ECF-HANFORD-10-0453
Revision 3

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

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

P.O. Box 1600
Richland, Washington 99352

Approved for Public Release;
Further Dissemination Unlimited

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ENVIRONMENTAL CALCULATION COVER PAGE

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Project: 100 and 300 Area RI/FS

Date: 09/09/2017

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 radiological soil preliminary remediation goals that will be used to support the Hanford Site

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ENVIRONMENTAL CALCULATION COVER PAGE (CONTINUED)

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Donna Morgans' professional experience has focused on assessing the potential for adverse human health effects associated with exposure to radiological and nonradiological contaminants in air, soil, water, and animal and plant tissues. In support of restoration efforts to address contamination in a variety of environmental media, she has managed and performed complex risk assessment and data compilation efforts to address a host of federal, state, and local regulations that include Comprehensive Environmental Response, Compensation, and Liability Act lifecycle decisions. Donna is also proficient in the application of aspects related to CERCLA including the development and review of work plans, remedial investigations, feasibility studies, and proposed plans. She has applied this knowledge to a variety of environmental projects and programs for private industry clients and federal government agencies. She has experience in developing risk assessment products and incorporating the appropriate federal and state regulatory requirements on projects throughout the US. Donna also has experience in the statistical evaluation of analytical data to determine population distributions using ProUCL and modeling the effects from exposure to radiological contaminants in soil using RESRAD.

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Mahmudur Rahman's professional experience has focused on managing numerous soil and groundwater remedial action program projects. His project work has encompassed performing both radiological and chemical baseline human health risk assessments and screening level ecological risk assessments, data review and validation, statistical data analysis and database management, evaluating site characterization results, deriving cleanup criteria for radiological and chemical contaminants, and determining media-specific background concentrations. Mahmudur's experience also includes estimating environmental cost analysis, conducting air quality analyses, and developing remedial action planning documents including federally approved quality assurance plans, baseline risk assessment work plans, remedial investigation and feasibility study plans, and remedial action work plans. In addition to his planning documentation expertise, Mahmudur's experience also includes development of reports that document remedial action project results including ISO 9001 and NQA-01 approved documents, engineering evaluation and cost analysis, decommissioning plans, five-year reviews, record of decision documents, annual monitoring reports for groundwater, surface water and sediment monitoring reports for storm water and treated wastewater, final status survey plans, post-remedial action reports, and site closeout reports consistent with EPA and NRC requirements along with other regulatory programs.

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BS, Chemistry, Whitman College, 1986

Sara Lindberg's professional environmental consulting experience encompasses environmental chemistry, software development, and environmental science. Her efforts have focused primarily in hazardous waste regulatory work and environmental documentation, including environmental data analysis in support of the Comprehensive Environmental Response, Compensation, and Liability Act remedial investigation/feasibility study process, Resource Conservation and Recovery Act permitting of hazardous waste treatment, storage, and disposal facilities at federal facilities, and analytical chemistry. She has prepared compliance plans, permit applications, and sampling and analysis plans, as well as systems for verifying and validating environmental analytical data to ensure completeness and accuracy. Sara spent two years as a member of a software development team responsible for a database management tool for the preparation and maintenance of metadata. She is a proficient code developer in HTML, ASP, and XML and has experience working in the US EPA code, ProUCL.

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Terms

ATSDR	Agency for Toxic Substances and Disease Registry
CalEPA	California Environmental Protection Agency
CLARC	Cleanup Level and Risk Calculation
CPF	carcinogenic potency factor
Ecology	Washington State Department of Ecology
EPA	Environmental Protection Agency
HEAST	Health Effects Assessment Summary Tables
HEEP	health and environmental effects profile
HHBP	human health benchmarks for pesticides
HQ	hazard quotient
IRIS	Integrated Risk Information System
LOAEL	lowest observed adverse effect level
MRL	minimal risk level
NJDEP	New Jersey Department of Environmental Protection
OEHHA	Office of Environmental Health Hazard Assessment
OU	Operable Unit
OPP	Office of Pesticide Programs
ORNL	Oak Ridge National Laboratory
PAH	polyaromatic hydrocarbon
PCB	polychlorinated biphenyl
PPRTVs	Provisional Peer Reviewed Toxicity Values
PRG	preliminary remediation goal
RAIS	Risk Assessment Information System
RAO	Remedial Action Objective
RCRA	*Resource Conservation and Recovery Act of 1976*
RfD	reference dose
RFI/CMS	RCRA Facility Investigation/Corrective Measures Study
RI/FS	Remedial Investigation/Feasibility Study
STSC	Superfund Health Risk Technical Support Cener

TCE	trichloroethene
TEF	Toxicity Equivalency Factor
WAC	Washington Administrative Code

1 Purpose

This environmental calculation file (ECF) documents the methods and assumptions for development of Standard Method C human health direct contact soil cleanup levels per the requirements set forth in the 2013 Washington Administrative Code (WAC) Section 173-340-745(5) soil cleanup standards for industrial properties. The calculated soil cleanup levels will be used to identify practical quantitation limits defined in Quality Assurance Project Plans, in baseline risk assessments, and identification of cleanup levels for the Remedial Investigation/Feasibility Study (RI/FS) process along the River Corridor and the Central Plateau, and in support of the *Resource Conservation and Recovery Act of 1976* (RCRA) Facility Investigation/Corrective Measures Study (RFI/CMS) process at RCRA-regulated units. 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 concentration goals that are protective of an industrial worker and as defined in the Model Toxics Control Act Statute and Regulation (MTCA) Cleanup Regulation Chapter 173-340 Washington Administrative Code (WAC). The PRG values calculated in this Environmental Calculation are further described in WAC 173-340-745(5)(b), "Method C Industrial Soil Cleanup Levels," "Standard Method C Industrial Soil Cleanup Levels".

2 Background

As described in DOE/RL-2008-46, *Integrated 100 Area Remedial Investigation/Feasibility Study Work Plan* and DOE/RL-2009-30, *300 Area Decision Unit Remedial Investigation/Feasibility Study Work Plan*, the 100 Areas and 300 Area contain 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. A number of operable units within the inner area of the Central Plateau are in the RI/FS work planning stage including 200-BC-1, 200-DV-1, 200-EA-1, 200-IS-1, and 200-WA-1. This calculation focuses on cleanup levels corresponding to industrial land use. For the purposes of developing non-radiological PRGs within this Environmental Calculation document, the following target objective is used:

- Prevent unacceptable risk to human health from exposure to 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 173-340-745). Standard Method C 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 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 RI/FS reports or the 300 Area RI/FS Report. These PRGs and screening levels can also be used to establish practical quantitation limits (PQLs) generally reported in the Quality Assurance Project Plan associated with each OU specific Sampling and Analysis Plan. 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, establishment of practical quantitation limits, or updates to toxicity values.

3 Methodology

The methodology used to determine Standard Method C industrial soil direct contact cleanup levels is described in WAC 173-340-745(5)(b).

The Standard Method C industrial soil cleanup levels are calculated for noncarcinogens and carcinogens using Equation 745-1 and Equation 745-2, respectively. Default input parameters for calculating the soil cleanup levels are defined within the equations. Standard Method C industrial soil cleanup levels are based on a HQ of 1 for noncarcinogens and an acceptable cancer risk level of 1×10^{-5} for carcinogens. Reference dose and carcinogenic potency factors are obtained from the U.S. Environmental Protection Agency (EPAc) "Regional Screening Levels for Chemical Contaminants at Superfund Sites" web site (EPA, 2017) (https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables-june-2017) or the Washington Department of Ecology (Ecology) "Cleanup Levels and Risk Calculations (CLARC)" web site (Ecology, 2017a) (https://fortress.wa.gov/ecy/clarc/CLARCHome.aspx) . Further details on the selection of toxicity values are presented in Section 4 of this ECF.

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

1. Identify Equation 745-1 and Equation 745-2 from WAC 173-340-745(5)(b) for noncarcinogenic and carcinogenic Standard Method C industrial soil cleanup levels.
2. Identify the exposure assumptions within Equation 745-1 and Equation 745-2 from WAC 173-340-745(5)(b) for noncarcinogens and carcinogens.
3. Obtain toxicity values for each contaminant.
4. Calculate concentrations in soil that correspond to a HQ of 1 or calculate concentrations in soil that correspond to an acceptable risk level of 1×10^{-5}.
5. Calculate screening concentrations in soil that correspond to a HQ of 0.1 or calculate concentrations in soil that correspond to an acceptable risk level of 1×10^{-6}.
6. When the nonradiological analyte has a Standard Method C industrial soil cleanup level calculated for both carcinogenic and noncarcinogenic effects, use the lower of the two soil cleanup levels (or screening level as applicable); the lower value is protective of both effects.
7. Document exposure assumptions, chemical-specific parameters, and their primary sources in a summary table.

The WAC 173-340-745 Standard Method C soil cleanup levels consider exposure through the soil ingestion pathway. The following represents the Standard Method C soil cleanup level equations for non-carcinogens and carcinogens. The parameters used for calculating the soil cleanup levels are defined in Table 3-1.

3.1.1 Equation 745-1 – Soil Cleanup Levels for Noncarcinogens

For chemical noncarcinogens, the Standard Method C industrial soil cleanup levels are calculated using Equation 745-1 which is obtained from WAC 173-340-745.

$$Soil\ Cleanup\ Level\ (mg/kg) = \frac{RfD \times ABW \times UCF \times HQ \times AT}{SIR \times AB1 \times EF \times ED}$$

3.1.2 Equation 745-2 – Soil Cleanup Levels for Carcinogens

For chemical carcinogens, the Standard Method C soil cleanup levels are calculated using Equation 745-2 which is obtained from WAC 173-340-745.

$$Soil\ Cleanup\ Level\ (mg/kg) = \frac{RISK \times ABW \times AT \times UCF}{CPF \times SIR \times AB1 \times ED \times EF}$$

Table 3-1. Summary of Exposure Assumptions Used to Calculate Standard Method C Industrial Soil Direct Contact Cleanup Levels

Exposure Factor	Symbol	Value	Units	Source
Gastrointestinal absorption fraction	AB1	1	unitless	WAC 173-340-745(5)(b)(iii)(B)(I) Equation 745-1 and WAC 173-340-745(5)(b)(iii)(B)(II) Equation 745-2
	AB1 cancer (dioxins/furans)	0.6	unitless	WAC 173-340-745(5)(b)(iii)(B)(II) Equation 745-2 (for mixtures of dioxins and furans)
Average body weight	ABW	70	kg	WAC 173-340-745(5)(b)(iii)(B)(I) Equation 745-1 and WAC 173-340-745(5)(b)(iii)(B)(II) Equation 745-2
Averaging time	AT (noncancer)	20	years	WAC 173-340-745(5)(b)(iii)(B)(II) Equation 745-1
	AT (cancer)	75	years	WAC 173-340-745(5)(b)(iii)(B)(I) Equation 745-2
Carcinogenic potency factor	CPF	Chemical-Specific	kg-day/mg	See Table 4-1
Exposure duration	ED	20	years	WAC 173-340-745(5)(b)(iii)(B)(I) Equation 745-1 and WAC 173-340-745(5)(b)(iii)(B)(II) Equation 745-2
Exposure frequency	EF	0.4	unitless	WAC 173-340-745(5)(b)(iii)(B)(I) Equation 745-1 and WAC 173-340-745(5)(b)(iii)(B)(II) Equation 745-2
Hazard quotient	HQ	1	unitless	WAC 173-340-745(5)(b)(iii)(B)(I) Equation 745-1
Reference dose	RfD	Chemical-Specific	mg/kg-day	See Table 4-1
Acceptable cancer risk level	RISK	1 in 100,000	unitless	WAC 173-340-745(5)(b)(iii)(B)(II) Equation 745-2
Soil ingestion rate	SIR	50	mg/day	WAC 173-340-745(5)(b)(iii)(B)(I) Equation 745-1 and WAC 173-340-745(5)(b)(iii)(B)(II) Equation 745-2
Unit conversion factor	UCF	1,000,000	mg/kg	WAC 173-340-745(5)(b)(iii)(B)(I) Equation 745-1 and WAC 173-340-745(5)(b)(iii)(B)(II) Equation 745-2

4 Assumptions and Inputs

The key assumptions and inputs used to calculate the 2013 WAC 173-340-745 Standard Method C industrial soil direct contact cleanup levels are as follows:

4.1 Exposure Factors

- The exposure route included in the Standard Method C soil cleanup level for industrial land use is incidental soil ingestion.
- Exposure assumptions for both noncarcinogens and carcinogens are in Table 3-1, along with the sources for each assumption.
- A gastrointestinal absorption fraction of 1.0 is used for all noncarcinogens. A gastrointestinal absorption fraction of 1 is used for all carcinogens except dioxins and/or furans. In accordance with Equation 745-2 of WAC 173-340-745(5), a gastrointestinal absorption fraction of 0.6 is used for dioxins and/or furans.
- Chemical-specific toxicity values (RfDs and carcinogenic potency factors[CPFs]) are listed in Table 4-1, along with the sources for the values.

4.2 Toxicity Values

The chemical-specific RfD used in Equation 745-1 for noncarcinogens and the chemical-specific CPF used in Equation 745-2 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) (EPA, 2017a)
- Tier 2 – The EPA Provisional Peer Reviewed Toxicity Values (PPRTVs) (EPA, 2017b)
- 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. These values are also published at the EPA's "Provisional Peer Reviewed Toxicity Values for Superfund (PPRTV)" website at https://hhpprtv.ornl.gov/

Tier 3 – Other Toxicity Values

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

- The California EPA's (CalEPA) Toxicity Criteria Database contains toxicity values that are peer reviewed and address both cancer and non-cancer effects (OEHHA, 2017).

- 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. Note that toxicity values are archived (removed) when an IRIS profile or a PPRTV assessment is released for a specific chemical. The toxicity value is removed from HEAST even if the PPRTV assessment indicates a toxicity value could not be derived.

- The Human Health Benchmarks for Pesticides (HHBPs) derived by EPA's Office of Pesticide Programs (OPP). IRIS has archived 51 chemical assessments for pesticides and has recommended the use of the toxicity values presented in the HHBP table. OPP lists 363 pesticides in the HHBP table. Only the 51 archived by IRIS will be used in the RSL calculations. The food quality protection factors (FQPA) will be applied to the RfDs, if available. Derivation of the RfDs, for use in RSL calculations, is done by dividing the given RfD by the FQPA to derive a value that is more protective.

Oral RfD screening values were developed by the STSC for 12 analytes included in this ECF. RfD screening values are developed when data from the available primary studies are insufficient to support derivation of a provisional toxicity value. RfD screening values have considerably more uncertainty associated with them in comparison to the provisional values, but may be of limited use to risk assessors. The following analytes are reported with a screening chronic RfD value, the resulting concentrations should be limited to screening and are not adequate for use as cleanup levels::

- A toxicological review of 1,1-dimethylhydrazine was developed and posted by EPA (https://hhpprtv.ornl.gov/issue_papers/Dimethylhydrazine11.pdf). IRIS does not include an oral RfD value for 1,1-dimethylhydrazine and was not listed in the HEAST. EPA's Chemical Assessments and Related Activities list included a Health and Environmental Effects Profile (HEEP) that concluded that 1,1-dimethylhydrazine was a carcinogen by the oral route in mice and hamsters and a cancer potency value was derived. The HEEP did not derive noncancer toxicity values. A single chronic oral study of 1,1-dimethylhydrazine was located in secondary form only. A screening oral RfD of 0.0001 mg/kg-day was derived: a composite uncertainty factor of 1,000 was applied to the chronic no observed adverse effect level (NOAEL) point of departure to emphasize the high uncertainty associated with the RfD. Cloudy corneas and corresponding corneal mineralization were reported in Fisher 344 rats was used as the POD (critical effect) for the screening level RfD.

