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Technical Report:

Development of Soil Cleanup Target Levels (SCTLs) for Chapter 62-777, F.A.C.

Prepared for the
Division of Waste Management
Florida Department of Environmental Protection

by

Christopher J. Saranko, Ph.D.
N. Christine Halmes, Ph.D.
J. Keith Tolson, M.S.
Stephen M. Roberts, Ph.D.

Center for Environmental & Human Toxicology
University of Florida
Gainesville, Florida

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I. Introduction

This document describes procedures for the development of risk-based cleanup target levels for chemicals of concern in soil based on direct human contact and migration of chemicals of concern from soil to groundwater. It provides equations that can be used for calculating these values and recommended sources for input values for these equations. In addition, it provides the information necessary for the derivation of the soil cleanup target levels (SCTLs) which are found in Chapter 62–777, F.A.C., and here as Table 2. For purposes of calculating SCTLs that are site-specific, procedures for identifying the necessary input values are also presented.

The approach in calculating SCTLs described here borrows from methodologies developed and described elsewhere, most notably the USEPA Soil Screening Guidance (USEPA, 1996a, 1996b) and the USEPA Region IX Preliminary Remediation Goals (USEPA, 1998). The rationale for selecting specific methods for use in Florida from these and other sources is discussed in this report. While an attempt has been made to provide a comprehensive description of methods for calculating Florida SCTLs, in some instances the reader is referred to the source document for a more detailed explanation.

SCTLs for direct human contact can be developed for a variety of exposure scenarios. Only two scenarios are presented in this report – exposure from residential and commercial/industrial land use – although SCTLs for other scenarios can also be calculated using this methodology. SCTLs based on either default or site-specific characteristics can be used as remediation goals.

It is important to note that the SCTL methods for direct human contact described in this report are based on protection of human health only. Soil contamination limits to protect non-human species or ecosystems are very much

dependent upon the site characteristics and species present and are therefore difficult to generalize. Under some circumstances, the SCTLs based on human health may not be protective of other species; for example, human health SCTLs for some metals exceed concentrations shown to produce phytotoxicity (USEPA, 1996b). It should also be recognized that the SCTL methodology described here is based on direct exposure, and does not consider intake and human health risk that may occur via indirect pathways such as uptake into plants and animals that are used as a food source.[1] Lastly, the SCTL methodology does not address issues such as objectionable odors and visible staining. It is possible that the human health SCTLs for some constituents, particularly those with relatively low toxicity and low mobility potential (such as TRPH) could result in staining, odors and/or nuisance conditions. As such, depending upon the setting and the management for a site, the SCTLs described here may not address all of the potential issues of concern.

II. Development of SCTLs Based on Direct Contact

A. Equations for calculating direct contact SCTLs

The equations for calculating SCTLs based on direct contact are shown in Figures 4 and 5. These equations are functionally equivalent to those used by USEPA Region IX in developing their preliminary remediation goals (USEPA, 1998). One equation is provided for calculating an SCTL based on non-cancer health effects and another for calculating an SCTL based on cancer risk, if appropriate (i.e., if the chemical is regarded as a potential carcinogen). It should be noted that for those chemicals that have both cancer and non-cancer health effects, the SCTL is based on the most sensitive endpoint. Both equations consider intake from ingestion of contaminated soil, dermal contact with the soil, and inhalation of

[1] Intake via food uptake is not regarded as a major exposure pathway for most contaminated sites. For special circumstances where individuals may make extensive use of crops or animals grown on contaminated soils, these SCTLs may not be appropriate.

chemicals of concern present in soil that have volatilized or have adhered to soil-derived particulates [dust]. The combined impact of exposure from all three routes[2] simultaneously is used to calculate the SCTL. For purposes of discussion, this is termed the *multi-route approach.*

In their Soil Screening Guidance (SSG), the USEPA has employed a somewhat different approach from the one used here. In the SSG, SSLs[3] for a chemical are calculated separately for ingestion and inhalation exposure, in what could be called a *route-specific approach.* In determining an SSL based on direct contact, the lower of the two values for a chemical would be selected. As a general rule, dermal intake is ignored unless there is evidence in the literature of substantial dermal absorption of the chemical (e.g., pentachlorophenol). In such instances, some adjustment of the SSL is made to account for this uptake.

The principal advantage of the multi-route approach is that it is easier to defend on conceptual grounds. In all but the most unusual circumstances, an individual exposed to contaminated soil will be exposed by all three routes simultaneously. The multi-route approach considers the risk or hazard from a chemical to that individual to be the sum of the risks or hazards from each of these exposure routes. The route-specific approach, in contrast, considers the risk or hazard posed by each route of exposure in isolation and makes the implicit assumption that risks or hazards from exposure to a chemical by multiple routes are unrelated, even if they involve the same target organ. Such an argument could be made if the toxicity posed by the chemical is route-dependent, i.e., is associated specifically and exclusively with a particular route of exposure. This situation is seldom the case. For the vast majority of chemicals, the toxicity upon which the

[2] In this context, *route* refers to route of entry into the body, such as through dermal contact or inhalation. Pathway refers to the means by which chemicals of concern in soil (or other environmental media) reach the body, such as volatilization into the air, direct contact with the skin, migration to groundwater that is used as a drinking water source, etc.
[3] The USEPA Soil Screening Guidance soil concentrations are defined as Soil Screening Levels (SSLs). The Florida soil values are defined as Soil Cleanup Target Levels (SCTLs).

SSL/SCTL is based is systemic in nature. That is, the reference doses and slope factors used to calculate the soil values are based on systemic toxicity endpoints, and a chemical reaching the target organ from any and all routes is likely to contribute to toxicity.[4] Under these circumstances it is difficult to consider the risks from the various routes of exposure to be less than additive.

From a practical standpoint, the difference between the values derived for a given chemical by the multi-route and route-specific approaches is relatively small, provided both ingestion and inhalation toxicity values are available and the risk from dermal exposure is small. In basing an SSL on only one route of exposure, and ignoring other routes, the route-specific approach will tend to underestimate exposure and risk. Assuming for the moment that risks from dermal exposure are negligible and that the lower of the ingestion and inhalation SSLs is selected, the maximum underestimation of risk would be by a factor of 2. This maximum underestimation would occur when ingestion and inhalation risks from a chemical in soil are equal. Under these circumstances, choosing either the ingestion or inhalation SSL as the value for that chemical will capture only 50% of the total risk. In situations where risk from soil contamination is dominated by one exposure route – ingestion, for example – ignoring other routes has little effect on risk, and the error introduced into health-based soil target level development by the route-specific approach is minimal. In this situation, the multi-route and route-specific approaches should yield nearly identical health-based soil target levels.

Despite this small theoretical difference in soil levels between the multi-route and the route-specific approaches, the route-specific approach could conceivably result in compatibility problems with baseline risk assessments. In baseline risk

[4] The *amount* of chemical reaching the target organ can be affected by the route of entry through physiological processes such as extent of local vascularization, diffusional barriers, presence or absence of transport mechanisms, pre-systemic elimination, and distribution. Such differences can be taken into account through estimation of relative systemic bioavailability from different routes.

assessments, the hazard index for a chemical is calculated from the sum of the hazard quotients for each of the exposure routes. When a soil target level is based on exposure from only one of those routes, it can provide a different indication of hazard potential. To illustrate the potential problem, suppose a site has Chemical A in the soil at a concentration just below a soil target level developed using a route-specific approach. Because the concentration of Chemical A is below the target level, the risk assessor for the site might choose to drop it from the baseline risk assessment. If it is retained, however, its hazard index could be as high as 2 (based on the discussion in the preceding paragraph). Any value greater than 1 signals a possible non-cancer health problem. In this example, the use of a route-specific soil target level can make possible the elimination from a baseline risk assessment of a chemical that would otherwise be flagged as posing a potentially unacceptable health risk. This inconsistency cannot occur for soil target levels developed using the multi-route approach since, like baseline risk assessments, they are based on risks summed from all relevant routes.

The multi-route approach does not preclude the development of soil target levels based on route-specific toxicity. For chemicals with toxicities unique and specific to certain routes of administration, the analysis may default to a route-specific approach. Perhaps the best example of this situation is toxicity resulting strictly from local effects at the site of contact (e.g., skin, gastrointestinal tract, or lungs). In this case, chemical exposure by other routes would probably not contribute to this toxicity, and risks for individual routes arguably should not be summed. In these instances, while the multi-route approach forces all routes to be considered, it results in a route-specifically determined soil target level. In order to derive a route-specific soil target level, the equations presented in Figures 4 and 5 can be modified by deleting equation components for all but the relevant exposure route (e.g., delete the dermal and inhalation equation components when developing a soil target level based solely on ingestion). In many cases it can be difficult to determine whether or not a toxicity value is route-specific. In the absence of

definitive information, one approach is to infer route specificity when the target organ is the portal of entry for the administered dose (i.e., the GI tract in the case of ingestion and the pulmonary tract in the case of inhalation) in the study providing the toxicity information. While no doubt imperfect, this approach allows route specificity to be addressed in soil target level development for a broad range of chemicals.

Unlike the SSG, the approach presented here explicitly includes dermal exposure as a contributor to risk and a component of the SCTL for direct contact with soil. Using default assumptions regarding the absorption of chemicals in soil through the skin, the contribution of this route to risk and to the SCTL for most chemicals is very small. This observation is consistent with the generally held notion that dermal absorption of chemicals of concern present in soil is a minor exposure route for all but a few chemicals. Despite the typically small contribution of dermal exposure, it is included in the SCTL equations for two reasons: 1) so that the equations can be considered complete with respect to potential exposure routes; and 2) from a practical perspective, so that a mechanism is in place to address those chemicals for which dermal absorption truly represents a significant exposure route.

The inhalation component of both equations (Figures 4 and 5) includes intake from airborne concentrations of chemicals of concern resulting from volatilization as well as airborne dusts derived from contaminated soils. As noted in the SSG, inhalation of soil-derived particulates is a significant contributor to risk in only a few instances, such as the risk of cancer from hexavalent chromium. Volatilization is an issue only for chemicals with the appropriate physical/chemical properties. In response to this fact, when developing their SSLs the SSG evaluates separately the particulate inhalation of non-volatile inorganics in surface soil and volatilization for subsurface chemicals of concern. This approach requires the use of different equations for different chemicals, depending upon their classification or

grouping. Rather than develop multiple equations, the approach taken in this report is to use a single equation each for cancer and non-cancer health effects, with the influence of physical/chemical properties on inhalation exposure handled through the input values selected for use in the equation rather than through changes in the equation itself. The inhalation component for volatilization does not take into account volatilization from subsurface soil into structures through cracks in building foundations. If the possibility exists for this route of exposure, then potential volatilization into buildings should be assessed using models such as that developed by Johnson and Ettinger (1991).

B. Input values for direct exposure

Risk or hazard. When calculating an SCTL for direct exposure, the target risk or hazard must be specified. In the examples included in this report, SCTLs are calculated to correspond to an excess cancer risk of 10^{-6} and a hazard index of 1. When selecting the target risk or hazard for SCTL development, it must be kept in mind that this is the accepted incremental excess risk per chemical, and not necessarily the accepted increase in risk to the individual. For many (perhaps most) sites, exposure is to more than one chemical, and the overall risk to the individual posed by contamination at the site will be some composite of the individual chemical risks. SCTLs for generic application cannot be developed based on total target risk to the exposed individual, since this risk will vary depending upon the number and type (i.e., carcinogenic versus non-carcinogenic) of chemicals present at specific sites. However, SCTLs based on total target risk to the individual can be developed on a site-specific basis using methods described in the SSG Section 2.5.3 (USEPA, 1996a). [For more discussion of risks from multiple chemicals of concern, see Section II E.]

Virtually all carcinogenic chemicals are also capable of producing non-cancer health effects. At target cancer risks typically employed by regulatory agencies,

SCTLs based on carcinogenicity are usually lower than SCTLs based on non-cancer health effects for the same chemical. This is not always the case, however. For example, the residential SCTL for the carcinogen cadmium is based on non-cancer effects because it is lower than the SCTL based on carcinogenicity. Therefore, when developing SCTLs it is important to consider both carcinogenic and non-carcinogenic effects to ensure that the SCTL for a given chemical is protective for both kinds of toxicity.

Exposure parameters. Most sites can be evaluated using SCTLs based on either of two basic land uses – residential and industrial/commercial. In the case of residential land use, potentially exposed individuals include both children and adults. For industrial/commercial land use, only adult exposure to contaminated soil is assumed to exist.[5]

Children are assumed to experience the greatest daily exposure to soil under residential land use scenarios. When risk is a function of the daily intake rate of a chemical of concern (as in the evaluation of non-cancer health effects), SCTLs must be based on childhood exposure assumptions in order to be protective. When risk is a function of cumulative exposure (as in the evaluation of cancer risk), the exposure period may cover time spent both as a child and as an adult for the residential scenario. Physiological parameters such as body weight, surface area, and inhalation rate of course change with age. Other exposure parameters such as soil ingestion rate are also age-dependent. In this situation, time-weighted average values reflecting both childhood and adult exposures must be used in calculating SCTLs for residential land use. In this report, the individual exposed both as a child and as an adult is termed the *aggregate resident.*

[5] For commercial uses involving significant regular contact by children, such as a school or daycare, residential rather than industrial/commercial SCTLs would be applicable.

For generic SCTLs (i.e., SCTLs applicable and protective for a broad range of sites), default exposure assumptions are available from the USEPA for both residential and commercial/industrial land uses. These are listed in Table 3. Some input parameters for the aggregate resident, such as inhalation rate and exposed dermal surface area, are not readily available from the USEPA and had to be developed from USEPA data sources. The values calculated for these parameters are also listed in Table 6, and the method of derivation is described in Appendix A.

In the case of the soil ingestion rate for the aggregate resident, the USEPA uses an age-adjusted soil ingestion rate of 114 mg-yr/kg-d in their SSG. This value is based on a 30-year exposure period being divided into 6 years of consumption of 200 mg of soil per day at a body weight of 15 kg, followed by 24 years of consumption of 100 mg of soil per day at a body weight of 70 kg (see USEPA, 1996b, for more information on the calculation of this value). While there is logic in this method of calculation, there is a potential problem in using this approach along with cancer slope factors in developing SCTLs based on carcinogenicity. Specifically, the problem involves the way the body weight is used in the averaging process. When cancer slope factors are developed, the typical approach in determining dose is to use an average intake rate of the chemical divided by an average body weight over the exposure period, usually a lifetime in the case of rodent bioassays. To be strictly comparable, a similar approach should be used in the development of the aggregate resident (time-weighted average) soil ingestion rate for use in calculating SCTLs. That is, a time-weighted average soil ingestion rate is calculated (e.g., 120 mg/day, based on 6 years at 200 mg/day and 24 years at 100 mg/day) and is then divided by a time-weighted average body weight (e.g., 59 kg, based on 6 years at 15 kg plus 24 years at 70 kg divided by an exposure duration of 30 years) to yield a time-weighted average soil ingestion rate, in mg soil/kg body weight/day. Aggregate resident values derived using this approach are employed in the calculation of residential SCTLs based on carcinogenicity. These values are listed in Table 3. The practical implications of this difference in

time-weighted averaging is that, all other factors being equal, the SCTLs derived based on carcinogenicity are about two-fold higher than those calculated using the SSG approach (e.g., the USEPA SSL for arsenic based on direct exposure is 0.4 mg/kg whereas the residential Florida SCTL for arsenic is 0.8 mg/kg).

One of the exposure variables, the particulate emission factor (PEF), is used to address intake from inhalation of contaminated soil-derived particulates. This value is a function both of site and local climatic conditions. The formula for calculating a PEF value is taken from the SSG (USEPA, 1996a) and appears in Figure 6. In calculating a PEF for Florida sites, default parameters from the SSG were used except for the Q/C term. The SSG selected as default, a Q/C for 0.5 acres of contaminated soil in Los Angeles, CA. In order to make the default PEF more relevant to Florida climatic conditions, a Q/C for 0.5 acres in Miami[6] is used instead.

Another input parameter used to assess the soil-to-air pathway of exposure is the volatilization factor (VF). This term is used to define the relationship between the concentration of the chemical of concern in soil and the flux of the volatilized chemical of concern to air. The VF is calculated using an equation from the SSG as shown in Figure 7. Parameters related to characteristics of both the chemical and the soil are used in the calculation of a VF. For the purposes of establishing default SCTLs, default soil characteristics specified in the SSG have been adopted, although it is recognized that the relevant characteristics can vary widely in Florida soils. As discussed above, a Q/C for Miami is used rather than the default Q/C from the SSG, which is based on meteorological conditions in Southern California.

The default exposure assumptions identified in Table 3 are intended to be

[6] The only city in Florida for which a modeled Q/C value is presented in the SSG.

health protective under circumstances of chronic exposure. Site-specific conditions may restrict exposure to such an extent that the default assumptions are not valid, and the desired target risk goals can be achieved with higher SCTLs. On the other hand, there may be situations in which exposure exceeds the default assumptions employed in developing generic SCTLs, e.g., workers with extensive soil contact and opportunity for exposure, such as construction workers involved in excavation, or children with soil pica. For these sites, the SCTLs may not be sufficiently protective. Whenever generic SCTLs are used for site evaluation, it is important to verify, to the extent possible, that the default assumptions upon which they are based are neither greatly above nor below actual present and future exposure conditions. Approaches for developing site-specific exposure assumptions, when necessary, are discussed in Section II C, below.

Physical/chemical parameters. The equations for the calculation of SCTLs for direct contact require the input of several chemical-specific values. These values, which include the organic carbon normalized soil-water partition coefficient for organic compounds (K_{oc}), Henry's Law constant (HLC), diffusivity in air (D_i), and diffusivity in water (D_w), are a function of the physical/chemical properties of each chemical of concern. In some cases, it may be necessary to calculate these values when published values do not exist. In these cases, additional physical/chemical values such as the density (d), water solubility (S) or the adsorption coefficient (K) are needed. In addition, the physical state of a chemical at ambient soil temperatures is an important parameter when determining the soil saturation limit (Csat) for that chemical (see Section II D below). The melting point (MP) is needed for this purpose. There are many sources for physical/chemical parameter values, but unfortunately the values listed in various sources can differ dramatically. In order to foster consistency in the development of SCTLs, it is important to have a designated hierarchy of sources for the selection of physical/chemical values.

In agreement with the SSG, chemical-specific values for MP[7], d, S, and HLC are preferentially selected from the *Superfund Chemical Data Matrix* (SCDM) (EPA/540/R-96/028). The SCDM is a database that can be accessed and downloaded via the internet. The SCDM database is composed of information selected from specified literature sources or other databases, and calculated values. The SCDM then ranks those values that reasonably apply to a hazardous substance and reports a single value for each of the physical/chemical parameters. Values should be taken directly from the SCDM source tables rather than from the user interface because the source tables list several of the parameters to greater precision. The primary source for K_{oc} values is the SCDM. Secondarily, K_{oc} values are calculated from K_d values in the SCDM according to equation (3) below. When data for these parameters are unavailable from the SCDM, the Hazardous Substance Data Bank (HSDB)[8], ATSDR *Toxicological Profiles*, or other reference texts (in that order of preference) are used. If data for d or HLC are not available from any of these sources, these values can be calculated using equations (1) and (2) below.

The primary source of diffusivity values is the CHEMDAT 8 database (EPA/453/C-94/080B). If diffusivity values are not provided in the CHEMDAT 8 database, they can be calculated using equations (4) and (5) below taken from the literature accompanying the database.

To summarize, the following is the list of sources (in order of preference) for the chemical/physical parameters used in the development of the SCTLs.

<u>For HLC, d, S, and MP</u>

1. The Superfund Chemical Data Matrix (SCDM)
2. The Hazardous Substances Data Bank (HSDB)

[7] MP was not available for all chemicals. If a specific MP could not be found in any of the reference sources, but a source listed it as a liquid, a default MP of –9.99 °C was assigned.
[8] For some chemicals, the HSDB reports several values for one or more of the physical/chemical parameters (e.g. S, K_{oc}, MP). Rather than choosing a single value from the range of reported values, a geometric mean was calculated from all the values. This is noted in Table 4 (Chemical Specific Parameters) with the notation "HSDB Geomean."

3. The Agency for Toxic Substances and Disease Registry's *Toxicological Profiles* (ATSDR)
4. Reference texts (e.g., CRC Handbook of Chemistry and Physics, 1994; Handbook of Environmental Data on Organic Chemicals, 1996; Handbook of Environmental Fate and Exposure Data for Organic Chemicals, Volumes. I-V, 1989-1997; Handbook of Physical Properties of Organic Chemicals, 1997; Illustrated Handbook of Physical Chemical Properties and Environmental Fate for Organic Chemicals, Volumes I-V, 1992-1997)
5. Values calculated using equations from reference texts

For density (d):

$$d = \frac{MW}{5\sum_{i} n_i \bullet v_{a,i}} \qquad (1)$$

where, MW = molecular weight of chemical (g/mol)
n_i = number of atoms i in a molecule
$v_{a,i}$ = relative volume of atom i (cm^3/mol)

source: Chemical Property Estimation, 1998.

For Henry's Law Constant (HLC):

$$HLC = \frac{VP \times MW}{S} \qquad (2)$$

where, MW = molecular weight of chemical (g/mol)
VP = vapor pressure (atm)
S = solubility (mol/m^3)

source: USEPA Soil Screening Guidance: Technical Background Document (1996b)

For K_{oc}[9]:

1. Superfund Chemical Data Matrix (SCDM)

[9] The Koc and Kd parameters are used in the development of SCTLs based on leaching to groundwater. In the case of some inorganic chemicals, the SSG developed Kd's using the MINTEQ model and used them to generate soil screening levels for leaching to groundwater. For those chemicals, the SSG leachability value was cited in Rule Table II and Technical Report Table 2, rather than a value based on the Kd from SCDM.

2. Calculated from the K_d published in SCDM using the following equation: $K_{oc} = K_d / 0.002$ (3)
3. The Hazardous Substances Data Bank (HSDB)
4. The Agency for Toxic Substances and Disease Registry's *Toxicological Profiles* (ATSDR)
5. Reference Texts (see reference texts listed above)

For D_i and D_w:

1. The CHEMDAT 8 database
2. Calculated using equations identified in the CHEMDAT 8 database support document and shown below:

For diffusivity in air (D_i):

$MW \leq 100$

$$D_i = 0.0067\, T^{1.5} \times (0.034 + MW^{-1})^{0.5} \times MW^{-0.17} \times [(MW / 2.5\, d)^{0.33} + 1.81]^{-2} \quad (4)$$

$MW > 100$

$$D_i = 0.0067\, T^{1.5} \times (0.034 + MW^{-1})^{0.5} \times MW^{-1.7} \times [(MW / 2.5\, d)^{0.33} + 1.81]^{2} \quad (5)$$

where, T = temperature, degrees Kelvin
MW = molecular weight of chemical (g/mol)
d = density of liquid chemical (g/cm^3)

For diffusivity in water (D_w):

$$D_w = 1.518 \times (10^{-4}) \times V_{cm}^{-0.6} \quad (6)$$

where V_{cm} = molar volume of chemical (cm^3/mol)

The precision with which the values from the various reference sources are reported can vary. In order to foster consistency in the development of SCTLs, it is important to have a designated rounding policy for the physical/chemical values. Listed below is the precision to which values from reference sources were used in calculating the SCTLs.

Input Precision for Physical/Chemical Parameters

Parameter	Numerical Precision
MW	2 decimal places
d	4 decimal places
HLC	3 significant figures
S	2 significant figures
MP	1 decimal place
K_{oc}	2 decimal places
D_i	3 significant figures
D_w	3 significant figures

The physical/chemical parameters for chemicals specifically listed in Chapter 62-777, F.A.C., are provided in Table 4.

For a limited number of contaminants in Chapter 62-777, F.A.C., the hierarchy of sources of physical/chemical values listed above were exhausted without finding a value for one or more of the required parameters. As noted previously, some d and HLC values were calculated using equations available in reference texts. The tables on the below list the chemicals for which d and HLC values were calculated and the calculated values. For HLCs, the VP values used in the calculations are also shown.

Calculated Density Values

Contaminant	Calculated Density
benomyl	1.2582
benzo(g,h,i)perylene	1.2683
chloro-m-cresol	1.2674
diuron	1.332
heptachlor epoxide	1.5219
linuron	1.3588

Calculated Henry's Law Constants

Contaminant	Vapor Pressure (mm Hg)	Vapor Pressure Source	Calculated Henry's Law Constant
chlorine cyanide	1000	Verschuren	9.515E-04
mercury, methyl	50	HHS[10]	1.52E-02
zineb	0.8E-07	Howard	2.90E-09

There were also nine chemicals for which surrogate density values were used. Surrogate density values were considered appropriate only when the density of an isomer of the chemical in question was available in the hierarchy of physical/chemical sources. The table below lists the chemicals for which surrogate density values were used, the value, and the source of the surrogate value.

Surrogate Density Values

Contaminant	Surrogate Density Value	Surrogate Contaminant
benzo(b)fluoranthene	1.351	benzo(a)pyrene
benzo(k)fluoranthene	1.351	benzo(a)pyrene
dichlorophenol, 2,3-	1.383	dichlorophenol, 2,4-
dichlorophenol, 2,5-	1.383	dichlorophenol, 2,4-
dichlorophenol, 2,6-	1.383	dichlorophenol, 2,4-
dichlorophenol, 3,4-	1.383	dichlorophenol, 2,4-
hexachlorocyclohexane, delta	1.89	hexachlorocyclohexane, beta
indeno(1,2,3-cd)pyrene	1.351	benzo(a)pyrene
phenylenediamine, p-	1.0096	phenylenediamine, m-

Toxicity values. The SCTL equations for direct exposure also require inputs in the form of chemical- and route-specific toxicity values. The USEPA provides such values for many chemicals. Toxicity values were taken from the USEPA sources with preference given in the following order:

[10] HHS–U.S. Department of Health and Human Services and U.S. Department of Labor Occupational Health Guideline for Organo (Alkyl) Mercury.

A. Integrated Risk Information System (IRIS)
B. Health Effects Assessment Summary Tables (HEAST)
C. National Center for Environmental Assessment (NCEA) provisional toxicity values
D. Office of Pesticide Programs (OPP), *Reference Dose Tracking Report*; or Office of Water, *Drinking Water Regulations and Health Advisories*; or Withdrawn values from IRIS or HEAST

When toxicity values are not available from the USEPA, alternative sources/approaches are available. Provisional toxicity values can be based on "surrogate values" (i.e., toxicity values for substances from the same chemical class and with similar toxicological properties); extrapolated from occupational exposure limits (see, for example, Williams et al., 1994); extrapolated from toxicity values available for other routes of exposure (i.e., route-to-route extrapolation); calculated using toxic equivalency factors (TEFs), or developed from toxicological information in the primary literature. TEFs are commonly used when they are available. Beyond this step, there is no fixed hierarchy for these approaches, and preference should be given to the one that appears to be based on the best information. Each of these alternative approaches has strengths and weaknesses that must be kept in mind when evaluating their suitability for developing toxicity values for SCTL calculation:

- For chemicals with little or no toxicity information, the use of surrogate toxicity values from chemically-related compounds offers a means to provide some estimate of risk, and of acceptable soil concentrations. However, small changes in chemical structure can produce profound differences in toxicity (compare CO and CO_2, acetate and fluoroacetate, ethanol and methanol, for example) and this approach carries with it significant uncertainty. The table below lists the chemicals for which surrogate toxicity values were used in the development of SCTLs for Chapter 62-777, F.A.C., the surrogate value, and the source of the

surrogate value. It should be noted that all of the chemicals in question are considered non-carcinogens and therefore only surrogate oral references doses were used.

Surrogate Toxicity Values

Contaminant	Surrogate RfD (mg/kg-day)	Surrogate Contaminant*
acenaphthylene	3.0E-02	pyrene
benzo(g,h,i)perylene	3.0E-02	pyrene
chlorophenol, 3-	5.0E-03	chlorophenol, 2-
chlorophenol, 4-	5.0E-03	chlorophenol, 2-
dichlorophenol, 2,3-	3.0E-03	dichlorophenol, 2,4-
dichlorophenol, 2,5-	3.0E-03	dichlorophenol, 2,4-
dichlorophenol, 2,6-	3.0E-03	dichlorophenol, 2,4-
dichlorophenol, 3,4-	3.0E-03	dichlorophenol, 2,4-
hexachlorocyclohexane, delta	3.0E-04	hexachlorocyclohexane, gamma
methylnaphthalene, 1-	3.0E-02	naphthalene
methylnaphthalene, 2-	3.0E-02	naphthalene
trichlorobenzene, 1,2,3-	1.0E-02	trichlorobenzene, 1,2,4-
trimethylbenzene, 1,2,3-	5.0E-02	trimethylbenzene, 1,2,4-

*For acenaphthylene and benzo(g,h,i)perylene, pyrene was chosen as a surrogate because its RfD was in the mid-range of RfDs for other non-carcinogenic PAHs. For all of the other contaminants in this table, the surrogate was chosen because it was the closest structurally-related compound with a RfD listed in IRIS.

- Occupational exposure limits are often based on relatively extensive study in humans, which is an advantage. Because they are intended for healthy adults, an adjustment must be made in order for them to be considered protective for a broader range of exposed individuals that may include some with special sensitivity. By incorporating the appropriate "safety factor," toxicity values from occupational exposure limits can be, in general, conservative and health protective (Williams et al., 1994). There may be, however, some situations in which a chemical poses special toxicity to sensitive individuals not found in the workplace (e.g., lead in children), where any extrapolation from occupational limits may be troublesome.

- Often, inhalation and dermal toxicity criteria are not available. In these cases, route-to-route extrapolation can be used to expand upon dose-toxicity relationships observed for one route of exposure to develop toxicity values for other routes. For example, the oral toxicity value can be used to derive corresponding inhalation or dermal values (see Appendix B). Intake from different routes is not necessarily equivalent, and information regarding toxicokinetics of the chemical (or assumptions in this regard) must be taken into account when performing route-to-route extrapolation. Further, route-to-route extrapolation is not appropriate when there is evidence that the toxicity value serving as the basis for extrapolation is likely to be route-specific. If a slope factor (SF) or a reference dose (RfD) is known or presumed to be route-specific, it should not be regarded as suitable for route-to-route extrapolation.[11]

While the USEPA originally recommended route-to-route extrapolation as a means of developing toxicity values (e.g., in USEPA, 1989a), more recently they have discouraged its use, citing the uncertainties involved (see for example the discussion in the USEPA, 1996b). While these uncertainties cannot be denied, when route-to-route extrapolation is performed with knowledge of the disposition and toxicity of the chemical, these uncertainties are hardly disproportionate to the uncertainties associated with other aspects in the calculation of SCTLs. Further, when the alternative is to omit a particular route of exposure from the SCTL calculation, in effect assuming that risk from this route is zero, this too is a source of uncertainty that is not well addressed by SSG methodology. In fact, for some chemicals, the absence of a toxicity value can mean that the dominant source of risk is ignored. In light of this discussion,

[11] In the case of carcinogenic PAHs the toxic endpoint (cancer) occurs regardless of the route of exposure. This effect is clearly evidenced by the fact that while the oral cancer slope factor (OSF) for benzo(a)pyrene is based on data in which oral dosing resulted in GI tract tumors in rodents, arguably a route-specific cancer, benzo(a)pyrene has also been observed to produce other types of cancer in several species when administered by a variety of routes, including inhalation and dermal contact. Although no slope factor has yet been derived for these routes, the rather strong evidence that benzo(a)pyrene (and, by implication, other carcinogenic PAHs) is carcinogenic by a variety of routes, suggests that PAH induced cancer is not wholly route-specific. Because of this property, route-to-route extrapolation was performed to derive both inhalation and dermal slope factors from the OSF for this group of chemicals in developing SCTLs for Chapter 62-777, F.A.C.

the cause of minimizing uncertainty is arguably best served by judicial use of route-to-route extrapolation in SCTL development.

- Toxicity equivalency factors are numerical expressions of the relative potency of a series of compounds, with a reference compound assigned a value of one (1). For example, a chemical with a TEF of 0.5 would be only half as potent as the reference compound. Using the toxicity value for the reference compound and the TEFs, toxicity values for the series of compounds can be calculated. For a chemical with a TEF of 0.5, for example, a provisional RfD can be developed by dividing the RfD for the reference compound by 0.5. In the case of a cancer slope factor (CSF), the CSF for the reference compound would be multiplied by the TEF to derive a provisional CSF for the related compound. TEFs are based on comparative potency regarding some effect thought to be related to the toxicity of interest. The ability of this surrogate effect to accurately portray relative toxic potency is a source of uncertainty in this approach.

- Development of a toxicity value from the primary literature is labor-intensive and requires judgment of an experienced toxicologist. If a sufficient body of information regarding dose-response relationships for toxicity is available in the literature for a chemical, however, it represents an important and useful approach to developing a provisional toxicity value.

For Chapter 62-777, F.A.C. chemicals, many toxicity values were available from USEPA sources whereas others had to be extrapolated using a combination of the above approaches. The identification of toxicity values needed for SCTL calculations primarily relied on surrogate values, and route-to-route extrapolation, and the TEF approach. Extrapolation from occupational exposure limits, while sometimes useful, were not employed in the development of any of the SCTLs in this report. The toxicity values and their sources/bases are provided in Tables 5a and 5b.

C. Development of site-specific direct contact SCTLs

While default SCTLs are useful tools in site evaluation and when formulating remediation strategies for a broad range of sites, there will be some sites for which default SCTL values are overly conservative or not conservative enough. That is, there will be some sites in which present and future site use and exposure characteristics are so different from the assumptions used to calculate default SCTLs, that these SCTLs do not accurately correspond to the risk goals for that site. This section identifies variables in the SCTL equations for which site-specific information can be substituted in order to obtain a more accurate SCTL, as well as some considerations in making site-specific modifications.

Exposure variables. When evaluating whether to use alternative assumptions for exposure frequency and exposure duration, responsible risk management requires consideration of not only the present use of the site, but also the range of plausible future uses. If site use is unrestricted, or only broadly restricted (e.g., to residential or commercial use), this range will almost always include some uses or site conditions in which exposure to soil can be substantial. In these situations, the default assumptions will represent the best choice. If site management includes engineering and/or institutional controls, then exposure assumptions should be based on the upper limit of exposures possible within those controls. Deviation from the default assumptions should occur only in circumstances where it can be shown that the engineering and/or institutional controls proposed for the site would reliably restrict exposure frequency and duration. Also, caution must be exercised in proposing limited exposure frequencies and/or durations even if the effectiveness of engineering and institutional controls can be assured. The SCTL methodology described here is based on chronic exposure. When exposure is of short duration or intermittent, the SCTLs calculated with these exposure assumptions are <u>not</u> valid. This type of exposure is most

commonly associated with construction worker scenarios. For these situations, the policy of the FDEP is to rely primarily on engineering and institutional controls to limit or prevent exposure. FDEP requires the institutional control to specify that construction workers be notified that contamination exists and that proper protective equipment should be utilized based on requirements from the Occupational Safety and Health Administration (OSHA),

Under extraordinary circumstances, the exposed dermal surface area and inhalation rates could be modified (e.g., if protective clothing and/or a respirator is required while on site). There will be very few, if any, sites where the long term management involves such restrictions, however. The adherence factor (the amount of soil which adheres to skin, per unit of surface area) might conceivably be influenced by local soil conditions, but empirical data to support an alternative value would probably be required.

Site soil and weather characteristics. Site soil characteristics can influence the rate of volatilization of organic chemicals into air, and thus the level of chemical of concern that may be acceptable. Measuring appropriate soil characteristics in order to develop site-specific VF may be useful, particularly if risks from soil at a site are thought to be dominated by inhalation of volatile chemicals from soil. Parameters necessary for the determination of the VF include the average soil moisture content (w), the dry soil bulk density (ρ_b), fraction of organic carbon (f_{oc}), and soil pH (used to select pH-specific K_{oc} and K_d values). Methods for determining these site-specific measured values for the derivation of the VF are listed below and outlined in the SSG (USEPA, 1996a).

Soil Characteristic	Data Source	Method
Soil moisture content (w)	Lab measurement	ASTM D 2216
Dry soil bulk density (ρ_b)	Field measurement	All soils: ASTM D 2937; shallow soils: ASTM D 1556, ASTM D 2167, ASTM D 2922
Soil organic carbon (f_{oc})	Lab measurement	Nelson & Sommers (1982)
Soil texture	Lab measurement	Particle size analysis (Gee & Bauder, 1986) and USDA classification; used to estimate θ_w & I
Soil pH	Field measurement	McLean (1982)

It is important to note that many site-specific values require data collected over a one-year period. Thus, while site-specific SCTLs may be desirable, the use of generic SCTLs may in fact be more cost-effective and less time-consuming. In addition to the time needed for the collection of site-specific data, the investigator must be in strict accordance with the approved methods. This condition is particularly important because the collected data are also used for the derivation of other site-specific parameters. Values derived from site-specific data include θ_w (water-filled soil porosity), θ_a (air-filled soil porosity), total soil porosity (n) and soil-water organic partition coefficient (organics) (K_d). Therefore, errors in the collection of data would result not only in one incorrect value, but in several other incorrectly derived values as well. For example θ_w and θ_a are derived from the soil moisture content (w). To adequately generate w, the soil moisture content must represent the *annual* average. The use of moisture content data from discrete soil samples which may be affected by preceding rainfall events would incorrectly represent the moisture content and therefore result in the incorrect derivation of θ_w and θ_a. Correctly deriving values such as θ_a is of great significance, because other than the initial soil concentration, air-filled soil porosity (θ_a) is the most significant soil parameter affecting the volatilization of chemicals of concern from soil. The higher the θ_a, the greater the potential for emission of volatile chemicals of concern.

The equations, sources, and methods for deriving soil characteristics using site-specific data are provided in the following table.

Soil Characteristic	Data Source	Method
Water-filled soil porosity (θ_w) (Average soil moisture content)	$\theta_w = n\ (I/K_s)^{1/(2b+3)}$ or $\theta_w = w\rho_b$	Where, n = total soil porosity (L_{pore}/L_{soil}) I = infiltration rate (m/yr) K_s = saturated hydraulic conductivity (m/yr) b = soil-specific exponential parameter (unitless) w = soil moisture content (g_{water}/g_{soil}) ρ_b = dry soil bulk density (g/cm^3)
Total soil porosity (n)	$n = 1 - (\rho_b/\rho_s)$	Where, ρ_b = dry soil bulk density (g/cm^3) ρ_s = soil particle density = 2.65 kg/L
Infiltration rate (I)	HELP model; Regional estimates	HELP (Schroeder et al., 1984); may be used for site-specific infiltration estimates; used to calculate θ_w
Soil-specific exponential parameter (b) (Moisture retention component)	Look-up	Attachment A (USEPA, 1996a); used to calculate θ_w
Saturated hydraulic conductivity (K_s)	Look-up	Attachment A (USEPA, 1996a); used to calculate θ_w
Air-filled soil porosity (θ_a)	$\theta_a = n - w\rho_b$ or $\theta_a = n - \theta_w$	Where, n = total soil porosity (L_{pore}/L_{soil}) w = soil moisture content (g_{water}/g_{soil}) ρ_b = dry soil bulk density (g/cm^3) θ_w = average soil moisture content (L_{water}/L_{soil})
Soil-water organic partition coefficient (organics) (K_d)	$K_d = K_{oc} \times f_{oc}$	Where, K_{oc} = chemical-specific soil-organic carbon partition coefficient (cm^3/g) f_{oc} = organic carbon content of soil (g/g)

VF is also a function of local climatic conditions and the size of contaminated area as expressed in the Q/C term. The USEPA (1996b) has tabulated Q/C values for contaminated areas ranging from 0.5 to 30 acres in size for selected cities around the U.S. These values are based on a modeling exercise that incorporated, among other things, meteorological data for these cities. The only city in Florida included in this exercise was Miami, and the next closest city was Atlanta. The default Q/C recommended in Figure 7 is based on Miami data and a 0.5 acre contaminated area. A site-specific Q/C term should be considered if the area of contaminated soil is significantly greater than 0.5 acres and inhalation exposure is a significant concern. Development of a site-specific Q/C term for a contaminated area outside the range presented by the SSG, or using meteorological data from a location in Florida other than Miami, is possible but would require a sophisticated and expensive analysis. In all but the most unusual circumstances, this level of

effort to develop a site-specific Q/C term beyond the use of the SSG tabulated values would not be worthwhile.

The PEF term is also influenced by local meteorological conditions, as well as site characteristics (Figure 6). An important site characteristic influencing PEF is the percent of vegetative cover over the contaminated soil. The default assumption is that 50% of the contaminated area has vegetative cover. This value can be adjusted for a specific site, but if a higher value is used some mechanism must be in place to ensure that the vegetative cover remains in place in the future. Local wind conditions can also influence PEF and could conceivably be used to adjust the PEF in the development of site-specific SCTLs. A preliminary analysis of annual average meteorological data from cities around Florida found average windspeeds only slightly different from the default value, however (unpublished observations). Because PEF is a quantitatively important factor in the SCTL of only a very few chemicals, there is generally little incentive for developing site-specific PEF values. It is important to note that the PEF is applicable only for undisturbed soil. If there is significant soil disturbance at a site, such as from vehicular traffic, site-specific estimates of dust levels may have to be substituted for the PEF in deriving an SCTL.

It should be noted that while the VF model used in the calculations of SCTLs for Chapter 62-777, F.A.C. is capable of adjusting the VF for different durations of exposure, the model is limited to exposure that begin immediately. The model assumes that the rate of flux of a volatile chemical from soil to air is highest when the concentration in surface soil is highest and declines over time. As the flux declines over time, so too does the air concentration. For a chemical at a given initial concentration in soil, the average concentration in air will depend on the averaging period (or exposure duration) such that longer periods have lower average concentrations. This is because as the concentration in soil declines over time, lower concentrations are included in the averaging process. For example, the

model predicts that, for a given concentration of xylene in soil, the average concentration over the first six years will be approximately twice the average concentration over the first 25 years because the air concentrations in later years are quite low.

The assumption in developing default SCTLs is that exposure begins immediately and continues for the number of years associated with the given exposure scenario. It is possible that in some site-specific situations, other exposure periods may be relevant, including exposures that do not begin immediately. An alternative approach under these circumstances is the use of the computer software EMSOFT, developed by the USEPA National Center for Environmental Assessment. VFs calculated by EMSOFT do not differ from those calculated with the current VF model for exposure durations that begin immediately. However, EMSOFT will compute average soil VFs for exposure intervals beginning and ending at any time in the future. Therefore, EMSOFT may be of value in deriving site-specific volatilization factors for exposure scenarios which differ from default assumptions.

Mass limits. The VF equation is based in part on the assumption of an infinite source. When the volume of contaminated soil is known (i.e., the area and depth), the VF equation can be modified to take mass of chemicals of concern into consideration. An alternative VF equation incorporating estimates of volume of contaminated soil is described in the SSG (USEPA, 1996a, 1996b).

Values that do not change from site to site. It is worth stating explicitly that there are some variables and assumptions that are unrelated to site conditions and circumstances and therefore should not be modified in deriving a site-specific SCTL. These parameters include toxicity values, fundamental physical/chemical properties of chemicals of concern, and the averaging time for carcinogenic effects. [Note: The averaging time for non-carcinogenic effects is a function of the exposure

duration, which could be modified at a particular site.] Also, it is generally impractical to consider body weight as a site-specific variable (except as it relates to the age of the exposed individuals, e.g., adults versus children).

D. Soil Saturation Limit

The inhalation component of the SCTL for residential and industrial exposure to volatile contaminants is calculated using a VF, as described in Section II B, "Input Values for Direct Exposure." The equation for the VF (Figure 7), which defines the relationship between the concentration of the chemical in soil and its flux to air, assumes an infinite source of the chemical and only one mechanism of transport, vapor phase diffusion. As emission flux increases, the air concentration increases, along with risks from inhalation exposure. The VF model assumes that this relationship holds throughout the possible range of chemical concentrations in soil, although at high concentrations this is not the case. At a sufficiently high concentration, the soil pore air and pore water are saturated and the adsorptive limits of the soil particles are reached. Any increase in concentration above this point does not result in greater flux – the rate of flux reaches a plateau and volatile emissions (and air concentrations) can go no higher no matter how much additional chemical is present in soil. This concentration is termed the soil saturation limit (C_{sat}).

The C_{sat} value for a chemical depends upon a variety of factors, including chemical-specific physical/chemical properties, as well as characteristics of the soil. As such, the C_{sat} value for different chemicals at a site will vary, and C_{sat} values for a given chemical can be different from site to site. A formula for estimating C_{sat}, using chemical-specific inputs and default soil assumptions, is shown in Figure 9.

Whenever the concentration of a chemical in soil exceeds its C_{sat} value, the standard formula for estimating volatilization and inhalation exposure will yield

inaccurate results. Specifically, the formula will overestimate flux and inhalation exposure. This is because it fails to recognize that flux reaches a maximum at or around the C_{sat} value, and assumes instead that it continues to increase with concentration. This is an issue in SCTL development because for some chemicals (primarily volatile chemicals of low toxic potency) the calculated SCTL for the chemical is greater than its C_{sat} value. This situation exists for about 40 of the chemicals for which SCTLs were developed for Chapter 62-777, F.A.C.

It is possible to correct for the influence of C_{sat} on the inhalation component of the SCTL, but this requires that the C_{sat} value be estimated with some confidence. Alternatively, the SCTLs can be uncorrected, recognizing that this adds some extra measure of conservatism to the value. Given the uncertainties in developing accurate C_{sat} values applicable to a wide variety of sites, the latter approach was chosen.

C_{sat} can also potentially influence the development of SCTLs for leachability. However, the leachability SCTLs for nearly all chemicals are well below their respective C_{sat} values (Note: Among the chemicals listed in Table 2, only di-n-octylphthalate and trichloro-1,2,2-trifluoroethane, 1,1,2- have a leachability SCTL > C_{sat}). This indicates that, for practical purposes, C_{sat} is not an issue of concern in developing leachability goals.

C_{sat} values may be useful in identifying situations in which free product may be present. Soil concentrations above the saturation limit could result in their presence as free product, which may be undesirable at the site for a number of reasons. It should be emphasized that the C_{sat} value doesn't signify the concentration at which free product is present, but the existence at a site of concentrations greater than C_{sat} could serve as a "red flag" for the possibility of free product. As a site management tool for this purpose, C_{sat} values have been tabulated for a series of chemicals that can exist as liquids at room temperature.

These are presented in Table 8. Actual determination of whether free product exists in soils should be made by other means.

E. Chemical Interactions

Exposure to combinations of chemicals may result in interactions leading to a significant increase or decrease in the overall toxicity of the mixture compared to the summation of the toxicity of the individual chemicals. As a result, the concept of toxic interactions from multiple chemical exposures is a subject of considerable interest and concern for hazardous waste sites where multiple chemical exposures are probable.

Toxic interactions may occur as a result of an alteration in the absorption, distribution, metabolism, and excretion of one chemical by another, modifying its toxicity. Studies in animals have reported the occurrence of such interactions among gaseous pollutants, pesticides, metals, and solvents. Interactions may also occur when one chemical alters the responsiveness of cells and target organs to the effects of other chemicals, such as through receptor up-regulation or altered cell signaling pathways. Very little information exists on toxic interactions in humans, and inferences must be made from studies of toxicant effects in laboratory animals. Even in circumstances where significant interactions have been observed in these studies, 1) the dosages at which the interaction occurs are usually not well characterized; 2) there is often uncertainty as to whether the mechanism for the interaction is relevant to humans, particularly at the comparatively low levels of exposure typically encountered from contaminated environmental media; and 3) most such studies involve exposure to two chemicals, whereas exposure at contaminated sites can involve several toxicants. For these reasons, the utility of these observations in evaluating the human health implications of multiple chemical exposures is limited, and it is extremely difficult to address chemical interactions in quantitative risk assessment other than on a rather simplistic level.

The standard approach taken in baseline risk assessments for contaminated sites is to assume that risks to the individual from multiple chemicals of concern are, at most, additive. The incremental excess cancer risk to the exposed individual is the sum of the cancer risks from individual carcinogenic site chemicals of concern. For non-carcinogens, hazard quotients for individual chemicals are summed only when there is evidence that the chemicals may have additive effects. The same mechanism of action or the same target organ for toxicity are usually taken as evidence for potential additivity.

Within the context of a tiered approach to site evaluation, the initial assessment of risk (and hazard) posed by site contaminants requires an approach that is both relatively simple and conservative[12]. For most sites, this objective can be achieved by assuming simple additivity of risk among the contaminants present. In the case of cancer risk, it is recognized that the cancer risks from individual chemicals are not truly independent (e.g., death from cancer from one contaminant reduces the risk of cancer from other contaminants to zero; also, there is evidence suggesting that developing one cancer may increase the risk of developing a second cancer), and therefore some error will be introduced in calculating total cancer risk from the sum of the individual cancer risks. However, since the probability of developing cancer from environmental exposure to contaminants is usually small, the error in summing them will also be small and of little consequence in estimating total cancer risk. When more than one carcinogen is present at a site, the direct exposure SCTLs in Table 2 must be adjusted, if applicable, to reflect total cancer risk. For initial site evaluation, to ensure that the total cancer risk does not exceed 1E-06, the SCTL from Table 2 for each carcinogen should, when appropriate, be divided by the number of carcinogens to derive site-specific SCTLs.

[12] Refer to Chapter 62-713, 62-770, 62-782, and 62-785, F.A.C., for the requirements regarding additivity for the appropriate cleanup program.

For non-carcinogens, additivity of effect is most likely to occur when the contaminants affect the same target organ. With this concept in mind, initial evaluation of a site should, when appropriate, employ SCTLs adjusted to reflect additivity in target organ toxicity. That is, for contaminants affecting the same target organ, the SCTLs from Table 2 for each should, when appropriate, be divided by the number of contaminants affecting that organ. For example, if four contaminants present at a site characteristically produce liver toxicity, the relevant SCTLs for these chemicals would be their direct exposure SCTL values in Table 2 divided by four. To assist in identifying chemicals affecting the same target organ, Table 5b lists each of the non-carcinogenic chemicals of concern for which an SCTL was derived for Chapter 62–777, F.A.C., the reference dose for that chemical and the toxic endpoint upon which the reference dose is based. To further facilitate the identification of chemicals with common target organs and/or effects, Table 6 lists the chemicals in Chapter 62-777, F.A.C. sorted by target organ or effect.

If risks are unevenly distributed among chemicals at a site, the simple method of apportionment described above for deriving site-specific SCTLs may lead to total site risk below the goals of 1E-06 and a hazard index of 1. In these circumstances, within the context of a site-specific risk assessment, a weighted approach to calculating SCTLs may be more appropriate. For example, consider the situation of four chemicals that affect the same target organ, each with an SCTL of 1 ppm. Chemical A is present at 0.05 ppm, Chemical B at 0.1 ppm, Chemical C at 0.25 ppm, and Chemical D at 0.9 ppm. Since there are four chemicals present that affect the same target organ, the SCTL for each would be divided by 4 – in this case leading to an SCTL of 0.25 ppm for each. In this example, only chemical D poses a potential problem (i.e., it is present at a concentration greater than its modified SCTL of 0.25 ppm). Cleanup of Chemical D to its SCTL of 0.25 ppm would lead to a total hazard index of only 0.65 for all four chemicals. If a weighted apportionment is used instead, Chemical D could be cleaned to 0.55 instead of 0.25 ppm, and still retain a hazard index ≥ 1.

While, in principle, interactions can occur among chemicals resulting in greater-than-additive effects, at present there are no specific examples which indicate that the additive approach described above is not sufficiently conservative for initial site evaluation purposes. If evidence arises in the future for specific interactions that would render this approach less than health-protective, the approach should be modified to take these interactions into consideration.

Although simple additivity is the most commonly recommended approach for risk assessment, the incorporation of quantitative information on toxicologic interactions as a means to more specifically evaluate the potential for additivity is an alternative for more detailed, site-specific risk assessments. Additivity may result from *dose addition*, which occurs when chemicals act on similar biological systems and elicit a common response, whereas *response addition* occurs when chemicals act by independent mechanisms to produce toxicity to the same organ or tissue (Hertzberg et al., 1997). With *dose addition*, the chemicals are assumed to be functional clones and thereby follow similar pathways of uptake, metabolism, distribution and elimination, and elicit the same toxicologic effect. Thus, although the dose of one chemical may be too small to elicit an effect, the addition of a second chemical may be enough so as to increase the total dose to a level that results in an adverse effect. Under *response addition*, different physiologic pathways are followed and the response to one chemical occurs whether or not the second chemical is present. For example, the liver may be the common target organ, but the mechanism of injury can differ (e.g., peroxisomal proliferation, induction of oxidant stress, protein adduction). However, it is the sum of the responses at the common target organ that is measured as the additive effect, regardless of the differences in mechanism of action. Dose addition should always be treated as a summation of hazard quotients. *Response addition*, however, may not always be accurately characterized by a simple summation of hazard quotients, depending upon the toxic mechanisms involved. In cases of *response addition*, approaches

other than simple addition can be used to derive site-specific SCTLs, but must be carefully justified by the mechanism(s) of action of the chemicals and supported by empirical observations.

In the context of a detailed, site-specific risk assessment, chemical interactions other than addition need to be considered, such as antagonism, inhibition, masking, synergism, and potentiation.[13] As with *response addition*, manipulation of SCTLs based on these interactions should be soundly and carefully based on mechanistic principles supported by empirical observations from the peer-reviewed scientific literature.

F. Acute Toxicity Concerns for Chemicals in Chapter 62-777, F.A.C.

The default residential direct exposure SCTLs for non-carcinogenic chemicals are intended to be health protective for children as well as adults, and are developed based on assumptions of chronic exposure. While it is generally assumed that these contaminant concentration limits are health protective for acute as well as chronic exposure, there may be circumstances where acute exposure is significantly larger than the time-averaged chronic exposure. This could result in an exposure that is acutely toxic. A striking example of this situation can be seen with soil ingestion rates in children. While most children may ingest up to 200 mg of soil per day (the standard USEPA default assumption), in some instances episodic ingestion can be 250-times that amount or more (Calabrese et al., 1997). Although a soil ingestion rate of 5 g soil/day has been proposed by the USEPA

[13] ***Antagonism***- When the toxic effects from exposure to a combination of chemicals is less than what would occur following individual chemical exposures.
Inhibition- When one substance's toxic effect to a specific organ is reduced by the presence of a second chemical, which does not have a toxic effect on the same organ.
Masking- When the toxic effects produced, at the same site, are opposite or functionally competing effects, reducing the toxic effects that would be elicited by the chemicals on an individual basis.
Synergism- When the toxic effect(s) from exposure to a combination of chemicals is greater than the effects produced by the individual chemicals (effects greater than additive).
Potentiation- When one substance's toxic effect to a specific organ is increased by the presence of a second chemical, which does not have a toxic effect on the same organ.

(USEPA, 1986) to address the possibility that some children may exhibit soil pica (ingestion) in quantities far greater than the 200 mg/day value, this approach is regularly disregarded in practice. To prevent this oversight when assessing a site whose current or future uses may include scenarios in which contact with soil by small children is possible, the potential for acute toxicity must be adequately addressed in the development of SCTLs.

Calabrese and coworkers evaluated the potential for acute toxicity from a pica episode involving soil with contaminant concentrations regarded by the USEPA as conservative[14] (Calabrese et al., 1997). Contaminant doses expected to result from a one-time soil pica episode of 5 to 50 g of soil were estimated and compared with acute dosages demonstrated to produce toxicity in humans in poisoning episodes. The findings indicated that some residential soil cleanup target levels could result, following a single large soil ingestion event, in doses in the range reported to produce acute toxicity and even death. Of the thirteen chemicals included in the analysis, ingestion of soil containing cyanide, fluoride, phenol, or vanadium was found to result in a contaminant dose exceeding the acute human lethal dose; and ingestion of barium, cadmium, copper, fluoride, nickel, or phenol from soil was found to produce doses associated with acute toxicity other than death.

Although the selective use of human data contributes greater confidence in the relevance and implications of these findings, it is important to acknowledge the limitations associated with this analysis. Estimates of the acute toxic and lethal doses were primarily extrapolated from reports on accidental ingestion, and exact dose estimation was difficult. In addition, most incidents of exposure were limited to adults; doses were then modified to approximate a dose that would have the same

[14] USEPA Soil Screening Levels and USEPA Region III Risk-Based Concentrations for residential soil.

effect in children. Doses reported to be lethal to humans indicate only that the dose needed to cause death was met or exceeded, thus it is possible that doses lower than those reported in these cases could also produce death. On the other hand, some observations may represent a particularly sensitive individual and not apply to the population in general. Also, the doses in this analysis were ingested doses rather than absorbed doses, and in many cases involved solutions where absorption may be extensive. The presence of these contaminants in soil may reduce their bioavailability, and therefore their toxicity. Despite these limitations, the serious nature of acute toxicity potentially associated with consumption of contaminated soil during a soil pica episode requires that attention be paid to this issue when developing residential soil cleanup target levels.

The chemicals identified in the study by Calabrese and coworkers as having the potential to produce an acute toxicity problem were evaluated for Chapter 62-777, F.A.C. to determine whether an adjustment in the residential SCTL was required. Because the intake under these circumstances would be driven almost exclusively by ingestion, the SCTL equation was altered to remove dermal contact and inhalation components. Also, because the value is based on a single exposure event, terms related to averaging time and exposure frequency were deleted to produce the following equation:

$$SCTL = \frac{BW}{\frac{1}{RfD_{acute}} \times SI \times CF}$$

where:
BW = body weight (kg)
RfD_{acute} = safe dose for acute exposure (mg/kg)
SI = amount of soil ingested (g)
CF = conversion factor for units (kg/g) (10^{-3})

Consistent with other SCTLs based on exposure of a child, a body weight of 15 kg was assumed. So as not to make the derivation of acute toxicity SCTLs

excessively conservative, an amount of soil ingested per event (SI) was selected (10 g) that is well within the range of values reported by Calabrese and others.

Unfortunately, safe acute doses are not routinely provided by the USEPA, and such information is extremely limited in the literature. As a starting point in the analysis, subacute and chronic oral reference doses were considered, with the logic that a dose that is safe for chronic consumption will also be safe for a single exposure. This value was then compared with observations in the medical and toxicological literature to determine whether the value might be excessively conservative. This analysis included, where possible, an attempt to derive differential dose-response information for more-serious and less-serious health effects specific to humans. In some cases, as discussed below, doses higher than the subchronic or chronic oral reference dose were identified that were consistent with the health protection goals of FDEP. A brief summary of the analysis for each of the eight chemicals appears below.

