WAC	0.0013	E	3.71E-04	E	--
69782-90-7	2,3,3',4,4',5'-Hexachlorobiphenyl	0.0011	WAC	4.0	WAC	0.0013	E	3.71E-04	E	--
38380-08-4	2,3,3',4,4',5-Hexachlorobiphenyl	0.0011	WAC	4.0	WAC	0.0013	E	3.71E-04	E	--
32598-14-4	2,3,3',4,4'-Pentachlorobiphenyl	0.0011	WAC	4.0	WAC	0.0013	E	3.71E-04	E	--
52663-72-6	2,3',4,4',5,5'-Hexachlorobiphenyl	0.0011	WAC	4.0	WAC	0.0013	E	3.71E-04	E	--
74472-37-0	2,3,4,4',5-Pentachlorobiphenyl	0.0011	WAC	4.0	WAC	0.0013	E	3.71E-04	E	--
65510-44-3	2',3,4,4',5-Pentachlorobiphenyl	0.0011	WAC	4.0	WAC	0.0013	E	3.71E-04	E	--
31508-00-6	2,3',4,4',5-Pentachlorobiphenyl	0.0011	WAC	4.0	WAC	0.0013	E	3.71E-04	E	--

Table 4-2. Selection of Inhalation Toxicity Values

CAS	Contaminant Name	Inhalation Unit Risk (IUR)[a] (µg/m3)-1	Reference[b]	Inhalation Cancer Potency Factor (CPFi)[c] (mg/kg-day)-1	Reference[b]	Inhalation Reference Concentration (RfCi)a (mg/m3)	Reference[b]	Inhalation Reference Dose (RfDi)[d] (mg/kg-day)	Reference[b]	Volatile?[e]
58-90-2	2,3,4,6-Tetrachlorophenol	--	--	--	--	--	--	--	--	--
93-76-5	2,4,5-T(2,4,5-Trichlorophenoxyacetic acid)	--	--	--	--	--	--	--	--	--
93-72-1	2,4,5-TP(2-(2,4,5-Trichlorophenoxy)propionic acid)Silvex	--	--	--	--	--	--	--	--	--
95-95-4	2,4,5-Trichlorophenol	--	--	--	--	--	--	--	--	V
88-06-2	2,4,6-Trichlorophenol	3.10E-06	I	0.011	I	--	--	--	--	V
94-75-7	2,4-D(2,4-Dichlorophenoxyacetic acid)	--	--	--	--	--	--	--	--	--
94-82-6	2,4-DB(4-(2,4-Dichlorophenoxy)butanoic acid)	--	--	--	--	--	--	--	--	--
120-83-2	2,4-Dichlorophenol	--	--	--	--	--	--	--	--	V
105-67-9	2,4-Dimethylphenol	--	--	--	--	--	--	--	--	V
51-28-5	2,4-Dinitrophenol	--	--	--	--	--	--	--	--	--
121-14-2	2,4-Dinitrotoluene	8.90E-05	C	0.31	C	--	--	--	--	--
606-20-2	2,6-Dinitrotoluene	--	--	--	--	--	--	--	--	--
53-96-3	2-Acetylaminofluorene	0.0013	C	4.6	C	--	--	--	--	--
78-93-3	2-Butanone	--	--	--	--	5.0	I	1.4	I	V
111-76-2	2-Butoxyethanol	--	--	--	--	1.6	I	0.46	I	V
91-58-7	2-Chloronaphthalene	--	--	--	--	--	--	--	--	V
95-57-8	2-Chlorophenol	--	--	--	--	--	--	--	--	V
591-78-6	2-Hexanone	--	--	--	--	0.030	I	0.0086	I	V
94-74-6	2-Methyl-4 chlorophenoxyacetic acid	--	--	--	--	--	--	--	--	--
91-57-6	2-methylnaphthalene	--	--	--	--	--	--	--	--	V
95-48-7	2-Methylphenol (cresol, o-)	--	--	--	--	0.60	C	0.17	C	V
91-59-8	2-Naphthylamine	--	--	--	--	--	--	--	--	--
88-74-4	2-Nitroaniline	--	--	--	--	5.00E-05	X	1.43E-05	X	--
88-75-5	2-Nitrophenol	--	--	--	--	--	--	--	--	--
108-10-1	2-Pentanone, 4-Methyl	--	--	--	--	3.0	I	0.86	I	V
32774-16-6	3,3',4,4',5,5'-Hexachlorobiphenyl	1.1	WAC	3,990	WAC	1.30E-06	E	3.71E-07	E	--
57465-28-8	3,3',4,4',5-Pentachlorobiphenyl	3.8	WAC	13,300	WAC	4.00E-07	E	1.14E-07	E	--
32598-13-3	3,3',4,4'-Tetrachlorobiphenyl	0.0038	WAC	13	WAC	4.00E-04	E	1.14E-04	E	--

Table 4-2. Selection of Inhalation Toxicity Values

CAS	Contaminant Name	Inhalation Unit Risk (IUR)[a] (µg/m3)-1	Reference[b]	Inhalation Cancer Potency Factor (CPFi)[c] (mg/kg-day)-1	Reference[b]	Inhalation Reference Concentration (RfCi)a (mg/m3)	Reference[b]	Inhalation Reference Dose (RfDi)[d] (mg/kg-day)	Reference[b]	Volatile?[e]
91-94-1	3,3'-Dichlorobenzidine	3.40E-04	C	1.2	C	--	--	--	--	--
119-93-7	3,3'-Dimethylbenzidine	--	--	--	--	--	--	--	--	--
70362-50-4	3,4,4',5- Tetrachlorobiphenyl	0.011	WAC	40	WAC	1.30E-04	E	3.71E-05	E	--
65794-96-9	3+4 Methylphenol (cresol, m+p)	--	--	--	--	--	--	--	--	--
56-49-5	3-Methylcholanthrene	0.0063	C	22	C	--	--	--	--	--
99-09-2	3-Nitroaniline	--	--	--	--	0.0010	NCEA	2.86E-04	NCEA	--
72-54-8	4,4'-DDD (Dichlorodiphenyldichloroethane)	6.90E-05	C	0.24	C	--	--	--	--	--
72-55-9	4,4'-DDE (Dichlorodiphenyldichloroethylene)	9.70E-05	C	0.34	C	--	--	--	--	--
50-29-3	4,4'-DDT (Dichlorodiphenyltrichloroethane)	9.70E-05	I	0.34	I	--	--	--	--	--
534-52-1	4,6-Dinitro-2-methylphenol	--	--	--	--	--	--	--	--	--
1918-02-1	4-Amino-3,5,6-trichloropicolinic acid	--	--	--	--	--	--	--	--	--
92-67-1	4-Aminobiphenyl	0.0060	C	21	C	--	--	--	--	--
101-55-3	4-Bromophenylphenyl ether	--	--	--	--	--	--	--	--	--
59-50-7	4-Chloro-3-methylphenol	--	--	--	--	--	--	--	--	--
106-47-8	4-Chloroaniline	--	--	--	--	--	--	--	--	V
7005-72-3	4-Chlorophenylphenyl ether	--	--	--	--	--	--	--	--	--
106-44-5	4-Methylphenol (cresol, p-)	--	--	--	--	0.60	C	0.17	C	V
100-01-6	4-Nitroaniline	--	--	--	--	0.0060	P	0.0017	P	--
100-02-7	4-Nitrophenol	--	--	--	--	--	--	--	--	--
99-55-8	5-Nitro-o-toluidine	--	--	--	--	--	--	--	--	--
83-32-9	Acenaphthene	--	--	--	--	--	--	--	--	V
208-96-8	Acenaphthylene	--	--	--	--	--	--	--	--	--
67-64-1	Acetone	--	--	--	--	31	A	8.9	A	V
75-05-8	Acetonitrile	--	--	--	--	0.060	I	0.017	I	V
98-86-2	Acetophenone	--	--	--	--	--	--	--	--	V
107-02-8	Acrolein	--	--	--	--	2.00E-05	I	5.71E-06	I	V
79-06-1	Acrylamide	1.00E-04	I	0.35	I	0.0060	I	0.0017	I	V
107-13-1	Acrylonitrile	6.80E-05	I	0.24	I	0.0020	I	5.71E-04	I	V

Table 4-2. Selection of Inhalation Toxicity Values

CAS	Contaminant Name	Inhalation Unit Risk (IUR)[a] (µg/m3)-1	Reference[b]	Inhalation Cancer Potency Factor (CPFi)[c] (mg/kg-day)-1	Reference[b]	Inhalation Reference Concentration (RfCi)a (mg/m3)	Reference[b]	Inhalation Reference Dose (RfDi)[d] (mg/kg-day)	Reference[b]	Volatile?[e]
309-00-2	Aldrin	0.0049	I	17	I	--	--	--	--	V
107-05-1	Allyl chloride	6.00E-06	C	0.021	C	0.0010	I	2.86E-04	I	V
319-84-6	Alpha-BHC	0.0018	I	6.3	I	--	--	--	--	--
5103-71-9	Alpha-Chlordane	1.00E-04	I	0.35	I	7.00E-04	I	2.00E-04	I	--
7429-90-5	Aluminum	--	--	--	--	0.0050	P	0.0014	P	--
62-53-3	Aniline	1.60E-06	C	0.0056	C	0.0010	I	2.86E-04	I	V
120-12-7	Anthracene	--	--	--	--	--	--	--	--	V
7440-36-0	Antimony	--	--	--	--	--	--	--	--	--
140-57-8	Aramite	7.10E-06	I	0.025	I	--	--	--	--	--
12674-11-2	Aroclor-1016	2.00E-05	S	0.070	S	--	--	--	--	--
11104-28-2	Aroclor-1221	5.70E-04	S	2.0	S	--	--	--	--	V
11141-16-5	Aroclor-1232	5.70E-04	S	2.0	S	--	--	--	--	V
53469-21-9	Aroclor-1242	5.70E-04	S	2.0	S	--	--	--	--	--
12672-29-6	Aroclor-1248	5.70E-04	S	2.0	S	--	--	--	--	--
11097-69-1	Aroclor-1254	5.70E-04	S	2.0	S	--	--	--	--	--
11096-82-5	Aroclor-1260	5.70E-04	S	2.0	S	--	--	--	--	--
37324-23-5	Aroclor-1262	--	--	--	--	--	--	--	--	--
11100-14-4	Aroclor-1268	--	--	--	--	--	--	--	--	--
7440-38-2	Arsenic	0.0043	I	15	I	1.50E-05	C	4.29E-06	C	--
103-33-3	Azobenzene	3.10E-05	I	0.11	I	--	--	--	--	V
7440-39-3	Barium	--	--	--	--	5.00E-04	H	1.43E-04	H	--
71-43-2	Benzene	7.80E-06	I	0.027	I	0.030	I	0.0086	I	V
56-55-3	Benzo(a)anthracene	1.10E-04	WAC	0.39	WAC	--	--	--	--	--
50-32-8	Benzo(a)pyrene	0.0011	C	3.9	C	--	--	--	--	--
205-99-2	Benzo(b)fluoranthene	1.10E-04	WAC	0.39	WAC	--	--	--	--	--
191-24-2	Benzo(g,h,i)perylene	--	--	--	--	--	--	--	--	--
207-08-9	Benzo(k)fluoranthene	1.10E-04	WAC	0.39	WAC	--	--	--	--	--
65-85-0	Benzoic acid	--	--	--	--	--	--	--	--	--