- A toxicological review of 1,2-dichloroethane (1,2-DCA) was developed and posted by EPA (https://hhpprtv.ornl.gov/issue_papers/Dichloroethane12.pdf). IRIS does not include an RfD value for 1,2-DCA and was not listed in the HEAST. IRIS and HEAST did not attempt to derive an RfD value because 1,2-DCA had been demonstrated to be carcinogenic. Two chronic oral studies of 1,2-DCA were located in literature searches for the purpose of deriving an oral RfD screening value. A screening oral RfD of 0.006 mg/kg-day was derived: a composite uncertainty factor of 30,000 was applied to the lowest observed adverse effect level (LOAEL) to emphasize the high uncertainty associated with the RfD. A >10% increase in absolute kidney weights in female F344/N rats were used as the point of departure (POD) (critical effect) for the screening level RfD.

- A toxicological review of 2,6-dinitrotoluene was developed and posted by EPA (https://hhpprtv.ornl.gov/issue_papers/Dinitrotoluene26.pdf). IRIS has developed assessments for 2,4-DNT (approximately 98% 2,4-DNT and 2% 2,6-DNT) and for 2,4/2,6-DNT (various

compositions of DNTs). One subchronic oral study of 2,6-DNT was located in literature searches. A screening oral RfD of 0.0003 mg/kg-day was derived: a composite uncertainty factor of 10,000 was applied to the LOAEL to emphasize the high uncertainty associated with the RfD. Splenic extramedullary hematopoiesis in male and female dogs was identified as the critical effect for the screening level RfD.

- A toxicological review of 2-chloroacetaldehyde was developed and posted by EPA (https://hhpprtv.ornl.gov/issue_papers/Chloroacetaldehyde2.pdf). IRIS does not list a chronic oral RfD, a RfC, or a cancer assessment for 2-chloroacetaldehyde. A screening cancer oral slope factor was developed using limited oral data from male mice exhibiting increased incidences of hepatocellular tumors in a cancer bioassay that included a single dose level. An oral slope factor of 0.27 $(mg/kg\text{-}day)^{-1}$ based on the lowest benchmark dose level. The study indicates that given the limited data available associated with the study, the oral slope factor should not be used with exposure exceeding the POD of 0.37 $(mg/kg\text{-}day)^{-1}$.

- A toxicological review of 2-nitroaniline was developed and posted by EPA (https://hhpprtv.ornl.gov/issue_papers/Nitroaniline2.pdf). IRIS does not list a chronic oral RfD, a RfC, or a cancer assessment for 2-nitroaniline. One short-term 14-day study, three developmental studies, and a 9-week reproductive study were located in literature searches. A screening oral RfD of 0.01 mg/kg-day was derived: a composite uncertainty factor of 10,000 was applied to the LOAEL. The critical effect for the critical study is systemic toxicity, lack of a point of departure based on critical hematological response significantly decreases the confidence in the critical study.

- A toxicological review of 4,6-dinitro-2-methylphenol was developed and posted by EPA (https://hhpprtv.ornl.gov/issue_papers/Dinitroocresol46.pdf). IRIS, HEAST, and the Drinking Water Standards and Health Advisories List do not report an RfD, an RfC, or a cancer assessment for 4,6-dinitro-2-methylphenol. One short-term human study was located in literature searches. The longest exposure duration in the principal study was 63 days, however, available human studies collectively report LOAELs for humans ingesting dinitro-o-cresols for up to 1 year. Because of the short exposure duration employed for the principal study, the certitude of the screening RfD is diminished. A screening chronic RfD of 0.00008 mg/kg-day was derived: a composite uncertainty factor of 10,000 was applied to the LOAEL. The critical effects for the principal study are reduced body weight, excessive sweating, fatigue, decreased appetite, elevated basal metabolic rate, body temperature, and greenish coloration of sclera.

- A toxicological review of 5-nitro-o-toluidine was developed and posted by EPA (https://hhpprtv.ornl.gov/issue_papers/Methyl5Nitroaniline2.pdf). IRIS and the Drinking Water Standards and Health Advisories List do not derive an RfD, an RfC, or a cancer assessment for 5-nitro-o-toluidine. A screening chronic RfD of 0.02 mg/kg-day was derived; a composite uncertainty factor of 10,000 was applied to the LOAEL POD. The critical effect is based on significant body-weight reduction occurring among female mice.

- A toxicological review of dibenzofuran was developed and posted by EPA (https://hhpprtv.ornl.gov/issue_papers/Dibenzofuran.pdf). IRIS and HEAST have not derived an RfD or an RfC, however a Class D cancer assessment is available on IRIS. Two short-term studies (one 78-day and one 200-day) were located in literature searches. A screening chronic RfD of 0.001 mg/kg-day was derived; a composite uncertainty factor of 10,000 was applied to the minimal LOAEL. The critical effects in female albino rats were reduced length and organ weight, and excess abdominal fat.

- A toxicological review of p-phenylenediamine was developed and posted by EPA (https://hhpprtv.ornl.gov/issue_papers/Phenylenediaminep.pdf). IRIS has not derived and RfD or RfC and HEAST derived an RfD in 1991. One unpublished subchronic-duration study was selected to derive the screening chronic RfD of 0.001 mg/kg-day; a composite uncertainty factor of 1,000 was applied to the POD. The critical effects in female rats were increased relative kidney and liver weight.
- A toxicological review of p-toluidine was developed and posted by EPA (https://hhpprtv.ornl.gov/issue_papers/Toluidinep.pdf). IRIS does not list a chronic oral RfD, a RfC, or a cancer assessment for p-toluidine. One acceptable study observing the toxicological effects from chronic exposure of p-toluidine was available. A screening chronic RfD was derived based on a critical endpoint of increased methemoglobin content in blood. A screening RfD of 0.004 mg/kg-day was derived for p-toluidine; an uncertainty factor of 10,000 was applied to the LOAEL.
- An IRIS Toxicological Review of Thallium and Compounds was developed and posted by EPA (http://www.epa.gov/iris/toxreviews/1012tr.pdf). However due to study and data quality limitations as stated in the IRIS Toxicological Review, an RfD was not derived. There are no human studies suitable for derivation of a provisional RfD. One of four animal studies was identified for the purpose of deriving an RfD that could be used for screening purposes. A screening RfD of 0.00001 mg/kg-day was derived for soluble thallium; an uncertainty factor of 1,000 was applied to the NOAEL to derive the RfD. Hair follicle atrophy in female rats was identified as the critical effect because atrophy of hair follicles is consistent with the atrophic changes observed in cases of human thallium poisoning.
- An IRIS Toxicological Review of Soluble Zirconium Compounds was developed and posted by EPA (http://hhpprtv.ornl.gov/issue_papers/Zirconium.pdf). There are no adequate human subchronic or chronic duration studies regarding the toxicity of oral exposure to zirconium to derive an RfD. One animal study was identified for the purpose of deriving an RfD that could be used for screening purposes. A screening RfD of 0.00008 mg/kg-day was derived for soluble zirconium; an uncertainty factor of 10,000 was applied to the LOAEL to derive the RfD.

Each of the Tier-3 toxicity values can be found at the EPA Regional Screening Levels website (EPA, 2017a).

Toxicity equivalency factors (TEFs) from Table 708-2 of 2013 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." Table 708-2 is presented in 2013 WAC 173-340-900, "Tables.[1]" Table 708-2 is presented in WAC 173-340-900, "Tables." 2013 WAC 173-340-708(e)(iii) describes a procedure for determining cleanup levels for mixtures of carcinogenic PAHs as a single hazardous substance and describes a method for calculating the total toxic equivalent concentration of benzo(a)pyrene. However, to maintain consistency with DOE/RL-96-17 and other Tri-Party approved documents, soil cleanup levels are derived on an individual carcinogenic PAH basis.

TEFs from Table 708-4 of 2013 WAC 173-340-708(8) are used to calculate toxicity values for dioxin-like polychlorinated biphenyl (PCB) congeners, as described in 2013 WAC-173-340-708(8)(f), "PCB Mixtures." Table 708-4 is presented in 2013 WAC 173-340-900, "Tables.[2]" WAC 173-340-708(f)(iii) describes a procedure for determining cleanup levels for PCB mixtures as a single hazardous substance

[1] All TEFs published in Table 708-2 were validated through comparison with the toxicity values published on the CLARC web site.

[2] All TEFs published in Table 708-4 were validated through comparison with the toxicity values published on the CLARC web site.

and describes a method for calculating the total toxic equivalent concentration of 2,3,7,8-TCDD. To maintain consistency with Tri-Party approved documents, soil cleanup levels are derived on an individual dioxin-like PCB congener basis.

A derived RfD for nitrate was calculated from the RfD reported in IRIS (1.6 mg/kg-day) for nitrate as nitrogen (NO_3^--N) using the mass fraction of nitrogen in nitrate. The mass fraction of nitrogen in nitrate = mol wt N/mol wt NO_3^- = (14 g/mol)/(62 g/mol) = 0.226. The derived RfD for nitrate = (1.6 mg NO_3^--N/kg-day) x (1 mg NO_3^-/0.226 mg NO_3^--N) = 7.1 mg NO_3^-/kg-day.

A derived RfD for nitrite was calculated from the RfD reported in IRIS (0.1 mg/kg-day) for nitrite as nitrogen (NO_2^--N) using the mass fraction of nitrogen in nitrite. The mass fraction of nitrogen in nitrite = mol wt N/mol wt NO_2^- = (14 g/mol)/(46 g/mol) = 0.304. The derived RfD for nitrite = (0.1 mg NO_2^--N/kg-day) x (1 mg NO_2^-/0.304 mg NO_2^--N) = 0.3 mg NO_2^-/kg-day.

For hexavalent chromium, the oral reference dose of 0.003 mg/kg-day published by IRIS is used to develop the Standard Method C industrial soil cleanup level. An oral cancer slope factor has been published by the New Jersey Department of Environmental Protection (NJDEP). The oral cancer slope factor derived by NJDEP is 0.5 $(mg/kg\text{-}day)^{-1}$, as presented in NJDEP, 2009, *Derivation of an Ingestion-Based Soil Remediation Criterion for Cr+6 Based on the NTP Chronic Bioassay Data for Sodium Dichromate Dihydrate*. Use of the IRIS value in this assessment has the potential to under-estimate cancer risk. If the NJDEP value were used to calculate the Standard Method C soil cleanup level, the soil concentration would decrease from 10,500 mg/kg to 263 mg/kg.

The MTCA Standard Method C soil cleanup level for TCE of 2,800 mg/kg is based on an acceptable cancer risk level of 1×10^{-5}. This value is published by Ecology in *CLARC Guidance, Trichloroethylene Toxicity Information and MTCA Cleanup Levels (TCE), CAS # 79-01-6* (Ecology, 2012) on the CLARC web site (Ecology, 2017a).

The MTCA Standard Method C soil cleanup level for vinyl chloride was calculated using an oral cancer potency factor of 0.75 risk per mg/kg-day. This cancer potency factor represents continuous exposure during adulthood where a site-specific reasonable maximum exposure is determined and neither a child nor a pregnant woman may be potentially exposed to vinyl chloride contaminated industrial soils. The recommended cancer potency value for vinyl chloride is published on the Focus Sheets available on the CLARC web site available at: https://fortress.wa.gov/ecy/clarc/FocusSheets/VinylChloride.pdf (Ecology, 2017).

The U.S. EPA recently updated (June 2017) the recommended oral RfD for uranium (soluble salts) published in the "Regional Screening Levels for Chemical Contaminants at Superfund sites" web site. The web site has published the oral RfD of 0.0002 mg/kg-day based on the intermediate-duration oral MRL resulting in renal effects in rats exposed to drinking water containing uranium for 91 days (ATSDR 2013). Previously this website published the oral RfD derived by EPA (and listed in the IRIS database) health assessment of 0.003 mg/kg-day based on initial weight loss and moderate nephrotoxicity in rabbits exposed to uranium in the diet for 30 days. ATSDR 2013 states the EPA oral RfD of 0.003 mg/kg-day is currently under review by EPA. However, the IRIS database has not withdrawn the oral RfD and indicates the uranium soluble salts is not being reassessed by IRIS at this time. Use of the EPA oral RfD has the potential to under-estimate noncancer effects from uranium (soluble salts). If the ATSDR oral RfD was used to calculate the WAC 173-340-745 Standard Method C industrial cleanup level, the soil concentration would decrease from 10,500 mg/kg to 700 mg/kg.

5 Software Applications

The WAC 173-340-745 Standard Method C industrial soil cleanup level calculations are performed on an electronic spreadsheet using Microsoft Excel®.

6 Calculation

The WAC 173-340-745 Standard Method C industrial soil cleanup levels are calculated using the methodology and equations presented 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. The hand calculations are provided in Figure 6-1.

7 Results/Conclusions

The calculated Standard Method C industrial soil cleanup levels based on the lower of the acceptable cancer risk level of 1×10^{-5} or a HQ of 1 are presented in Table 7-1. Standard Method C industrial soil screening levels based on the lower of the acceptable cancer risk level of 1×10^{-6} or a HQ of 0.1 are presented in Table 7-2. Each table provides calculated values for both noncarinogens and carcinogens as well as a final value, the final value is the lower of the two soil concentrations for analytes with both noncarcinogenic and carcinogenic effects.