Acute Toxicity Summaries

Barium. There is a clear distinction in the toxic potential of soluble and insoluble salts of barium. Barium sulfate is insoluble and commonly used in medicine as radiocontrast media. Its toxicity potential is regarded as extremely low. Soluble barium salts, however, can be quite toxic and have been used as rodenticides. Numerous poisonings with soluble forms of barium have been reported in the medical literature, predominantly from the first half of this century. Some have resulted from accidental ingestion, suicide attempts, or mistaken use of a soluble form of barium in medicine (e.g., barium sulfide instead of barium sulfate). One case, for example, involved 144 persons poisoned when barium carbonate was substituted accidentally for potato starch in the preparation of sausage (Ogen et al., 1967). Among the individuals poisoned, 19 were hospitalized and one died. Vomiting, abdominal pain and spasms, diarrhea, weakness, hypokalemia

(decreased blood potassium levels), cardiac arrhythmias, paresthesias (abnormal sensation such as tingling), and muscle paralysis are typical signs and symptoms of barium poisoning (Ellenhorn, 1997). Acute renal failure has occasionally been reported (Wetherill et. al., 1981). For barium carbonate, the lowest acute lethal dose is 57 mg/kg, and the lowest toxic dose is 29 mg/kg (Ellenhorn, 1997). Effects at this lowest toxic dose include muscle paralysis, weakness, and paresthesia. Barium chloride is somewhat more toxic, and the lowest lethal dose is reported to be 11 mg/kg (Ellenhorn, 1997). A value of 200 mg [corresponding to about 3 mg/kg in a 70 kg adult] has been proposed as the low end of the toxic dose range for soluble barium compounds (McNally, 1925), and a public health guide by the WHO reports the lowest toxic doses of barium to be 3-7 mg/kg (WHO, 1991). Clinical symptoms from acute ingestion of lesser barium doses usually subside by 24 hours and the patient is ambulatory within 48 hours, although in some cases muscle paralysis and weakness can last for over a week (Ellenhorn, 1997). There is no clear distinction in the literature between doses producing gastrointestinal symptoms and those resulting in other symptoms that may require medical intervention. One report of mass poisoning with barium noted that none of the children were hospitalized and that their symptoms were generally less severe than the adults (Ogen et al., 1967). However, the children did not eat the same meal as the adults that were poisoned, and it is unclear whether the children received comparable barium doses.

From our survey of the medical literature, it appears that an acute barium dose of approximately 3 mg/kg is at the lower end of the range of toxic doses for soluble forms in adults. Given the nature of barium toxicity, symptoms at the lower end of the toxic range would be expected to be reversible within a few days, but may require medical attention. Data with which to derive an upper bound no-effect dose for soluble barium in humans do not exist. The USEPA chronic oral RfD for barium (0.07 mg/kg/day) is approximately 40-fold less than the lower end of the frank toxicity level of soluble barium in humans, which is not an unreasonable margin of

safety. Using the chronic oral RfD as a safe acute exposure dose, a residential SCTL for barium based on acute exposure of a child would be 105 ppm.

Of course, naturally occurring barium is not in the form of water-soluble salts, and therefore poses little risk of toxicity. Operationally, barium concentrations at residential sites will probably have to be screened first against background concentrations. If elevated barium concentrations are found, the residential SCTL for barium will be of value only if the fraction of barium present that is soluble can be determined.

Cadmium. With chronic exposure, the health effects of primary concern are renal toxicity and lung cancer. Both require long-term exposure, and neither is an issue with acute (one-time) ingestion of cadmium. The health effects occurring at the lowest acute dosages are primarily gastrointestinal - nausea, vomiting, salivation, abdominal pain, cramps, and diarrhea (ATSDR, 1997). Several cases of acute cadmium poisoning occurred during the 1940s and 1950s when cadmium was substituted for scarce chromium in plating cooking utensils and containers. In one report, two adults and four children experienced vomiting and cramps after drinking tea from a pitcher plated on the inside with cadmium (Frant and Kleeman, 1941). From information provided in this report, doses ranging from 0.2 to 1 mg/kg can be calculated. Other studies have reported that doses as low as 0.04 to 0.07 mg/kg cadmium are capable of inducing vomiting (Nordberg et al., 1973; Lauwerys, 1979). In all cases of cadmium ingestion within this dose range, recovery was rapid and complete, usually within 24 hours.

Use of the chronic oral RfD for cadmium as a safe acute toxic dose, on an interim basis, in order to establish a protective residential SCTL for this chemical is possible. However, because this RfD is based on an effect (renal toxicity) that is not a concern with acute ingestion, it could be argued that this value is too conservative. The SCTL for cadmium based on chronic exposure to children (75

mg/kg) would result in a dose of 0.05 mg/kg if a child ingests 10 g of soil in a single event. This is at the lower end of the dose range for nausea and vomiting for cadmium, suggesting that some children ingesting soil at this concentration might experience transient GI symptoms.

Copper. Several studies have reported that ingestion of drinking water or beverages with elevated copper concentrations results in gastrointestinal effects including nausea, vomiting, diarrhea, and abdominal pain (Knobeloch et al., 1994; Sidhu et al., 1995; ATSDR, 1990). In fact, copper sulfate was used historically in medicine to induce vomiting (Goodman and Gilman, 1941). Three separate reports provide relatively consistent information regarding the doses of copper required to produce these effects. In one report, military nurses experienced nausea, vomiting, and diarrhea within 30 minutes to one hour after consuming cocktails from a copper lined shaker (Wyllie, 1957). All but five of the fifteen nurses experienced weakness, abdominal cramps, dizziness, and headache the next day. Reconstruction of the cocktail mixture and measurement of copper concentrations, coupled with consumption estimates for each of the nurses, can be used to derive copper dose estimates. The lowest dose (received by three of the nurses who became sick), was 0.09 mg/kg. Nicholas (1968) reported an incident in which twenty workmen became sick after drinking tea at work which contained 30 ppm copper. All experienced nausea and several had diarrhea, with or without vomiting. The estimated dose of copper was 0.07 mg/kg. Spitalney et al. (1984) reported recurrent, acute gastrointestinal symptoms including nausea, vomiting, and abdominal pain in a family associated with drinking copper-contaminated well water, or beverages (juice or coffee) made with the water. Based on the concentration of copper in the water (7.8 ppm), a copper dose of 0.06 mg/kg is estimated. It is not clear whether children have increased sensitivity to gastrointestinal irritation from copper. One study of gastrointestinal complaints from copper in drinking water in two communities in Wisconsin found higher prevalences of symptoms in children, but this could have resulted from higher exposures than adults (Knobeloch et al., 1994).

It should be noted that copper is considered to be an essential element, and a WHO expert committee has recommended intake of 0.08 mg/kg/day for infants and children (as cited in NRC, 1989). The American Academy of Pediatrics has recommended the inclusion of copper in infant formulas that could result in approximately 0.4 mg copper per day (as cited in NRC, 1989), and many vitamin and mineral products available for children contain about 2 mg copper. When expressed on a per-kg body weight basis, the copper doses resulting from this dietary supplementation are well within the range reported to produce nausea and vomiting (above) – an apparent inconsistency. The explanation appears to be that the effect of copper is dependent upon its form. Each of the case reports of copper-induced gastrointestinal effects involved copper ions in solution. Dietary copper and copper in supplements is typically in less soluble forms (i.e., cupric oxide). For example, a recent WHO report on trace elements in nutrition states,

> *"In the assessment of a safe level of intake for copper, it is important to distinguish ionic copper ingested in water or as a supplement from dietary copper in foods, which is largely present in the form of organic compounds. While there is little doubt that the uncontrolled ingestion of soluble inorganic copper salts in milligram quantities should be regarded with caution, levels of copper in food up to around 10 mg/day seem to have no detrimental effect on human health. The upper limit to the safe range of population mean intakes, Cu^{tox}_{PImax}, for adults has accordingly been set at 12 mg/day for men and 10 mg/day for women. This will take account of the quantity likely to be consumed from the usual diet (< 10 mg/day) and will limit both the amount of copper that can be introduced by dietary fortification and the quantity of contaminating copper that can be regarded as tolerable."* (WHO, 1996).[15]

The USEPA previously established an oral RfD for copper of 0.006 mg/kg/day, but this was subsequently withdrawn. In the absence of an updated value, a "guidance" concentration range of 0.04 to 0.07 mg/kg/day has been developed by the National Center for Environmental Assessment (NCEA). The

[15] The WHO has set the upper limit of the safe range of population mean intakes of copper for children 1-6 years of age (the most relevant age range for an acute soil ingestion episode) at 1.5 mg/day, based on an assumed body weight of 16 kg (WHO, 1996). This corresponds to a dose of 0.09 mg/kg/day.

NCEA believes that existing data are not adequate to develop an oral reference dose for copper (consistent with USEPA practice not to develop an RfD based on human data unless the dataset is unusually extensive); hence, presentation of these values as guidance. Use of the upper end of the USEPA guidance range for a copper dose, 0.07 mg/kg, as a safe acute dose would place it at the lower end of the effective dose range for gastrointestinal symptoms. The SCTL corresponding to this dose, based on acute exposure for a child, would be 105 ppm.

Beyond gastrointestinal symptoms, the health effect of copper of greatest concern for children is probably hepatotoxicity. In one study of teen-agers and adults acutely poisoned with copper sulfate, 23% developed signs or symptoms of hepatic injury (Chuttani et al., 1965). No information on the copper dose received by these patients was provided. Children have poorly developed homeostatic mechanisms for copper, making them more susceptible to excessive copper accumulation in the liver. Presumably, the acute copper dose required to produce hepatotoxicity would be lower in children, but again, no quantitative information is available. Some children appear to be particularly sensitive to copper accumulation, and severe, usually fatal hepatic disease has been reported from chronic ingestion of relatively modest doses of copper. Childhood cirrhosis from copper is endemic in the Indian subcontinent, where copper contamination of milk from the use of copper and brass containers is common, but rare in other parts of the world (Scheinberg and Sternlieb, 1996; Pandit and Bhave, 1996). Vulnerability to copper hepatotoxicity is probably a function of copper intake and perhaps genetic and other factors that have not been well characterized. While it is reasonable to conclude that doses protective of GI effects are also protective of hepatic effects, a safe acute, upper bound copper dose that would not push hepatic copper stores in children to a toxic level would be very difficult to estimate.

Cyanide. Cyanide is a potent and rapid-acting toxicant that has been involved in numerous intentional and accidental poisonings. The USEPA reviewed the medical

literature and determined that the average fatal dose of cyanide is 1.52 mg/kg (as cited in ATSDR, 1997). The lowest human lethal dose reported in the medical literature is 0.5 mg/kg (Gettler and Baine, 1938). Interestingly, in developing their Soil Screening Guidance, the USEPA acknowledged that their SSL (Soil Screening Level) for cyanide in residential soil was not protective of children who might ingest soil during a pica event:

> *"Review of clinical reports on contaminants addressed in this guidance suggests that acute effects of cyanide and phenol may be of concern in children exhibiting pica behavior. If soils containing cyanide and phenol are present at a site, the protectiveness of the chronic ingestion SSLs for these chemicals should be reconsidered."* (USEPA, 1996).

While clinical experience with cyanide is extensive, an upper-bound no-effect level has not been identified in humans. Any dose of cyanide capable of producing symptoms is potentially serious and medical attention will be required. The USEPA oral RfD for cyanide is 0.02 mg/kg/day, and this dose should also be protective for acute exposures. It is, however, only 25-fold lower than the lowest dose reported to cause death in humans. Given the severity of the endpoint, this margin of safety is not overly conservative, and we would strongly recommend that no higher dose be used in setting residential SCTLs based on acute exposure in children. The SCTL corresponding to this dose, based on acute exposure for a child, would be 30 ppm.

Fluoride. Acute fluoride poisoning has resulted from its use as an insecticide and in products intended to prevent tooth decay. Soluble forms of fluoride are the most toxic (WHO, 1984). Fluoride is corrosive to the gastrointestinal tract, and toxicity from acute, low dose exposure principally involves gastrointestinal symptoms such as nausea, vomiting, and diarrhea. More severe acute intoxication with fluoride is characterized by excessive salivation, muscle twitching, muscle spasms, tetany, and convulsions (Spoerke et al., 1980). Estimates of the acute lethal dose vary widely. From information in the literature, Hodge and Smith (1965) have placed the lethal

dose for adults at approximately 70 to 140 mg/kg sodium fluoride (corresponding to 32 to 64 mg/kg as fluoride). Two case reports of fatalities in small children following acute fluoride ingestion suggest that the lethal dose in children may be smaller. In one case, a 3-year old boy died after ingesting sodium fluoride tablets (Eichler et al., 1982), corresponding to a dose of 16 mg/kg. In another case, a 27-month old child died after ingesting sodium fluoride tablets corresponding to a dose of 8 mg/kg (Whitford, 1990). Based on this case, Whitford (1990) proposed that 5 mg/kg is a "probably toxic dose" for a child, and this value is often cited. This value appears to represent a threshold for serious toxicity, i.e., prolonged symptoms or intoxication requiring medical attention. Transient gastrointestinal symptoms from fluoride (nausea, vomiting, and diarrhea) can occur at lower fluoride doses.

A review of 150 reported accidental poisonings with fluoride found that a dose below 5 mg (absolute dose, not mg/kg) produced no gastrointestinal symptoms, 10% of individuals receiving 5-9 mg had gastrointestinal symptoms, 21% at 10-19 mg, nearly 50% at 20-29 mg, and 100% of individuals who received 30-39 mg. From this information, it can be concluded that to avoid gastrointestinal symptoms from acute ingestion of soil (10 g on a single occasion), fluoride concentrations in soil should not exceed 500 ppm (5 mg fluoride per 10 g of soil). Acute ingestion of soil (10 g by a 15 kg child) containing fluoride at the residential SCTL based on chronic exposure (4,700 mg/kg) would result in a dose of about 3 mg/kg (45 mg absolute dose). This dose is less than that associated with serious acute toxicity (5 mg/kg, see above), but corresponds to fluoride doses that have a very high incidence of gastrointestinal symptoms (i.e., 45 mg). Consumption of 20 g of soil by a child at this concentration would result in a dose just below the lowest reported lethal dose. In the case of flouride, a reduction of the residential SCTL to 500 ppm is recommended.

Phenol. Acute ingestion of non-fatal doses of phenol results in symptoms of burning mouth and gastrointestinal irritation and distress (Deichman, 1969). An

acute lethal dose for an adult was reported by Bennett et al. (1950) as 230 mg/kg. Deichman (1969) reports the lethal range for adults to be between 14.3 mg/kg and 143 mg/kg. Interestingly, there is also a report of an ingestion of 14 mg/kg which caused only gastrointestinal effects (Cleland and Kingsbury, 1977). Intake of water contaminated with phenol for a period of several weeks resulted in diarrhea, mouth sores, and burning mouth (Baker et al., 1978). The dose calculated to have been ingested in these cases ranged from 0.14-3.4 mg/kg/day.

Phenol is another chemical for which the USEPA acknowledges that their residential soil screening level based on chronic exposure may not be protective of children under acute exposure circumstances (see discussion for cyanide, above). The USEPA chronic oral RfD is actually within the lower end of the range of subchronic doses reported to cause effects and, while about 20-fold lower than the lowest dose reported to produce acute effects in humans, is within a factor of 25 of the lowest reported human lethal dose. Under the circumstances, any adjustment of the acute toxicity dose above the USEPA chronic oral RfD for phenol would appear ill advised. Thus, the recommended residential SCTL for children based on acute exposure is 900 ppm.

Nickel. There is only one report of a death from acute ingestion of nickel. A 2-year old child ingested nickel sulfate crystals (approx. 570 mg/kg) and died from cardiac arrest 8 hours later. Sunderman et al. (1988) reported a case in which 35 workers drank from a water fountain contaminated with nickel sulfate, nickel chloride, and boric acid. Twenty of the workers reported symptoms and 10 were hospitalized. The authors indicated that the dose of boric acid received by the workers was insufficient to have caused the symptoms, and attributed them to the nickel. Symptoms included nausea, vomiting, abdominal cramps, diarrhea, muscular pain, giddiness, weariness, headache, cough, and shortness of breath. The symptoms typically lasted a few hours, but in 7 cases lasted 1-2 days. All of the hospitalized subjects were discharged on day 5 after exposure. Clinical chemistry

results indicated evidence of transient liver and kidney abnormalities. Estimated nickel doses for these workers ranged from about 7 to 36 mg/kg.

Several studies indicate that ingestion of a single oral dose of nickel can result in dermatitis in nickel-sensitive individuals (ATSDR, 1995). Dermal reactions can include generalized eruptions of maculopapular vesicles, typically affecting the elbows, sides of the neck, armpits, eyelids, and the genital area (WHO, 1991). A vesicular eczema of the hand may also develop. The prevalence of nickel sensitivity is about 1% in men and 10% in women (WHO, 1991). Among the various studies of dermal sensitivity to nickel, the lowest single oral dose reported to elicit a reaction is 0.009 mg/kg (Cronin et al., 1980). In another study, women with known nickel sensitivity and hand eczema were fed a diet with elevated nickel (0.007 mg/kg) for a total of four days (Nielsen et al., 1990). Hand eczema was exacerbated in half of the women by the end of the 4-day diet treatment, and in 10 of 12 a week later. Time to resolution of symptoms was not indicated in the studies reviewed.

The USEPA RfD for nickel is 0.02 mg/kg/day. In discussing this RfD, the USEPA acknowledges that this value may not be protective for nickel-sensitive individuals. If the risk management goal focuses instead on health endpoints occurring at higher exposures, the only real source of human data is the Sunderman et al. (1988) report. While the symptoms of poisoned workers in this study were predominantly gastrointestinal and resolved within a day or two, 10 of 25 were hospitalized for 5 days. Consequently, this should be regarded as a serious toxicity episode. The lower end of the range of estimated doses was 7 mg/kg, and a health protective dose for acute exposure, particularly for children, should be well below this value. Tentatively, this dose could be reduced by a factor of 100, yielding an acute dose of 0.07 mg/kg. This would correspond to a residential acute exposure SCTL of approximately 105 ppm.

Vanadium. Information on the toxicity of vanadium in humans is limited, and much of what is available concerns effects on the respiratory tract of inhaling vanadium dusts in an occupational setting. In the early part of this century, vanadium was used medicinally in doses of 1 to 8 mg. Higher dosages (e.g., 75 to 125 mg/day) were tested for effects on cholesterol, but produced clear evidence of toxicity (Louria et al., 1972). Human lethal doses of vanadium were reported as 0.86-1.7 mg/kg (Stokinger, 1981). As with other metals, the toxicity of vanadium probably depends on its form. Humans who were given 0.47-1.3 mg/kg vanadium (in the form of ammonium vanadyl tartrate) for 45-68 days experienced gastrointestinal distress (abdominal cramping and diarrhea) (Dimond et al., 1963). Some subjects in this study also complained of fatigue or lethargy, and three participants noted increased dysmenorrhea.

The USEPA has developed an oral RfD for vanadium pentoxide of 0.009 mg/kg-day based on changes in hair cystine content in rats chronically fed vanadium pentoxide in the diet for 2.5 years. Arguably, this RfD may not be particularly valuable in determining what constitutes a safe acute dose of vanadium in humans. The difficulty in determining a safe acute vanadium dose is that there is little data with which to work. The lower end of the range of doses reported to produce gastrointestinal effects from vanadium ingestion (0.47 mg/kg) is only marginally less than the reported lower end of the range of lethal doses. The reliability of the lethal dose information provided by Stokinger is uncertain because of the absence of documentation. Several clinical studies have been conducted using vanadium doses within the lethal range reported by Stokinger, and while some side effects may have occurred, clearly there was not massive lethality. This apparent discrepancy might be explained by differences in the toxicity of different forms of vanadium – clinical studies conducted with less toxic forms (for obvious reasons) and Stokinger reporting lethalities from more toxic forms – but information are lacking to verify this. A vanadium dose of 0.01 mg/kg would be nearly 50-fold less than the lowest dose reported to produce gastrointestinal and

other symptoms and about 80-fold less than the lowest reported lethal dose. Using this value to calculate a residential SCTL based on acute exposure results in a soil vanadium concentration of 15 ppm.

Caveats in the Acute Toxicity Analysis

There are several caveats to the above analysis that should be acknowledged. These include the following:

- The focus of the analysis was intentionally on data relevant to acute (single dose) exposure in humans. In our opinion, these data are most pertinent in assessing potential human health risks from acute ingestion of soils. These data are limited, however, and there are several uncertainties inherent in human studies. Principal among these is the fact that doses must nearly always be estimated. The only alternative to this approach would be to use animal data. While dose estimation is more precise, studies of acute toxicity in animals are usually restricted to death as the endpoint, and extrapolation of safe human doses from lethal doses in animals is an extremely uncertain process.

- It is quite possible that some poisoning reports or other relevant data were missed in this analysis, particularly those appearing during the first half of this century that are not accessible through computerized search vehicles such as Medline or Toxline. Finding older literature citations (pre-1966) is both time-consuming and labor-intensive, and an exhaustive search was not possible within the time constraints of this analysis.

- The chemicals selected for this analysis were those identified by Calabrese et al. (1997) as representing a potential acute toxicity problem for children. While these are regarded as the most likely to pose an acute toxicity hazard, it is possible that there are other chemicals for which a similar concern is warranted.

Should evidence arise that a chemical might pose an acute toxicity hazard for small children, the residential SCTL for that chemical should be reconsidered.

- None of the studies in the analysis involved exposure to the chemical in soil. In most of the cases reported, the chemical was ingested in a soluble form, and the dose from soil required to produce equivalent toxicity may be much different. Presence of the chemical in soil in an insoluble form, or interactions between the chemical and soil that reduce its aborption from the gut could significantly reduce toxicity.

Calculating Residential SCTLs Based on Acute Toxicity

Based on the information provided above and discussions with FDEP regarding health protection goals, provisional acute oral reference doses were selected for each of the eight chemicals. These are tabulated below, along with their corresponding acute toxicity SCTL. For comparison purposes, the residential SCTL based on chronic exposure is also provided.

Chemical	Acute Oral Reference Dose mg/kg	Residential SCTL	
		Based on Acute Toxicity (mg/kg)	Based on Chronic Exposure (mg/kg)
Barium	7.0E-02	110	5200
Cadmium	1.00E-02	75	75
Copper	7.00E-02	110	5500
Cyanide	2.00E-02	30	570
Fluoride	3.30E-01	500	4700
Nickel	7.00E-02	110	1500
Phenol	6.00E-01	900	31000
Vanadium	1.00E-02	15	510

There are several points relevant to the application of these SCTLs:

1. These values are based on protection of small children. Examples of situations where they would be applicable would be residential sites, playgrounds, and daycare facilities. They would not be relevant for industrial sites.

2. For chemicals which occur naturally in soils (e.g., barium), the acute toxicity SCTLs may be below natural background levels for a site. If the SCTL value is lower than natural background, a site-specific SCTL should be set equal to the naturally-occurring background concentration.

3. In the absence of specific information regarding the form of a chemical present at a site or its bioavailability, a conservative approach in developing default SCTLs is warranted. In developing these SCTLs, we have assumed that the most toxic form of the chemical is present in soils and that bioavailability is equivalent to the chemical in solution. For many of these chemicals, toxic potential can vary dramatically with the form of the chemical, e.g., whether the chemical is present in a soluble or non-soluble form. Presumably for soils, soluble forms would be removed through leaching and, for "mature" sites, the assumption that all of the chemical present is soluble and toxic may be quite conservative. In some cases, the assumption that all of the chemical present is in a toxic form could lead to an SCTL that is below natural background concentrations. For specific sites, a determination of the form of chemical present and/or its bioavailability may be warranted, and might provide justification for higher acute toxicity SCTLs.

III. Development of SCTLs Based on Migration to Groundwater (Leaching)

A. Equation for calculating SCTLs based on leachability

The migration to groundwater pathway was developed to identify chemical concentrations in soil that have the potential to contaminate groundwater. The migration of chemicals of concern from soil to groundwater can be envisioned as a two-stage process: the release of chemicals of concern in soil into leachate, and the transport of chemicals of concern through the soil to and within an underlying aquifer. The method for calculating a leachability-based SCTL is taken from the SSG and incorporates a standard linear equilibrium soil/water partition equation to estimate release of chemicals of concern in soil leachate and a dilution factor to account for dilution of soil leachates in an aquifer. The SCTLs are then back-calculated from applicable groundwater cleanup target levels (GWCTLs). In circumstances where contaminated soil is adjacent to surface water bodies, GWCTLs based on protection of the surface water body can also be employed. The GWCTL is multiplied by a dilution attenuation factor (DAF) to derive a target leachate concentration. The equation for calculating SCTLs based on migration of chemicals of concern from soil to groundwater is shown in Figure 8.

B. Input values for leachability

The equation for the calculation of SCTLs based on leachability requires the input of several chemical-specific factors. These values include the organic carbon normalized soil-water partition coefficient for organic compounds (K_{oc}) and the Henry's Law constant (HLC). Because the relationship between soil organic carbon content and soil sorption is not as robust for inorganics (metals) as it is for organic chemicals, the development of leachability-based SCTLs for inorganics requires K_d values (soil-water partition coefficient) for inorganic constituents. It is sometimes necessary to calculate values such as K_{oc} or HLC when they are not otherwise available. In these cases, additional physical/chemical values such as the density

(d), water solubility (S), or the adsorption coefficient (K) are needed. Different references for physical/chemical parameters can cite very different values and, as discussed in Section II B above, a hierarchy of sources for these values is recommended. Chemical-specific values for d, S, and HLC are preferentially selected from the *Superfund Chemical Data Matrix* (SCDM) (EPA/540/R-96/028). The primary source for K_{oc} values is the SCDM. Secondarily, K_{oc} values are calculated from K_d values in the SCDM according to the equation $K_{oc} = K_d/0.002$. When data are unavailable from the SCDM, the Hazardous Substance Database (HSDB), ATSDR *Toxicological Profiles*, or other reference texts (in that order of preference) are used.

Currently, generating K_d values for metals is difficult. For this reason, the USEPA suggests using an equilibrium geochemical speciation model (MINTEQ) for estimating these values. However, modeled values may not accurately represent the potential for leachability because, unlike organic compounds, K_d values (soil/water partition) for metals are significantly affected by a variety of soil conditions. Iron oxide content, soil organic matter content, cation exchange capacity, pH, oxidation-reduction conditions, and major ion chemistry, are significant parameters that can affect the soil/water partition of metals and hence the leachability values. Therefore, in some instances, a leach test may be more useful than an SCTL based on a partitioning equation (see Section III C below).

C. Developing site-specific SCTLs based on leachability

In Florida, soil types vary significantly across the state, from quartz sand to muck, and leaching potential covers an extreme range. The default soil characteristics used to develop generic leachability-based SCTLs lie somewhere in the middle of this range. Development of site-specific leachability-based SCTLs can be quite important, because the soil characteristics at a given site may bear little resemblance to the default assumptions. It should be recognized, however, that

site-specific SCTLs for leachability calculated using the equation in Figure 8 can be either higher or lower than the generic values because the default assumptions are not skewed toward the conservative end of the range of values possible in Florida. Site-specific characteristics important in calculating a leachability-based SCTL include the f_{oc}, θ_w, θ_a, n, and ρ_b, and procedures for developing site-specific SCTLs are described in the SSG (USEPA, 1996a).

Another parameter that is important in calculating leachability-based SCTLs is the dilution attenuation factor (DAF). The USEPA arrived at a default DAF using results from OSW's EPACMTP Model. This model utilized a Monte Carlo analysis with input parameters obtained from nationwide surveys of waste sites and from applying the SSL dilution model to 300 groundwater sites across the country. The model distributions were repeated 15,000 times for each scenario and a cumulative frequency distribution of DAF values was generated. The results of the accompanying sensitivity analysis indicated that climate, soil type, and size of the contaminated area have the greatest effect on the DAF. To gain further information on the national range and distribution of DAF values, the dilution model was applied to two large surveys of hydrogeologic site investigations. These were the American Petroleum Institute's hydrogeologic database (HGDB) and USEPA's database of conditions at DNAPL sites. DAF modeling information from a combination of 300 sites indicated that the geometric mean DAF of all sites combined was 20 for a source area of 0.5 acre. This value was carefully selected using a "weight of evidence" approach which best represents a nationwide average and is therefore regarded as an acceptable default for use at most sites. In only special circumstances, such as very complex sites, a site-specific DAF can be calculated, but the aquifer hydraulic conductivity, the hydraulic gradient, the mixing zone depth, the infiltration rate, and the source length parallel to groundwater flow must be determined (USEPA, 1996a).

It has been demonstrated that the leachability-based SCTL partition equation can be used to derive leaching-based SCTLs for organic compounds. However, inorganics present at cleanup sites can also pose risks to an underlying aquifer. To derive leachability-based values for most metals is more complicated, however. Unlike organic compounds, K_d values (soil/water partition coefficient) for metals are significantly affected by a variety of soil conditions. In some instances, a leach test may be more useful than the partitioning method. Therefore, FDEP recommends the use of a leach test instead of the soil/water partition equation. However, site-specific leachability values for metals derived using K_d values estimated with the MINTEQA2 model are considered acceptable leachability SCTLs, if oily wastes are not present. If the decision is made to determine site-specific leachate values, the Synthetic Precipitation Leaching Procedure (SPLP), developed to model an acid rain leaching environment, can be used when there are no oily soil chemicals of concern.[16] When oily wastes are present, FDEP specifically requires the use of the Toxicity Characteristic Leaching Procedure (TCLP) for cleanup of these sites. While this procedure was developed to model leaching from the bottom of a landfill, it more closely estimates leaching from soil contaminated with oily constituents, such as used oil or similar petroleum products.

IV. Special Cases

A. Development of SCTLs for Ammonia

Ammonia is an inorganic compound that exists in a state of equilibrium between un-ionized ammonia (NH_3) and ammonium ion (NH_4^+). The state of ionization, and thus the percentages present as NH_3 versus NH_4^+, is generally dependent upon the pH of the medium (i.e., soil or water), and to a lesser degree upon temperature. Higher pH levels result in a greater percentage as NH_3 and

[16] Direct leachability testing should include a minimum of three representative soil samples, pursuant to USEPA Test Method 1312 (SPLP). Leachate concentrations from SPLP should not exceed the applicable GWCTLs. SPLP should not be used for chemicals of concern derived from used oil or similar petroleum products.

lower pH favors the formation of NH_4^+. Current literature suggests that ammonia as NH_3 is the more toxic form of this compound, and toxicity values exist only for NH_3 (ATSDR, 1990). Current analytical methods detect total ammonia (NH_3 + NH_4^+), however, and interpretation of this value from a toxicological perspective requires an estimation of the NH_3 content based on pH and temperature.

The residential and industrial SCTLs for ammonia are 550 and 3700 mg/kg, respectively, and the leachability value is 570 mg/kg. The leachability value is based on an acceptable groundwater cleanup target level (GWCTL) of 2800 µg/L ammonia as NH_3, derived by using the standard FDEP equation for the calculation of health-based groundwater cleanup target levels and an oral minimal risk level (MRL) of 0.4 mg/kg/day (ATSDR, 1990)[17]. The residential and industrial SCTLs for ammonia were calculated using the oral MRL and the inhalation reference dose of 0.03 mg/kg-day, which was derived from the inhalation reference concentration of 0.1 mg/m^3 (IRIS) assuming an inhalation rate of 20 m^3/day and a body weight of 70 kg.

When leachability is calculated according to the equation in Figure 8 using the default parameters listed and the appropriate chemical-physical constants, a value of 570 mg/kg is derived. The equation and defaults, however, do not take into account that ammonia generally exists as a pH dependent ratio of NH_3 to NH_4^+. Site-specific soil considerations may greatly affect the ionization of ammonia and therefore the potential for leaching. Leachability values based on the GWCTL may require adjustment, on a site-specific basis, to reflect leachability at a specified pH.

[17] It should be noted that the oral MRL for ammonia currently listed in the ATSDR Toxicant Profile for Ammonia is 0.3 mg/kg/day. This value was derived by adjusting the NOAEL of 40 mg/kg/day by an uncertainty factor of 100 and an adjustment factor for intermittent exposure. Per discussion with John Wheeler at ATSDR it was indicated that the use of an intermittent exposure factor in the extrapolation of the NOAEL to the MRL is no longer recommended. As such, the ATSDR recommended oral MRL for ammonia has been modified to 0.4 mg/kg/day and the drinking water MRL is 14 mg/L. Although an MRL of 14 mg/L exists for ammonia in drinking water, a value of 2.8 mg/L was used here since it incorporates a relative source contribution factor of 20%, which FDEP includes in the development of groundwater guidance concentrations for non-carcinogens.

The SCTLs for direct exposure to soil are based on the assumption that ammonia is present in the soil as NH_3. However, as stated above, the NH_3/NH_4^+ ratio will vary with soil pH. Ammonia as NH_3 has a significant capacity to volatilize while NH_4^+ will be fully dissolved in water within the soil matrix. Thus, when the NH_3/NH_4^+ ratio is primarily NH_4^+, volatilization will be minimal. Under these circumstances, the SCTL will be driven primarily by the oral component. Therefore, in those instances where volatilization is minimal (see table below), the ammonia SCTLs based on oral and dermal exposure pathways only are 31,000 mg/kg and 820,000 mg/kg for residential and industrial scenarios, respectively. Alternatively, at higher soil pH levels, the SCTL for ammonia is predominantly driven by the inhalation component of the equation, and therefore reflects the capacity of these compounds to volatilize. When calculating an SCTL for ammonia in these cases, the inhalation component of the SCTL equation must be adjusted to account for the proportion of ammonia available for volatilization. Thus, to accurately select an SCTL for ammonia, the soil pH must be known, otherwise one must make a conservative assumption and use the default SCTLs, which are based on 100% NH_3. The table below provides SCTLs for ammonia based on soil pH at an ambient soil temperature of 25°C

Range of SCTLs for Direct Exposure to Soil (at 25°C)

Soil pH*	Percent Un-Ionized Ammonia (NH_3)**	Residential (mg/kg)‡	Industrial (mg/kg)‡
	100%	**550**	**3700**
9.5	64.3%	855	5750
8.5	15.2%	3620	24300
7.5	1.77%	31000	209000
6.5	0.18%	31000	820000
6.0	0.0568%	31000	820000
5.5	0.0180%	31000	820000
5.04	0.00624%	31000	820000
5.0	0.00569%	31000	820000

*Increasing ammonia concentrations will tend to increase soil pH. Situations of low soil pH and high ammonia concentrations while theoretically possible, are unlikely to exist at contaminated sites.

**USEPA: Aqueous Ammonia Equilibrium-Tabulation of Percent Un-Ionized Ammonia, EPA/600/3-79/091.

‡Calculated by dividing 550 mg/kg or 37000 mg/kg by the percent corresponding to the selected pH but limited by the oral route contribution (31000 mg/kg residential and 820000 mg/kg industrial).

B. Development of the Direct Exposure SCTLs for Lead

1. Residential

The residential direct exposure SCTL for lead, is based on OSWER Directive #9355.4–12 *Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Correction Action Facilities* (USEPA, 1994a). The guidance level for lead in soils described in this directive was calculated with the USEPA's Integrated Exposure Uptake Biokinetic (IEUBK) Model for Lead in Children (USEPA, 1994b). This model takes into account the multimedia nature of lead exposure in children and calculates distributions of exposure and risk likely to occur at a site using default assumptions. Research indicates that young children are particularly sensitive to the effects of lead and require specific attention in the development of an SCTL for lead. Thus, an SCTL that is protective for young children is expected to be protective for older persons as well. The 400 mg/kg guidance level for lead in residential soils cited in the 1994 OSWER directive was calculated such that a hypothetical child would have an estimated risk of no more than 5% of exceeding the 10 µg/dl blood lead concentration. This blood lead level is based on research conducted by the Centers for Disease Control and EPA that associate blood lead levels exceeding 10 µg/dl with health effects in children.

2. Industrial

To calculate the industrial direct exposure SCTL for lead, the approach outlined in *Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil* (USEPA, 1996d) (TRW) was followed. This guidance document provides methodology for assessing risks associated with non-residential adult exposures to lead in soil based on the potentially most sensitive workers – women of child-bearing age. The methodology focuses on estimating fetal blood lead concentrations in pregnant women exposed to lead contaminated soil. That is, the model is designed to estimate an acceptable soil lead concentration to which women

could be exposed, while pregnant, without the risk of producing unacceptable blood lead concentrations in the developing fetus, i.e., levels above 10 µg/dL.

This method is based, in part, on a simplified representation of lead biokinetics assumed to predict quasi-steady state blood lead concentrations among adults (women of child-bearing age) who are relatively consistently exposed to a site. A constant of proportionality between fetal blood lead concentration at birth and maternal blood lead concentration is also employed. As such, this model provides a means for consistency in calculating acceptable industrial soil lead levels.

A series of equations, discussed in detail in the TRW document, are used to derive an acceptable lead concentration in soil. $PbB_{a,c,g,}$ is derived first. This value represents the risk-based goal for the central estimate of blood lead concentrations in adult women that ensures the fetal blood lead concentration goal of 10 µg/dL is not exceeded. This value is derived from the equation below in which $PbB_{fetal,0.95,goal}$ = 10, the goal for the 95th percentile blood lead concentration (µg/dL) among fetuses born to women having exposures to the specified site soil concentration; R = 0.9, the constant of proportionality between fetal blood lead concentration at birth and maternal blood lead concentration; and GSD, the geometric standard deviation for blood lead concentrations among adults having exposures to similar on-site lead concentrations but having non-uniform response to site lead (intake, biokinetics) and non-uniform off-site lead exposures. Ideally the GSD used in the model is estimated from the population of concern at the site. In the absence of site-specific blood lead data, the TRW recommends estimates of 1.8-2.1 µg/dL as the plausible range based on an evaluation of available blood lead concentration data for different types of populations.

$$PbB_{a,c,g} = \frac{PbB_{fetal,0.95,goal}}{GSD_{i,adult}^{1.645} \times R_{fetal/maternal}}$$

A value of 1.8 is recommended by the TRW for homogeneous populations whereas 2.1 is recommended for heterogeneous populations. For the default industrial direct exposure SCTL, heterogeneity of populations at a workplace was assumed. Thus, the GSD selected from the recommended defaults is 2.1 µg/dL, resulting in a $PbB_{a,c,g}$ = 3.28 µg/dL. Next, the target blood lead concentration ($PbB_{a,c,g}$) is employed along with several other variables to calculate PbS, the SCTL.

Technical Review Workgroup Model

$$PbS = \frac{\left(PbB_{a,c,g} - PbB_{a,0}\right) \times AT}{BKSF \times IR_{soil} \times AF_{soil} \times EF_{soil}}$$

where :

$PbB_{adult,\ central,\ goal} = 3.28 - 4.23\ \mu g/dL$

$PbB_{adult,\ 0\ (background)} = 1.7 - 2.2\ \mu g/dL$

$AT = 365$ days/year

BKSF (biokinetic slope factor) = 0.4 µg/dL per µg/day

IR_{soil} (ingestion rate) = 0.05 g/day

AF_{soil} (absorption factor) = 0.12 [unitless]

EF_{soil} (exposure frequency) = 219 days/year

In this equation, the baseline blood lead concentration, $PbB_{a,0}$, represents the adult blood lead concentration (µg/dL) in the absence of site exposures. It is intended to be a best estimate of a reasonable central value of blood lead concentrations in women of child-bearing age who are not exposed to lead-contaminated non-residential soil or dust at the site. Ideally, this value is obtained from a representative sample of adult women from the area. In the absence of site-specific data, the TRW recommends a range of 1.7-2.2 µg/dL, representative of women aged 20-49 years. For Chapter 62-777, F.A.C. an average value of 1.95 µg/dL was selected, taken from the middle of the range of values provided by the TRW. In the TRW model, the baseline $PbB_{a,0}$ is subtracted from the

target $PbB_{a,c,g}$ to obtain a value representative of the allowable increase in blood lead level that will not cause an exceedance of the target blood lead level. Using the default values selected for Chapter 62-777, F.A.C., this value equals 1.33 µg/dL (3.28 µg/dL minus 1.95 µg/dL). Additionally, the model uses an averaging time of 365 days/year, an exposure frequency of 219 days/year (based on USEPA guidance for average time spent at work by both full-time and part-time workers), and an exposure duration of one year (not shown in the denominator of the equation because it is 1). The other variables are defined as follows:

- BKSF = Biokinetic slope factor relating increase in the typical adult blood lead concentration to average daily lead uptake. Recommended value is 0.4 µg/dL blood lead increase per µg/day lead uptake.
- AF_{soil} = Fraction of lead in soil ingested daily that is absorbed from the gastrointestinal tract. TRW recommends a default value of 0.12 based on the assumption that the absorption factor for soluble lead is 0.2 and that the relative bioavailability of lead in soil compared to soluble lead is 0.6, thus 0.2 x 0.6 = 0.12.
- IR_{soil} = Intake rate of soil. Recommended value is 0.05 g/day*.

*Although the 0.05 g/day default value addresses all occupational soil intake by an individual, whether directly from soil or indirectly through contact with dust, risks associated with more intensive soil contact activities such as construction and excavation are not included. Site-specific data on soil contact intensity should be considered when evaluating the applicability of the default industrial direct exposure SCTL. Depending on the duration of exposure and type of exposure scenario being evaluated, larger ingestion rates may be more appropriate and should, therefore, be employed.

Using these standard equations with the recommended defaults and values selected to best represent a contaminated site, a value of 920 mg/kg lead is calculated as the industrial direct exposure SCTL.

For Chapter 62-777, F.A.C.:

$$PbB_{a,c,g} = \frac{10\ \mu g/dL}{2.1^{1.645} \times 0.9} = 3.28\ \mu g/dL$$

$$SCTL_{Pb} = \frac{(3.28\ \mu g/dL - 1.95\ \mu g/dL) \times 365\ days/yr}{0.4\ \mu g/dL\ per\ \mu g/day \times 0.05\ g/day \times 0.12 \times 219\ days/yr} = 923.6 \text{ or } 920\ mg/kg$$

Applying other default values provided in the TRW documentation to the model results in a range of possible lead soil cleanup target levels, from 750 mg/kg to 1800 mg/kg. Following the guidance in the TRW document for selection of appropriate default values based on population statistics and descriptions, and provided the soil intake rate is 0.05 g/day, a soil lead value within this range can be derived on a site-specific basis.

The TRW recognizes that other models with more detailed blood lead kinetics could provide better estimates regarding brief acute exposures or intermittent exposure patterns. However, pending further development and evaluation of other biokinetic models, the methodology provided by the TRW is the recommended approach.

C. Development of SCTLs for Methyl Mercury

Most USEPA-approved analytical methods for determining methyl mercury concentrations in soil are based on measurement of total organic mercury. As such, soil concentrations reported as methyl mercury may, in fact, include or consist of other organic mercury species. Recognizing this, the default SCTL for methyl mercury was developed in a way that would be protective for organic mercury species in general. Data regarding the comparative toxicity of organic murcurial compounds is limited. Only methyl mercury has a RfD from the USEPA, and this value was tentatively assumed to be applicable to all forms of organic mercury. The physical/chemical properties of organic mercury compounds can vary significantly, however. Dimethyl mercury has much greater volatility than methyl mercury, and the dose received from a given concentration in soil would be much

higher. In order to develop an SCTL protective under circumstances of dimethyl mercury exposure, the physical/chemical properties of this compound were used to derive the default methyl mercury SCTL. Under site-specific circumstances where analytical methodology capable of reliably speciating organic mercury is employed, alternative SCTLs directed to specific forms (including methyl mercury) could be utilized.

D. Development of SCTLs for Total Recoverable Petroleum Hydrocarbons (TRPHs)

The TRPH SCTLs were developed to be used in a two-tiered approach with a primary TRPH soil cleanup target level as the starting value. Primary TRPH values for direct exposure and leachability included in Table 2 are based on the assumption that the TRPHs consist exclusively of aromatic hydrocarbons in the >C_8-C_{10} range. While SCTLs derived for hydrocarbons in the C_5-C_7 range are the most restrictive (Table C4, Appendix C), these compounds are not detected using the Florida Petroleum Residual Organic (FL-PRO) analysis. Currently, the FL-PRO method of TRPH analysis is limited to measuring the concentration of mixed petroleum hydrocarbons in the range of C_8-C_{40}. While FL-PRO does not measure hydrocarbons in the C_5-C_7 range, the most toxic and prevalent COCs among these are addressed by other analyses and individual cleanup target levels. Therefore, the primary TRPH SCTL is based on the most conservative and health protective carbon range that can be detected by FL-PRO, the >C_8-C_{10} carbon range.

TRPH SCTLs are derived from chemical/physical parameters and toxicity values assigned to each carbon range as described in Appendix C. It should be noted, however, that while the >C_8-C_{10} aromatic fraction has the most restrictive inhalation RfD, the >C_{16} aromatic fractions currently have the most restrictive oral RfD (TPHCWG, 1997b; Table C3, Appendix C). Therefore, under certain site-specific conditions in which there may be elevated soil moisture and fraction

organic carbon, such that volatilization would not be a significant consideration relative to ingestion, the potential exists for the $>C_{16}$ aromatic hydrocarbon concentrations to pose the greater risk.

If the primary SCTL is exceeded, it is proposed that a second tier would be employed, such that each TRPH sub-classification would possess its own SCTL. However, individual SCTLs could not be set for each C-range because the current FL-PRO method of analysis cannot distinguish between aliphatics and aromatics. Additionally, the quantitation of individual compounds is difficult and not confirmative, as only "fresh" petroleum hydrocarbons provide distinct peaks in analysis by gas chromatography (GC). Weathered petroleum hydrocarbons such as those found at contaminated sites, produce "hills" not peaks when analyzed by GC. Therefore, one can only obtain an estimate over the entire C-range of the fraction of petroleum hydrocarbons that are present in the sample. The Massachusetts Department of Environmental Protection (MADEP) and the Total Petroleum Hydrocarbon Criteria Working Group (TPHCWG) have developed analytical methods for separating aliphatics and aromatics into fractions based on equivalent carbon number. These have recently been approved by the FDEP for use in Florida.

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(This address provides information on how to subscribe to EHRAV.)

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3. HALs: Drinking Water Regulations and Health Advisories (EPA/822/B-96/002)
http://www.epa.gov/OST/Tools/dwstds1.html

4. HSDB: Hazardous Substance Database
http://www.nlm.nih.gov/pubs/factsheets/hsdbfs.html
(This address provides information on how to subscribe to HSDB.)

5. IRIS: Integrated Risk Information System
http://www.epa.gov/ngispgm3/iris/Substance_List.htm

6. MINTEQA2: Metal Speciation Equilibrium for Surface and Groundwater
http://www.epa.gov/earth100/records/a00164.html
(This address provides information on how to obtain a copy of this model.)

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http://www.epa.gov/reg3hwmd/riskmenu.htm?=Risk+Guidance

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VIII. Figures & Tables

Table 1 - Technical Report

Groundwater and Surface Water Cleanup Target Levels

Contaminant	CAS #	Groundwater Criteria (ug/L)	Freshwater Surface Water Criteria (ug/L)	Marine Surface Water Criteria (ug/L)	Groundwater of Low Yield/Poor Quality Criteria (ug/L)	Target Organ/System or Effect
Acenaphthene	83-32-9	20 *Minimum Criteria Organoleptic*	3 *Toxicity Criteria*	3 *Toxicity Criteria*	200	-Liver
Acenaphthylene	208-96-8	210 *Minimum Criteria Systemic Toxicant*	0.031 *62-302*	0.031 *62-302*	2100	-Body Weight -Liver
Acephate	30560-19-1	7.5 *Minimum Criteria PQL*	190 *Toxicity Criteria*	190 *Toxicity Criteria*	75	-Carcinogen -Neurological
Acetone	67-64-1	700 *Minimum Criteria Systemic Toxicant*	1692 *Toxicity Criteria*	1692 *Toxicity Criteria*	7000	-Kidney -Liver -Neurological
Acetonitrile	75-05-8	500 *Minimum Criteria PQL*	19983 *Toxicity Criteria*	19983 *Toxicity Criteria*	5000	-Blood -Liver
Acetophenone	98-86-2	700 *Minimum Criteria Systemic Toxicant*	7750 *Toxicity Criteria*	7750 *Toxicity Criteria*	7000	-None Specified
Acifluorfen, sodium [or Blazer]	62476-59-9	1 *Minimum Criteria Health Advisory Level*	190 *Toxicity Criteria*	190 *Toxicity Criteria*	10	-Kidney -Mortality
Acrolein	107-02-8	14 *Minimum Criteria Systemic Toxicant*	0.4 *Toxicity Criteria*	0.4 *Toxicity Criteria*	140	-Nasal
Acrylamide	79-06-1	1 *Minimum Criteria PQL*	5.98 *Human Health*	5.98 *Human Health*	10	-Carcinogen -Neurological
Acrylonitrile	107-13-1	1 *Minimum Criteria PQL*	49.9 *Human Health*	49.9 *Human Health*	10	-Carcinogen -Nasal -Reproductive
Alachlor	15972-60-8	2 *Primary Standard Carcinogen*	0.596 *Human Health*	0.596 *Human Health*	20	-Blood -Carcinogen
Aldicarb [or Temik]	116-06-3	7 *Minimum Criteria Systemic Toxicant*	0.85 *Toxicity Criteria*	0.85 *Toxicity Criteria*	70	-Neurological
Aldicarb sulfone	1646-88-4	7 *Minimum Criteria Systemic Toxicant*	46 *Toxicity Criteria*	46 *Toxicity Criteria*	70	-Neurological
Aldicarb sulfoxide	1646-87-3	7 *Minimum Criteria Health Advisory Level*	4.2 *Toxicity Criteria*	4.2 *Toxicity Criteria*	70	-Neurological
Aldrin	309-00-2	0.005 *Minimum Criteria PQL*	0.00014 *62-302 annual avg; 3.0 max*	0.00014 *62-302 annual avg; 1.3 max*	0.05	-Carcinogen -Liver

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Groundwater and Surface Water Cleanup Target Levels

Contaminant	CAS #	Groundwater Criteria (ug/L)	Freshwater Surface Water Criteria (ug/L)	Marine Surface Water Criteria (ug/L)	Groundwater of Low Yield/Poor Quality Criteria (ug/L)	Target Organ/System or Effect
Allyl alcohol	107-18-6	250 *Minimum Criteria PQL*	5 *Toxicity Criteria*	5 *Toxicity Criteria*	2500	-Kidney -Liver
Allyl chloride	107-05-1	35 *Minimum Criteria Systemic Toxicant*	*NA*	*NA*	350	-Neurological
Aluminum	7429-90-5	200 *Secondary Standard Systemic Toxicant*	13 *Toxicity Criteria*	13 *Toxicity Criteria*	2000	-Body Weight
Aluminum phosphide	20859-73-8	50 *Minimum Criteria PQL*	6.5 *Toxicity Criteria*	6.5 *Toxicity Criteria*	500	-Body Weight
Ametryn	834-12-8	63 *Minimum Criteria Systemic Toxicant*	6.2 *Toxicity Criteria*	6.2 *Toxicity Criteria*	630	-Liver
Ammonia	7664-41-7	2800 *Minimum Criteria Systemic Toxicant*	20 *62-302*	*NA*	28000	-Respiratory
Anilazine [or Dyrene]	101-05-3	2.8 *Minimum Criteria Systemic Toxicant*	*NA*	*NA*	28	-None Specified
Aniline	62-53-3	6.1 *Minimum Criteria Carcinogen*	4 *Toxicity Criteria*	4 *Toxicity Criteria*	61	-Blood -Carcinogen
Anthracene	120-12-7	2100 *Minimum Criteria Systemic Toxicant*	0.3 *Toxicity Criteria*	0.3 *Toxicity Criteria*	21000	-None Specified
Antimony	7440-36-0	6 *Primary Standard Systemic Toxicant*	4300 *62-302*	4300 *62-302*	60	-Blood -Mortality
Aramite	140-57-8	10 *Minimum Criteria PQL*	3 *Toxicity Criteria*	3 *Toxicity Criteria*	100	-Carcinogen
Arsenic	7440-38-2	~~50~~ 10 jan. 2005 *Primary Standard Carcinogen*	50 *62-302*	50 *62-302*	500	-Carcinogen -Cardiovascular -Skin
Atrazine	1912-24-9	3 *Primary Standard Carcinogen*	1.8 *Human Health*	1.8 *Human Health*	30	-Body Weight -Carcinogen
Azobenzene	103-33-3	4 *Minimum Criteria PQL*	0.559 *Human Health*	0.559 *Human Health*	40	-Carcinogen
Barium	7440-39-3	2000 *Primary Standard Systemic Toxicant*	*b*	*b*	20000	-Cardiovascular

Table 1 - Technical Report

Groundwater and Surface Water Cleanup Target Levels

Contaminant	CAS #	Groundwater Criteria (ug/L)	Freshwater Surface Water Criteria (ug/L)	Marine Surface Water Criteria (ug/L)	Groundwater of Low Yield/Poor Quality Criteria (ug/L)	Target Organ/System or Effect
Bayleton	43121-43-3	210 *Minimum Criteria Systemic Toxicant*	500 *Toxicity Criteria*	500 *Toxicity Criteria*	2100	-Blood -Body Weight
Benomyl	17804-35-2	35 *Minimum Criteria Systemic Toxicant*	0.3 *Toxicity Criteria*	0.3 *Toxicity Criteria*	350	-Developmental
Bensulide	741-58-2	46.2 *Minimum Criteria Systemic Toxicant*	*NA*	*NA*	462	-None Specified
Bentazon	25057-89-0	210 *Minimum Criteria Systemic Toxicant*	*NA*	*NA*	2100	-Blood
Benzaldehyde	100-52-7	700 *Minimum Criteria Systemic Toxicant*	53.5 *Toxicity Criteria*	53.5 *Toxicity Criteria*	7000	-Gastrointestinal -Kidney
Benzene	71-43-2	1 *Primary Standard Carcinogen*	71.28 *62-302 annual average*	71.28 *62-302 annual average*	10	-Carcinogen
Benzenethiol	108-98-5	20 *Minimum Criteria PQL*	*NA*	*NA*	200	-Liver
Benzidine	92-87-5	400 *Minimum Criteria PQL*	*NA*	*NA*	4000	-Carcinogen
Benzo(a)anthracene	56-55-3	0.2 *Minimum Criteria PQL*	0.031 *62-302 annual average*	0.031 *62-302 annual average*	2	-Carcinogen
Benzo(a)pyrene	50-32-8	0.2 *Primary Standard Carcinogen*	0.031 *62-302 annual average*	0.031 *62-302 annual average*	2	-Carcinogen
Benzo(b)fluoranthene	205-99-2	0.2 *Minimum Criteria PQL*	0.031 *62-302 annual average*	0.031 *62-302 annual average*	2	-Carcinogen
Benzo(g,h,i)perylene	191-24-2	210 *Minimum Criteria Systemic Toxicant*	0.031 *62-302 annual average*	0.031 *62-302 annual average*	2100	-Neurological
Benzo(k)fluoranthene	207-08-9	0.5 *Minimum Criteria Carcinogen*	0.031 *62-302 annual average*	0.031 *62-302 annual average*	5	-Carcinogen
Benzoic acid	65-85-0	28000 *Minimum Criteria Systemic Toxicant*	9000 *Toxicity Criteria*	9000 *Toxicity Criteria*	280000	-None Specified
Benzotrichloride	98-08-7	0.06 *Minimum Criteria PQL*	0.0029 *Human Health*	0.0029 *Human Health*	0.6	-Carcinogen

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Groundwater and Surface Water Cleanup Target Levels

Contaminant	CAS #	Groundwater Criteria (ug/L)	Freshwater Surface Water Criteria (ug/L)	Marine Surface Water Criteria (ug/L)	Groundwater of Low Yield/Poor Quality Criteria (ug/L)	Target Organ/System or Effect
Benzyl alcohol	100-51-6	2100 *Minimum Criteria Systemic Toxicant*	500 *Toxicity Criteria*	500 *Toxicity Criteria*	21000	-Gastrointestinal
Benzyl chloride	100-44-7	0.5 *Minimum Criteria PQL*	2.95 *Human Health*	2.95 *Human Health*	5	-Carcinogen
Beryllium	7440-41-7	4 *Primary Standard Carcinogen*	0.13 *62-302 annual average*	0.13 *62-302 annual average*	40	-Carcinogen -Gastrointestinal -Respiratory
Beta radiation		4 *Primary Standard Carcinogen*	*NA*	*NA*	40	-Carcinogen
Bidrin [or Dicrotophos]	141-66-2	0.7 *Minimum Criteria Systemic Toxicant*	21.5 *Toxicity Criteria*	21.5 *Toxicity Criteria*	7	-Developmental
Bioallethrin	28057-48-9	35 *Minimum Criteria Systemic Toxicant*	*NA*	*NA*	350	-Liver
Biphenyl, 1,1- [or Diphenyl]	92-52-4	0.5 *Minimum Criteria Organoleptic*	18 *Toxicity Criteria*	18 *Toxicity Criteria*	5	-Kidney
Bis(2-chloroethyl)ether	111-44-4	4 *Minimum Criteria PQL*	9.99 *Human Health*	9.99 *Human Health*	40	-Carcinogen
Bis(2-chloroisopropyl)ether	108-60-1	10 *Minimum Criteria PQL*	0.5 *Human Health*	0.5 *Human Health*	100	-Blood -Carcinogen
Bis(2-ethylhexyl)adipate	103-23-1	400 *Primary Standard Carcinogen*	33 *Toxicity Criteria*	33 *Toxicity Criteria*	4000	-Carcinogen
Bis(2-ethylhexyl)phthalate [or DEHP]	117-81-7	6 *Primary Standard Carcinogen*	0.02 *Human Health*	0.02 *Human Health*	60	-Carcinogen -Liver
Bisphenol A	80-05-7	350 *Minimum Criteria Systemic Toxicant*	55 *Toxicity Criteria*	55 *Toxicity Criteria*	3500	-Body Weight
Boron	7440-42-8	630 *Minimum Criteria Health Advisory Level*	*NA*	*NA*	6300	-Reproductive -Respiratory
Bromacil	314-40-9	91 *Minimum Criteria Health Advisory Level*	97 *Toxicity Criteria*	97 *Toxicity Criteria*	910	-Body Weight
Bromochloromethane	74-97-5	91 *Minimum Criteria Systemic Toxicant*	*NA*	*NA*	910	-None Specified

Canada 1.2 mg/l

Table 1 - Technical Report

Groundwater and Surface Water Cleanup Target Levels

Contaminant	CAS #	Groundwater Criteria (ug/L)	Freshwater Surface Water Criteria (ug/L)	Marine Surface Water Criteria (ug/L)	Groundwater of Low Yield/Poor Quality Criteria (ug/L)	Target Organ/System or Effect
Bromodichloromethane	75-27-4	0.6 *Minimum Criteria Carcinogen*	22 *62-302 annual average*	22 *62-302 annual average*	6	-Carcinogen -Kidney
Bromoform	75-25-2	4.4 *Minimum Criteria Carcinogen*	360 *62-302 annual average*	360 *62-302 annual average*	44	-Carcinogen -Liver
Bromomethane [or Methyl bromide]	74-83-9	9.8 *Minimum Criteria Systemic Toxicant*	35 *Toxicity Criteria*	35 *Toxicity Criteria*	98	-Gastrointestinal
Bromophenyl phenyl ether, 4-	101-55-3	406 *Minimum Criteria Systemic Toxicant*	*NA*	*NA*	4060	-None Specified
Bromoxynil	1689-84-5	140 *Minimum Criteria Systemic Toxicant*	*NA*	*NA*	1400	-None Specified
Bromoxynil octanoate	1689-99-2	140 *Minimum Criteria Systemic Toxicant*	*NA*	*NA*	1400	-Neurological
Butanol, 1-	71-36-3	700 *Minimum Criteria Systemic Toxicant*	25000 *Toxicity Criteria*	25000 *Toxicity Criteria*	7000	-Neurological
Butanone, 2- [or MEK]	78-93-3	4200 *Minimum Criteria Systemic Toxicant*	120000 *Toxicity Criteria*	120000 *Toxicity Criteria*	42000	-Developmental
Butyl acetate, n-	123-86-4	43 *Minimum Criteria Organoleptic*	1000 *Toxicity Criteria*	1000 *Toxicity Criteria*	430	-None Specified
Butyl benzyl phthalate, n-	85-68-7	140 *Minimum Criteria Systemic Toxicant*	25.5 *Toxicity Criteria*	25.5 *Toxicity Criteria*	1400	-Liver
Butylate	2008-41-5	350 *Minimum Criteria Systemic Toxicant*	10.5 *Toxicity Criteria*	10.5 *Toxicity Criteria*	3500	-Liver
Butylphthalyl butylglycolate	85-70-1	7000 *Minimum Criteria Systemic Toxicant*	*NA*	*NA*	70000	-None Specified
Cacodylic acid (as Arsenic)	75-60-5	21 *Minimum Criteria Systemic Toxicant*	850 *Toxicity Criteria*	850 *Toxicity Criteria*	210	-Carcinogen -Cardiovascular -Skin
Cadmium	7440-43-9	5 *Primary Standard Carcinogen*	*a*	9.3 *62-302*	50	-Carcinogen -Kidney
Calcium cyanide	592-01-8	280 *Minimum Criteria Systemic Toxicant*	*NA*	*NA*	2800	-Body Weight -Neurological -Thyroid