Table 4-2. Selection of Inhalation Toxicity Values

CAS	Contaminant Name	Inhalation Unit Risk (IUR)[a] (µg/m3)-1	Reference[b]	Inhalation Cancer Potency Factor (CPFi)[c] (mg/kg-day)-1	Reference[b]	Inhalation Reference Concentration (RfCi)a (mg/m3)	Reference[b]	Inhalation Reference Dose (RfDi)[d] (mg/kg-day)	Reference[b]	Volatile?[e]
100-51-6	Benzyl alcohol	--	--	--	--	--	--	--	--	V
7440-41-7	Beryllium	0.0024	I	8.4	I	2.00E-05	I	5.71E-06	I	--
319-85-7	beta-1,2,3,4,5,6-Hexachlorocyclohexane (beta-BHC)	5.30E-04	I	1.9	I	--	--	--	--	--
108-60-1	Bis(2-chloro-1-methylethyl)ether	1.00E-05	H	0.035	H	--	--	--	--	V
111-91-1	Bis(2-Chloroethoxy)methane	--	--	--	--	--	--	--	--	--
111-44-4	Bis(2-chloroethyl) ether	3.30E-04	I	1.2	I	--	--	--	--	V
117-81-7	Bis(2-ethylhexyl) phthalate	2.40E-06	C	0.0084	C	--	--	--	--	--
7440-69-9	Bismuth	--	--	--	--	--	--	--	--	--
7440-42-8	Boron	--	--	--	--	0.020	H	0.0057	H	--
24959-67-9	Bromide	--	--	--	--	--	--	--	--	--
75-27-4	Bromodichloromethane	3.70E-05	C	0.13	C	--	--	--	--	V
75-25-2	Bromoform	1.10E-06	I	0.0039	I	--	--	--	--	V
74-83-9	Bromomethane	--	--	--	--	0.0050	I	0.0014	I	V
85-68-7	Butylbenzylphthalate	--	--	--	--	--	--	--	--	--
7440-43-9	Cadmium	0.0018	I	6.3	I	2.00E-05	C	5.71E-06	C	--
7440-70-2	Calcium	--	--	--	--	--	--	--	--	--
86-74-8	Carbazole	--	--	--	--	--	--	--	--	--
75-15-0	Carbon disulfide	--	--	--	--	0.70	I	0.20	I	V
56-23-5	Carbon tetrachloride	6.00E-06	I	0.021	I	0.10	I	0.029	I	V
57-74-9	Chlordane	1.00E-04	I	0.35	I	7.00E-04	I	2.00E-04	I	--
16887-00-6	Chloride	--	--	--	--	--	--	--	--	--
108-90-7	Chlorobenzene	--	--	--	--	0.050	P	0.014	P	V
510-15-6	Chlorobenzilate	3.10E-05	C	0.11	C	--	--	--	--	--
75-00-3	Chloroethane	--	--	--	--	10	I	2.9	I	V
67-66-3	Chloroform	2.30E-05	I	0.081	I	0.098	A	0.028	A	V
74-87-3	Chloromethane	--	--	--	--	0.090	I	0.026	I	V
126-99-8	Chloroprene	3.00E-04	I	1.1	I	0.020	I	0.0057	I	V
7440-47-3	Chromium	--	--	--	--	--	--	--	--	--

Table 4-2. Selection of Inhalation Toxicity Values

CAS	Contaminant Name	Inhalation Unit Risk (IUR)[a] (µg/m3)-1	Reference[b]	Inhalation Cancer Potency Factor (CPFi)[c] (mg/kg-day)-1	Reference[b]	Inhalation Reference Concentration (RfCi)a (mg/m3)	Reference[b]	Inhalation Reference Dose (RfDi)[d] (mg/kg-day)	Reference[b]	Volatile?[e]
218-01-9	Chrysene	1.10E-05	WAC	0.039	WAC	--	--	--	--	--
156-59-2	cis-1,2-Dichloroethylene	--	--	--	--	--	--	--	--	V
10061-01-5	cis-1,3-Dichloropropene	4.00E-06	I	0.014	I	0.020	I	0.0057	I	V
7440-48-4	Cobalt	0.0090	P	32	P	6.00E-06	P	1.71E-06	P	--
PCB1242/1016	Co-elution of Aroclor 1242 and Aroclor 1016	--	--	--	--	--	--	--	--	--
7440-50-8	Copper	--	--	--	--	--	--	--	--	--
57-12-5	Cyanide	--	--	--	--	8.00E-04	S	2.29E-04	S	V
110-82-7	Cyclohexane	--	--	--	--	6.0	I	1.7	I	V
108-94-1	Cyclohexanone	--	--	--	--	0.70	P	0.20	P	V
75-99-0	Dalapon	--	--	--	--	--	--	--	--	V
124-18-5	Decane	--	--	--	--	--	--	--	--	--
319-86-8	Delta-BHC	--	--	--	--	--	--	--	--	--
2303-16-4	Diallate	--	--	--	--	--	--	--	--	--
53-70-3	Dibenz[a,h]anthracene	1.10E-04	WAC	0.39	WAC	--	--	--	--	--
132-64-9	Dibenzofuran	--	--	--	--	--	--	--	--	V
124-48-1	Dibromochloromethane	2.70E-05	C	0.095	C	--	--	--	--	V
74-95-3	Dibromomethane	--	--	--	--	0.0040	X	0.0011	X	V
1918-00-9	Dicamba	--	--	--	--	--	--	--	--	--
75-71-8	Dichlorodifluoromethane	--	--	--	--	0.10	X	0.029	X	V
120-36-5	Dichloroprop	--	--	--	--	--	--	--	--	--
60-57-1	Dieldrin	0.0046	I	16	I	--	--	--	--	--
60-29-7	Diethyl ether	--	--	--	--	--	--	--	--	V
84-66-2	Diethylphthalate	--	--	--	--	--	--	--	--	--
60-51-5	Dimethoate	--	--	--	--	--	--	--	--	--
131-11-3	Dimethyl phthalate	--	--	--	--	--	--	--	--	--
84-74-2	Di-n-butylphthalate	--	--	--	--	--	--	--	--	--
117-84-0	Di-n-octylphthalate	--	--	--	--	--	--	--	--	--
88-85-7	Dinoseb(2-secButyl-4,6-dinitrophenol)	--	--	--	--	--	--	--	--	--

Table 4-2. Selection of Inhalation Toxicity Values

CAS	Contaminant Name	Inhalation Unit Risk (IUR)[a] (µg/m3)-1	Reference[b]	Inhalation Cancer Potency Factor (CPFi)[c] (mg/kg-day)-1	Reference[b]	Inhalation Reference Concentration (RfCi)a (mg/m3)	Reference[b]	Inhalation Reference Dose (RfDi)[d] (mg/kg-day)	Reference[b]	Volatile?[e]
298-04-4	Disulfoton	--	--	--	--	--	--	--	--	--
959-98-8	Endosulfan I	--	--	--	--	--	--	--	--	--
33213-65-9	Endosulfan II	--	--	--	--	--	--	--	--	--
1031-07-8	Endosulfan sulfate	--	--	--	--	--	--	--	--	--
72-20-8	Endrin	--	--	--	--	--	--	--	--	--
7421-93-4	Endrin Aldehyde	--	--	--	--	--	--	--	--	--
53494-70-5	Endrin ketone	--	--	--	--	--	--	--	--	--
64-17-5	Ethanol	--	--	--	--	--	--	--	--	V
141-78-6	Ethyl acetate	--	--	--	--	--	--	--	--	V
97-63-2	Ethyl methacrylate	--	--	--	--	0.30	P	0.086	P	V
100-41-4	Ethylbenzene	2.50E-06	C	0.0088	C	1.0	I	0.29	I	V
107-21-1	Ethylene glycol	--	--	--	--	0.40	C	0.11	C	V
206-44-0	Fluoranthene	--	--	--	--	--	--	--	--	--
86-73-7	Fluorene	--	--	--	--	--	--	--	--	V
16984-48-8	Fluoride	--	--	--	--	0.013	C	0.0037	C	--
58-89-9	Gamma-BHC (Lindane)	3.10E-04	C	1.1	C	--	--	--	--	--
5566-34-7	Gamma-Chlordane	1.00E-04	I	0.35	I	7.00E-04	I	2.00E-04	I	--
76-44-8	Heptachlor	0.0013	I	4.6	I	--	--	--	--	--
1024-57-3	Heptachlor epoxide	0.0026	I	9.1	I	--	--	--	--	V
118-74-1	Hexachlorobenzene	4.60E-04	I	1.6	I	--	--	--	--	--
87-68-3	Hexachlorobutadiene	2.20E-05	I	0.077	I	--	--	--	--	V
77-47-4	Hexachlorocyclopentadiene	--	--	--	--	2.00E-04	I	5.71E-05	I	V
67-72-1	Hexachloroethane	1.10E-05	C	0.039	C	0.030	I	0.0086	I	V
70-30-4	Hexachlorophene	--	--	--	--	--	--	--	--	--
110-54-3	Hexane	--	--	--	--	0.70	I	0.20	I	V
18540-29-9	Hexavalent Chromium	0.084	S	294	S	1.00E-04	I	2.86E-05	I	--
302-01-2	Hydrazine	0.0049	I	17	I	3.00E-05	P	8.57E-06	P	V
193-39-5	Indeno(1,2,3-cd)pyrene	1.10E-04	WAC	0.39	WAC	--	--	--	--	--