8 References

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Tables

Table 4-1. **Summary of Reference Dose and Carcinogenic Potency Factors Used to Calculate WAC 173-340-745 Standard Method C Industrial Soil Cleanup Levels**

Chemical Abstracts Service Registry Number	Contaminant Name	Non-Carcinogen[a]		Carcinogenic Gastrointestinal Absorption Factor[c]	Carcinogen[a]	
		Oral Reference Dose (RfD) (mg/kg-day)	Reference[b]		Oral Cancer Potency Factor (CPF) $(mg/kg\text{-}day)^{-1}$	Reference[b]
630-20-6	1,1,1,2-Tetrachloroethane	0.03	I	1	0.026	I
71-55-6	1,1,1-Trichloroethane	2	I	--	--	--
79-34-5	1,1,2,2-Tetrachloroethane	0.02	I	1	0.2	I
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	30	I	--	--	--
79-00-5	1,1,2-Trichloroethane	0.004	I	1	0.057	I
92-52-4	1,1-Biphenyl	0.5	I	1	0.008	I
75-34-3	1,1-Dichloroethane	0.2	P	1	0.0057	C
75-35-4	1,1-Dichloroethene	0.05	I	--	--	--
57-14-7	1,1-Dimethylhydrazine	0.0001	X	--	--	--
96-18-4	1,2,3-Trichloropropane	0.004	I	1	30	I
95-94-3	1,2,4,5-Tetrachlorobenzene	0.0003	I	--	--	--
120-82-1	1,2,4-Trichlorobenzene	0.01	I	1	0.029	P
96-12-8	1,2-Dibromo-3-chloropropane	0.0002	P	1	0.8	P
106-93-4	1,2-Dibromoethane	0.009	I	1	2	I
95-50-1	1,2-Dichlorobenzene	0.09	I	--	--	--

Table 4-1. **Summary of Reference Dose and Carcinogenic Potency Factors Used to Calculate WAC 173-340-745 Standard Method C Industrial Soil Cleanup Levels**

Chemical Abstracts Service Registry Number	Contaminant Name	Non-Carcinogen[a]		Carcinogenic Gastrointestinal Absorption Factor[c]	Carcinogen[a]	
		Oral Reference Dose (RfD) (mg/kg-day)	Reference[b]		Oral Cancer Potency Factor (CPF) $(mg/kg\text{-}day)^{-1}$	Reference[b]
107-06-2	1,2-Dichloroethane	0.006	X	1	0.091	I
78-87-5	1,2-Dichloropropane	0.04	P	1	0.037	P
106-46-7	1,4-Dichlorobenzene	0.07	A	1	0.0054	C
100-25-4	1,4-Dinitrobenzene	0.0001	P	--	--	--
123-91-1	1,4-Dioxane	0.03	I	1	0.1	I
71-36-3	1-Butanol	0.1	I	--	--	--
93-65-2	2-(2-methyl-4-chlorophenoxy) propionic acid	0.001	I	--	--	--
39635-31-9	2,3,3',4,4',5,5'-Heptachlorobiphenyl	0.000023	WAC	0.6	3.9	WAC
69782-90-7	2,3,3',4,4',5'-Hexachlorobiphenyl	0.000023	WAC	0.6	3.9	WAC
38380-08-4	2,3,3',4,4',5-Hexachlorobiphenyl	0.000023	WAC	0.6	3.9	WAC
32598-14-4	2,3,3',4,4'-Pentachlorobiphenyl	0.000023	WAC	0.6	3.9	WAC
52663-72-6	2,3',4,4',5,5'-Hexachlorobiphenyl	0.000023	WAC	0.6	3.9	WAC
74472-37-0	2,3,4,4',5-Pentachlorobiphenyl	0.000023	WAC	0.6	3.9	WAC
31508-00-6	2,3',4,4',5-Pentachlorobiphenyl	0.000023	WAC	0.6	3.9	WAC
65510-44-3	2',3,4,4',5-Pentachlorobiphenyl	0.000023	WAC	0.6	3.9	WAC

Table 4-1. **Summary of Reference Dose and Carcinogenic Potency Factors Used to Calculate WAC 173-340-745 Standard Method C Industrial Soil Cleanup Levels**

Chemical Abstracts Service Registry Number	Contaminant Name	Non-Carcinogen[a]		Carcinogenic Gastrointestinal Absorption Factor[c]	Carcinogen[a]	
		Oral Reference Dose (RfD) (mg/kg-day)	Reference[b]		Oral Cancer Potency Factor (CPF) $(mg/kg\text{-}day)^{-1}$	Reference[b]
58-90-2	2,3,4,6-Tetrachlorophenol	0.03	I	--	--	--
93-76-5	2,4,5-T(2,4,5-Trichlorophenoxyacetic acid)	0.01	I	--	--	--
93-72-1	2,4,5-TP(2-(2,4,5-Trichlorophenoxy)propionic acid)Silvex	0.008	I	--	--	--
95-95-4	2,4,5-Trichlorophenol	0.1	I	--	--	--
88-06-2	2,4,6-Trichlorophenol	0.001	P	1	0.011	I
94-75-7	2,4-D(2,4-Dichlorophenoxyacetic acid)	0.01	I	--	--	--
94-82-6	2,4-DB(4-(2,4-Dichlorophenoxy)butanoic acid)	0.03	O	--	--	--
120-83-2	2,4-Dichlorophenol	0.003	I	--	--	--
105-67-9	2,4-Dimethylphenol	0.02	I	--	--	--
51-28-5	2,4-Dinitrophenol	0.002	I	--	--	--
121-14-2	2,4-Dinitrotoluene	0.002	I	1	0.31	C
606-20-2	2,6-Dinitrotoluene	0.0003	X	1	1.5	P
128-37-0	2,6-Bis (tert-butyl)-4-methylphenol	0.3	P	1	0.0036	P
53-96-3	2-Acetylaminofluorene	--	--	1	3.8	C
78-93-3	2-Butanone	0.6	I	--	--	--

Table 4-1. **Summary of Reference Dose and Carcinogenic Potency Factors Used to Calculate WAC 173-340-745 Standard Method C Industrial Soil Cleanup Levels**

Chemical Abstracts Service Registry Number	Contaminant Name	Non-Carcinogen[a]		Carcinogenic Gastrointestinal Absorption Factor[c]	Carcinogen[a]	
		Oral Reference Dose (RfD) (mg/kg-day)	Reference[b]		Oral Cancer Potency Factor (CPF) $(mg/kg\text{-}day)^{-1}$	Reference[b]
111-76-2	2-Butoxyethanol	0.1	I	--	--	--
107-20-0	2-Chloroacetaldehyde	--	--	1	0.27	X
91-58-7	2-Chloronaphthalene	0.08	I	--	--	--
95-57-8	2-Chlorophenol	0.005	I	--	--	--
591-78-6	2-Hexanone	0.005	I	--	--	--
94-74-6	2-Methyl-4 chlorophenoxyacetic acid	0.0005	I	--	--	--
91-57-6	2-Methylnaphthalene	0.004	I	--	--	--
95-48-7	2-Methylphenol (cresol, o-)	0.05	I	--	--	--
91-59-8	2-Naphthylamine	--	--	1	1.8	C
88-74-4	2-Nitroaniline	0.01	X	--	--	--
79-46-9	2-Nitropropane	--	--	--	--	--
67-63-0	2-propanol	2	P	--	--	--
32774-16-6	3,3',4,4',5,5'-Hexachlorobiphenyl	0.000000023	WAC	0.6	3900	WAC
57465-28-8	3,3',4,4',5-Pentachlorobiphenyl	0.000000007	WAC	0.6	13000	WAC
32598-13-3	3,3',4,4'-Tetrachlorobiphenyl	0.000007	WAC	0.6	13	WAC
91-94-1	3,3'-Dichlorobenzidine	--	--	1	0.45	I

Table 4-1. **Summary of Reference Dose and Carcinogenic Potency Factors Used to Calculate WAC 173-340-745 Standard Method C Industrial Soil Cleanup Levels**

Chemical Abstracts Service Registry Number	Contaminant Name	Non-Carcinogen[a]		Carcinogenic Gastrointestinal Absorption Factor[c]	Carcinogen[a]	
		Oral Reference Dose (RfD) (mg/kg-day)	Reference[b]		Oral Cancer Potency Factor (CPF) $(mg/kg\text{-}day)^{-1}$	Reference[b]
119-93-7	3,3'-Dimethylbenzidine	--	--	1	11	P
70362-50-4	3,4,4',5- Tetrachlorobiphenyl	0.0000023	WAC	0.6	39	WAC
56-49-5	3-Methylcholanthrene	--	--	1	22	C
108-39-4	3-Methylphenol (cresol, m-)	0.05	I	--	--	--
99-09-2	3-Nitroaniline	--	--	--	--	--
72-54-8	4,4'-DDD (Dichlorodiphenyldichloroethane)	--	--	1	0.24	I
72-55-9	4,4'-DDE (Dichlorodiphenyldichloroethylene)	--	--	1	0.34	I
50-29-3	4,4'-DDT (Dichlorodiphenyltrichloroethane)	0.0005	I	1	0.34	I
534-52-1	4,6-Dinitro-2-methylphenol	0.00008	X	--	--	--
1918-02-1	4-Amino-3,5,6-trichloropicolinic acid	0.07	I	--	--	--
92-67-1	4-Aminobiphenyl	--	--	1	21	C
59-50-7	4-Chloro-3-methylphenol	0.1	A	--	--	--
106-47-8	4-Chloroaniline	0.004	I	1	0.2	P
108-10-1	4-Methyl-2-pentanone	--	--	--	--	--
106-44-5	4-Methylphenol (cresol, p-)	0.1	A	--	--	--

Table 4-1. **Summary of Reference Dose and Carcinogenic Potency Factors Used to Calculate WAC 173-340-745 Standard Method C Industrial Soil Cleanup Levels**

Chemical Abstracts Service Registry Number	Contaminant Name	Non-Carcinogen[a]		Carcinogenic Gastrointestinal Absorption Factor[c]	Carcinogen[a]	
		Oral Reference Dose (RfD) (mg/kg-day)	Reference[b]		Oral Cancer Potency Factor (CPF) $(mg/kg\text{-}day)^{-1}$	Reference[b]
100-01-6	4-Nitroaniline	0.004	P	1	0.02	P
99-55-8	5-Nitro-o-toluidine	0.02	X	1	0.009	P
57-97-6	7,12-Dimethylbenz[a]anthracene	--	--	1	250	C
83-32-9	Acenaphthene	0.06	I	--	--	--
75-07-0	Acetaldehyde	--	--	--	--	--
67-64-1	Acetone	0.9	I	--	--	--
75-05-8	Acetonitrile	--	--	--	--	--
98-86-2	Acetophenone	0.1	I	--	--	--
107-02-8	Acrolein	0.0005	I	--	--	--
79-06-1	Acrylamide	0.002	I	1	0.5	I
107-13-1	Acrylonitrile	0.04	A	1	0.54	I
309-00-2	Aldrin	0.00003	I	1	17	I
107-05-1	Allyl chloride	--	--	1	0.021	C
319-84-6	Alpha-BHC	0.008	A	1	6.3	I
5103-71-9	Alpha-Chlordane	0.0005	I	1	0.35	I
7429-90-5	Aluminum	1	P	--	--	--

Table 4-1. **Summary of Reference Dose and Carcinogenic Potency Factors Used to Calculate WAC 173-340-745 Standard Method C Industrial Soil Cleanup Levels**

Chemical Abstracts Service Registry Number	Contaminant Name	Non-Carcinogen[a]		Carcinogenic Gastrointestinal Absorption Factor[c]	Carcinogen[a]	
		Oral Reference Dose (RfD) (mg/kg-day)	Reference[b]		Oral Cancer Potency Factor (CPF) $(mg/kg\text{-}day)^{-1}$	Reference[b]
62-53-3	Aniline	0.007	P	1	0.0057	I
120-12-7	Anthracene	0.3	I	--	--	--
7440-36-0	Antimony	0.0004	I	--	--	--
140-57-8	Aramite	0.05	H	1	0.025	I
12674-11-2	Aroclor-1016	0.00007	I	1	0.07	S
11104-28-2	Aroclor-1221	--	--	1	2	S
11141-16-5	Aroclor-1232	--	--	1	2	S
53469-21-9	Aroclor-1242	--	--	1	2	S
12672-29-6	Aroclor-1248	--	--	1	2	S
11097-69-1	Aroclor-1254	0.00002	I	1	2	S
11096-82-5	Aroclor-1260	--	--	1	2	S
7440-38-2	Arsenic	0.0003	I	1	1.5	I
103-33-3	Azobenzene	--	--	1	0.11	I
7440-39-3	Barium	0.2	I	--	--	--
71-43-2	Benzene	0.004	I	1	0.055	I
56-55-3	Benzo(a)anthracene	--	--	1	0.1	WAC

Table 4-1. **Summary of Reference Dose and Carcinogenic Potency Factors Used to Calculate WAC 173-340-745 Standard Method C Industrial Soil Cleanup Levels**

Chemical Abstracts Service Registry Number	Contaminant Name	Non-Carcinogen[a]		Carcinogenic Gastrointestinal Absorption Factor[c]	Carcinogen[a]	
		Oral Reference Dose (RfD) (mg/kg-day)	Reference[b]		Oral Cancer Potency Factor (CPF) $(mg/kg\text{-}day)^{-1}$	Reference[b]
50-32-8	Benzo(a)pyrene	0.0003	I	1	1	I
205-99-2	Benzo(b)fluoranthene	--	--	1	0.1	WAC
207-08-9	Benzo(k)fluoranthene	--	--	1	0.01	WAC
65-85-0	Benzoic acid	4	I	--	--	--
100-51-6	Benzyl alcohol	0.1	P	--	--	--
7440-41-7	Beryllium	0.002	I	--	--	--
319-85-7	beta-1,2,3,4,5,6-Hexachlorocyclohexane (beta-BHC)	--	--	1	1.8	I
108-60-1	Bis(2-chloro-1-methylethyl)ether	0.04	I	--	--	--
111-91-1	Bis(2-Chloroethoxy)methane	0.003	P	--	--	--
111-44-4	Bis(2-chloroethyl) ether	--	--	1	1.1	I
117-81-7	Bis(2-ethylhexyl) phthalate	0.02	I	1	0.014	I
80-05-7	Bisphenol A	0.05	I	--	--	--
7440-42-8	Boron	0.2	I	--	--	--
75-27-4	Bromodichloromethane	0.02	I	1	0.062	I
75-25-2	Bromoform	0.02	I	1	0.0079	I

Table 4-1. **Summary of Reference Dose and Carcinogenic Potency Factors Used to Calculate WAC 173-340-745 Standard Method C Industrial Soil Cleanup Levels**

Chemical Abstracts Service Registry Number	Contaminant Name	Non-Carcinogen[a]		Carcinogenic Gastrointestinal Absorption Factor[c]	Carcinogen[a]	
		Oral Reference Dose (RfD) (mg/kg-day)	Reference[b]		Oral Cancer Potency Factor (CPF) $(mg/kg\text{-}day)^{-1}$	Reference[b]
74-83-9	Bromomethane	0.0014	I	--	--	--
85-68-7	Butylbenzylphthalate	0.2	I	1	0.0019	P
7440-43-9	Cadmium (Diet)	0.001	I	--	--	--
86-74-8	Carbazole	--	--	--	--	--
75-15-0	Carbon disulfide	0.1	I	--	--	--
56-23-5	Carbon tetrachloride	0.004	I	1	0.07	I
110-80-5	Cellosolve Solvent	0.09	P	--	--	--
57-74-9	Chlordane	0.0005	I	1	0.35	I
108-90-7	Chlorobenzene	0.02	I	--	--	--
510-15-6	Chlorobenzilate	0.02	I	1	0.11	C
75-00-3	Chloroethane	--	--	--	--	--
67-66-3	Chloroform	0.01	I	1	0.031	C
74-87-3	Chloromethane	--	--	--	--	--
126-99-8	Chloroprene	0.02	H	--	--	--
7440-47-3	Chromium	1.5	I	--	--	--
218-01-9	Chrysene	--	--	1	0.001	WAC

Table 4-1. **Summary of Reference Dose and Carcinogenic Potency Factors Used to Calculate WAC 173-340-745 Standard Method C Industrial Soil Cleanup Levels**