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Groundwater and Surface Water Cleanup Target Levels

Contaminant	CAS #	Groundwater Criteria (ug/L)	Freshwater Surface Water Criteria (ug/L)	Marine Surface Water Criteria (ug/L)	Groundwater of Low Yield/Poor Quality Criteria (ug/L)	Target Organ/System or Effect
Captafol	2425-06-1	100 *Minimum Criteria PQL*	0.85 *Toxicity Criteria*	0.85 *Toxicity Criteria*	1000	-Carcinogen
Captan	133-06-2	250 *Minimum Criteria PQL*	1.9 *Toxicity Criteria*	1.9 *Toxicity Criteria*	2500	-Body Weight -Carcinogen
Carbaryl [or Sevin]	63-25-2	700 *Minimum Criteria Systemic Toxicant*	0.06 *Toxicity Criteria*	0.06 *Toxicity Criteria*	7000	-Kidney -Liver
Carbazole	86-74-8	4 *Minimum Criteria PQL*	46.5 *Toxicity Criteria*	46.5 *Toxicity Criteria*	40	-Carcinogen
Carbofuran	1563-66-2	40 *Primary Standard Systemic Toxicant*	0.1 *Toxicity Criteria*	0.1 *Toxicity Criteria*	400	-Neurological -Reproductive
Carbon disulfide	75-15-0	700 *Minimum Criteria Systemic Toxicant*	105 *Toxicity Criteria*	105 *Toxicity Criteria*	7000	-Developmental -Neurological
Carbon tetrachloride	56-23-5	3 *Primary Standard Carcinogen*	4.42 *62-302 annual average*	4.42 *62-302 annual average*	30	-Carcinogen -Liver
Carbophenothion [or Trithion]	786-19-6	0.9 *Minimum Criteria Systemic Toxicant*	0.1 *Toxicity Criteria*	0.1 *Toxicity Criteria*	9	-Neurological
Carboxin	5234-68-4	700 *Minimum Criteria Systemic Toxicant*	60 *Toxicity Criteria*	60 *Toxicity Criteria*	7000	-Body Weight -Mortality
Chloral	75-87-6	14 *Minimum Criteria Systemic Toxicant*	*NA*	*NA*	140	-Liver
Chloramben	133-90-4	105 *Minimum Criteria Systemic Toxicant*	*NA*	*NA*	1050	-Liver
Chlordane	57-74-9	2 *Primary Standard Carcinogen*	0.00059 *62-302 annual avg; 0.0043 max*	0.00059 *62-302 annual avg; 0.0043 max*	20	-Carcinogen -Liver
Chloride	16887-00-6	250000 *Secondary Standard Organoleptic*	*62-302*	*62-302 b*	2500000	-None Specified
Chlorine	7782-50-5	700 *Minimum Criteria Systemic Toxicant*	10 *62-302*	10 *62-302*	7000	-Body Weight
Chlorine cyanide [or Cyanogen chloride]	506-77-4	350 *Minimum Criteria Systemic Toxicant*	1.45 *Toxicity Criteria*	1.45 *Toxicity Criteria*	3500	-Body Weight -Neurological -Thyroid

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Groundwater and Surface Water Cleanup Target Levels

Contaminant	CAS #	Groundwater Criteria (ug/L)	Freshwater Surface Water Criteria (ug/L)	Marine Surface Water Criteria (ug/L)	Groundwater of Low Yield/Poor Quality Criteria (ug/L)	Target Organ/System or Effect
Chlorite, sodium	7758-19-2	100 *Minimum Criteria PQL*	29 *Toxicity Criteria*	29 *Toxicity Criteria*	1000	-None Specified
Chloro-1,3-butadiene [or Chloroprene]	126-99-8	140 *Minimum Criteria Systemic Toxicant*	*NA*	*NA*	1400	-Body Weight -Hair Loss -Nasal
Chloro-m-cresol, p- [or 4-chloro-3-methylphenol]	59-50-7	63 *Minimum Criteria Systemic Toxicant*	100 *Toxicity Criteria*	100 *Toxicity Criteria*	630	-Body Weight
Chloroacetic acid	79-11-8	14 *Minimum Criteria Systemic Toxicant*	*NA*	*NA*	140	-Cardiovascular
Chloroaniline, 4-	106-47-8	28 *Minimum Criteria Systemic Toxicant*	2.5 *Toxicity Criteria*	2.5 *Toxicity Criteria*	280	-Spleen
Chlorobenzene	108-90-7	100 *Primary Standard Systemic Toxicant*	17 *Toxicity Criteria*	17 *Toxicity Criteria*	1000	-Liver
Chlorobenzilate	510-15-6	0.1 *Minimum Criteria Carcinogen*	0.09 *Human Health*	0.09 *Human Health*	1	-Body Weight -Carcinogen
Chloroethyl vinyl ether, 2-	110-75-8	175 *Minimum Criteria Systemic Toxicant*	*NA*	*NA*	1750	-None Specified
Chloroform	67-66-3	5.7 *Minimum Criteria Carcinogen*	470.8 *62-302 annual average*	470.8 *62-302 annual average*	57	-Carcinogen -Liver
Chloromethane	74-87-3	2.7 *Minimum Criteria Carcinogen*	470.8 *62-302 annual average*	470.8 *62-302 annual average*	27	-Carcinogen
Chloronaphthalene, beta-	91-58-7	560 *Minimum Criteria Systemic Toxicant*	*NA*	*NA*	5600	-Liver -Respiratory
Chloronitrobenzene, p-	100-00-5	250 *Minimum Criteria PQL*	107 *Toxicity Criteria*	107 *Toxicity Criteria*	2500	-Carcinogen
Chlorophenol, 2-	95-57-8	35 *Minimum Criteria Systemic Toxicant*	130 *Toxicity Criteria*	130 *Toxicity Criteria*	350	-Reproductive
Chlorophenol, 3-	108-43-0	10 *Minimum Criteria Organoleptic (PQL)*	173.5 *Toxicity Criteria*	173.5 *Toxicity Criteria*	100	-None Specified
Chlorophenol, 4-	106-48-9	5.5 *Minimum Criteria Organoleptic (PQL)*	175 *Toxicity Criteria*	175 *Toxicity Criteria*	55	-None Specified

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Groundwater and Surface Water Cleanup Target Levels

Contaminant	CAS #	Groundwater Criteria (ug/L)	Freshwater Surface Water Criteria (ug/L)	Marine Surface Water Criteria (ug/L)	Groundwater of Low Yield/Poor Quality Criteria (ug/L)	Target Organ/System or Effect
Chloropicrin	76-06-2	7.3 *Minimum Criteria Organoleptic*	*NA*	*NA*	73	-None Specified
Chlorothalonil [or Bravo]	1897-45-6	3.2 *Minimum Criteria Carcinogen*	0.8 *Toxicity Criteria*	0.8 *Toxicity Criteria*	32	-Carcinogen -Kidney
Chlorotoluene, o-	95-49-8	140 *Minimum Criteria Systemic Toxicant*	390 *Toxicity Criteria*	390 *Toxicity Criteria*	1400	-Body Weight
Chlorotoluene, p-	106-43-4	140 *Minimum Criteria Health Advisory Level*	*NA*	*NA*	1400	-None Specified
Chlorpropham	101-21-3	1400 *Minimum Criteria Systemic Toxicant*	190 *Toxicity Criteria*	190 *Toxicity Criteria*	14000	-Bone Marrow -Kidney -Liver -Spleen
Chlorpyrifos (Lorsban)	2921-88-2	21 *Minimum Criteria Systemic Toxicant*	0.002 *Toxicity Criteria*	0.002 *Toxicity Criteria*	210	-Neurological
Chlorpyrifos, methyl	5598-13-0	70 *Minimum Criteria Systemic Toxicant*	0.035 *Toxicity Criteria*	0.035 *Toxicity Criteria*	700	-Reproductive
Chlorsulfuron	64902-72-3	350 *Minimum Criteria Systemic Toxicant*	16 *Toxicity Criteria*	16 *Toxicity Criteria*	3500	-Body Weight
Chromium (hexavalent)	18540-29-9	100 *Primary Standard Carcinogen*	11 *62-302*	50 *62-302*	1000	-Carcinogen -Respiratory
Chromium (total)	NOCAS#	100 *Primary Standard*	*NA*	*NA*	1000	-Carcinogen
Chromium (trivalent)	16065-83-1	100 *Primary Standard Systemic Toxicant*	*Numerical a*	515 *Toxicity Criteria*	1000	-None Specified
Chrysene	218-01-9	4.8 *Minimum Criteria Carcinogen*	0.031 *62-302 annual average*	0.031 *62-302 annual average*	48	-Carcinogen
Cobalt	7440-48-4	420 *Minimum Criteria Systemic Toxicant*	*NA*	*NA*	4200	-Cardiovascular -Immunological -Neurological -Reproductive
Copper	7440-50-8	1000 *Secondary Standard Systemic Toxicant*	*a*	2.9 *62-302*	10000	-Gastrointestinal
Coumaphos	56-72-4	1.8 *Minimum Criteria Systemic Toxicant*	0.004 *Toxicity Criteria*	0.004 *Toxicity Criteria*	18	-Neurological

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Groundwater and Surface Water Cleanup Target Levels

Contaminant	CAS #	Groundwater Criteria (ug/L)	Freshwater Surface Water Criteria (ug/L)	Marine Surface Water Criteria (ug/L)	Groundwater of Low Yield/Poor Quality Criteria (ug/L)	Target Organ/System or Effect
Crotonaldehyde	123-73-9	4000 *Minimum Criteria Carcinogen*	*NA*	*NA*	40000	-Carcinogen
Cumene [or Isopropyl benzene]	98-82-8	0.8 *Minimum Criteria Organoleptic*	255 *Toxicity Criteria*	255 *Toxicity Criteria*	8	-Adrenals -Kidney
Cyanazine	21725-46-2	0.1 *Minimum Criteria PQL*	5.5 *Toxicity Criteria*	5.5 *Toxicity Criteria*	1	-Carcinogen
Cyanide (potassium salt)	57-12-5	200 *Primary Standard Systemic Toxicant*	5.2 *62-302*	1 *62-302*	2000	-Body Weight -Neurological -Thyroid
Cyanogen	460-19-5	10000 *Minimum Criteria PQL*	*NA*	*NA*	100000	-None Specified
Cycloate	1134-23-2	35 *Minimum Criteria Systemic Toxicant*	130 *Toxicity Criteria*	130 *Toxicity Criteria*	350	-Neurological
Cyclohexanone	108-94-1	35000 *Minimum Criteria Systemic Toxicant*	26350 *Toxicity Criteria*	26350 *Toxicity Criteria*	350000	-Body Weight
Cyclohexylamine	108-91-8	5000 *Minimum Criteria PQL*	4000 *Toxicity Criteria*	4000 *Toxicity Criteria*	50000	-Body Weight -Reproductive
para Cymene = isopropyltoluene						
Cypermethrin	52315-07-8	7 *Minimum Criteria Systemic Toxicant*	0.0005 *Toxicity Criteria*	0.0005 *Toxicity Criteria*	70	-Gastrointestinal
Dacthal [or DCPA]	1861-32-1	70 *Minimum Criteria Systemic Toxicant*	310 *Toxicity Criteria*	310 *Toxicity Criteria*	700	-Kidney -Liver -Respiratory -Thyroid
Dalapon	75-99-0	200 *Primary Standard Systemic Toxicant*	5000 *Toxicity Criteria*	5000 *Toxicity Criteria*	2000	-Kidney
DDD, 4,4'-	72-54-8	0.1 *Minimum Criteria Carcinogen*	0.003 *Human Health*	0.003 *Human Health*	1	-Carcinogen
DDE, 4,4'-	72-55-9	0.1 *Minimum Criteria Carcinogen*	0.0006 *Human Health*	0.0006 *Human Health*	1	-Carcinogen
DDT, 4,4'-	50-29-3	0.1 *Minimum Criteria Carcinogen*	0.00059 *62-302 annual avg; 0.001 max*	0.00059 *62-302 annual avg; 0.001 max*	1	-Carcinogen -Liver
DEET	134-62-3	6300 *Minimum Criteria Systemic Toxicant*	*NA*	*NA*	63000	-Body Weight

Table 1 - Technical Report

Groundwater and Surface Water Cleanup Target Levels

Contaminant	CAS #	Groundwater Criteria (ug/L)	Freshwater Surface Water Criteria (ug/L)	Marine Surface Water Criteria (ug/L)	Groundwater of Low Yield/Poor Quality Criteria (ug/L)	Target Organ/System or Effect
Demeton	8065-48-3	0.3 *Minimum Criteria Systemic Toxicant*	1.35 *Toxicity Criteria*	1.35 *Toxicity Criteria*	3	-Eye -Neurological
Di-n-butylphthalate	84-74-2	700 *Minimum Criteria Systemic Toxicant*	23 *Toxicity Criteria*	23 *Toxicity Criteria*	7000	-Mortality
Di-n-octylphthalate	117-84-0	140 *Minimum Criteria Systemic Toxicant*	*NA*	*NA*	1400	-Kidney -Liver
Diallate	2303-16-4	0.6 *Minimum Criteria Carcinogen*	*NA*	*NA*	6	-Carcinogen
Diazinon	333-41-5	0.63 *Minimum Criteria Systemic Toxicant*	0.002 *Toxicity Criteria*	0.002 *Toxicity Criteria*	6.3	-Neurological
Dibenz(a,h)anthracene	53-70-3	0.2 *Minimum Criteria PQL*	0.031 *62-302 annual average*	0.031 *62-302 annual average*	2	-Carcinogen
Dibenzofuran	132-64-9	28 *Minimum Criteria Systemic Toxicant*	67 *Toxicity Criteria*	67 *Toxicity Criteria*	280	-None Specified
Dibromo-3-chloropropane, 1-2- [or DBCPI	96-12-8	0.2 *Primary Standard Carcinogen*	*NA*	*NA*	2	-Carcinogen -Reproductive
Dibromoacetonitrile	3252-43-5	14 *Minimum Criteria Health Advisory Level*	*NA*	*NA*	140	-None Specified
Dibromochloromethane	124-48-1	0.4 *Minimum Criteria Carcinogen*	34 *62-302 annual average*	34 *62-302 annual average*	4	-Carcinogen -Liver
Dibromoethane, 1,2- [or EDB]	106-93-4	0.02 *Primary Standard Carcinogen*	13 *Toxicity Criteria*	13 *Toxicity Criteria*	0.2	-Carcinogen -Reproductive
Dicamba	1918-00-9	210 *Minimum Criteria Systemic Toxicant*	195 *Toxicity Criteria*	195 *Toxicity Criteria*	2100	-Developmental
Dichloroacetic acid	79-43-6	28 *Minimum Criteria Health Advisory Level*	1150 *Toxicity Criteria*	1150 *Toxicity Criteria*	280	-None Specified
Dichloroacetonitrile	3018-12-0	5.6 *Minimum Criteria Health Advisory Level*	*NA*	*NA*	56	-None Specified
Dichlorobenzene, 1,2-	95-50-1	600 *Primary Standard Systemic Toxicant*	99 *Toxicity Criteria*	99 *Toxicity Criteria*	6000	-Body Weight

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Groundwater and Surface Water Cleanup Target Levels

Contaminant	CAS #	Groundwater Criteria (ug/L)	Freshwater Surface Water Criteria (ug/L)	Marine Surface Water Criteria (ug/L)	Groundwater of Low Yield/Poor Quality Criteria (ug/L)	Target Organ/System or Effect
Dichlorobenzene, 1,3-	541-73-1	10 *Minimum Criteria Organoleptic (PQL)*	85 *Toxicity Criteria*	85 *Toxicity Criteria*	100	-None Specified
Dichlorobenzene, 1,4-	106-46-7	75 *Primary Standard Carcinogen*	100 *Toxicity Criteria*	100 *Toxicity Criteria*	750	-Carcinogen -Liver
Dichlorobenzidine, 3,3'-	91-94-1	12 *Minimum Criteria PQL*	0.06 *Human Health*	0.06 *Human Health*	120	-Carcinogen
Dichlorodifluoromethane	75-71-8	1400 *Minimum Criteria Systemic Toxicant*	*NA*	*NA*	14000	-Body Weight -Liver
Dichloroethane, 1,1-	75-34-3	70 *Minimum Criteria Systemic Toxicant*	*NA*	*NA*	700	-Kidney
Dichloroethane, 1,2- [or EDC]	107-06-2	3 *Primary Standard Carcinogen*	5 *Human Health*	5 *Human Health*	30	-Carcinogen
Dichloroethene, 1,1-	75-35-4	7 *Primary Standard Carcinogen*	3.2 *62-302 annual average*	3.2 *62-302 annual average*	70	-Carcinogen -Liver
Dichloroethene, 1,2- (mixture)	540-59-0	63 *Minimum Criteria Systemic Toxicant*	7000 *Toxicity Criteria*	7000 *Toxicity Criteria*	630	-Blood -Liver
Dichloroethene, cis-1,2-	156-59-2	70 *Primary Standard Systemic Toxicant*	*NA*	*NA*	700	-Blood
Dichloroethene, trans-1,2-	156-60-5	100 *Primary Standard Systemic Toxicant*	11000 *Toxicity Criteria*	11000 *Toxicity Criteria*	1000	-Blood -Liver
Dichlorophenol, 2,3-	576-24-9	10 *Minimum Criteria PQL*	56 *Toxicity Criteria*	56 *Toxicity Criteria*	100	-None Specified
Dichlorophenol, 2,4-	120-83-2	0.5 *Minimum Criteria PQL*	13 *Toxicity Criteria*	13 *Toxicity Criteria*	5	-Immunological
Dichlorophenol, 2,5-	583-78-8	10 *Minimum Criteria PQL*	90 *Toxicity Criteria*	90 *Toxicity Criteria*	100	-None Specified
Dichlorophenol, 2,6-	87-65-0	4 *Minimum Criteria PQL*	73 *Toxicity Criteria*	73 *Toxicity Criteria*	40	-None Specified
Dichlorophenol, 3,4-	95-77-2	0.5 *Minimum Criteria PQL*	61 *Toxicity Criteria*	61 *Toxicity Criteria*	5	-None Specified

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Groundwater and Surface Water Cleanup Target Levels

Contaminant	CAS #	Groundwater Criteria (ug/L)	Freshwater Surface Water Criteria (ug/L)	Marine Surface Water Criteria (ug/L)	Groundwater of Low Yield/Poor Quality Criteria (ug/L)	Target Organ/System or Effect
Dichlorophenoxy acetic acid, 2,4- 2,4-D	94-75-7	70 *Primary Standard Systemic Toxicant*	80 *Toxicity Criteria*	80 *Toxicity Criteria*	700	-Kidney -Liver
Dichlorophenoxy butyric acid, 2,4- [or 2.4-DB]	94-82-6	56 *Minimum Criteria Systemic Toxicant*	*NA*	*NA*	560	-Blood -Cardiovascular -Mortality
Dichloropropane, 1,2-	78-87-5	5 *Primary Standard Carcinogen*	2600 *Toxicity Criteria*	2600 *Toxicity Criteria*	50	-Carcinogen -Nasal
Dichloropropene, 1,3-	542-75-6	0.2 *Minimum Criteria Carcinogen*	12 *Toxicity Criteria*	12 *Toxicity Criteria*	2	-Carcinogen -Kidney -Nasal
Dichlorprop	120-36-5	35 *Minimum Criteria Systemic Toxicant*	42 *Toxicity Criteria*	42 *Toxicity Criteria*	350	-None Specified
Dichlorvos	62-73-7	0.1 *Minimum Criteria Carcinogen*	0.005 *Toxicity Criteria*	0.005 *Toxicity Criteria*	1	-Carcinogen -Neurological
Dicofol [or Kelthane]	115-32-2	0.4 *Minimum Criteria PQL*	0.003 *Human Health*	0.003 *Human Health*	4	-Adrenals -Carcinogen
Dieldrin	60-57-1	0.005 *Minimum Criteria PQL*	0.00014 *62-302 annual avg; 0.0019 max*	0.00014 *62-302 annual avg; 0.0019 max*	0.05	-Carcinogen -Liver
Diethylphthalate	84-66-2	5600 *Minimum Criteria Systemic Toxicant*	380 *Toxicity Criteria*	380 *Toxicity Criteria*	56000	-Body Weight
Diethylstilbestrol	56-53-1	100 *Minimum Criteria PQL*	*NA*	*NA*	1000	-Carcinogen
Dimethoate	60-51-5	0.1 *Minimum Criteria Systemic Toxicant*	0.1 *Toxicity Criteria*	0.1 *Toxicity Criteria*	1	-Neurological
Dimethoxybenzidine, 3,3'-	119-90-4	250 *Minimum Criteria PQL*	*NA*	*NA*	2500	-Carcinogen
Dimethrin	70-38-2	2100 *Minimum Criteria Health Advisory Level*	1.1 *Toxicity Criteria*	1.1 *Toxicity Criteria*	21000	-Liver
Dimethylaniline, N,N-	121-69-7	50 *Minimum Criteria PQL*	1650 *Toxicity Criteria*	1650 *Toxicity Criteria*	500	-Spleen
Dimethylbenzidine, 3,3'-	119-93-7	160 *Minimum Criteria PQL*	*NA*	*NA*	1600	-Carcinogen

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Groundwater and Surface Water Cleanup Target Levels

Contaminant	CAS #	Groundwater Criteria (ug/L)	Freshwater Surface Water Criteria (ug/L)	Marine Surface Water Criteria (ug/L)	Groundwater of Low Yield/Poor Quality Criteria (ug/L)	Target Organ/System or Effect
Dimethylformamide, N,N-	68-12-2	700 *Minimum Criteria Systemic Toxicant*	50000 *Toxicity Criteria*	50000 *Toxicity Criteria*	7000	-Gastrointestinal -Liver
Dimethylphenol, 2,4-	105-67-9	140 *Minimum Criteria Systemic Toxicant*	261 *Human Health*	261 *Human Health*	1400	-Blood -Neurological
Dimethylphthalate	131-11-3	70000 *Minimum Criteria Systemic Toxicant*	1450 *Toxicity Criteria*	1450 *Toxicity Criteria*	700000	-Kidney
Dinitro-o-cyclohexylphenol	131-89-5	100 *Minimum Criteria PQL*	*NA*	*NA*	1000	-Eye
Dinitrobenzene, 1,2- (o)	528-29-0	200 *Minimum Criteria PQL*	30 *Toxicity Criteria*	30 *Toxicity Criteria*	2000	-Spleen
Dinitrobenzene, 1,3- (m)	99-65-0	8 *Minimum Criteria PQL*	72 *Toxicity Criteria*	72 *Toxicity Criteria*	80	-Spleen
Dinitrobenzene, 1,4- (p)	100-25-4	50 *Minimum Criteria PQL*	30 *Toxicity Criteria*	30 *Toxicity Criteria*	500	-Spleen
Dinitrophenol, 2,4-	51-28-5	14 *Minimum Criteria Systemic Toxicant*	3 *Toxicity Criteria*	3 *Toxicity Criteria*	140	-Eye
Dinitrotoluene (mixture)	NOCAS#	0.2 *Minimum Criteria PQL*	*NA*	*NA*	2	-Carcinogen
Dinitrotoluene, 2,4-	121-14-2	0.1 *Minimum Criteria PQL*	9.1 *62-302 annual average*	9.1 *62-302 annual average*	1	-Carcinogen -Liver -Neurological
Dinitrotoluene, 2,6-	606-20-2	0.1 *Minimum Criteria PQL*	4 *Human Health*	4 *Human Health*	1	-Blood -Carcinogen -Kidney -Mortality -Neurological
Dinoseb	88-85-7	7 *Primary Standard Systemic Toxicant*	5.9 *Toxicity Criteria*	5.9 *Toxicity Criteria*	70	-Developmental
Dioxane, 1,4-	123-91-1	5 *Minimum Criteria PQL*	245 *Human Health*	245 *Human Health*	50	-Carcinogen
Dioxin [or 2,3,7,8-TCDD]	1746-01-6	0.00003 *Primary Standard Carcinogen*	1.3E-08 *62-302*	1.3E-08 *62-302*	0.0003	-Carcinogen 0.03ng/l
Diphenamid	957-51-7	210 *Minimum Criteria Systemic Toxicant*	1600 *Toxicity Criteria*	1600 *Toxicity Criteria*	2100	-Liver

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Groundwater and Surface Water Cleanup Target Levels

Contaminant	CAS #	Groundwater Criteria (ug/L)	Freshwater Surface Water Criteria (ug/L)	Marine Surface Water Criteria (ug/L)	Groundwater of Low Yield/Poor Quality Criteria (ug/L)	Target Organ/System or Effect
Diphenylamine, N,N-	122-39-4	175 *Minimum Criteria Systemic Toxicant*	*NA*	*NA*	1750	-Body Weight -Kidney -Liver
Diphenylhydrazine, 1,2-	122-66-7	10 *Minimum Criteria PQL*	0.38 *Human Health*	0.38 *Human Health*	100	-Carcinogen
Diquat	85-00-7	20 *Primary Standard Systemic Toxicant*	1.5 *Toxicity Criteria*	1.5 *Toxicity Criteria*	200	-Eye
Disulfoton	298-04-4	0.3 *Minimum Criteria Systemic Toxicant*	0.3 *Toxicity Criteria*	0.3 *Toxicity Criteria*	3	-Neurological
Diuron	330-54-1	14 *Minimum Criteria Systemic Toxicant*	8 *Toxicity Criteria*	8 *Toxicity Criteria*	140	-Blood
Endosulfan - includes I, II + sulfate	115-29-7	42 *Minimum Criteria Systemic Toxicant*	0.056 *62-302*	0.0087 *62-302*	420	-Body Weight -Cardiovascular -Kidney
Endothall	145-73-3	100 *Primary Standard Systemic Toxicant*	105 *Toxicity Criteria*	105 *Toxicity Criteria*	1000	-Gastrointestinal
Endrin w/ endrin aldehyde unless may want to develop a separate value	72-20-8	2 *Primary Standard Systemic Toxicant*	0.0023 *62-302*	0.0023 *62-302*	20	-Liver
Epichlorohydrin	106-89-8	3.5 *Minimum Criteria Carcinogen*	272 *Human Health*	272 *Human Health*	35	-Carcinogen -Kidney -Nasal
Ethion	563-12-2	3.5 *Minimum Criteria Systemic Toxicant*	0.007 *Toxicity Criteria*	0.007 *Toxicity Criteria*	35	-Neurological
Ethoprop	13194-48-4	0.7 *Minimum Criteria Systemic Toxicant*	0.315 *Toxicity Criteria*	0.315 *Toxicity Criteria*	7	-Neurological
Ethoxyethanol, 2-	110-80-5	25000 *Minimum Criteria PQL*	*NA*	*NA*	250000	-Body Weight -Reproductive
Ethyl acetate	141-78-6	6300 *Minimum Criteria Systemic Toxicant*	6250 *Toxicity Criteria*	6250 *Toxicity Criteria*	63000	-Body Weight -Mortality
Ethyl acrylate	140-88-5	5000 *Minimum Criteria PQL*	125 *Toxicity Criteria*	125 *Toxicity Criteria*	50000	-Carcinogen
Ethyl chloride [or Chloroethane]	75-00-3	12 *Minimum Criteria Carcinogen*	*NA*	*NA*	120	-Carcinogen -Developmental

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Groundwater and Surface Water Cleanup Target Levels

Contaminant	CAS #	Groundwater Criteria (ug/L)	Freshwater Surface Water Criteria (ug/L)	Marine Surface Water Criteria (ug/L)	Groundwater of Low Yield/Poor Quality Criteria (ug/L)	Target Organ/System or Effect
Ethyl dipropylthiocarbamate, S- [or EPTC]	759-94-4	175 *Minimum Criteria Systemic Toxicant*	235 *Toxicity Criteria*	235 *Toxicity Criteria*	1750	-Cardiovascular
Ethyl ether	60-29-7	750 *Minimum Criteria Organoleptic*	128000 *Toxicity Criteria*	128000 *Toxicity Criteria*	7500	-Body Weight
Ethyl methacrylate	97-63-2	630 *Minimum Criteria Systemic Toxicant*	*NA*	*NA*	6300	-Kidney
Ethyl p-nitrophenyl phenylphosphorothioate [or EPN]	2104-64-5	0.2 *Minimum Criteria PQL*	0.015 *Toxicity Criteria*	0.015 *Toxicity Criteria*	2	-Neurological
Ethylbenzene	100-41-4	30 *Secondary Standard Systemic Toxicant*	605 *Toxicity Criteria*	605 *Toxicity Criteria*	300	-Developmental -Kidney -Liver
Ethylene diamine	107-15-3	10000 *Minimum Criteria PQL*	800 *Toxicity Criteria*	800 *Toxicity Criteria*	100000	-Blood -Cardiovascular
Ethylene glycol	107-21-1	14000 *Minimum Criteria Systemic Toxicant*	16300 *Toxicity Criteria*	16300 *Toxicity Criteria*	140000	-Kidney
Ethylene oxide	75-21-8	10 *Minimum Criteria PQL*	4200 *Toxicity Criteria*	4200 *Toxicity Criteria*	100	-Carcinogen
Ethylene thiourea [or ETU]	96-45-7	5 *Minimum Criteria PQL*	1320 *Toxicity Criteria*	1320 *Toxicity Criteria*	50	-Carcinogen
Ethylphthalyl ethylglycolate [or EPEG]	84-72-0	21000 *Minimum Criteria Systemic Toxicant*	*NA*	*NA*	210000	-Kidney -Mortality
Famphur	52-85-7	3.5 *Minimum Criteria Systemic Toxicant*	*NA*	*NA*	35	-Blood
Fenamiphos	22224-92-6	1.8 *Minimum Criteria Systemic Toxicant*	0.225 *Toxicity Criteria*	0.225 *Toxicity Criteria*	18	-Neurological
Fensulfothion	115-90-2	1.8 *Minimum Criteria Systemic Toxicant*	0.5 *Toxicity Criteria*	0.5 *Toxicity Criteria*	18	-Neurological
Fluometuron	2164-17-2	91 *Minimum Criteria Systemic Toxicant*	190 *Toxicity Criteria*	190 *Toxicity Criteria*	910	-None Specified
Fluoranthene	206-44-0	280 *Minimum Criteria Systemic Toxicant*	0.3 *Toxicity Criteria*	0.3 *Toxicity Criteria*	2800	-Blood -Kidney -Liver

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Contaminant	CAS #	Groundwater Criteria (ug/L)	Freshwater Surface Water Criteria (ug/L)	Marine Surface Water Criteria (ug/L)	Groundwater of Low Yield/Poor Quality Criteria (ug/L)	Target Organ/System or Effect
Fluorene	86-73-7	280 *Minimum Criteria Systemic Toxicant*	30 *Toxicity Criteria*	30 *Toxicity Criteria*	2800	-Blood
Fluoride	7782-41-4	2000 *Secondary Standard Systemic*	10000 *62-302*	5000 *62-302*	20000	-Teeth
Fluoridone	59756-60-4	560 *Minimum Criteria Systemic Toxicant*	105 *Toxicity Criteria*	105 *Toxicity Criteria*	5600	-Body Weight -Kidney -Reproductive
Fonofos	944-22-9	14 *Minimum Criteria Systemic Toxicant*	0.095 *Toxicity Criteria*	0.095 *Toxicity Criteria*	140	-Liver -Neurological
Formaldehyde	50-00-0	600 *Minimum Criteria Organoleptic*	105 *Toxicity Criteria*	105 *Toxicity Criteria*	6000	-Body Weight -Carcinogen -Gastrointestinal
Formic acid	64-18-6	14000 *Minimum Criteria Systemic Toxicant*	4500 *Toxicity Criteria*	4500 *Toxicity Criteria*	140000	-Body Weight
Furfural	98-01-1	250 *Minimum Criteria PQL*	650 *Toxicity Criteria*	650 *Toxicity Criteria*	2500	-Liver -Nasal
Glyphosate [or Roundup]	1071-83-6	700 *Primary Standard Systemic Toxicant*	115 *Toxicity Criteria*	115 *Toxicity Criteria*	7000	-Kidney
Gross alpha radiation	14127-62-9	15 *Primary Standard pCi/L*	15 *62-302 pCi/L*	15 *62-302 pCi/L*	150	-Carcinogen
Guthion [or Azinphos, methyl]	86-50-0	10.5 *Minimum Criteria Systemic Toxicant*	0.01 *62-302*	0.01 *62-302*	105	-Neurological
Heptachlor	76-44-8	0.4 *Primary Standard Carcinogen*	0.0021 *62-302 annual avg; 0.0038 max*	0.0021 *62-302 annual avg; 0.0038 max*	4	-Carcinogen -Liver
Heptachlor epoxide	1024-57-3	0.2 *Primary Standard Carcinogen*	0.002 *Toxicity Criteria*	0.002 *Toxicity Criteria*	2	-Carcinogen -Liver
Hexachloro-1,3-butadiene	87-68-3	0.5 *Minimum Criteria Carcinogen*	49.7 *62-302 annual average*	49.7 *62-302 annual average*	5	-Carcinogen -Kidney
Hexachlorobenzene	118-74-1	1 *Primary Standard Carcinogen*	0.00036 *Human Health*	0.00036 *Human Health*	10	-Carcinogen -Liver
Hexachlorocyclohexane [technical or ~~BHC~~ HCH	608-73-1	0.02 *Minimum Criteria Carcinogen*	0.017 *Toxicity Criteria*	0.017 *Toxicity Criteria*	0.2	-Carcinogen

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Contaminant	CAS #	Groundwater Criteria (ug/L)	Freshwater Surface Water Criteria (ug/L)	Marine Surface Water Criteria (ug/L)	Groundwater of Low Yield/Poor Quality Criteria (ug/L)	Target Organ/System or Effect
Hexachlorocyclohexane, alpha-	319-84-6	0.006 *Minimum Criteria Carcinogen*	0.0116 *Human Health*	0.0116 *Human Health*	0.06	-Carcinogen
Hexachlorocyclohexane, beta-	319-85-7	0.02 *Minimum Criteria Carcinogen*	0.046 *62-302 annual average*	0.046 *62-302 annual average*	0.2	-Carcinogen
Hexachlorocyclohexane, delta-	319-86-8	2.1 *Minimum Criteria Systemic (b)*	*NA*	*NA*	21	-Kidney -Liver
Hexachlorocyclohexane, gamma- [or Lindane]	58-89-9	0.2 *Primary Standard Carcinogen*	0.063 *62-302 annual avg; 0.08 max.*	0.063 *62-302 annual avg; 0.08 max.*	2	-Carcinogen -Kidney -Liver
Hexachlorocyclopentadiene	77-47-4	50 *Primary Standard Systemic Toxicant*	2.95 *Toxicity Criteria*	2.95 *Toxicity Criteria*	500	-Gastrointestinal
Hexachlorodibenzo-p-dioxin (mixture)	19408-74-3	0.00025 *Minimum Criteria PQL*	*NA*	*NA*	0.0025	-Carcinogen
Hexachloroethane	67-72-1	2.5 *Minimum Criteria Carcinogen*	1.1 *Human Health*	1.1 *Human Health*	25	-Carcinogen -Kidney
Hexachlorophene	70-30-4	6 *Minimum Criteria PQL*	1.05 *Toxicity Criteria*	1.05 *Toxicity Criteria*	60	-Neurological
Hexahydro-1,3,5-trinitro-1,3,5-triazine [or RDX]	121-82-4	1 *Minimum Criteria PQL*	180 *Toxicity Criteria*	180 *Toxicity Criteria*	10	-Carcinogen -Reproductive
Hexane, n-	110-54-3	10 *Minimum Criteria PQL*	3400 *Toxicity Criteria*	3400 *Toxicity Criteria*	100	-Neurological
Hexanone, 2- [or Methyl butyl ketone]	591-78-6	280 *Minimum Criteria Systemic Toxicant*	*NA*	*NA*	2800	-None Specified
Hexazinone	51235-04-2	231 *Minimum Criteria Systemic Toxicant*	1020 *Human Health*	1020 *Human Health*	2310	-Body Weight
Hydrogen cyanide (as Cyanide)	74-90-8	140 *Minimum Criteria Systemic Toxicant*	3.45 *Toxicity Criteria*	3.45 *Toxicity Criteria*	1400	-Body Weight -Neurological -Thyroid
Hydrogen sulfide (as Sulfur)	7783-06-4	100 *Minimum Criteria PQL*	0.1 *Toxicity Criteria*	0.1 *Toxicity Criteria*	1000	-Gastrointestinal
Hydroquinone	123-31-9	280 *Minimum Criteria Systemic Toxicant*	4.5 *Toxicity Criteria*	4.5 *Toxicity Criteria*	2800	-Blood

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Groundwater and Surface Water Cleanup Target Levels

Contaminant	CAS #	Groundwater Criteria (ug/L)	Freshwater Surface Water Criteria (ug/L)	Marine Surface Water Criteria (ug/L)	Groundwater of Low Yield/Poor Quality Criteria (ug/L)	Target Organ/System or Effect
Indeno(1,2,3-cd)pyrene	193-39-5	0.2 *Minimum Criteria PQL*	0.031 *62-302 annual average*	0.031 *62-302 annual average*	2	-Carcinogen
Iprodione	36734-19-7	280 *Minimum Criteria Systemic Toxicant*	153 *Toxicity Criteria*	153 *Toxicity Criteria*	2800	-Blood
Iron chronic health-based 4600 ug/l	7439-89-6	300 *Secondary Standard Systemic Toxicant*	1000 *62-302*	300 *62-302*	3000	-Blood -Gastrointestinal
Isobutyl alcohol	78-83-1	2100 *Minimum Criteria Systemic Toxicant*	47450 *Toxicity Criteria*	47450 *Toxicity Criteria*	21000	-Neurological
Isophorone	78-59-1	37 *Minimum Criteria Carcinogen*	645 *Toxicity Criteria*	645 *Toxicity Criteria*	370	-Carcinogen
Kepone	143-50-0	20 *Minimum Criteria PQL*	*NA*	*NA*	200	-Carcinogen
Lead	7439-92-1	15 *Primary Standard Systemic Toxicant*	*a*	5.6 *62-302*	150	-Neurological
Linuron	330-55-2	1.4 *Minimum Criteria Systemic Toxicant*	44.5 *Toxicity Criteria*	44.5 *Toxicity Criteria*	14	-Blood
Lithium	7439-93-32	140 *Minimum Criteria Systemic Toxicant*	*NA*	*NA*	1400	-None Specified
Malathion	121-75-5	140 *Minimum Criteria Systemic Toxicant*	0.1 *62-302*	0.1 *62-302*	1400	-Neurological
Mancozeb	8018-01-7	210 *Minimum Criteria Systemic Toxicant*	3.5 *Toxicity Criteria*	3.5 *Toxicity Criteria*	2100	-Thyroid
Maneb	12427-38-2	75 *Minimum Criteria PQL*	5.5 *Toxicity Criteria*	5.5 *Toxicity Criteria*	750	-Thyroid
Manganese health-based chronic: 360 ug/l.	7439-96-5	50 *Secondary Standard Systemic Toxicant*	*NA*	*NA*	500	-Neurological
Mercuric chloride (as Mercury)	7487-94-7	0.2 *Minimum Criteria Systemic Toxicant*	0.05 *Toxicity Criteria*	0.05 *Toxicity Criteria*	2	-Immunological -Kidney
Mercury	7439-97-6	2 *Primary Standard Systemic Toxicant*	0.012 *62-302*	0.012 *62-302*	20	-Neurological

Table 1 - Technical Report

Groundwater and Surface Water Cleanup Target Levels

Contaminant	CAS #	Groundwater Criteria (ug/L)	Freshwater Surface Water Criteria (ug/L)	Marine Surface Water Criteria (ug/L)	Groundwater of Low Yield/Poor Quality Criteria (ug/L)	Target Organ/System or Effect
Mercury, methyl	22967-92-6	0.07 *Minimum Criteria Systemic Toxicant*	*NA*	*NA*	0.7	-Neurological
Merphos	150-50-5	0.2 *Minimum Criteria Systemic Toxicant*	*NA*	*NA*	2	-Body Weight -Neurological
Metalaxyl	57837-19-1	420 *Minimum Criteria Systemic Toxicant*	36.5 *Toxicity Criteria*	36.5 *Toxicity Criteria*	4200	-Blood -Liver -Neurological
Methacrylonitrile	126-98-7	5 *Minimum Criteria PQL*	*NA*	*NA*	50	-Liver
Methamidophos	10265-92-6	5 *Minimum Criteria PQL*	0.000011 *Toxicity Criteria*	0.000011 *Toxicity Criteria*	50	-Neurological
Methanol	67-56-1	5000 *Minimum Criteria PQL*	45037 *Toxicity Criteria*	45037 *Toxicity Criteria*	50000	-Liver -Neurological
Methidathion	950-37-8	0.7 *Minimum Criteria Systemic Toxicant*	0.03 *Toxicity Criteria*	0.03 *Toxicity Criteria*	7	-Liver
Methomyl	16752-77-5	175 *Minimum Criteria Systemic Toxicant*	0.95 *Toxicity Criteria*	0.95 *Toxicity Criteria*	1750	-Kidney -Spleen
Methoxy-5-nitroaniline, 2-	99-59-2	50 *Minimum Criteria PQL*	*NA*	*NA*	500	-Carcinogen
Methoxychlor	72-43-5	40 *Primary Standard Systemic Toxicant*	0.03 *62-302*	0.03 *62-302*	400	-Developmental -Reproductive
Methoxyethanol, 2-	109-86-4	100000 *Minimum Criteria PQL*	*NA*	*NA*	1000000	-Reproductive
Methyl acetate	79-20-9	5000 *Minimum Criteria PQL*	*NA*	*NA*	50000	-Liver
Methyl acrylate	96-33-3	210 *Minimum Criteria Systemic Toxicant*	*NA*	*NA*	2100	-None Specified
Methyl isobutyl ketone [or MIBK]	108-10-1	560 *Minimum Criteria Systemic Toxicant*	23000 *Toxicity Criteria*	23000 *Toxicity Criteria*	5600	-Kidney -Liver
Methyl methacrylate	80-62-6	25 *Minimum Criteria Organoleptic*	6500 *Toxicity Criteria*	6500 *Toxicity Criteria*	250	-Nasal

MEK (2-butanone)

Table 1 - Technical Report

Groundwater and Surface Water Cleanup Target Levels

Contaminant	CAS #	Groundwater Criteria (ug/L)	Freshwater Surface Water Criteria (ug/L)	Marine Surface Water Criteria (ug/L)	Groundwater of Low Yield/Poor Quality Criteria (ug/L)	Target Organ/System or Effect
Methyl parathion [or Parathion, methyl]	298-00-0	1.8 *Minimum Criteria Systemic Toxicant*	0.01 *Toxicity Criteria*	0.01 *Toxicity Criteria*	18	-Blood -Neurological
Methyl tert-butyl ether [or MTBE]	1634-04-4	50 *Minimum Criteria Organoleptic*	33600 *Toxicity Criteria*	33600 *Toxicity Criteria*	500	-Eye -Kidney -Liver
Methyl(1,4-chlorophenoxy)propionic acid (MCPP)	7085-19-0	7 *Minimum Criteria Systemic Toxicant*	*NA*	*NA*	70	-None Specified
Methyl-4-chlorophenoxy acetic acid, 2- (MCPA)	94-74-6	3.5 *Minimum Criteria Systemic Toxicant*	72 *Toxicity Criteria*	72 *Toxicity Criteria*	35	-Kidney -Liver
Methyl-5-nitroaniline, 2-	99-55-8	10 *Minimum Criteria PQL*	*NA*	*NA*	100	-Carcinogen
Methylaniline, 2-	95-53-4	50 *Minimum Criteria PQL*	26 *Toxicity Criteria*	26 *Toxicity Criteria*	500	-Carcinogen
Methylene bis(2-chloroaniline), 4,4-	101-14-4	50 *Minimum Criteria PQL*	*NA*	*NA*	500	-Carcinogen -Liver -Bladder
Methylene bromide	74-95-3	70 *Minimum Criteria Systemic Toxicant*	*NA*	*NA*	700	-Blood
Methylene chloride (Dichloromethane	75-09-2	5 *Primary Standard Carcinogen*	1580 *62-302 annual average*	1580 *62-302 annual average*	50	-Carcinogen -Liver
Methylnaphthalene, 1-	90-12-0	20 *Minimum Criteria Organoleptic*	95 *Toxicity Criteria*	95 *Toxicity Criteria*	200	-Body Weight -Nasal
Methylnaphthalene, 2-	91-57-6	20 *Minimum Criteria Organoleptic*	30 *Toxicity Criteria*	30 *Toxicity Criteria*	200	-Body Weight -Nasal
Methylphenol, 2- [or o-Cresol]	95-48-7	35 *Minimum Criteria Systemic Toxicant*	250 *Toxicity Criteria*	250 *Toxicity Criteria*	350	-Body Weight -Neurological
Methylphenol, 3- [or m-Cresol]	108-39-4	35 *Minimum Criteria Systemic Toxicant*	445 *Toxicity Criteria*	445 *Toxicity Criteria*	350	-Body Weight -Neurological
Methylphenol, 4- [or p-Cresol]	106-44-5	4 *Minimum Criteria PQL*	70 *Toxicity Criteria*	70 *Toxicity Criteria*	40	-Maternal Death -Neurological -Respiratory
Metolachlor	51218-45-2	105 *Minimum Criteria Systemic Toxicant*	1.08 *Toxicity Criteria*	1.08 *Toxicity Criteria*	1050	-Body Weight

Table 1 - Technical Report

Groundwater and Surface Water Cleanup Target Levels

Contaminant	CAS #	Groundwater Criteria (ug/L)	Freshwater Surface Water Criteria (ug/L)	Marine Surface Water Criteria (ug/L)	Groundwater of Low Yield/Poor Quality Criteria (ug/L)	Target Organ/System or Effect
Metribuzin	21087-64-9	175 *Minimum Criteria* *Systemic Toxicant*	64 *Toxicity Criteria*	64 *Toxicity Criteria*	1750	-Body Weight -Kidney -Liver -Mortality
Metsulfuron, methyl [or Ally]	74223-64-6	1750 *Minimum Criteria* *Systemic Toxicant*	*NA*	*NA*	17500	-Body Weight
Mevinphos	7786-34-7	1.8 *Minimum Criteria* *Systemic Toxicant*	0.0475 *Toxicity Criteria*	0.0475 *Toxicity Criteria*	18	-Neurological
Mirex	2385-85-5	1.4 *Minimum Criteria* *Systemic Toxicant*	0.001 *62-302*	0.001 *62-302*	14	-Liver -Thyroid
Molinate	2212-67-1	14 *Minimum Criteria* *Systemic Toxicant*	17 *Toxicity Criteria*	17 *Toxicity Criteria*	140	-Reproductive
Molybdenum	7439-98-7	35 *Minimum Criteria* *Systemic Toxicant*	*NA*	*NA*	350	-Gout
Naled	300-76-5	14 *Minimum Criteria* *Systemic Toxicant*	0.018 *Toxicity Criteria*	0.018 *Toxicity Criteria*	140	-Neurological
Naphthalene	91-20-3	20 *Minimum Criteria* *Organoleptic*	26 *Toxicity Criteria*	26 *Toxicity Criteria*	200	-Body Weight -Nasal
Naphthylamine, 2-	91-59-8	10 *Minimum Criteria* *PQL*	*NA*	*NA*	100	-Carcinogen
Napropamide	15299-99-7	700 *Minimum Criteria* *Systemic Toxicant*	210 *Toxicity Criteria*	210 *Toxicity Criteria*	7000	-Body Weight
Nickel	7440-02-0	100 *Primary Standard* *Systemic Toxicant*	*a*	8.3 *62-302*	1000	-Body Weight
Nitrate	14797-55-8	10000 *Primary Standard* *Systemic Toxicant*	*62-302* *b*	*62-302* *b*	100000	-Blood
Nitrate+Nitrite	NOCAS#	10000 *Primary Standard* *Systemic Toxicant*	*62-302* *b*	*62-302* *b*	100000	-Blood
Nitrite	14797-65-0	1000 *Primary Standard* *Systemic Toxicant*	*62-302* *b*	*62-302* *b*	10000	-Blood
Nitroaniline, m- (3)	99-09-2	50 *Minimum Criteria* *PQL*	*NA*	*NA*	500	-None Specified

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Groundwater and Surface Water Cleanup Target Levels

Contaminant	CAS #	Groundwater Criteria (ug/L)	Freshwater Surface Water Criteria (ug/L)	Marine Surface Water Criteria (ug/L)	Groundwater of Low Yield/Poor Quality Criteria (ug/L)	Target Organ/System or Effect
Nitroaniline, o- (2)	88-74-4	50 *Minimum Criteria PQL*	*NA*	*NA*	500	-Blood
Nitroaniline, p- (4)	100-01-6	21 *Minimum Criteria Systemic Toxicant*	1200 *Toxicity Criteria*	1200 *Toxicity Criteria*	210	-None Specified
Nitrobenzene	98-95-3	4 *Minimum Criteria PQL*	90 *Toxicity Criteria*	90 *Toxicity Criteria*	40	-Adrenals -Blood -Kidney -Liver
Nitrophenol, 4-	100-02-7	56 *Minimum Criteria Systemic Toxicant*	55 *Toxicity Criteria*	55 *Toxicity Criteria*	560	-None Specified
Nitroso-di-ethylamine, N-	55-18-5	4 *Minimum Criteria PQL*	0.18 *Human Health*	0.18 *Human Health*	40	-Carcinogen
Nitroso-di-n-butylamine, N-	924-16-3	4 *Minimum Criteria PQL*	0.16 *Human Health*	0.16 *Human Health*	40	-Carcinogen
Nitroso-di-n-propylamine, N-	621-64-7	4 *Minimum Criteria PQL*	0.83 *Human Health*	0.83 *Human Health*	40	-Carcinogen
Nitroso-dimethylamine, N-	62-75-9	2 *Minimum Criteria PQL*	0.53 *Human Health*	0.53 *Human Health*	20	-Carcinogen
Nitroso-diphenylamine, N-	86-30-6	7.1 *Minimum Criteria Carcinogen*	44 *Human Health*	44 *Human Health*	71	-Carcinogen
Nitroso-N-methylethylamine, N-	10595-95-6	8 *Minimum Criteria PQL*	1.22 *Human Health*	1.22 *Human Health*	80	-Carcinogen
Nitrosopyrrolidine, N-	930-55-2	8 *Minimum Criteria PQL*	*NA*	*NA*	80	-Carcinogen
Nitrotoluene, m-	99-08-1	250 *Minimum Criteria PQL*	375 *Toxicity Criteria*	375 *Toxicity Criteria*	2500	-Spleen
Nitrotoluene, o-	88-72-2	250 *Minimum Criteria PQL*	550 *Toxicity Criteria*	550 *Toxicity Criteria*	2500	-Spleen
Nitrotoluene, p-	99-99-0	250 *Minimum Criteria PQL*	550 *Toxicity Criteria*	550 *Toxicity Criteria*	2500	-Spleen
Norflurazon	27314-13-2	280 *Minimum Criteria Systemic Toxicant*	*NA*	*NA*	2800	-Kidney -Liver -Thyroid

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Groundwater and Surface Water Cleanup Target Levels

Contaminant	CAS #	Groundwater Criteria (ug/L)	Freshwater Surface Water Criteria (ug/L)	Marine Surface Water Criteria (ug/L)	Groundwater of Low Yield/Poor Quality Criteria (ug/L)	Target Organ/System or Effect
Octahydro-1,3,5,7-tetranitro-tetrazocine [or HMX]	2691-41-0	350 *Minimum Criteria* *Systemic Toxicant*	1250 *Toxicity Criteria*	1250 *Toxicity Criteria*	3500	-Blood
Octamethylpyrophosphoramide	152-16-9	1000 *Minimum Criteria* *PQL*	*NA*	*NA*	10000	-Neurological
Oryzalin	19044-88-3	350 *Minimum Criteria* *Systemic Toxicant*	*NA*	*NA*	3500	-Blood -Kidney -Liver
Oxadiazon	19666-30-9	35 *Minimum Criteria* *Systemic Toxicant*	44 *Toxicity Criteria*	44 *Toxicity Criteria*	350	-Liver
Oxamyl	23135-22-0	200 *Primary Standard* *Systemic Toxicant*	8.5 *Toxicity Criteria*	8.5 *Toxicity Criteria*	2000	-Body Weight
Paraquat	1910-42-5	31.5 *Minimum Criteria* *Systemic Toxicant*	47 *Toxicity Criteria*	47 *Toxicity Criteria*	315	-Respiratory
Parathion	56-38-2	42 *Minimum Criteria* *Systemic Toxicant*	0.04 *62-302*	0.04 *62-302*	420	-Neurological
PCBs [Aroclor mixture]	1336-36-3	0.5 *Primary Standard* *Carcinogen*	0.000045 *62-302* *annual avg; 0.14 max*	0.000045 *62-302* *annual avg; 0.14 max*	5	-Carcinogen -Immunological
Pebulate	1114-71-2	350 *Minimum Criteria* *Systemic Toxicant*	305 *Toxicity Criteria*	305 *Toxicity Criteria*	3500	-Blood
Pendimethalin	40487-42-1	280 *Minimum Criteria* *Systemic Toxicant*	10 *Toxicity Criteria*	10 *Toxicity Criteria*	2800	-Liver
Pentachlorobenzene	608-93-5	5.6 *Minimum Criteria* *Systemic Toxicant*	1.7 *Human Health*	1.7 *Human Health*	56	-Kidney -Liver
Pentachloronitrobenzene	82-68-8	0.5 *Minimum Criteria* *PQL*	0.04 *Human Health*	0.04 *Human Health*	5	-Carcinogen -Liver
Pentachlorophenol	87-86-5	1 *Primary Standard* *Carcinogen*	8.2 *62-302* *annual avg; 30 max. c*	7.9 *62-302*	10	-Carcinogen -Kidney -Liver
Permethrin	52645-53-1	350 *Minimum Criteria* *Systemic Toxicant*	0.001 *Toxicity Criteria*	0.001 *Toxicity Criteria*	3500	-Liver
Phenanthrene	85-01-8	210 *Minimum Criteria* *Systemic (a)*	0.031 *62-302* *annual average*	0.031 *62-302* *annual average*	2100	-Kidney

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Groundwater and Surface Water Cleanup Target Levels

Contaminant	CAS #	Groundwater Criteria (ug/L)	Freshwater Surface Water Criteria (ug/L)	Marine Surface Water Criteria (ug/L)	Groundwater of Low Yield/Poor Quality Criteria (ug/L)	Target Organ/System or Effect
Phenol	108-95-2	10 *Minimum Criteria Organoleptic*	6.5 *Toxicity Criteria*	6.5 *Toxicity Criteria*	100	-Developmental
Phenylenediamine, p-	106-50-3	1330 *Minimum Criteria Systemic Toxicant*	*NA*	*NA*	13300	-Whole Body
Phenylphenol, 2-	90-43-7	18 *Minimum Criteria Carcinogen*	35.5 *Toxicity Criteria*	35.5 *Toxicity Criteria*	180	-Carcinogen
Phorate	298-02-2	1.4 *Minimum Criteria Systemic Toxicant*	0.0055 *Toxicity Criteria*	0.0055 *Toxicity Criteria*	14	-Neurological
Phosmet	732-11-6	140 *Minimum Criteria Systemic Toxicant*	0.1 *Toxicity Criteria*	0.1 *Toxicity Criteria*	1400	-Body Weight -Liver -Neurological
Phosphine	7803-51-2	125 *Minimum Criteria PQL*	*NA*	*NA*	1250	-Body Weight
Phthalic anhydride	85-44-9	14000 *Minimum Criteria Systemic Toxicant*	*NA*	*NA*	140000	-Kidney -Nasal -Respiratory
Picloram	1918-02-1	500 *Primary Standard Systemic Toxicant*	70 *Toxicity Criteria*	70 *Toxicity Criteria*	5000	-Liver
Potassium cyanide	151-50-8	350 *Minimum Criteria Systemic Toxicant*	5.5 *Toxicity Criteria*	5.5 *Toxicity Criteria*	3500	-Body Weight -Neurological -Thyroid
Profluralin	26399-36-0	42 *Minimum Criteria Systemic Toxicant*	*NA*	*NA*	420	-None Specified
Prometon	1610-18-0	105 *Minimum Criteria Systemic Toxicant*	600 *Toxicity Criteria*	600 *Toxicity Criteria*	1050	-None Specified
Prometryn	7287-19-6	28 *Minimum Criteria Systemic Toxicant*	21 *Toxicity Criteria*	21 *Toxicity Criteria*	280	-Bone Marrow -Kidney -Liver
Pronamide	23950-58-5	53 *Minimum Criteria Systemic Toxicant*	*NA*	*NA*	530	-None Specified
Propachlor	1918-16-7	91 *Minimum Criteria Systemic Toxicant*	11.5 *Toxicity Criteria*	11.5 *Toxicity Criteria*	910	-Body Weight -Liver
Propanil	709-98-8	35 *Minimum Criteria Systemic Toxicant*	20 *Toxicity Criteria*	20 *Toxicity Criteria*	350	-Spleen

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Groundwater and Surface Water Cleanup Target Levels