Table 4-2. Selection of Inhalation Toxicity Values

CAS	Contaminant Name	Inhalation Unit Risk (IUR)[a] (µg/m3)-1	Reference[b]	Inhalation Cancer Potency Factor (CPFi)[c] (mg/kg-day)-1	Reference[b]	Inhalation Reference Concentration (RfCi)a (mg/m3)	Reference[b]	Inhalation Reference Dose (RfDi)[d] (mg/kg-day)	Reference[b]	Volatile?[e]
7439-89-6	Iron	--	--	--	--	--	--	--	--	--
78-83-1	Isobutyl alcohol	--	--	--	--	--	--	--	--	V
78-59-1	Isophorone	--	--	--	--	2.0	C	0.57	C	V
98-82-8	Isopropylbenzene	--	--	--	--	0.40	I	0.11	I	V
143-50-0	Kepone	0.0046	C	16	C	--	--	--	--	--
7439-92-1	Lead	--	--	--	--	--	--	--	--	--
7439-93-2	Lithium	--	--	--	--	--	--	--	--	--
7439-95-4	Magnesium	--	--	--	--	--	--	--	--	--
7439-96-5	Manganese	--	--	--	--	5.00E-05	I	1.43E-05	I	--
99-65-0	m-Dinitrobenzene	--	--	--	--	--	--	--	--	--
7439-97-6	Mercury	--	--	--	--	3.00E-04	S	8.57E-05	S	--
126-98-7	Methacrylonitrile	--	--	--	--	0.030	P	0.0086	P	V
67-56-1	Methanol	--	--	--	--	4.0	C	1.1	C	V
72-43-5	Methoxychlor	--	--	--	--	--	--	--	--	--
80-62-6	Methyl methacrylate	--	--	--	--	0.70	I	0.20	I	V
66-27-3	Methyl methanesulfonate	2.80E-05	C	0.098	C	--	--	--	--	--
298-00-0	Methyl parathion	--	--	--	--	--	--	--	--	--
75-09-2	Methylene chloride	1.00E-08	I	3.50E-05	I	0.60	I	0.17	I	V
7439-98-7	Molybdenum	--	--	--	--	--	--	--	--	--
108-38-3	m-Xylene	--	--	--	--	0.10	S	0.029	S	V
91-20-3	Naphthalene	3.40E-05	C	0.12	C	0.0030	I	8.57E-04	I	V
104-51-8	n-Butylbenzene	--	--	--	--	--	--	--	--	V
7440-02-0	Nickel	2.60E-04	C	0.91	C	9.00E-05	A	2.57E-05	A	--
14797-55-8	Nitrate	--	--	--	--	--	--	--	--	--
14797-65-0	Nitrite	--	--	--	--	--	--	--	--	--
98-95-3	Nitrobenzene	4.00E-05	I	0.14	I	0.0090	I	0.0026	I	V
NO3-N	Nitrogen in Nitrate	--	--	--	--	--	--	--	--	--
NO2-N	Nitrogen in Nitrite	--	--	--	--	--	--	--	--	--

Table 4-2. Selection of Inhalation Toxicity Values

CAS	Contaminant Name	Inhalation Unit Risk (IUR)[a] (µg/m3)-1	Reference[b]	Inhalation Cancer Potency Factor (CPFi)[c] (mg/kg-day)-1	Reference[b]	Inhalation Reference Concentration (RfCi)a (mg/m3)	Reference[b]	Inhalation Reference Dose (RfDi)[d] (mg/kg-day)	Reference[b]	Volatile?[e]
NO2+NO3-N	Nitrogen in Nitrite and Nitrate	--	--	--	--	--	--	--	--	--
930-55-2	Nitrosopyrrolidine	6.10E-04	I	2.1	I	--	--	--	--	V
55-18-5	n-Nitrosodiethylamine	0.043	I	151	I	--	--	--	--	V
62-75-9	n-Nitrosodimethylamine	0.014	I	49	I	4.00E-05	X	1.14E-05	X	V
924-16-3	n-Nitrosodi-n-butylamine	0.0016	I	5.6	I	--	--	--	--	V
621-64-7	n-Nitrosodi-n-dipropylamine	0.0020	C	7.0	C	--	--	--	--	--
86-30-6	n-Nitrosodiphenylamine	2.60E-06	C	0.0091	C	--	--	--	--	--
10595-95-6	n-Nitrosomethylethylamine	0.0063	C	22	C	--	--	--	--	--
59-89-2	n-Nitrosomorpholine	0.0019	C	6.7	C	--	--	--	--	--
100-75-4	n-Nitrosopiperidine	0.0027	C	9.5	C	--	--	--	--	--
95-47-6	o-Xylene	--	--	--	--	0.10	S	0.029	S	V
56-38-2	Parathion	--	--	--	--	--	--	--	--	--
60-11-7	p-Dimethylaminoazobenzene	0.0013	C	4.6	C	--	--	--	--	--
608-93-5	Pentachlorobenzene	--	--	--	--	--	--	--	--	--
76-01-7	Pentachloroethane	--	--	--	--	--	--	--	--	V
82-68-8	Pentachloronitrobenzene (PCNB)	--	--	--	--	--	--	--	--	--
87-86-5	Pentachlorophenol	5.10E-06	C	0.018	C	--	--	--	--	--
62-44-2	Phenacetin	6.30E-07	C	0.0022	C	--	--	--	--	--
85-01-8	Phenanthrene	--	--	--	--	--	--	--	--	V
108-95-2	Phenol	--	--	--	--	0.20	C	0.057	C	V
298-02-2	Phorate	--	--	--	--	--	--	--	--	--
14265-44-2	Phosphate	--	--	--	--	--	--	--	--	--
7723-14-0	Phosphorus	--	--	--	--	--	--	--	--	--
PO4-P	Phosphorus in phosphate	--	--	--	--	--	--	--	--	--
7440-09-7	Potassium	--	--	--	--	--	--	--	--	--
106-50-3	p-Phenylenediamine	--	--	--	--	--	--	--	--	--
23950-58-5	Pronamide	--	--	--	--	--	--	--	--	--
129-00-0	Pyrene	--	--	--	--	--	--	--	--	V

Table 4-2. Selection of Inhalation Toxicity Values

CAS	Contaminant Name	Inhalation Unit Risk (IUR)[a] (µg/m3)-1	Reference[b]	Inhalation Cancer Potency Factor (CPFi)[c] (mg/kg-day)-1	Reference[b]	Inhalation Reference Concentration (RfCi)a (mg/m3)	Reference[b]	Inhalation Reference Dose (RfDi)[d] (mg/kg-day)	Reference[b]	Volatile?[e]
110-86-1	Pyridine	--	--	--	--	--	--	--	--	V
94-59-7	Safrol	6.30E-05	C	0.22	C	--	--	--	--	--
7782-49-2	Selenium	--	--	--	--	0.020	C	0.0057	C	--
7440-21-3	Silicon	--	--	--	--	--	--	--	--	--
7440-22-4	Silver	--	--	--	--	--	--	--	--	--
7440-23-5	Sodium	--	--	--	--	--	--	--	--	--
7440-24-6	Strontium	--	--	--	--	--	--	--	--	--
100-42-5	Styrene	--	--	--	--	1.0	I	0.29	I	V
14808-79-8	Sulfate	--	--	--	--	--	--	--	--	--
18496-25-8	Sulfide	--	--	--	--	--	--	--	--	--
99-35-4	sym-Trinitrobenzene	--	--	--	--	--	--	--	--	--
127-18-4	Tetrachloroethene	2.60E-07	I	9.10E-04	I	0.040	I	0.011	I	V
3689-24-5	Tetraethyl dithiopyrophosphate (Sulfotepp)	--	--	--	--	--	--	--	--	--
7440-28-0	Thallium	--	--	--	--	--	--	--	--	--
7440-31-5	Tin	--	--	--	--	--	--	--	--	--
7440-32-6	Titanium	--	--	--	--	--	--	--	--	--
108-88-3	Toluene	--	--	--	--	5.0	I	1.4	I	V
1336-36-3	Total PCBs	5.70E-04	I	2.0	I	--	--	--	--	--
TPH	Total Petroleum Hydrocarbons	--	--	--	--	--	--	--	--	--
TPHDIESEL	Total petroleum hydrocarbons - diesel range	--	--	--	--	--	--	--	--	--
TPHGASOLINE	Total petroleum hydrocarbons - gasoline range	--	--	--	--	--	--	--	--	--
TPHKEROSENE	Total petroleum hydrocarbons - kerosene range	--	--	--	--	--	--	--	--	--
TPH/OILH	Total petroleum hydrocarbons - motor oil (high boiling)	--	--	--	--	--	--	--	--	--
TOTALPCB	Total Polychlorinated Biphenyls	5.70E-04	I	2.0	I	--	--	--	--	--
8001-35-2	Toxaphene	3.20E-04	I	1.1	I	--	--	--	--	--
156-60-5	trans-1,2-Dichloroethylene	--	--	--	--	0.060	P	0.017	P	V
10061-02-6	trans-1,3-Dichloropropene	4.00E-06	I	0.014	I	0.020	I	0.0057	I	V
5103-74-2	trans-Chlordane	1.00E-04	I	0.35	I	7.00E-04	I	2.00E-04	I	--

Table 4-2. Selection of Inhalation Toxicity Values

CAS	Contaminant Name	Inhalation Unit Risk (IUR)[a] (µg/m3)-1	Reference[b]	Inhalation Cancer Potency Factor (CPFi)[c] (mg/kg-day)-1	Reference[b]	Inhalation Reference Concentration (RfCi)a (mg/m3)	Reference[b]	Inhalation Reference Dose (RfDi)[d] (mg/kg-day)	Reference[b]	Volatile?[e]
126-73-8	Tributyl phosphate	--	--	--	--	--	--	--	--	--
79-01-6	Trichloroethene	4.10E-06	I	0.014	I	0.0020	I	5.71E-04	I	V
75-69-4	Trichloromonofluoromethane	--	--	--	--	0.70	H	0.20	H	V
7440-61-1	Uranium	--	--	--	--	4.00E-05	NCEA	1.14E-05	NCEA	--
7440-62-2	Vanadium	--	--	--	--	--	--	--	--	--
108-05-4	Vinyl acetate	--	--	--	--	0.20	I	0.057	I	V
75-01-4	Vinyl chloride	4.40E-06	I	0.015	I	0.10	I	0.029	I	V
1330-20-7	Xylenes (total)	--	--	--	--	0.10	I	0.029	I	V
7440-66-6	Zinc	--	--	--	--	--	--	--	--	--
7440-67-7	Zirconium	--	--	--	--	--	--	--	--	--

Notes:

a. Source = U.S. Environmental Protection Agency web site “Regional Screening Levels for Chemical Contaminants at Superfund Sites” (EPA, November 2012) (http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/Generic_Tables/index.htm).

b. Reference key:

A = The Agency for Toxic Substances and Disease Registry (ATSDR)

C = The California Environmental Protection Agency (CalEPA)

E = Environmental Criteria and Assessment Office

H = Health Effects Assessment Summary Tables (HEAST)

I = EPA's Integrated Risk Information System (IRIS)

NCEA = National Center for Environmental Assessment (NCEA)

P = Provisional Peer Reviewed Toxicity Values (PPRTV)

S = Special case chemical; basis for value discussed on EPA Regional Screening Levels web site (EPA, 2012)

WAC = Value calculated using a toxicity equivalency factor (TEF) as provided by WAC 173-340-708(8), "Human Health Risk Assessment Procedures, Carcinogenic Potency Factor" and WAC 173-340-900, "Tables"

X = PPRTV Appendix

c. Inhalation unit risk (IUR) converted to inhalation cancer potency factor (CPF_i) following EPA protocol (EPA 540/1-89/002) using formula CPF_i (kg-day/mg) = IUR (m^3/µg) x 1/20 (m^3/day) x 70 (kg) x 1000 (µg/mg).

d. Inhalation reference concentration (RfC) converted to inhalation reference dose (RfD_i) following EPA protocol (EPA 540/1-89/002) using formula RfD_i (mg/kg-day) = RfC (mg/m^3) x 20 (m^3/day) x 1/70 (kg).

e. Volatile organic compound (VOC) as defined in WAC 173-340-200, "Definitions." or designated in the CLARC database (2013)

5 Software Applications

The WAC 173-340-740 Standard Method C air cleanup level calculations are performed on an electronic spreadsheet using Microsoft Excel®.