Chemical Abstracts Service Registry Number	Contaminant Name	Non-Carcinogen[a]		Carcinogenic Gastrointestinal Absorption Factor[c]	Carcinogen[a]	
		Oral Reference Dose (RfD) (mg/kg-day)	Reference[b]		Oral Cancer Potency Factor (CPF) $(mg/kg\text{-}day)^{-1}$	Reference[b]
156-59-2	cis-1,2-Dichloroethylene	0.002	I	--	--	--
10061-01-5	cis-1,3-Dichloropropene	0.03	I	1	0.1	I
7440-48-4	Cobalt	0.0003	P	--	--	--
7440-50-8	Copper	0.04	H	--	--	--
544-92-3	Copper cyanide	0.005	I	--	--	--
57-12-5	Cyanide	0.0006	I	--	--	--
110-82-7	Cyclohexane	--	--	--	--	--
108-94-1	Cyclohexanone	5	I	--	--	--
75-99-0	Dalapon	0.03	I	--	--	--
2303-16-4	Diallate	--	--	1	0.061	H
53-70-3	Dibenz[a,h]anthracene	--	--	--	1	WAC
132-64-9	Dibenzofuran	0.001	X	--	--	--
124-48-1	Dibromochloromethane	0.02	I	1	0.084	I
74-95-3	Dibromomethane	--	--	--	--	--
1918-00-9	Dicamba	0.03	I	--	--	--
75-71-8	Dichlorodifluoromethane	0.2	I	--	--	--

Table 4-1. **Summary of Reference Dose and Carcinogenic Potency Factors Used to Calculate WAC 173-340-745 Standard Method C Industrial Soil Cleanup Levels**

Chemical Abstracts Service Registry Number	Contaminant Name	Non-Carcinogen[a]		Carcinogenic Gastrointestinal Absorption Factor[c]	Carcinogen[a]	
		Oral Reference Dose (RfD) (mg/kg-day)	Reference[b]		Oral Cancer Potency Factor (CPF) $(mg/kg\text{-}day)^{-1}$	Reference[b]
120-36-5	Dichloroprop	--	--	--	--	--
60-57-1	Dieldrin	0.00005	I	1	16	I
60-29-7	Diethyl ether	0.2	I	--	--	--
84-66-2	Diethylphthalate	0.8	I	--	--	--
60-51-5	Dimethoate	0.0022	O	--	--	--
131-11-3	Dimethyl phthalate	--	--	--	--	--
84-74-2	Di-n-butylphthalate	0.1	I	--	--	--
117-84-0	Di-n-octylphthalate	0.01	P	--	--	--
88-85-7	Dinoseb(2-secButyl-4,6-dinitrophenol)	0.001	I	--	--	--
122-39-4	Diphenylamine	0.1	O	--	--	--
298-04-4	Disulfoton	0.00004	I	--	--	--
959-98-8	Endosulfan I	0.006	I	--	--	--
33213-65-9	Endosulfan II	0.006	I	--	--	--
1031-07-8	Endosulfan sulfate	--	--	--	--	--
72-20-8	Endrin	0.0003	I	--	--	--
7421-93-4	Endrin Aldehyde	--	--	--	--	--

Table 4-1. **Summary of Reference Dose and Carcinogenic Potency Factors Used to Calculate WAC 173-340-745 Standard Method C Industrial Soil Cleanup Levels**

Chemical Abstracts Service Registry Number	Contaminant Name	Non-Carcinogen[a]		Carcinogenic Gastrointestinal Absorption Factor[c]	Carcinogen[a]	
		Oral Reference Dose (RfD) (mg/kg-day)	Reference[b]		Oral Cancer Potency Factor (CPF) $(mg/kg\text{-}day)^{-1}$	Reference[b]
53494-70-5	Endrin ketone	--	--	--	--	--
106-89-8	Epichlorohydrin	0.006	P	1	0.0099	I
64-17-5	Ethanol	--	--	--	--	--
107-21-1	Ethelyne glycol	2	I	--	--	--
141-78-6	Ethyl acetate	0.9	I	--	--	--
97-63-2	Ethyl methacrylate	--	--	--	--	--
100-41-4	Ethylbenzene	0.1	I	1	0.011	C
206-44-0	Fluoranthene	0.04	I	--	--	--
86-73-7	Fluorene	0.04	I	--	--	--
16984-48-8	Fluoride	0.06	I	--	--	--
50-00-0	Formaldehyde	0.2	I	--	--	--
64-18-6	Formic acid	0.9	P	--	--	--
98-01-1	Furfural	0.003	I	--	--	--
58-89-9	Gamma-BHC (Lindane)	0.0003	I	1	1.1	C
5566-34-7	gamma-Chlordane	0.0005	I	1	0.35	I
76-44-8	Heptachlor	0.0005	I	1	4.5	I

Table 4-1. **Summary of Reference Dose and Carcinogenic Potency Factors Used to Calculate WAC 173-340-745 Standard Method C Industrial Soil Cleanup Levels**

Chemical Abstracts Service Registry Number	Contaminant Name	Non-Carcinogen[a]		Carcinogenic Gastrointestinal Absorption Factor[c]	Carcinogen[a]	
		Oral Reference Dose (RfD) (mg/kg-day)	Reference[b]		Oral Cancer Potency Factor (CPF) $(mg/kg\text{-}day)^{-1}$	Reference[b]
1024-57-3	Heptachlor epoxide	0.000013	I	1	9.1	I
118-74-1	Hexachlorobenzene	0.0008	I	1	1.6	I
87-68-3	Hexachlorobutadiene	0.001	P	1	0.078	I
77-47-4	Hexachlorocyclopentadiene	0.006	I	--	--	--
67-72-1	Hexachloroethane	0.0007	I	1	0.04	I
70-30-4	Hexachlorophene	0.0003	I	--	--	--
110-54-3	Hexane	--	--	--	--	--
18540-29-9	Hexavalent Chromium	0.003	I	--	--	--
302-01-2	Hydrazine	--	--	1	3	I
7664-39-3	Hydrofluoric Acid	0.04	C	--	--	--
193-39-5	Indeno(1,2,3-cd)pyrene	--	--	1	0.1	WAC
7439-89-6	Iron	0.7	P	--	--	--
78-83-1	Isobutyl alcohol	0.3	I	--	--	--
78-59-1	Isophorone	0.2	I	1	0.00095	I
98-82-8	Isopropylbenzene	0.1	I	--	--	--
143-50-0	Kepone	0.0003	I	1	10	I

Table 4-1. **Summary of Reference Dose and Carcinogenic Potency Factors Used to Calculate WAC 173-340-745 Standard Method C Industrial Soil Cleanup Levels**

Chemical Abstracts Service Registry Number	Contaminant Name	Non-Carcinogen[a]		Carcinogenic Gastrointestinal Absorption Factor[c]	Carcinogen[a]	
		Oral Reference Dose (RfD) (mg/kg-day)	Reference[b]		Oral Cancer Potency Factor (CPF) $(mg/kg\text{-}day)^{-1}$	Reference[b]
7439-92-1	Lead	--	--	--	--	--
7439-93-2	Lithium	0.002	P	--	--	--
7439-95-4	Magnesium	--	--	--	--	--
7439-96-5	Manganese	0.14	I	--	--	--
99-65-0	m-Dinitrobenzene	0.0001	I	--	--	--
7439-97-6	Mercury (Mercuric chloride)	0.0003	I	--	--	--
126-98-7	Methacrylonitrile	0.0001	I	--	--	--
67-56-1	Methanol	2	I	--	--	--
72-43-5	Methoxychlor	0.005	I	--	--	--
60-34-4	Methylhydrazine	0.001	P	--	--	--
80-62-6	Methyl methacrylate	1.4	I	--	--	--
66-27-3	Methyl methanesulfonate	--	--	1	0.099	C
298-00-0	Methyl parathion	0.00025	I	--	--	--
75-09-2	Methylene chloride	0.006	I	1	0.002	I
7439-98-7	Molybdenum	0.005	I	--	--	--
108-38-3	m-Xylene	0.2	S	--	--	--

Table 4-1. **Summary of Reference Dose and Carcinogenic Potency Factors Used to Calculate WAC 173-340-745 Standard Method C Industrial Soil Cleanup Levels**

Chemical Abstracts Service Registry Number	Contaminant Name	Non-Carcinogen[a]		Carcinogenic Gastrointestinal Absorption Factor[c]	Carcinogen[a]	
		Oral Reference Dose (RfD) (mg/kg-day)	Reference[b]		Oral Cancer Potency Factor (CPF) $(mg/kg\text{-}day)^{-1}$	Reference[b]
91-20-3	Naphthalene	0.02	I	--	--	--
104-51-8	n-Butylbenzene	0.05	P	--	--	--
7440-02-0	Nickel	0.02	I	--	--	--
14797-55-8	Nitrate	7.1	--	--	--	--
14797-65-0	Nitrite	0.3	--	--	--	--
98-95-3	Nitrobenzene	0.002	I	--	--	--
NO3-N	Nitrogen in Nitrate	1.6	I	--	--	--
NO2-N	Nitrogen in Nitrite	0.1	I	--	--	--
NO2+NO3-N	Nitrogen in Nitrite and Nitrate	1.6		--	--	--
930-55-2	Nitrosopyrrolidine	--	--	11	2.1	I
55-18-5	n-Nitrosodiethylamine	--	--	1	150	I
62-75-9	n-Nitrosodimethylamine	0.000008	P	1	51	I
924-16-3	n-Nitrosodi-n-butylamine	--	--	1	5.4	I
621-64-7	n-Nitrosodi-n-dipropylamine	--	--	1	7	I
86-30-6	n-Nitrosodiphenylamine	--	--	1	0.0049	I
10595-95-6	n-Nitrosomethylethylamine	--	--	1	22	I

Table 4-1. **Summary of Reference Dose and Carcinogenic Potency Factors Used to Calculate WAC 173-340-745 Standard Method C Industrial Soil Cleanup Levels**

Chemical Abstracts Service Registry Number	Contaminant Name	Non-Carcinogen[a]		Carcinogenic Gastrointestinal Absorption Factor[c]	Carcinogen[a]	
		Oral Reference Dose (RfD) (mg/kg-day)	Reference[b]		Oral Cancer Potency Factor (CPF) $(mg/kg\text{-}day)^{-1}$	Reference[b]
59-89-2	n-Nitrosomorpholine	--	--	1	6.7	C
100-75-4	n-Nitrosopiperidine	--	--	1	9.4	C
95-53-4	o-Toluidine	--	--	1	0.016	P
95-47-6	o-Xylene	0.2	S	--	--	--
56-38-2	Parathion	0.006	H	--	--	--
60-11-7	p-Dimethylaminoazobenzene	--	--	1	4.6	C
100-00-5	p-Nitrochlorobenzene	0.0007	P	1	0.06	P
106-50-3	p-Phenylenediamine	0.001	X	--	--	--
106-49-0	p-Toluidine	0.004	X	1	0.03	P
106-42-3	p-Xylene	0.2	S	--	--	--
608-93-5	Pentachlorobenzene	0.0008	I	--	--	--
76-01-7	Pentachloroethane	--	--	1	0.09	P
82-68-8	Pentachloronitrobenzene (PCNB)	0.003	I	1	0.26	H
87-86-5	Pentachlorophenol	0.005	I	1	0.4	I
62-44-2	Phenacetin	--	--	1	0.0022	C
85-01-8	Phenanthrene	--	--	--	--	--

Table 4-1. **Summary of Reference Dose and Carcinogenic Potency Factors Used to Calculate WAC 173-340-745 Standard Method C Industrial Soil Cleanup Levels**

Chemical Abstracts Service Registry Number	Contaminant Name	Non-Carcinogen[a]		Carcinogenic Gastrointestinal Absorption Factor[c]	Carcinogen[a]	
		Oral Reference Dose (RfD) (mg/kg-day)	Reference[b]		Oral Cancer Potency Factor (CPF) $(mg/kg\text{-}day)^{-1}$	Reference[b]
108-95-2	Phenol	0.3	I	--	--	--
298-02-2	Phorate	0.0002	H	--	--	--
14265-44-2	Phosphate	--	--	--	--	--
7723-14-0	Phosphorus	--	I	--	--	--
PO4-P	Phosphorus in phosphate	--	--	--	--	--
7440-09-7	Potassium	--	--	--	--	--
151-50-8	Potassium cyanide	0.002	I	--	--	--
23950-58-5	Pronamide	0.075	I	--	--	--
107-19-7	Propargyl Alchol	0.002	I	--	--	--
129-00-0	Pyrene	0.03	I	--	--	--
110-86-1	Pyridine	0.001	I	--	--	--
94-59-7	Safrol	--	--	1	0.22	C
7782-49-2	Selenium	0.005	I	--	--	--
7440-21-3	Silicon	--	--	--	--	--
7440-22-4	Silver	0.005	I	--	--	--
7440-23-5	Sodium	--	--	--	--	--

Table 4-1. **Summary of Reference Dose and Carcinogenic Potency Factors Used to Calculate WAC 173-340-745 Standard Method C Industrial Soil Cleanup Levels**

Chemical Abstracts Service Registry Number	Contaminant Name	Non-Carcinogen[a]		Carcinogenic Gastrointestinal Absorption Factor[c]	Carcinogen[a]	
		Oral Reference Dose (RfD) (mg/kg-day)	Reference[b]		Oral Cancer Potency Factor (CPF) $(mg/kg\text{-}day)^{-1}$	Reference[b]
26628-22-8	Sodium azide	0.004	I	--	--	--
143-33-9	Sodium cyanide	0.001	I	--	--	--
7440-24-6	Strontium	0.6	I	--	--	--
100-42-5	Styrene	0.2	I	--	--	--
14808-79-8	Sulfate	--	--	--	--	--
18496-25-8	Sulfide	--	--	--	--	--
99-35-4	sym-Trinitrobenzene	0.03	I	--	--	--
127-18-4	Tetrachloroethene	0.006	I	1	0.0021	I
3689-24-5	Tetraethyl dithiopyrophosphate (Sulfotepp)	0.0005	I	--	--	--
109-99-9	Tetrahydrofuran	0.9	I	--	--	--
1314-32-5	Thallic oxide	0.00002	S	--	--	--
7440-28-0	Thallium	0.00001	X	--	--	--
7440-31-5	Tin	0.6	H	--	--	--
7440-32-6	Titanium	--	--	--	--	--
108-88-3	Toluene	0.08	I	--	--	--

Table 4-1. **Summary of Reference Dose and Carcinogenic Potency Factors Used to Calculate WAC 173-340-745 Standard Method C Industrial Soil Cleanup Levels**

Chemical Abstracts Service Registry Number	Contaminant Name	Non-Carcinogen[a]		Carcinogenic Gastrointestinal Absorption Factor[c]	Carcinogen[a]	
		Oral Reference Dose (RfD) (mg/kg-day)	Reference[b]		Oral Cancer Potency Factor (CPF) $(mg/kg\text{-}day)^{-1}$	Reference[b]
1319-77-3	Total cresols	0.1	A	--	--	--
TOTALPCB	Total PCBs	--	--	1	2	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	--	--	1	2	I
8001-35-2	Toxaphene	--	--	1	1.1	I
156-60-5	trans-1,2-Dichloroethylene	0.02	I	--	--	--
10061-02-6	trans-1,3-Dichloropropene	0.03	I	1	0.1	I
5103-74-2	trans-Chlordane	0.0005	I	1	0.35	I
126-73-8	Tributyl phosphate	0.01	P	1	0.009	P
79-01-6	Trichloroethene	0.0005	I	--	0.0464	Guidance