Contaminant	CAS #	Groundwater Criteria (ug/L)	Freshwater Surface Water Criteria (ug/L)	Marine Surface Water Criteria (ug/L)	Groundwater of Low Yield/Poor Quality Criteria (ug/L)	Target Organ/System or Effect
Propargite	2312-35-8	140 *Minimum Criteria Systemic Toxicant*	1.55 *Toxicity Criteria*	1.55 *Toxicity Criteria*	1400	-None Specified
Propazine	139-40-2	14 *Minimum Criteria Systemic Toxicant*	185 *Toxicity Criteria*	185 *Toxicity Criteria*	140	-Body Weight
Propham	122-42-9	140 *Minimum Criteria Systemic Toxicant*	500 *Toxicity Criteria*	500 *Toxicity Criteria*	1400	-Neurological
Propiconazole	60207-90-1	90 *Minimum Criteria Systemic Toxicant*	25.5 *Toxicity Criteria*	25.5 *Toxicity Criteria*	900	-Gastrointestinal
Propoxur [or Baygon]	114-26-1	2.8 *Minimum Criteria Systemic Toxicant*	0.35 *Toxicity Criteria*	0.35 *Toxicity Criteria*	28	-Blood -Neurological
Propylene glycol	57-55-6	140000 *Minimum Criteria Systemic Toxicant*	35500 *Toxicity Criteria*	35500 *Toxicity Criteria*	1400000	-Blood -Bone Marrow
Propylene oxide	75-56-9	5000 *Minimum Criteria PQL*	*NA*	*NA*	50000	-Carcinogen -Nasal -Respiratory
Pydrin [or Fenvalerate]	51630-58-1	1750 *Minimum Criteria Systemic Toxicant*	0.00035 *Toxicity Criteria*	0.00035 *Toxicity Criteria*	17500	-Neurological
Pyrene	129-00-0	210 *Minimum Criteria Systemic Toxicant*	0.3 *Toxicity Criteria*	0.3 *Toxicity Criteria*	2100	-Kidney
Pyridine	110-86-1	7 *Minimum Criteria PQL*	1300 *Toxicity Criteria*	1300 *Toxicity Criteria*	70	-Liver
Radium, 226 and 228 (combined)	7440-14-4	5 *Primary Standard pCi/L*	5 *62-302 pCi/L*	5 *62-302 pCi/L*	50	-Carcinogen
Resmethrin	10453-86-8	210 *Minimum Criteria Systemic Toxicant*	0.0026 *Toxicity Criteria*	0.0026 *Toxicity Criteria*	2100	-Reproductive
Ronnel	299-84-3	350 *Minimum Criteria Systemic Toxicant*	0.061 *Toxicity Criteria*	0.061 *Toxicity Criteria*	3500	-Liver
Rotenone	83-79-4	28 *Minimum Criteria Systemic Toxicant*	0.115 *Toxicity Criteria*	0.115 *Toxicity Criteria*	280	-Developmental
Selenious acid (as Selenium)	7783-00-8	35 *Minimum Criteria Systemic Toxicant*	40 *Toxicity Criteria*	40 *Toxicity Criteria*	350	-Hair Loss -Neurological -Skin

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Contaminant	CAS #	Groundwater Criteria (ug/L)	Freshwater Surface Water Criteria (ug/L)	Marine Surface Water Criteria (ug/L)	Groundwater of Low Yield/Poor Quality Criteria (ug/L)	Target Organ/System or Effect
Selenium	7782-49-2	50 *Primary Standard Systemic Toxicant*	5 *62-302*	71 *62-302*	500	-Hair Loss -Neurological -Skin
Silver	7440-22-4	100 *Secondary Standard Systemic Toxicant*	0.07 *62-302*	0.35 *Toxicity Criteria*	1000	-Skin
Simazine	122-34-9	4 *Primary Standard Carcinogen*	5.8 *Human Health*	5.8 *Human Health*	40	-Blood -Body Weight -Carcinogen
Sodium	7440-23-5	160000 *Primary Standard*	*c*	*NA*	1600000	-None Specified
Sodium cyanide (as Cyanide)	143-33-9	280 *Minimum Criteria Systemic Toxicant*	3.79 *Toxicity Criteria*	3.79 *Toxicity Criteria*	2800	-Neurological
Strontium	7440-24-6	4200 *Minimum Criteria Systemic Toxicant*	*NA*	*NA*	42000	-Bone
Strychnine	57-24-9	100 *Minimum Criteria PQL*	38 *Toxicity Criteria*	38 *Toxicity Criteria*	1000	-Mortality
Styrene	100-42-5	100 *Primary Standard Systemic Toxicant*	455 *Toxicity Criteria*	455 *Toxicity Criteria*	1000	-Blood -Liver -Neurological
Sulfate	14808-79-8	250000 *Secondary Standard*	*b*	*b*	2500000	-None Specified
Tebuthiuron	34014-18-1	490 *Minimum Criteria Systemic Toxicant*	307 *Toxicity Criteria*	307 *Toxicity Criteria*	4900	-Body Weight
Temephos	3383-96-8	140 *Minimum Criteria Systemic Toxicant*	0.002 *Toxicity Criteria*	0.002 *Toxicity Criteria*	1400	-None Specified
Terbacil	5902-51-2	91 *Minimum Criteria Systemic Toxicant*	2450 *Toxicity Criteria*	2450 *Toxicity Criteria*	910	-Liver -Thyroid
Terbufos	13071-79-9	0.2 *Minimum Criteria Systemic Toxicant*	0.01 *Toxicity Criteria*	0.01 *Toxicity Criteria*	2	-Neurological
Terbutryn	886-50-0	330 *Minimum Criteria PQL*	3.1 *Toxicity Criteria*	3.1 *Toxicity Criteria*	3300	-Blood
Tetrachlorobenzene, 1,2,4,5-	95-94-3	2.1 *Minimum Criteria Systemic Toxicant*	2.3 *Human Health*	2.3 *Human Health*	21	-Kidney

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Groundwater and Surface Water Cleanup Target Levels

Contaminant	CAS #	Groundwater Criteria (ug/L)	Freshwater Surface Water Criteria (ug/L)	Marine Surface Water Criteria (ug/L)	Groundwater of Low Yield/Poor Quality Criteria (ug/L)	Target Organ/System or Effect
Tetrachloroethane, 1,1,1,2-	630-20-6	1.3 *Minimum Criteria Carcinogen*	*NA*	*NA*	13	-Carcinogen -Kidney -Liver
Tetrachloroethane, 1,1,2,2-	79-34-5	0.2 *Minimum Criteria Carcinogen*	10.8 *62-302 annual average*	10.8 *62-302 annual average*	2	-Carcinogen
Tetrachloroethene [or PCE]	127-18-4	3 *Primary Standard Carcinogen*	8.85 *62-302 annual average*	8.85 *62-302 annual average*	30	-Body Weight -Carcinogen -Liver
Tetrachlorophenol, 2,3,4,6-	58-90-2	210 *Minimum Criteria Systemic Toxicant*	4.5 *Toxicity Criteria*	4.5 *Toxicity Criteria*	2100	-Liver
Tetraethyl dithiopyrophosphate	3689-24-5	3.5 *Minimum Criteria PQL*	0.0115 *Toxicity Criteria*	0.0115 *Toxicity Criteria*	35	-Bone Marrow -Neurological
Thallium	7440-28-0	2 *Primary Standard Systemic Toxicant*	6.3 *62-302*	6.3 *62-302*	20	-Blood -Hair Loss -Liver
Thiocyanomethylthio-benzothiazole, 2-	21564-17-0	210 *Minimum Criteria Systemic Toxicant*	0.435 *Toxicity Criteria*	0.435 *Toxicity Criteria*	2100	-Gastrointestinal
Thiram	137-26-8	35 *Minimum Criteria Systemic Toxicant*	0.168 *Toxicity Criteria*	0.168 *Toxicity Criteria*	350	-Neurological
Tin	7440-31-5	4200 *Minimum Criteria Systemic Toxicant*	*NA*	*NA*	42000	-Kidney -Liver
Toluene	108-88-3	40 *Secondary Standard Systemic Toxicant*	475 *Toxicity Criteria*	475 *Toxicity Criteria*	400	-Kidney -Liver -Neurological
Toluene-2,4-diamine	95-80-7	100 *Minimum Criteria PQL*	*NA*	*NA*	1000	-Carcinogen
Toluidine, p-	106-49-0	150 *Minimum Criteria PQL*	*NA*	*NA*	1500	-Carcinogen
Total dissolved solids [or TDS]	C-010	500000 *Secondary Standard*	*NA*	*NA*	5000000	-None Specified
Toxaphene	8001-35-2	3 *Primary Standard Carcinogen*	0.0002 *62-302*	0.0002 *62-302*	30	-Carcinogen -Developmental
Triallate	2303-17-5	91 *Minimum Criteria Systemic Toxicant*	65 *Toxicity Criteria*	65 *Toxicity Criteria*	910	-Liver -Spleen

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Groundwater and Surface Water Cleanup Target Levels

Contaminant	CAS #	Groundwater Criteria (ug/L)	Freshwater Surface Water Criteria (ug/L)	Marine Surface Water Criteria (ug/L)	Groundwater of Low Yield/Poor Quality Criteria (ug/L)	Target Organ/System or Effect
Tributyltin oxide	56-35-9	10 *Minimum Criteria PQL*	0.05 *Toxicity Criteria*	0.05 *Toxicity Criteria*	100	-Immunological
Trichloro-1,2,2-trifluoroethane, 1,1,2- [or CFC 113]	76-13-1	500000 *Minimum Criteria PQL*	*NA*	*NA*	5000000	-Body Weight -Neurological
Trichloroacetic acid	76-03-9	300 *Minimum Criteria Health Advisory Level*	100000 *Toxicity Criteria*	100000 *Toxicity Criteria*	3000	-None Specified
Trichlorobenzene, 1,2,3-	87-61-6	70 *Minimum Criteria Systemic (c)*	85 *Toxicity Criteria*	85 *Toxicity Criteria*	700	-Adrenals -Body Weight
Trichlorobenzene, 1,2,4-	120-82-1	70 *Primary Standard Systemic Toxicant*	22.5 *Toxicity Criteria*	22.5 *Toxicity Criteria*	700	-Adrenals -Body Weight
Trichlorobenzene, 1,3,5-	108-70-3	40 *Minimum Criteria Systemic Toxicant*	*NA*	*NA*	400	-None Specified
Trichloroethane, 1,1,1- [or Methyl chloroform]	71-55-6	200 *Primary Standard Systemic Toxicant*	270 *Toxicity Criteria*	270 *Toxicity Criteria*	2000	-None Specified
Trichloroethane, 1,1,2-	79-00-5	5 *Primary Standard Carcinogen*	28.5 *Human Health*	28.5 *Human Health*	50	-Carcinogen -Liver
Trichloroethene [or TCE]	79-01-6	3 *Primary Standard Carcinogen*	80.7 *62-302 annual average*	80.7 *62-302 annual average*	30	-Carcinogen
Trichlorofluoromethane	75-69-4	2100 *Minimum Criteria Systemic Toxicant*	*NA*	*NA*	21000	-Cardiovascular -Kidney -Mortality -Respiratory
Trichlorophenol, 2,4,5-	95-95-4	4 *Minimum Criteria Organoleptic*	22.5 *Toxicity Criteria*	22.5 *Toxicity Criteria*	40	-Kidney -Liver
Trichlorophenol, 2,4,6-	88-06-2	3.2 *Minimum Criteria Carcinogen*	6.5 *62-302 annual average*	6.5 *62-302 annual average*	32	-Carcinogen
Trichlorophenoxy acetic acid, 2,4,5- 2,4,5-T	93-76-5	70 *Minimum Criteria Systemic Toxicant*	145 *Toxicity Criteria*	145 *Toxicity Criteria*	700	-Kidney
Trichlorophenoxy propionic acid [or Silvex] 2,4,5-TP	93-72-1	50 *Primary Standard Systemic Toxicant*	*NA*	*NA*	500	-Liver
Trichloropropane, 1,2,3-	96-18-4	0.2 *Minimum Criteria PQL*	0.26 *Human Health*	0.26 *Human Health*	2	-Body Weight -Carcinogen -Kidney -Liver -Mortality

Table 1 - Technical Report

Groundwater and Surface Water Cleanup Target Levels

Contaminant	CAS #	Groundwater Criteria (ug/L)	Freshwater Surface Water Criteria (ug/L)	Marine Surface Water Criteria (ug/L)	Groundwater of Low Yield/Poor Quality Criteria (ug/L)	Target Organ/System or Effect
Trifluralin	1582-09-8	4.5 *Minimum Criteria Carcinogen*	0.78 *Human Health*	0.78 *Human Health*	45	-Blood -Carcinogen -Liver
Trimethyl phosphate	512-56-1	50 *Minimum Criteria PQL*	*NA*	*NA*	500	-Carcinogen
Trimethylbenzene, 1,2,3-	526-73-8	10 *Minimum Criteria Organoleptic*	*NA*	*NA*	100	-None Specified
Trimethylbenzene, 1,2,4-	95-63-6	10 *Minimum Criteria Organoleptic*	217.5 *Toxicity Criteria*	217.5 *Toxicity Criteria*	100	-None Specified
Trimethylbenzene, 1,3,5-	108-67-8	10 *Minimum Criteria Organoleptic*	215 *Toxicity Criteria*	215 *Toxicity Criteria*	100	-None Specified
Trinitrobenzene, 1,3,5-	99-35-4	210 *Minimum Criteria Systemic Toxicant*	19 *Toxicity Criteria*	19 *Toxicity Criteria*	2100	-Blood -Spleen
Trinitrotoluene, 2,4,6-	118-96-7	10 *Minimum Criteria PQL*	49 *Toxicity Criteria*	49 *Toxicity Criteria*	100	-Carcinogen -Liver
TRPH	NOCAS#	5000 *Minimum Criteria ##*	5000 *62-302 ##*	5000 *62-302 ##*	50000	-Multiple Endpoints Mixed Contaminants
Uranium, natural	7440-61-1	21 *Minimum Criteria Systemic Toxicant*	*NA*	*NA*	210	-None Specified
Vanadium	7440-62-2	49 *Minimum Criteria Systemic Toxicant*	*NA*	*NA*	490	-None Specified
Vernam	1929-77-7	7 *Minimum Criteria Systemic Toxicant*	11.5 *Toxicity Criteria*	11.5 *Toxicity Criteria*	70	-Body Weight
Vinyl acetate	108-05-4	88 *Minimum Criteria Organoleptic*	700 *Toxicity Criteria*	700 *Toxicity Criteria*	880	-Body Weight -Kidney -Nasal
Vinyl chloride	75-01-4	1 *Primary Standard Carcinogen*	*NA*	*NA*	10	-Carcinogen
Xylenes, total	1330-20-7	20 *Secondary Standard Systemic Toxicant*	370 *Toxicity Criteria*	370 *Toxicity Criteria*	200	-Body Weight -Mortality -Neurological
Zinc	7440-66-6	5000 *Secondary Standard Systemic Toxicant*	*62-302 a*	86 *62-302*	50000	-Blood

Table 1 - Technical Report

Groundwater and Surface Water Cleanup Target Levels

Contaminant	CAS #	Groundwater Criteria (ug/L)	Freshwater Surface Water Criteria (ug/L)	Marine Surface Water Criteria (ug/L)	Groundwater of Low Yield/Poor Quality Criteria (ug/L)	Target Organ/System or Effect
Zinc chloride	7646-85-7	2100 *Minimum Criteria Systemic Toxicant*	1.5 *Toxicity Criteria*	1.5 *Toxicity Criteria*	21000	-Blood
Zinc phosphide	1314-84-7	2.1 *Minimum Criteria Systemic Toxicant*	*NA*	*NA*	21	-Body Weight
Zineb	12122-67-7	350 *Minimum Criteria Systemic Toxicant*	13.5 *Toxicity Criteria*	13.5 *Toxicity Criteria*	3500	-Thyroid

* = As provided in Chapters 62-550 and 62-520, F.A.C.
** = As provided in Chapter 62-302, F.A.C.
*** = Equal to 10 times the value provided in Chapters 62-550 and 62-520, F.A.C.

a = Hardness-dependent per Chapter 62-302, F.A.C.

b = Not greater than 10% above background.

c = Shall not be increased more than 50% above background or to 1275, whichever is greater (per Chapter 62-302, F.A.C.).

= Based on similarity to chloride considerations as provided in Chapter 62-302, F.A.C.
= Based on similarity to oil and grease standard as provided in Chapter 62-302, F.A.C.

PQL = Practical Quantitation Limit.
MRL = Minimum Risk Level from ATSDR Toxicant Profile.
Toxicity Criteria = 1/20 of applicable LC50 data.
NA = Not Available at time of Rule adoption.

Surrogate (a): Surrogate RfD based on other non-carcinogenic PAHs (e.g. pyrene).
Surrogate (b): Surrogate RfD based on oral RfD for HCH-gamma (lindane).
Surrogate (c): Surrogate RfD based on Primary Groundwater Standard for 1,2,4-trichlorobenzene.

62-302 = As provided in Chapter 62-302, F.A.C. If the PQL using the most sensitive and currently available technology is higher than the specified criterion, the PQL shall be used.

Note: Freshwater and Marine Surfacewaters shall pass Toxicity Bioassay Tests; "pass test" shall mean mortality less than fifty percent in a 96-hour acute toxicity test performed, in predominantly fresh waters, on both Cyprinella leedsi (bannerfin shiner) and Ceriodaphnia dubia (water flea), and in predominantly marine waters, on both Menidia beryllina (inland silversides) and Americamysis bahia (possum shrimp).

Table 2 - Technical Report
Soil Cleanup Target Levels

Contaminant	CAS#	Direct Exposure		Leachability Based on Groundwater Criteria	Leachability Based on Freshwater Surface Water Criteria	Leachability Based on Marine Surface Water Criteria	Leachability Based on Groundwater of Low Yield/ Poor Quality	Target Organ/System or Effect
		Residential	Commercial/ Industrial					
		(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	
Acenaphthene	83-32-9	1900	18000	2.1	0.7	0.7	21	-Liver
Acenaphthylene	208-96-8	1100	11000	27	0.7	0.7	270	-Body Weight -Liver
Acephate	30560-19-1	64	130	0.03	0.8	0.8	0.3	-Carcinogen -Neurological
Acetone	67-64-1	780	5500	2.8	6.8	6.8	28	-Kidney -Liver -Neurological
Acetonitrile	75-05-8	120	960	2	80	80	20	-Blood -Liver
Acetophenone	98-86-2	2700	24000	3.9	44	44	39	-None Specified
Acrolein	107-02-8	0.04	0.3	0.06	0.002	0.002	0.6	-Nasal
Acrylamide	79-06-1	0.1	0.3	0.004	0.02	0.02	0.04	-Carcinogen -Neurological
Acrylonitrile	107-13-1	0.3	0.5	0.004	0.2	0.2	0.04	-Carcinogen -Nasal -Reproductive
Alachlor	15972-60-8	12	36	0.02	0.006	0.006	0.2	-Blood -Carcinogen
Aldicarb [or Temik]	116-06-3	56	760	0.03	0.004	0.004	0.3	-Neurological
Aldrin	309-00-2	0.07	0.3	0.5	0.01	0.01	5	-Carcinogen -Liver
Allyl alcohol	107-18-6	62	460	1	0.02	0.02	10	-Kidney -Liver
Aluminum	7429-90-5	72000	*	***	***	***	***	-Body Weight
Aluminum phosphide	20859-73-8	31	730	***	***	***	***	-Body Weight
Ametryn	834-12-8	590	9300	0.8	0.08	0.08	8	-Liver
Ammonia (a)	7664-41-7	550	3700	570	4	NA	5700	-Respiratory
Aniline	62-53-3	14	100	0.03	0.02	0.02	0.3	-Blood -Carcinogen
Anthracene	120-12-7	18000	260000	2500	0.7	0.7	25000	-None Specified

Table 2 - Technical Report
Soil Cleanup Target Levels

Contaminant	CAS#	Direct Exposure		Leachability Based on Groundwater Criteria	Leachability Based on Freshwater Surface Water Criteria	Leachability Based on Marine Surface Water Criteria	Leachability Based on Groundwater of Low Yield/ Poor Quality	Target Organ/System or Effect
		Residential	Commercial/ Industrial					
		(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	
Antimony (b)	7440-36-0	26	240	5	***	***	50	-Blood -Mortality
Arsenic (b)	7440-38-2	0.8	3.7	29	***	***	290	-Carcinogen -Cardiovascular -Skin
Atrazine	1912-24-9	4	12	0.06	0.04	0.04	0.6	-Body Weight -Carcinogen
Azobenzene	103-33-3	8.2	24	0.4	0.06	0.06	4	-Carcinogen
Barium (b)	7440-39-3	110**	87000	1600	***	***	16000	-Cardiovascular
Bayleton	43121-43-3	2000	29000	4.8	11	11	48	-Blood -Body Weight
Benomyl	17804-35-2	3600	64000	3.1	0.03	0.03	31	-Developmental
Bentazon	25057-89-0	1500	18000	1.2	NA	NA	12	-Blood
Benzaldehyde	100-52-7	2200	18000	4.8	0.4	0.4	48	-Gastrointestinal -Kidney
Benzene	71-43-2	1.1	1.6	0.007	0.5	0.5	0.07	-Carcinogen
Benzenethiol	108-98-5	0.1	1	0.3	NA	NA	3	-Liver
Benzo(a)anthracene	56-55-3	1.4	5	3.2	0.7	0.7	32	-Carcinogen
Benzo(a)pyrene	50-32-8	0.1	0.5	8	1.2	1.2	80	-Carcinogen
Benzo(b)fluoranthene	205-99-2	1.4	4.8	10	1.6	1.6	100	-Carcinogen
Benzo(g,h,i)perylene	191-24-2	2300	41000	32000	4.8	4.8	320000	-Neurological
Benzo(k)fluoranthene	207-08-9	15	52	25	1.6	1.6	250	-Carcinogen
Benzoic acid	65-85-0	150000	*	110	36	36	1100	-None Specified
Benzotrichloride	98-08-7	0.04	0.07	0.003	0.0002	0.0002	0.03	-Carcinogen
Benzyl alcohol	100-51-6	23000	610000	9.5	2.3	2.3	95	-Gastrointestinal

Table 2 - Technical Report
Soil Cleanup Target Levels

Contaminant	CAS#	Direct Exposure		Leachability Based on Groundwater Criteria	Leachability Based on Freshwater Surface Water Criteria	Leachability Based on Marine Surface Water Criteria	Leachability Based on Groundwater of Low Yield/ Poor Quality	Target Organ/System or Effect
		Residential	Commercial/ Industrial					
		(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	
Benzyl chloride	100-44-7	0.8	1.2	0.006	0.03	0.03	0.06	-Carcinogen
Beryllium (b)(c)	7440-41-7	120	800	63	***	***	630	-Carcinogen -Gastrointestinal -Respiratory
Bidrin [or Dicrotophos]	141-66-2	5.5	67	0.005	0.1	0.1	0.05	-Developmental
Biphenyl, 1,1- [or Diphenyl]	92-52-4	2300	26000	0.2	5.8	5.8	2	-Kidney
Bis(2-chloroethyl)ether	111-44-4	0.3	0.4	0.02	0.05	0.05	0.2	-Carcinogen
Bis(2-chloroisopropyl)ether	108-60-1	4.4	7.3	0.07	0.003	0.003	0.7	-Blood -Carcinogen
Bis(2-ethylhexyl)phthalate [or DEHP]	117-81-7	76	280	3600	12	12	36000	-Carcinogen -Liver
Bisphenol A	80-05-7	3300	51000	11	1.7	1.7	110	-Body Weight
Boron	7440-42-8	7000	160000	***	NA	NA	***	-Reproductive -Respiratory
Bromacil	314-40-9	5700	72000	0.6	0.6	0.6	6	-Body Weight
Bromochloromethane	74-97-5	57	390	0.6	NA	NA	6	-None Specified
Bromodichloromethane	75-27-4	1.4	2	0.004	0.1	0.1	0.04	-Carcinogen -Kidney
Bromoform	75-25-2	48	84	0.03	2.7	2.7	0.3	-Carcinogen -Liver
Bromomethane [or Methyl bromide]	74-83-9	2.2	15	0.05	0.2	0.2	0.5	-Gastrointestinal
Butanol, 1-	71-36-3	1300	10000	3	110	110	30	-Neurological
Butanone, 2- [or MEK]	78-93-3	3100	21000	17	490	490	170	-Developmental
Butyl benzyl phthalate, n-	85-68-7	15000	320000	310	56	56	3100	-Liver
Butylate	2008-41-5	2100	22000	5.2	0.2	0.2	52	-Liver
Butylphthalyl butylglycolate	85-70-1	74000	*	4200	NA	NA	42000	-None Specified

Table 2 - Technical Report
Soil Cleanup Target Levels

Contaminant	CAS#	Direct Exposure		Leachability Based on Groundwater Criteria	Leachability Based on Freshwater Surface Water Criteria	Leachability Based on Marine Surface Water Criteria	Leachability Based on Groundwater of Low Yield/ Poor Quality	Target Organ/System or Effect
		Residential	Commercial/ Industrial					
		(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	
Cadmium (b)	7440-43-9	75**	1300	8	***	***	80	-Carcinogen -Kidney
Calcium cyanide	592-01-8	3100	73000	***	NA	NA	***	-Body Weight -Neurological -Thyroid
Captan	133-06-2	190	410	3.6	0.03	0.03	36	-Body Weight -Carcinogen
Carbaryl [or Sevin]	63-25-2	6800	120000	8.7	0.0007	0.0007	87	-Kidney -Liver
Carbazole	86-74-8	53	190	0.6	6.5	6.5	6	-Carcinogen
Carbofuran	1563-66-2	58	430	0.2	0.0006	0.0006	2	-Neurological -Reproductive
Carbon disulfide	75-15-0	200	1400	5.6	0.8	0.8	56	-Developmental -Neurological
Carbon tetrachloride	56-23-5	0.4	0.6	0.04	0.06	0.06	0.4	-Carcinogen -Liver
Carbophenothion [or Trithion]	786-19-6	9.8	180	13	1.5	1.5	130	-Neurological
Chlordane	57-74-9	3.1	12	9.6	0.003	0.003	96	-Carcinogen -Liver
Chlorine	7782-50-5	7800	200000	***	***	***	***	-Body Weight
Chlorine cyanide [or Cyanogen chloride]	506-77-4	910	7200	71	0.3	0.3	710	-Body Weight -Neurological -Thyroid
Chloro-1,3-butadiene [or Chloroprene]	126-99-8	2.6	17	1.5	NA	NA	15	-Body Weight -Hair Loss -Nasal
Chloro-m-cresol, p- [or 4-chloro-3-methylphenol]	59-50-7	410	4400	0.4	0.6	0.6	4	-Body Weight
Chloroacetic acid	79-11-8	87	920	0.07	NA	NA	0.7	-Cardiovascular
Chloroaniline, 4-	106-47-8	190	2000	0.2	0.02	0.02	2	-Spleen
Chlorobenzene	108-90-7	30	200	1.3	0.2	0.2	13	-Liver
Chlorobenzilate	510-15-6	3.9	14	0.08	0.07	0.07	0.8	-Body Weight -Carcinogen
Chloroform	67-66-3	0.4	0.5	0.03	2.8	2.8	0.3	-Carcinogen -Liver

Table 2 - Technical Report
Soil Cleanup Target Levels

Contaminant	CAS#	Direct Exposure		Leachability Based on Groundwater Criteria	Leachability Based on Freshwater Surface Water Criteria	Leachability Based on Marine Surface Water Criteria	Leachability Based on Groundwater of Low Yield/ Poor Quality	Target Organ/System or Effect
		Residential	Commercial/ Industrial					
		(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	
Chloromethane	74-87-3	1.7	2.3	0.01	2.3	2.3	0.1	-Carcinogen
Chloronaphthalene, beta-	91-58-7	4000	49000	260	NA	NA	2600	-Liver -Respiratory
Chloronitrobenzene, p-	100-00-5	28	55	3.7	1.6	1.6	37	-Carcinogen
Chlorophenol, 2-	95-57-8	82	640	0.7	2.5	2.5	7	-Reproductive
Chlorophenol, 3-	108-43-0	280	3400	0.2	3.1	3.1	2	-None Specified
Chlorophenol, 4-	106-48-9	220	2400	0.04	1.2	1.2	0.4	-None Specified
Chlorothalonil [or Bravo]	1897-45-6	88	280	0.2	0.06	0.06	2	-Carcinogen -Kidney
Chlorotoluene, o-	95-49-8	120	850	2.8	7.7	7.7	28	-Body Weight
Chlorotoluene, p-	106-43-4	100	730	2.5	NA	NA	25	-None Specified
Chlorpropham	101-21-3	13000	200000	51	7	7	510	-Bone Marrow -Kidney -Liver -Spleen
Chlorpyrifos	2921-88-2	220	4200	15	0.001	0.001	150	-Neurological
Chromium (hexavalent) (b)	18540-29-9	210	420	38	***	***	380	-Carcinogen -Respiratory
Chrysene	218-01-9	140	450	77	0.7	0.7	770	-Carcinogen
Cobalt	7440-48-4	4700	110000	***	NA	NA	***	-Cardiovascular -Immunological -Neurological -Reproductive
Copper	7440-50-8	110**	76000	***	***	***	***	-Gastrointestinal
Coumaphos	56-72-4	18	300	0.3	0.0007	0.0007	3	-Neurological
Crotonaldehyde	123-73-9	0.07	0.1	17	NA	NA	170	-Carcinogen
Cumene [or Isopropyl benzene]	98-82-8	160	1100	0.2	56	56	2	-Adrenals -Kidney
Cyanide (potassium salt) (b)	57-12-5	30**	39000	40	***	***	400	-Body Weight -Neurological -Thyroid

Table 2 - Technical Report
Soil Cleanup Target Levels

Contaminant	CAS#	Direct Exposure		Leachability Based on Groundwater Criteria	Leachability Based on Freshwater Surface Water Criteria	Leachability Based on Marine Surface Water Criteria	Leachability Based on Groundwater of Low Yield/ Poor Quality	Target Organ/System or Effect
		Residential	Commercial/ Industrial					
		(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	
Cyanogen	460-19-5	340	2500	2000	NA	NA	20000	-None Specified
Cycloate	1134-23-2	240	2600	0.7	2.5	2.5	7	-Neurological
Cyclohexanone	108-94-1	68000	510000	150	110	110	1500	-Body Weight
Cypermethrin	52315-07-8	750	14000	70	0.005	0.005	700	-Gastrointestinal
DDD, 4,4'-	72-54-8	4.6	18	4	0.1	0.1	40	-Carcinogen
DDE, 4,4'-	72-55-9	3.3	13	18	0.1	0.1	180	-Carcinogen
DDT, 4,4'-	50-29-3	3.3	13	11	0.06	0.06	110	-Carcinogen -Liver
Di-n-butylphthalate	84-74-2	7300	140000	47	1.5	1.5	470	-Mortality
Di-n-octylphthalate	117-84-0	1500	27000	480000	NA	NA	4800000	-Kidney -Liver
Diallate	2303-16-4	17	56	0.6	NA	NA	6	-Carcinogen
Diazinon	333-41-5	55	760	0.02	0.00005	0.00005	0.2	-Neurological
Dibenz(a,h)anthracene	53-70-3	0.1	0.5	30	4.7	4.7	300	-Carcinogen
Dibenzofuran	132-64-9	280	5000	15	36	36	150	-None Specified
Dibromo-3-chloropropane, 1-2- [or DBCP]	96-12-8	0.8	2.7	0.001	NA	NA	0.01	-Carcinogen -Reproductive
Dibromochloromethane	124-48-1	1.4	2.1	0.003	0.2	0.2	0.03	-Carcinogen -Liver
Dibromoethane, 1,2- [or EDB]	106-93-4	0.01	0.04	0.0001	0.07	0.07	0.001	-Carcinogen -Reproductive
Dicamba	1918-00-9	1800	24000	2.6	2.4	2.4	26	-Developmental
Dichloroacetic acid	79-43-6	200	2300	0.2	8.1	8.1	2	-None Specified
Dichloroacetonitrile	3018-12-0	170	1400	0.03	NA	NA	0.3	-None Specified

Table 2 - Technical Report
Soil Cleanup Target Levels

Contaminant	CAS#	Direct Exposure		Leachability Based on Groundwater Criteria	Leachability Based on Freshwater Surface Water Criteria	Leachability Based on Marine Surface Water Criteria	Leachability Based on Groundwater of Low Yield/ Poor Quality	Target Organ/System or Effect
		Residential	Commercial/ Industrial					
		(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	
Dichlorobenzene, 1,2-	95-50-1	650	4600	17	2.8	2.8	170	-Body Weight
Dichlorobenzene, 1,3-	541-73-1	27	180	0.3	2.8	2.8	3	-None Specified
Dichlorobenzene, 1,4-	106-46-7	6	9	2.2	2.9	2.9	22	-Carcinogen -Liver
Dichlorobenzidine, 3,3'-	91-94-1	2.1	6.3	0.4	0.002	0.002	4	-Carcinogen
Dichlorodifluoromethane	75-71-8	56	370	44	NA	NA	440	-Body Weight -Liver
Dichloroethane, 1,1-	75-34-3	290	2000	0.4	NA	NA	4	-Kidney
Dichloroethane, 1,2- [or EDC]	107-06-2	0.5	0.7	0.01	0.02	0.02	0.1	-Carcinogen
Dichloroethene, 1,1-	75-35-4	0.09	0.1	0.06	0.03	0.03	0.6	-Carcinogen -Liver
Dichloroethene, cis-1,2-	156-59-2	19	130	0.4	NA	NA	4	-Blood
Dichloroethene, trans-1,2-	156-60-5	31	210	0.7	75	75	7	-Blood -Liver
Dichlorophenol, 2,3-	576-24-9	180	2500	0.2	1.2	1.2	2	-None Specified
Dichlorophenol, 2,4-	120-83-2	130	1300	0.005	0.1	0.1	0.05	-Immunological
Dichlorophenol, 2,5-	583-78-8	200	3000	0.5	4.3	4.3	5	-None Specified
Dichlorophenol, 2,6-	87-65-0	170	2200	0.1	2.5	2.5	1	-None Specified
Dichlorophenol, 3,4-	95-77-2	200	3100	0.03	3.9	3.9	0.3	-None Specified
Dichlorophenoxy acetic acid, 2,4- 240	94-75-7	670	11000	0.7	0.9	0.9	7	-Kidney -Liver
Dichloropropane, 1,2-	78-87-5	0.6	0.8	0.03	15	15	0.3	-Carcinogen -Nasal
Dichloropropene, 1,3-	542-75-6	0.2	0.2	0.001	0.09	0.09	0.01	-Carcinogen -Kidney -Nasal
Dichlorprop	120-36-5	270	3300	0.3	0.3	0.3	3	-None Specified

Table 2 - Technical Report
Soil Cleanup Target Levels

Contaminant	CAS#	Direct Exposure		Leachability Based on Groundwater Criteria	Leachability Based on Freshwater Surface Water Criteria	Leachability Based on Marine Surface Water Criteria	Leachability Based on Groundwater of Low Yield/ Poor Quality	Target Organ/System or Effect
		Residential	Commercial/ Industrial					
		(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	
Dichlorvos	62-73-7	0.2	0.3	0.0005	0.00002	0.00002	0.005	-Carcinogen -Neurological
Dicofol [or Kelthane]	115-32-2	2.3	7.6	0.05	0.0004	0.0004	0.5	-Adrenals -Carcinogen
Dieldrin	60-57-1	0.07	0.3	0.004	0.0001	0.0001	0.04	-Carcinogen -Liver
Diethylphthalate	84-66-2	54000	920000	86	5.9	5.9	860	-Body Weight
Dimethoate	60-51-5	8.4	86	0.0004	0.0004	0.0004	0.004	-Neurological
Dimethrin	70-38-2	19000	270000	2500	1.3	1.3	25000	-Liver
Dimethylformamide, N,N-	68-12-2	1100	7800	3	210	210	30	-Gastrointestinal -Liver
Dimethylphenol, 2,4-	105-67-9	910	9800	1.7	3.2	3.2	17	-Blood -Neurological
Dimethylphthalate	131-11-3	590000	*	380	7.8	7.8	3800	-Kidney
Dinitrobenzene, 1,2- (o)	528-29-0	13	130	1	0.2	0.2	10	-Spleen
Dinitrobenzene, 1,3- (m)	99-65-0	3.5	33	0.04	0.4	0.4	0.4	-Spleen
Dinitrophenol, 2,4-	51-28-5	66	620	0.06	0.01	0.01	0.6	-Eye
Dinitrotoluene, 2,4-	121-14-2	1.3	3.7	0.0008	0.07	0.07	0.008	-Carcinogen -Liver -Neurological
Dinitrotoluene, 2,6-	606-20-2	1	2.1	0.0007	0.03	0.03	0.007	-Blood -Carcinogen -Kidney -Mortality -Neurological
Dinoseb	88-85-7	55	740	0.03	0.03	0.03	0.3	-Developmental
Dioxane, 1,4-	123-91-1	12	18	0.02	1	1	0.2	-Carcinogen
Dioxin [or 2,3,7,8-TCDD]	1746-01-6	0.000007	0.00003	0.003	0.000001	0.000001	0.03	-Carcinogen
Diphenamid	957-51-7	1800	25000	2.6	20	20	26	-Liver
Diphenylhydrazine, 1,2-	122-66-7	1.2	3.7	0.4	0.01	0.01	4	-Carcinogen

Digest

Table 2 - Technical Report
Soil Cleanup Target Levels

Contaminant	CAS#	Direct Exposure		Leachability Based on Groundwater Criteria	Leachability Based on Freshwater Surface Water Criteria	Leachability Based on Marine Surface Water Criteria	Leachability Based on Groundwater of Low Yield/ Poor Quality	Target Organ/System or Effect
		Residential	Commercial/ Industrial					
		(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	
Disulfoton	298-04-4	2.9	56	0.1	0.1	0.1	1	-Neurological
Diuron	330-54-1	130	2000	0.3	0.2	0.2	3	-Blood
Endosulfan	115-29-7	410	6700	3.8	0.005	0.0008	38	-Body Weight -Cardiovascular -Kidney
Endothall	145-73-3	780	7800	0.4	0.4	0.4	4	-Gastrointestinal
Endrin	72-20-8	21	340	1	0.001	0.001	10	-Liver
Epichlorohydrin	106-89-8	11	74	0.03	2.4	2.4	0.3	-Carcinogen -Kidney -Nasal
Ethion	563-12-2	38	780	1.7	0.003	0.003	17	-Neurological
Ethoprop	13194-48-4	5.5	69	0.005	0.002	0.002	0.05	-Neurological
Ethoxyethanol, 2-	110-80-5	8100	65000	120	NA	NA	1200	-Body Weight -Reproductive
Ethyl acetate	141-78-6	5500	39000	26	26	26	260	-Body Weight -Mortality
Ethyl acrylate	140-88-5	1.6	2.2	25	0.6	0.6	250	-Carcinogen
Ethyl chloride [or Chloroethane]	75-00-3	2.9	4	0.06	NA	NA	0.6	-Carcinogen -Developmental
Ethyl dipropylthiocarbamate, S- [or EPTC]	759-94-4	1100	13000	11	15	15	110	-Cardiovascular
Ethyl ether	60-29-7	150	1000	5	850	850	50	-Body Weight
Ethyl methacrylate	97-63-2	380	2600	3.5	NA	NA	35	-Kidney
Ethyl p-nitrophenyl phenylphosphorothioate [or EPN]	2104-64-5	0.7	15	0.04	0.003	0.003	0.4	-Neurological
Ethylbenzene	100-41-4	1100	8400	0.6	12	12	6	-Developmental -Kidney -Liver
Ethylene diamine	107-15-3	610	5500	40	3.2	3.2	400	-Blood -Cardiovascular
Ethylene glycol	107-21-1	24000	180000	56	65	65	560	-Kidney

Table 2 - Technical Report
Soil Cleanup Target Levels

Contaminant	CAS#	Direct Exposure		Leachability Based on Groundwater Criteria	Leachability Based on Freshwater Surface Water Criteria	Leachability Based on Marine Surface Water Criteria	Leachability Based on Groundwater of Low Yield/ Poor Quality	Target Organ/System or Effect
		Residential	Commercial/ Industrial					
		(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	
Ethylene oxide	75-21-8	0.3	0.4	0.05	20	20	0.5	-Carcinogen
Fenamiphos	22224-92-6	15	210	0.02	0.003	0.003	0.2	-Neurological
Fensulfothion	115-90-2	14	180	0.01	0.004	0.004	0.1	-Neurological
Fluometuron	2164-17-2	750	9700	0.9	1.8	1.8	9	-None Specified
Fluoranthene	206-44-0	2900	48000	1200	1.3	1.3	12000	-Blood -Kidney -Liver
Fluorene	86-73-7	2200	28000	160	17	17	1600	-Blood
Fluoride	7782-41-4	500**	120000	***	***	***	***	-Teeth
Fonofos	944-22-9	120	1800	0.4	0.003	0.003	4	-Liver -Neurological
Formaldehyde	50-00-0	21	29	2.4	0.4	0.4	24	-Body Weight -Carcinogen - Gastrointestinal
Furfural	98-01-1	160	2000	1	2.7	2.7	10	-Liver -Nasal
Guthion [or Azinphos, methyl]	86-50-0	110	2000	0.2	0.0002	0.0002	2	-Neurological
Heptachlor	76-44-8	0.2	0.9	23	0.1	0.1	230	-Carcinogen -Liver
Heptachlor epoxide	1024-57-3	0.1	0.4	0.6	0.006	0.006	6	-Carcinogen -Liver
Hexachloro-1,3-butadiene	87-68-3	6.3	12	1.1	110	110	11	-Carcinogen -Kidney
Hexachlorobenzene	118-74-1	0.5	1.1	2.2	0.0008	0.0008	22	-Carcinogen -Liver
Hexachlorocyclohexane, alpha-	319-84-6	0.2	0.5	0.0003	0.0006	0.0006	0.003	-Carcinogen
Hexachlorocyclohexane, beta-	319-85-7	0.6	2.1	0.001	0.003	0.003	0.01	-Carcinogen
Hexachlorocyclohexane, delta-	319-86-8	22	420	0.2	NA	NA	2	-Kidney -Liver
Hexachlorocyclohexane, gamma- [or Lindane]	58-89-9	0.7	2.2	0.009	0.003	0.003	0.09	-Carcinogen -Kidney -Liver

Table 2 - Technical Report
Soil Cleanup Target Levels

Contaminant	CAS#	Direct Exposure		Leachability Based on Groundwater Criteria	Leachability Based on Freshwater Surface Water Criteria	Leachability Based on Marine Surface Water Criteria	Leachability Based on Groundwater of Low Yield/ Poor Quality	Target Organ/System or Effect
		Residential	Commercial/ Industrial					
		(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	
Hexachlorocyclopentadiene	77-47-4	2.4	16	400	24	24	4000	-Gastrointestinal
Hexachloroethane	67-72-1	34	78	0.2	0.08	0.08	2	-Carcinogen -Kidney
Hexahydro-1,3,5-trinitro-1,3,5-triazine [or RDX]	121-82-4	6.7	16	0.007	1.3	1.3	0.07	-Carcinogen -Reproductive
Hexane, n-	110-54-3	500	3600	3.5	1200	1200	35	-Neurological
Hexanone, 2- [or Methyl butyl ketone]	591-78-6	5.1	34	1.4	NA	NA	14	-None Specified
Hexazinone	51235-04-2	1600	18000	1.1	5	5	11	-Body Weight
Hydroquinone	123-31-9	1800	19000	1.4	0.02	0.02	14	-Blood
Indeno(1,2,3-cd)pyrene	193-39-5	1.5	5.3	28	4.3	4.3	280	-Carcinogen
Iron	7439-89-6	23000	480000	***	***	***	***	-Blood -Gastrointestinal
Isobutyl alcohol	78-83-1	4100	31000	8.9	200	200	89	-Neurological
Isophorone	78-59-1	340	580	0.2	3.8	3.8	2	-Carcinogen
Lead (d)	7439-92-1	400	920	***	***	***	***	-Neurological
Linuron	330-55-2	130	2000	0.04	1.4	1.4	0.4	-Blood
Lithium	7439-93-32	1600	40000	***	NA	NA	***	-None Specified
Malathion	121-75-5	1300	20000	4.2	0.003	0.003	42	-Neurological
Maneb	12427-38-2	350	5500	6.3	0.5	0.5	63	-Thyroid
Manganese	7439-96-5	1600	22000	***	NA	NA	***	-Neurological
Mercury	7439-97-6	3.4	26	2.1	0.01	0.01	21	-Neurological
Mercury, methyl	22967-92-6	0.8	5.4	0.002	NA	NA	0.02	-Neurological

Table 2 - Technical Report
Soil Cleanup Target Levels

Contaminant	CAS#	Direct Exposure		Leachability Based on Groundwater Criteria	Leachability Based on Freshwater Surface Water Criteria	Leachability Based on Marine Surface Water Criteria	Leachability Based on Groundwater of Low Yield/ Poor Quality	Target Organ/System or Effect
		Residential	Commercial/ Industrial					
		(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	
Merphos	150-50-5	2.2	41	0.5	NA	NA	5	-Body Weight -Neurological
Methacrylonitrile	126-98-7	0.8	5.4	0.02	NA	NA	0.2	-Liver
Methamidophos	10265-92-6	1.9	19	0.02	0	0	0.2	-Neurological
Methanol	67-56-1	5800	43000	20	180	180	200	-Liver -Neurological
Methidathion	950-37-8	47	530	0.003	0.0001	0.0001	0.03	-Liver
Methomyl	16752-77-5	22	150	1.2	0.007	0.007	12	-Kidney -Spleen
Methoxy-5-nitroaniline, 2-	99-59-2	17	41	0.4	NA	NA	4	-Carcinogen
Methoxychlor	72-43-5	370	7500	160	0.1	0.1	1600	-Developmental -Reproductive
Methyl acetate	79-20-9	4100	28000	26	NA	NA	260	-Liver
Methyl acrylate	96-33-3	99	680	0.9	NA	NA	9	-None Specified
Methyl isobutyl ketone [or MIBK]	108-10-1	220	1500	2.6	110	110	26	-Kidney -Liver
Methyl methacrylate	80-62-6	1400	9400	0.1	32	32	1	-Nasal
Methyl parathion [or Parathion, methyl]	298-00-0	18	310	0.06	0.0003	0.0003	0.6	-Blood -Neurological
Methyl tert-butyl ether [or MTBE]	1634-04-4	3200	22000	0.2	150	150	2	-Eye -Kidney -Liver
Methyl-4-chlorophenoxy acetic acid, 2- MCPA	94-74-6	30	440	0.02	0.4	0.4	0.2	-Kidney -Liver
Methylaniline, 2-	95-53-4	1.8	3.3	0.3	0.2	0.2	3	-Carcinogen
Methylene bis(2-chloroaniline), 4,4-	101-14-4	6.4	17	0.2	NA	NA	2	-Carcinogen -Liver -Bladder
Methylene bromide	74-95-3	58	400	0.3	NA	NA	3	-Blood
Methylene chloride	75-09-2	16	23	0.02	7.3	7.3	0.2	-Carcinogen -Liver
MCPP		42	430	0.03				

Table 2 - Technical Report

Soil Cleanup Target Levels

Contaminant	CAS#	Direct Exposure		Leachability Based on Groundwater Criteria	Leachability Based on Freshwater Surface Water Criteria	Leachability Based on Marine Surface Water Criteria	Leachability Based on Groundwater of Low Yield/ Poor Quality	Target Organ/System or Effect
		Residential	Commercial/ Industrial					
		(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	
Methylnaphthalene, 1-	90-12-0	68	470	2.2	10	10	22	-Body Weight -Nasal
Methylnaphthalene, 2-	91-57-6	80	560	6.1	9.1	9.1	61	-Body Weight -Nasal
Methylphenol, 2- [or o-Cresol]	95-48-7	2400	28000	0.3	1.9	1.9	3	-Body Weight -Neurological
Methylphenol, 3- [or m-Cresol]	108-39-4	2500	29000	0.3	3.3	3.3	3	-Body Weight -Neurological
Methylphenol, 4- [or p-Cresol]	106-44-5	250	3000	0.03	0.5	0.5	0.3	-Maternal Death -Neurological -Respiratory
Metolachlor	51218-45-2	9100	120000	1.2	0.01	0.01	12	-Body Weight
Metribuzin	21087-64-9	32	210	2.2	0.8	0.8	22	-Body Weight -Kidney -Liver -Mortality
Mevinphos	7786-34-7	16	240	0.01	0.0003	0.0003	0.1	-Neurological
Molinate	2212-67-1	100	1200	0.1	0.1	0.1	1	-Reproductive
Molybdenum	7439-98-7	390	9700	***	NA	NA	***	-Gout
Naled	300-76-5	130	2100	0.1	0.0002	0.0002	1	-Neurological
Naphthalene	91-20-3	40	270	1.7	2.2	2.2	17	-Body Weight -Nasal
Nickel (b)	7440-02-0	110**	28000	130	***	***	1300	-Body Weight
Nitrate	14797-55-8	120000	*	***	***	***	***	-Blood
Nitrite	14797-65-0	7800	180000	***	***	***	***	-Blood
Nitroaniline, o- (o-2-)	88-74-4	5.7	66	0.3	NA	NA	3	-Blood
Nitroaniline, p- (o-4-)	100-01-6	5.2	56	0.1	5.9	5.9	1	-None Specified
Nitrobenzene	98-95-3	14	120	0.03	0.6	0.6	0.3	-Adrenals -Blood -Kidney -Liver
Nitrophenol, 4-	100-02-7	390	4400	0.3	0.3	0.3	3	-None Specified

Table 2 - Technical Report
Soil Cleanup Target Levels

Contaminant	CAS#	Direct Exposure		Leachability Based on Groundwater Criteria	Leachability Based on Freshwater Surface Water Criteria	Leachability Based on Marine Surface Water Criteria	Leachability Based on Groundwater of Low Yield/ Poor Quality	Target Organ/System or Effect
		Residential	Commercial/ Industrial					
		(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	
Nitroso-di-ethylamine, N-	55-18-5	0.003	0.005	0.02	0.0007	0.0007	0.2	-Carcinogen
Nitroso-di-n-butylamine, N-	924-16-3	0.05	0.07	0.05	0.002	0.002	0.5	-Carcinogen
Nitroso-di-n-propylamine, N-	621-64-7	0.09	0.2	0.04	0.008	0.008	0.4	-Carcinogen
Nitroso-dimethylamine, N-	62-75-9	0.009	0.02	0.008	0.002	0.002	0.08	-Carcinogen
Nitroso-diphenylamine, N-	86-30-6	170	440	0.4	2.5	2.5	4	-Carcinogen
Nitroso-N-methylethylamine, N-	10595-95-6	0.01	0.02	0.03	0.005	0.005	0.3	-Carcinogen
Nitrotoluene, m-	99-08-1	210	1800	2.4	3.6	3.6	24	-Spleen
Nitrotoluene, o-	88-72-2	280	2500	3.3	7.3	7.3	33	-Spleen
Nitrotoluene, p-	99-99-0	640	9700	3.3	7.3	7.3	33	-Spleen
Octamethylpyrophosphoramide	152-16-9	83	860	4	NA	NA	40	-Neurological
Oxamyl	23135-22-0	1100	12000	0.9	0.04	0.04	9	-Body Weight
Paraquat	1910-42-5	310	4000	160	230	230	1600	-Respiratory
Parathion	56-38-2	450	9100	10	0.01	0.01	100	-Neurological
PCBs [Aroclor miture]	1336-36-3	0.5	2.1	17	0.002	0.002	170	-Carcinogen -Immunological
Pebulate	1114-71-2	1600	15000	8.5	7.4	7.4	85	-Blood
Pendimethalin	40487-42-1	2500	36000	28	1	1	280	-Liver
Pentachlorobenzene	608-93-5	27	250	3.9	1.2	1.2	39	-Kidney -Liver
Pentachloronitrobenzene	82-68-8	3	7.7	0.7	0.06	0.06	7	-Carcinogen -Liver
Pentachlorophenol	87-86-5	7.7	23	0.03	0.2	0.2	0.3	-Carcinogen -Kidney -Liver

Table 2 - Technical Report
Soil Cleanup Target Levels

Contaminant	CAS#	Direct Exposure		Leachability Based on Groundwater Criteria	Leachability Based on Freshwater Surface Water Criteria	Leachability Based on Marine Surface Water Criteria	Leachability Based on Groundwater of Low Yield/ Poor Quality	Target Organ/System or Effect
		Residential	Commercial/ Industrial					
		(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	
Permethrin	52645-53-1	3700	67000	880	0.003	0.003	8800	-Liver
Phenanthrene	85-01-8	2000	30000	250	0.7	0.7	2500	-Kidney
Phenol	108-95-2	900**	390000	0.05	0.03	0.03	0.5	-Developmental
Phenylenediamine, p-	106-50-3	8000	83000	6.2	NA	NA	62	-Whole Body
Phenylphenol, 2-	90-43-7	460	1300	0.4	0.8	0.8	4	-Carcinogen
Phorate	298-02-2	14	280	0.3	0.001	0.001	3	-Neurological
Phosmet	732-11-6	1400	21000	5	0.004	0.004	50	-Body Weight -Liver -Neurological
Phthalic anhydride	85-44-9	8300	57000	76	NA	NA	760	-Kidney -Nasal -Respiratory
Prometon	1610-18-0	980	14000	2.4	14	14	24	-None Specified
Prometryn	7287-19-6	260	3900	0.7	0.5	0.5	7	-Bone Marrow -Kidney -Liver
Propachlor	1918-16-7	770	10000	1.1	0.1	0.1	11	-Body Weight -Liver
Propanil	709-98-8	300	4100	0.4	0.2	0.2	4	-Spleen
Propazine	139-40-2	1200	17000	0.2	2.7	2.7	2	-Body Weight
Propylene glycol	57-55-6	710000	*	560	140	140	5600	-Blood -Bone Marrow
Propylene oxide	75-56-9	3.2	8.1	22	NA	NA	220	-Carcinogen -Nasal -Respiratory
Pydrin [or Fenvalerate]	51630-58-1	1800	32000	700	0.0001	0.0001	7000	-Neurological
Pyrene	129-00-0	2200	37000	880	1.3	1.3	8800	-Kidney
Pyridine	110-86-1	13	95	0.03	5.4	5.4	0.3	-Liver
Resmethrin	10453-86-8	2200	39000	1200	0.01	0.01	12000	-Reproductive

Table 2 - Technical Report
Soil Cleanup Target Levels

Contaminant	CAS#	Direct Exposure		Leachability Based on Groundwater Criteria	Leachability Based on Freshwater Surface Water Criteria	Leachability Based on Marine Surface Water Criteria	Leachability Based on Groundwater of Low Yield/ Poor Quality	Target Organ/System or Effect
		Residential	Commercial/ Industrial					
		(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	
Ronnel	299-84-3	3600	59000	1300	0.2	0.2	13000	-Liver
Selenium (b)	7782-49-2	390	10000	5	***	***	50	-Hair Loss -Neurological -Skin
Silver (b)	7440-22-4	390	9100	17	***	***	170	-Skin
Simazine	122-34-9	7.4	21	0.08	0.1	0.1	0.8	-Blood -Body Weight -Carcinogen
Strontium	7440-24-6	47000	*	***	NA	NA	***	-Bone
Strychnine	57-24-9	17	210	0.7	0.3	0.3	7	-Mortality
Styrene	100-42-5	2700	21000	3.6	16	16	36	-Blood -Liver -Neurological
Terbacil	5902-51-2	660	7700	0.5	14	14	5	-Liver -Thyroid
Terbufos	13071-79-9	1.4	17	0.02	0.001	0.001	0.2	-Neurological
Tetrachlorobenzene, 1,2,4,5-	95-94-3	6.3	51	0.5	0.5	0.5	5	-Kidney
Tetrachloroethane, 1,1,1,2-	630-20-6	4	5.7	0.01	NA	NA	0.1	-Carcinogen -Kidney -Liver
Tetrachloroethane, 1,1,2,2-	79-34-5	0.7	1.1	0.002	0.08	0.08	0.02	-Carcinogen
Tetrachloroethene [or PCE]	127-18-4	8.9	17	0.03	0.1	0.1	0.3	-Body Weight -Carcinogen -Liver
Tetrachlorophenol, 2,3,4,6-	58-90-2	1500	17000	3.2	0.07	0.07	32	-Liver
Tetraethyl dithiopyrophosphate	3689-24-5	31	420	0.1	0.0004	0.0004	1	-Bone Marrow -Neurological
Thiram	137-26-8	330	4900	1.1	0.005	0.005	11	-Neurological
Tin	7440-31-5	44000	660000	***	NA	NA	***	-Kidney -Liver
Toluene	108-88-3	380	2600	0.5	5.6	5.6	5	-Kidney -Liver -Neurological
Toluidine, p-	106-49-0	1.4	2.2	0.7	NA	NA	7	-Carcinogen

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Soil Cleanup Target Levels

Contaminant	CAS#	Direct Exposure		Leachability Based on Groundwater Criteria	Leachability Based on Freshwater Surface Water Criteria	Leachability Based on Marine Surface Water Criteria	Leachability Based on Groundwater of Low Yield/ Poor Quality	Target Organ/System or Effect
		Residential	Commercial/ Industrial					
		(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	
Toxaphene	8001-35-2	1	3.7	31	0.002	0.002	310	-Carcinogen -Developmental
Triallate	2303-17-5	740	9500	8.4	6	6	84	-Liver -Spleen
Tributyltin oxide	56-35-9	22	400	36	0.2	0.2	360	-Immunological
Trichloro-1,2,2-trifluoroethane, 1,1,2- [or CFC 113]	76-13-1	13000	88000	27000	NA	NA	270000	-Body Weight -Neurological
Trichloroacetic acid	76-03-9	480	4600	1.2	400	400	12	-None Specified
Trichlorobenzene, 1,2,3-	87-61-6	560	7400	4.6	5.6	5.6	46	-Adrenals -Body Weight
Trichlorobenzene, 1,2,4-	120-82-1	560	7500	5.3	1.7	1.7	53	-Adrenals -Body Weight
Trichlorobenzene, 1,3,5-	108-70-3	190	1800	16	NA	NA	160	-None Specified
Trichloroethane, 1,1,1- [or Methyl chloroform]	71-55-6	400	3300	1.9	2.6	2.6	19	-None Specified
Trichloroethane, 1,1,2-	79-00-5	1.3	1.8	0.03	0.2	0.2	0.3	-Carcinogen -Liver
Trichloroethene [or TCE]	79-01-6	6	8.5	0.03	0.9	0.9	0.3	-Carcinogen
Trichlorofluoromethane	75-69-4	200	1300	33	NA	NA	330	-Cardiovascular -Kidney -Mortality -Respiratory
Trichlorophenol, 2,4,5-	95-95-4	6000	82000	0.3	1.5	1.5	3	-Kidney -Liver
Trichlorophenol, 2,4,6-	88-06-2	72	180	0.06	0.1	0.1	0.6	-Carcinogen
Trichlorophenoxy acetic acid, 2,4,5- 2,4,5-T	93-76-5	590	8300	0.4	0.8	0.8	4	-Kidney
Trichlorophenoxy propionic acid [or Silvex] 2,4,5-TP	93-72-1	590	12000	5.4	NA	NA	54	-Liver
Trichloropropane, 1,2,3-	96-18-4	0.01	0.02	0.001	0.002	0.002	0.01	-Body Weight -Carcinogen -Kidney -Liver -Mortality
Trifluralin	1582-09-8	94	220	3.5	0.6	0.6	35	-Blood -Carcinogen -Liver
Trimethyl phosphate	512-56-1	15	30	0.2	NA	NA	2	-Carcinogen

Table 2 - Technical Report
Soil Cleanup Target Levels

Contaminant	CAS#	Direct Exposure		Leachability Based on Groundwater Criteria	Leachability Based on Freshwater Surface Water Criteria	Leachability Based on Marine Surface Water Criteria	Leachability Based on Groundwater of Low Yield/ Poor Quality	Target Organ/System or Effect
		Residential	Commercial/ Industrial					
		(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	
Trimethylbenzene, 1,2,3-	526-73-8	13	89	0.3	NA	NA	3	-None Specified
Trimethylbenzene, 1,2,4-	95-63-6	13	88	0.3	7.2	7.2	3	-None Specified
Trimethylbenzene, 1,3,5-	108-67-8	11	74	0.3	6.7	6.7	3	-None Specified
Trinitrobenzene, 1,3,5-	99-35-4	1300	14000	1	0.09	0.09	10	-Blood -Spleen
Trinitrotoluene, 2,4,6-	118-96-7	24	55	0.06	0.3	0.3	0.6	-Carcinogen -Liver
TRPH	NOCAS#	340	2500	340	340	340	3400	-Multiple Endpoints Mixed Contaminants
Uranium, natural	7440-61-1	120	470	***	NA	NA	***	-None Specified
Vanadium (b)	7440-62-2	15**	7400	980	NA	NA	9800	-None Specified
Vernam	1929-77-7	29	260	0.1	0.2	0.2	1	-Body Weight
Vinyl acetate	108-05-4	230	1600	0.4	3	3	4	-Body Weight -Kidney -Nasal
Vinyl chloride	75-01-4	0.03	0.04	0.007	NA	NA	0.07	-Carcinogen
Xylenes, total	1330-20-7	5900	40000	0.2	3.9	3.9	2	-Body Weight -Mortality -Neurological
Zinc (b)	7440-66-6	23000	560000	6000	***	***	60000	-Blood
Zinc phosphide	1314-84-7	23	550	***	NA	NA	***	-Body Weight
Zineb	12122-67-7	3400	53000	19	0.7	0.7	190	-Thyroid

Table 2 - Technical Report
Soil Cleanup Target Levels

Contaminant	CAS#	Direct Exposure		Leachability Based on Groundwater Criteria	Leachability Based on Freshwater Surface Water Criteria	Leachability Based on Marine Surface Water Criteria	Leachability Based on Groundwater of Low Yield/ Poor Quality	Target Organ/System or Effect
		Residential	Commercial/ Industrial					
		(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	

Values rounded to two significant figures if >1 and to one significant figure if <1.