6 Calculation

The WAC 173-340-750 soil inhalation pathway PRGs based on Standard Method C air cleanup levels are calculated using the methodology and equationspresented in Section 3 and the assumptions and inputs presented in Section 4. Results of the calculations are presented in Section 7. The spreadsheet calculations are validated by comparison with hand calculations which are provided in Figure 6-1.

7 Results/Conclusions

Calculation results for the Standard Method C air cleanup levels are presented in Table 7-1. The table provides calculated values for both noncarinogens and carcinogens as well as a final value, which is the lower of the two air concentrations for contaminants with both noncarcinogenic and carcinogenic effects.

Calculation results for the inhalation pathway PRGs protective of Standard Method C air cleanup levels are presented in Table 7-2. The table provides calculated values for both noncarcinogens and carcinogens as well as a final value, which is the lower of the two soil concentrations for contaminants with both noncarcinogenic and carcinogenic effects.

Table 7-1. Summary of Standard Method C Air Cleanup Levels

CAS Number	Contaminant Name	Non-Carinogen (µg/m^3)	Carcinogen (µg/m^3)	Standard Method C Air CUL (µg/m^3)
630-20-6	1,1,1,2-Tetrachloroethane	3.4	--	3.4
71-55-6	1,1,1-Trichloroethane	--	5,000	5,000
79-34-5	1,1,2,2-Tetrachloroethane	0.43	--	0.43
79-00-5	1,1,2-Trichloroethane	1.6	0.20	0.20
75-34-3	1,1-Dichloroethane	16	--	16
75-35-4	1,1-Dichloroethene	--	200	200
96-18-4	1,2,3-Trichloropropane	--	0.30	0.30
95-94-3	1,2,4,5-Tetrachlorobenzene	--	--	--
120-82-1	1,2,4-Trichlorobenzene	--	2.0	2.0
96-12-8	1,2-Dibromo-3-chloropropane	0.0042	0.20	0.0042
106-93-4	1,2-Dibromoethane	0.042	9.0	0.042
95-50-1	1,2-Dichlorobenzene	--	200	200
107-06-2	1,2-Dichloroethane	0.96	7.0	0.96
540-59-0	1,2-Dichloroethene (Total)	--	--	--
78-87-5	1,2-Dichloropropane	2.5	4.0	2.5
541-73-1	1,3-Dichlorobenzene	--	--	--
106-46-7	1,4-Dichlorobenzene	2.3	800	2.3
123-91-1	1,4-Dioxane	3.2	3,000	3.2
71-36-3	1-Butanol	--	--	--
93-65-2	2-(2-methyl-4-chlorophenoxy) propionic acid	--	--	--

Table 7-1. Summary of Standard Method C Air Cleanup Levels

CAS Number	Contaminant Name	Non-Carinogen (µg/m^3)	Carcinogen (µg/m^3)	Standard Method C Air CUL (µg/m^3)
39635-31-9	2,3,3',4,4',5,5'-Heptachlorobiphenyl	0.022	1.3	0.022
69782-90-7	2,3,3',4,4',5'-Hexachlorobiphenyl	0.022	1.3	0.022
38380-08-4	2,3,3',4,4',5-Hexachlorobiphenyl	0.022	1.3	0.022
32598-14-4	2,3,3',4,4'-Pentachlorobiphenyl	0.022	1.3	0.022
52663-72-6	2,3',4,4',5,5'-Hexachlorobiphenyl	0.022	1.3	0.022
74472-37-0	2,3,4,4',5-Pentachlorobiphenyl	0.022	1.3	0.022
65510-44-3	2',3,4,4',5-Pentachlorobiphenyl	0.022	1.3	0.022
31508-00-6	2,3',4,4',5-Pentachlorobiphenyl	0.022	1.3	0.022
58-90-2	2,3,4,6-Tetrachlorophenol	--	--	--
93-76-5	2,4,5-T(2,4,5-Trichlorophenoxyacetic acid)	--	--	--
93-72-1	2,4,5-TP(2-(2,4,5-Trichlorophenoxy)propionic acid)Silvex	--	--	--
95-95-4	2,4,5-Trichlorophenol	--	--	--
88-06-2	2,4,6-Trichlorophenol	8.1	--	8.1
94-75-7	2,4-D(2,4-Dichlorophenoxyacetic acid)	--	--	--
94-82-6	2,4-DB(4-(2,4-Dichlorophenoxy)butanoic acid)	--	--	--
120-83-2	2,4-Dichlorophenol	--	--	--
105-67-9	2,4-Dimethylphenol	--	--	--
51-28-5	2,4-Dinitrophenol	--	--	--
121-14-2	2,4-Dinitrotoluene	0.28	--	0.28
606-20-2	2,6-Dinitrotoluene	--	--	--

Table 7-1. Summary of Standard Method C Air Cleanup Levels

CAS Number	Contaminant Name	Non-Carinogen (µg/m^3)	Carcinogen (µg/m^3)	Standard Method C Air CUL (µg/m^3)
53-96-3	2-Acetylaminofluorene	0.019	--	0.019
78-93-3	2-Butanone	--	5,000	5,000
111-76-2	2-Butoxyethanol	--	1,600	1,600
91-58-7	2-Chloronaphthalene	--	--	--
95-57-8	2-Chlorophenol	--	--	--
591-78-6	2-Hexanone	--	30	30
94-74-6	2-Methyl-4 chlorophenoxyacetic acid	--	--	--
91-57-6	2-methylnaphthalene	--	--	--
95-48-7	2-Methylphenol (cresol, o-)	--	600	600
91-59-8	2-Naphthylamine	--	--	--
88-74-4	2-Nitroaniline	--	0.050	0.050
88-75-5	2-Nitrophenol	--	--	--
108-10-1	2-Pentanone, 4-Methyl	--	3,000	3,000
32774-16-6	3,3',4,4',5,5'-Hexachlorobiphenyl	2.19E-05	0.0013	2.19E-05
57465-28-8	3,3',4,4',5-Pentachlorobiphenyl	6.58E-06	4.00E-04	6.58E-06
32598-13-3	3,3',4,4'-Tetrachlorobiphenyl	0.0066	0.40	0.0066
91-94-1	3,3'-Dichlorobenzidine	0.074	--	0.074
119-93-7	3,3'-Dimethylbenzidine	--	--	--
70362-50-4	3,4,4',5- Tetrachlorobiphenyl	0.0022	0.13	0.0022
65794-96-9	3+4 Methylphenol (cresol, m+p)	--	--	--

Table 7-1. Summary of Standard Method C Air Cleanup Levels

CAS Number	Contaminant Name	Non-Carinogen (µg/m^3)	Carcinogen (µg/m^3)	Standard Method C Air CUL (µg/m^3)
56-49-5	3-Methylcholanthrene	0.0040	--	0.0040
99-09-2	3-Nitroaniline	--	1.00	1.00
72-54-8	4,4'-DDD (Dichlorodiphenyldichloroethane)	0.36	--	0.36
72-55-9	4,4'-DDE (Dichlorodiphenyldichloroethylene)	0.26	--	0.26
50-29-3	4,4'-DDT (Dichlorodiphenyltrichloroethane)	0.26	--	0.26
534-52-1	4,6-Dinitro-2-methylphenol	--	--	--
1918-02-1	4-Amino-3,5,6-trichloropicolinic acid	--	--	--
92-67-1	4-Aminobiphenyl	0.0042	--	0.0042
101-55-3	4-Bromophenylphenyl ether	--	--	--
59-50-7	4-Chloro-3-methylphenol	--	--	--
106-47-8	4-Chloroaniline	--	--	--
7005-72-3	4-Chlorophenylphenyl ether	--	--	--
106-44-5	4-Methylphenol (cresol, p-)	--	600	600
100-01-6	4-Nitroaniline	--	6.0	6.0
100-02-7	4-Nitrophenol	--	--	--
99-55-8	5-Nitro-o-toluidine	--	--	--
83-32-9	Acenaphthene	--	--	--
208-96-8	Acenaphthylene	--	--	--
67-64-1	Acetone	--	31,000	31,000
75-05-8	Acetonitrile	--	60	60

Table 7-1. Summary of Standard Method C Air Cleanup Levels

CAS Number	Contaminant Name	Non-Carinogen (µg/m^3)	Carcinogen (µg/m^3)	Standard Method C Air CUL (µg/m^3)
98-86-2	Acetophenone	--	--	--
107-02-8	Acrolein	--	0.020	0.020
79-06-1	Acrylamide	0.25	6.0	0.25
107-13-1	Acrylonitrile	0.37	2.0	0.37
309-00-2	Aldrin	0.0051	--	0.0051
107-05-1	Allyl chloride	4.2	1.00	1.00
319-84-6	Alpha-BHC	0.014	--	0.014
5103-71-9	Alpha-Chlordane	0.25	0.70	0.25
7429-90-5	Aluminum	--	5.0	5.0
62-53-3	Aniline	16	1.00	1.00
120-12-7	Anthracene	--	--	--
7440-36-0	Antimony	--	--	--
140-57-8	Aramite	3.5	--	3.5
12674-11-2	Aroclor-1016	1.3	--	1.3
11104-28-2	Aroclor-1221	0.044	--	0.044
11141-16-5	Aroclor-1232	0.044	--	0.044
53469-21-9	Aroclor-1242	0.044	--	0.044
12672-29-6	Aroclor-1248	0.044	--	0.044
11097-69-1	Aroclor-1254	0.044	--	0.044
11096-82-5	Aroclor-1260	0.044	--	0.044