Table 4-1. **Summary of Reference Dose and Carcinogenic Potency Factors Used to Calculate WAC 173-340-745 Standard Method C Industrial Soil Cleanup Levels**

Chemical Abstracts Service Registry Number	Contaminant Name	Non-Carcinogen[a]		Carcinogenic Gastrointestinal Absorption Factor[c]	Carcinogen[a]	
		Oral Reference Dose (RfD) (mg/kg-day)	Reference[b]		Oral Cancer Potency Factor (CPF) $(mg/kg\text{-}day)^{-1}$	Reference[b]
75-69-4	Trichloromonofluoromethane	0.3	I	--	--	--
115-96-8	Tris-2-chloroethyl phosphate	0.007	P	1	0.02	P
7440-61-1	Uranium	0.003	I	--	--	--
7440-62-2	Vanadium	0.005	S	--	--	--
108-05-4	Vinyl acetate	1	H	--	--	--
75-01-4	Vinyl chloride	0.003	I	1	0.75	Guidance
1330-20-7	Xylenes (total)	0.2	I	--	--	--
7440-66-6	Zinc	0.3	I	--	--	--
7440-67-7	Zirconium	0.00008	X	--	--	--

Notes:

a. Source = EPA Regional Screening Levels website (EPA, 2017).

b. Reference key:

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

C = The California Environmental Protection Agency (CalEPA)

Guidance =

H = U.S. EPA Health Effects Assessment Summary Tables (HEAST)

I = U.S. EPA Integrated Risk Information System (IRIS)

O = U.S. EPA Office of Pesticide Programs (OPP) Human Health Benchmarks for Pesticides

P = U.S. EPA Provisional Peer Reviewed Toxicity Values (PPRTV)

Table 4-1. **Summary of Reference Dose and Carcinogenic Potency Factors Used to Calculate WAC 173-340-745 Standard Method C Industrial Soil Cleanup Levels**

Chemical Abstracts Service Registry Number	Contaminant Name	Non-Carcinogen[a]		Carcinogenic Gastrointestinal Absorption Factor[c]	Carcinogen[a]	
		Oral Reference Dose (RfD) (mg/kg-day)	Reference[b]		Oral Cancer Potency Factor (CPF) $(mg/kg\text{-}day)^{-1}$	Reference[b]

S = Special case chemical; basis for value discussed on EPA Regional Screening Levels website (EPA, 2017)

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 = Appendix PPRTV Screening Value. Method C industrial soil cleanup levels calculated with these oral reference dose and oral cancer potency factors are considerably more uncertain than PPRTV toxicity values.

c. WAC-173-340-740(3)(b)(B)(II) Equation 740-2: Carcinogenic Gastrointestinal absorption fraction = 0.6 for dioxins and/or furans; 1.0 for all other carcinogens.

1. The toxicity value listed for uranium is from IRIS. The minimum risk level of 0.0002 mg/kg-day published by ATSDR is currently the toxicity value published in the Regional Screening Level website (EPA, 2017). The ATSDR MRL value is not used to calculate the Method C soil cleanup level.

Table 7-1. Summary of WAC 173-340-745 Standard Method C Industrial Soil Direct Contact Cleanup Levels

Chemical Abstracts Service Registry Number	Contaminant Name	Method C Industrial Soil Cleanup Level		
		Carcinogen (Target Risk= 10^{-5}) (mg/kg)	Non-Carcinogen (HQ=1) (mg/kg)	Final (mg/kg)
630-20-6	1,1,1,2-Tetrachloroethane	5,048	105,000	5,048
71-55-6	1,1,1-Trichloroethane	--	7.00E+06	7.00E+06
79-34-5	1,1,2,2-Tetrachloroethane	656	70,000	656
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	--	1.05E+08	1.05E+08
92-52-4	1,1-Biphenyl	16,406	1.75E+06	16,406
79-00-5	1,1,2-Trichloroethane	2,303	14,000	2,303
75-34-3	1,1-Dichloroethane	23,026	700,000	23,026
57-14-7	1,1-Dimethylhydrazine	--	350[a]	350[a]
75-35-4	1,1-Dichloroethene	--	175,000	175,000
96-18-4	1,2,3-Trichloropropane	4.4	14,000	4.4
95-94-3	1,2,4,5-Tetrachlorobenzene	--	1,050	1,050
120-82-1	1,2,4-Trichlorobenzene	4,526	35,000	4,526
96-12-8	1,2-Dibromo-3-chloropropane	164	700	164
106-93-4	1,2-Dibromoethane	66	31,500	66
95-50-1	1,2-Dichlorobenzene	--	315,000	315,000

Table 7-1. Summary of WAC 173-340-745 Standard Method C Industrial Soil Direct Contact Cleanup Levels

Chemical Abstracts Service Registry Number	Contaminant Name	Method C Industrial Soil Cleanup Level		
		Carcinogen (Target Risk= 10^{-5}) (mg/kg)	Non-Carcinogen (HQ=1) (mg/kg)	Final (mg/kg)
107-06-2	1,2-Dichloroethane	1,442	21,000[a]	1,442
78-87-5	1,2-Dichloropropane	3,547	140,000	3,547
106-46-7	1,4-Dichlorobenzene	24,306	245,000	24,306
100-25-4	1,4-Dinitrobenzene	--	350	350
123-91-1	1,4-Dioxane	1,313	105,000	1,313
71-36-3	1-Butanol	--	350,000	350,000
93-65-2	2-(2-methyl-4-chlorophenoxy) propionic acid	--	3,500	3,500
39635-31-9	2,3,3',4,4',5,5'-Heptachlorobiphenyl	56	81	56
69782-90-7	2,3,3',4,4',5'-Hexachlorobiphenyl	56	81	56
38380-08-4	2,3,3',4,4',5-Hexachlorobiphenyl	56	81	56
32598-14-4	2,3,3',4,4'-Pentachlorobiphenyl	56	81	56
52663-72-6	2,3',4,4',5,5'-Hexachlorobiphenyl	56	81	56
74472-37-0	2,3,4,4',5-Pentachlorobiphenyl	56	81	56
31508-00-6	2,3',4,4',5-Pentachlorobiphenyl	56	81	56
65510-44-3	2',3,4,4',5-Pentachlorobiphenyl	56	81	56
58-90-2	2,3,4,6-Tetrachlorophenol	--	105,000	105,000

Table 7-1. Summary of WAC 173-340-745 Standard Method C Industrial Soil Direct Contact Cleanup Levels

Chemical Abstracts Service Registry Number	Contaminant Name	Method C Industrial Soil Cleanup Level		
		Carcinogen (Target Risk= 10^{-5}) (mg/kg)	Non-Carcinogen (HQ=1) (mg/kg)	Final (mg/kg)
93-76-5	2,4,5-T(2,4,5-Trichlorophenoxyacetic acid)	--	35,000	35,000
93-72-1	2,4,5-TP(2-(2,4,5-Trichlorophenoxy)propionic acid)Silvex	--	28,000	28,000
95-95-4	2,4,5-Trichlorophenol	--	350,000	350,000
88-06-2	2,4,6-Trichlorophenol	11,932	3,500	3,500
94-75-7	2,4-D(2,4-Dichlorophenoxyacetic acid)	--	35,000	35,000
94-82-6	2,4-DB(4-(2,4-Dichlorophenoxy)butanoic acid)	--	105,000	105,000
120-83-2	2,4-Dichlorophenol	--	10,500	10,500
105-67-9	2,4-Dimethylphenol	--	70,000	70,000
51-28-5	2,4-Dinitrophenol	--	7,000	7,000
121-14-2	2,4-Dinitrotoluene	423	7,000	423
606-20-2	2,6-Dinitrotoluene	88	1,050	88
128-37-0	2,6-Bis (tert-butyl)-4-methylphenol	36,458	1.05E+06	36,458
53-96-3	2-Acetylaminofluorene	35	--	35
78-93-3	2-Butanone	--	2.10E+06	2.10E+06
111-76-2	2-Butoxyethanol	--	350,000	350,000
107-20-0	2-Chloroacetaldehyde	486[a]	--	486[a]

Table 7-1. Summary of WAC 173-340-745 Standard Method C Industrial Soil Direct Contact Cleanup Levels

Chemical Abstracts Service Registry Number	Contaminant Name	Method C Industrial Soil Cleanup Level		
		Carcinogen (Target Risk= 10^{-5}) (mg/kg)	Non-Carcinogen (HQ=1) (mg/kg)	Final (mg/kg)
91-58-7	2-Chloronaphthalene	--	280,000	280,000
95-57-8	2-Chlorophenol	--	17,500	17,500
591-78-6	2-Hexanone	--	17,500	17,500
94-74-6	2-Methyl-4 chlorophenoxyacetic acid	--	1,750	1,750
91-57-6	2-Methylnaphthalene	--	14,000	14,000
95-48-7	2-Methylphenol (cresol, o-)	--	175,000	175,000
91-59-8	2-Naphthylamine	73	--	73
88-74-4	2-Nitroaniline	--	35,000[a]	35,000[a]
79-46-9	2-Nitropropane	--	--	--
67-63-0	2-propanol	--	7.00E+06	7.00E+06
32774-16-6	3,3',4,4',5,5'-Hexachlorobiphenyl	0.056	0.081	0.056
57465-28-8	3,3',4,4',5-Pentachlorobiphenyl	0.017	0.025	0.017
32598-13-3	3,3',4,4'-Tetrachlorobiphenyl	17	25	17
91-94-1	3,3'-Dichlorobenzidine	292	--	292
119-93-7	3,3'-Dimethylbenzidine	12	--	12
70362-50-4	3,4,4',5- Tetrachlorobiphenyl	5.6	8.1	5.6

Table 7-1. Summary of WAC 173-340-745 Standard Method C Industrial Soil Direct Contact Cleanup Levels

Chemical Abstracts Service Registry Number	Contaminant Name	Method C Industrial Soil Cleanup Level		
		Carcinogen (Target Risk= 10^{-5}) (mg/kg)	Non-Carcinogen (HQ=1) (mg/kg)	Final (mg/kg)
56-49-5	3-Methylcholanthrene	6.0	--	6.0
108-39-4	3-Methylphenol (cresol, m-)	--	175,000	175,000
99-09-2	3-Nitroaniline	--	--	--
72-54-8	4,4'-DDD (Dichlorodiphenyldichloroethane)	547	--	547
72-55-9	4,4'-DDE (Dichlorodiphenyldichloroethylene)	386	--	386
50-29-3	4,4'-DDT (Dichlorodiphenyltrichloroethane)	386	1,750	386
534-52-1	4,6-Dinitro-2-methylphenol	--	280[a]	280[a]
1918-02-1	4-Amino-3,5,6-trichloropicolinic acid	--	245,000	245,000
92-67-1	4-Aminobiphenyl	6.3	--	6.3
59-50-7	4-Chloro-3-methylphenol	--	350,000	350,000
106-47-8	4-Chloroaniline	656	14,000	656
108-10-1	4-Methyl-2-pentanone	--	--	--
106-44-5	4-Methylphenol (cresol, p-)	--	350,000	350,000
100-01-6	4-Nitroaniline	6,563	14,000	6,563
99-55-8	5-Nitro-o-toluidine	14,583	70,000[a]	14,583
57-97-6	7,12-Dimethylbenz[a]anthracene	0.53	--	0.53

Table 7-1. Summary of WAC 173-340-745 Standard Method C Industrial Soil Direct Contact Cleanup Levels

Chemical Abstracts Service Registry Number	Contaminant Name	Method C Industrial Soil Cleanup Level		
		Carcinogen (Target Risk= 10^{-5}) (mg/kg)	Non-Carcinogen (HQ=1) (mg/kg)	Final (mg/kg)
83-32-9	Acenaphthene	--	210,000	210,000
75-07-0	Acetaldehyde	--	--	--
67-64-1	Acetone	--	3.15E+06	3.15E+06
75-05-8	Acetonitrile	--	--	--
98-86-2	Acetophenone	--	350,000	350,000
107-02-8	Acrolein	--	1,750	1,750
79-06-1	Acrylamide	263	7,000	263
107-13-1	Acrylonitrile	243	140,000	243
309-00-2	Aldrin	7.7	105	7.7
107-05-1	Allyl chloride	6,250	--	6,250
319-84-6	Alpha-BHC	21	28,000	21
5103-71-9	Alpha-Chlordane	375	1,750	375
7429-90-5	Aluminum	--	3.50E+06	3.50E+06
62-53-3	Aniline	23,026	24,500	23,026
120-12-7	Anthracene	--	1.05E+06	1.05E+06
7440-36-0	Antimony	--	1,400	1,400

Table 7-1. Summary of WAC 173-340-745 Standard Method C Industrial Soil Direct Contact Cleanup Levels

Chemical Abstracts Service Registry Number	Contaminant Name	Method C Industrial Soil Cleanup Level		
		Carcinogen (Target Risk= 10^{-5}) (mg/kg)	Non-Carcinogen (HQ=1) (mg/kg)	Final (mg/kg)
140-57-8	Aramite	5,250	175,000	5,250
12674-11-2	Aroclor-1016	1,875	245	245
11104-28-2	Aroclor-1221	66	--	66
11141-16-5	Aroclor-1232	66	--	66
53469-21-9	Aroclor-1242	66	--	66
12672-29-6	Aroclor-1248	66	--	66
11097-69-1	Aroclor-1254	66	70	66
11096-82-5	Aroclor-1260	66	--	66
7440-38-2	Arsenic	88	1,050	88
103-33-3	Azobenzene	1,193	--	1,193
7440-39-3	Barium	--	700,000	700,000
71-43-2	Benzene	2,386	14,000	2,386
56-55-3	Benzo(a)anthracene	1,313	--	1,313
50-32-8	Benzo(a)pyrene	131	1,050	131
205-99-2	Benzo(b)fluoranthene	1,313	--	1,313
207-08-9	Benzo(k)fluoranthene	13,125	--	13,125

Table 7-1. Summary of WAC 173-340-745 Standard Method C Industrial Soil Direct Contact Cleanup Levels

Chemical Abstracts Service Registry Number	Contaminant Name	Method C Industrial Soil Cleanup Level		
		Carcinogen (Target Risk= 10^{-5}) (mg/kg)	Non-Carcinogen (HQ=1) (mg/kg)	Final (mg/kg)
65-85-0	Benzoic acid	--	1.40E+07	1.40E+07
100-51-6	Benzyl alcohol	--	350,000	350,000
7440-41-7	Beryllium	--	7,000	7,000
319-85-7	beta-1,2,3,4,5,6-Hexachlorocyclohexane (beta-BHC)	73	--	73
108-60-1	Bis(2-chloro-1-methylethyl)ether	--	140,000	140,000
111-91-1	Bis(2-Chloroethoxy)methane	--	10,500	10,500
111-44-4	Bis(2-chloroethyl) ether	119	--	119
117-81-7	Bis(2-ethylhexyl) phthalate	9,375	70,000	9,375
80-05-7	Bisphenol A	--	175,000	175,000
7440-42-8	Boron	--	700,000	700,000
75-27-4	Bromodichloromethane	2,117	70,000	2,117
75-25-2	Bromoform	16,614	70,000	16,614
74-83-9	Bromomethane	--	4,900	4,900
85-68-7	Butylbenzylphthalate	69,079	700,000	69,079
7440-43-9	Cadmium	--	3,500	3,500
86-74-8	Carbazole	--	--	--