* Contaminant is not a health concern for this exposure scenario.

** Direct exposure value based on acute toxicity considerations.

*** Leachability values may be derived using the SPLP Test to calculate site-specific SCTLs or may be determined using TCLP in the event oily wastes are present.

(a) = See discussion on the development of SCTLs for Ammonia in the Technical Report: Development of Soil Cleanup Target Levels for Chapter 62-777, F.A.C., Final Report dated XXXX, 1999.

(b) = Leachability values derived from USEPA Soil Screening Guidance (1996). These values were derived assuming soil pH 6.8. These leachability values are dependent upon both the metal concentration in soil and soil characteristics. Thus, if site-specific soil characteristics are different than the defaults, these leachability values may not apply. If this is the case, site-specific leachability values should be derived using methods such as TCLP or SPLP.

(c) = Phytotoxicity must be considered.

(d) = Residential direct exposure value from USEPA Revised Interm Soil Guidance for CERCLA Sites and BCRA Corrective Action Facilities. OSWER Directive 9355.4-12 (1994). The industrial direct exposure value was derived using methodologies outlined in USEPA 'Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil', December 1996.

None Specified = Target organ(s) not available at time of rule adoption.

Note: If more than one contaminant is present at a site, the direct exposure values are to be modified, if necessary, such that the sum of the hazard quotients for non-carcinogenic contaminants affecting the same organ(s) is 1 or less. For carcinogens, the direct exposure values shall be modified such that the cummulative lifetime risk level posed by the contaminants is 1.0E-06.

NA = Not available at time of rule adoption

Table 3 - Technical Report

Default Parameters for Figures 4, 5, and 7

Symbol	Definition (units)	Default	Reference
BW	body weight (kg) (aggregate resident)**	59	Derived from equation using child and adult body weights (See Appendix A)
	body weight (kg) (child)*	15	Exposure Factors, USEPA 1991 (OSWER No. 9285.6-03)
	body weight (kg) (adult/worker)	70	RAGS (part A), USEPA 1989a (EPA/540/1-89/002)
IRo	ingestion rate, oral (mg/day) (aggregate resident)	120	Derived from equation using child and adult ingestion rates (Technical Report, page 11)
	ingestion rate, oral (mg/day) (child)	200	Exposure Factors, USEPA 1991 (OSWER No. 9285.6-03)
	ingestion rate, oral (mg/day) (worker)	50	Exposure Factors, USEPA 1991 (OSWER No. 9285.6-03)
EF	exposure frequency (days/yr) (aggregate resident)	350	Exposure Factors, USEPA 1991 (OSWER No. 9285.6-03)
	exposure frequency (days/yr) (child)	350	Exposure Factors, USEPA 1991 (OSWER No. 9285.6-03)
	exposure frequency (days/yr) (worker)	250	Exposure Factors, USEPA 1991 (OSWER No. 9285.6-03)
ED	exposure duration (years) (aggregate resident)	30	Exposure Factors, USEPA 1991 (OSWER No. 9285.6-03)
	exposure duration (years) (child)	6	Exposure Factors, USEPA 1991 (OSWER No. 9285.6-03)
	exposure duration (years) (worker)	25	Exposure Factors, USEPA 1991 (OSWER No. 9285.6-03)
SA	surface area exposed (cm^2/day) (aggregate resident)	3674	Derived based on data from the Exposure Factors Handbook, USEPA 1989b (EPA/600/8-89/043) (See Appendix A)
	surface area exposed (cm^2/day) (child)	1800	Derived based on data from the Exposure Factors Handbook, USEPA 1989b (EPA/600/8-89/043) (See Appendix A)
	surface area exposed (cm^2/day) (worker)	2000	Derived based on data in Dermal Exposure Assessment: Principles and Applications, USEPA 1992 (EPA/600/8-91/011B)
AF	adherence factor (mg/cm^2) (aggregate resident and child)	0.2	Selected from range of values in Dermal Exposure Assessment: Principles and Applications, USEPA 1992 (EPA/600/8-91/011B)
	adherence factor (mg/cm^2) (worker)	0.6	Selected from range of values in Dermal Exposure Assessment: Principles and Applications, USEPA 1992 (EPA/600/8-91/011B)
AT	averaging time (days) (carcinogens)	25550 (70 years)	RAGS (part A), USEPA 1989a (EPA/540/1-89/002)
	averaging time (days) (non-carcinogens) (aggregate resident)	10950 (30 years)	RAGS (part A), USEPA 1989a (EPA/540/1-89/002) (AT=ED)
	averaging time (days) (non-carcinogens) (child)	2190 (6 years)	RAGS (part A), USEPA 1989a (EPA/540/1-89/002) (AT=ED)
	averaging time (days) (non-carcinogens) (worker)	9125 (25 years)	RAGS (part A), USEPA 1989a (EPA/540/1-89/002) (AT=ED)
DA	dermal absorption (unitless) (organics)	0.01	USEPA Region IV Guidance
	dermal absorption (unitless) (inorganics)	0.001	USEPA Region IV Guidance
IRi	inhalation rate (m^3/day) (aggregate resident)	15	Derived based on data from the Exposure Factors Handbook, USEPA 1989b (EPA/600/8-89/043) (See Appendix A)
	inhalation rate (m^3/day) (child)	10	RAGS (part A), USEPA 1989a (EPA/540/1-89/002)
	inhalation rate (m^3/day) (worker)	20	Exposure Factors, USEPA 1991 (OSWER No. 9285.6-03)
VF	volatilization factor (m^3/kg)	chemical-specific	Soil Screening Guidance, USEPA 1996b (EPA/540/R-95/128) (See Fig. 4)
PEF	particulate emission factor (m^3/kg)	1.24×10^9	Soil Screening Guidance, USEPA 1996b (EPA/540/R-95/128) (See Fig. 3)
TR	target cancer risk (unitless)	10^{-6}	Per Section 376.81, F.S.
THI	target hazard index (unitless)	1	Per Section 376.81, F.S.

*Child: Age 1-6 years **Aggregate Resident: Age 1-30 years PEF: The default is for 0.5 acre sites with undisturbed soil. Site-specific PEFs must be calculated for sites with contaminated areas which are significantly larger in size or if warranted based on site-specific conditions.

Table 4 - Technical Report

Chemical Specific Values

Contaminant	Values from Reference Sources								Calculated Values ***				
											Resident	Child	Industrial
	CAS#	MP	d (g/cm3)	S (mg/L)	Koc(L/kg)	H(atm-m3/mol)	Di(cm2/s)**	Dw(cm2/s)**	Kd(L/kg)*	Da(cm2/s)	Volatilization Factor (m3/kg)		
Acenaphthene	83-32-9	93.4 SCDM	1.0242 SCDM	4.240E+00 SCDM	2.58E+03 HSDB	1.550E-04 SCDM	4.210E-02 CHEM8	7.690E-06 CHEM8	1.550E+01	9.169E-07	1.624E+05	7.264E+04	1.483E+05
Acenaphthylene	208-96-8	92.5 SCDM	0.8987 SCDM	1.610E+01 SCDM	3.10E+03 SCDM	1.130E-04 SCDM	4.387E-02 CHEM8	7.530E-06 CHEM8	1.860E+01	5.816E-07	2.039E+05	9.121E+04	1.862E+05
Acephate	30560-19-1	85.4 HSDB-GeoMean	1.35 MacKay	7.300E+05 HSDB-GeoMean	4.00E+00 HSDB-GeoMean	5.000E-13 HSDB	3.072E-02 Calculated	7.976E-06 Calculated	2.400E-02	4.083E-07	2.434E+05	1.089E+05	2.222E+05
Acetone	67-64-1	-94.8 SCDM	0.7899 SCDM	1.000E+06 SCDM	6.00E-01 SCDM	3.880E-05 SCDM	1.240E-01 CHEM8	1.140E-05 CHEM8	3.600E-03	1.018E-04	1.541E+04	6.893E+03	1.407E+04
Acetonitrile	75-05-8	-43.8 SCDM	0.7857 SCDM	1.000E+06 SCDM	4.65E-01 SCDM	3.460E-05 SCDM	1.280E-01 CHEM8	1.660E-05 CHEM8	2.790E-03	9.489E-05	1.597E+04	7.141E+03	1.458E+04
Acetophenone	98-86-2	20 SCDM	1.0281 SCDM	6.130E+03 SCDM	4.10E+01 SCDM	1.070E-05 SCDM	6.000E-02 CHEM8	8.730E-06 CHEM8	2.460E-01	4.212E-06	7.578E+04	3.389E+04	6.918E+04
Acrolein	107-02-8	-87.7 SCDM	0.84 SCDM	2.130E+05 SCDM	1.00E+00 SCDM	1.220E-04 SCDM	1.050E-01 CHEM8	1.220E-05 CHEM8	6.000E-03	2.624E-04	9.602E+03	4.294E+03	8.766E+03
Acrylamide	79-06-1	84.5 SCDM	1.122 HSDB	6.400E+05 SCDM	1.15E-01 SCDM	1.000E-09 SCDM	9.700E-02 CHEM8	1.060E-05 CHEM8	6.900E-04	6.704E-07	1.900E+05	8.495E+04	1.734E+05
Acrylonitrile	107-13-1	-83.5 SCDM	0.806 SCDM	7.400E+04 SCDM	1.75E+00 SCDM	1.030E-04 SCDM	1.220E-01 CHEM8	1.340E-05 CHEM8	1.050E-02	2.474E-04	9.889E+03	4.422E+03	9.027E+03
Alachlor	15972-60-8	40 HSDB	1.1333 HSDB	1.830E+02 HSDB-GeoMean	1.51E+02 HSDB-GeoMean	2.000E-09 HSDB-GeoMean	2.011E-02 Calculated	5.692E-06 Calculated	9.060E-01	3.601E-08	8.197E+05	3.666E+05	7.483E+05
Aldicarb [or Temik]	116-06-3	99 SCDM	1.195 SCDM	6.030E+03 SCDM	1.25E+01 SCDM	1.440E-09 SCDM	3.050E-02 CHEM8	7.190E-06 CHEM8	7.500E-02	2.614E-07	3.042E+05	1.361E+05	2.777E+05
Aldrin	309-00-2	104 SCDM	1.6 HSDB	1.800E-01 SCDM	2.45E+06 SCDM	1.700E-04 SCDM	1.320E-02 CHEM8	4.860E-06 CHEM8	1.470E+04	3.355E-10	8.491E+06	3.797E+06	7.751E+06
Allyl alcohol	107-18-6	-129 SCDM	0.854 SCDM	1.000E+06 SCDM	1.45E+00 SCDM	5.600E-06 SCDM	1.140E-01 CHEM8	1.140E-05 CHEM8	8.700E-03	1.349E-05	4.235E+04	1.894E+04	3.866E+04
Aluminum	7429-90-5	660.37 SCDM	2.702 SCDM	0.000 ATSDR	NA	NA	4.683E-01 Calculated	3.816E-05 Calculated	1.500E+03 SCDM	1.615E-10	#	#	#
Aluminum phosphide	20859-73-8	1000 ATSDR	2.4 SCDM	0.000 ATSDR	NA	NA	2.606E-01 Calculated	2.247E-05 Calculated	0.000	1.426E-06	#	#	#
Ametryn	834-12-8	88.5 HSDB-GeoMean	1.19 HSDB	2.090E+02 HSDB	2.09E+02 HSDB	2.400E-09 HSDB	2.980E-02 CHEM8	4.960E-06 CHEM8	1.254E+00	2.337E-08	1.017E+06	4.550E+05	9.288E+05
Ammonia	7664-41-7	-77.7 SCDM	0.771 HSDB	5.300E+05 SCDM	NA	3.200E-04 SCDM	4.455E-01 Calculated	2.370E-05 Calculated	9.900E+00 SCDM	3.115E-05	2.787E+04	1.246E+04	2.544E+04

Table 4 - Technical Report

Chemical Specific Values

Contaminant	Values from Reference Sources								Calculated Values ***				
											Resident	Child	Industrial
	CAS#	MP	d (g/cm3)	S (mg/L)	Koc(L/kg)	H(atm-m3/mol)	Di(cm2/s)**	Dw(cm2/s)**	Kd(L/kg)*	Da(cm2/s)	Volatilization Factor (m3/kg)		
Aniline	62-53-3	-6 SCDM	1.0217 SCDM	3.600E+04 SCDM	9.00E+00 SCDM	1.900E-06 SCDM	7.000E-02 CHEM8	8.300E-06 CHEM8	5.400E-02	2.228E-06	1.042E+05	4.660E+04	9.511E+04
Anthracene	120-12-7	215 SCDM	1.28 SCDM	4.340E-02 SCDM	2.95E+04 SCDM	6.500E-05 SCDM	3.240E-02 CHEM8	7.740E-06 CHEM8	1.770E+02	2.625E-08	9.599E+05	4.293E+05	8.763E+05
Antimony	7440-36-0	630.5 SCDM	6.684 SCDM	0.000 HSDB	NA	NA	2.887E-02 Calculated	2.661E-05 Calculated	4.500E+01 SCDM	3.745E-09	#	#	#
Arsenic	7440-38-2	817 HSDB	5.727 SCDM	0.000 HSDB	NA	NA	2.952E-01 Calculated	3.245E-05 Calculated	2.900E+01 SSG	7.080E-09	#	#	#
Atrazine	1912-24-9	173 SCDM	1.23 HSDB	7.000E+01 SCDM	4.05E+02 SCDM	2.960E-09 HSDB	2.585E-02 Calculated	6.838E-06 Calculated	2.430E+00	1.722E-08	1.185E+06	5.300E+05	1.082E+06
Azobenzene	103-33-3	68 HSDB	1.203 HSDB	6.400E+00 HSDB	2.58E+03 HSDB-GeoMean	1.350E-05 HSDB	3.257E-02 Calculated	7.466E-06 Calculated	1.548E+01	6.469E-08	6.115E+05	2.735E+05	5.583E+05
Barium	7440-39-3	725 SCDM	3.51 SCDM	0.000 ATSDR	NA	NA	3.066E-02 Calculated	1.682E-05 Calculated	4.100E+01 SCDM	2.598E-09	#	#	#
Bayleton	43121-43-3	82 HSDB	1.22 HSDB	1.360E+02 HSDB-GeoMean	4.70E+02 HSDB-GeoMean	8.110E-11 HSDB	1.743E-02 Calculated	5.653E-06 Calculated	2.820E+00	1.229E-08	1.403E+06	6.274E+05	1.281E+06
Benomyl	17804-35-2	138.5 MacKay	1.2582 Calculated	3.800E+00 HSDB	2.10E+03 HSDB	3.720E-10 Howard&Meylan	1.743E-02 Calculated	5.799E-06 Calculated	1.260E+01	2.900E-09	2.888E+06	1.292E+06	2.637E+06
Bentazon	25057-89-0	138 HSDB-GeoMean	1.47 HSDB	5.340E+02 HSDB-GeoMean	4.84E+01 HSDB-GeoMean	2.200E-09 HSDB	2.070E-02 Calculated	7.132E-06 Calculated	2.904E-01	1.162E-07	4.562E+05	2.040E+05	4.165E+05
Benzaldehyde	100-52-7	-26 HSDB	1.05 HSDB	3.000E+03 HSDB	7.14E+01 HSDB-GeoMean	2.670E-05 HSDB	7.300E-02 CHEM8	9.070E-06 CHEM8	4.284E-01	8.163E-06	5.444E+04	2.435E+04	4.969E+04
Benzene	71-43-2	5.5 SCDM	0.8765 SCDM	1.750E+03 SCDM	5.90E+01 SCDM	5.550E-03 SCDM	8.800E-02 CHEM8	9.800E-06 CHEM8	3.540E-01	2.146E-03	3.357E+03	1.501E+03	3.065E+03
Benzenethiol	108-98-5	-14.8 HSDB	1.0728 HSDB	8.360E+02 HSDB	2.46E+02 HSDB-GeoMean	3.500E-04 HSDB	6.743E-02 Calculated	9.426E-06 Calculated	1.476E+00	3.269E-05	2.720E+04	1.217E+04	2.483E+04
Benzo(a)anthracene	56-55-3	84 SCDM	1.274 ATSDR	9.400E-03 SCDM	4.00E+05 SCDM	3.350E-06 SCDM	5.100E-02 CHEM8	9.000E-06 CHEM8	2.400E+03	1.793E-10	1.162E+07	5.195E+06	1.060E+07
Benzo(a)pyrene	50-32-8	176.5 SCDM	1.351 HSDB	1.620E-03 SCDM	1.00E+06 SCDM	1.130E-06 SCDM	4.300E-02 CHEM8	9.000E-06 CHEM8	6.000E+03	2.721E-11	2.982E+07	1.333E+07	2.722E+07
Benzo(b)fluoranthene	205-99-2	168 SCDM	1.351 Surrogate (a)	1.500E-03 SCDM	1.25E+06 SCDM	1.110E-04 SCDM	2.260E-02 CHEM8	5.560E-06 CHEM8	7.500E+03	7.353E-10	5.736E+06	2.565E+06	5.236E+06
Benzo(g,h,i)perylene	191-24-2	277 HSDB	1.283 Calculated	2.600E-04 SCDM	3.85E+06 SCDM	1.410E-07 SCDM	1.840E-02 Calculated	6.044E-06 Calculated	2.310E+04	1.906E-12	1.126E+08	5.038E+07	1.028E+08

Table 4 - Technical Report

Chemical Specific Values

Contaminant	Values from Reference Sources								Calculated Values ***				
											Resident	Child	Industrial
	CAS#	MP	d (g/cm3)	S (mg/L)	Koc(L/kg)	H(atm-m3/mol)	Di(cm2/s)**	Dw(cm2/s)**	Kd(L/kg)*	Da(cm2/s)	Volatilization Factor (m3/kg)		
Benzo(k)fluoranthene	207-08-9	217 SCDM	1.351 Surrogate (a)	8.000E-04 SCDM	1.25E+06 SCDM	8.290E-07 SCDM	2.260E-02 CHEM8	5.560E-06 CHEM8	7.500E+03	1.016E-11	4.879E+07	2.182E+07	4.454E+07
Benzoic acid	65-85-0	122.4 SCDM	1.2659 SCDM	3.500E+03 SCDM	6.00E-01 SCDM	1.540E-06 SCDM	5.360E-02 CHEM8	7.970E-06 CHEM8	3.600E-03	2.229E-06	1.042E+05	4.660E+04	9.511E+04
Benzotrichloride	98-08-7	-5 HSDB	1.3756 HSDB	1.000E+02 Verschueren	1.20E+03 HSDB	2.600E-04 HSDB	2.750E-02 CHEM8	7.770E-06 CHEM8	7.200E+00	2.146E-06	1.062E+05	4.749E+04	9.693E+04
Benzyl alcohol	100-51-6	-15.2 SCDM	1.0419 SCDM	4.000E+04 SCDM	1.25E+01 SCDM	3.910E-07 HSDB	7.118E-02 CHEM8	8.970E-06 CHEM8	7.500E-02	6.728E-07	1.896E+05	8.480E+04	1.731E+05
Benzyl chloride	100-44-7	-45 SCDM	1.1004 SCDM	5.250E+02 SCDM	1.80E+02 SCDM	4.150E-04 SCDM	7.500E-02 CHEM8	7.800E-06 CHEM8	1.080E+00	5.750E-05	2.051E+04	9.173E+03	1.872E+04
Beryllium	7440-41-7	1278 SCDM	1.8477 SCDM	0.000 HSDB	NA	NA	9.909E-01 Calculated	5.866E-05 Calculated	7.900E+02 SCDM	4.713E-10	#	#	#
Bidrin [or Dicrotophos]	141-66-2	-9.9 MacKay	1.216 HSDB	1.000E+06 MacKay	7.32E+01 HSDB-GeoMean	1.200E-12 HSDB	2.296E-02 Calculated	6.414E-06 Calculated	4.392E-01	7.552E-08	5.660E+05	2.531E+05	5.167E+05
Biphenyl, 1,1- [or Diphenyl]	92-52-4	69 SCDM	1.04 SCDM	6.030E+00 SCDM	8.00E+03 SCDM	3.000E-04 SCDM	4.040E-02 CHEM8	8.150E-06 CHEM8	4.800E+01	5.515E-07	2.094E+05	9.367E+04	1.912E+05
Bis(2-chloroethyl)ether	111-44-4	-51.9 SCDM	1.22 SCDM	1.720E+04 SCDM	1.55E+01 SCDM	1.800E-05 SCDM	6.920E-02 CHEM8	7.530E-06 CHEM8	9.300E-02	1.433E-05	4.108E+04	1.837E+04	3.750E+04
Bis(2-chloroisopropyl)ether	108-60-1	-99.3 HSDB-GeoMean	1.1122 HSDB	1.310E+03 SCDM	7.30E+01 HSDB	3.320E-04 Howard	3.668E-02 Calculated	7.397E-06 Calculated	4.380E-01	4.929E-05	2.215E+04	9.908E+03	2.022E+04
Bis(2-ethylhexyl)phthalate [or DEHP]	117-81-7	-55 SCDM	0.981 SCDM	3.400E-01 SCDM	1.50E+07 SCDM	1.020E-07 SCDM	3.510E-02 CHEM8	3.660E-06 CHEM8	9.000E+04	3.450E-13	2.648E+08	1.184E+08	2.417E+08
Bisphenol A	80-05-7	152.5 HSDB-GeoMean	1.195 HSDB	1.200E+02 HSDB	6.92E+02 HSDB-GeoMean	1.000E-10 HSDB	2.640E-02 CHEM8	5.730E-06 CHEM8	4.152E+00	8.556E-09	1.681E+06	7.520E+05	1.535E+06
Boron	7440-42-8	2300 SCDM	2.35 SCDM	0.000 HSDB	NA	NA	9.117E-01 Calculated	6.076E-05 Calculated	3.000E+00 SCDM	1.244E-07	#	#	#
Bromacil	314-40-9	158.7 HSDB-GeoMean	1.55 HSDB	8.150E+02 HSDB	6.62E+01 HSDB-GeoMean	5.070E-11 HSDB	2.500E-02 CHEM8	4.560E-06 CHEM8	3.972E-01	5.823E-08	6.446E+05	2.883E+05	5.884E+05
Bromochloromethane	74-97-5	-86.5 HSDB	1.9344 HSDB	1.670E+04 HSDB	5.40E+01 HSDB-GeoMean	1.500E-03 HSDB	4.740E-02 CHEM8	1.000E-05 CHEM8	3.240E-01	3.566E-04	8.236E+03	3.683E+03	7.518E+03
Bromodichloromethane	75-27-4	-57 SCDM	1.98 SCDM	6.740E+03 SCDM	5.50E+01 SCDM	1.600E-03 SCDM	2.980E-02 CHEM8	1.060E-05 CHEM8	3.300E-01	2.356E-04	1.013E+04	4.532E+03	9.251E+03
Bromoform	75-25-2	8 SCDM	2.899 SCDM	3.100E+03 SCDM	8.50E+01 SCDM	5.350E-04 SCDM	1.490E-02 CHEM8	1.030E-05 CHEM8	5.100E-01	2.846E-05	2.916E+04	1.304E+04	2.662E+04

Table 4 - Technical Report

Chemical Specific Values

Contaminant	Values from Reference Sources								Calculated Values ***				
	CAS#	MP	d (g/cm3)	S (mg/L)	Koc(L/kg)	H(atm-m3/mol)	Di(cm2/s)**	Dw(cm2/s)**	Kd(L/kg)*	Da(cm2/s)	Resident Volatilization Factor (m3/kg)	Child Volatilization Factor (m3/kg)	Industrial Volatilization Factor (m3/kg)
Bromomethane [or Methyl bromide]	74-83-9	-93.7 SCDM	1.6755 SCDM	1.520E+04 SCDM	1.04E+01 SCDM	6.240E-03 SCDM	7.280E-02 CHEM8	1.210E-05 CHEM8	6.240E-02	4.707E-03	2.267E+03	1.014E+03	2.070E+03
Butanol, 1-	71-36-3	-89.8 SCDM	0.8098 SCDM	7.400E+04 SCDM	7.00E+00 SCDM	8.810E-06 SCDM	8.000E-02 CHEM8	9.300E-06 CHEM8	4.200E-02	1.125E-05	4.637E+04	2.074E+04	4.233E+04
Butanone, 2- [or MEK]	78-93-3	-87 SCDM	0.8054 SCDM	2.230E+05 SCDM	1.90E+00 SCDM	5.690E-05 SCDM	8.080E-02 CHEM8	9.800E-06 CHEM8	1.140E-02	9.035E-05	1.636E+04	7.318E+03	1.494E+04
Butyl benzyl phthalate, n-	85-68-7	-35 HSDB	1.117 HSDB-GeoMean	2.690E+00 SCDM	5.50E+04 SCDM	1.260E-06 SCDM	1.681E-02 Calculated	5.168E-06 Calculated	3.300E+02	2.395E-10	1.005E+07	4.495E+06	9.174E+06
Butylate	2008-41-5	-9.99 HSDB est.	0.9402 HSDB	4.400E+01 HSDB	2.68E+02 HSDB-GeoMean	8.450E-06 HSDB	2.897E-02 Calculated	5.792E-06 Calculated	1.608E+00	3.346E-07	2.689E+05	1.203E+05	2.455E+05
Butylphthalyl butylglycolate	85-70-1	-35 HSDB	1.097 HSDB	1.200E+02 HSDB	1.50E+04 HSDB	2.060E-08 HSDB	1.544E-02 Calculated	4.890E-06 Calculated	9.000E+01	3.522E-10	8.288E+06	3.706E+06	7.566E+06
Cadmium	7440-43-9	321 SCDM	8.65 SCDM	0.000 HSDB	NA	NA	2.981E-02 Calculated	3.258E-05 Calculated	7.500E+01 SCDM	2.754E-09	#	#	#
Calcium cyanide	592-01-8	640 HSDB	1.853 HSDB	7.160E+04 ATSDR	NA	NA	1.719E-01 Calculated	1.457E-05 Calculated	0.000	9.248E-07	#	#	#
Captan	133-06-2	172.5 SCDM	1.74 SCDM	3.300E+00 SCDM	2.55E+02 SCDM	7.190E-06 SCDM	1.810E-02 CHEM8	5.000E-06 CHEM8	1.530E+00	1.939E-07	3.533E+05	1.580E+05	3.225E+05
Carbaryl [or Sevin]	63-25-2	145 SCDM	1.2282 SCDM	1.040E+02 SCDM	2.10E+02 SCDM	3.460E-09 SCDM	2.780E-02 CHEM8	7.130E-06 CHEM8	1.260E+00	3.344E-08	8.506E+05	3.804E+05	7.765E+05
Carbazole	86-74-8	246.2 SCDM	1.1 HSDB	7.480E+00 SCDM	3.40E+03 SCDM	1.530E-08 SCDM	3.799E-02 Calculated	7.450E-06 Calculated	2.040E+01	2.369E-09	3.196E+06	1.429E+06	2.917E+06
Carbofuran	1563-66-2	151 SCDM	1.18 SCDM	3.200E+02 SCDM	3.85E+01 SCDM	9.200E-05 SCDM	2.548E-02 Calculated	6.568E-06 Calculated	2.310E-01	1.556E-05	3.942E+04	1.763E+04	3.599E+04
Carbon disulfide	75-15-0	-115 SCDM	1.2632 SCDM	1.190E+03 SCDM	4.57E+01 SCDM	3.030E-02 SCDM	1.040E-01 CHEM8	1.000E-05 CHEM8	2.742E-01	1.130E-02	1.463E+03	6.545E+02	1.336E+03
Carbon tetrachloride	56-23-5	-23 SCDM	1.594 SCDM	7.930E+02 SCDM	1.75E+02 SCDM	3.040E-02 SCDM	7.800E-02 CHEM8	8.800E-06 CHEM8	1.050E+00	3.737E-03	2.544E+03	1.138E+03	2.323E+03
Carbophenothion [or Trithion]	786-19-6	-9.99 HSDB est.	1.271 SCDM	3.650E-02 SCDM	3.65E+05 SCDM	2.150E-07 HSDB	1.405E-02 Calculated	5.281E-06 Calculated	2.190E+03	1.832E-11	3.634E+07	1.625E+07	3.317E+07
Chlordane	57-74-9	106 SCDM	1.6 SCDM	5.600E-02 SCDM	1.20E+05 SCDM	4.860E-05 SCDM	1.180E-02 CHEM8	4.370E-06 CHEM8	7.200E+02	1.778E-09	3.689E+06	1.650E+06	3.367E+06
Chlorine	7782-50-5	-105.5 HSDB	1.4085 HSDB	5.700E+03 HSDB	NA	NA	1.852E-01 Calculated	1.446E-05 Calculated	0.000	9.178E-07	#	#	#

Table 4 - Technical Report

Chemical Specific Values

Contaminant	Values from Reference Sources								Calculated Values ***				
											Resident	Child	Industrial
	CAS#	MP	d (g/cm3)	S (mg/L)	Koc(L/kg)	H(atm-m3/mol)	Di(cm2/s)**	Dw(cm2/s)**	Kd(L/kg)*	Da(cm2/s)	Volatilization Factor (m3/kg)		
Chlorine cyanide [or Cyanogen chloride]	506-77-4	-6.5 SCDM	1.186 SCDM	8.500E+04 Verschueren	4.95E+03 SCDM	9.515E-04 Calculated	1.917E-01 Calculated	1.421E-05 Calculated	2.970E+01	1.337E-05	4.253E+04	1.902E+04	3.883E+04
Chloro-1,3-butadiene [or Chloroprene]	126-99-8	-130 SCDM	0.956 SCDM	1.740E+03 SCDM	1.10E+02 SCDM	3.200E-02 HSDB	1.040E-01 CHEM8	1.050E-05 CHEM8	6.600E-01	7.209E-03	1.832E+03	8.192E+02	1.672E+03
Chloro-m-cresol, p- [or 4-chloro-3-methylphenol]	59-50-7	67 HSDB-GeoMean	1.2674 Calculated	3.800E+03 SCDM	5.00E+01 HSDB	3.990E-07 SCDM	4.415E-02 Calculated	8.925E-06 Calculated	3.000E-01	2.378E-07	3.189E+05	1.426E+05	2.911E+05
Chloroacetic acid	79-11-8	50 HSDB	1.4043 HSDB	6.140E+06 HSDB	3.00E+01 HSDB	1.300E-09 HSDB	7.330E-02 CHEM8	1.210E-05 CHEM8	1.800E-01	2.751E-07	2.966E+05	1.326E+05	2.707E+05
Chloroaniline, 4-	106-47-8	72.5 SCDM	1.429 SCDM	5.300E+03 SCDM	6.50E+01 SCDM	3.310E-07 SCDM	4.830E-02 CHEM8	1.010E-05 SCDM	3.900E-01	2.021E-07	3.460E+05	1.547E+05	3.158E+05
Chlorobenzene	108-90-7	-45.2 SCDM	1.1058 SCDM	4.720E+02 SCDM	2.19E+02 SCDM	3.700E-03 SCDM	7.300E-02 CHEM8	8.700E-06 CHEM8	1.314E+00	4.090E-04	7.691E+03	3.439E+03	7.021E+03
Chlorobenzilate	510-15-6	37 SCDM	1.2816 SCDM	1.110E+01 SCDM	2.00E+04 SCDM	7.240E-08 HSDB	1.409E-02 CHEM8	5.800E-06 CHEM8	1.200E+02	3.251E-10	8.626E+06	3.858E+06	7.874E+06
Chloroform	67-66-3	-63.6 SCDM	1.4832 SCDM	7.920E+03 SCDM	3.98E+01 SCDM	3.670E-03 SCDM	1.040E-01 CHEM8	1.000E-05 CHEM8	2.388E-01	2.270E-03	3.264E+03	1.460E+03	2.980E+03
Chloromethane	74-87-3	-97.7 SCDM	0.911 SCDM	5.330E+03 SCDM	6.30E+00 SCDM	8.820E-03 SCDM	1.997E-01 Calculated	1.365E-05 Calculated	3.780E-02	1.866E-02	1.139E+03	5.093E+02	1.040E+03
Chloronaphthalene, beta-	91-58-7	61 SCDM	1.1377 SCDM	1.170E+01 SCDM	1.15E+04 SCDM	3.140E-04 SCDM	3.470E-02 CHEM8	8.790E-06 CHEM8	6.900E+01	3.452E-07	2.647E+05	1.184E+05	2.417E+05
Chloronitrobenzene, p-	100-00-5	83 HSDB	1.52 HSDB	3.190E+02 HSDB-GeoMean	2.68E+02 HSDB-GeoMean	3.600E-05 HSDB	3.490E-02 CHEM8	9.420E-06 CHEM8	1.608E+00	1.642E-06	1.214E+05	5.429E+04	1.108E+05
Chlorophenol, 2-	95-57-8	9.8 SCDM	1.2634 SCDM	2.200E+04 SCDM	3.88E+02 SCDM	3.910E-04 SCDM	5.010E-02 CHEM8	9.460E-06 CHEM8	2.328E+00	1.763E-05	3.705E+04	1.657E+04	3.382E+04
Chlorophenol, 3-	108-43-0	32.6 HSDB	1.268 HSDB	2.500E+04 HSDB	3.50E+02 HSDB	8.500E-07 HSDB	5.050E-02 CHEM8	9.370E-06 CHEM8	2.100E+00	6.966E-08	5.893E+05	2.636E+05	5.380E+05
Chlorophenol, 4-	106-48-9	42.7 HSDB	1.2238 HSDB	2.600E+04 HSDB	7.05E+01 HSDB	5.920E-07 HSDB	4.930E-02 CHEM8	9.680E-06 CHEM8	4.230E-01	2.394E-07	3.179E+05	1.422E+05	2.902E+05
Chlorothalonil [or Bravo]	1897-45-6	250.5 HSDB-GeoMean	1.7 HSDB	6.000E-01 HSDB	1.80E+03 HSDB	2.000E-07 HSDB	1.700E-02 Calculated	7.324E-06 Calculated	1.080E+01	4.946E-09	2.211E+06	9.890E+05	2.019E+06
Chlorotoluene, o-	95-49-8	-35.6 HSDB	1.0826 HSDB	3.740E+02 HSDB	3.87E+02 CHEM8	3.570E-03 HSDB	5.500E-02 CHEM8	8.650E-06 CHEM8	2.322E+00	1.751E-04	1.175E+04	5.257E+03	1.073E+04
Chlorotoluene, p-	106-43-4	7.5 HSDB	1.0697 HSDB	1.060E+02 HSDB	3.40E+02 HSDB	4.400E-03 HSDB	5.500E-02 CHEM8	8.650E-06 CHEM8	2.040E+00	2.432E-04	9.974E+03	4.461E+03	9.105E+03

Table 4 - Technical Report

Chemical Specific Values

Contaminant	Values from Reference Sources								Calculated Values ***				
	CAS#	MP	d (g/cm3)	S (mg/L)	Koc(L/kg)	H(atm-m3/mol)	Di(cm2/s)**	Dw(cm2/s)**	Kd(L/kg)*	Da(cm2/s)	Resident Volatilization Factor (m3/kg)	Child Volatilization Factor (m3/kg)	Industrial Volatilization Factor (m3/kg)
Chlorpropham	101-21-3	40.9 HSDB-GeoMean	1.18 HSDB	1.080E+02 HSDB	8.16E+02 HSDB	2.500E-08 HSDB	2.666E-02 Calculated	6.707E-06 Calculated	4.896E+00	8.814E-09	1.657E+06	7.409E+05	1.512E+06
Chlorpyrifos	2921-88-2	42 SCDM	1.398 HSDB	1.120E+00 SCDM	1.74E+04 SCDM	1.230E-05 HSDB	1.305E-02 Calculated	5.517E-06 Calculated	1.044E+02	3.691E-09	2.560E+06	1.145E+06	2.337E+06
Chromium (hexavalent)	18540-29-9	1900 SCDM	7.1 SCDM	0.000 ATSDR	NA	NA	3.978E-01 Calculated	4.596E-05 Calculated	1.900E+01 SCDM	1.528E-08	#	#	#
Chrysene	218-01-9	258.2 SCDM	1.274 SCDM	1.600E-03 SCDM	4.00E+05 SCDM	9.460E-05 SCDM	2.480E-02 CHEM8	6.210E-06 CHEM8	2.400E+03	2.152E-09	3.353E+06	1.500E+06	3.061E+06
Cobalt	7440-48-4	1493 SCDM	8.92 SCDM	0.000 HSDB	NA	NA	3.925E-01 Calculated	4.890E-05 Calculated	4.500E+01 SCDM	6.883E-09	#	#	#
Copper	7440-50-8	1083 SCDM	8.94 SCDM	0.000 HSDB	NA	NA	3.748E-01 Calculated	4.680E-05 Calculated	4.300E+02 SCDM	6.907E-10	#	#	#
Coumaphos	56-72-4	91 HSDB	1.47 HSDB	1.500E+00 HSDB	4.23E+03 HSDB	3.200E-08 HSDB	1.221E-02 Calculated	5.570E-06 Calculated	2.538E+01	1.421E-09	4.126E+06	1.845E+06	3.766E+06
Crotonaldehyde	123-73-9	-76 HSDB	0.869 HSDB	1.560E+05 HSDB	6.20E+00 HSDB	1.940E-05 HSDB	9.030E-02 CHEM8	1.020E-05 CHEM8	3.720E-02	2.833E-05	2.922E+04	1.307E+04	2.668E+04
Cumene [or Isopropyl benzene]	98-82-8	-96 SCDM	0.8618 SCDM	6.130E+01 SCDM	3.30E+03 SCDM	1.160E+00 SCDM	6.500E-02 CHEM8	7.100E-06 CHEM8	1.980E+01	5.698E-03	2.060E+03	9.215E+02	1.881E+03
Cyanide (potassium salt)	57-12-5	634 HSDB	1.553 HSDB	5.000E+05 HSDB	NA	NA	2.507E-01 Calculated	1.913E-05 Calculated	9.900E+00 SCDM	1.214E-08	#	#	#
Cyanogen	460-19-5	-27.9 SCDM	0.9537 SCDM	8.500E+03 SCDM	4.95E+03 SCDM	5.400E-03 HSDB	2.030E-01 CHEM8	1.370E-05 CHEM8	2.970E+01	8.024E-05	1.736E+04	7.765E+03	1.585E+04
Cycloate	1134-23-2	11.5 HSDB	1.016 HSDB	7.500E+01 HSDB	3.82E+02 HSDB-GeoMean	6.700E-06 HSDB	2.828E-02 Calculated	6.102E-06 Calculated	2.292E+00	1.892E-07	3.576E+05	1.599E+05	3.264E+05
Cyclohexanone	108-94-1	-31 SCDM	0.9478 SCDM	5.000E+03 SCDM	6.50E+00 SCDM	8.410E-06 SCDM	7.840E-02 CHEM8	8.620E-06 CHEM8	3.900E-02	1.075E-05	4.744E+04	2.121E+04	4.330E+04
Cypermethrin	52315-07-8	69.3 HSDB-GeoMean	1.24 MacKay	1.000E-02 HSDB	2.50E+05 HSDB	1.920E-07 HSDB	1.114E-02 Calculated	4.631E-06 Calculated	1.500E+03	2.271E-11	3.264E+07	1.460E+07	2.979E+07
DDD, 4,4'-	72-54-8	109.5 SCDM	1.385 HSDB	9.000E-02 SCDM	1.00E+06 SCDM	4.000E-06 SCDM	1.472E-02 Calculated	5.795E-06 Calculated	6.000E+03	2.756E-11	2.962E+07	1.325E+07	2.704E+07
DDE, 4,4'-	72-55-9	89 SCDM	1.41 CHEM8	1.200E-01 SCDM	4.40E+06 SCDM	2.100E-05 SCDM	1.440E-02 CHEM8	5.870E-06 CHEM8	2.640E+04	2.643E-11	3.025E+07	1.353E+07	2.762E+07
DDT, 4,4'-	50-29-3	108.5 SCDM	0.985 HSDB	2.500E-02 SCDM	2.65E+06 SCDM	8.100E-06 SCDM	1.370E-02 CHEM8	4.950E-06 CHEM8	1.590E+04	1.722E-11	3.748E+07	1.676E+07	3.421E+07

Table 4 - Technical Report

Chemical Specific Values

Contaminant	Values from Reference Sources								Calculated Values ***				
											Resident	Child	Industrial
	CAS#	MP	d (g/cm3)	S (mg/L)	Koc(L/kg)	H(atm-m3/mol)	Di(cm2/s)**	Dw(cm2/s)**	Kd(L/kg)*	Da(cm2/s)	Volatilization Factor (m3/kg)		
Di-n-butylphthalate	84-74-2	-35 SCDM	1.0465 SCDM	1.120E+01 SCDM	1.57E+03 SCDM	9.800E-10 SCDM	4.380E-02 CHEM8	7.860E-06 CHEM8	9.420E+00	5.251E-09	2.146E+06	9.599E+05	1.959E+06
Di-n-octylphthalate	117-84-0	25 SCDM	0.978 HSDB	2.000E-02 SCDM	8.50E+07 SCDM	6.680E-05 SCDM	1.510E-02 CHEM8	3.580E-06 CHEM8	5.100E+05	4.365E-12	7.445E+07	3.329E+07	6.796E+07
Diallate	2303-16-4	27.4 HSDB-GeoMean	1.188 HSDB	4.000E+01 SCDM	2.60E+04 SCDM	3.800E-06 HSDB	1.963E-02 Calculated	5.850E-06 Calculated	1.560E+02	1.282E-09	4.344E+06	1.943E+06	3.966E+06
Diazinon	333-41-5	-9.99 HSDB est.	1.1088 SCDM	4.000E+01 SCDM	5.35E+02 SCDM	1.400E-06 HSDB	2.060E-02 CHEM8	4.160E-06 CHEM8	3.210E+00	2.701E-08	9.464E+05	4.232E+05	8.639E+05
Dibenz(a,h)anthracene	53-70-3	269.5 SCDM	1.282 HSDB	2.490E-03 SCDM	3.75E+06 SCDM	1.470E-08 SCDM	1.824E-02 Calculated	6.015E-06 Calculated	2.250E+04	1.723E-12	1.185E+08	5.299E+07	1.082E+08
Dibenzofuran	132-64-9	86.5 SCDM	1.0886 SCDM	1.000E+01 SCDM	1.35E+04 SCDM	1.260E-05 SCDM	2.670E-02 CHEM8	6.000E-06 CHEM8	8.100E+01	9.531E-09	1.593E+06	7.125E+05	1.454E+06
Dibromo-3-chloropropane, 1-2- [or DBCP]	96-12-8	5 HSDB	2.093 SCDM	1.230E+03 SCDM	8.50E+01 SCDM	1.470E-04 SCDM	2.120E-02 CHEM8	7.020E-06 CHEM8	5.100E-01	1.121E-05	4.645E+04	2.077E+04	4.240E+04
Dibromochloromethane	124-48-1	-20 SCDM	2.451 SCDM	2.600E+03 SCDM	6.30E+01 SCDM	7.830E-04 SCDM	1.960E-02 CHEM8	1.050E-05 CHEM8	3.780E-01	6.939E-05	1.867E+04	8.350E+03	1.704E+04
Dibromoethane, 1,2- [or EDB]	106-93-4	9.9 SCDM	2.1791 SCDM	4.180E+03 SCDM	4.26E+01 SCDM	7.430E-04 SCDM	2.870E-02 CHEM8	8.060E-06 CHEM8	2.556E-01	1.290E-04	1.369E+04	6.123E+03	1.250E+04
Dicamba	1918-00-9	115 SCDM	1.57 SCDM	4.500E+03 SCDM	2.05E+02 SCDM	7.900E-09 SCDM	2.242E-02 Calculated	7.801E-06 Calculated	1.230E+00	3.752E-08	8.029E+05	3.591E+05	7.330E+05
Dichloroacetic acid	79-43-6	13.5 HSDB	1.563 HSDB	1.000E+06 HSDB	7.50E+01 HSDB	6.800E-08 HSDB	4.628E-02 Calculated	1.075E-05 Calculated	4.500E-01	1.366E-07	4.209E+05	1.882E+05	3.842E+05
Dichloroacetonitrile	3018-12-0	NA	1.369 HSDB	3.340E+04 Howard&Meylan	1.28E+01 HSDB	3.790E-06 HSDB	6.097E-02 Calculated	1.092E-05 Calculated	7.680E-02	3.247E-06	8.632E+04	3.860E+04	7.880E+04
Dichlorobenzene, 1,2-	95-50-1	-16.7 SCDM	1.3059 SCDM	1.560E+02 SCDM	6.15E+02 SCDM	1.900E-03 SCDM	6.900E-02 CHEM8	7.900E-06 CHEM8	3.690E+00	7.528E-05	1.793E+04	8.017E+03	1.636E+04
Dichlorobenzene, 1,3-	541-73-1	-24.8 SCDM	1.2884 SCDM	1.330E+02 SCDM	7.25E+02 SCDM	3.100E-03 SCDM	4.207E-02 Calculated	8.849E-06 Calculated	4.350E+00	6.368E-05	1.949E+04	8.716E+03	1.779E+04
Dichlorobenzene, 1,4-	106-46-7	52.7 SCDM	1.2475 SCDM	7.380E+01 SCDM	6.15E+02 SCDM	2.400E-03 SCDM	6.900E-02 CHEM8	7.900E-06 CHEM8	3.690E+00	9.499E-05	1.596E+04	7.137E+03	1.457E+04
Dichlorobenzidine, 3,3'-	91-94-1	132.5 SCDM	1.41 CHEM8	3.110E+00 SCDM	7.25E+02 SCDM	4.000E-09 SCDM	1.940E-02 CHEM8	6.740E-06 CHEM8	4.350E+00	9.653E-09	1.583E+06	7.080E+05	1.445E+06
Dichlorodifluoromethane	75-71-8	-158 SCDM	1.486 HSDB	2.800E+02 SCDM	6.15E+01 HSDB	3.430E-01 SCDM	5.165E-02 Calculated	1.084E-05 Calculated	3.690E-01	1.236E-02	1.399E+03	6.257E+02	1.277E+03

Table 4 - Technical Report

Chemical Specific Values

Contaminant	Values from Reference Sources								Calculated Values ***				
											Resident	Child	Industrial
	CAS#	MP	d (g/cm3)	S (mg/L)	Koc(L/kg)	H(atm-m3/mol)	Di(cm2/s)**	Dw(cm2/s)**	Kd(L/kg)*	Da(cm2/s)	Volatilization Factor (m3/kg)		
Dichloroethane, 1,1-	75-34-3	-96.9 SCDM	1.1757 SCDM	5.060E+03 SCDM	3.16E+01 SCDM	5.620E-03 SCDM	7.420E-02 CHEM8	1.050E-05 CHEM8	1.896E-01	2.734E-03	2.975E+03	1.330E+03	2.716E+03
Dichloroethane, 1,2- [or EDC]	107-06-2	-35.5 SCDM	1.2351 SCDM	8.520E+03 SCDM	1.74E+01 SCDM	9.790E-04 SCDM	1.040E-01 CHEM8	9.900E-06 CHEM8	1.044E-01	1.049E-03	4.801E+03	2.147E+03	4.383E+03
Dichloroethene, 1,1-	75-35-4	-122.5 SCDM	1.213 SCDM	2.250E+03 SCDM	5.90E+01 SCDM	2.610E-02 SCDM	9.000E-02 CHEM8	1.040E-05 CHEM8	3.540E-01	7.815E-03	1.759E+03	7.868E+02	1.606E+03
Dichloroethene, cis-1,2-	156-59-2	-80 SCDM	1.2837 SCDM	3.500E+03 SCDM	3.55E+01 SCDM	4.080E-03 SCDM	7.360E-02 CHEM8	1.130E-05 CHEM8	2.130E-01	1.903E-03	3.565E+03	1.594E+03	3.255E+03
Dichloroethene, trans-1,2-	156-60-5	-49.8 SCDM	1.2565 SCDM	6.300E+03 SCDM	5.25E+01 SCDM	9.380E-03 SCDM	7.070E-02 CHEM8	1.190E-05 CHEM8	3.150E-01	2.970E-03	2.854E+03	1.276E+03	2.605E+03
Dichlorophenol, 2,3-	576-24-9	58 HSDB	1.383 Surrogate (b)	8.220E+03 ATSDR	4.26E+02 HSDB	3.100E-07 HSDB	4.000E-02 CHEM8	7.220E-06 CHEM8	2.556E+00	2.745E-08	9.387E+05	4.198E+05	8.569E+05
Dichlorophenol, 2,4-	120-83-2	45 SCDM	1.383 HSDB	4.500E+03 SCDM	1.47E+02 SCDM	3.160E-06 SCDM	3.460E-02 CHEM8	8.770E-06 CHEM8	8.820E-01	2.999E-07	2.840E+05	1.270E+05	2.593E+05
Dichlorophenol, 2,5-	583-78-8	59 HSDB	1.383 Surrogate (b)	5.000E+05 Merck	1.10E+03 HSDB	3.100E-07 HSDB	4.000E-02 CHEM8	7.220E-06 CHEM8	6.600E+00	1.088E-08	1.491E+06	6.668E+05	1.361E+06
Dichlorophenol, 2,6-	87-65-0	68.5 HSDB	1.383 Surrogate (b)	2.650E+03 HSDB	7.50E+02 HSDB	2.700E-06 HSDB	3.468E-02 CHEM8	8.770E-06 CHEM8	4.500E+00	5.657E-08	6.540E+05	2.925E+05	5.970E+05
Dichlorophenol, 3,4-	95-77-2	68 HSDB	1.383 Surrogate (b)	9.260E+00 Howard&Meylan	1.50E+03 HSDB	3.100E-07 HSDB	3.550E-02 Calculated	8.679E-06 Calculated	9.000E+00	8.696E-09	1.668E+06	7.459E+05	1.523E+06
Dichlorophenoxy acetic acid, 2,4-	94-75-7	140.5 SCDM	1.416 HSDB	6.770E+02 SCDM	1.66E+02 SCDM	1.020E-08 SCDM	5.880E-02 CHEM8	6.490E-06 CHEM8	9.960E-01	3.879E-08	7.898E+05	3.532E+05	7.210E+05
Dichloropropane, 1,2-	78-87-5	-70 SCDM	1.159 SCDM	2.800E+03 SCDM	4.37E+01 SCDM	2.800E-03 SCDM	7.820E-02 CHEM8	8.730E-06 CHEM8	2.622E-01	1.246E-03	4.406E+03	1.971E+03	4.023E+03
Dichloropropene, 1,3-	542-75-6	-50 HSDB	1.22 SCDM	2.800E+03 SCDM	4.57E+01 SCDM	1.770E-02 SCDM	6.260E-02 CHEM8	1.000E-05 CHEM8	2.742E-01	4.731E-03	2.261E+03	1.011E+03	2.064E+03
Dichlorprop	120-36-5	117.8 HSDB	1.42 HSDB	3.500E+02 HSDB	8.02E+01 HSDB	1.220E-08 HSDB	2.164E-02 Calculated	7.078E-06 Calculated	4.811E-01	7.832E-08	5.558E+05	2.485E+05	5.073E+05
Dichlorvos	62-73-7	-9.99 HSDB est.	1.415 SCDM	1.000E+04 SCDM	1.62E+01 SCDM	1.500E-03 SCDM	2.315E-02 CHEM8	7.330E-06 CHEM8	9.720E-02	3.634E-04	8.159E+03	3.649E+03	7.448E+03
Dicofol [or Kelthane]	115-32-2	77.5 SCDM	1.13 HSDB	1.320E+00 SCDM	2.95E+03 HSDB	5.590E-10 Howard&Meylan	1.348E-02 Calculated	4.697E-06 Calculated	1.770E+01	1.676E-09	3.799E+06	1.699E+06	3.468E+06
Dieldrin	60-57-1	175.5 SCDM	1.75 SCDM	1.950E-01 SCDM	2.14E+04 SCDM	1.510E-05 SCDM	1.250E-02 CHEM8	4.740E-06 CHEM8	1.284E+02	3.443E-09	2.651E+06	1.185E+06	2.420E+06

Table 4 - Technical Report

Chemical Specific Values

Contaminant	Values from Reference Sources								Calculated Values ***				
											Resident	Child	Industrial
	CAS#	MP	d (g/cm3)	S (mg/L)	Koc(L/kg)	H(atm-m3/mol)	Di(cm2/s)**	Dw(cm2/s)**	Kd(L/kg)*	Da(cm2/s)	Volatilization Factor (m3/kg)		
Diethylphthalate	84-66-2	-40.5 SCDM	1.232 SCDM	1.080E+03 SCDM	2.85E+02 SCDM	4.500E-07 SCDM	2.484E-02 Calculated	6.350E-06 Calculated	1.710E+00	3.576E-08	8.225E+05	3.678E+05	7.508E+05
Dimethoate	60-51-5	52 SCDM	1.277 SCDM	2.500E+04 SCDM	4.75E+00 SCDM	6.150E-11 SCDM	2.347E-02 Calculated	6.742E-06 Calculated	2.850E-02	3.331E-07	2.695E+05	1.205E+05	2.460E+05
Dimethrin	70-38-2	-9.99 Versch. est.	0.98 HSDB	0.000 HSDB	3.02E+04 HSDB	7.610E-05 HSDB	1.997E-02 Calculated	5.033E-06 Calculated	1.812E+02	1.849E-08	1.144E+06	5.116E+05	1.044E+06
Dimethylformamide, N,N-	68-12-2	-61 HSDB	0.9445 HSDB	1.000E+06 Howard&Meylan	7.00E+00 HSDB	7.390E-08 HSDB	9.390E-02 CHEM8	1.030E-05 CHEM8	4.200E-02	5.672E-07	2.065E+05	9.236E+04	1.885E+05
Dimethylphenol, 2,4-	105-67-9	24.5 SCDM	0.965 SCDM	7.870E+03 SCDM	2.10E+02 SCDM	2.000E-06 SCDM	5.840E-02 CHEM8	8.690E-06 CHEM8	1.260E+00	2.282E-07	3.256E+05	1.456E+05	2.973E+05
Dimethylphthalate	131-11-3	5.5 SCDM	1.1905 SCDM	4.000E+03 SCDM	3.50E+01 SCDM	1.050E-07 SCDM	5.680E-02 CHEM8	6.290E-06 CHEM8	2.100E-01	1.708E-07	3.763E+05	1.683E+05	3.435E+05
Dinitrobenzene, 1,2- (o)	528-29-0	118 HSDB	1.565 HSDB	1.330E+02 Howard&Meylan	2.95E+01 HSDB	2.330E-06 HSDB	3.228E-02 Calculated	9.175E-06 Calculated	1.770E-01	8.033E-07	1.735E+05	7.761E+04	1.584E+05
Dinitrobenzene, 1,3- (m)	99-65-0	90 SCDM	1.5751 SCDM	8.610E+02 SCDM	3.00E+01 SCDM	2.310E-07 SCDM	2.790E-01 CHEM8	7.640E-06 CHEM8	1.800E-01	6.760E-07	1.892E+05	8.460E+04	1.727E+05
Dinitrophenol, 2,4-	51-28-5	113 HSDB-GeoMean	1.683 SCDM	2.790E+03 SCDM	1.00E-02 SCDM	4.430E-07 SCDM	2.730E-02 CHEM8	9.060E-06 CHEM8	6.000E-05	8.388E-07	1.698E+05	7.595E+04	1.550E+05
Dinitrotoluene, 2,4-	121-14-2	71 SCDM	1.3208 SCDM	2.700E+02 SCDM	9.50E+01 SCDM	9.260E-08 SCDM	2.030E-01 CHEM8	7.060E-06 CHEM8	5.700E-01	1.282E-07	4.344E+05	1.943E+05	3.966E+05
Dinitrotoluene, 2,6-	606-20-2	66 SCDM	1.2833 SCDM	1.820E+02 SCDM	7.00E+01 SCDM	7.470E-07 SCDM	3.270E-02 CHEM8	7.260E-06 CHEM8	4.200E-01	1.912E-07	3.557E+05	1.591E+05	3.247E+05
Dinoseb	88-85-7	40 SCDM	1.265 SCDM	5.200E+01 SCDM	1.89E+01 SCDM	4.560E-07 SCDM	2.219E-02 Calculated	6.519E-06 Calculated	1.134E-01	2.975E-07	2.852E+05	1.275E+05	2.603E+05
Dioxane, 1,4-	123-91-1	11.8 SCDM	1.0337 SCDM	1.000E+06 SCDM	4.15E-01 HSDB	4.800E-06 SCDM	2.290E-01 CHEM8	1.020E-05 CHEM8	2.490E-03	2.405E-05	3.172E+04	1.418E+04	2.895E+04
Dioxin [or 2,3,7,8-TCDD]	1746-01-6	295 SCDM	1.41 CHEM8	7.910E-06 SCDM	2.65E+06 SCDM	7.920E-05 SCDM	1.430E-02 CHEM8	5.830E-06 CHEM8	1.590E+04	1.579E-10	1.238E+07	5.535E+06	1.130E+07
Diphenamid	957-51-7	135 HSDB-GeoMean	1.17 HSDB	2.600E+02 HSDB	2.10E+02 HSDB	2.420E-11 HSDB	2.311E-02 Calculated	6.234E-06 Calculated	1.260E+00	2.910E-08	9.118E+05	4.078E+05	8.323E+05
Diphenylhydrazine, 1,2-	122-66-7	131 SCDM	1.158 SCDM	6.800E+01 SCDM	8.00E+02 SCDM	1.530E-06 SCDM	3.170E-02 CHEM8	7.360E-06 CHEM8	4.800E+00	3.116E-08	8.812E+05	3.941E+05	8.044E+05
Disulfoton	298-04-4	-25 SCDM	1.144 SCDM	1.630E+01 SCDM	8.00E+03 SCDM	3.990E-06 SCDM	1.959E-02 Calculated	5.666E-06 Calculated	4.800E+01	4.298E-09	2.372E+06	1.061E+06	2.166E+06