Table 7-1. Summary of Standard Method C Air Cleanup Levels

CAS Number	Contaminant Name	Non-Carinogen (µg/m^3)	Carcinogen (µg/m^3)	Standard Method C Air CUL (µg/m^3)
37324-23-5	Aroclor-1262	--	--	--
11100-14-4	Aroclor-1268	--	--	--
7440-38-2	Arsenic	0.0058	0.015	0.0058
103-33-3	Azobenzene	0.81	--	0.81
7440-39-3	Barium	--	0.50	0.50
71-43-2	Benzene	3.2	30	3.2
56-55-3	Benzo(a)anthracene	0.23	--	0.23
50-32-8	Benzo(a)pyrene	0.023	--	0.023
205-99-2	Benzo(b)fluoranthene	0.23	--	0.23
191-24-2	Benzo(g,h,i)perylene	--	--	--
207-08-9	Benzo(k)fluoranthene	0.23	--	0.23
65-85-0	Benzoic acid	--	--	--
100-51-6	Benzyl alcohol	--	--	--
7440-41-7	Beryllium	0.010	0.020	0.010
319-85-7	beta-1,2,3,4,5,6-Hexachlorocyclohexane (beta-BHC)	0.047	--	0.047
108-60-1	Bis(2-chloro-1-methylethyl)ether	2.5	--	2.5
111-91-1	Bis(2-Chloroethoxy)methane	--	--	--
111-44-4	Bis(2-chloroethyl) ether	0.076	--	0.076
117-81-7	Bis(2-ethylhexyl) phthalate	10	--	10
7440-69-9	Bismuth	--	--	--

Table 7-1. Summary of Standard Method C Air Cleanup Levels

CAS Number	Contaminant Name	Non-Carinogen (µg/m^3)	Carcinogen (µg/m^3)	Standard Method C Air CUL (µg/m^3)
7440-42-8	Boron	--	20	20
24959-67-9	Bromide	--	--	--
75-27-4	Bromodichloromethane	0.68	--	0.68
75-25-2	Bromoform	23	--	23
74-83-9	Bromomethane	--	5.0	5.0
85-68-7	Butylbenzylphthalate	--	--	--
7440-43-9	Cadmium	0.014	0.020	0.014
7440-70-2	Calcium	--	--	--
86-74-8	Carbazole	--	--	--
75-15-0	Carbon disulfide	--	700	700
56-23-5	Carbon tetrachloride	4.2	100	4.2
57-74-9	Chlordane	0.25	0.70	0.25
16887-00-6	Chloride	--	--	--
108-90-7	Chlorobenzene	--	50	50
510-15-6	Chlorobenzilate	0.81	--	0.81
75-00-3	Chloroethane	--	10,000	10,000
67-66-3	Chloroform	1.1	98	1.1
74-87-3	Chloromethane	--	90	90
126-99-8	Chloroprene	0.083	20	0.083
7440-47-3	Chromium	--	--	--

Table 7-1. Summary of Standard Method C Air Cleanup Levels

CAS Number	Contaminant Name	Non-Carinogen (µg/m^3)	Carcinogen (µg/m^3)	Standard Method C Air CUL (µg/m^3)
218-01-9	Chrysene	2.3	--	2.3
156-59-2	cis-1,2-Dichloroethylene	--	--	--
10061-01-5	cis-1,3-Dichloropropene	6.3	20	6.3
7440-48-4	Cobalt	0.0028	0.0060	0.0028
PCB1242/1016	Co-elution of Aroclor 1242 and Aroclor 1016	--	--	--
7440-50-8	Copper	--	--	--
57-12-5	Cyanide	--	0.80	0.80
110-82-7	Cyclohexane	--	6,000	6,000
108-94-1	Cyclohexanone	--	700	700
75-99-0	Dalapon	--	--	--
124-18-5	Decane	--	--	--
319-86-8	Delta-BHC	--	--	--
2303-16-4	Diallate	--	--	--
53-70-3	Dibenz[a,h]anthracene	0.23	--	0.23
132-64-9	Dibenzofuran	--	--	--
124-48-1	Dibromochloromethane	0.93	--	0.93
74-95-3	Dibromomethane	--	4.0	4.0
1918-00-9	Dicamba	--	--	--
75-71-8	Dichlorodifluoromethane	--	100	100
120-36-5	Dichloroprop	--	--	--

Table 7-1. Summary of Standard Method C Air Cleanup Levels

CAS Number	Contaminant Name	Non-Carinogen (µg/m^3)	Carcinogen (µg/m^3)	Standard Method C Air CUL (µg/m^3)
60-57-1	Dieldrin	0.0054	--	0.0054
60-29-7	Diethyl ether	--	--	--
84-66-2	Diethylphthalate	--	--	--
60-51-5	Dimethoate	--	--	--
131-11-3	Dimethyl phthalate	--	--	--
84-74-2	Di-n-butylphthalate	--	--	--
117-84-0	Di-n-octylphthalate	--	--	--
88-85-7	Dinoseb(2-secButyl-4,6-dinitrophenol)	--	--	--
298-04-4	Disulfoton	--	--	--
959-98-8	Endosulfan I	--	--	--
33213-65-9	Endosulfan II	--	--	--
1031-07-8	Endosulfan sulfate	--	--	--
72-20-8	Endrin	--	--	--
7421-93-4	Endrin Aldehyde	--	--	--
53494-70-5	Endrin ketone	--	--	--
64-17-5	Ethanol	--	--	--
141-78-6	Ethyl acetate	--	--	--
97-63-2	Ethyl methacrylate	--	300	300
100-41-4	Ethylbenzene	10	1,000	10
107-21-1	Ethylene glycol	--	400	400

Table 7-1. Summary of Standard Method C Air Cleanup Levels

CAS Number	Contaminant Name	Non-Carinogen (µg/m^3)	Carcinogen (µg/m^3)	Standard Method C Air CUL (µg/m^3)
206-44-0	Fluoranthene	--	--	--
86-73-7	Fluorene	--	--	--
16984-48-8	Fluoride	--	13	13
58-89-9	Gamma-BHC (Lindane)	0.081	--	0.081
5566-34-7	Gamma-Chlordane	0.25	0.70	0.25
76-44-8	Heptachlor	0.019	--	0.019
1024-57-3	Heptachlor epoxide	0.0096	--	0.0096
118-74-1	Hexachlorobenzene	0.054	--	0.054
87-68-3	Hexachlorobutadiene	1.1	--	1.1
77-47-4	Hexachlorocyclopentadiene	--	0.20	0.20
67-72-1	Hexachloroethane	2.3	30	2.3
70-30-4	Hexachlorophene	--	--	--
110-54-3	Hexane	--	700	700
18540-29-9	Hexavalent Chromium	2.98E-04	0.10	2.98E-04
302-01-2	Hydrazine	0.0051	0.030	0.0051
193-39-5	Indeno(1,2,3-cd)pyrene	0.23	--	0.23
7439-89-6	Iron	--	--	--
78-83-1	Isobutyl alcohol	--	--	--
78-59-1	Isophorone	--	2,000	2,000
98-82-8	Isopropylbenzene	--	400	400

Table 7-1. Summary of Standard Method C Air Cleanup Levels

CAS Number	Contaminant Name	Non-Carinogen (µg/m^3)	Carcinogen (µg/m^3)	Standard Method C Air CUL (µg/m^3)
143-50-0	Kepone	0.0054	--	0.0054
7439-92-1	Lead	--	--	--
7439-93-2	Lithium	--	--	--
7439-95-4	Magnesium	--	--	--
7439-96-5	Manganese	--	0.050	0.050
99-65-0	m-Dinitrobenzene	--	--	--
7439-97-6	Mercury	--	0.30	0.30
126-98-7	Methacrylonitrile	--	30	30
67-56-1	Methanol	--	4,000	4,000
72-43-5	Methoxychlor	--	--	--
80-62-6	Methyl methacrylate	--	700	700
66-27-3	Methyl methanesulfonate	0.89	--	0.89
298-00-0	Methyl parathion	--	--	--
75-09-2	Methylene chloride	2,500	600	600
7439-98-7	Molybdenum	--	--	--
108-38-3	m-Xylene	--	100	100
91-20-3	Naphthalene	0.74	3.0	0.74
104-51-8	n-Butylbenzene	--	--	--
7440-02-0	Nickel	0.096	0.090	0.090
14797-55-8	Nitrate	--	--	--

Table 7-1. Summary of Standard Method C Air Cleanup Levels

CAS Number	Contaminant Name	Non-Carinogen (µg/m^3)	Carcinogen (µg/m^3)	Standard Method C Air CUL (µg/m^3)
14797-65-0	Nitrite	--	--	--
98-95-3	Nitrobenzene	0.63	9.0	0.63
NO3-N	Nitrogen in Nitrate	--	--	--
NO2-N	Nitrogen in Nitrite	--	--	--
NO2+NO3-N	Nitrogen in Nitrite and Nitrate	--	--	--
930-55-2	Nitrosopyrrolidine	0.041	--	0.041
55-18-5	n-Nitrosodiethylamine	5.81E-04	--	5.81E-04
62-75-9	n-Nitrosodimethylamine	0.0018	0.040	0.0018
924-16-3	n-Nitrosodi-n-butylamine	0.016	--	0.016
621-64-7	n-Nitrosodi-n-dipropylamine	0.013	--	0.013
86-30-6	n-Nitrosodiphenylamine	9.6	--	9.6
10595-95-6	n-Nitrosomethylethylamine	0.0040	--	0.0040
59-89-2	n-Nitrosomorpholine	0.013	--	0.013
100-75-4	n-Nitrosopiperidine	0.0093	--	0.0093
95-47-6	o-Xylene	--	100	100
56-38-2	Parathion	--	--	--
60-11-7	p-Dimethylaminoazobenzene	0.019	--	0.019
608-93-5	Pentachlorobenzene	--	--	--
76-01-7	Pentachloroethane	--	--	--
82-68-8	Pentachloronitrobenzene (PCNB)	--	--	--

Table 7-1. Summary of Standard Method C Air Cleanup Levels

CAS Number	Contaminant Name	Non-Carinogen (µg/m^3)	Carcinogen (µg/m^3)	Standard Method C Air CUL (µg/m^3)
87-86-5	Pentachlorophenol	4.9	--	4.9
62-44-2	Phenacetin	40	--	40
85-01-8	Phenanthrene	--	--	--
108-95-2	Phenol	--	200	200
298-02-2	Phorate	--	--	--
14265-44-2	Phosphate	--	--	--
7723-14-0	Phosphorus	--	--	--
PO4-P	Phosphorus in phosphate	--	--	--
7440-09-7	Potassium	--	--	--
106-50-3	p-Phenylenediamine	--	--	--
23950-58-5	Pronamide	--	--	--
129-00-0	Pyrene	--	--	--
110-86-1	Pyridine	--	--	--
94-59-7	Safrol	0.40	--	0.40
7782-49-2	Selenium	--	20	20
7440-21-3	Silicon	--	--	--
7440-22-4	Silver	--	--	--
7440-23-5	Sodium	--	--	--
7440-24-6	Strontium	--	--	--
100-42-5	Styrene	--	1,000	1,000