Table 7-1. Summary of WAC 173-340-745 Standard Method C Industrial Soil Direct Contact Cleanup Levels

Chemical Abstracts Service Registry Number	Contaminant Name	Method C Industrial Soil Cleanup Level		
		Carcinogen (Target Risk= 10^{-5}) (mg/kg)	Non-Carcinogen (HQ=1) (mg/kg)	Final (mg/kg)
75-15-0	Carbon disulfide	--	350,000	350,000
56-23-5	Carbon tetrachloride	1,875	14,000	1,875
110-80-5	Cellosolve Solvent	--	315,000	315,000
57-74-9	Chlordane	375	1,750	375
108-90-7	Chlorobenzene	--	70,000	70,000
510-15-6	Chlorobenzilate	1,193	70,000	1,193
75-00-3	Chloroethane	--	--	--
67-66-3	Chloroform	4,234	35,000	4,234
74-87-3	Chloromethane	--	--	--
126-99-8	Chloroprene	--	70,000	70,000
7440-47-3	Chromium	--	5.25E+06	5.25E+06
218-01-9	Chrysene	131,250	--	131,250
156-59-2	cis-1,2-Dichloroethylene	--	7,000	7,000
10061-01-5	cis-1,3-Dichloropropene	1,313	105,000	1,313
7440-48-4	Cobalt	--	1,050	1,050
7440-50-8	Copper	--	140,000	140,000

Table 7-1. Summary of WAC 173-340-745 Standard Method C Industrial Soil Direct Contact Cleanup Levels

Chemical Abstracts Service Registry Number	Contaminant Name	Method C Industrial Soil Cleanup Level		
		Carcinogen (Target Risk= 10^{-5}) (mg/kg)	Non-Carcinogen (HQ=1) (mg/kg)	Final (mg/kg)
544-92-3	Copper cyanide	--	17,500	17,500
57-12-5	Cyanide	--	2,100	2,100
110-82-7	Cyclohexane	--	--	--
108-94-1	Cyclohexanone	--	1.75E+07	1.75E+07
75-99-0	Dalapon	--	105,000	105,000
2303-16-4	Diallate	2,152	--	2,152
53-70-3	Dibenz[a,h]anthracene	131	--	131
132-64-9	Dibenzofuran	--	3,500[a]	3,500[a]
124-48-1	Dibromochloromethane	1,563	70,000	1,563
74-95-3	Dibromomethane	--	--	--
1918-00-9	Dicamba	--	105,000	105,000
75-71-8	Dichlorodifluoromethane	--	700,000	700,000
120-36-5	Dichloroprop	--	--	--
60-57-1	Dieldrin	8.2	175	8.2
60-29-7	Diethyl ether	--	700,000	700,000
84-66-2	Diethylphthalate	--	2.80E+06	2.80E+06

Table 7-1. Summary of WAC 173-340-745 Standard Method C Industrial Soil Direct Contact Cleanup Levels

Chemical Abstracts Service Registry Number	Contaminant Name	Method C Industrial Soil Cleanup Level		
		Carcinogen (Target Risk= 10^{-5}) (mg/kg)	Non-Carcinogen (HQ=1) (mg/kg)	Final (mg/kg)
60-51-5	Dimethoate	--	7,700	7,700
131-11-3	Dimethyl phthalate	--	--	--
84-74-2	Di-n-butylphthalate	--	350,000	350,000
117-84-0	Di-n-octylphthalate	--	35,000	35,000
88-85-7	Dinoseb(2-secButyl-4,6-dinitrophenol)	--	3,500	3,500
122-39-4	Diphenylamine	--	350,000	350,000
298-04-4	Disulfoton	--	140	140
959-98-8	Endosulfan I	--	21,000	21,000
33213-65-9	Endosulfan II	--	21,000	21,000
1031-07-8	Endosulfan sulfate	--	--	--
72-20-8	Endrin	--	1,050	1,050
7421-93-4	Endrin Aldehyde	--	--	--
53494-70-5	Endrin ketone	--	--	--
106-89-8	Epichlorohydrin	13,258	21,000	13,258
64-17-5	Ethanol	--	--	--
107-21-1	Ethelyne glycol	--	7.00E+06	7.00E+06

Table 7-1. Summary of WAC 173-340-745 Standard Method C Industrial Soil Direct Contact Cleanup Levels

Chemical Abstracts Service Registry Number	Contaminant Name	Method C Industrial Soil Cleanup Level		
		Carcinogen (Target Risk= 10^{-5}) (mg/kg)	Non-Carcinogen (HQ=1) (mg/kg)	Final (mg/kg)
141-78-6	Ethyl acetate	--	3.15E+06	3.15E+06
97-63-2	Ethyl methacrylate	--	--	--
100-41-4	Ethylbenzene	11,932	350,000	11,932
206-44-0	Fluoranthene	--	140,000	140,000
86-73-7	Fluorene	--	140,000	140,000
16984-48-8	Fluoride	--	210,000	210,000
50-00-0	Formaldehyde	--	700,000	700,000
64-18-6	Formic acid	--	3.15E+06	3.15E+06
98-01-1	Furfural	--	10,500	10,500
58-89-9	Gamma-BHC (Lindane)	119	1,050	119
5566-34-7	gamma-Chlordane	375	1,750	375
76-44-8	Heptachlor	29	1,750	29
1024-57-3	Heptachlor epoxide	14	46	14
118-74-1	Hexachlorobenzene	82	2,800	82
87-68-3	Hexachlorobutadiene	1,683	3,500	1,683
77-47-4	Hexachlorocyclopentadiene	--	21,000	21,000

Table 7-1. Summary of WAC 173-340-745 Standard Method C Industrial Soil Direct Contact Cleanup Levels

Chemical Abstracts Service Registry Number	Contaminant Name	Method C Industrial Soil Cleanup Level		
		Carcinogen (Target Risk= 10^{-5}) (mg/kg)	Non-Carcinogen (HQ=1) (mg/kg)	Final (mg/kg)
67-72-1	Hexachloroethane	3,281	2,450	2,450
70-30-4	Hexachlorophene	--	1,050	1,050
110-54-3	Hexane	--	--	--
18540-29-9	Hexavalent Chromium	--	10,500	10,500
302-01-2	Hydrazine	44	--	44
7664-39-3	Hydrofluoric Acid	--	140,000	140,000
193-39-5	Indeno(1,2,3-cd)pyrene	1,313	--	1,313
7439-89-6	Iron	--	2.45E+06	2.45E+06
78-83-1	Isobutyl alcohol	--	1.05E+06	1.05E+06
78-59-1	Isophorone	138,158	700,000	138,158
98-82-8	Isopropylbenzene	--	350,000	350,000
143-50-0	Kepone	13	1,050	13
7439-92-1	Lead	--	--	--
7439-93-2	Lithium	--	7,000	7,000
7439-95-4	Magnesium	--	--	--
7439-96-5	Manganese	--	490,000	490,000

Table 7-1. Summary of WAC 173-340-745 Standard Method C Industrial Soil Direct Contact Cleanup Levels

Chemical Abstracts Service Registry Number	Contaminant Name	Method C Industrial Soil Cleanup Level		
		Carcinogen (Target Risk= 10^{-5}) (mg/kg)	Non-Carcinogen (HQ=1) (mg/kg)	Final (mg/kg)
99-65-0	m-Dinitrobenzene	--	350	350
7439-97-6	Mercury (Mercuric chloride)	--	1,050	1,050
126-98-7	Methacrylonitrile	--	350	350
67-56-1	Methanol	--	7.00E+06	7.00E+06
72-43-5	Methoxychlor	--	17,500	17,500
60-34-4	Methylhydrazine	--	3,500	3,500
80-62-6	Methyl methacrylate	--	4.90E+06	4.90E+06
66-27-3	Methyl methanesulfonate	1,326	--	1,326
298-00-0	Methyl parathion	--	875	875
75-09-2	Methylene chloride	65,625	21,000	21,000
7439-98-7	Molybdenum	--	17,500	17,500
108-38-3	m-Xylene	--	700,000	700,000
91-20-3	Naphthalene	--	70,000	70,000
104-51-8	n-Butylbenzene	--	175,000	175,000
7440-02-0	Nickel	--	70,000	70,000
14797-55-8	Nitrate	--	2.49E+07	2.49E+07

Table 7-1. Summary of WAC 173-340-745 Standard Method C Industrial Soil Direct Contact Cleanup Levels

Chemical Abstracts Service Registry Number	Contaminant Name	Method C Industrial Soil Cleanup Level		
		Carcinogen (Target Risk= 10^{-5}) (mg/kg)	Non-Carcinogen (HQ=1) (mg/kg)	Final (mg/kg)
14797-65-0	Nitrite	--	1.05E+06	1.05E+06
98-95-3	Nitrobenzene	--	7,000	7,000
NO3-N	Nitrogen in Nitrate	--	5.60E+06	5.60E+06
NO2-N	Nitrogen in Nitrite	--	350,000	350,000
NO2+NO3-N	Nitrogen in Nitrite and Nitrate	--	5.60E+06	5.60E+06
930-55-2	Nitrosopyrrolidine	63	--	63
55-18-5	n-Nitrosodiethylamine	0.88	--	0.88
62-75-9	n-Nitrosodimethylamine	2.6	28	2.6
924-16-3	n-Nitrosodi-n-butylamine	24	--	24
621-64-7	n-Nitrosodi-n-dipropylamine	19	--	19
86-30-6	n-Nitrosodiphenylamine	26,786	--	26,786
10595-95-6	n-Nitrosomethylethylamine	6.0	--	6.0
59-89-2	n-Nitrosomorpholine	20	--	20
100-75-4	n-Nitrosopiperidine	14	--	14
95-53-4	o-Toluidine	8,203	--	8,203
95-47-6	o-Xylene	--	700,000	700,000

Table 7-1. Summary of WAC 173-340-745 Standard Method C Industrial Soil Direct Contact Cleanup Levels

Chemical Abstracts Service Registry Number	Contaminant Name	Method C Industrial Soil Cleanup Level		
		Carcinogen (Target Risk= 10^{-5}) (mg/kg)	Non-Carcinogen (HQ=1) (mg/kg)	Final (mg/kg)
56-38-2	Parathion	--	21,000	21,000
60-11-7	p-Dimethylaminoazobenzene	29	--	29
100-00-5	p-Nitrochlorobenzene	2,188	2,450	2,188
106-50-3	p-Phenylenediamine	--	3,500[a]	3,500[a]
106-49-0	p-Toluidine	4,375	14,000[a]	4,375
106-42-3	p-Xylene	--	700,000	700,000
608-93-5	Pentachlorobenzene	--	2,800	2,800
76-01-7	Pentachloroethane	1,458	--	1,458
82-68-8	Pentachloronitrobenzene (PCNB)	505	10,500	505
87-86-5	Pentachlorophenol	328	17,500	328
62-44-2	Phenacetin	59,659	--	59,659
85-01-8	Phenanthrene	--	--	--
108-95-2	Phenol	--	1.05E+06	1.05E+06
298-02-2	Phorate	--	700	700
14265-44-2	Phosphate	--	--	--
7723-14-0	Phosphorus	--	--	--

Table 7-1. Summary of WAC 173-340-745 Standard Method C Industrial Soil Direct Contact Cleanup Levels

Chemical Abstracts Service Registry Number	Contaminant Name	Method C Industrial Soil Cleanup Level		
		Carcinogen (Target Risk= 10^{-5}) (mg/kg)	Non-Carcinogen (HQ=1) (mg/kg)	Final (mg/kg)
PO4-P	Phosphorus in phosphate	--	--	--
7440-09-7	Potassium	--	--	--
151-50-8	Potassium cyanide	--	7,000	7,000
23950-58-5	Pronamide	--	262,500	262,500
107-19-7	Propargyl Alchol	--	7,000	7,000
129-00-0	Pyrene	--	105,000	105,000
110-86-1	Pyridine	--	3,500	3,500
94-59-7	Safrol	597	--	597
7782-49-2	Selenium	--	17,500	17,500
7440-21-3	Silicon	--	--	--
7440-22-4	Silver	--	17,500	17,500
7440-23-5	Sodium	--	--	--
26628-22-8	Sodium azide	--	14,000	14,000
143-33-9	Sodium cyanide	--	3,500	3,500
7440-24-6	Strontium	--	2.10E+06	2.10E+06
100-42-5	Styrene	--	700,000	700,000

Table 7-1. Summary of WAC 173-340-745 Standard Method C Industrial Soil Direct Contact Cleanup Levels

Chemical Abstracts Service Registry Number	Contaminant Name	Method C Industrial Soil Cleanup Level		
		Carcinogen (Target Risk= 10^{-5}) (mg/kg)	Non-Carcinogen (HQ=1) (mg/kg)	Final (mg/kg)
14808-79-8	Sulfate	--	--	--
18496-25-8	Sulfide	--	--	--
99-35-4	sym-Trinitrobenzene	--	105,000	105,000
127-18-4	Tetrachloroethene	62,500	21,000	21,000
3689-24-5	Tetraethyl dithiopyrophosphate (Sulfotepp)	--	1,750	1,750
109-99-9	Tetrahydrofuran	--	3.15E+06	3.15E+06
7440-28-0	Thallium	--	35[a]	35[a]
1314-32-5	Thallic oxide	--	70	70
7440-31-5	Tin	--	2.10E+06	2.10E+06
7440-32-6	Titanium	--	--	--
108-88-3	Toluene	--	280,000	280,000
1319-77-3	Total cresols	--	350,000	350,000
TOTALPCB	Total PCBs	66	--	66
TPH	Total petroleum hydrocarbons	--	--	--
TPHDIESEL	Total petroleum hydrocarbons - diesel range	--	--	--
TPHGASOLINE	Total petroleum hydrocarbons - gasoline range	--	--	--

Table 7-1. Summary of WAC 173-340-745 Standard Method C Industrial Soil Direct Contact Cleanup Levels

Chemical Abstracts Service Registry Number	Contaminant Name	Method C Industrial Soil Cleanup Level		
		Carcinogen (Target Risk= 10^{-5}) (mg/kg)	Non-Carcinogen (HQ=1) (mg/kg)	Final (mg/kg)
TPHKEROSENE	Total petroleum hydrocarbons - kerosene range	--	--	--
TPH/OILH	Total petroleum hydrocarbons - motor oil (high boiling)	--	--	--
TOTALPCB	Total Polychlorinated Biphenyls	66	--	66
8001-35-2	Toxaphene	119	--	119
156-60-5	trans-1,2-Dichloroethylene	--	70,000	70,000
10061-02-6	trans-1,3-Dichloropropene	1,313	105,000	1,313
5103-74-2	trans-Chlordane	375	1,750	375
126-73-8	Tributyl phosphate	14,583	35,000	14,583
79-01-6	Trichloroethene	2,829	1,750	1,750
75-69-4	Trichloromonofluoromethane	--	1.05E+06	1.05E+06
115-96-8	Tris-2-chloroethyl phosphate	6,563	24,500	6,563
7440-61-1	Uranium	--	10,500	10,500
7440-62-2	Vanadium	--	17,500	17,500
108-05-4	Vinyl acetate	--	3.50E+06	3.50E+06
75-01-4	Vinyl chloride	175	10,500	175
1330-20-7	Xylenes (total)	--	700,000	700,000

Table 7-1. Summary of WAC 173-340-745 Standard Method C Industrial Soil Direct Contact Cleanup Levels

Chemical Abstracts Service Registry Number	Contaminant Name	Method C Industrial Soil Cleanup Level		
		Carcinogen (Target Risk= 10^{-5}) (mg/kg)	Non-Carcinogen (HQ=1) (mg/kg)	Final (mg/kg)
7440-66-6	Zinc	--	1.05E+06	1.05E+06
7440-67-7	Zirconium	--	280[a]	280[a]

The Method C industrial soil cleanup level associated with this analyte is a screening level because of the uncertainty associated with its associated toxicity value. A risk-management decision is required for its use as a final cleanup level in a Record of Decision or a Corrective Action Decision.