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											Resident	Child	Industrial
	CAS#	MP	d (g/cm3)	S (mg/L)	Koc(L/kg)	H(atm-m3/mol)	Di(cm2/s)**	Dw(cm2/s)**	Kd(L/kg)*	Da(cm2/s)	Volatilization Factor (m3/kg)		
Diuron	330-54-1	158 SCDM	1.332 Calculated	4.200E+01 SCDM	4.30E+02 SCDM	2.700E-06 Howard&Meylan	2.253E-02 Calculated	6.846E-06 Calculated	2.580E+00	6.579E-08	6.064E+05	2.712E+05	5.535E+05
Endosulfan	115-29-7	106 SCDM	1.745 SCDM	5.100E-01 SCDM	2.14E+03 SCDM	1.120E-05 SCDM	1.150E-02 CHEM8	4.550E-06 CHEM8	1.284E+01	2.397E-08	1.005E+06	4.492E+05	9.170E+05
Endothall	145-73-3	144 SCDM	1.431 SCDM	2.100E+04 SCDM	2.90E-01 SCDM	2.590E-10 SCDM	2.192E-02 Calculated	7.165E-06 Calculated	1.740E-03	4.472E-07	2.326E+05	1.040E+05	2.123E+05
Endrin	72-20-8	392 HSDB	1.7 HSDB	2.500E-01 SCDM	1.23E+04 SCDM	7.520E-06 SCDM	1.250E-02 CHEM8	4.740E-06 CHEM8	7.380E+01	3.186E-09	2.756E+06	1.232E+06	2.516E+06
Epichlorohydrin	106-89-8	-48 HSDB	1.1801 HSDB	6.580E+04 HSDB	1.23E+02 HSDB	3.350E-05 CHEM8	8.600E-02 CHEM8	9.800E-06 CHEM8	7.380E-01	7.582E-06	5.649E+04	2.526E+04	5.157E+04
Ethion	563-12-2	-13 SCDM	1.22 SCDM	6.000E-01 SCDM	1.23E+04 SCDM	6.900E-07 HSDB	1.240E-02 Calculated	4.810E-06 Calculated	7.380E+01	6.662E-10	6.026E+06	2.695E+06	5.501E+06
Ethoprop	13194-48-4	20 HSDB	1.094 HSDB	7.500E+02 HSDB	9.40E+01 HSDB	1.620E-07 HSDB	2.346E-02 Calculated	5.943E-06 Calculated	5.640E-01	6.932E-08	5.907E+05	2.642E+05	5.393E+05
Ethoxyethanol, 2-	110-80-5	-70 HSDB	0.931 HSDB	1.000E+06 HSDB	1.60E+01 HSDB	1.000E-08 HSDB	9.470E-02 CHEM8	9.570E-06 CHEM8	9.600E-02	3.205E-07	2.747E+05	1.229E+05	2.508E+05
Ethyl acetate	141-78-6	-83.6 SCDM	0.9003 SCDM	8.030E+04 SCDM	4.75E+00 SCDM	1.380E-04 SCDM	7.320E-02 CHEM8	9.660E-06 CHEM8	2.850E-02	1.708E-04	1.190E+04	5.323E+03	1.087E+04
Ethyl acrylate	140-88-5	-71.2 HSDB	0.9234 HSDB	1.500E+04 HSDB	2.20E+01 HSDB	3.050E-04 HSDB	7.700E-02 CHEM8	8.600E-06 CHEM8	1.320E-01	2.191E-04	1.051E+04	4.699E+03	9.592E+03
Ethyl chloride [or Chloroethane]	75-00-3	-138.7 SCDM	0.8902 SCDM	5.680E+03 SCDM	1.60E+01 SCDM	8.820E-03 SCDM	2.710E-01 CHEM8	1.150E-05 CHEM8	9.600E-02	1.974E-02	1.107E+03	4.950E+02	1.010E+03
Ethyl dipropylthiocarbamate, S- [or EPTC]	759-94-4	-9.99 HSDB est.	0.9546 SCDM	3.700E+02 SCDM	1.45E+03 SCDM	1.070E-04 SCDM	3.442E-02 Calculated	6.351E-06 Calculated	8.700E+00	9.187E-07	1.623E+05	7.257E+04	1.481E+05
Ethyl ether	60-29-7	-116.3 SCDM	0.7138 SCDM	5.680E+04 SCDM	6.50E+00 SCDM	3.300E-02 SCDM	7.400E-02 CHEM8	9.300E-06 CHEM8	3.900E-02	1.350E-02	1.339E+03	5.987E+02	1.222E+03
Ethyl methacrylate	97-63-2	-75 HSDB	0.9135 SCDM	3.670E+03 SCDM	3.65E+01 SCDM	8.420E-04 SCDM	6.890E-02 Calculated	8.380E-06 Calculated	2.190E-01	3.895E-04	7.881E+03	3.525E+03	7.195E+03
Ethyl p-nitrophenyl phenylphosphorothioate [or EPN]	2104-64-5	36 HSDB	1.27 CRC	3.110E+00 HSDB	5.35E+03 HSDB-GeoMean	1.300E-07 HSDB	1.514E-02 Calculated	5.467E-06 Calculated	3.210E+01	1.211E-09	4.469E+06	1.999E+06	4.079E+06
Ethylbenzene	100-41-4	-94.9 SCDM	0.867 SCDM	1.690E+02 SCDM	3.63E+02 SCDM	7.880E-03 SCDM	7.500E-02 CHEM8	7.800E-06 CHEM8	2.178E+00	5.519E-04	6.621E+03	2.961E+03	6.044E+03
Ethylene diamine	107-15-3	8.5 HSDB	0.898 HSDB	1.000E+06 HSDB	5.00E-02 HSDB est.	7.080E-08 HSDB	1.525E-01 CHEM8	1.410E-05 CHEM8	3.000E-04	1.128E-06	1.465E+05	6.551E+04	1.337E+05

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Contaminant	Values from Reference Sources								Calculated Values ***				
											Resident	Child	Industrial
	CAS#	MP	d (g/cm3)	S (mg/L)	Koc(L/kg)	H(atm-m3/mol)	Di(cm2/s)**	Dw(cm2/s)**	Kd(L/kg)*	Da(cm2/s)	Volatilization Factor (m3/kg)		
Ethylene glycol	107-21-1	-13 SCDM	1.1088 SCDM	1.000E+06 SCDM	4.60E-02 SCDM	6.000E-08 SCDM	1.080E+01 CHEM8	1.220E-05 CHEM8	2.760E-04	1.489E-05	4.031E+04	1.803E+04	3.680E+04
Ethylene oxide	75-21-8	-111 HSDB	0.882 HSDB	1.000E+06 HSDB est.	1.60E+01 HSDB	1.480E-04 HSDB	1.040E-01 CHEM8	1.450E-05 CHEM8	9.600E-02	1.710E-04	1.189E+04	5.319E+03	1.086E+04
Fenamiphos	22224-92-6	49.2 HSDB	1.15 HSDB	4.800E+02 HSDB-GeoMean	1.84E+02 HSDB-GeoMean	1.200E-09 HSDB	1.720E-02 Calculated	5.352E-06 Calculated	1.104E+00	2.825E-08	9.253E+05	4.138E+05	8.447E+05
Fensulfothion	115-90-2	215.5 Howard&Meylan	1.202 HSDB	1.540E+03 HSDB	8.99E+01 HSDB-GeoMean	1.800E-10 HSDB	1.650E-02 Calculated	5.442E-06 Calculated	5.394E-01	5.404E-08	6.691E+05	2.992E+05	6.108E+05
Fluometuron	2164-17-2	163.8 HSDB	1.39 HSDB	8.490E+01 HSDB-GeoMean	1.34E+02 HSDB-GeoMean	1.450E-09 HSDB	2.221E-02 Calculated	7.040E-06 Calculated	8.040E-01	4.951E-08	6.990E+05	3.126E+05	6.381E+05
Fluoranthene	206-44-0	107.8 SCDM	1.252 SCDM	2.060E-01 SCDM	1.10E+05 SCDM	1.610E-05 SCDM	3.020E-02 CHEM8	6.350E-06 CHEM8	6.600E+02	1.670E-09	3.806E+06	1.702E+06	3.474E+06
Fluorene	86-73-7	114.8 SCDM	1.203 SCDM	1.980E+00 SCDM	1.40E+04 SCDM	6.360E-05 SCDM	3.679E-02 Calculated	7.889E-06 Calculated	8.400E+01	6.136E-08	6.279E+05	2.808E+05	5.732E+05
Fluoride	7782-41-4	-219.6 SCDM	1.5127 HSDB	4.200E+04 CRC	7.50E+04 SCDM	NA	2.995E-01 Calculated	2.194E-05 Calculated	4.500E+02	3.094E-10	#	#	#
Fonofos	944-22-9	-9.99 HSDB est.	1.16 HSDB	1.300E+01 HSDB	6.71E+02 HSDB-GeoMean	5.400E-06 HSDB	2.236E-02 Calculated	6.096E-06 Calculated	4.026E+00	7.329E-08	5.745E+05	2.569E+05	5.245E+05
Formaldehyde	50-00-0	-92 SCDM	0.815 SCDM	5.500E+05 SCDM	9.00E-01 SCDM	3.360E-07 SCDM	1.780E-01 CHEM8	1.980E-05 CHEM8	5.400E-03	2.432E-06	9.974E+04	4.460E+04	9.105E+04
Furfural	98-01-1	-36.5 SCDM	1.1594 SCDM	1.100E+05 SCDM	2.55E+00 SCDM	4.000E-06 SCDM	8.720E-02 CHEM8	1.040E-05 CHEM8	1.530E-02	7.179E-06	5.805E+04	2.596E+04	5.299E+04
Guthion [or Azinphos, methyl]	86-50-0	73.5 SCDM	1.44 SCDM	2.090E+01 SCDM	4.70E+02 SCDM	1.500E-10 HSDB	1.950E-02 CHEM8	4.060E-06 CHEM8	2.820E+00	8.829E-09	1.655E+06	7.403E+05	1.511E+06
Heptachlor	76-44-8	95.5 SCDM	1.57 SCDM	1.800E-01 SCDM	1.45E+06 SCDM	1.480E-03 HSDB	1.120E-02 CHEM8	5.690E-06 CHEM8	8.700E+03	4.166E-09	2.410E+06	1.078E+06	2.200E+06
Heptachlor epoxide	1024-57-3	160 SCDM	1.5219 Calculated	2.000E-01 SCDM	8.00E+04 SCDM	9.500E-06 SCDM	1.098E-02 Calculated	5.452E-06 Calculated	4.800E+02	5.468E-10	6.651E+06	2.975E+06	6.072E+06
Hexachloro-1,3-butadiene	87-68-3	-21 SCDM	1.556 SCDM	3.230E+00 SCDM	5.50E+04 SCDM	8.150E-03 SCDM	5.610E-02 CHEM8	6.160E-06 CHEM8	3.300E+02	3.025E-06	8.943E+04	3.999E+04	8.163E+04
Hexachlorobenzene	118-74-1	231.8 SCDM	2.044 SCDM	5.000E-03 SCDM	5.50E+04 SCDM	1.320E-03 SCDM	5.420E-02 CHEM8	5.910E-06 CHEM8	3.300E+02	4.735E-07	2.260E+05	1.011E+05	2.063E+05
Hexachlorocyclohexane, alpha-	319-84-6	159.5 HSDB-GeoMean	1.87 HSDB	2.000E+00 SCDM	1.23E+03 SCDM	1.060E-05 SCDM	1.449E-02 Calculated	7.348E-06 Calculated	7.380E+00	5.110E-08	6.880E+05	3.077E+05	6.281E+05

Table 4 - Technical Report

Chemical Specific Values

Contaminant	Values from Reference Sources								Calculated Values ***				
											Resident	Child	Industrial
	CAS#	MP	d (g/cm3)	S (mg/L)	Koc(L/kg)	H(atm-m3/mol)	Di(cm2/s)**	Dw(cm2/s)**	Kd(L/kg)*	Da(cm2/s)	Volatilization Factor (m3/kg)		
Hexachlorocyclohexane, beta-	319-85-7	314.5 Howard&Meylan	1.89 SCDM	2.400E-01 SCDM	1.26E+03 SCDM	7.430E-07 SCDM	1.443E-02 Calculated	7.395E-06 Calculated	7.560E+00	9.185E-09	1.623E+06	7.258E+05	1.481E+06
Hexachlorocyclohexane, delta-	319-86-8	141.5 SCDM	1.89 Surrogate (c)	3.100E+01 SCDM	2.29E+03 SCDM	4.290E-07 SCDM	1.443E-02 Calculated	7.395E-06 Calculated	1.374E+01	4.369E-09	2.353E+06	1.052E+06	2.148E+06
Hexachlorocyclohexane, gamma- [or Lindane]	58-89-9	112.5 SCDM	1.85 HSDB	6.800E+00 SCDM	1.07E+03 SCDM	1.400E-05 SCDM	1.420E-02 CHEM8	7.340E-06 CHEM8	6.420E+00	7.375E-08	5.727E+05	2.561E+05	5.228E+05
Hexachlorocyclopentadiene	77-47-4	-9 SCDM	1.7019 SCDM	1.800E+00 SCDM	2.00E+05 SCDM	2.700E-02 SCDM	1.610E-02 CHEM8	7.210E-06 CHEM8	1.200E+03	7.911E-07	1.749E+05	7.820E+04	1.596E+05
Hexachloroethane	67-72-1	187 SCDM	2.091 SCDM	5.000E+01 SCDM	1.78E+03 SCDM	3.890E-03 SCDM	2.500E-03 CHEM8	6.800E-06 CHEM8	1.068E+01	1.969E-06	1.108E+05	4.957E+04	1.012E+05
Hexahydro-1,3,5-trinitro-1,3,5-triazine [or RDX]	121-82-4	205.5 SCDM	1.82 SCDM	5.980E+01 SCDM	7.89E+01 HSDB-GeoMean	6.300E-08 HSDB	2.086E-02 Calculated	8.499E-06 Calculated	4.734E-01	9.910E-08	4.941E+05	2.210E+05	4.510E+05
Hexane, n-	110-54-3	-95.3 SCDM	0.6548 SCDM	1.240E+01 SCDM	8.50E+03 SCDM	1.430E-02 SCDM	2.000E-01 CHEM8	7.770E-06 CHM 8	5.100E+01	1.220E-04	1.408E+04	6.298E+03	1.286E+04
Hexanone, 2- [or Methyl butyl ketone]	591-78-6	-55.5 SCDM	0.8113 SCDM	1.750E+04 SCDM	2.35E+01 SCDM	9.300E-05 HSDB	8.680E-02 Calculated	8.440E-06 Calculated	1.410E-01	7.317E-05	1.818E+04	8.132E+03	1.660E+04
Hexazinone	51235-04-2	116 HSDB	1.25 HSDB	3.300E+04 HSDB	2.21E+01 HSDB-GeoMean	2.000E-12 HSDB	2.093E-02 Calculated	6.284E-06 Calculated	1.326E-01	1.715E-07	3.756E+05	1.680E+05	3.429E+05
Hydroquinone	123-31-9	170.5 HSDB-GeoMean	1.332 HSDB	7.270E+04 HSDB-GeoMean	2.12E+01 HSDB-GeoMean	1.320E-09 HSDB	6.853E-02 CHEM8	9.040E-06 CHEM8	1.272E-01	2.535E-07	3.089E+05	1.382E+05	2.820E+05
Indeno(1,2,3-cd)pyrene	193-39-5	161.5 SCDM	1.351 Surrogate (a)	2.200E-05 SCDM	3.45E+06 SCDM	1.600E-06 SCDM	1.900E-02 CHEM8	5.660E-06 CHEM8	2.070E+04	4.944E-12	6.995E+07	3.128E+07	6.386E+07
Iron	7439-89-6	1535 SCDM	7.86 SCDM	0.000 HSDB	NA	NA	3.915E-01 Calculated	4.681E-05 Calculated	2.500E+01 SCDM	1.184E-08	#	#	#
Isobutyl alcohol	78-83-1	-108 SCDM	0.8018 SCDM	8.500E+04 SCDM	5.50E+00 SCDM	1.180E-05 SCDM	1.423E-01 Calculated	1.004E-05 Calculated	3.300E-02	2.804E-05	2.937E+04	1.314E+04	2.681E+04
Isophorone	78-59-1	-8.1 SCDM	0.9255 SCDM	1.200E+04 SCDM	4.70E+01 SCDM	6.640E-06 SCDM	6.230E-02 CHEM8	6.760E-06 CHEM8	2.820E-01	2.477E-06	9.882E+04	4.419E+04	9.021E+04
Lead	7439-92-1	NA	NA	0.000	NA	NA	0.000E+00	0.000E+00	0.000	0.000	#	#	#
Linuron	330-55-2	93.5 HSDB	1.3588 Calculated	8.100E+01 HSDB	6.80E+02 HSDB-GeoMean	6.600E-08 HSDB	2.048E-02 Calculated	6.658E-06 Calculated	4.080E+00	1.082E-08	1.495E+06	6.688E+05	1.365E+06
Lithium	7439-93-32	180.54 HSDB	NA	0.000 HSDB	NA	NA	0.000E+00 Calculated	0.000E+00 Calculated	0.000	0.000	#	#	#

Table 4 - Technical Report
Chemical Specific Values

Contaminant	Values from Reference Sources								Calculated Values ***				
											Resident	Child	Industrial
	CAS#	MP	d (g/cm3)	S (mg/L)	Koc(L/kg)	H(atm-m3/mol)	Di(cm2/s)**	Dw(cm2/s)**	Kd(L/kg)*	Da(cm2/s)	Volatilization Factor (m3/kg)		
Malathion	121-75-5	2.8 SCDM	1.21 SCDM	1.430E+02 SCDM	6.50E+02 SCDM	4.890E-09 SCDM	1.507E-02 Calculated	5.243E-06 Calculated	3.900E+00	8.360E-09	1.701E+06	7.607E+05	1.553E+06
Maneb	12427-38-2	200 Howard&Meylan	1.92 HSDB	6.000E+00 Howard&Meylan	2.00E+03 HSDB	4.360E-09 HSDB	1.614E-02 Calculated	7.889E-06 Calculated	1.200E+01	4.152E-09	2.414E+06	1.080E+06	2.204E+06
Manganese	7439-96-5	1244 SCDM	7.2 SCDM	0.000 HSDB	NA	NA	3.856E-01 Calculated	4.485E-05 Calculated	6.500E+01 SCDM	4.373E-09	#	#	#
Mercury	7439-97-6	-38.9 SCDM	13.534 SCDM	5.600E-02 HSDB	NA	1.140E-02 SCDM	1.108E-02 Calculated	3.011E-05 Calculated	5.200E+01 SCDM	5.291E-06	6.762E+04	3.024E+04	6.173E+04
Mercury, methyl	22967-92-6	NA	3.1874 ATSDR	1.000E+03 ATSDR 97	5.37E+02 ATSDR	1.520E-02 Calculated	1.562E-02 Calculated	1.163E-05 Calculated	3.222E+00	1.508E-04	1.266E+04	5.664E+03	1.156E+04
Merphos	150-50-5	83 Howard&Meylan	1 HSDB	3.500E-03 Howard&Meylan	6.20E+04 HSDB	2.270E-05 HSDB	1.877E-02 Calculated	4.969E-06 Calculated	3.720E+02	2.586E-09	3.059E+06	1.368E+06	2.792E+06
Methacrylonitrile	126-98-7	-35.8 SCDM	0.8001 SCDM	2.540E+04 SCDM	3.40E+00 SCDM	2.470E-04 SCDM	1.531E-01 Calculated	1.065E-05 Calculated	2.040E-02	6.757E-04	5.983E+03	2.676E+03	5.462E+03
Methamidophos	10265-92-6	44.5 HSDB	1.31 HSDB	2.000E+06 HSDB	3.85E+00 HSDB	8.700E-10 HSDB	4.412E-02 Calculated	9.159E-06 Calculated	2.310E-02	4.730E-07	2.262E+05	1.011E+05	2.064E+05
Methanol	67-56-1	-97.6 SCDM	0.7914 SCDM	1.000E+06 SCDM	2.00E-01 SCDM	4.550E-06 SCDM	1.500E-01 CHEM8	1.640E-05 CHEM8	1.200E-03	1.575E-05	3.919E+04	1.752E+04	3.577E+04
Methidathion	950-37-8	39.5 HSDB	1.495 HSDB	2.160E+02 HSDB-GeoMean	1.98E+01 HSDB-GeoMean	7.170E-09 HSDB	1.528E-02 Calculated	6.277E-06 Calculated	1.188E-01	1.832E-07	3.634E+05	1.625E+05	3.317E+05
Methomyl	16752-77-5	78 SCDM	1.2946 SCDM	5.800E+04 SCDM	2.15E+00 SCDM	3.800E-02 SCDM	4.610E-02 CHEM8	6.070E-06 CHEM8	1.290E-02	9.383E-03	1.606E+03	7.181E+02	1.466E+03
Methoxy-5-nitroaniline, 2-	99-59-2	118 HSDB	1.2068 HSDB	2.210E+03 HSDB	9.72E+01 HSDB-GeoMean	1.250E-08 HSDB	3.617E-02 Calculated	7.849E-06 Calculated	5.832E-01	7.438E-08	5.703E+05	2.551E+05	5.206E+05
Methoxychlor	72-43-5	87 SCDM	1.41 SCDM	4.500E-02 SCDM	1.00E+05 SCDM	1.580E-05 SCDM	1.560E-02 CHEM8	4.460E-06 CHEM8	6.000E+02	9.444E-10	5.061E+06	2.263E+06	4.620E+06
Methyl acetate	79-20-9	-98 HSDB	0.9342 HSDB	2.430E+05 HSDB	3.00E+01 HSDB	5.110E-04 HSDB	1.040E-01 CHEM8	1.000E-05 CHEM8	1.800E-01	4.090E-04	7.691E+03	3.439E+03	7.020E+03
Methyl acrylate	96-33-3	-76.5 HSDB	0.9561 HSDB	5.590E+04 HSDB-GeoMean	1.10E+01 HSDB	1.970E-04 HSDB	9.760E-02 CHEM8	1.020E-05 CHEM8	6.600E-02	2.511E-04	9.816E+03	4.390E+03	8.960E+03
Methyl isobutyl ketone [or MIBK]	108-10-1	-84 SCDM	0.7978 SCDM	1.900E+04 SCDM	1.50E+01 SCDM	1.400E-04 SCDM	7.500E-02 CHEM8	7.800E-06 CHEM8	9.000E-02	1.203E-04	1.418E+04	6.342E+03	1.295E+04
Methyl methacrylate	80-62-6	-48 SCDM	0.944 SCDM	1.500E+04 SCDM	2.25E+01 SCDM	3.370E-04 SCDM	7.700E-02 CHEM8	8.600E-06 CHEM8	1.350E-01	2.388E-04	1.007E+04	4.501E+03	9.189E+03

Table 4 - Technical Report

Chemical Specific Values

Contaminant	Values from Reference Sources								Calculated Values ***				
											Resident	Child	Industrial
	CAS#	MP	d (g/cm3)	S (mg/L)	Koc(L/kg)	H(atm-m3/mol)	Di(cm2/s)**	Dw(cm2/s)**	Kd(L/kg)*	Da(cm2/s)	Volatilization Factor (m3/kg)		
Methyl parathion [or Parathion, methyl]	298-00-0	37.5 SCDM	1.358 SCDM	5.500E+01 SCDM	7.00E+02 SCDM	1.000E-07 SCDM	2.000E-02 CHEM8	5.910E-06 CHEM8	4.200E+00	9.741E-09	1.576E+06	7.048E+05	1.439E+06
Methyl tert-butyl ether [or MTBE]	1634-04-4	-109 HSDB	0.7405 HSDB	5.100E+04 HSDB	1.12E+01 HSDB	5.870E-04 HSDB	1.024E-01 CHEM8	1.050E-05 CHEM8	6.720E-02	7.648E-04	5.624E+03	2.515E+03	5.134E+03
Methyl-4-chlorophenoxy acetic acid, 2-	94-74-6	120 HSDB	1.56 HSDB	8.250E+02 HSDB	5.38E+01 HSDB-GeoMean	1.330E-09 HSDB	2.555E-02 Calculated	8.237E-06 Calculated	3.228E-01	1.238E-07	4.420E+05	1.977E+05	4.035E+05
Methylaniline, 2-	95-53-4	-14.7 HSDB	1.008 HSDB	1.660E+04 HSDB	5.94E+01 HSDB-GeoMean	2.720E-06 HSDB	7.197E-02 Calculated	9.233E-06 Calculated	3.564E-01	1.065E-06	1.507E+05	6.739E+04	1.376E+05
Methylene bis(2-chloroaniline), 4,4-	101-14-4	110 HSDB	1.44 HSDB	1.390E+01 SCDM	2.25E+01 SCDM	4.060E-11 SCDM	1.990E-02 CHEM8	5.770E-06 CHEM8	1.350E-01	1.559E-07	3.940E+05	1.762E+05	3.596E+05
Methylene bromide	74-95-3	-52.5 SCDM	2.4969 SCDM	1.190E+04 SCDM	2.29E+01 SCDM	8.610E-04 SCDM	2.533E-02 Calculated	1.190E-05 Calculated	1.374E-01	1.955E-04	1.113E+04	4.975E+03	1.016E+04
Methylene chloride	75-09-2	-95.1 SCDM	1.3266 SCDM	1.300E+04 SCDM	1.18E+01 SCDM	2.190E-03 SCDM	1.010E-01 CHEM8	1.170E-05 CHEM8	7.080E-02	2.573E-03	3.066E+03	1.371E+03	2.799E+03
Methylnaphthalene, 1-	90-12-0	-22 HSDB	1.0202 HSDB	2.580E+01 HSDB	2.66E+03 HSDB	2.600E-04 HSDB	4.800E-02 CHEM8	7.840E-06 CHEM8	1.596E+01	1.700E-06	1.193E+05	5.334E+04	1.089E+05
Methylnaphthalene, 2-	91-57-6	34.4 SCDM	1.0058 SCDM	2.460E+01 SCDM	7.50E+03 SCDM	5.180E-04 SCDM	4.800E-02 CHEM8	7.840E-06 CHEM8	4.500E+01	1.205E-06	1.417E+05	6.336E+04	1.293E+05
Methylphenol, 2- [or o-Cresol]	95-48-7	29.8 SCDM	1.135 SCDM	2.600E+04 SCDM	9.00E+01 SCDM	1.200E-06 SCDM	7.400E-02 CHEM8	8.300E-06 CHEM8	5.400E-01	3.854E-07	2.505E+05	1.120E+05	2.287E+05
Methylphenol, 3- [or m-Cresol]	108-39-4	11.8 SCDM	1.0341 SCDM	2.270E+04 SCDM	8.50E+01 SCDM	8.650E-07 SCDM	7.400E-02 CHEM8	1.000E-05 CHEM8	5.100E-01	3.333E-07	2.694E+05	1.205E+05	2.459E+05
Methylphenol, 4- [or p-Cresol]	106-44-5	35.5 SCDM	1.0185 SCDM	2.150E+04 SCDM	8.50E+01 SCDM	7.920E-07 SCDM	7.400E-02 CHEM8	1.000E-05 CHEM8	5.100E-01	3.139E-07	2.776E+05	1.241E+05	2.534E+05
Metolachlor	51218-45-2	-9.99 HSDB est.	1.12 HSDB	5.300E+02 HSDB	1.76E+02 HSDB-GeoMean	9.000E-09 HSDB	1.896E-02 Calculated	5.483E-06 Calculated	1.056E+00	3.043E-08	8.916E+05	3.987E+05	8.139E+05
Metribuzin	21087-64-9	126 SCDM	1.31 SCDM	1.200E+03 SCDM	4.70E+01 SCDM	8.780E-02 SCDM	2.533E-02 Calculated	7.129E-06 Calculated	2.820E-01	4.568E-03	2.301E+03	1.029E+03	2.101E+03
Mevinphos	7786-34-7	12 Howard&Meylan	1.25 HSDB	6.000E+05 HSDB	5.09E+01 HSDB-GeoMean	3.900E-09 HSDB	2.440E-02 Calculated	6.747E-06 Calculated	3.054E-01	1.062E-07	4.774E+05	2.135E+05	4.358E+05
Molinate	2212-67-1	-9.99 HSDB est.	1.5156 HSDB	8.800E+02 HSDB	1.11E+02 HSDB-GeoMean	4.100E-06 HSDB	2.833E-02 Calculated	8.434E-06 Calculated	6.660E-01	4.011E-07	2.456E+05	1.098E+05	2.242E+05
Molybdenum	7439-98-7	2610 SCDM	10.2 SCDM	0.000 HSDB	NA	NA	3.040E-01 Calculated	3.956E-05 Calculated	2.000E+01 SCDM	1.249E-08	#	#	#

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Contaminant	Values from Reference Sources								Calculated Values ***				
											Resident	Child	Industrial
	CAS#	MP	d (g/cm3)	S (mg/L)	Koc(L/kg)	H(atm-m3/mol)	Di(cm2/s)**	Dw(cm2/s)**	Kd(L/kg)*	Da(cm2/s)	Volatilization Factor (m3/kg)		
Naled	300-76-5	26.9 HSDB-GeoMean	1.96 HSDB	2.000E+03 HSDB	1.11E+02 HSDB-GeoMean	5.000E-07 HSDB	1.004E-02 Calculated	6.430E-06 Calculated	6.660E-01	6.760E-08	5.982E+05	2.675E+05	5.461E+05
Naphthalene	91-20-3	80.2 SCDM	1.0253 SCDM	3.100E+01 SCDM	2.00E+03 SCDM	4.830E-04 SCDM	5.900E-02 CHEM8	7.500E-06 CHEM8	1.200E+01	5.147E-06	6.856E+04	3.066E+04	6.259E+04
Nickel	7440-02-0	1455 SCDM	8.9 SCDM	0.000 HSDB	NA	NA	3.933E-01 Calculated	4.895E-05 Calculated	6.500E+01 SCDM	4.773E-09	#	#	#
Nitrate	14797-55-8	308 HSDB	2.26 HSDB	9.210E+05 HSDB	NA	NA	2.434E-01 Calculated	2.081E-05 Calculated	0.000	1.321E-06	#	#	#
Nitrite	14797-65-0	271 HSDB	2.26 HSDB	6.670E+05 HSDB	NA	NA	3.001E-01 Calculated	2.489E-05 Calculated	0.000	1.580E-06	#	#	#
Nitroaniline, o-	88-74-4	71.2 SCDM	1.442 SCDM	2.950E+02 SCDM	6.50E+01 SCDM	1.810E-08 HSDB	4.359E-02 Calculated	9.828E-06 Calculated	3.900E-01	1.308E-07	4.300E+05	1.923E+05	3.925E+05
Nitroaniline, p-	100-01-6	147 SCDM	1.424 SCDM	7.280E+02 SCDM	2.35E+01 SCDM	2.070E-09 SCDM	4.730E-02 CHEM8	8.580E-06 CHEM8	1.410E-01	2.269E-07	3.265E+05	1.460E+05	2.981E+05
Nitrobenzene	98-95-3	5.7 SCDM	1.2037 SCDM	2.090E+03 SCDM	6.50E+01 SCDM	2.400E-05 SCDM	7.600E-02 CHEM8	8.600E-06 CHEM8	3.900E-01	8.239E-06	5.419E+04	2.423E+04	4.946E+04
Nitrophenol, 4-	100-02-7	113.8 SCDM	1.479 SCDM	1.160E+04 SCDM	4.89E+01 SCDM	4.150E-10 SCDM	4.300E-02 CHEM8	9.610E-06 CHEM8	2.934E-01	1.552E-07	3.948E+05	1.766E+05	3.604E+05
Nitroso-di-ethylamine, N-	55-18-5	-10 Howard&Meylan	0.9422 SCDM	9.300E+04 SCDM	2.95E+00 SCDM	3.630E-06 SCDM	7.915E-02 Calculated	9.125E-06 Calculated	1.770E-02	5.823E-06	6.446E+04	2.883E+04	5.884E+04
Nitroso-di-n-butylamine, N-	924-16-3	2.1 Howard&Meylan	0.9009 HSDB	1.270E+03 SCDM	2.35E+02 SCDM	3.160E-04 SCDM	4.474E-02 Calculated	6.831E-06 Calculated	1.410E+00	2.045E-05	3.440E+04	1.538E+04	3.140E+04
Nitroso-di-n-propylamine, N-	621-64-7	7 Howard&Meylan	0.916 HSDB	1.000E+04 HSDB	1.31E+02 HSDB	1.400E-06 HSDB	5.758E-02 Calculated	7.755E-06 Calculated	7.860E-01	2.543E-07	3.084E+05	1.379E+05	2.816E+05
Nitroso-dimethylamine, N-	62-75-9	-9.99 HSDB est.	1.0059 SCDM	1.000E+06 SCDM	2.75E-01 SCDM	1.200E-06 SCDM	1.126E-01 CHEM8	1.240E-05 CHEM8	1.650E-03	3.678E-06	8.110E+04	3.627E+04	7.404E+04
Nitroso-diphenylamine, N-	86-30-6	66.5 SCDM	1.23 ATSDR	3.510E+01 SCDM	1.30E+03 SCDM	5.000E-06 SCDM	2.886E-02 Calculated	7.193E-06 Calculated	7.800E+00	4.569E-08	7.277E+05	3.254E+05	6.643E+05
Nitroso-N-methylethylamine, N-	10595-95-6	-9.99 HSDB est.	0.9448 HSDB	1.970E+04 SCDM	7.50E-01 SCDM	1.400E-06 HSDB	1.346E-01 Calculated	9.989E-06 Calculated	4.500E-03	4.544E-06	7.297E+04	3.263E+04	6.661E+04
Nitrotoluene, m-	99-08-1	15.5 HSDB	1.1581 HSDB	4.990E+02 HSDB-GeoMean	1.43E+02 HSDB	7.500E-05 HSDB	4.950E-02 CHEM8	8.220E-06 CHEM8	8.580E-01	8.514E-06	5.330E+04	2.384E+04	4.866E+04
Nitrotoluene, o-	88-72-2	-9.5 HSDB	1.1622 HSDB	6.250E+02 HSDB-GeoMean	2.30E+02 HSDB-GeoMean	5.600E-05 HSDB	4.760E-02 CHEM8	8.670E-06 CHEM8	1.380E+00	3.970E-06	7.806E+04	3.491E+04	7.126E+04

Table 4 - Technical Report

Chemical Specific Values

Contaminant	Values from Reference Sources								Calculated Values ***				
	CAS#	MP	d (g/cm3)	S (mg/L)	Koc(L/kg)	H(atm-m3/mol)	Di(cm2/s)**	Dw(cm2/s)**	Kd(L/kg)*	Da(cm2/s)	Resident Volatilization Factor (m3/kg)	Child Volatilization Factor (m3/kg)	Industrial Volatilization Factor (m3/kg)
Nitrotoluene, p-	99-99-0	51.6 SCDM	1.1038 SCDM	9.360E+01 SCDM	2.30E+02 SCDM	2.090E-07 SCDM	4.780E-02 CHEM8	8.610E-06 CHEM8	1.380E+00	5.168E-08	6.842E+05	3.060E+05	6.246E+05
Octamethylpyrophosphoramide	152-16-9	17 SCDM	1.1343 SCDM	1.000E+06 SCDM	3.10E-01 SCDM	6.300E-17 HSDB	1.864E-02 Calculated	5.496E-06 Calculated	1.860E-03	3.425E-07	2.658E+05	1.188E+05	2.426E+05
Oxamyl	23135-22-0	109 HSDB-GeoMean	0.98 HSDB	2.800E+05 HSDB	8.89E+00 HSDB	2.370E-10 HSDB	2.811E-02 Calculated	5.908E-06 Calculated	5.334E-02	2.447E-07	3.144E+05	1.406E+05	2.870E+05
Paraquat	1910-42-5	300 Merck	1.24 HSDB	1.000E+06 Merck	1.24E+05 HSDB-GeoMean	1.000E-09 HSDB	3.121E-02 Calculated	7.504E-06 Calculated	7.440E+02	6.411E-11	1.943E+07	8.688E+06	1.773E+07
Parathion	56-38-2	6.1 SCDM	1.2681 SCDM	6.540E+00 SCDM	6.00E+03 SCDM	5.650E-07 SCDM	1.700E-02 CHEM8	5.790E-06 CHEM8	3.600E+01	1.599E-09	3.889E+06	1.739E+06	3.550E+06
PCBs [Aroclor miture]	1336-36-3	357.1 HSDB-GeoMean	1.44 HSDB	7.000E-02 SCDM	8.50E+05 SCDM	2.600E-03 SCDM	1.750E-02 CHEM8	8.000E-06 CHEM8	5.100E+03	1.950E-08	1.114E+06	4.981E+05	1.017E+06
Pebulate	1114-71-2	-9.99 HSDB est.	0.9458 HSDB	6.000E+01 HSDB	5.05E+02 HSDB-GeoMean	1.600E-04 HSDB	3.149E-02 Calculated	6.050E-06 Calculated	3.030E+00	3.528E-06	8.281E+04	3.703E+04	7.560E+04
Pendimethalin	40487-42-1	56.5 HSDB	1.19 HSDB	3.000E-01 HSDB	2.40E+03 HSDB	5.890E-06 HSDB-GeoMean	1.863E-02 Calculated	5.716E-06 Calculated	1.440E+01	1.903E-08	1.127E+06	5.042E+05	1.029E+06
Pentachlorobenzene	608-93-5	86 SCDM	1.8342 SCDM	1.330E+00 SCDM	1.74E+04 SCDM	7.100E-04 SCDM	5.700E-02 CHEM8	6.300E-06 CHEM8	1.044E+02	8.463E-07	1.691E+05	7.561E+04	1.543E+05
Pentachloronitrobenzene	82-68-8	144 SCDM	1.718 SCDM	5.500E-01 SCDM	3.65E+04 SCDM	3.800E-04 SCDM	1.590E-02 CHEM8	6.140E-06 CHEM8	2.190E+02	6.041E-08	6.328E+05	2.830E+05	5.777E+05
Pentachlorophenol	87-86-5	174 SCDM	1.978 SCDM	1.950E+03 SCDM	5.92E+02 SCDM	2.440E-08 SCDM	5.600E-02 CHEM8	6.100E-06 CHEM8	3.552E+00	1.142E-08	1.455E+06	6.509E+05	1.329E+06
Permethrin	52645-53-1	34.5 HSDB	1.23 HSDB-GeoMean	1.170E-01 HSDB-GeoMean	6.31E+04 HSDB	2.510E-08 HSDB	1.209E-02 Calculated	4.783E-06 Calculated	3.786E+02	8.193E-11	1.718E+07	7.685E+06	1.569E+07
Phenanthrene	85-01-8	99.2 SCDM	0.98 SCDM	1.150E+00 SCDM	2.95E+04 SCDM	2.330E-05 SCDM	3.680E-02 Calculated	6.690E-06 Calculated	1.770E+02	1.082E-08	1.495E+06	6.688E+05	1.365E+06
Phenol	108-95-2	40.9 SCDM	1.0545 SCDM	8.280E+04 SCDM	2.85E+01 SCDM	3.970E-07 SCDM	8.200E-02 CHEM8	9.100E-06 CHEM8	1.710E-01	4.756E-07	2.255E+05	1.009E+05	2.059E+05
Phenylenediamine, p-	106-50-3	146 HSDB	1.0096 Surrogate (d)	3.800E+04 HSDB	1.60E+01 HSDB	6.700E-10 HSDB	6.615E-02 CHEM8	9.930E-06 CHEM8	9.600E-02	3.221E-07	2.741E+05	1.226E+05	2.502E+05
Phenylphenol, 2-	90-43-7	56.5 HSDB	1.213 HSDB	7.000E+02 HSDB	4.38E+02 HSDB-GeoMean	5.230E-08 HSDB	3.552E-02 Calculated	7.817E-06 Calculated	2.628E+00	1.968E-08	1.109E+06	4.959E+05	1.012E+06
Phorate	298-02-2	-42.9 HSDB	1.16 SCDM	5.000E+01 SCDM	5.50E+03 SCDM	4.400E-06 HSDB	2.082E-02 Calculated	5.896E-06 Calculated	3.300E+01	7.176E-09	1.836E+06	8.211E+05	1.676E+06

Table 4 - Technical Report

Chemical Specific Values

Contaminant	Values from Reference Sources								Calculated Values ***				
											Resident	Child	Industrial
	CAS#	MP	d (g/cm3)	S (mg/L)	Koc(L/kg)	H(atm-m3/mol)	Di(cm2/s)**	Dw(cm2/s)**	Kd(L/kg)*	Da(cm2/s)	Volatilization Factor (m3/kg)		
Phosmet	732-11-6	71.9 HSDB	1.03 HSDB	2.320E+01 HSDB-GeoMean	7.98E+02 HSDB-GeoMean	8.380E-09 HSDB	1.713E-02 Calculated	4.876E-06 Calculated	4.788E+00	6.397E-09	1.945E+06	8.697E+05	1.775E+06
Phthalic anhydride	85-44-9	130.8 SCDM	1.527 SCDM	6.200E+03 SCDM	3.60E+01 HSDB	1.630E-08 SCDM	7.100E-02 CHEM8	8.600E-06 CHEM8	2.160E-01	1.808E-07	3.658E+05	1.636E+05	3.340E+05
Prometon	1610-18-0	91.5 HSDB	1.088 HSDB	7.500E+02 HSDB	4.69E+02 HSDB-GeoMean	9.100E-10 HSDB	2.584E-02 Calculated	6.189E-06 Calculated	2.814E+00	1.350E-08	1.339E+06	5.987E+05	1.222E+06
Prometryn	7287-19-6	119 HSDB	1.15 HSDB	4.800E+01 HSDB	5.14E+02 HSDB-GeoMean	1.300E-08 HSDB	2.304E-02 Calculated	6.139E-06 Calculated	3.084E+00	1.244E-08	1.394E+06	6.235E+05	1.273E+06
Propachlor	1918-16-7	71.4 HSDB-GeoMean	1.242 HSDB	6.130E+02 HSDB	1.89E+02 HSDB-GeoMean	1.090E-07 HSDB	2.637E-02 Calculated	6.955E-06 Calculated	1.134E+00	4.087E-08	7.694E+05	3.441E+05	7.024E+05
Propanil	709-98-8	87 HSDB	1.054 HSDB	2.250E+02 HSDB-GeoMean	1.81E+02 HSDB-GeoMean	4.500E-09 HSDB	2.736E-02 Calculated	6.191E-06 Calculated	1.086E+00	3.337E-08	8.515E+05	3.808E+05	7.773E+05
Propazine	139-40-2	213 HSDB	1.162 HSDB	6.600E+00 HSDB-GeoMean	2.66E+02 HSDB-GeoMean	1.330E-11 HSDB	2.439E-02 Calculated	6.357E-06 Calculated	1.596E+00	2.379E-08	1.008E+06	4.509E+05	9.205E+05
Propylene glycol	57-55-6	-59 HSDB	1.0361 CRC	1.000E+06 HSDB	4.60E-02 Surrogate (w)	1.310E-10 HSDB	9.300E-02 CHEM8	1.020E-05 CHEM8	2.760E-04	6.460E-07	1.935E+05	8.654E+04	1.767E+05
Propylene oxide	75-56-9	-112.13 HSDB	0.8304 HSDB	4.890E+05 HSDB-GeoMean	1.04E+01 HSDB-GeoMean	8.300E-05 HSDB	1.040E-01 CHEM8	1.000E-05 CHEM8	6.240E-02	1.160E-04	1.444E+04	6.457E+03	1.318E+04
Pydrin [or Fenvalerate]	51630-58-1	59.6 Howard&Meylan	1.17 HSDB	1.000E+00 HSDB	9.85E+03 HSDB-GeoMean	1.190E-07 HSDB	1.134E-02 Calculated	4.450E-06 Calculated	5.910E+01	5.270E-10	6.776E+06	3.030E+06	6.185E+06
Pyrene	129-00-0	151.2 SCDM	1.271 SCDM	1.350E-01 SCDM	1.05E+05 SCDM	1.100E-05 SCDM	2.770E-02 Calculated	7.248E-06 Calculated	6.300E+02	1.129E-09	4.629E+06	2.070E+06	4.225E+06
Pyridine	110-86-1	-41.6 SCDM	0.9819 SCDM	1.000E+06 SCDM	4.55E+00 SCDM	8.800E-06 SCDM	1.478E-01 Calculated	1.090E-05 Calculated	2.730E-02	2.285E-05	3.254E+04	1.455E+04	2.970E+04
Resmethrin	10453-86-8	45.5 HSDB	0.963 HSDB-GeoMean	1.000E+00 HSDB	1.41E+05 HSDB-GeoMean	5.560E-06 HSDB	1.632E-02 Calculated	4.505E-06 Calculated	8.460E+02	2.680E-10	9.500E+06	4.249E+06	8.672E+06
Ronnel	299-84-3	41 SCDM	1.44 SCDM	1.080E+00 SCDM	9.50E+04 SCDM	3.200E-05 HSDB	1.437E-02 Calculated	5.915E-06 Calculated	5.700E+02	1.827E-09	3.639E+06	1.627E+06	3.321E+06
Selenium	7782-49-2	217 SCDM	4.81 SCDM	0.000 HSDB	NA	NA	2.674E-01 Calculated	2.811E-05 Calculated	5.000E+00 SSG	3.499E-08	#	#	#
Silver	7440-22-4	962 SCDM	10.49 SCDM	0.000 HSDB	NA	NA	2.982E-02 Calculated	3.750E-05 Calculated	8.300E+00 SCDM	2.834E-08	#	#	#
Simazine	122-34-9	226 HSDB-GeoMean	1.33 HSDB	6.200E+00 HSDB	3.93E+02 HSDB-GeoMean	3.400E-09 SCDM	2.724E-02 Calculated	7.461E-06 Calculated	2.358E+00	1.935E-08	1.118E+06	5.000E+05	1.021E+06

Table 4 - Technical Report

Chemical Specific Values

Contaminant	Values from Reference Sources								Calculated Values ***				
											Resident	Child	Industrial
	CAS#	MP	d (g/cm3)	S (mg/L)	Koc(L/kg)	H(atm-m3/mol)	Di(cm2/s)**	Dw(cm2/s)**	Kd(L/kg)*	Da(cm2/s)	Volatilization Factor (m3/kg)		
Strontium	7440-24-6	769 SCDM	2.6 SCDM	0.000 HSDB	NA	NA	2.025E-01 Calculated	1.839E-05 Calculated	3.500E+01 SCDM	3.327E-09	#	#	#
Strychnine	57-24-9	287 SCDM	1.36 SCDM	1.600E+02 SCDM	8.00E+01 SCDM	7.600E-14 SCDM	1.404E-02 Calculated	5.582E-06 Calculated	4.800E-01	6.110E-08	6.292E+05	2.814E+05	5.744E+05
Styrene	100-42-5	-31 SCDM	0.906 SCDM	3.100E+02 SCDM	8.00E+02 SCDM	2.750E-03 SCDM	7.100E-02 CHEM8	8.000E-06 CHEM8	4.800E+00	8.667E-05	1.671E+04	7.471E+03	1.525E+04
Terbacil	5902-51-2	176 HSDB	1.34 HSDB	7.100E+02 HSDB	4.58E+01 HSDB-GeoMean	1.200E-10 HSDB	2.472E-02 Calculated	7.179E-06 Calculated	2.748E-01	1.216E-07	4.460E+05	1.995E+05	4.071E+05
Terbufos	13071-79-9	-29.2 HSDB	1.105 HSDB	1.500E+01 HSDB	2.40E+03 HSDB	2.400E-05 HSDB	1.869E-02 Calculated	5.386E-06 Calculated	1.440E+01	6.994E-08	5.881E+05	2.630E+05	5.369E+05
Tetrachlorobenzene, 1,2,4,5-	95-94-3	139.5 SCDM	1.858 SCDM	5.950E-01 SCDM 98	5.60E+03 HSDB	2.580E-03 SCDM	2.110E-02 CHEM8	8.750E-06 CHEM8	3.360E+01	3.528E-06	8.281E+04	3.703E+04	7.559E+04
Tetrachloroethane, 1,1,1,2-	630-20-6	-70.2 SCDM	1.5406 SCDM	1.100E+03 SCDM	1.45E+02 SCDM	2.420E-03 SCDM	3.257E-02 Calculated	9.098E-06 Calculated	8.700E-01	1.742E-04	1.179E+04	5.271E+03	1.076E+04
Tetrachloroethane, 1,1,2,2-	79-34-5	-43.8 SCDM	1.5953 SCDM	2.970E+03 SCDM	9.35E+01 SCDM	3.450E-04 SCDM	7.100E-02 CHEM8	7.900E-06 CHEM8	5.610E-01	8.070E-05	1.731E+04	7.743E+03	1.581E+04
Tetrachloroethene [or PCE]	127-18-4	-22.3 SCDM	1.6227 SCDM	2.000E+02 SCDM	1.55E+02 SCDM	1.840E-02 SCDM	7.200E-02 CHEM8	8.200E-06 CHEM8	9.300E-01	2.467E-03	3.131E+03	1.400E+03	2.858E+03
Tetrachlorophenol, 2,3,4,6-	58-90-2	70 SCDM	1.839 HSDB	1.000E+02 SCDM	2.80E+02 SCDM	4.390E-06 SCDM	2.170E-02 CHEM8	7.100E-06 CHEM8	1.680E+00	1.422E-07	4.124E+05	1.844E+05	3.765E+05
Tetraethyl dithiopyrophosphate	3689-24-5	88 HSDB	1.196 SCDM	2.500E+01 SCDM	7.40E+02 HSDB	2.900E-06 HSDB	1.500E-02 CHEM8	5.450E-06 CHEM8	4.440E+00	2.855E-08	9.205E+05	4.117E+05	8.403E+05
Thiram	137-26-8	155.6 SCDM	1.29 HSDB	3.000E+01 SCDM	6.70E+02 HSDB	1.820E-07 HSDB	2.196E-02 Calculated	6.592E-06 Calculated	4.020E+00	1.228E-08	1.404E+06	6.278E+05	1.281E+06
Tin	7440-31-5	231.9 HSDB	5.75 HSDB	0.000 HSDB	NA	NA	3.155E-02 Calculated	2.468E-05 Calculated	0.000	1.567E-06	#	#	#
Toluene	108-88-3	-94.9 SCDM	0.8669 SCDM	5.260E+02 SCDM	1.82E+02 SCDM	6.640E-03 SCDM	8.700E-02 CHEM8	8.600E-06 CHEM8	1.092E+00	1.015E-03	4.883E+03	2.184E+03	4.457E+03
Toluidine, p-	106-49-0	43.7 SCDM	0.9616 SCDM	7.820E+02 SCDM	2.40E+01 SCDM	7.220E-06 HSDB	6.976E-02 CHEM8	9.430E-06 CHEM8	1.440E-01	4.753E-06	7.134E+04	3.190E+04	6.512E+04
Toxaphene	8001-35-2	76.5 HSDB-GeoMean	1.65 HSDB	7.400E-01 SCDM	2.55E+05 SCDM	6.000E-06 SCDM	1.160E-02 CHEM8	4.340E-06 CHEM8	1.530E+03	1.174E-10	1.436E+07	6.421E+06	1.311E+07
Triallate	2303-17-5	29.5 HSDB-GeoMean	1.273 HSDB	4.000E+00 HSDB	2.22E+03 HSDB	1.930E-05 HSDB	1.630E-02 Calculated	5.674E-06 Calculated	1.332E+01	5.390E-08	6.699E+05	2.996E+05	6.116E+05

Table 4 - Technical Report

Chemical Specific Values

Contaminant	Values from Reference Sources								Calculated Values ***				
	CAS#	MP	d (g/cm3)	S (mg/L)	Koc(L/kg)	H(atm-m3/mol)	Di(cm2/s)**	Dw(cm2/s)**	Kd(L/kg)*	Da(cm2/s)	Resident Volatilization Factor (m3/kg)	Child Volatilization Factor (m3/kg)	Industrial Volatilization Factor (m3/kg)
Tributyltin oxide	56-35-9	-9.99 HSDB est.	1.17 HSDB	8.940E+00 HSDB-GeoMean	9.08E+04 HSDB	1.260E-07 HSDB	7.370E-03 Calculated	3.607E-06 Calculated	5.448E+02	4.575E-11	2.300E+07	1.028E+07	2.099E+07
Trichloro-1,2,2-trifluoroethane, 1,1,2- [or CFC 113]	76-13-1	-35 SCDM	1.5635 SCDM	1.700E+02 SCDM	3.80E+02 SCDM	4.810E-01 SCDM	2.880E-02 CHEM8	8.070E-06 CHEM8	2.280E+00	4.950E-03	2.211E+03	9.887E+02	2.018E+03
Trichloroacetic acid	76-03-9	57.5 HSDB	1.6126 HSDB	6.300E+06 HSDB-GeoMean	1.00E+00 HSDB	2.400E-08 HSDB	3.310E-02 Calculated	9.502E-06 Calculated	6.000E-03	5.855E-07	2.033E+05	9.091E+04	1.856E+05
Trichlorobenzene, 1,2,3-	87-61-6	52.6 HSDB	1.69 HSDB	1.630E+01 HSDB	1.55E+03 HSDB-GeoMean	1.250E-03 HSDB	3.000E-02 CHEM8	8.230E-06 CHEM8	9.300E+00	8.711E-06	5.270E+04	2.357E+04	4.811E+04
Trichlorobenzene, 1,2,4-	120-82-1	17 SCDM	1.459 SCDM	3.460E+01 SCDM	1.78E+03 SCDM	1.420E-03 SCDM	3.000E-02 CHEM8	8.230E-06 CHEM8	1.068E+01	8.628E-06	5.295E+04	2.368E+04	4.834E+04
Trichlorobenzene, 1,3,5-	108-70-3	63.5 HSDB-GeoMean	1.3865 MacKay	5.800E+00 HSDB	9.91E+03 HSDB-GeoMean	1.900E-03 HSDB	3.000E-02 CHEM8	8.230E-06 CHEM8	5.946E+01	2.091E-06	1.076E+05	4.810E+04	9.819E+04
Trichloroethane, 1,1,1- [or Methyl chloroform]	71-55-6	-30.4 SCDM	1.339 SCDM	1.330E+03 SCDM	1.10E+02 SCDM	1.720E-02 SCDM	7.800E-02 CHEM8	8.800E-06 CHEM8	6.600E-01	3.280E-03	2.716E+03	1.215E+03	2.479E+03
Trichloroethane, 1,1,2-	79-00-5	-36.6 SCDM	1.4397 SCDM	4.420E+03 SCDM	5.00E+01 SCDM	9.130E-04 SCDM	7.800E-02 CHEM8	8.800E-06 CHEM8	3.000E-01	3.823E-04	7.955E+03	3.558E+03	7.262E+03
Trichloroethene [or TCE]	79-01-6	-84.7 SCDM	1.4642 SCDM	1.100E+03 SCDM	1.66E+02 SCDM	1.030E-02 SCDM	7.900E-02 CHEM8	9.100E-06 CHEM8	9.960E-01	1.512E-03	4.001E+03	1.789E+03	3.652E+03
Trichlorofluoromethane	75-69-4	-111.1 SCDM	1.49 CHEM8	1.100E+03 SCDM	1.20E+02 SCDM	9.700E-02 SCDM	8.700E-02 CHEM8	9.700E-06 CHEM8	7.200E-01	1.172E-02	1.437E+03	6.425E+02	1.312E+03
Trichlorophenol, 2,4,5-	95-95-4	69 SCDM	1.678 HSDB	1.200E+03 SCDM	1.60E+03 SCDM	4.330E-06 SCDM	2.910E-02 CHEM8	7.030E-06 CHEM8	9.600E+00	3.298E-08	8.565E+05	3.830E+05	7.819E+05
Trichlorophenol, 2,4,6-	88-06-2	69 SCDM	1.4901 SCDM	8.000E+02 SCDM	3.81E+02 SCDM	7.790E-06 SCDM	3.180E-02 CHEM8	6.250E-06 CHEM8	2.286E+00	2.434E-07	3.153E+05	1.410E+05	2.878E+05
Trichlorophenoxy acetic acid, 2,4,5-	93-76-5	153 SCDM	1.8 HSDB	2.680E+02 SCDM	3.41E+01 SCDM	8.680E-09 SCDM	1.745E-02 Calculated	7.763E-06 Calculated	2.046E-01	1.629E-07	3.854E+05	1.724E+05	3.518E+05
Trichlorophenoxy propionic acid [or Silvex]	93-72-1	181.6 HSDB	1.2085 HSDB	1.400E+02 HSDB	2.60E+03 HSDB	9.060E-09 Howard&Meylan	1.940E-02 CHEM8	5.830E-06 CHEM8	1.560E+01	2.382E-09	3.187E+06	1.425E+06	2.909E+06
Trichloropropane, 1,2,3-	96-18-4	-14.7 SCDM	1.3889 SCDM	1.750E+03 SCDM	7.25E+01 SCDM	4.090E-04 SCDM	7.100E-02 CHEM8	7.900E-06 CHEM8	4.350E-01	1.180E-04	1.432E+04	6.404E+03	1.307E+04
Trifluralin	1582-09-8	49 SCDM	1.15 CHEM8	8.110E+00 SCDM	1.95E+04 SCDM	2.640E-05 SCDM	1.493E-02 CHEM8	5.040E-06 CHEM8	1.170E+02	7.626E-09	1.781E+06	7.965E+05	1.626E+06
Trimethyl phosphate	512-56-1	-46 HSDB	1.2144 HSDB	5.000E+05 HSDB	6.20E+00 HSDB	7.200E-09 HSDB	4.607E-02 Calculated	8.792E-06 Calculated	3.720E-02	4.121E-07	2.423E+05	1.084E+05	2.212E+05

Table 4 - Technical Report
Chemical Specific Values

Contaminant	Values from Reference Sources								Calculated Values ***				
											Resident	Child	Industrial
	CAS#	MP	d (g/cm3)	S (mg/L)	Koc(L/kg)	H(atm-m3/mol)	Di(cm2/s)**	Dw(cm2/s)**	Kd(L/kg)*	Da(cm2/s)	Volatilization Factor (m3/kg)		
Trimethylbenzene, 1,2,3-	526-73-8	-43.8 HSDB	0.8761 HSDB	5.700E+01 HSDB	7.20E+02 HSDB	6.160E-03 HSDB	6.400E-02 CHEM8	7.990E-06 CHEM8	4.320E+00	1.928E-04	1.120E+04	5.010E+03	1.023E+04
Trimethylbenzene, 1,2,4-	95-63-6	-43.8 HSDB	0.8761 HSDB	5.700E+01 HSDB	7.20E+02 HSDB	6.160E-03 HSDB	6.543E-02 Calculated	7.922E-06 Calculated	4.320E+00	1.971E-04	1.108E+04	4.955E+03	1.011E+04
Trimethylbenzene, 1,3,5-	108-67-8	-44.8 HSDB	0.8637 HSDB	3.100E+01 HSDB-GeoMean	6.60E+02 HSDB	8.770E-03 HSDB	6.020E-02 CHEM8	8.670E-06 CHEM8	3.960E+00	2.794E-04	9.305E+03	4.162E+03	8.495E+03
Trinitrobenzene, 1,3,5-	99-35-4	121.5 SCDM	1.4775 SCDM	3.500E+02 SCDM	1.45E+01 SCDM	1.600E-08 SCDM	2.417E-02 Calculated	7.688E-06 Calculated	8.700E-02	2.655E-07	3.019E+05	1.350E+05	2.756E+05
Trinitrotoluene, 2,4,6-	118-96-7	80.1 SCDM	1.654 SCDM	1.240E+02 SCDM	3.75E+01 SCDM	4.870E-09 SCDM	2.450E-02 CHEM8	6.360E-06 CHEM8	2.250E-01	1.250E-07	4.399E+05	1.967E+05	4.015E+05
TRPH	NOCAS#	999	NA	6.500E+01 TPHCWG	1.58E+03 TPHCWG	1.170E-02 TPHCWG	1.000E-01 TPHCWG	1.000E-05 TPHCWG	9.480E+00	2.643E-04	9.568E+03	4.279E+03	8.734E+03
Uranium, natural	7440-61-1	1132.3 SCDM	19.05 SCDM	0.000 HSDB	NA	NA	7.758E-03 Calculated	3.336E-05 Calculated	4.500E+02 SCDM	4.705E-10	#	#	#
Vanadium	7440-62-2	1917 SCDM	6.11 SCDM	0.000 HSDB	NA	NA	3.857E-01 Calculated	4.253E-05 Calculated	1.000E+03 SCDM	2.699E-10	#	#	#
Vernam	1929-77-7	-9.99 HSDB est.	0.954 HSDB	1.070E+02 HSDB	2.50E+02 HSDB-GeoMean	3.050E-05 HSDB	3.137E-02 Calculated	6.082E-06 Calculated	1.500E+00	1.330E-06	1.349E+05	6.031E+04	1.231E+05
Vinyl acetate	108-05-4	-93.2 SCDM	0.9317 SCDM	2.000E+04 SCDM	5.00E+00 SCDM	5.110E-04 SCDM	8.500E-02 CHEM8	9.200E-06 CHEM8	3.000E-02	7.087E-04	5.843E+03	2.613E+03	5.334E+03
Vinyl chloride	75-01-4	-153.7 SCDM	0.9106 SCDM	2.760E+03 SCDM	1.86E+01 SCDM	2.700E-02 SCDM	1.703E-01 Calculated	1.200E-05 Calculated	1.116E-01	2.384E-02	1.007E+03	4.505E+02	9.195E+02
Xylenes, total	1330-20-7	-19.86 ATSDR	0.864 HSDB	1.300E+02 ATSDR	1.53E+02 HSDB-GeoMean	7.000E-03 HSDB	7.140E-02 CHEM8	9.340E-06 CHEM8	9.180E-01	1.018E-03	4.874E+03	2.180E+03	4.450E+03
Zinc	7440-66-6	419.5 SCDM	7.14 SCDM	0.000 HSDB	NA	NA	3.446E-01 Calculated	4.020E-05 Calculated	6.200E+01 SCDM	4.109E-09	#	#	#
Zinc phosphide	1314-84-7	420 SCDM	4.55 SCDM	0.000 HSDB	NA	NA	1.162E-02 Calculated	1.346E-05 Calculated	6.200E+01 SCDM	1.376E-09	#	#	#
Zineb	12122-67-7	100 Pest.Man.	1.74 HSDB	1.000E+01 HSDB	1.23E+03 HSDB	2.900E-09 Calculated	1.604E-02 Calculated	7.266E-06 Calculated	7.380E+00	6.180E-09	1.979E+06	8.848E+05	1.806E+06

Table 4 - Technical Report

Chemical Specific Values

Contaminant	Values from Reference Sources								Calculated Values ***				
	CAS#	MP	d (g/cm3)	S (mg/L)	Koc(L/kg)	H(atm-m3/mol)	Di(cm2/s)**	Dw(cm2/s)**	Kd(L/kg)*	Da(cm2/s)	Resident Volatilization Factor (m3/kg)	Child Volatilization Factor (m3/kg)	Industrial Volatilization Factor (m3/kg)

* Kd values listed are calculated as Koc multiplied by an Foc of 0.006 (for volatilization) except in cases where an inorganic Kd values, if available, is used. For Leachability calculation, Kd should be calculated as Koc multiplied by an Foc of 0.002.