Table 7-1. Summary of Standard Method C Air Cleanup Levels

CAS Number	Contaminant Name	Non-Carinogen (µg/m^3)	Carcinogen (µg/m^3)	Standard Method C Air CUL (µg/m^3)
14808-79-8	Sulfate	--	--	--
18496-25-8	Sulfide	--	--	--
99-35-4	sym-Trinitrobenzene	--	--	--
127-18-4	Tetrachloroethene	96	40	40
3689-24-5	Tetraethyl dithiopyrophosphate (Sulfotepp)	--	--	--
7440-28-0	Thallium	--	--	--
7440-31-5	Tin	--	--	--
7440-32-6	Titanium	--	--	--
108-88-3	Toluene	--	5,000	5,000
1336-36-3	Total PCBs	0.044	--	0.044
TPH	Total Petroleum hydrocarbons	--	--	--
TPHDIESEL	Total petroleum hydrocarbons - diesel range	--	--	--
TPHGASOLINE	Total petroleum hydrocarbons - gasoline range	--	--	--
TPHKEROSENE	Total petroleum hydrocarbons - kerosene range	--	--	--
TPH/OILH	Total petroleum hydrocarbons - motor oil (high boiling)	--	--	--
TOTALPCB	Total Polychlorinated Biphenyls	0.044	--	0.044
8001-35-2	Toxaphene	0.078	--	0.078
156-60-5	trans-1,2-Dichloroethylene	--	60	60

Table 7-1. Summary of Standard Method C Air Cleanup Levels

CAS Number	Contaminant Name	Non-Carinogen (µg/m^3)	Carcinogen (µg/m^3)	Standard Method C Air CUL (µg/m^3)
10061-02-6	trans-1,3-Dichloropropene	6.3	20	6.3
5103-74-2	trans-Chlordane	0.25	0.70	0.25
126-73-8	Tributyl phosphate	--	--	--
79-01-6	Trichloroethene	6.1	2.0	2.0
75-69-4	Trichloromonofluoromethane	--	700	700
7440-61-1	Uranium	--	0.040	0.040
7440-62-2	Vanadium	--	--	--
108-05-4	Vinyl acetate	--	200	200
75-01-4	Vinyl chloride	5.7	100	5.7
1330-20-7	Xylenes (total)	--	100	100
7440-66-6	Zinc	--	--	--
7440-67-7	Zirconium	--	--	--

Table 7-2. Summary of Soil Concentrations Protective of Standard Method C Air CULs

CAS Number	Contaminant Name	Non-Carcinogenic Soil Concentration (mg/kg)	Carcinogenic Soil Concentration (mg/kg)	Final Soil Concentration (mg/kg)
630-20-6	1,1,1,2-Tetrachloroethane	--	12	12
71-55-6	1,1,1-Trichloroethane	7,976	--	7,976
79-34-5	1,1,2,2-Tetrachloroethane	--	3.9	3.9
79-00-5	1,1,2-Trichloroethane	0.96	7.5	0.96
75-34-3	1,1-Dichloroethane	--	28	28
75-35-4	1,1-Dichloroethene	224	--	224
96-18-4	1,2,3-Trichloropropane	2.8	--	2.8
95-94-3	1,2,4,5-Tetrachlorobenzene	--	--	--
120-82-1	1,2,4-Trichlorobenzene	31	--	31
96-12-8	1,2-Dibromo-3-chloropropane	3.8	0.078	0.078
106-93-4	1,2-Dibromoethane	62	0.29	0.29
95-50-1	1,2-Dichlorobenzene	1,193	--	1,193
107-06-2	1,2-Dichloroethane	26	3.5	3.5
540-59-0	1,2-Dichloroethene (Total)	--	--	--
78-87-5	1,2-Dichloropropane	10	6.3	6.3
541-73-1	1,3-Dichlorobenzene	--	--	--
106-46-7	1,4-Dichlorobenzene	5,203	15	15
123-91-1	1,4-Dioxane	125,921	136	136
71-36-3	1-Butanol	--	--	--

Table 7-2. Summary of Soil Concentrations Protective of Standard Method C Air CULs

CAS Number	Contaminant Name	Non-Carcinogenic Soil Concentration (mg/kg)	Carcinogenic Soil Concentration (mg/kg)	Final Soil Concentration (mg/kg)
93-65-2	2-(2-methyl-4-chlorophenoxy) propionic acid	--	--	--
39635-31-9	2,3,3',4,4',5,5'-Heptachlorobiphenyl	9.48E+07	1.60E+06	1.60E+06
69782-90-7	2,3,3',4,4',5'-Hexachlorobiphenyl	9.48E+07	1.60E+06	1.60E+06
38380-08-4	2,3,3',4,4',5-Hexachlorobiphenyl	9.48E+07	1.60E+06	1.60E+06
32598-14-4	2,3,3',4,4'-Pentachlorobiphenyl	9.48E+07	1.60E+06	1.60E+06
52663-72-6	2,3',4,4',5,5'-Hexachlorobiphenyl	9.48E+07	1.60E+06	1.60E+06
74472-37-0	2,3,4,4',5-Pentachlorobiphenyl	9.48E+07	1.60E+06	1.60E+06
65510-44-3	2',3,4,4',5-Pentachlorobiphenyl	9.48E+07	1.60E+06	1.60E+06
31508-00-6	2,3',4,4',5-Pentachlorobiphenyl	9.48E+07	1.60E+06	1.60E+06
58-90-2	2,3,4,6-Tetrachlorophenol	--	--	--
93-76-5	2,4,5-T(2,4,5-Trichlorophenoxyacetic acid)	--	--	--
93-72-1	2,4,5-TP(2-(2,4,5-Trichlorophenoxy)propionic acid)Silvex	--	--	--
95-95-4	2,4,5-Trichlorophenol	--	--	--
88-06-2	2,4,6-Trichlorophenol	--	948	948
94-75-7	2,4-D(2,4-Dichlorophenoxyacetic acid)	--	--	--
94-82-6	2,4-DB(4-(2,4-Dichlorophenoxy)butanoic acid)	--	--	--
120-83-2	2,4-Dichlorophenol	--	--	--
105-67-9	2,4-Dimethylphenol	--	--	--

Table 7-2. Summary of Soil Concentrations Protective of Standard Method C Air CULs

CAS Number	Contaminant Name	Non-Carcinogenic Soil Concentration (mg/kg)	Carcinogenic Soil Concentration (mg/kg)	Final Soil Concentration (mg/kg)
51-28-5	2,4-Dinitrophenol	--	--	--
121-14-2	2,4-Dinitrotoluene	--	2.05E+07	2.05E+07
606-20-2	2,6-Dinitrotoluene	--	--	--
53-96-3	2-Acetylaminofluorene	--	1.40E+06	1.40E+06
78-93-3	2-Butanone	62,217	--	62,217
111-76-2	2-Butoxyethanol	128,077	--	128,077
91-58-7	2-Chloronaphthalene	--	--	--
95-57-8	2-Chlorophenol	--	--	--
591-78-6	2-Hexanone	349	--	349
94-74-6	2-Methyl-4 chlorophenoxyacetic acid	--	--	--
91-57-6	2-methylnaphthalene	--	--	--
95-48-7	2-Methylphenol (cresol, o-)	113,699	--	113,699
91-59-8	2-Naphthylamine	--	--	--
88-74-4	2-Nitroaniline	3.65E+06	--	3.65E+06
88-75-5	2-Nitrophenol	--	--	--
108-10-1	2-Pentanone, 4-Methyl	28,602	--	28,602
32774-16-6	3,3',4,4',5,5'-Hexachlorobiphenyl	94,837	1,600	1,600
57465-28-8	3,3',4,4',5-Pentachlorobiphenyl	29,181	480	480
32598-13-3	3,3',4,4'-Tetrachlorobiphenyl	2.92E+07	479,945	479,945

Table 7-2. Summary of Soil Concentrations Protective of Standard Method C Air CULs

CAS Number	Contaminant Name	Non-Carcinogenic Soil Concentration (mg/kg)	Carcinogenic Soil Concentration (mg/kg)	Final Soil Concentration (mg/kg)
91-94-1	3,3'-Dichlorobenzidine	--	5.36E+06	5.36E+06
119-93-7	3,3'-Dimethylbenzidine	--	--	--
70362-50-4	3,4,4',5- Tetrachlorobiphenyl	9.48E+06	159,982	159,982
65794-96-9	3+4 Methylphenol (cresol, m+p)	--	--	--
56-49-5	3-Methylcholanthrene	--	289,491	289,491
99-09-2	3-Nitroaniline	7.30E+07	--	7.30E+07
72-54-8	4,4'-DDD (Dichlorodiphenyldichloroethane)	--	2.64E+07	2.64E+07
72-55-9	4,4'-DDE (Dichlorodiphenyldichloroethylene)	--	1.88E+07	1.88E+07
50-29-3	4,4'-DDT (Dichlorodiphenyltrichloroethane)	--	1.88E+07	1.88E+07
534-52-1	4,6-Dinitro-2-methylphenol	--	--	--
1918-02-1	4-Amino-3,5,6-trichloropicolinic acid	--	--	--
92-67-1	4-Aminobiphenyl	--	303,965	303,965
101-55-3	4-Bromophenylphenyl ether	--	--	--
59-50-7	4-Chloro-3-methylphenol	--	--	--
106-47-8	4-Chloroaniline	--	--	--
7005-72-3	4-Chlorophenylphenyl ether	--	--	--
106-44-5	4-Methylphenol (cresol, p-)	122,222	--	122,222
100-01-6	4-Nitroaniline	4.38E+08	--	4.38E+08
100-02-7	4-Nitrophenol	--	--	--

Table 7-2. Summary of Soil Concentrations Protective of Standard Method C Air CULs

CAS Number	Contaminant Name	Non-Carcinogenic Soil Concentration (mg/kg)	Carcinogenic Soil Concentration (mg/kg)	Final Soil Concentration (mg/kg)
99-55-8	5-Nitro-o-toluidine	--	--	--
83-32-9	Acenaphthene	--	--	--
208-96-8	Acenaphthylene	--	--	--
67-64-1	Acetone	424,564	--	424,564
75-05-8	Acetonitrile	791	--	791
98-86-2	Acetophenone	--	--	--
107-02-8	Acrolein	0.15	--	0.15
79-06-1	Acrylamide	868	36	36
107-13-1	Acrylonitrile	15	2.7	2.7
309-00-2	Aldrin	--	1.2	1.2
107-05-1	Allyl chloride	1.3	5.4	1.3
319-84-6	Alpha-BHC	--	1.01E+06	1.01E+06
5103-71-9	Alpha-Chlordane	5.11E+07	1.82E+07	1.82E+07
7429-90-5	Aluminum	3.65E+08	--	3.65E+08
62-53-3	Aniline	82	1,276	82
120-12-7	Anthracene	--	--	--
7440-36-0	Antimony	--	--	--
140-57-8	Aramite	--	2.57E+08	2.57E+08
12674-11-2	Aroclor-1016	--	9.12E+07	9.12E+07