Table 7-2. Summary of WAC 173-340-745 Standard Method C Industrial Soil Direct Contact Screening Levels

Chemical Abstracts Service Registry Number	Contaminant Name	Method C Industrial Soil Cleanup Level		
		Carcinogen (Target Risk= 10^{-6}) (mg/kg)	Non-Carcinogen (HQ=0.1) (mg/kg)	Final (mg/kg)
630-20-6	1,1,1,2-Tetrachloroethane	505	10,500	505
71-55-6	1,1,1-Trichloroethane	--	700,000	700,000
79-34-5	1,1,2,2-Tetrachloroethane	66	7,000	66
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	--	1.05E+07	1.05E+07
79-00-5	1,1,2-Trichloroethane	230	1,400	230
92-52-4	1,1-Biphenyl	1,641	175,000	1,641
75-34-3	1,1-Dichloroethane	2,303	70,000	2,303
75-35-4	1,1-Dichloroethene	--	17,500	17,500
57-14-7	1,1-Dimethylhydrazine	--	35	35
96-18-4	1,2,3-Trichloropropane	0.44	1,400	0.44
95-94-3	1,2,4,5-Tetrachlorobenzene	--	105	105
120-82-1	1,2,4-Trichlorobenzene	453	3,500	453
96-12-8	1,2-Dibromo-3-chloropropane	16	70	16
106-93-4	1,2-Dibromoethane	6.6	3,150	6.6
95-50-1	1,2-Dichlorobenzene	--	31,500	31,500
107-06-2	1,2-Dichloroethane	144	2,100	144

Table 7-2. Summary of WAC 173-340-745 Standard Method C Industrial Soil Direct Contact Screening Levels

Chemical Abstracts Service Registry Number	Contaminant Name	Method C Industrial Soil Cleanup Level		
		Carcinogen (Target Risk= 10^{-6}) (mg/kg)	Non-Carcinogen (HQ=0.1) (mg/kg)	Final (mg/kg)
78-87-5	1,2-Dichloropropane	355	14,000	355
106-46-7	1,4-Dichlorobenzene	2,431	24,500	2,431
123-91-1	1,4-Dioxane	131	10,500	131
100-25-4	1,4-Dinitrobenzene	--	35	35
71-36-3	1-Butanol	--	35,000	35,000
93-65-2	2-(2-methyl-4-chlorophenoxy) propionic acid	--	350	350
39635-31-9	2,3,3',4,4',5,5'-Heptachlorobiphenyl	5.6	8.1	5.6
69782-90-7	2,3,3',4,4',5'-Hexachlorobiphenyl	5.6	8.1	5.6
38380-08-4	2,3,3',4,4',5-Hexachlorobiphenyl	5.6	8.1	5.6
32598-14-4	2,3,3',4,4'-Pentachlorobiphenyl	5.6	8.1	5.6
52663-72-6	2,3',4,4',5,5'-Hexachlorobiphenyl	5.6	8.1	5.6
74472-37-0	2,3,4,4',5-Pentachlorobiphenyl	5.6	8.1	5.6
31508-00-6	2,3',4,4',5-Pentachlorobiphenyl	5.6	8.1	5.6
65510-44-3	2',3,4,4',5-Pentachlorobiphenyl	5.6	8.1	5.6
58-90-2	2,3,4,6-Tetrachlorophenol	--	10,500	10,500
93-76-5	2,4,5-T(2,4,5-Trichlorophenoxyacetic acid)	--	3,500	3,500

Table 7-2. Summary of WAC 173-340-745 Standard Method C Industrial Soil Direct Contact Screening Levels

Chemical Abstracts Service Registry Number	Contaminant Name	Method C Industrial Soil Cleanup Level		
		Carcinogen (Target Risk= 10^{-6}) (mg/kg)	Non-Carcinogen (HQ=0.1) (mg/kg)	Final (mg/kg)
93-72-1	2,4,5-TP(2-(2,4,5-Trichlorophenoxy)propionic acid)Silvex	--	2,800	2,800
95-95-4	2,4,5-Trichlorophenol	--	35,000	35,000
88-06-2	2,4,6-Trichlorophenol	1,193	350	350
94-75-7	2,4-D(2,4-Dichlorophenoxyacetic acid)	--	3,500	3,500
94-82-6	2,4-DB(4-(2,4-Dichlorophenoxy)butanoic acid)	--	10,500	10,500
120-83-2	2,4-Dichlorophenol	--	1,050	1,050
105-67-9	2,4-Dimethylphenol	--	7,000	7,000
51-28-5	2,4-Dinitrophenol	--	700	700
121-14-2	2,4-Dinitrotoluene	42	700	42
606-20-2	2,6-Dinitrotoluene	8.8	105	8.8
128-37-0	2,6-Bis (tert-butyl)-4-methylphenol	3,646	105,000	3,646
53-96-3	2-Acetylaminofluorene	3.5	--	3.5
78-93-3	2-Butanone	--	210,000	210,000
111-76-2	2-Butoxyethanol	--	35,000	35,000
107-20-0	2-Chloroacetaldehyde	49	--	49
91-58-7	2-Chloronaphthalene	--	28,000	28,000

Table 7-2. Summary of WAC 173-340-745 Standard Method C Industrial Soil Direct Contact Screening Levels

Chemical Abstracts Service Registry Number	Contaminant Name	Method C Industrial Soil Cleanup Level		
		Carcinogen (Target Risk= 10^{-6}) (mg/kg)	Non-Carcinogen (HQ=0.1) (mg/kg)	Final (mg/kg)
95-57-8	2-Chlorophenol	--	1,750	1,750
591-78-6	2-Hexanone	--	1,750	1,750
94-74-6	2-Methyl-4 chlorophenoxyacetic acid	--	175	175
91-57-6	2-Methylnaphthalene	--	1,400	1,400
95-48-7	2-Methylphenol (cresol, o-)	--	17,500	17,500
91-59-8	2-Naphthylamine	7.3	--	7.3
88-74-4	2-Nitroaniline	--	3,500	3,500
79-46-9	2-Nitropropane	--	--	--
67-63-0	2-propanol	--	700,000	700,000
32774-16-6	3,3',4,4',5,5'-Hexachlorobiphenyl	0.0056	0.0081	0.0056
57465-28-8	3,3',4,4',5-Pentachlorobiphenyl	0.0017	0.0025	0.0017
32598-13-3	3,3',4,4'-Tetrachlorobiphenyl	1.7	2.5	1.7
91-94-1	3,3'-Dichlorobenzidine	29	--	29
119-93-7	3,3'-Dimethylbenzidine	1.2	--	1.2
70362-50-4	3,4,4',5- Tetrachlorobiphenyl	0.56	0.81	0.56
56-49-5	3-Methylcholanthrene	0.60	--	0.60

Table 7-2. Summary of WAC 173-340-745 Standard Method C Industrial Soil Direct Contact Screening Levels

Chemical Abstracts Service Registry Number	Contaminant Name	Method C Industrial Soil Cleanup Level		
		Carcinogen (Target Risk= 10^{-6}) (mg/kg)	Non-Carcinogen (HQ=0.1) (mg/kg)	Final (mg/kg)
108-39-4	3-Methylphenol (cresol, m-)	--	17,500	17,500
99-09-2	3-Nitroaniline	--	--	--
72-54-8	4,4'-DDD (Dichlorodiphenyldichloroethane)	55	--	55
72-55-9	4,4'-DDE (Dichlorodiphenyldichloroethylene)	39	--	39
50-29-3	4,4'-DDT (Dichlorodiphenyltrichloroethane)	39	175	39
534-52-1	4,6-Dinitro-2-methylphenol	--	28	28
1918-02-1	4-Amino-3,5,6-trichloropicolinic acid	--	24,500	24,500
92-67-1	4-Aminobiphenyl	0.63	--	0.63
59-50-7	4-Chloro-3-methylphenol	--	35,000	35,000
106-47-8	4-Chloroaniline	66	1,400	66
108-10-1	4-Methyl-2-pentanone	--	--	--
106-44-5	4-Methylphenol (cresol, p-)	--	35,000	35,000
100-01-6	4-Nitroaniline	656	1,400	656
99-55-8	5-Nitro-o-toluidine	1,458	7,000	1,458
57-97-6	7,12-Dimethylbenz[a]anthracene	0.053	--	0.053

Table 7-2. Summary of WAC 173-340-745 Standard Method C Industrial Soil Direct Contact Screening Levels

Chemical Abstracts Service Registry Number	Contaminant Name	Method C Industrial Soil Cleanup Level		
		Carcinogen (Target Risk= 10^{-6}) (mg/kg)	Non-Carcinogen (HQ=0.1) (mg/kg)	Final (mg/kg)
83-32-9	Acenaphthene	--	21,000	21,000
75-07-0	Acetaldehyde	--	--	--
67-64-1	Acetone	--	315,000	315,000
75-05-8	Acetonitrile	--	--	--
98-86-2	Acetophenone	--	35,000	35,000
107-02-8	Acrolein	--	175	175
79-06-1	Acrylamide	26	700	26
107-13-1	Acrylonitrile	24	14,000	24
309-00-2	Aldrin	0.77	11	0.77
107-05-1	Allyl chloride	625	--	625
319-84-6	Alpha-BHC	2.1	2,800	2.1
5103-71-9	Alpha-Chlordane	38	175	38
7429-90-5	Aluminum	--	350,000	350,000
62-53-3	Aniline	2,303	2,450	2,303
120-12-7	Anthracene	--	105,000	105,000
7440-36-0	Antimony	--	140	140

Table 7-2. Summary of WAC 173-340-745 Standard Method C Industrial Soil Direct Contact Screening Levels

Chemical Abstracts Service Registry Number	Contaminant Name	Method C Industrial Soil Cleanup Level		
		Carcinogen (Target Risk= 10^{-6}) (mg/kg)	Non-Carcinogen (HQ=0.1) (mg/kg)	Final (mg/kg)
140-57-8	Aramite	525	17,500	525
12674-11-2	Aroclor-1016	188	25	25
11104-28-2	Aroclor-1221	6.6	--	6.6
11141-16-5	Aroclor-1232	6.6	--	6.6
53469-21-9	Aroclor-1242	6.6	--	6.6
12672-29-6	Aroclor-1248	6.6	--	6.6
11097-69-1	Aroclor-1254	6.6	7.0	6.6
11096-82-5	Aroclor-1260	6.6	--	6.6
7440-38-2	Arsenic	8.8	105	8.8
103-33-3	Azobenzene	119	--	119
7440-39-3	Barium	--	70,000	70,000
71-43-2	Benzene	239	1,400	239
56-55-3	Benzo(a)anthracene	131	--	131
50-32-8	Benzo(a)pyrene	13	105	13
205-99-2	Benzo(b)fluoranthene	131	--	131
207-08-9	Benzo(k)fluoranthene	1,313	--	1,313

Table 7-2. Summary of WAC 173-340-745 Standard Method C Industrial Soil Direct Contact Screening Levels

Chemical Abstracts Service Registry Number	Contaminant Name	Method C Industrial Soil Cleanup Level		
		Carcinogen (Target Risk= 10^{-6}) (mg/kg)	Non-Carcinogen (HQ=0.1) (mg/kg)	Final (mg/kg)
65-85-0	Benzoic acid	--	1.40E+06	1.40E+06
100-51-6	Benzyl alcohol	--	35,000	35,000
7440-41-7	Beryllium	--	700	700
319-85-7	beta-1,2,3,4,5,6-Hexachlorocyclohexane (beta-BHC)	7.3	--	7.3
108-60-1	Bis(2-chloro-1-methylethyl)ether	--	14,000	14,000
111-91-1	Bis(2-Chloroethoxy)methane	--	1,050	1,050
111-44-4	Bis(2-chloroethyl) ether	12	--	12
117-81-7	Bis(2-ethylhexyl) phthalate	938	7,000	938
80-05-7	Bisphenol A	--	17,500	17,500
7440-42-8	Boron	--	70,000	70,000
75-27-4	Bromodichloromethane	212	7,000	212
75-25-2	Bromoform	1,661	7,000	1,661
74-83-9	Bromomethane	--	490	490
85-68-7	Butylbenzylphthalate	6,908	70,000	6,908
7440-43-9	Cadmium	--	350	350
86-74-8	Carbazole	--	--	--

Table 7-2. Summary of WAC 173-340-745 Standard Method C Industrial Soil Direct Contact Screening Levels

Chemical Abstracts Service Registry Number	Contaminant Name	Method C Industrial Soil Cleanup Level		
		Carcinogen (Target Risk= 10^{-6}) (mg/kg)	Non-Carcinogen (HQ=0.1) (mg/kg)	Final (mg/kg)
75-15-0	Carbon disulfide	--	35,000	35,000
56-23-5	Carbon tetrachloride	188	1,400	188
110-80-5	Cellosolve Solvent	--	31,500	31,500
57-74-9	Chlordane	38	175	38
108-90-7	Chlorobenzene	--	7,000	7,000
510-15-6	Chlorobenzilate	119	7,000	119
75-00-3	Chloroethane	--	--	--
67-66-3	Chloroform	423	3,500	423
74-87-3	Chloromethane	--	--	--
126-99-8	Chloroprene	--	7,000	7,000
7440-47-3	Chromium	--	525,000	525,000
218-01-9	Chrysene	13,125	--	13,125
156-59-2	cis-1,2-Dichloroethylene	--	700	700
10061-01-5	cis-1,3-Dichloropropene	131	10,500	131
7440-48-4	Cobalt	--	105	105
7440-50-8	Copper	--	14,000	14,000

Table 7-2. Summary of WAC 173-340-745 Standard Method C Industrial Soil Direct Contact Screening Levels

Chemical Abstracts Service Registry Number	Contaminant Name	Method C Industrial Soil Cleanup Level		
		Carcinogen (Target Risk= 10^{-6}) (mg/kg)	Non-Carcinogen (HQ=0.1) (mg/kg)	Final (mg/kg)
544-92-3	Copper cyanide	--	1,750	1,750
57-12-5	Cyanide	--	210	210
110-82-7	Cyclohexane	--	--	--
108-94-1	Cyclohexanone	--	1.75E+06	1.75E+06
75-99-0	Dalapon	--	10,500	10,500
2303-16-4	Diallate	215	--	215
53-70-3	Dibenz[a,h]anthracene	13	--	13
132-64-9	Dibenzofuran	--	350	350
124-48-1	Dibromochloromethane	156	7,000	156
74-95-3	Dibromomethane	--	--	--
1918-00-9	Dicamba	--	10,500	10,500
75-71-8	Dichlorodifluoromethane	--	70,000	70,000
120-36-5	Dichloroprop	--	--	--
60-57-1	Dieldrin	0.82	18	0.82
60-29-7	Diethyl ether	--	70,000	70,000
84-66-2	Diethylphthalate	--	280,000	280,000