** For most compounds the diffusion coefficients in air (Di) and water (Dw) were taken from the values listed in CHEMDAT8 Appendix C. When values were not available from this source, Di and Dw were calculated using equations 2-5 (Di) and 2-6 (Dw) from the documentation for the CHEMDAT8 database.

*** All calculations are carried out without intermediate rounding, Da values have been rounded to two significant figures and VF values have been rounded to three significant figures for presentation in this Table.

N/A = Not available at time of rule adoption

= Volatilization factors not relevant for these compounds

Reference sources for chemical/physical data:

SCDM = SuperfundChemical Data Matrix

SSG = Soil Screening Guidance for Superfund - Note: The SSG leachability value was calculated using a Kd value different than reported in SCDM

HSDB = Hazardous Substances Data Bank

HSDB-GeoMean = A range of values was reported in HSDB. The value shown is the geometric mean of these values.

Chem8 = CHEMDAT8 Database (EPA/453/C-94080B)

Calculated= - Density estimated using Girolami's Method as illustrated in: Baum, E.J. Chemical Propety Estimation, 1998
- Henery' Law Constants (HLC) estimated using equation 68 [HLC = (VP)(M)/(S)] in the USEPA SSG, 1996

ATSDR = Agency for Toxic Substances and Disease Registry Toxicant Profiles

CRC = CRC Handbook of Chemistry and Physics, 75th edition, 1994

Howard = Howard, P.H. Handbook of Environmental Fate and Exposure Data for Organic Chemicals, Volumes I-V, 1989

Howard and Meylan = Howard, P.H. and Meylan, W.M. (eds.) Handbook of Physical properties of Organic Chemicals , 1997

MacKay = MaKay, D., et al. Illustrated Handbook of Physical-Chemical Properties

Merck = The Merck Index, 11th edition, 1989

Pest.Man. = Worthing, C.R. (ed.) The Pesticide Manual, 8th Edition, 1987

Verschueren = Verschueren, K. Handbook of Environmental Data on Organic Chemicals, 3rd Edition, 1996

Versch. est., HSDB est., ATSDR est., = For MP: If an exact MP for a chemical was not found in any of the reference sources , but a source listed it as a liquid, a default MP of -9.9 degrees C was assigned.

Surrogate (a): Surrogate density based on benzo(a)pyrene

Surrogate (b): Surrogate density based on 2,4-dichlorophenol

Surrogate (c): Surrogate density based on hexachlorocyclohexane, beta

Surrogate (d): Surrogate density based on phenylenediamine, m

Table 5a - Technical Report

Sources and Derivation of Toxicity Values Used in Calculations for Carcinogens

Contaminant	GI Absorption	Cancer Class	OSF 1/(mg/kg/day)	ISF 1/(mg/kg/day)	DSF 1/(mg/kg/day)
Acephate	0.5 *Region IV*	C	8.700E-03 *IRIS*	1.740E-02 *extrapolated*	1.740E-02 *extrapolated*
Acrylamide	0.5 *Region IV*	B2	4.500E+00 *IRIS*	4.550E+00 *extrapolated**	9.000E+00 *extrapolated*
Acrylonitrile	0.8 *Region IV*	B1	5.400E-01 *IRIS*	2.380E-01 *extrapolated**	6.750E-01 *extrapolated*
Alachlor	0.8 *Region IV*	B2	8.000E-02 *HEAST*	1.000E-01 *extrapolated*	1.000E-01 *extrapolated*
Aldrin	1 *HSDB*	B2	1.700E+01 *IRIS*	1.715E+01 *extrapolated**	1.700E+01 *extrapolated*
Aniline	0.5 *Region IV*	B2	5.700E-03 *IRIS*	1.140E-02 *extrapolated*	1.140E-02 *extrapolated*
Arsenic	0.95 *ATSDR*	A	1.500E+00 *IRIS*	1.505E+01 *extrapolated**	1.579E+00 *extrapolated*
Atrazine	0.5 *Region IV*	C	2.220E-01 *HEAST*	4.440E-01 *extrapolated*	4.440E-01 *extrapolated*
Azobenzene	0.5 *Region IV*	B2	1.100E-01 *IRIS*	1.085E-01 *extrapolated**	2.200E-01 *extrapolated*
Benzene	0.9 *ATSDR*	A	2.900E-02 *IRIS*	2.730E-02 *extrapolated**	3.222E-02 *extrapolated*
Benzo(a)anthracene	0.5 *ATSDR*	B2	7.300E-01 *NCEA*	1.460E+00 *extrapolated*	1.460E+00 *extrapolated*
Benzo(a)pyrene	0.5 *ATSDR*	B2	7.300E+00 *IRIS*	3.100E+00 *NCEA*	1.460E+01 *extrapolated*
Benzo(b)fluoranthene	0.5 *ATSDR*	B2	7.300E-01 *NCEA*	1.460E+00 *extrapolated*	1.460E+00 *extrapolated*
Benzo(k)fluoranthene	0.5 *ATSDR*	B2	7.300E-02 *NCEA*	1.460E-01 *extrapolated*	1.460E-01 *extrapolated*
Benzotrichloride	0.8 *Region IV*	B2	1.300E+01 *IRIS*	1.625E+01 *extrapolated*	1.625E+01 *extrapolated*
Benzyl chloride	0.8 *Region IV*	B2	1.700E-01 *IRIS*	2.125E-01 *extrapolated*	2.125E-01 *extrapolated*
Beryllium	0.006 *ATSDR*	B1	0.000E+00	8.400E+00 *extrapolated**	0.000E+00
Bis(2-chloroethyl)ether	0.98 *ATSDR*	B2	1.100E+00 *IRIS*	1.155E+00 *extrapolated**	1.122E+00 *extrapolated*
Bis(2-chloroisopropyl)ether	0.8 *Region IV*	C	7.000E-02 *HEAST*	3.500E-02 *HEAST*	8.750E-02 *extrapolated*
Bis(2-ethylhexyl)phthalate [or DEHP]	0.5 *Region IV*	B2	1.400E-02 *IRIS*	2.800E-02 *extrapolated*	2.800E-02 *extrapolated*
Bromodichloromethane	0.98 *ATSDR*	B2	6.200E-02 *IRIS*	6.327E-02 *extrapolated*	6.327E-02 *extrapolated*
Bromoform	0.75 *ATSDR*	B2	7.900E-03 *IRIS*	3.850E-03 *extrapolated**	1.053E-02 *extrapolated*
Cadmium	0.044 *ATSDR*	B1	0.000E+00	6.300E+00 *extrapolated**	0.000E+00
Captan	0.5 *Region IV*	B2	3.500E-03 *HEAST*	7.000E-03 *extrapolated*	7.000E-03 *extrapolated*
Carbazole	0.8 *Region IV*	B2	2.000E-02 *HEAST*	2.500E-02 *extrapolated*	2.500E-02 *extrapolated*
Carbon tetrachloride	0.85 *ATSDR*	B2	1.300E-01 *IRIS*	5.250E-02 *extrapolated**	1.529E-01 *extrapolated*
Chlordane	0.8 *ATSDR*	B2	3.500E-01 *IRIS*	3.500E-01 *extrapolated**	4.375E-01 *extrapolated*
Chlorobenzilate	0.57 *HSDB*	B2	2.700E-01 *HEAST*	2.700E-01 *HEAST*	4.737E-01 *extrapolated*
Chloroform	1 *ATSDR*	B2	6.100E-03 *IRIS*	8.050E-02 *extrapolated**	6.100E-03 *extrapolated*

Table 5a - Technical Report

Sources and Derivation of Toxicity Values Used in Calculations for Carcinogens

Contaminant	GI Absorption	Cancer Class	OSF 1/(mg/kg/day)	ISF 1/(mg/kg/day)	DSF 1/(mg/kg/day)
Chloromethane	0.8 *Region IV*	C	1.300E-02 *HEAST*	6.300E-03 *extrapolated**	1.625E-02 *extrapolated*
Chloronitrobenzene, p-	0.8 *Region IV*	B2	1.800E-02 *HEAST*	2.250E-02 *extrapolated*	2.250E-02 *extrapolated*
Chlorothalonil [or Bravo]	0.5 *Region IV*	B2	1.100E-02 *HEAST*	2.200E-02 *extrapolated*	2.200E-02 *extrapolated*
Chromium (hexavalent)	0.013 *ATSDR*	A	0.000E+00	4.200E+01 *extrapolated**	0.000E+00
Chrysene	0.5 *ATSDR*	B2	7.300E-03 *NCEA*	1.460E-02 *extrapolated*	1.460E-02 *extrapolated*
Crotonaldehyde	0.5 *Region IV*	C	1.900E+00 *HEAST*	3.800E+00 *extrapolated*	3.800E+00 *extrapolated*
DDD, 4,4'-	0.8 *ATSDR*	B2	2.400E-01 *IRIS*	3.000E-01 *extrapolated*	3.000E-01 *extrapolated*
DDE, 4,4'-	0.8 *ATSDR*	B2	3.400E-01 *IRIS*	4.250E-01 *extrapolated*	4.250E-01 *extrapolated*
DDT, 4,4'-	0.8 *ATSDR*	B2	3.400E-01 *IRIS*	3.395E-01 *extrapolated**	4.250E-01 *extrapolated*
Diallate	0.5 *Region IV*	B2	6.100E-02 *HEAST*	1.220E-01 *extrapolated*	1.220E-01 *extrapolated*
Dibenz(a,h)anthracene	0.5 *ATSDR*	B2	7.300E+00 *NCEA*	1.460E+01 *extrapolated*	1.460E+01 *extrapolated*
Dibromo-3-chloropropane, 1-2- [or DBCP]	0.5 *Region IV*	B2	1.400E+00 *HEAST*	2.415E-03 *extrapolated**	2.800E+00 *extrapolated*
Dibromochloromethane	0.75 *ATSDR*	C	8.400E-02 *IRIS*	1.120E-01 *extrapolated*	1.120E-01 *extrapolated*
Dibromoethane, 1,2- [or EDB]	0.98 *ATSDR*	B2	8.500E+01 *IRIS*	7.700E-01 *extrapolated**	8.673E+01 *extrapolated*
Dichlorobenzene, 1,4-	1 *ATSDR*	C	2.400E-02 *HEAST*	2.200E-02 *NCEA*	2.400E-02 *extrapolated*
Dichlorobenzidine, 3,3'-	0.5 *Region IV*	B2	4.500E-01 *IRIS*	9.000E-01 *extrapolated*	9.000E-01 *extrapolated*
Dichloroethane, 1,2- [or EDC]	1 *ATSDR*	B2	9.100E-02 *IRIS*	9.100E-02 *extrapolated**	9.100E-02 *extrapolated*
Dichloroethene, 1,1-	1 *ATSDR*	C	6.000E-01 *IRIS*	1.750E-01 *extrapolated**	6.000E-01 *extrapolated*
Dichloropropane, 1,2-	1 *ATSDR*	B2	6.800E-02 *HEAST*	6.800E-02 *extrapolated*	6.800E-02 *extrapolated*
Dichloropropene, 1,3-	0.98 *ATSDR*	B2	1.800E-01 *HEAST*	1.295E-01 *extrapolated**	1.837E-01 *extrapolated*
Dichlorvos	0.96 *HSDB*	B2	2.900E-01 *IRIS*	3.021E-01 *extrapolated*	3.021E-01 *extrapolated*
Dicofol [or Kelthane]	0.5 *Region IV*		4.400E-01 *IRIS-WD*	8.800E-01 *extrapolated*	8.800E-01 *extrapolated*
Dieldrin	1 *HSDB*	B2	1.600E+01 *IRIS*	1.610E+01 *extrapolated**	1.600E+01 *extrapolated*
Dinitrotoluene, 2,4-	1 *HSDB*	B2	6.800E-01 *IRIS*	6.800E-01 *extrapolated*	6.800E-01 *extrapolated*
Dinitrotoluene, 2,6-	0.5 *Region IV*	B2	6.800E-01 *IRIS*	1.360E+00 *extrapolated*	1.360E+00 *extrapolated*
Dioxane, 1,4-	0.5 *Region IV*	B2	1.100E-02 *IRIS*	2.200E-02 *extrapolated*	2.200E-02 *extrapolated*
Dioxin [or 2,3,7,8-TCDD]	0.9	B2	1.500E+05 *HEAST*	1.155E+05 *extrapolated**	1.667E+05 *extrapolated*
Diphenylhydrazine, 1,2-	0.5 *Region IV*	B2	8.000E-01 *IRIS*	7.700E-01 *extrapolated**	1.600E+00 *extrapolated*
Epichlorohydrin	0.8 *Region IV*	B2	9.900E-03 *IRIS*	4.200E-03 *extrapolated**	1.238E-02 *extrapolated*

Table 5a - Technical Report

Sources and Derivation of Toxicity Values Used in Calculations for Carcinogens

Contaminant	GI Absorption	Cancer Class	OSF 1/(mg/kg/day)	ISF 1/(mg/kg/day)	DSF 1/(mg/kg/day)
Ethyl acrylate	0.8 *Region IV*	B2	4.800E-02 *HEAST*	6.000E-02 *extrapolated*	6.000E-02 *extrapolated*
Ethyl chloride [or Chloroethane]	0.8 *Region IV*	D	2.900E-03 *NCEA*	3.625E-03 *extrapolated*	3.625E-03 *extrapolated*
Ethylene oxide	0.8 *Region IV*	B1	1.020E+00 *HEAST*	3.500E-01 *extrapolated**	1.275E+00 *extrapolated*
Formaldehyde	0.5 *Region IV*	B1	0.000E+00	4.550E-02 *extrapolated**	0.000E+00
Heptachlor	0.8 *ATSDR*	B2	4.500E+00 *IRIS*	4.550E+00 *extrapolated**	5.625E+00 *extrapolated*
Heptachlor epoxide	0.4 *ATSDR*	B2	9.100E+00 *IRIS*	9.100E+00 *extrapolated**	2.275E+01 *extrapolated*
Hexachloro-1,3-butadiene	1 *ATSDR*	C	7.800E-02 *IRIS*	7.700E-02 *extrapolated**	7.800E-02 *extrapolated*
Hexachlorobenzene	0.8 *ATSDR*	B2	1.600E+00 *IRIS*	1.610E+00 *extrapolated**	2.000E+00 *extrapolated*
Hexachlorocyclohexane, alpha-	0.974 *ATSDR*	B2	6.300E+00 *IRIS*	6.300E+00 *extrapolated**	6.468E+00 *extrapolated*
Hexachlorocyclohexane, beta-	0.907 *ATSDR*	C	1.800E+00 *IRIS*	1.855E+00 *extrapolated**	1.985E+00 *extrapolated*
Hexachlorocyclohexane, gamma- [or Lindane]	0.994 *ATSDR*	B2-C	1.300E+00 *HEAST*	1.308E+00 *extrapolated*	1.308E+00 *extrapolated*
Hexachloroethane	0.8 *Region IV*	C	1.400E-02 *IRIS*	1.400E-02 *extrapolated**	1.750E-02 *extrapolated*
Hexahydro-1,3,5-trinitro-1,3,5-triazine [or RDX]	0.5 *Region IV*	C	1.100E-01 *IRIS*	2.200E-01 *extrapolated*	2.200E-01 *extrapolated*
Indeno(1,2,3-cd)pyrene	0.5 *ATSDR*	B2	7.300E-01 *NCEA*	1.460E+00 *extrapolated*	1.460E+00 *extrapolated*
Isophorone	0.5 *Region IV*	C	9.500E-04 *IRIS*	1.900E-03 *extrapolated*	1.900E-03 *extrapolated*
Methoxy-5-nitroaniline, 2-	0.5 *Region IV*	B2	4.600E-02 *HEAST*	9.200E-02 *extrapolated*	9.200E-02 *extrapolated*
Methylaniline, 2-	0.5 *Region IV*	B2	2.400E-01 *HEAST*	4.800E-01 *extrapolated*	4.800E-01 *extrapolated*
Methylene bis(2-chloroaniline), 4,4-	0.5 *Region IV*	B2	1.300E-01 *HEAST*	1.295E-01 *extrapolated**	2.600E-01 *extrapolated*
Methylene chloride	1 *ATSDR*	B2	7.500E-03 *IRIS*	1.645E-03 *extrapolated**	7.500E-03 *extrapolated*
Nitroso-di-ethylamine, N-	0.5 *Region IV*	B2	1.500E+02 *IRIS*	1.505E+02 *extrapolated**	3.000E+02 *extrapolated*
Nitroso-di-n-butylamine, N-	0.8 *Region IV*	B2	5.400E+00 *IRIS*	5.600E+00 *extrapolated**	6.750E+00 *extrapolated*
Nitroso-di-n-propylamine, N-	0.475 *ATSDR*	B2	7.000E+00 *IRIS*	1.474E+01 *extrapolated*	1.474E+01 *extrapolated*
Nitroso-dimethylamine, N-	0.5 *Region IV*	B2	5.100E+01 *IRIS*	4.900E+01 *extrapolated**	1.020E+02 *extrapolated*
Nitroso-diphenylamine, N-	0.5 *Region IV*	B2	4.900E-03 *IRIS*	9.800E-03 *extrapolated*	9.800E-03 *extrapolated*
Nitroso-N-methylethylamine, N-	0.5 *Region IV*	B2	2.200E+01 *IRIS*	4.400E+01 *extrapolated*	4.400E+01 *extrapolated*
PCBs [Aroclor miture]	0.85 *ATSDR*	B2	2.000E+00 *IRIS*	3.500E-01 *extrapolated**	2.353E+00 *extrapolated*
Pentachloronitrobenzene	0.5 *Region IV*	C	2.600E-01 *HEAST*	5.200E-01 *extrapolated*	5.200E-01 *extrapolated*
Pentachlorophenol	0.5 *ATSDR*	B2	1.200E-01 *IRIS*	2.400E-01 *extrapolated*	2.400E-01 *extrapolated*
Phenylphenol, 2-	0.5 *Region IV*	C	1.940E-03 *HEAST*	3.880E-03 *extrapolated*	3.880E-03 *extrapolated*

Table 5a - Technical Report

Sources and Derivation of Toxicity Values Used in Calculations for Carcinogens

Contaminant	GI Absorption	Cancer Class	OSF 1/(mg/kg/day)	ISF 1/(mg/kg/day)	DSF 1/(mg/kg/day)
Propylene oxide	0.8 *Region IV*	B2	2.400E-01 *IRIS*	1.295E-02 *extrapolated**	3.000E-01 *extrapolated*
Simazine	0.5 *Region IV*	C	1.200E-01 *HEAST*	2.400E-01 *extrapolated*	2.400E-01 *extrapolated*
Tetrachloroethane, 1,1,1,2-	0.8 *Region IV*	C	2.600E-02 *IRIS*	2.590E-02 *extrapolated**	3.250E-02 *extrapolated*
Tetrachloroethane, 1,1,2,2-	0.7 *ATSDR*	C	2.000E-01 *IRIS*	2.030E-01 *extrapolated**	2.857E-01 *extrapolated*
Tetrachloroethene [or PCE]	1 *ATSDR*	C-B2	5.200E-02 *NCEA*	2.000E-03 *NCEA*	5.200E-02 *extrapolated*
Toluidine, p-	0.5 *Region IV*	C	1.900E-01 *HEAST*	3.800E-01 *extrapolated*	3.800E-01 *extrapolated*
Toxaphene	0.63 *HSDB*	B2	1.100E+00 *IRIS*	1.120E+00 *extrapolated**	1.746E+00 *extrapolated*
Trichloroethane, 1,1,2-	0.81 *ATSDR*	C	5.700E-02 *IRIS*	5.600E-02 *extrapolated**	7.037E-02 *extrapolated*
Trichloroethene [or TCE]	0.945 *ATSDR*	B2	1.100E-02 *NCEA*	6.000E-03 *NCEA*	1.164E-02 *extrapolated*
Trichlorophenol, 2,4,6-	0.5 *Region IV*	B2	1.100E-02 *IRIS*	1.085E-02 *extrapolated**	2.200E-02 *extrapolated*
Trichloropropane, 1,2,3-	0.8 *Region IV*	B2	7.000E+00 *IRIS*	8.750E+00 *extrapolated*	8.750E+00 *extrapolated*
Trifluralin	0.2 *HSDB*	C	7.700E-03 *IRIS*	3.850E-02 *extrapolated*	3.850E-02 *extrapolated*
Trimethyl phosphate	0.5 *Region IV*	B2	3.700E-02 *HEAST*	7.400E-02 *extrapolated*	7.400E-02 *extrapolated*
Trinitrotoluene, 2,4,6-	0.5 *Region IV*	C	3.000E-02 *IRIS*	6.000E-02 *extrapolated*	6.000E-02 *extrapolated*
Vinyl chloride	0.875 *ATSDR*	A	1.900E+00 *HEAST*	2.940E-01 *extrapolated**	2.171E+00 *extrapolated*

extrapolated = Extrapolated from a slope factor for another route of administration

extrapolated* = Extrapolated from an inhalation unit risk

Reference sources for toxicity data:

IRIS: U.S.EPA's Integrated Risk Information System

HEAST: U.S.EPA's Health Effects Assessment Summary Tables

NCEA: National Center for Environmental Assessment

Table 5b - Technical Report

Sources and Derivation of Toxicity Values Used in Calculations for Noncarcinogens

Contaminant	GI Absorption	RfDo (mg/kg/day)	RfDi (mg/kg/day)	RfDd (mg/kg/day)	Target Organ/System or Effect
Acenaphthene	0.5 *ATSDR*	6.000E-02 *IRIS Low*	3.000E-02 *extrapolated*	3.000E-02 *extrapolated*	-Liver
Acenaphthylene	0.5 *Region IV*	3.000E-02 *Surrogate (a)*	1.500E-02 *extrapolated*	1.500E-02 *extrapolated*	-Body Weight -Liver
Acephate	0.5 *Region IV*	4.000E-03 *IRIS High*	2.000E-03 *extrapolated*	2.000E-03 *extrapolated*	-Carcinogen -Neurological
Acetone	0.8 *Region IV*	1.000E-01 *IRIS Low*	8.000E-02 *extrapolated*	8.000E-02 *extrapolated*	-Kidney -Liver -Neurological
Acetonitrile	0.8 *Region IV*	6.000E-03 *IRIS Low*	1.429E-02 *extrapolated**	4.800E-03 *extrapolated*	-Blood -Liver
Acetophenone	0.8 *Region IV*	1.000E-01 *IRIS Low*	8.000E-02 *extrapolated*	8.000E-02 *extrapolated*	-None Specified
Acrolein	0.8 *Region IV*	2.000E-02 *HEAST*	5.714E-06 *extrapolated* Medium	1.600E-02 *extrapolated*	-Nasal
Acrylamide	0.5 *Region IV*	2.000E-04 *IRIS Medium*	1.000E-04 *extrapolated*	1.000E-04 *extrapolated*	-Carcinogen -Neurological
Acrylonitrile	0.8 *Region IV*	1.000E-03 *HEAST*	5.714E-04 *extrapolated* Medium	8.000E-04 *extrapolated*	-Carcinogen -Nasal -Reproductive
Alachlor	0.8 *Region IV*	1.000E-02 *IRIS High*	8.000E-03 *extrapolated*	8.000E-03 *extrapolated*	-Blood -Carcinogen
Aldicarb [or Temik]	1 *HSDB*	1.000E-03 *IRIS Medium*	1.000E-03 *extrapolated*	1.000E-03 *extrapolated*	-Neurological
Aldrin	1 *HSDB*	3.000E-05 *IRIS Medium*	3.000E-05 *extrapolated*	3.000E-05 *extrapolated*	-Carcinogen -Liver
Allyl alcohol	0.5 *Region IV*	5.000E-03 *IRIS Low*	2.500E-03 *extrapolated*	2.500E-03 *extrapolated*	-Kidney -Liver
Aluminum	0.04 *ATSDR*	1.000E+00 *NCEA*	1.000E-03 *NCEA*	4.000E-02 *extrapolated*	-Body Weight

Table 5b - Technical Report

Sources and Derivation of Toxicity Values Used in Calculations for Noncarcinogens

Contaminant	GI Absorption	RfDo (mg/kg/day)	RfDi (mg/kg/day)	RfDd (mg/kg/day)	Target Organ/System or Effect
Aluminum phosphide	0.2 *Region IV*	4.000E-04 *IRIS* *Medium*	8.000E-05 *extrapolated*	8.000E-05 *extrapolated*	-Body Weight
Ametryn	0.679 *HSDB*	9.000E-03 *IRIS* *Low*	6.111E-03 *extrapolated*	6.111E-03 *extrapolated*	-Liver
Ammonia	0.8 *Region IV*	4.000E-01 *ATSDR*	2.857E-02 *extrapolated** *Medium*	3.200E-01 *extrapolated*	-Respiratory
Aniline	0.5 *Region IV*	5.714E-04 *extrapolated*	2.857E-04 *extrapolated** *Low*	2.857E-04 *extrapolated*	-Blood -Carcinogen
Anthracene	0.5 *ATSDR*	3.000E-01 *IRIS* *Low*	1.500E-01 *extrapolated*	1.500E-01 *extrapolated*	-None Specified
Antimony	0.01 *ATSDR*	4.000E-04 *IRIS* *Low*	4.000E-06 *extrapolated*	4.000E-06 *extrapolated*	-Blood -Mortality
Arsenic	0.95 *ATSDR*	3.000E-04 *IRIS* *Medium*	2.850E-04 *extrapolated*	2.850E-04 *extrapolated*	-Carcinogen -Cardiovascular -Skin
Atrazine	0.5 *Region IV*	3.500E-02 *IRIS* *High*	1.750E-02 *extrapolated*	1.750E-02 *extrapolated*	-Body Weight -Carcinogen
Barium	0.05 *ATSDR*	7.000E-02 *IRIS* *Medium*	1.429E-04 *extrapolated**	3.500E-03 *extrapolated*	-Cardiovascular
Bayleton	0.5 *Region IV*	3.000E-02 *IRIS* *High*	1.500E-02 *extrapolated*	1.500E-02 *extrapolated*	-Blood -Body Weight
Benomyl	0.665 *HSDB*	5.000E-02 *IRIS* *High*	3.325E-02 *extrapolated*	3.325E-02 *extrapolated*	-Developmental
Bentazon	0.5 *Region IV*	3.000E-02 *IRIS* *Medium*	1.500E-02 *extrapolated*	1.500E-02 *extrapolated*	-Blood
Benzaldehyde	0.8 *Region IV*	1.000E-01 *IRIS* *Low*	8.000E-02 *extrapolated*	8.000E-02 *extrapolated*	-Gastrointestinal -Kidney
Benzenethiol	0.8 *Region IV*	1.000E-05 *HEAST*	8.000E-06 *extrapolated*	8.000E-06 *extrapolated*	-Liver

Table 5b - Technical Report

Sources and Derivation of Toxicity Values Used in Calculations for Noncarcinogens

Contaminant	GI Absorption	RfDo (mg/kg/day)	RfDi (mg/kg/day)	RfDd (mg/kg/day)	Target Organ/System or Effect
Benzo(g,h,i)perylene	0.5 *ATSDR*	3.000E-02 *Surrogate (a)*	1.500E-02 *extrapolated*	1.500E-02 *extrapolated*	-Neurological
Benzoic acid	1 *HSDB*	4.000E+00 *IRIS Medium*	4.000E+00 *extrapolated*	4.000E+00 *extrapolated*	-None Specified
Benzyl alcohol	0.5 *Region IV*	3.000E-01 *HEAST*	NA	NA	-Gastrointestinal
Beryllium	0.006 *ATSDR*	2.000E-03 *IRIS*	5.714E-06 *extrapolated* Medium*	1.200E-05 *extrapolated*	-Carcinogen -Gastrointestinal -Respiratory
Bidrin [or Dicrotophos]	0.5 *Region IV*	1.000E-04 *IRIS Low*	5.000E-05 *extrapolated*	5.000E-05 *extrapolated*	-Developmental
Biphenyl, 1,1- [or Diphenyl]	0.8 *Region IV*	5.000E-02 *IRIS Medium*	4.000E-02 *extrapolated*	4.000E-02 *extrapolated*	-Kidney
Bis(2-chloroisopropyl)ether	0.8 *Region IV*	4.000E-02 *IRIS Low*	3.200E-02 *extrapolated*	3.200E-02 *extrapolated*	-Blood -Carcinogen
Bis(2-ethylhexyl)phthalate [or DEHP]	0.5 *Region IV*	2.000E-02 *IRIS Medium*	1.000E-02 *extrapolated*	1.000E-02 *extrapolated*	-Carcinogen -Liver
Bisphenol A	0.5 *Region IV*	5.000E-02 *IRIS High*	2.500E-02 *extrapolated*	2.500E-02 *extrapolated*	-Body Weight
Boron	0.2 *Region IV*	9.000E-02 *IRIS Medium*	5.714E-03 *extrapolated**	1.800E-02 *extrapolated*	-Reproductive -Respiratory
Bromacil	0.5 *Region IV*	1.000E-01 *OPP*	5.000E-02 *extrapolated*	5.000E-02 *extrapolated*	-Body Weight
Bromochloromethane	0.8 *Region IV*	1.300E-02 *HAL*	1.040E-02 *extrapolated*	1.040E-02 *extrapolated*	-None Specified
Bromodichloromethane	0.98 *ATSDR*	2.000E-02 *IRIS Medium*	1.960E-02 *extrapolated*	1.960E-02 *extrapolated*	-Carcinogen -Kidney
Bromoform	0.75 *ATSDR*	2.000E-02 *IRIS Medium*	1.500E-02 *extrapolated*	1.500E-02 *extrapolated*	-Carcinogen -Liver

Table 5b - Technical Report

Sources and Derivation of Toxicity Values Used in Calculations for Noncarcinogens

Contaminant	GI Absorption	RfDo (mg/kg/day)	RfDi (mg/kg/day)	RfDd (mg/kg/day)	Target Organ/System or Effect
Bromomethane [or Methyl bromide]	0.8 *Region IV*	1.400E-03 *IRIS Medium*	1.429E-03 *extrapolated**	1.120E-03 *extrapolated*	-Gastrointestinal
Butanol, 1-	0.5 *Region IV*	1.000E-01 *IRIS Low*	5.000E-02 *extrapolated*	5.000E-02 *extrapolated*	-Neurological
Butanone, 2- [or MEK]	0.8 *Region IV*	6.000E-01 *IRIS Low*	2.857E-01 *extrapolated* Low*	4.800E-01 *extrapolated*	-Developmental
Butyl benzyl phthalate, n-	1 *HSDB*	2.000E-01 *IRIS Low*	2.000E-01 *extrapolated*	2.000E-01 *extrapolated*	-Liver
Butylate	0.5 *Region IV*	5.000E-02 *IRIS High*	2.500E-02 *extrapolated*	2.500E-02 *extrapolated*	-Liver
Butylphthalyl butylglycolate	0.5 *Region IV*	1.000E+00 *IRIS Low*	5.000E-01 *extrapolated*	5.000E-01 *extrapolated*	-None Specified
Cadmium	0.044 *ATSDR*	1.000E-03 *IRIS High*	4.400E-05 *extrapolated*	4.400E-05 *extrapolated*	-Carcinogen -Kidney
Calcium cyanide	0.2 *Region IV*	4.000E-02 *IRIS Medium*	8.000E-03 *extrapolated*	8.000E-03 *extrapolated*	-Body Weight -Neurological -Thyroid
Captan	0.5 *Region IV*	1.300E-01 *IRIS High*	6.500E-02 *extrapolated*	6.500E-02 *extrapolated*	-Body Weight -Carcinogen
Carbaryl [or Sevin]	0.98 *HSDB*	1.000E-01 *IRIS Medium*	9.800E-02 *extrapolated*	9.800E-02 *extrapolated*	-Kidney -Liver
Carbofuran	0.5 *Region IV*	5.000E-03 *IRIS High*	2.500E-03 *extrapolated*	2.500E-03 *extrapolated*	-Neurological -Reproductive
Carbon disulfide	0.8 *Region IV*	1.000E-01 *IRIS Medium*	2.000E-01 *extrapolated* Medium*	8.000E-02 *extrapolated*	-Developmental -Neurological
Carbon tetrachloride	0.85 *ATSDR*	7.000E-04 *IRIS Medium*	5.710E-04 *NCEA*	5.950E-04 *extrapolated*	-Carcinogen -Liver
Carbophenothion [or Trithion]	0.5 *Region IV*	1.300E-04 *OPP*	6.500E-05 *extrapolated*	6.500E-05 *extrapolated*	-Neurological

Table 5b - Technical Report

Sources and Derivation of Toxicity Values Used in Calculations for Noncarcinogens

Contaminant	GI Absorption	RfDo (mg/kg/day)	RfDi (mg/kg/day)	RfDd (mg/kg/day)	Target Organ/System or Effect
Chlordane	0.8 *ATSDR*	5.000E-04 *IRIS Medium*	2.000E-04 *extrapolated* Low*	4.000E-04 *extrapolated*	-Carcinogen -Liver
Chlorine	0.2 *Region IV*	1.000E-01 *IRIS Medium*	NA	NA	-Body Weight
Chlorine cyanide [or Cyanogen chloride]	0.8 *Region IV*	5.000E-02 *IRIS Medium*	4.000E-02 *extrapolated*	4.000E-02 *extrapolated*	-Body Weight -Neurological -Thyroid
Chloro-1,3-butadiene [or Chloroprene]	0.8 *Region IV*	2.000E-02 *HEAST*	2.000E-03 *extrapolated**	1.600E-02 *extrapolated*	-Body Weight -Hair Loss -Nasal
Chloro-m-cresol, p- [or 4-chloro-3-methylphenol]	0.5 *Region IV*	9.000E-03 *OPP*	4.500E-03 *extrapolated*	4.500E-03 *extrapolated*	-Body Weight
Chloroacetic acid	0.5 *Region IV*	2.000E-03 *HEAST*	1.000E-03 *extrapolated*	1.000E-03 *extrapolated*	-Cardiovascular
Chloroaniline, 4-	0.5 *Region IV*	4.000E-03 *IRIS Low*	2.000E-03 *extrapolated*	2.000E-03 *extrapolated*	-Spleen
Chlorobenzene	0.31 *ATSDR*	2.000E-02 *IRIS Medium*	5.714E-03 *extrapolated**	6.200E-03 *extrapolated*	-Liver
Chlorobenzilate	0.57 *HSDB*	2.000E-02 *IRIS Medium*	1.140E-02 *extrapolated*	1.140E-02 *extrapolated*	-Body Weight -Carcinogen
Chloroform	1 *ATSDR*	1.000E-02 *IRIS Medium*	1.000E-02 *extrapolated*	1.000E-02 *extrapolated*	-Carcinogen -Liver
Chloronaphthalene, beta-	0.8 *Region IV*	8.000E-02 *IRIS Low*	6.400E-02 *extrapolated*	6.400E-02 *extrapolated*	-Liver -Respiratory
Chlorophenol, 2-	0.8 *Region IV*	5.000E-03 *IRIS Low*	4.000E-03 *extrapolated*	4.000E-03 *extrapolated*	-Reproductive
Chlorophenol, 3-	0.5 *Region IV*	5.000E-03 *Surrogate (b)*	2.500E-03 *extrapolated*	2.500E-03 *extrapolated*	-None Specified
Chlorophenol, 4-	0.5 *Region IV*	5.000E-03 *Surrogate (b)*	2.500E-03 *extrapolated*	2.500E-03 *extrapolated*	-None Specified

Table 5b - Technical Report

Sources and Derivation of Toxicity Values Used in Calculations for Noncarcinogens

Contaminant	GI Absorption	RfDo (mg/kg/day)	RfDi (mg/kg/day)	RfDd (mg/kg/day)	Target Organ/System or Effect
Chlorothalonil [or Bravo]	0.5 *Region IV*	1.500E-02 *IRIS Medium*	7.500E-03 *extrapolated*	7.500E-03 *extrapolated*	-Carcinogen -Kidney
Chlorotoluene, o-	0.8 *Region IV*	2.000E-02 *IRIS Low*	1.600E-02 *extrapolated*	1.600E-02 *extrapolated*	-Body Weight
Chlorotoluene, p-	0.8 *Region IV*	2.000E-02 *HAL*	1.600E-02 *extrapolated*	1.600E-02 *extrapolated*	-None Specified
Chlorpropham	0.5 *Region IV*	2.000E-01 *IRIS Medium*	1.000E-01 *extrapolated*	1.000E-01 *extrapolated*	-Bone Marrow -Kidney -Liver -Spleen
Chlorpyrifos	0.9 *HSDB*	3.000E-03 *IRIS Medium*	2.700E-03 *extrapolated*	2.700E-03 *extrapolated*	-Neurological
Chromium (hexavalent)	0.013 *ATSDR*	3.000E-03 *IRIS Low*	2.857E-05 *extrapolated* Low*	3.900E-05 *extrapolated*	-Carcinogen -Respiratory
Cobalt	0.25 *HSDB*	6.000E-02 *NCEA*	1.500E-02 *extrapolated*	1.500E-02 *extrapolated*	-Cardiovascular -Immunological -Neurological -Reproductive
Copper	0.56 *ATSDR*	3.714E-02 *HEAST-extrap.*	NA	NA	-Gastrointestinal
Coumaphos	0.5 *Region IV*	2.500E-04 *OPP*	1.250E-04 *extrapolated*	1.250E-04 *extrapolated*	-Neurological
Cumene [or Isopropyl benzene]	0.8 *Region IV*	1.000E-01 *IRIS Low*	1.143E-01 *extrapolated* Medium*	8.000E-02 *extrapolated*	-Adrenals -Kidney
Cyanide (potassium salt)	0.5 *Region IV*	2.000E-02 *IRIS Medium*	1.000E-02 *extrapolated*	1.000E-02 *extrapolated*	-Body Weight -Neurological -Thyroid
Cyanogen	0.8 *Region IV*	4.000E-02 *IRIS Medium*	3.200E-02 *extrapolated*	3.200E-02 *extrapolated*	-None Specified
Cycloate	0.5 *Region IV*	5.000E-03 *OPP*	2.500E-03 *extrapolated*	2.500E-03 *extrapolated*	-Neurological
Cyclohexanone	0.5 *Region IV*	5.000E+00 *IRIS Medium*	2.500E+00 *extrapolated*	2.500E+00 *extrapolated*	-Body Weight

Table 5b - Technical Report

Sources and Derivation of Toxicity Values Used in Calculations for Noncarcinogens

Contaminant	GI Absorption	RfDo (mg/kg/day)	RfDi (mg/kg/day)	RfDd (mg/kg/day)	Target Organ/System or Effect
Cypermethrin	0.5 *Region IV*	1.000E-02 *IRIS High*	5.000E-03 *extrapolated*	5.000E-03 *extrapolated*	-Gastrointestinal
DDT, 4,4'-	0.8 *ATSDR*	5.000E-04 *IRIS Medium*	4.000E-04 *extrapolated*	4.000E-04 *extrapolated*	-Carcinogen -Liver
Di-n-butylphthalate	1 *ATSDR*	1.000E-01 *IRIS Low*	1.000E-01 *extrapolated*	1.000E-01 *extrapolated*	-Mortality
Di-n-octylphthalate	0.5 *Region IV*	2.000E-02 *HEAST*	1.000E-02 *extrapolated*	1.000E-02 *extrapolated*	-Kidney -Liver
Diallate	0.5 *Region IV*	5.000E-03 *OPP*	2.500E-03 *extrapolated*	2.500E-03 *extrapolated*	-Carcinogen
Diazinon	0.5 *Region IV*	9.000E-04 *HEAST*	4.500E-04 *extrapolated*	4.500E-04 *extrapolated*	-Neurological
Dibenzofuran	0.8 *Region IV*	4.000E-03 *NCEA*	3.200E-03 *extrapolated*	3.200E-03 *extrapolated*	-None Specified
Dibromo-3-chloropropane, 1-2- [or DBCP]	0.5 *Region IV*	1.143E-04 *extrapolated*	5.714E-05 *extrapolated* Medium*	5.715E-05 *extrapolated*	-Carcinogen -Reproductive
Dibromochloromethane	0.75 *ATSDR*	2.000E-02 *IRIS Medium*	1.500E-02 *extrapolated*	1.500E-02 *extrapolated*	-Carcinogen -Liver
Dibromoethane, 1,2- [or EDB]	0.98 *ATSDR*	5.831E-05 *extrapolated*	5.714E-05 *extrapolated**	5.714E-05 *extrapolated*	-Carcinogen -Reproductive
Dicamba	0.5 *Region IV*	3.000E-02 *IRIS High*	1.500E-02 *extrapolated*	1.500E-02 *extrapolated*	-Developmental
Dichloroacetic acid	0.5 *Region IV*	4.000E-03 *HAL*	2.000E-03 *extrapolated*	2.000E-03 *extrapolated*	-None Specified
Dichloroacetonitrile	0.5 *Region IV*	8.000E-03 *HAL*	4.000E-03 *extrapolated*	4.000E-03 *extrapolated*	-None Specified
Dichlorobenzene, 1,2-	0.8 *Region IV*	9.000E-02 *IRIS*	5.714E-02 *extrapolated**	7.200E-02 *extrapolated*	-Body Weight

Table 5b - Technical Report

Sources and Derivation of Toxicity Values Used in Calculations for Noncarcinogens

Contaminant	GI Absorption	RfDo (mg/kg/day)	RfDi (mg/kg/day)	RfDd (mg/kg/day)	Target Organ/System or Effect
Dichlorobenzene, 1,3-	0.8 *Region IV*	3.000E-02 *NCEA*	2.000E-03 *NCEA*	2.400E-02 *extrapolated*	-None Specified
Dichlorobenzene, 1,4-	1 *ATSDR*	3.000E-02 *NCEA*	2.286E-01 *extrapolated* Medium*	3.000E-02 *extrapolated*	-Carcinogen -Liver
Dichlorodifluoromethane	0.8 *Region IV*	2.000E-01 *IRIS Medium*	5.714E-02 *extrapolated**	1.600E-01 *extrapolated*	-Body Weight -Liver
Dichloroethane, 1,1-	0.8 *Region IV*	1.786E-01 *extrapolated*	1.429E-01 *extrapolated**	1.429E-01 *extrapolated*	-Kidney
Dichloroethene, 1,1-	1 *ATSDR*	9.000E-03 *IRIS Medium*	9.000E-03 *extrapolated*	9.000E-03 *extrapolated*	-Carcinogen -Liver
Dichloroethene, cis-1,2-	0.8 *Region IV*	1.000E-02 *HEAST*	8.000E-03 *extrapolated*	8.000E-03 *extrapolated*	-Blood
Dichloroethene, trans-1,2-	0.8 *Region IV*	2.000E-02 *IRIS Low*	1.600E-02 *extrapolated*	1.600E-02 *extrapolated*	-Blood -Liver
Dichlorophenol, 2,3-	0.5 *Region IV*	3.000E-03 *Surrogate (c)*	1.500E-03 *extrapolated*	1.500E-03 *extrapolated*	-None Specified
Dichlorophenol, 2,4-	0.5 *Region IV*	3.000E-03 *IRIS Low*	1.500E-03 *extrapolated*	1.500E-03 *extrapolated*	-Immunological
Dichlorophenol, 2,5-	0.5 *Region IV*	3.000E-03 *Surrogate (c)*	1.500E-03 *extrapolated*	1.500E-03 *extrapolated*	-None Specified
Dichlorophenol, 2,6-	0.5 *Region IV*	3.000E-03 *Surrogate (c)*	1.500E-03 *extrapolated*	1.500E-03 *extrapolated*	-None Specified
Dichlorophenol, 3,4-	0.5 *Region IV*	3.000E-03 *Surrogate (c)*	1.500E-03 *extrapolated*	1.500E-03 *extrapolated*	-None Specified
Dichlorophenoxy acetic acid, 2,4-	1 *HSDB*	1.000E-02 *IRIS Medium*	1.000E-02 *extrapolated*	1.000E-02 *extrapolated*	-Kidney -Liver
Dichloropropane, 1,2-	1 *ATSDR*	NA	1.143E-03 *extrapolated* Medium*	NA	-Carcinogen -Nasal

Table 5b - Technical Report

Sources and Derivation of Toxicity Values Used in Calculations for Noncarcinogens

Contaminant	GI Absorption	RfDo (mg/kg/day)	RfDi (mg/kg/day)	RfDd (mg/kg/day)	Target Organ/System or Effect
Dichloropropene, 1,3-	0.98 *ATSDR*	3.000E-04 *IRIS Low*	5.714E-03 *extrapolated* High*	2.940E-04 *extrapolated*	-Carcinogen -Kidney -Nasal
Dichlorprop	0.5 *Region IV*	5.000E-03 *OPP*	2.500E-03 *extrapolated*	2.500E-03 *extrapolated*	-None Specified
Dichlorvos	0.96 *HSDB*	5.000E-04 *IRIS Medium*	1.429E-04 *extrapolated* Medium*	4.800E-04 *extrapolated*	-Carcinogen -Neurological
Dicofol [or Kelthane]	0.5 *Region IV*	1.200E-03 *OPP*	6.000E-04 *extrapolated*	6.000E-04 *extrapolated*	-Adrenals -Carcinogen
Dieldrin	1 *HSDB*	5.000E-05 *IRIS Medium*	5.000E-05 *extrapolated*	5.000E-05 *extrapolated*	-Carcinogen -Liver
Diethylphthalate	1 *HSDB*	8.000E-01 *IRIS Low*	8.000E-01 *extrapolated*	8.000E-01 *extrapolated*	-Body Weight
Dimethoate	0.5 *Region IV*	2.000E-04 *IRIS Medium*	1.000E-04 *extrapolated*	1.000E-04 *extrapolated*	-Neurological
Dimethrin	0.5 *Region IV*	3.000E-01 *OPP*	1.500E-01 *extrapolated*	1.500E-01 *extrapolated*	-Liver
Dimethylformamide, N,N-	0.5 *Region IV*	1.000E-01 *HEAST*	8.571E-03 *extrapolated* Medium*	5.000E-02 *extrapolated*	-Gastrointestinal -Liver
Dimethylphenol, 2,4-	0.5 *Region IV*	2.000E-02 *IRIS Low*	1.000E-02 *extrapolated*	1.000E-02 *extrapolated*	-Blood -Neurological
Dimethylphthalate	1 *HSDB*	1.000E+01 *HEAST-WD*	1.000E+01 *extrapolated*	1.000E+01 *extrapolated*	-Kidney
Dinitrobenzene, 1,2- (o)	0.5 *Region IV*	4.000E-04 *HEAST*	2.000E-04 *extrapolated*	2.000E-04 *extrapolated*	-Spleen
Dinitrobenzene, 1,3- (m)	0.5 *Region IV*	1.000E-04 *IRIS Low*	5.000E-05 *extrapolated*	5.000E-05 *extrapolated*	-Spleen
Dinitrophenol, 2,4-	0.5 *Region IV*	2.000E-03 *IRIS Low*	1.000E-03 *extrapolated*	1.000E-03 *extrapolated*	-Eye

Table 5b - Technical Report

Sources and Derivation of Toxicity Values Used in Calculations for Noncarcinogens

Contaminant	GI Absorption	RfDo (mg/kg/day)	RfDi (mg/kg/day)	RfDd (mg/kg/day)	Target Organ/System or Effect
Dinitrotoluene, 2,4-	1 *HSDB*	2.000E-03 *IRIS High*	2.000E-03 *extrapolated*	2.000E-03 *extrapolated*	-Carcinogen -Liver -Neurological
Dinitrotoluene, 2,6-	0.5 *Region IV*	1.000E-03 *HEAST*	5.000E-04 *extrapolated*	5.000E-04 *extrapolated*	-Blood -Carcinogen -Kidney -Mortality -Neurological
Dinoseb	1 *HSDB*	1.000E-03 *IRIS Low*	1.000E-03 *extrapolated*	1.000E-03 *extrapolated*	-Developmental
Diphenamid	0.5 *Region IV*	3.000E-02 *IRIS Medium*	1.500E-02 *extrapolated*	1.500E-02 *extrapolated*	-Liver
Disulfoton	0.939 *ATSDR*	4.000E-05 *IRIS Medium*	3.756E-05 *extrapolated*	3.756E-05 *extrapolated*	-Neurological
Diuron	0.9 *HSDB*	2.000E-03 *IRIS Low*	1.800E-03 *extrapolated*	1.800E-03 *extrapolated*	-Blood
Endosulfan	0.815 *ATSDR*	6.000E-03 *IRIS Medium*	4.890E-03 *extrapolated*	4.890E-03 *extrapolated*	-Body Weight -Cardiovascular -Kidney
Endothall	0.5 *Region IV*	2.000E-02 *IRIS Medium*	1.000E-02 *extrapolated*	1.000E-02 *extrapolated*	-Gastrointestinal
Endrin	0.5 *Region IV*	3.000E-04 *IRIS Medium*	1.500E-04 *extrapolated*	1.500E-04 *extrapolated*	-Liver
Epichlorohydrin	0.8 *Region IV*	2.000E-03 *HEAST*	2.857E-04 *extrapolated* Medium*	1.600E-03 *extrapolated*	-Carcinogen -Kidney -Nasal
Ethion	1 *HSDB*	5.000E-04 *IRIS Medium*	5.000E-04 *extrapolated*	5.000E-04 *extrapolated*	-Neurological
Ethoprop	0.5 *Region IV*	1.000E-04 *OPP*	5.000E-05 *extrapolated*	5.000E-05 *extrapolated*	-Neurological
Ethoxyethanol, 2-	0.5 *Region IV*	4.000E-01 *HEAST*	5.714E-02 *extrapolated* Medium*	2.000E-01 *extrapolated*	-Body Weight -Reproductive
Ethyl acetate	0.8 *Region IV*	9.000E-01 *IRIS Low*	7.200E-01 *extrapolated*	7.200E-01 *extrapolated*	-Body Weight -Mortality

Table 5b - Technical Report

Sources and Derivation of Toxicity Values Used in Calculations for Noncarcinogens

Contaminant	GI Absorption	RfDo (mg/kg/day)	RfDi (mg/kg/day)	RfDd (mg/kg/day)	Target Organ/System or Effect
Ethyl chloride [or Chloroethane]	0.8 *Region IV*	4.000E-01 *NCEA*	2.857E+00 *extrapolated* Medium*	3.200E-01 *extrapolated*	-Carcinogen -Developmental
Ethyl dipropylthiocarbamate, S- [or EPTC]	0.96 *HSDB*	2.500E-02 *IRIS Medium*	2.400E-02 *extrapolated*	2.400E-02 *extrapolated*	-Cardiovascular
Ethyl ether	0.8 *Region IV*	2.000E-01 *IRIS Low*	1.600E-01 *extrapolated*	1.600E-01 *extrapolated*	-Body Weight
Ethyl methacrylate	0.8 *Region IV*	9.000E-02 *HEAST*	7.200E-02 *extrapolated*	7.200E-02 *extrapolated*	-Kidney
Ethyl p-nitrophenyl phenylphosphorothioate [or EPN]	1 *HSDB*	1.000E-05 *IRIS Medium*	1.000E-05 *extrapolated*	1.000E-05 *extrapolated*	-Neurological
Ethylbenzene	0.8 *Region IV*	1.000E-01 *IRIS Low*	2.857E-01 *extrapolated* Low*	8.000E-02 *extrapolated*	-Developmental -Kidney -Liver
Ethylene diamine	0.5 *Region IV*	2.000E-02 *HEAST*	1.000E-02 *extrapolated*	1.000E-02 *extrapolated*	-Blood -Cardiovascular
Ethylene glycol	0.5 *Region IV*	2.000E+00 *IRIS High*	1.000E+00 *extrapolated*	1.000E+00 *extrapolated*	-Kidney
Fenamiphos	0.5 *Region IV*	2.500E-04 *IRIS High*	1.250E-04 *extrapolated*	1.250E-04 *extrapolated*	-Neurological
Fensulfothion	0.5 *Region IV*	2.500E-04 *OPP*	1.250E-04 *extrapolated*	1.250E-04 *extrapolated*	-Neurological
Fluometuron	0.5 *Region IV*	1.300E-02 *IRIS Low*	6.500E-03 *extrapolated*	6.500E-03 *extrapolated*	-None Specified
Fluoranthene	0.5 *ATSDR*	4.000E-02 *IRIS Low*	2.000E-02 *extrapolated*	2.000E-02 *extrapolated*	-Blood -Kidney -Liver
Fluorene	0.5 *ATSDR*	4.000E-02 *IRIS Low*	2.000E-02 *extrapolated*	2.000E-02 *extrapolated*	-Blood
Fluoride	0.97 *ATSDR*	6.000E-02 *IRIS High*	5.820E-02 *extrapolated*	5.820E-02 *extrapolated*	-Teeth

Table 5b - Technical Report

Sources and Derivation of Toxicity Values Used in Calculations for Noncarcinogens

Contaminant	GI Absorption	RfDo (mg/kg/day)	RfDi (mg/kg/day)	RfDd (mg/kg/day)	Target Organ/System or Effect
Fonofos	0.815 *HSDB*	2.000E-03 *IRIS Medium*	1.630E-03 *extrapolated*	1.630E-03 *extrapolated*	-Liver -Neurological
Formaldehyde	0.5 *Region IV*	2.000E-01 *IRIS Medium*	1.000E-01 *extrapolated*	1.000E-01 *extrapolated*	-Body Weight -Carcinogen -Gastrointestinal
Furfural	0.5 *Region IV*	3.000E-03 *IRIS Low*	1.429E-02 *extrapolated**	1.500E-03 *extrapolated*	-Liver -Nasal
Guthion [or Azinphos, methyl]	1 *HSDB*	1.500E-03 *OPP*	1.500E-03 *extrapolated*	1.500E-03 *extrapolated*	-Neurological
Heptachlor	0.8 *ATSDR*	5.000E-04 *IRIS Low*	4.000E-04 *extrapolated*	4.000E-04 *extrapolated*	-Carcinogen -Liver
Heptachlor epoxide	0.4 *ATSDR*	1.300E-05 *IRIS Low*	5.200E-06 *extrapolated*	5.200E-06 *extrapolated*	-Carcinogen -Liver
Hexachloro-1,3-butadiene	1 *ATSDR*	2.000E-04 *HEAST*	2.000E-04 *extrapolated*	2.000E-04 *extrapolated*	-Carcinogen -Kidney
Hexachlorobenzene	0.8 *ATSDR*	8.000E-04 *IRIS Medium*	6.400E-04 *extrapolated*	6.400E-04 *extrapolated*	-Carcinogen -Liver
Hexachlorocyclohexane, delta-	0.919 *ATSDR*	3.000E-04 *Surrogate(d)*	2.757E-04 *extrapolated*	2.757E-04 *extrapolated*	-Kidney -Liver
Hexachlorocyclohexane, gamma- [or Lindane]	0.994 *ATSDR*	3.000E-04 *IRIS Medium*	2.982E-04 *extrapolated*	2.982E-04 *extrapolated*	-Carcinogen -Kidney -Liver
Hexachlorocyclopentadiene	0.9 *HSDB*	7.000E-03 *IRIS Low*	2.000E-05 *extrapolated**	6.300E-03 *extrapolated*	-Gastrointestinal
Hexachloroethane	0.8 *Region IV*	1.000E-03 *IRIS Medium*	8.000E-04 *extrapolated*	8.000E-04 *extrapolated*	-Carcinogen -Kidney
Hexahydro-1,3,5-trinitro-1,3,5-triazine [or RDX]	0.5 *Region IV*	3.000E-03 *IRIS High*	1.500E-03 *extrapolated*	1.500E-03 *extrapolated*	-Carcinogen -Reproductive
Hexane, n-	0.8 *Region IV*	6.000E-02 *HEAST*	5.714E-02 *extrapolated* Medium*	4.800E-02 *extrapolated*	-Neurological

Table 5b - Technical Report

Sources and Derivation of Toxicity Values Used in Calculations for Noncarcinogens