Table 7-2. Summary of Soil Concentrations Protective of Standard Method C Air CULs

CAS Number	Contaminant Name	Non-Carcinogenic Soil Concentration (mg/kg)	Carcinogenic Soil Concentration (mg/kg)	Final Soil Concentration (mg/kg)
11104-28-2	Aroclor-1221	--	1.9	1.9
11141-16-5	Aroclor-1232	--	1.9	1.9
53469-21-9	Aroclor-1242	--	3.20E+06	3.20E+06
12672-29-6	Aroclor-1248	--	3.20E+06	3.20E+06
11097-69-1	Aroclor-1254	--	3.20E+06	3.20E+06
11096-82-5	Aroclor-1260	--	3.20E+06	3.20E+06
37324-23-5	Aroclor-1262	--	--	--
11100-14-4	Aroclor-1268	--	--	--
7440-38-2	Arsenic	1.09E+06	424,137	424,137
103-33-3	Azobenzene	--	196	196
7440-39-3	Barium	3.65E+07	--	3.65E+07
71-43-2	Benzene	53	5.7	5.7
56-55-3	Benzo(a)anthracene	--	1.66E+07	1.66E+07
50-32-8	Benzo(a)pyrene	--	1.66E+06	1.66E+06
205-99-2	Benzo(b)fluoranthene	--	1.66E+07	1.66E+07
191-24-2	Benzo(g,h,i)perylene	--	--	--
207-08-9	Benzo(k)fluoranthene	--	1.66E+07	1.66E+07
65-85-0	Benzoic acid	--	--	--
100-51-6	Benzyl alcohol	--	--	--

Table 7-2. Summary of Soil Concentrations Protective of Standard Method C Air CULs

CAS Number	Contaminant Name	Non-Carcinogenic Soil Concentration (mg/kg)	Carcinogenic Soil Concentration (mg/kg)	Final Soil Concentration (mg/kg)
7440-41-7	Beryllium	1.46E+06	759,913	759,913
319-85-7	beta-1,2,3,4,5,6-Hexachlorocyclohexane (beta-BHC)	--	3.44E+06	3.44E+06
108-60-1	Bis(2-chloro-1-methylethyl)ether	--	48	48
111-91-1	Bis(2-Chloroethoxy)methane	--	--	--
111-44-4	Bis(2-chloroethyl) ether	--	2.7	2.7
117-81-7	Bis(2-ethylhexyl) phthalate	--	7.60E+08	7.60E+08
7440-69-9	Bismuth	--	--	--
7440-42-8	Boron	1.46E+09	--	1.46E+09
24959-67-9	Bromide	--	--	--
75-27-4	Bromodichloromethane	--	2.6	2.6
75-25-2	Bromoform	--	219	219
74-83-9	Bromomethane	6.9	--	6.9
85-68-7	Butylbenzylphthalate	--	--	--
7440-43-9	Cadmium	1.46E+06	1.01E+06	1.01E+06
7440-70-2	Calcium	--	--	--
86-74-8	Carbazole	--	--	--
75-15-0	Carbon disulfide	668	--	668
56-23-5	Carbon tetrachloride	147	6.1	6.1

Table 7-2. Summary of Soil Concentrations Protective of Standard Method C Air CULs

CAS Number	Contaminant Name	Non-Carcinogenic Soil Concentration (mg/kg)	Carcinogenic Soil Concentration (mg/kg)	Final Soil Concentration (mg/kg)
57-74-9	Chlordane	5.11E+07	1.82E+07	1.82E+07
16887-00-6	Chloride	--	--	--
108-90-7	Chlorobenzene	159	--	159
510-15-6	Chlorobenzilate	--	5.88E+07	5.88E+07
75-00-3	Chloroethane	11,798	--	11,798
67-66-3	Chloroform	218	2.4	2.4
74-87-3	Chloromethane	100	--	100
126-99-8	Chloroprene	20	0.082	0.082
7440-47-3	Chromium	--	--	--
218-01-9	Chrysene	--	1.66E+08	1.66E+08
156-59-2	cis-1,2-Dichloroethylene	--	--	--
10061-01-5	cis-1,3-Dichloropropene	25	7.7	7.7
7440-48-4	Cobalt	437,710	202,643	202,643
PCB1242/1016	Co-elution of Aroclor 1242 and Aroclor 1016	--	--	--
7440-50-8	Copper	--	--	--
57-12-5	Cyanide	42	--	42
110-82-7	Cyclohexane	5,709	--	5,709
108-94-1	Cyclohexanone	24,875	--	24,875
75-99-0	Dalapon	--	--	--

Table 7-2. Summary of Soil Concentrations Protective of Standard Method C Air CULs

CAS Number	Contaminant Name	Non-Carcinogenic Soil Concentration (mg/kg)	Carcinogenic Soil Concentration (mg/kg)	Final Soil Concentration (mg/kg)
124-18-5	Decane	--	--	--
319-86-8	Delta-BHC	--	--	--
2303-16-4	Diallate	--	--	--
53-70-3	Dibenz[a,h]anthracene	--	1.66E+07	1.66E+07
132-64-9	Dibenzofuran	--	--	--
124-48-1	Dibromochloromethane	--	6.2	6.2
74-95-3	Dibromomethane	19	--	19
1918-00-9	Dicamba	--	--	--
75-71-8	Dichlorodifluoromethane	91	--	91
120-36-5	Dichloroprop	--	--	--
60-57-1	Dieldrin	--	396,476	396,476
60-29-7	Diethyl ether	--	--	--
84-66-2	Diethylphthalate	--	--	--
60-51-5	Dimethoate	--	--	--
131-11-3	Dimethyl phthalate	--	--	--
84-74-2	Di-n-butylphthalate	--	--	--
117-84-0	Di-n-octylphthalate	--	--	--
88-85-7	Dinoseb(2-secButyl-4,6-dinitrophenol)	--	--	--
298-04-4	Disulfoton	--	--	--

Table 7-2. Summary of Soil Concentrations Protective of Standard Method C Air CULs

CAS Number	Contaminant Name	Non-Carcinogenic Soil Concentration (mg/kg)	Carcinogenic Soil Concentration (mg/kg)	Final Soil Concentration (mg/kg)
959-98-8	Endosulfan I	--	--	--
33213-65-9	Endosulfan II	--	--	--
1031-07-8	Endosulfan sulfate	--	--	--
72-20-8	Endrin	--	--	--
7421-93-4	Endrin Aldehyde	--	--	--
53494-70-5	Endrin ketone	--	--	--
64-17-5	Ethanol	--	--	--
141-78-6	Ethyl acetate	--	--	--
97-63-2	Ethyl methacrylate	1,499	--	1,499
100-41-4	Ethylbenzene	2,283	23	23
107-21-1	Ethylene glycol	51,713	--	51,713
206-44-0	Fluoranthene	--	--	--
86-73-7	Fluorene	--	--	--
16984-48-8	Fluoride	9.48E+08	--	9.48E+08
58-89-9	Gamma-BHC (Lindane)	--	5.88E+06	5.88E+06
5566-34-7	Gamma-Chlordane	5.11E+07	1.82E+07	1.82E+07
76-44-8	Heptachlor	--	1.40E+06	1.40E+06
1024-57-3	Heptachlor epoxide	--	13	13
118-74-1	Hexachlorobenzene	--	3.96E+06	3.96E+06

Table 7-2. Summary of Soil Concentrations Protective of Standard Method C Air CULs

CAS Number	Contaminant Name	Non-Carcinogenic Soil Concentration (mg/kg)	Carcinogenic Soil Concentration (mg/kg)	Final Soil Concentration (mg/kg)
87-68-3	Hexachlorobutadiene	--	50	50
77-47-4	Hexachlorocyclopentadiene	9.1	--	9.1
67-72-1	Hexachloroethane	326	25	25
70-30-4	Hexachlorophene	--	--	--
110-54-3	Hexane	708	--	708
18540-29-9	Hexavalent Chromium	7.30E+06	21,712	21,712
302-01-2	Hydrazine	2.19E+06	372,202	372,202
193-39-5	Indeno(1,2,3-cd)pyrene	--	1.66E+07	1.66E+07
7439-89-6	Iron	--	--	--
78-83-1	Isobutyl alcohol	--	--	--
78-59-1	Isophorone	110,520	--	110,520
98-82-8	Isopropylbenzene	1,257	--	1,257
143-50-0	Kepone	--	396,476	396,476
7439-92-1	Lead	--	--	--
7439-93-2	Lithium	--	--	--
7439-95-4	Magnesium	--	--	--
7439-96-5	Manganese	3.65E+06	--	3.65E+06
99-65-0	m-Dinitrobenzene	--	--	--
7439-97-6	Mercury	2.19E+07	--	2.19E+07

Table 7-2. Summary of Soil Concentrations Protective of Standard Method C Air CULs

CAS Number	Contaminant Name	Non-Carcinogenic Soil Concentration (mg/kg)	Carcinogenic Soil Concentration (mg/kg)	Final Soil Concentration (mg/kg)
126-98-7	Methacrylonitrile	183	--	183
67-56-1	Methanol	127,460	--	127,460
72-43-5	Methoxychlor	--	--	--
80-62-6	Methyl methacrylate	4,197	--	4,197
66-27-3	Methyl methanesulfonate	--	6.51E+07	6.51E+07
298-00-0	Methyl parathion	--	--	--
75-09-2	Methylene chloride	1,268	5,283	1,268
7439-98-7	Molybdenum	--	--	--
108-38-3	m-Xylene	233	--	233
91-20-3	Naphthalene	55	14	14
104-51-8	n-Butylbenzene	--	--	--
7440-02-0	Nickel	6.57E+06	7.01E+06	6.57E+06
14797-55-8	Nitrate	--	--	--
14797-65-0	Nitrite	--	--	--
98-95-3	Nitrobenzene	287	20	20
NO3-N	Nitrogen in Nitrate	--	--	--
NO2-N	Nitrogen in Nitrite	--	--	--
NO2+NO3-N	Nitrogen in Nitrite and Nitrate	--	--	--
930-55-2	Nitrosopyrrolidine	--	8.6	8.6

Table 7-2. Summary of Soil Concentrations Protective of Standard Method C Air CULs