Table 7-2. Summary of WAC 173-340-745 Standard Method C Industrial Soil Direct Contact Screening Levels

Chemical Abstracts Service Registry Number	Contaminant Name	Method C Industrial Soil Cleanup Level		
		Carcinogen (Target Risk= 10^{-6}) (mg/kg)	Non-Carcinogen (HQ=0.1) (mg/kg)	Final (mg/kg)
60-51-5	Dimethoate	--	770	770
131-11-3	Dimethyl phthalate	--	--	--
84-74-2	Di-n-butylphthalate	--	35,000	35,000
117-84-0	Di-n-octylphthalate	--	3,500	3,500
88-85-7	Dinoseb(2-secButyl-4,6-dinitrophenol)	--	350	350
122-39-4	Diphenylamine	--	35,000	35,000
298-04-4	Disulfoton	--	14	14
959-98-8	Endosulfan I	--	2,100	2,100
33213-65-9	Endosulfan II	--	2,100	2,100
1031-07-8	Endosulfan sulfate	--	--	--
72-20-8	Endrin	--	105	105
7421-93-4	Endrin Aldehyde	--	--	--
53494-70-5	Endrin ketone	--	--	--
106-89-8	Epichlorohydrin	1,326	2,100	1,326
64-17-5	Ethanol	--	--	--
107-21-1	Ethelyne glycol	--	700,000	700,000

Table 7-2. Summary of WAC 173-340-745 Standard Method C Industrial Soil Direct Contact Screening Levels

Chemical Abstracts Service Registry Number	Contaminant Name	Method C Industrial Soil Cleanup Level		
		Carcinogen (Target Risk= 10^{-6}) (mg/kg)	Non-Carcinogen (HQ=0.1) (mg/kg)	Final (mg/kg)
141-78-6	Ethyl acetate	--	315,000	315,000
97-63-2	Ethyl methacrylate	--	--	--
100-41-4	Ethylbenzene	1,193	35,000	1,193
206-44-0	Fluoranthene	--	14,000	14,000
86-73-7	Fluorene	--	14,000	14,000
16984-48-8	Fluoride	--	21,000	21,000
50-00-0	Formaldehyde	--	70,000	70,000
64-18-6	Formic acid	--	315,000	315,000
98-01-1	Furfural	--	1,050	1,050
58-89-9	Gamma-BHC (Lindane)	12	105	12
5566-34-7	gamma-Chlordane	38	175	38
76-44-8	Heptachlor	2.9	175	2.9
1024-57-3	Heptachlor epoxide	1.4	4.6	1.4
118-74-1	Hexachlorobenzene	8.2	280	8.2
87-68-3	Hexachlorobutadiene	168	350	168
77-47-4	Hexachlorocyclopentadiene	--	2,100	2,100

Table 7-2. Summary of WAC 173-340-745 Standard Method C Industrial Soil Direct Contact Screening Levels

Chemical Abstracts Service Registry Number	Contaminant Name	Method C Industrial Soil Cleanup Level		
		Carcinogen (Target Risk= 10^{-6}) (mg/kg)	Non-Carcinogen (HQ=0.1) (mg/kg)	Final (mg/kg)
67-72-1	Hexachloroethane	328	245	245
70-30-4	Hexachlorophene	--	105	105
110-54-3	Hexane	--	--	--
18540-29-9	Hexavalent Chromium	--	1,050	1,050
7664-39-3	Hydrofluoric Acid	--	14,000	14,000
302-01-2	Hydrazine	4.4	--	4.4
193-39-5	Indeno(1,2,3-cd)pyrene	131	--	131
7439-89-6	Iron	--	245,000	245,000
78-83-1	Isobutyl alcohol	--	105,000	105,000
78-59-1	Isophorone	13,816	70,000	13,816
98-82-8	Isopropylbenzene	--	35,000	35,000
143-50-0	Kepone	1.3	105	1.3
7439-92-1	Lead	--	--	--
7439-93-2	Lithium	--	700	700
7439-95-4	Magnesium	--	--	--
7439-96-5	Manganese	--	49,000	49,000

Table 7-2. Summary of WAC 173-340-745 Standard Method C Industrial Soil Direct Contact Screening Levels

Chemical Abstracts Service Registry Number	Contaminant Name	Method C Industrial Soil Cleanup Level		
		Carcinogen (Target Risk= 10^{-6}) (mg/kg)	Non-Carcinogen (HQ=0.1) (mg/kg)	Final (mg/kg)
99-65-0	m-Dinitrobenzene	--	35	35
7439-97-6	Mercury (elemental)1	--	--	--
7439-97-6	Mercury (Mercuric chloride)	--	105	105
126-98-7	Methacrylonitrile	--	35	35
67-56-1	Methanol	--	700,000	700,000
72-43-5	Methoxychlor	--	1,750	1,750
60-34-4	Methylhydrazine	--	350	350
80-62-6	Methyl methacrylate	--	490,000	490,000
66-27-3	Methyl methanesulfonate	133	--	133
298-00-0	Methyl parathion	--	88	88
75-09-2	Methylene chloride	6,563	2,100	2,100
7439-98-7	Molybdenum	--	1,750	1,750
108-38-3	m-Xylene	--	70,000	70,000
91-20-3	Naphthalene	--	7,000	7,000
104-51-8	n-Butylbenzene	--	17,500	17,500
7440-02-0	Nickel	--	7,000	7,000

Table 7-2. Summary of WAC 173-340-745 Standard Method C Industrial Soil Direct Contact Screening Levels

Chemical Abstracts Service Registry Number	Contaminant Name	Method C Industrial Soil Cleanup Level		
		Carcinogen (Target Risk= 10^{-6}) (mg/kg)	Non-Carcinogen (HQ=0.1) (mg/kg)	Final (mg/kg)
14797-55-8	Nitrate	--	2.49E+06	2.49E+06
14797-65-0	Nitrite	--	105,000	105,000
98-95-3	Nitrobenzene	--	700	700
NO3-N	Nitrogen in Nitrate	--	560,000	560,000
NO2-N	Nitrogen in Nitrite	--	35,000	35,000
NO2+NO3-N	Nitrogen in Nitrite and Nitrate	--	560,000	560,000
930-55-2	Nitrosopyrrolidine	6.3	--	6.3
55-18-5	n-Nitrosodiethylamine	0.088	--	0.088
62-75-9	n-Nitrosodimethylamine	0.26	2.8	0.26
924-16-3	n-Nitrosodi-n-butylamine	2.4	--	2.4
621-64-7	n-Nitrosodi-n-dipropylamine	1.9	--	1.9
86-30-6	n-Nitrosodiphenylamine	2,679	--	2,679
10595-95-6	n-Nitrosomethylethylamine	0.60	--	0.60
59-89-2	n-Nitrosomorpholine	2.0	--	2.0
100-75-4	n-Nitrosopiperidine	1.4	--	1.4
95-53-4	o-Toluidine	820	--	820

Table 7-2. Summary of WAC 173-340-745 Standard Method C Industrial Soil Direct Contact Screening Levels

Chemical Abstracts Service Registry Number	Contaminant Name	Method C Industrial Soil Cleanup Level		
		Carcinogen (Target Risk= 10^{-6}) (mg/kg)	Non-Carcinogen (HQ=0.1) (mg/kg)	Final (mg/kg)
95-47-6	o-Xylene	--	70,000	70,000
56-38-2	Parathion	--	2,100	2,100
60-11-7	p-Dimethylaminoazobenzene	2.9	--	2.9
100-00-5	p-Nitrochlorobenzene	219	245	219
106-42-3	p-Xylene	--	70,000	70,000
608-93-5	Pentachlorobenzene	--	280	280
76-01-7	Pentachloroethane	146	--	146
82-68-8	Pentachloronitrobenzene (PCNB)	50	1,050	50
87-86-5	Pentachlorophenol	33	1,750	33
62-44-2	Phenacetin	5,966	--	5,966
85-01-8	Phenanthrene	--	--	--
108-95-2	Phenol	--	105,000	105,000
298-02-2	Phorate	--	70	70
14265-44-2	Phosphate	--	--	--
7723-14-0	Phosphorus	--	--	--
PO4-P	Phosphorus in phosphate	--	--	--

Table 7-2. Summary of WAC 173-340-745 Standard Method C Industrial Soil Direct Contact Screening Levels

Chemical Abstracts Service Registry Number	Contaminant Name	Method C Industrial Soil Cleanup Level		
		Carcinogen (Target Risk= 10^{-6}) (mg/kg)	Non-Carcinogen (HQ=0.1) (mg/kg)	Final (mg/kg)
7440-09-7	Potassium	--	--	--
151-50-8	Potassium cyanide	--	700	700
106-50-3	p-Phenylenediamine	--	350	350
23950-58-5	Pronamide	--	26,250	26,250
107-19-7	Propargyl Alchol	--	700	700
106-49-0	p-Toluidine	438	1,400	438
129-00-0	Pyrene	--	10,500	10,500
110-86-1	Pyridine	--	350	350
94-59-7	Safrol	60	--	60
7782-49-2	Selenium	--	1,750	1,750
7440-21-3	Silicon	--	--	--
7440-22-4	Silver	--	1,750	1,750
7440-23-5	Sodium	--	--	--
26628-22-8	Sodium azide	--	1,400	1,400
143-33-9	Sodium cyanide	--	350	350
7440-24-6	Strontium	--	210,000	210,000

Table 7-2. Summary of WAC 173-340-745 Standard Method C Industrial Soil Direct Contact Screening Levels

Chemical Abstracts Service Registry Number	Contaminant Name	Method C Industrial Soil Cleanup Level		
		Carcinogen (Target Risk= 10^{-6}) (mg/kg)	Non-Carcinogen (HQ=0.1) (mg/kg)	Final (mg/kg)
100-42-5	Styrene	--	70,000	70,000
14808-79-8	Sulfate	--	--	--
18496-25-8	Sulfide	--	--	--
99-35-4	sym-Trinitrobenzene	--	10,500	10,500
127-18-4	Tetrachloroethene	6,250	2,100	2,100
3689-24-5	Tetraethyl dithiopyrophosphate (Sulfotepp)	--	175	175
109-99-9	Tetrahydrofuran	--	315,000	315,000
7440-28-0	Thallium	--	3.5	3.5
1314-32-5	Thallic oxide	--	7.0	7.0
7440-31-5	Tin	--	210,000	210,000
7440-32-6	Titanium	--	--	--
108-88-3	Toluene	--	28,000	28,000
1319-77-3	Total cresols	--	35,000	35,000
TOTALPCB	Total PCBs	6.6	--	6.6
TPH	Total petroleum hydrocarbons	--	--	--
TPHDIESEL	Total petroleum hydrocarbons - diesel range	--	--	--

Table 7-2. Summary of WAC 173-340-745 Standard Method C Industrial Soil Direct Contact Screening Levels

Chemical Abstracts Service Registry Number	Contaminant Name	Method C Industrial Soil Cleanup Level		
		Carcinogen (Target Risk= 10^{-6}) (mg/kg)	Non-Carcinogen (HQ=0.1) (mg/kg)	Final (mg/kg)
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	6.6	--	6.6
8001-35-2	Toxaphene	12	--	12
156-60-5	trans-1,2-Dichloroethylene	--	7,000	7,000
10061-02-6	trans-1,3-Dichloropropene	131	10,500	131
5103-74-2	trans-Chlordane	38	175	38
126-73-8	Tributyl phosphate	1,458	3,500	1,458
79-01-6	Trichloroethene	283	175	175
75-69-4	Trichloromonofluoromethane	--	105,000	105,000
115-96-8	Tris-2-chloroethyl phosphate	656	2,450	656
7440-61-1	Uranium	--	1,050	1,050
7440-62-2	Vanadium	--	1,750	1,750
108-05-4	Vinyl acetate	--	350,000	350,000
75-01-4	Vinyl chloride	18	1,050	18

Table 7-2. Summary of WAC 173-340-745 Standard Method C Industrial Soil Direct Contact Screening Levels

Chemical Abstracts Service Registry Number	Contaminant Name	Method C Industrial Soil Cleanup Level		
		Carcinogen (Target Risk= 10^{-6}) (mg/kg)	Non-Carcinogen (HQ=0.1) (mg/kg)	Final (mg/kg)
1330-20-7	Xylenes (total)	--	70,000	70,000
7440-66-6	Zinc	--	105,000	105,000
7440-67-7	Zirconium	--	28	28

Figures

Figure 6-1
HAND CALCULATIONS

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Method C Industrial Soil Cleanup Levels
Equation 745-1

Noncarcinogen

$$\text{Soil CUL} = \frac{RfD \cdot ABW \cdot UCF \cdot HQ \cdot AT}{SIR \cdot ABS \cdot EF \cdot ED}$$

1,1,1,2-Tetrachloroethane

$$\text{Soil CUL} = \frac{0.03\,\frac{mg}{kg\text{-}d} \cdot 70\,kg \cdot 1E{+}06\,\frac{mg}{kg} \cdot 1 \cdot 20\,yr}{50\,\frac{mg}{d} \cdot 1 \cdot 0.4 \cdot 20\,yr}$$

$$= 105{,}000\,\frac{mg}{kg}$$

Vinyl chloride

$$\text{Soil CUL} = \frac{0.003\,\frac{mg}{kg\text{-}d} \cdot 70\,kg \cdot 1E{+}06\,\frac{mg}{kg} \cdot 1 \cdot 20\,yr}{50\,\frac{mg}{d} \cdot 1 \cdot 0.4 \cdot 20\,yr}$$

$$= 10{,}500\,\frac{mg}{kg}$$

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Method C Industrial Soil CULs

Equation 745-2

Carcinogens

$$\text{Soil CUL} = \frac{\text{Risk} \cdot \text{ABW} \cdot \text{UCF} \cdot \text{AT}}{\text{CPF} \cdot \text{SIR} \cdot \text{AB1} \cdot \text{EF} \cdot \text{ED}}$$

1,1,1,2-tetrachloroethane

$$\text{Soil CUL} = \frac{1E\text{-}05 \cdot 70\,\text{Kg} \cdot 1E\text{+}06\,\frac{\text{mg}}{\text{Kg}} \cdot 75\,\text{yr}}{0.026\,\frac{\text{Kg-d}}{\text{mg}} \cdot 50\,\frac{\text{mg}}{\text{d}} \cdot 0.4 \cdot 20\,\text{yr}}$$

$$= 5{,}048\,\frac{\text{mg}}{\text{Kg}}$$

Vinyl Chloride

$$\text{Soil CUL} = \frac{1E\text{-}05 \cdot 70\,\text{Kg} \cdot 1E\text{+}06\,\frac{\text{mg}}{\text{Kg}} \cdot 75\,\text{yr}}{0.75\,\frac{\text{Kg-d}}{\text{mg}} \cdot 50\,\frac{\text{mg}}{\text{d}} \cdot 0.4 \cdot 20\,\text{yr}}$$

$$= 175\,\frac{\text{mg}}{\text{Kg}}$$