CAS Number	Contaminant Name	Non-Carcinogenic Soil Concentration (mg/kg)	Carcinogenic Soil Concentration (mg/kg)	Final Soil Concentration (mg/kg)
55-18-5	n-Nitrosodiethylamine	--	0.040	0.040
62-75-9	n-Nitrosodimethylamine	2.7	0.12	0.12
924-16-3	n-Nitrosodi-n-butylamine	--	1.5	1.5
621-64-7	n-Nitrosodi-n-dipropylamine	--	911,895	911,895
86-30-6	n-Nitrosodiphenylamine	--	7.01E+08	7.01E+08
10595-95-6	n-Nitrosomethylethylamine	--	289,491	289,491
59-89-2	n-Nitrosomorpholine	--	959,890	959,890
100-75-4	n-Nitrosopiperidine	--	675,478	675,478
95-47-6	o-Xylene	286	--	286
56-38-2	Parathion	--	--	--
60-11-7	p-Dimethylaminoazobenzene	--	1.40E+06	1.40E+06
608-93-5	Pentachlorobenzene	--	--	--
76-01-7	Pentachloroethane	--	--	--
82-68-8	Pentachloronitrobenzene (PCNB)	--	--	--
87-86-5	Pentachlorophenol	--	3.58E+08	3.58E+08
62-44-2	Phenacetin	--	2.89E+09	2.89E+09
85-01-8	Phenanthrene	--	--	--
108-95-2	Phenol	25,073	--	25,073
298-02-2	Phorate	--	--	--

Table 7-2. Summary of Soil Concentrations Protective of Standard Method C Air CULs

CAS Number	Contaminant Name	Non-Carcinogenic Soil Concentration (mg/kg)	Carcinogenic Soil Concentration (mg/kg)	Final Soil Concentration (mg/kg)
14265-44-2	Phosphate	--	--	--
7723-14-0	Phosphorus	--	--	--
PO4-P	Phosphorus in phosphate	--	--	--
7440-09-7	Potassium	--	--	--
106-50-3	p-Phenylenediamine	--	--	--
23950-58-5	Pronamide	--	--	--
129-00-0	Pyrene	--	--	--
110-86-1	Pyridine	--	--	--
94-59-7	Safrol	--	2.89E+07	2.89E+07
7782-49-2	Selenium	1.46E+09	--	1.46E+09
7440-21-3	Silicon	--	--	--
7440-22-4	Silver	--	--	--
7440-23-5	Sodium	--	--	--
7440-24-6	Strontium	--	--	--
100-42-5	Styrene	6,371	--	6,371
14808-79-8	Sulfate	--	--	--
18496-25-8	Sulfide	--	--	--
99-35-4	sym-Trinitrobenzene	--	--	--
127-18-4	Tetrachloroethene	82	197	82

Table 7-2. Summary of Soil Concentrations Protective of Standard Method C Air CULs

CAS Number	Contaminant Name	Non-Carcinogenic Soil Concentration (mg/kg)	Carcinogenic Soil Concentration (mg/kg)	Final Soil Concentration (mg/kg)
3689-24-5	Tetraethyl dithiopyrophosphate (Sulfotepp)	--	--	--
7440-28-0	Thallium	--	--	--
7440-31-5	Tin	--	--	--
7440-32-6	Titanium	--	--	--
108-88-3	Toluene	10,425	--	10,425
1336-36-3	Total PCBs	--	3.20E+06	3.20E+06
TPH	Total Petroleum hydrocarbons	--	--	--
TPHDIESEL	Total petroleum hydrocarbons - diesel range	--	--	--
TPHGASOLINE	Total petroleum hydrocarbons - gasoline range	--	--	--
TPHKEROSENE	Total petroleum hydrocarbons - kerosene range	--	--	--
TPH/OILH	Total petroleum hydrocarbons - motor oil (high boiling)	--	--	--
TOTALPCB	Total Polychlorinated Biphenyls	--	3.20E+06	3.20E+06
8001-35-2	Toxaphene	--	5.70E+06	5.70E+06
156-60-5	trans-1,2-Dichloroethylene	84	--	84
10061-02-6	trans-1,3-Dichloropropene	25	7.7	7.7
5103-74-2	trans-Chlordane	5.11E+07	1.82E+07	1.82E+07
126-73-8	Tributyl phosphate	--	--	--

Table 7-2. Summary of Soil Concentrations Protective of Standard Method C Air CULs

CAS Number	Contaminant Name	Non-Carcinogenic Soil Concentration (mg/kg)	Carcinogenic Soil Concentration (mg/kg)	Final Soil Concentration (mg/kg)
79-01-6	Trichloroethene	3.5	11	3.5
75-69-4	Trichloromonofluoromethane	731	--	731
7440-61-1	Uranium	2.92E+06	--	2.92E+06
7440-62-2	Vanadium	--	--	--
108-05-4	Vinyl acetate	879	--	879
75-01-4	Vinyl chloride	93	5.3	5.3
1330-20-7	Xylenes (total)	227	--	227
7440-66-6	Zinc	--	--	--
7440-67-7	Zirconium	--	--	--

8 References

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Figure 6-1
HAND CALCULATIONS
(4 Sheets)

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Air Cleanup levels - Method C

Noncarcinogen (Equation 750-1)

$$\text{Air cleanup level}\left(\frac{ug}{m^3}\right) = \frac{RFD * ABW * UCF * HQ * AT}{BR * ABS * ED * EF}$$

→ Trichloroethene (TCE)

$$\text{Air CUL}\left(\frac{ug}{m^3}\right) = \frac{5.71E\text{-}04\ \frac{mg}{kg\cdot d} * 70\,kg * 1000\ \frac{ug}{mg} * 1 * 6\,yrs}{20\ \frac{m^3}{d} * 1 * 6\,yrs * 1}$$

$$= 2.0\ ug/m^3 \checkmark$$

Carcinogen (Equation 750-2)

$$\text{Air CUL}\left(\frac{ug}{m^3}\right) = \frac{RISK * ABW * AT * UCF}{CPF * BR * ABS * ED * EF}$$

→ Carbon tetrachloride

$$\text{Air CUL}\left(\frac{ug}{m^3}\right) = \frac{1E\text{-}05 * 70\,kg * 75\,yrs * 1000\ ug/mg}{2.10E\text{-}02\ \frac{kg\cdot d}{mg} * 20\ \frac{m^3}{d} * 1 * 30\,yrs * 1}$$

$$= 4.17\ ug/m^3 \checkmark$$

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Air Cleanup - Inhalation Pathway
PRGs - Method C Air CULs

$$PEF = \frac{Q}{C} * \frac{3{,}600}{0.036 * (1-V) * \left(\frac{u_m}{u_t}\right)^3 * F(x)}$$

where: $\frac{Q}{C} = A * \exp\left[\frac{(\ln[A_s] - B)^2}{C}\right]$

and: $F(x) = 0.18(8x^3 + 12x)\exp -(x^2)$

and: $x = 0.886\left(\frac{u_t}{u_m}\right) = 0.886\left(\frac{11.32\frac{m}{s}}{3.4\frac{m}{s}}\right) = 2.95$ ✓

$F(x) = 0.18(8[2.95]^3 + 12[2.95])e^{-(2.95)^2} = 7.21\,E\text{-}03$ ✓

$\frac{Q}{C} = 11.3161 * \exp\left[\frac{(\ln[0.5] - 19.6437)^2}{224.8172}\right] = 71.23\ \frac{g/m^2\text{-}s}{Kg/m^3}$ ✓

$PEF = 71.23\ \frac{g/m^2\text{-}s}{Kg/m^3} * \frac{3{,}600}{0.036 * ((-0.5) * \left(\frac{3.4}{11.32}\right)^3 * 7.21\,E\text{-}03}$

$= 7.29\,E+10\ m^3/kg$ ✓

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Inhalation Pathway PRGs - Method C Air CULs

Analyte-Specific Volatilization Factor (VF):

$$VF = \frac{\frac{Q}{C} * (3.14 * D_A * T)^{\frac{1}{2}} * 10^{-4}\left(\frac{m^2}{cm^2}\right)}{2 * \rho_b * D_A}$$

where:

$$DA = \left[\frac{\left(\theta_a^{\frac{10}{3}} * D_i * H' + \theta_w^{\frac{10}{3}} * D_w\right)}{\frac{n^2}{\rho_b * K_d + \theta_w + \theta_a * H'}}\right]$$

→ Carbon tetrachloride

$$DA = \frac{\left(0.284 \frac{L_{air}}{L_{soil}}\right)^{\frac{10}{3}} * 5.71E\text{-}02 \frac{cm^2}{s} * 1.25 + (0.15)^{\frac{10}{3}} \frac{L_{air}}{L_{soil}} * 9.78E\text{-}06 \frac{cm}{s}}{\frac{0.434^2}{1.5 \frac{kg}{L} * 1.52E\text{-}01 + 0.15 \frac{L_{air}}{L_{soil}} + 0.284 \frac{L_{air}}{L_{soil}} * 1.25}}$$

$$= \frac{5.7079E\text{-}03 \frac{cm^2}{s}}{0.228 + 0.15 + 0.355} = \frac{5.7079E\text{-}03}{0.733} = 7.79E^{-3} \frac{cm^2}{s} \checkmark$$

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Inhalation Pathway PRGs - Method C Air

$$VF = \frac{71.2281 \frac{g}{m^2 \cdot s} / \frac{kg}{m^3} * (3.14 * 7.79E\text{-}03 \frac{cm^2}{s} * 9.50E+08\ s)^{\frac{1}{2}} * 10^{-4} \frac{m^2}{cm^2}}{2 * 1.5 \frac{kg}{L} * 7.79E\text{-}03 \frac{cm^2}{s}}$$

$= 1.47E+03\ m^3/kg$ ✓

Inhalation Soil PRGs (Nonvolatile):

$$\text{Soil cleanup level } (mg/kg) = \frac{\text{Air Cleanup Level } (ug/m^3)}{\left(\frac{1}{PEF\ (m^3/kg)}\right)} * 0.001\ mg/ug$$

→ Pentachlorophenol

$$\text{Soil CUL } (mg/kg) = \frac{4.90\ ug/m^3}{\frac{1}{7.29E+10\ m^3/kg}} * 0.001 \frac{mg}{ug} = 3.57E+08 \frac{mg}{kg}$$ ✓

Inhalation Soil PRGs (Volatile):

$$\text{Soil PRG } (mg/kg) = \frac{\text{Air CUL } (ug/m^3)}{\left[\frac{1}{PEF\ (m^3/kg)} + \frac{1}{VF\ (m^3/kg)}\right]} * 0.001 \frac{mg}{ug}$$

→ Carbon tetrachloride

$$\text{Soil PRG } (mg/kg) = \frac{4.17\ ug/m^3}{\left(\frac{1}{7.29E+10\ m^3/kg}\right) + \left(\frac{1}{1.47E+03\ m^3/kg}\right)} * 0.001 \frac{mg}{ug} = \left(\frac{4.17 \frac{ug}{m^3}}{1.37E\text{-}11 \frac{m^3}{kg} + 6.80E\text{-}0\ \frac{m^3}{kg}}\right) * 0.001 \frac{mg}{ug}$$

6.13 mg/kg ✓