Contaminant	GI Absorption	RfDo (mg/kg/day)	RfDi (mg/kg/day)	RfDd (mg/kg/day)	Target Organ/System or Effect
Hexanone, 2- [or Methyl butyl ketone]	0.98 *ATSDR*	4.000E-02 *NCEA*	4.000E-04 *extrapolated**	3.920E-02 *extrapolated*	-None Specified
Hexazinone	0.5 *Region IV*	3.300E-02 *IRIS Medium*	1.650E-02 *extrapolated*	1.650E-02 *extrapolated*	-Body Weight
Hydroquinone	0.5 *Region IV*	4.000E-02 *HEAST*	2.000E-02 *extrapolated*	2.000E-02 *extrapolated*	-Blood
Iron	0.085 *Casarett 4th*	3.000E-01 *NCEA*	2.550E-02 *extrapolated*	2.550E-02 *extrapolated*	-Blood -Gastrointestinal
Isobutyl alcohol	0.8 *Region IV*	3.000E-01 *IRIS*	2.400E-01 *extrapolated*	2.400E-01 *extrapolated*	-Neurological
Isophorone	0.5 *Region IV*	2.000E-01 *IRIS Low*	1.000E-01 *extrapolated*	1.000E-01 *extrapolated*	-Carcinogen
Linuron	0.5 *Region IV*	2.000E-03 *IRIS High*	1.000E-03 *extrapolated*	1.000E-03 *extrapolated*	-Blood
Lithium	1 *Assumed*	2.000E-02 *NCEA*	2.000E-02 *extrapolated*	2.000E-02 *extrapolated*	-None Specified
Malathion	0.47 *HSDB*	2.000E-02 *IRIS Medium*	9.400E-03 *extrapolated*	9.400E-03 *extrapolated*	-Neurological
Maneb	0.5 *Region IV*	5.000E-03 *IRIS Low*	2.500E-03 *extrapolated*	2.500E-03 *extrapolated*	-Thyroid
Manganese	0.04 *ATSDR*	2.300E-02 *IRIS (modifed) Medium*	1.429E-05 *extrapolated* Medium*	9.200E-04 *extrapolated*	-Neurological
Mercury	0.1 *ATSDR*	3.000E-04 *HEAST*	8.571E-05 *extrapolated* Medium*	3.000E-05 *extrapolated*	-Neurological
Mercury, methyl	0.95 *ATSDR*	1.000E-04 *IRIS Medium*	9.500E-05 *extrapolated*	9.500E-05 *extrapolated*	-Neurological
Merphos	0.8 *Region IV*	3.000E-05 *IRIS Low*	2.400E-05 *extrapolated*	2.400E-05 *extrapolated*	-Body Weight -Neurological

Table 5b - Technical Report

Sources and Derivation of Toxicity Values Used in Calculations for Noncarcinogens

Contaminant	GI Absorption	RfDo (mg/kg/day)	RfDi (mg/kg/day)	RfDd (mg/kg/day)	Target Organ/System or Effect
Methamidophos	0.5 *Region IV*	5.000E-05 *IRIS Medium*	2.500E-05 *extrapolated*	2.500E-05 *extrapolated*	-Neurological
Methanol	0.5 *Region IV*	5.000E-01 *IRIS*	2.500E-01 *extrapolated*	2.500E-01 *extrapolated*	-Liver -Neurological
Methidathion	0.5 *Region IV*	1.000E-03 *IRIS Medium*	5.000E-04 *extrapolated*	5.000E-04 *extrapolated*	-Liver
Methomyl	0.8 *Region IV*	2.500E-02 *IRIS Medium*	2.000E-02 *extrapolated*	2.000E-02 *extrapolated*	-Kidney -Spleen
Methoxychlor	0.9 *ATSDR*	5.000E-03 *IRIS Low*	4.500E-03 *extrapolated*	4.500E-03 *extrapolated*	-Developmental -Reproductive
Methyl acetate	0.8 *Region IV*	1.000E+00 *HEAST*	8.000E-01 *extrapolated*	8.000E-01 *extrapolated*	-Liver
Methyl acrylate	0.5 *Region IV*	3.000E-02 *HEAST*	1.500E-02 *extrapolated*	1.500E-02 *extrapolated*	-None Specified
Methyl isobutyl ketone [or MIBK]	0.8 *Region IV*	8.000E-02 *HEAST*	2.286E-02 *extrapolated**	6.400E-02 *extrapolated*	-Kidney -Liver
Methyl methacrylate	0.8 *Region IV*	1.400E+00 *IRIS*	2.000E-01 *extrapolated**	1.120E+00 *extrapolated*	-Nasal
Methyl parathion [or Parathion, methyl]	0.8 *ATSDR*	2.500E-04 *IRIS Medium*	2.000E-04 *extrapolated*	2.000E-04 *extrapolated*	-Blood -Neurological
Methyl tert-butyl ether [or MTBE]	0.8 *Region IV*	1.071E+00 *extrapolated*	8.571E-01 *extrapolated* Medium*	8.571E-01 *extrapolated*	-Eye -Kidney -Liver
Methyl-4-chlorophenoxy acetic acid, 2-	0.932 *HSDB*	5.000E-04 *IRIS Medium*	4.660E-04 *extrapolated*	4.660E-04 *extrapolated*	-Kidney -Liver
Methylene bis(2-chloroaniline), 4,4-	0.5 *Region IV*	7.000E-04 *HEAST*	3.500E-04 *extrapolated*	3.500E-04 *extrapolated*	-Carcinogen -Liver -Bladder
Methylene bromide	0.8 *Region IV*	1.000E-02 *HEAST*	8.000E-03 *extrapolated*	8.000E-03 *extrapolated*	-Blood

Table 5b - Technical Report

Sources and Derivation of Toxicity Values Used in Calculations for Noncarcinogens

Contaminant	GI Absorption	RfDo (mg/kg/day)	RfDi (mg/kg/day)	RfDd (mg/kg/day)	Target Organ/System or Effect
Methylene chloride	1 *ATSDR*	6.000E-02 *IRIS Medium*	8.571E-01 *extrapolated**	6.000E-02 *extrapolated*	-Carcinogen -Liver
Methylnaphthalene, 1-	0.8 *Region IV*	2.000E-02 *Surrogate(e)*	8.571E-04 *extrapolated**	1.600E-02 *extrapolated*	-Body Weight -Nasal
Methylnaphthalene, 2-	0.8 *Region IV*	2.000E-02 *Surrogate (e)*	8.571E-04 *extrapolated**	1.600E-02 *extrapolated*	-Body Weight -Nasal
Methylphenol, 2- [or o-Cresol]	0.745 *ATSDR*	5.000E-02 *IRIS Medium*	3.725E-02 *extrapolated*	3.725E-02 *extrapolated*	-Body Weight -Neurological
Methylphenol, 3- [or m-Cresol]	0.745 *ATSDR*	5.000E-02 *IRIS Medium*	3.725E-02 *extrapolated*	3.725E-02 *extrapolated*	-Body Weight -Neurological
Methylphenol, 4- [or p-Cresol]	0.745 *ATSDR*	5.000E-03 *HEAST*	3.725E-03 *extrapolated*	3.725E-03 *extrapolated*	-Maternal Death -Neurological -Respiratory
Metolachlor	0.5 *Region IV*	1.500E-01 *IRIS High*	7.500E-02 *extrapolated*	7.500E-02 *extrapolated*	-Body Weight
Metribuzin	0.8 *Region IV*	2.500E-02 *IRIS Medium*	2.000E-02 *extrapolated*	2.000E-02 *extrapolated*	-Body Weight -Kidney -Liver -Mortality
Mevinphos	1 *HSDB*	2.500E-04 *OPP*	2.500E-04 *extrapolated*	2.500E-04 *extrapolated*	-Neurological
Molinate	0.865 *HSDB*	2.000E-03 *IRIS Low*	1.730E-03 *extrapolated*	1.730E-03 *extrapolated*	-Reproductive
Molybdenum	0.45 *HSDB*	5.000E-03 *IRIS Medium*	2.250E-03 *extrapolated*	2.250E-03 *extrapolated*	-Gout
Naled	1 *HSDB*	2.000E-03 *IRIS Medium*	2.000E-03 *extrapolated*	2.000E-03 *extrapolated*	-Neurological
Naphthalene	1 *ATSDR*	2.000E-02 *IRIS Low*	8.571E-04 *extrapolated** *Medium*	2.000E-02 *extrapolated*	-Body Weight -Nasal
Nickel	0.05 *ATSDR*	2.000E-02 *IRIS Medium*	1.000E-03 *extrapolated*	1.000E-03 *extrapolated*	-Body Weight

Table 5b - Technical Report

Sources and Derivation of Toxicity Values Used in Calculations for Noncarcinogens

Contaminant	GI Absorption	RfDo (mg/kg/day)	RfDi (mg/kg/day)	RfDd (mg/kg/day)	Target Organ/System or Effect
Nitrate	0.2 *Region IV*	1.600E+00 *IRIS High*	3.200E-01 *extrapolated*	3.200E-01 *extrapolated*	-Blood
Nitrite	0.2 *Region IV*	1.000E-01 *IRIS High*	2.000E-02 *extrapolated*	2.000E-02 *extrapolated*	-Blood
Nitroaniline, o-	0.5 *Region IV*	1.143E-04 *extrapolated*	5.714E-05 *extrapolated**	5.715E-05 *extrapolated*	-Blood
Nitroaniline, p-	0.5 *Region IV*	1.143E-04 *extrapolated*	5.714E-05 *extrapolated**	5.715E-05 *extrapolated*	-None Specified
Nitrobenzene	0.8 *Region IV*	5.000E-04 *IRIS Low*	5.714E-04 *extrapolated**	4.000E-04 *extrapolated*	-Adrenals -Blood -Kidney -Liver
Nitrophenol, 4-	0.5 *Region IV*	8.000E-03 *NCEA*	4.000E-03 *extrapolated*	4.000E-03 *extrapolated*	-None Specified
Nitrotoluene, m-	0.8 *Region IV*	1.000E-02 *HEAST*	8.000E-03 *extrapolated*	8.000E-03 *extrapolated*	-Spleen
Nitrotoluene, o-	0.8 *Region IV*	1.000E-02 *HEAST*	8.000E-03 *extrapolated*	8.000E-03 *extrapolated*	-Spleen
Nitrotoluene, p-	0.8 *Region IV*	1.000E-02 *HEAST*	8.000E-03 *extrapolated*	8.000E-03 *extrapolated*	-Spleen
Octamethylpyrophosphoramide	0.5 *Region IV*	2.000E-03 *HEAST*	1.000E-03 *extrapolated*	1.000E-03 *extrapolated*	-Neurological
Oxamyl	0.5 *Region IV*	2.500E-02 *IRIS Medium*	1.250E-02 *extrapolated*	1.250E-02 *extrapolated*	-Body Weight
Paraquat	0.2 *HSDB*	4.500E-03 *IRIS High*	9.000E-04 *extrapolated*	9.000E-04 *extrapolated*	-Respiratory
Parathion	1 *HSDB*	6.000E-03 *HEAST*	6.000E-03 *extrapolated*	6.000E-03 *extrapolated*	-Neurological
PCBs [Aroclor miture]	0.85 *ATSDR*	2.000E-05 *IRIS Medium*	1.700E-05 *extrapolated*	1.700E-05 *extrapolated*	-Carcinogen -Immunological

Table 5b - Technical Report

Sources and Derivation of Toxicity Values Used in Calculations for Noncarcinogens

Contaminant	GI Absorption	RfDo (mg/kg/day)	RfDi (mg/kg/day)	RfDd (mg/kg/day)	Target Organ/System or Effect
Pebulate	0.95 *HSDB*	5.000E-02 *HEAST*	4.750E-02 *extrapolated*	4.750E-02 *extrapolated*	-Blood
Pendimethalin	0.5 *Region IV*	4.000E-02 *IRIS Medium*	2.000E-02 *extrapolated*	2.000E-02 *extrapolated*	-Liver
Pentachlorobenzene	0.5 *Region IV*	8.000E-04 *IRIS Low*	4.000E-04 *extrapolated*	4.000E-04 *extrapolated*	-Kidney -Liver
Pentachloronitrobenzene	0.5 *Region IV*	3.000E-03 *IRIS Medium*	1.500E-03 *extrapolated*	1.500E-03 *extrapolated*	-Carcinogen -Liver
Pentachlorophenol	0.5 *ATSDR*	3.000E-02 *IRIS Medium*	1.500E-02 *extrapolated*	1.500E-02 *extrapolated*	-Carcinogen -Kidney -Liver
Permethrin	0.5 *Region IV*	5.000E-02 *IRIS High*	2.500E-02 *extrapolated*	2.500E-02 *extrapolated*	-Liver
Phenanthrene	0.5 *ATSDR*	3.000E-02 *Surogate (a)*	1.500E-02 *extrapolated*	1.500E-02 *extrapolated*	-Kidney
Phenol	1 *ATSDR*	6.000E-01 *IRIS Low*	6.000E-01 *extrapolated*	6.000E-01 *extrapolated*	-Developmental
Phenylenediamine, p-	0.5 *Region IV*	1.900E-01 *HEAST*	9.500E-02 *extrapolated*	9.500E-02 *extrapolated*	-Whole Body
Phorate	1 *HSDB*	2.000E-04 *HEAST*	2.000E-04 *extrapolated*	2.000E-04 *extrapolated*	-Neurological
Phosmet	0.5 *Region IV*	2.000E-02 *IRIS High*	1.000E-02 *extrapolated*	1.000E-02 *extrapolated*	-Body Weight -Liver -Neurological
Phthalic anhydride	0.5 *Region IV*	2.000E+00 *IRIS Medium*	3.429E-02 *extrapolated**	1.000E+00 *extrapolated*	-Kidney -Nasal -Respiratory
Prometon	0.5 *Region IV*	1.500E-02 *IRIS Low*	7.500E-03 *extrapolated*	7.500E-03 *extrapolated*	-None Specified
Prometryn	0.5 *Region IV*	4.000E-03 *IRIS Low*	2.000E-03 *extrapolated*	2.000E-03 *extrapolated*	-Bone Marrow -Kidney -Liver

Table 5b - Technical Report

Sources and Derivation of Toxicity Values Used in Calculations for Noncarcinogens

Contaminant	GI Absorption	RfDo (mg/kg/day)	RfDi (mg/kg/day)	RfDd (mg/kg/day)	Target Organ/System or Effect
Propachlor	0.5 *Region IV*	1.300E-02 *IRIS Low*	6.500E-03 *extrapolated*	6.500E-03 *extrapolated*	-Body Weight -Liver
Propanil	0.5 *Region IV*	5.000E-03 *IRIS Medium*	2.500E-03 *extrapolated*	2.500E-03 *extrapolated*	-Spleen
Propazine	0.5 *Region IV*	2.000E-02 *IRIS Medium*	1.000E-02 *extrapolated*	1.000E-02 *extrapolated*	-Body Weight
Propylene glycol	0.5 *Region IV*	2.000E+01 *HEAST*	1.000E+01 *extrapolated*	1.000E+01 *extrapolated*	-Blood -Bone Marrow
Propylene oxide	0.8 *Region IV*	NA	8.571E-03 *extrapolated* Medium*	NA	-Carcinogen -Nasal -Respiratory
Pydrin [or Fenvalerate]	0.5 *Region IV*	2.500E-02 *IRIS High*	1.250E-02 *extrapolated*	1.250E-02 *extrapolated*	-Neurological
Pyrene	0.5 *ATSDR*	3.000E-02 *IRIS Low*	1.500E-02 *extrapolated*	1.500E-02 *extrapolated*	-Kidney
Pyridine	0.67 *ATSDR*	1.000E-03 *IRIS Medium*	6.700E-04 *extrapolated*	6.700E-04 *extrapolated*	-Liver
Resmethrin	0.5 *Region IV*	3.000E-02 *IRIS High*	1.500E-02 *extrapolated*	1.500E-02 *extrapolated*	-Reproductive
Ronnel	0.5 *Region IV*	5.000E-02 *HEAST*	2.500E-02 *extrapolated*	2.500E-02 *extrapolated*	-Liver
Selenium	0.97 *ATSDR*	5.000E-03 *IRIS High*	4.850E-03 *extrapolated*	4.850E-03 *extrapolated*	-Hair Loss -Neurological -Skin
Silver	0.2 *Region IV*	5.000E-03 *IRIS Low*	1.000E-03 *extrapolated*	1.000E-03 *extrapolated*	-Skin
Simazine	0.5 *Region IV*	5.000E-03 *IRIS High*	2.500E-03 *extrapolated*	2.500E-03 *extrapolated*	-Blood -Body Weight -Carcinogen
Strontium	0.2 *Region IV*	6.000E-01 *IRIS Medium*	1.200E-01 *extrapolated*	1.200E-01 *extrapolated*	-Bone

Table 5b - Technical Report

Sources and Derivation of Toxicity Values Used in Calculations for Noncarcinogens

Contaminant	GI Absorption	RfDo (mg/kg/day)	RfDi (mg/kg/day)	RfDd (mg/kg/day)	Target Organ/System or Effect
Strychnine	0.5 *Region IV*	3.000E-04 *IRIS Low*	1.500E-04 *extrapolated*	1.500E-04 *extrapolated*	-Mortality
Styrene	1 *ATSDR*	2.000E-01 *IRIS Medium*	2.857E-01 *extrapolated* Medium*	2.000E-01 *extrapolated*	-Blood -Liver -Neurological
Terbacil	0.5 *Region IV*	1.300E-02 *IRIS Medium*	6.500E-03 *extrapolated*	6.500E-03 *extrapolated*	-Liver -Thyroid
Terbufos	0.5 *Region IV*	2.500E-05 *HEAST*	1.250E-05 *extrapolated*	1.250E-05 *extrapolated*	-Neurological
Tetrachlorobenzene, 1,2,4,5-	0.5 *Region IV*	3.000E-04 *IRIS Low*	1.500E-04 *extrapolated*	1.500E-04 *extrapolated*	-Kidney
Tetrachloroethane, 1,1,1,2-	0.8 *Region IV*	3.000E-02 *IRIS Low*	2.400E-02 *extrapolated*	2.400E-02 *extrapolated*	-Carcinogen -Kidney -Liver
Tetrachloroethene [or PCE]	1 *ATSDR*	1.000E-02 *IRIS Medium*	1.400E-01 *NCEA*	1.000E-02 *extrapolated*	-Body Weight -Carcinogen -Liver
Tetrachlorophenol, 2,3,4,6-	0.5 *Region IV*	3.000E-02 *IRIS Medium*	1.500E-02 *extrapolated*	1.500E-02 *extrapolated*	-Liver
Tetraethyl dithiopyrophosphate	0.5 *Region IV*	5.000E-04 *IRIS Low*	2.500E-04 *extrapolated*	2.500E-04 *extrapolated*	-Bone Marrow -Neurological
Thiram	0.5 *Region IV*	5.000E-03 *IRIS Low*	2.500E-03 *extrapolated*	2.500E-03 *extrapolated*	-Neurological
Tin	0.028 *ATSDR*	6.000E-01 *HEAST*	1.680E-02 *extrapolated*	1.680E-02 *extrapolated*	-Kidney -Liver
Toluene	0.8 *Region IV*	2.000E-01 *IRIS Medium*	1.143E-01 *extrapolated* Medium*	1.600E-01 *extrapolated*	-Kidney -Liver -Neurological
Toxaphene	0.63 *HSDB*	2.500E-04 *OPP*	1.575E-04 *extrapolated*	1.575E-04 *extrapolated*	-Carcinogen -Developmental
Triallate	0.5 *Region IV*	1.300E-02 *IRIS High*	6.500E-03 *extrapolated*	6.500E-03 *extrapolated*	-Liver -Spleen

Table 5b - Technical Report

Sources and Derivation of Toxicity Values Used in Calculations for Noncarcinogens

Contaminant	GI Absorption	RfDo (mg/kg/day)	RfDi (mg/kg/day)	RfDd (mg/kg/day)	Target Organ/System or Effect
Tributyltin oxide	0.5 *Region IV*	3.000E-04 *IRIS High*	1.500E-04 *extrapolated*	1.500E-04 *extrapolated*	-Immunological
Trichloro-1,2,2-trifluoroethane, 1,1,2- [or CFC 113]	0.8 *Region IV*	3.000E+01 *IRIS Low*	8.571E+00 *extrapolated**	2.400E+01 *extrapolated*	-Body Weight -Neurological
Trichloroacetic acid	0.5 *Region IV*	1.300E-02 *HAL*	6.500E-03 *extrapolated*	6.500E-03 *extrapolated*	-None Specified
Trichlorobenzene, 1,2,3-	0.8 *Region IV*	1.000E-02 *Surrogate (f)*	5.714E-02 *extrapolated**	8.000E-03 *extrapolated*	-Adrenals -Body Weight
Trichlorobenzene, 1,2,4-	0.9 *HSDB*	1.000E-02 *IRIS Medium*	5.714E-02 *extrapolated**	9.000E-03 *extrapolated*	-Adrenals -Body Weight
Trichlorobenzene, 1,3,5-	0.8 *Region IV*	5.700E-03 *HAL*	4.560E-03 *extrapolated*	4.560E-03 *extrapolated*	-None Specified
Trichloroethane, 1,1,1- [or Methyl chloroform]	1 *HSDB*	2.000E-02 *NCEA*	2.860E-01 *NCEA*	2.000E-02 *extrapolated*	-None Specified
Trichloroethane, 1,1,2-	0.81 *ATSDR*	4.000E-03 *IRIS Medium*	3.240E-03 *extrapolated*	3.240E-03 *extrapolated*	-Carcinogen -Liver
Trichloroethene [or TCE]	0.945 *ATSDR*	6.000E-03 *NCEA*	5.670E-03 *extrapolated*	5.670E-03 *extrapolated*	-Carcinogen
Trichlorofluoromethane	0.8 *Region IV*	3.000E-01 *IRIS Medium*	2.000E-01 *extrapolated**	2.400E-01 *extrapolated*	-Cardiovascular -Kidney -Mortality -Respiratory
Trichlorophenol, 2,4,5-	0.5 *Region IV*	1.000E-01 *IRIS Low*	5.000E-02 *extrapolated*	5.000E-02 *extrapolated*	-Kidney -Liver
Trichlorophenoxy acetic acid, 2,4,5-	0.95 *HSDB*	1.000E-02 *IRIS Medium*	9.500E-03 *extrapolated*	9.500E-03 *extrapolated*	-Kidney
Trichlorophenoxy propionic acid [or Silvex]	1 *HSDB*	8.000E-03 *IRIS Medium*	8.000E-03 *extrapolated*	8.000E-03 *extrapolated*	-Liver
Trichloropropane, 1,2,3-	0.8 *Region IV*	6.000E-03 *IRIS Low*	4.800E-03 *extrapolated*	4.800E-03 *extrapolated*	-Body Weight -Carcinogen -Kidney -Liver -Mortality

Table 5b - Technical Report

Sources and Derivation of Toxicity Values Used in Calculations for Noncarcinogens

Contaminant	GI Absorption	RfDo (mg/kg/day)	RfDi (mg/kg/day)	RfDd (mg/kg/day)	Target Organ/System or Effect
Trifluralin	0.2 *HSDB*	7.500E-03 *IRIS High*	1.500E-03 *extrapolated*	1.500E-03 *extrapolated*	-Blood -Carcinogen -Liver
Trimethylbenzene, 1,2,3-	0.8 *Region IV*	5.000E-02 *Surogate (g)*	1.700E-03 *Surrogate (g)*	4.000E-02 *extrapolated*	-None Specified
Trimethylbenzene, 1,2,4-	0.8 *Region IV*	5.000E-02 *NCEA*	1.700E-03 *NCEA*	4.000E-02 *extrapolated*	-None Specified
Trimethylbenzene, 1,3,5-	0.8 *Region IV*	5.000E-02 *NCEA*	1.700E-03 *NCEA*	4.000E-02 *extrapolated*	-None Specified
Trinitrobenzene, 1,3,5-	0.5 *Region IV*	3.000E-02 *IRIS Medium*	1.500E-02 *extrapolated*	1.500E-02 *extrapolated*	-Blood -Spleen
Trinitrotoluene, 2,4,6-	0.5 *Region IV*	5.000E-04 *IRIS Medium*	2.500E-04 *extrapolated*	2.500E-04 *extrapolated*	-Carcinogen -Liver
TRPH	0.8 *ATSDR*	4.000E-02 *TPHCWG*	5.714E-02 *extrapolated**	3.200E-02 *extrapolated*	-Multiple Endpoints Mixed Contaminants
Uranium, natural	0.002 *ATSDR*	3.000E-03 *NCEA*	6.000E-06 *extrapolated*	6.000E-06 *extrapolated*	-None Specified
Vanadium	0.026 *ATSDR*	7.000E-03 *HEAST*	1.820E-04 *extrapolated*	1.820E-04 *extrapolated*	-None Specified
Vernam	0.5 *Region IV*	1.000E-03 *IRIS Low*	5.000E-04 *extrapolated*	5.000E-04 *extrapolated*	-Body Weight
Vinyl acetate	0.8 *Region IV*	1.000E+00 *HEAST*	5.714E-02 *extrapolated* High*	8.000E-01 *extrapolated*	-Body Weight -Kidney -Nasal
Xylenes, total	0.895 *ATSDR*	2.000E+00 *IRIS Medium*	1.790E+00 *extrapolated*	1.790E+00 *extrapolated*	-Body Weight -Mortality -Neurological
Zinc	0.25 *ATSDR*	3.000E-01 *IRIS Medium*	7.500E-02 *extrapolated*	7.500E-02 *extrapolated*	-Blood
Zinc phosphide	0.2 *Region IV*	3.000E-04 *IRIS Low*	6.000E-05 *extrapolated*	6.000E-05 *extrapolated*	-Body Weight

Table 5b - Technical Report

Sources and Derivation of Toxicity Values Used in Calculations for Noncarcinogens

Contaminant	GI Absorption	RfDo (mg/kg/day)	RfDi (mg/kg/day)	RfDd (mg/kg/day)	Target Organ/System or Effect
Zineb	0.5 *Region IV*	5.000E-02 *IRIS Medium*	2.500E-02 *extrapolated*	2.500E-02 *extrapolated*	-Thyroid

Note: Although reference doses are reported for all contaminants for which they are available, some contaminants have both carcinogenic and non-carcinogenic health effects. In those cases SCTLs are generated for both endpoints and the lower of the two SCTLs are provided.

extrapolated = Extrapolated from a reference dose for another route of administration

extrapolated* = Extrapolated from an inhalation reference concentration

"Low", "Medium", and "High" are taken from IRIS and are qualitative descriptors of the USEPA's confidence in the reference doses contained in IRIS.

Reference sources for toxicity data:

IRIS: U.S. EPA's Integrated Risk Information System

HEAST: U.S. EPA's Health Effects Assessment Summary Tables

NCEA: National Center for Environmental Assessment

OPP: U.S. EPA's Office of Pesticide "Programs Reference Dose Tracking Report"

HAL: Drinking Regulations and Health Advisories (U.S. EPA Office of Water)

IRIS (modified): Oral RfD for manganese modified in accordance with guidance from IRIS regarding background exposure

HEAST-WD: Value withdrawn from Health Effects Assessment Summary Tables

Surrogate (a): Surrogate RfD based on other non-carcinogenic PAHs (e.g., pyrene)

Surrogate (c): Surrogate RfD based oral RfD for 2,4-dichlorophenol

Surrogate (b): Surrogate RfD based on oral RfD for 2-chlorophenol

Surrogate (d): Surrogate RfD based on oral RfD for HCH-gamme (lindane)

Surrogate (e): Surrogate RfD based on other non-carcinogenic PAHs (e.g., naphthalene)

Surrogate (f): Surrogate RfD based on oral RfD for 1,2,4-trichlorobenzene

Surrogate (g): Surrogate RfD based on oral RfD for 1,2,4-trimethylbenzene

Table 6 - Technical Report

Chemicals Sorted by Target Organ

Chemical	Target Organ/System or Effect
Adrenals	
Cumene [or Isopropyl benzene]	-Adrenals -Kidney
Dicofol [or Kelthane]	-Adrenals -Carcinogen
Nitrobenzene	-Adrenals -Blood -Kidney -Liver
Trichlorobenzene, 1,2,3-	-Adrenals -Body Weight
Trichlorobenzene, 1,2,4-	-Adrenals -Body Weight
Blood	
Acetonitrile	-Blood -Liver
Alachlor	-Blood -Carcinogen
Aniline	-Blood -Carcinogen
Antimony	-Blood -Mortality
Bayleton	-Blood -Body Weight
Bentazon	-Blood
Bis(2-chloroisopropyl)ether	-Blood -Carcinogen
Dichloroethene, cis-1,2-	-Blood
Dichloroethene, trans-1,2-	-Blood -Liver
Dimethylphenol, 2,4-	-Blood -Neurological
Dinitrotoluene, 2,6-	-Blood -Carcinogen -Kidney -Mortality -Neurological
Diuron	-Blood
Ethylene diamine	-Blood -Cardiovascular
Fluoranthene	-Blood -Kidney -Liver
Fluorene	-Blood
Hydroquinone	-Blood
Iron	-Blood -Gastrointestinal
Linuron	-Blood
Methyl parathion [or Parathion, methyl]	-Blood -Neurological
Methylene bromide	-Blood
Nitrate	-Blood
Nitrite	-Blood
Nitroaniline, o-	-Blood
Nitrobenzene	-Adrenals -Blood -Kidney -Liver
Pebulate	-Blood
Propylene glycol	-Blood -Bone Marrow
Simazine	-Blood -Body Weight -Carcinogen
Styrene	-Blood -Liver -Neurological
Trifluralin	-Blood -Carcinogen -Liver

Chemical	Target Organ/System or Effect
Trinitrobenzene, 1,3,5-	-Blood -Spleen
Zinc	-Blood

Body Weight

Acenaphthylene	-Body Weight -Liver
Aluminum	-Body Weight
Aluminum phosphide	-Body Weight
Atrazine	-Body Weight -Carcinogen
Bayleton	-Blood -Body Weight
Bisphenol A	-Body Weight
Bromacil	-Body Weight
Calcium cyanide	-Body Weight -Neurological -Thyroid
Captan	-Body Weight -Carcinogen
Chlorine	-Body Weight
Chlorine cyanide [or Cyanogen chloride]	-Body Weight -Neurological -Thyroid
Chloro-1,3-butadiene [or Chloroprene]	-Body Weight -Hair Loss -Nasal
Chloro-m-cresol, p- [or 4-chloro-3-methylphenol]	-Body Weight
Chlorobenzilate	-Body Weight -Carcinogen
Chlorotoluene, o-	-Body Weight
Cyanide (potassium salt)	-Body Weight -Neurological -Thyroid
Cyclohexanone	-Body Weight
Dichlorobenzene, 1,2-	-Body Weight
Dichlorodifluoromethane	-Body Weight -Liver
Diethylphthalate	-Body Weight
Endosulfan	-Body Weight -Cardiovascular -Kidney
Ethoxyethanol, 2-	-Body Weight -Reproductive
Ethyl acetate	-Body Weight -Mortality
Ethyl ether	-Body Weight
Formaldehyde	-Body Weight -Carcinogen -Gastrointestinal
Hexazinone	-Body Weight
Merphos	-Body Weight -Neurological
Methylnaphthalene, 1-	-Body Weight -Nasal
Methylnaphthalene, 2-	-Body Weight -Nasal
Methylphenol, 2- [or o-Cresol]	-Body Weight -Neurological
Methylphenol, 3- [or m-Cresol]	-Body Weight -Neurological
Metolachlor	-Body Weight
Metribuzin	-Body Weight -Kidney -Liver -Mortality
Naphthalene	-Body Weight -Nasal

Table 6 - Technical Report

Chemicals Sorted by Target Organ

Chemical	Target Organ/System or Effect
Nickel	-Body Weight
Oxamyl	-Body Weight
Phosmet	-Body Weight -Liver -Neurological
Propachlor	-Body Weight -Liver
Propazine	-Body Weight
Simazine	-Blood -Body Weight -Carcinogen
Tetrachloroethene [or PCE]	-Body Weight -Carcinogen -Liver
Trichloro-1,2,2-trifluoroethane, 1,1,2- [or CFC 113	-Body Weight -Neurological
Trichlorobenzene, 1,2,3-	-Adrenals -Body Weight
Trichlorobenzene, 1,2,4-	-Adrenals -Body Weight
Trichloropropane, 1,2,3-	-Body Weight -Carcinogen -Kidney -Liver -Mortality
Vernam	-Body Weight
Vinyl acetate	-Body Weight -Kidney -Nasal
Xylenes, total	-Body Weight -Mortality -Neurological
Zinc phosphide	-Body Weight

Bone Marrow

Chlorpropham	-Bone Marrow -Kidney -Liver -Spleen
Prometryn	-Bone Marrow -Kidney -Liver
Propylene glycol	-Blood -Bone Marrow
Tetraethyl dithiopyrophosphate	-Bone Marrow -Neurological

Carcinogen

Acephate	-Carcinogen -Neurological
Acrylamide	-Carcinogen -Neurological
Acrylonitrile	-Carcinogen -Nasal -Reproductive
Alachlor	-Blood -Carcinogen
Aldrin	-Carcinogen -Liver
Aniline	-Blood -Carcinogen
Arsenic	-Carcinogen -Cardiovascular -Skin
Atrazine	-Body Weight -Carcinogen
Azobenzene	-Carcinogen
Benzene	-Carcinogen
Benzo(a)anthracene	-Carcinogen
Benzo(a)pyrene	-Carcinogen
Benzo(b)fluoranthene	-Carcinogen
Benzo(k)fluoranthene	-Carcinogen
Benzotrichloride	-Carcinogen

Table 6 - Technical Report
Chemicals Sorted by Target Organ

Chemical	Target Organ/System or Effect
Benzyl chloride	-Carcinogen
Beryllium	-Carcinogen -Gastrointestinal -Respiratory
Bis(2-chloroethyl)ether	-Carcinogen
Bis(2-chloroisopropyl)ether	-Blood -Carcinogen
Bis(2-ethylhexyl)phthalate [or DEHP]	-Carcinogen -Liver
Bromodichloromethane	-Carcinogen -Kidney
Bromoform	-Carcinogen -Liver
Cadmium	-Carcinogen -Kidney
Captan	-Body Weight -Carcinogen
Carbazole	-Carcinogen
Carbon tetrachloride	-Carcinogen -Liver
Chlordane	-Carcinogen -Liver
Chlorobenzilate	-Body Weight -Carcinogen
Chloroform	-Carcinogen -Liver
Chloromethane	-Carcinogen
Chloronitrobenzene, p-	-Carcinogen
Chlorothalonil [or Bravo]	-Carcinogen -Kidney
Chromium (hexavalent)	-Carcinogen -Respiratory
Chrysene	-Carcinogen
Crotonaldehyde	-Carcinogen
DDD, 4,4'-	-Carcinogen
DDE, 4,4'-	-Carcinogen
DDT, 4,4'-	-Carcinogen -Liver
Diallate	-Carcinogen
Dibenz(a,h)anthracene	-Carcinogen
Dibromo-3-chloropropane, 1-2- [or DBCP]	-Carcinogen -Reproductive
Dibromochloromethane	-Carcinogen -Liver
Dibromoethane, 1,2- [or EDB]	-Carcinogen -Reproductive
Dichlorobenzene, 1,4-	-Carcinogen -Liver
Dichlorobenzidine, 3,3'-	-Carcinogen
Dichloroethane, 1,2- [or EDC]	-Carcinogen
Dichloroethene, 1,1-	-Carcinogen -Liver
Dichloropropane, 1,2-	-Carcinogen -Nasal
Dichloropropene, 1,3-	-Carcinogen -Kidney -Nasal
Dichlorvos	-Carcinogen -Neurological
Dicofol [or Kelthane]	-Adrenals -Carcinogen
Dieldrin	-Carcinogen -Liver

Table 6 - Technical Report
Chemicals Sorted by Target Organ

Chemical	Target Organ/System or Effect
Dinitrotoluene, 2,4-	-Carcinogen -Liver -Neurological
Dinitrotoluene, 2,6-	-Blood -Carcinogen -Kidney -Mortality -Neurological
Dioxane, 1,4-	-Carcinogen
Dioxin [or 2,3,7,8-TCDD]	-Carcinogen
Diphenylhydrazine, 1,2-	-Carcinogen
Epichlorohydrin	-Carcinogen -Kidney -Nasal
Ethyl acrylate	-Carcinogen
Ethyl chloride [or Chloroethane]	-Carcinogen -Developmental
Ethylene oxide	-Carcinogen
Formaldehyde	-Body Weight -Carcinogen -Gastrointestinal
Heptachlor	-Carcinogen -Liver
Heptachlor epoxide	-Carcinogen -Liver
Hexachloro-1,3-butadiene	-Carcinogen -Kidney
Hexachlorobenzene	-Carcinogen -Liver
Hexachlorocyclohexane, alpha-	-Carcinogen
Hexachlorocyclohexane, beta-	-Carcinogen
Hexachlorocyclohexane, gamma- [or Lindane]	-Carcinogen -Kidney -Liver
Hexachloroethane	-Carcinogen -Kidney
Hexahydro-1,3,5-trinitro-1,3,5-triazine [or RDX]	-Carcinogen -Reproductive
Indeno(1,2,3-cd)pyrene	-Carcinogen
Isophorone	-Carcinogen
Methoxy-5-nitroaniline, 2-	-Carcinogen
Methylaniline, 2-	-Carcinogen
Methylene bis(2-chloroaniline), 4,4-	-Carcinogen -Liver -Bladder
Methylene chloride	-Carcinogen -Liver
Nitroso-di-ethylamine, N-	-Carcinogen
Nitroso-di-n-butylamine, N-	-Carcinogen
Nitroso-di-n-propylamine, N-	-Carcinogen
Nitroso-dimethylamine, N-	-Carcinogen
Nitroso-diphenylamine, N-	-Carcinogen
Nitroso-N-methylethylamine, N-	-Carcinogen
PCBs [Aroclor miture]	-Carcinogen -Immunological
Pentachloronitrobenzene	-Carcinogen -Liver
Pentachlorophenol	-Carcinogen -Kidney -Liver
Phenylphenol, 2-	-Carcinogen
Propylene oxide	-Carcinogen -Nasal -Respiratory
Simazine	-Blood -Body Weight -Carcinogen

Table 6 - Technical Report

Chemicals Sorted by Target Organ

Chemical	Target Organ/System or Effect
Tetrachloroethane, 1,1,1,2-	-Carcinogen -Kidney -Liver
Tetrachloroethane, 1,1,2,2-	-Carcinogen
Tetrachloroethene [or PCE]	-Body Weight -Carcinogen -Liver
Toluidine, p-	-Carcinogen
Toxaphene	-Carcinogen -Developmental
Trichloroethane, 1,1,2-	-Carcinogen -Liver
Trichloroethene [or TCE]	-Carcinogen
Trichlorophenol, 2,4,6-	-Carcinogen
Trichloropropane, 1,2,3-	-Body Weight -Carcinogen -Kidney -Liver -Mortality
Trifluralin	-Blood -Carcinogen -Liver
Trimethyl phosphate	-Carcinogen
Trinitrotoluene, 2,4,6-	-Carcinogen -Liver
Vinyl chloride	-Carcinogen
Cardiovascular	
Arsenic	-Carcinogen -Cardiovascular -Skin
Barium	-Cardiovascular
Chloroacetic acid	-Cardiovascular
Cobalt	-Cardiovascular -Immunological -Neurological -Reproductive
Endosulfan	-Body Weight -Cardiovascular -Kidney
Ethyl dipropylthiocarbamate, S- [or EPTC]	-Cardiovascular
Ethylene diamine	-Blood -Cardiovascular
Trichlorofluoromethane	-Cardiovascular -Kidney -Mortality -Respiratory
Developmental	
Benomyl	-Developmental
Bidrin [or Dicrotophos]	-Developmental
Butanone, 2- [or MEK]	-Developmental
Carbon disulfide	-Developmental -Neurological
Dicamba	-Developmental
Dinoseb	-Developmental
Ethyl chloride [or Chloroethane]	-Carcinogen -Developmental
Ethylbenzene	-Developmental -Kidney -Liver
Methoxychlor	-Developmental -Reproductive
Phenol	-Developmental
Toxaphene	-Carcinogen -Developmental
Eye	
Dinitrophenol, 2,4-	-Eye

Table 6 - Technical Report

Chemicals Sorted by Target Organ

Chemical	Target Organ/System or Effect
Methyl tert-butyl ether [or MTBE]	-Eye -Kidney -Liver
Gastrointestinal	
Benzaldehyde	-Gastrointestinal -Kidney
Benzyl alcohol	-Gastrointestinal
Beryllium	-Carcinogen -Gastrointestinal -Respiratory
Bromomethane [or Methyl bromide]	-Gastrointestinal
Copper	-Gastrointestinal
Cypermethrin	-Gastrointestinal
Dimethylformamide, N,N-	-Gastrointestinal -Liver
Endothall	-Gastrointestinal
Formaldehyde	-Body Weight -Carcinogen -Gastrointestinal
Hexachlorocyclopentadiene	-Gastrointestinal
Iron	-Blood -Gastrointestinal
Hair Loss	
Chloro-1,3-butadiene [or Chloroprene]	-Body Weight -Hair Loss -Nasal
Selenium	-Hair Loss -Neurological -Skin
Immunological	
Cobalt	-Cardiovascular -Immunological -Neurological -Reproductive
Dichlorophenol, 2,4-	-Immunological
PCBs [Aroclor miture]	-Carcinogen -Immunological
Tributyltin oxide	-Immunological
Kidney	
Acetone	-Kidney -Liver -Neurological
Allyl alcohol	-Kidney -Liver
Benzaldehyde	-Gastrointestinal -Kidney
Biphenyl, 1,1- [or Diphenyl]	-Kidney
Bromodichloromethane	-Carcinogen -Kidney
Cadmium	-Carcinogen -Kidney
Carbaryl [or Sevin]	-Kidney -Liver
Chlorothalonil [or Bravo]	-Carcinogen -Kidney
Chlorpropham	-Bone Marrow -Kidney -Liver -Spleen
Cumene [or Isopropyl benzene]	-Adrenals -Kidney
Di-n-octylphthalate	-Kidney -Liver
Dichloroethane, 1,1-	-Kidney
Dichlorophenoxy acetic acid, 2,4-	-Kidney -Liver
Dichloropropene, 1,3-	-Carcinogen -Kidney -Nasal

Table 6 - Technical Report

Chemicals Sorted by Target Organ

Chemical	Target Organ/System or Effect
Dimethylphthalate	-Kidney
Dinitrotoluene, 2,6-	-Blood -Carcinogen -Kidney -Mortality -Neurological
Endosulfan	-Body Weight -Cardiovascular -Kidney
Epichlorohydrin	-Carcinogen -Kidney -Nasal
Ethyl methacrylate	-Kidney
Ethylbenzene	-Developmental -Kidney -Liver
Ethylene glycol	-Kidney
Fluoranthene	-Blood -Kidney -Liver
Hexachloro-1,3-butadiene	-Carcinogen -Kidney
Hexachlorocyclohexane, delta-	-Kidney -Liver
Hexachlorocyclohexane, gamma- [or Lindane]	-Carcinogen -Kidney -Liver
Hexachloroethane	-Carcinogen -Kidney
Methomyl	-Kidney -Spleen
Methyl isobutyl ketone [or MIBK]	-Kidney -Liver
Methyl tert-butyl ether [or MTBE]	-Eye -Kidney -Liver
Methyl-4-chlorophenoxy acetic acid, 2-	-Kidney -Liver
Metribuzin	-Body Weight -Kidney -Liver -Mortality
Nitrobenzene	-Adrenals -Blood -Kidney -Liver
Pentachlorobenzene	-Kidney -Liver
Pentachlorophenol	-Carcinogen -Kidney -Liver
Phenanthrene	-Kidney
Phthalic anhydride	-Kidney -Nasal -Respiratory
Prometryn	-Bone Marrow -Kidney -Liver
Pyrene	-Kidney
Tetrachlorobenzene, 1,2,4,5-	-Kidney
Tetrachloroethane, 1,1,1,2-	-Carcinogen -Kidney -Liver
Tin	-Kidney -Liver
Toluene	-Kidney -Liver -Neurological
Trichlorofluoromethane	-Cardiovascular -Kidney -Mortality -Respiratory
Trichlorophenol, 2,4,5-	-Kidney -Liver
Trichlorophenoxy acetic acid, 2,4,5-	-Kidney
Trichloropropane, 1,2,3-	-Body Weight -Carcinogen -Kidney -Liver -Mortality
Vinyl acetate	-Body Weight -Kidney -Nasal

Liver

Acenaphthene	-Liver
Acenaphthylene	-Body Weight -Liver
Acetone	-Kidney -Liver -Neurological

Table 6 - Technical Report

Chemicals Sorted by Target Organ

Chemical	Target Organ/System or Effect
Acetonitrile	-Blood -Liver
Aldrin	-Carcinogen -Liver
Allyl alcohol	-Kidney -Liver
Ametryn	-Liver
Benzenethiol	-Liver
Bis(2-ethylhexyl)phthalate [or DEHP]	-Carcinogen -Liver
Bromoform	-Carcinogen -Liver
Butyl benzyl phthalate, n-	-Liver
Butylate	-Liver
Carbaryl [or Sevin]	-Kidney -Liver
Carbon tetrachloride	-Carcinogen -Liver
Chlordane	-Carcinogen -Liver
Chlorobenzene	-Liver
Chloroform	-Carcinogen -Liver
Chloronaphthalene, beta-	-Liver -Respiratory
Chlorpropham	-Bone Marrow -Kidney -Liver -Spleen
DDT, 4,4'-	-Carcinogen -Liver
Di-n-octylphthalate	-Kidney -Liver
Dibromochloromethane	-Carcinogen -Liver
Dichlorobenzene, 1,4-	-Carcinogen -Liver
Dichlorodifluoromethane	-Body Weight -Liver
Dichloroethene, 1,1-	-Carcinogen -Liver
Dichloroethene, trans-1,2-	-Blood -Liver
Dichlorophenoxy acetic acid, 2,4-	-Kidney -Liver
Dieldrin	-Carcinogen -Liver
Dimethrin	-Liver
Dimethylformamide, N,N-	-Gastrointestinal -Liver
Dinitrotoluene, 2,4-	-Carcinogen -Liver -Neurological
Diphenamid	-Liver
Endrin	-Liver
Ethylbenzene	-Developmental -Kidney -Liver
Fluoranthene	-Blood -Kidney -Liver
Fonofos	-Liver -Neurological
Furfural	-Liver -Nasal
Heptachlor	-Carcinogen -Liver
Heptachlor epoxide	-Carcinogen -Liver
Hexachlorobenzene	-Carcinogen -Liver

Table 6 - Technical Report
Chemicals Sorted by Target Organ

Chemical	Target Organ/System or Effect
Hexachlorocyclohexane, delta-	-Kidney -Liver
Hexachlorocyclohexane, gamma- [or Lindane]	-Carcinogen -Kidney -Liver
Methacrylonitrile	-Liver
Methanol	-Liver -Neurological
Methidathion	-Liver
Methyl acetate	-Liver
Methyl isobutyl ketone [or MIBK]	-Kidney -Liver
Methyl tert-butyl ether [or MTBE]	-Eye -Kidney -Liver
Methyl-4-chlorophenoxy acetic acid, 2-	-Kidney -Liver
Methylene bis(2-chloroaniline), 4,4-	-Carcinogen -Liver -Bladder
Methylene chloride	-Carcinogen -Liver
Metribuzin	-Body Weight -Kidney -Liver -Mortality
Nitrobenzene	-Adrenals -Blood -Kidney -Liver
Pendimethalin	-Liver
Pentachlorobenzene	-Kidney -Liver
Pentachloronitrobenzene	-Carcinogen -Liver
Pentachlorophenol	-Carcinogen -Kidney -Liver
Permethrin	-Liver
Phosmet	-Body Weight -Liver -Neurological
Prometryn	-Bone Marrow -Kidney -Liver
Propachlor	-Body Weight -Liver
Pyridine	-Liver
Ronnel	-Liver
Styrene	-Blood -Liver -Neurological
Terbacil	-Liver -Thyroid
Tetrachloroethane, 1,1,1,2-	-Carcinogen -Kidney -Liver
Tetrachloroethene [or PCE]	-Body Weight -Carcinogen -Liver
Tetrachlorophenol, 2,3,4,6-	-Liver
Tin	-Kidney -Liver
Toluene	-Kidney -Liver -Neurological
Triallate	-Liver -Spleen
Trichloroethane, 1,1,2-	-Carcinogen -Liver
Trichlorophenol, 2,4,5-	-Kidney -Liver
Trichlorophenoxy propionic acid [or Silvex]	-Liver
Trichloropropane, 1,2,3-	-Body Weight -Carcinogen -Kidney -Liver -Mortality
Trifluralin	-Blood -Carcinogen -Liver
Trinitrotoluene, 2,4,6-	-Carcinogen -Liver

Table 6 - Technical Report

Chemicals Sorted by Target Organ

Chemical	Target Organ/System or Effect
Maternal Death	
Methylphenol, 4- [or p-Cresol]	-Maternal Death -Neurological -Respiratory
Mortality	
Antimony	-Blood -Mortality
Di-n-butylphthalate	-Mortality
Dinitrotoluene, 2,6-	-Blood -Carcinogen -Kidney -Mortality -Neurological
Ethyl acetate	-Body Weight -Mortality
Metribuzin	-Body Weight -Kidney -Liver -Mortality
Strychnine	-Mortality
Trichlorofluoromethane	-Cardiovascular -Kidney -Mortality -Respiratory
Trichloropropane, 1,2,3-	-Body Weight -Carcinogen -Kidney -Liver -Mortality
Xylenes, total	-Body Weight -Mortality -Neurological
Nasal	
Acrolein	-Nasal
Acrylonitrile	-Carcinogen -Nasal -Reproductive
Chloro-1,3-butadiene [or Chloroprene]	-Body Weight -Hair Loss -Nasal
Dichloropropane, 1,2-	-Carcinogen -Nasal
Dichloropropene, 1,3-	-Carcinogen -Kidney -Nasal
Epichlorohydrin	-Carcinogen -Kidney -Nasal
Furfural	-Liver -Nasal
Methyl methacrylate	-Nasal
Methylnaphthalene, 1-	-Body Weight -Nasal
Methylnaphthalene, 2-	-Body Weight -Nasal
Naphthalene	-Body Weight -Nasal
Phthalic anhydride	-Kidney -Nasal -Respiratory
Propylene oxide	-Carcinogen -Nasal -Respiratory
Vinyl acetate	-Body Weight -Kidney -Nasal
Neurological	
Acephate	-Carcinogen -Neurological
Acetone	-Kidney -Liver -Neurological
Acrylamide	-Carcinogen -Neurological
Aldicarb [or Temik]	-Neurological
Benzo(g,h,i)perylene	-Neurological
Butanol, 1-	-Neurological
Calcium cyanide	-Body Weight -Neurological -Thyroid
Carbofuran	-Neurological -Reproductive

Table 6 - Technical Report

Chemicals Sorted by Target Organ

Chemical	Target Organ/System or Effect
Carbon disulfide	-Developmental -Neurological
Carbophenothion [or Trithion]	-Neurological
Chlorine cyanide [or Cyanogen chloride]	-Body Weight -Neurological -Thyroid
Chlorpyrifos	-Neurological
Cobalt	-Cardiovascular -Immunological -Neurological -Reproductive
Coumaphos	-Neurological
Cyanide (potassium salt)	-Body Weight -Neurological -Thyroid
Cycloate	-Neurological
Diazinon	-Neurological
Dichlorvos	-Carcinogen -Neurological
Dimethoate	-Neurological
Dimethylphenol, 2,4-	-Blood -Neurological
Dinitrotoluene, 2,4-	-Carcinogen -Liver -Neurological
Dinitrotoluene, 2,6-	-Blood -Carcinogen -Kidney -Mortality -Neurological
Disulfoton	-Neurological
Ethion	-Neurological
Ethoprop	-Neurological
Ethyl p-nitrophenyl phenylphosphorothioate [or EP	-Neurological
Fenamiphos	-Neurological
Fensulfothion	-Neurological
Fonofos	-Liver -Neurological
Guthion [or Azinphos, methyl]	-Neurological
Hexane, n-	-Neurological
Isobutyl alcohol	-Neurological
Lead	-Neurological
Malathion	-Neurological
Manganese	-Neurological
Mercury	-Neurological
Mercury, methyl	-Neurological
Merphos	-Body Weight -Neurological
Methamidophos	-Neurological
Methanol	-Liver -Neurological
Methyl parathion [or Parathion, methyl]	-Blood -Neurological
Methylphenol, 2- [or o-Cresol]	-Body Weight -Neurological
Methylphenol, 3- [or m-Cresol]	-Body Weight -Neurological
Methylphenol, 4- [or p-Cresol]	-Maternal Death -Neurological -Respiratory
Mevinphos	-Neurological

Table 6 - Technical Report

Chemicals Sorted by Target Organ

Chemical	Target Organ/System or Effect
Naled	-Neurological
Octamethylpyrophosphoramide	-Neurological
Parathion	-Neurological
Phorate	-Neurological
Phosmet	-Body Weight -Liver -Neurological
Pydrin [or Fenvalerate]	-Neurological
Selenium	-Hair Loss -Neurological -Skin
Styrene	-Blood -Liver -Neurological
Terbufos	-Neurological
Tetraethyl dithiopyrophosphate	-Bone Marrow -Neurological
Thiram	-Neurological
Toluene	-Kidney -Liver -Neurological
Trichloro-1,2,2-trifluoroethane, 1,1,2- [or CFC 113	-Body Weight -Neurological
Xylenes, total	-Body Weight -Mortality -Neurological

None Specified

Acetophenone	-None Specified
Anthracene	-None Specified
Benzoic acid	-None Specified
Bromochloromethane	-None Specified
Butylphthalyl butylglycolate	-None Specified
Chlorophenol, 3-	-None Specified
Chlorophenol, 4-	-None Specified
Chlorotoluene, p-	-None Specified
Cyanogen	-None Specified
Dibenzofuran	-None Specified
Dichloroacetic acid	-None Specified
Dichloroacetonitrile	-None Specified
Dichlorobenzene, 1,3-	-None Specified
Dichlorophenol, 2,3-	-None Specified
Dichlorophenol, 2,5-	-None Specified
Dichlorophenol, 2,6-	-None Specified
Dichlorophenol, 3,4-	-None Specified
Dichlorprop	-None Specified
Fluometuron	-None Specified
Hexanone, 2- [or Methyl butyl ketone]	-None Specified
Lithium	-None Specified
Methyl acrylate	-None Specified

Table 6 - Technical Report

Chemicals Sorted by Target Organ

Chemical	Target Organ/System or Effect
Nitroaniline, p-	-None Specified
Nitrophenol, 4-	-None Specified
Prometon	-None Specified
Trichloroacetic acid	-None Specified
Trichlorobenzene, 1,3,5-	-None Specified
Trichloroethane, 1,1,1- [or Methyl chloroform]	-None Specified
Trimethylbenzene, 1,2,3-	-None Specified
Trimethylbenzene, 1,2,4-	-None Specified
Trimethylbenzene, 1,3,5-	-None Specified
Uranium, natural	-None Specified
Vanadium	-None Specified

Reproductive

Acrylonitrile	-Carcinogen -Nasal -Reproductive
Boron	-Reproductive -Respiratory
Carbofuran	-Neurological -Reproductive
Chlorophenol, 2-	-Reproductive
Cobalt	-Cardiovascular -Immunological -Neurological -Reproductive
Dibromo-3-chloropropane, 1-2- [or DBCP]	-Carcinogen -Reproductive
Dibromoethane, 1,2- [or EDB]	-Carcinogen -Reproductive
Ethoxyethanol, 2-	-Body Weight -Reproductive
Hexahydro-1,3,5-trinitro-1,3,5-triazine [or RDX]	-Carcinogen -Reproductive
Methoxychlor	-Developmental -Reproductive
Molinate	-Reproductive
Resmethrin	-Reproductive

Respiratory

Ammonia	-Respiratory
Beryllium	-Carcinogen -Gastrointestinal -Respiratory
Boron	-Reproductive -Respiratory
Chloronaphthalene, beta-	-Liver -Respiratory
Chromium (hexavalent)	-Carcinogen -Respiratory
Methylphenol, 4- [or p-Cresol]	-Maternal Death -Neurological -Respiratory
Paraquat	-Respiratory
Phthalic anhydride	-Kidney -Nasal -Respiratory
Propylene oxide	-Carcinogen -Nasal -Respiratory
Trichlorofluoromethane	-Cardiovascular -Kidney -Mortality -Respiratory

Table 6 - Technical Report

Chemicals Sorted by Target Organ

Chemical	Target Organ/System or Effect
Skin	
Arsenic	-Carcinogen -Cardiovascular -Skin
Selenium	-Hair Loss -Neurological -Skin
Silver	-Skin
Spleen	
Chloroaniline, 4-	-Spleen
Chlorpropham	-Bone Marrow -Kidney -Liver -Spleen
Dinitrobenzene, 1,2- (o)	-Spleen
Dinitrobenzene, 1,3- (m)	-Spleen
Methomyl	-Kidney -Spleen
Nitrotoluene, m-	-Spleen
Nitrotoluene, o-	-Spleen
Nitrotoluene, p-	-Spleen
Propanil	-Spleen
Triallate	-Liver -Spleen
Trinitrobenzene, 1,3,5-	-Blood -Spleen
Thyroid	
Calcium cyanide	-Body Weight -Neurological -Thyroid
Chlorine cyanide [or Cyanogen chloride]	-Body Weight -Neurological -Thyroid
Cyanide (potassium salt)	-Body Weight -Neurological -Thyroid
Maneb	-Thyroid
Terbacil	-Liver -Thyroid
Zineb	-Thyroid
Other	
Fluoride	-Teeth
Methylene bis(2-chloroaniline), 4,4-	-Carcinogen -Liver -Bladder
Molybdenum	-Gout
Phenylenediamine, p-	-Whole Body
Strontium	-Bone
TRPH	-Multiple Endpoints Mixed Contaminants

Table 7 - Technical Report

Contaminant Name and CAS# Cross Reference

Alternative Contaminant Name	Chapter 62-777 F.A.C. Contaminant Name	CAS #
Ally	Metsulfuron, methyl [or Ally]	74223-64-6
Azinphos, methyl	Guthion [or Azinphos, methyl]	86-50-0
Baygon	Propoxur [or Baygon]	114-26-1
Betanal	Phenmedipham [or Betanal]	13684-63-4
BHC	Hexachlorocyclohexane [technical or BHC]	608-73-1
Bis(2-chloro-1-metylethyl)ether	Bis(2-chloroisopropyl)ether	108-60-1
Blazer	Acifluorfen, sodium [or Blazer]	62476-59-9
Bravo	Chlorothalonil [or Bravo]	1897-45-6
CFC 113	Trichloro-1,2,2-trifluoroethane, 1,1,2- [or CFC 113]	76-13-1
Chloro-3-methylphenol, 4-	Chloro-m-cresol, p- [or 4-chloro-3-methylphenol]	59-50-7
Chloroethane	Ethyl chloride [or Chloroethane]	75-00-3
Chloroprene	Chloro-1,3-butadiene [or Chloroprene]	126-99-8
Cresol, m-	Methylphenol, 3- [or m-Cresol]	108-39-4
Cresol, p-	Methylphenol, 4- [or p-Cresol]	106-44-5
Cresol,o-	Methylphenol, 2- [or o-Cresol]	95-48-7
Cyanogen chloride	Chlorine cyanide [or Cyanogen chloride]	506-77-4
DB, 2,4-	Dichlorophenoxy butyric acid, 2,4- [or 2,4-DB]	94-82-6
DBCP	Dibromo-3-chloropropane, 1-2- [or DBCP]	96-12-8
DCPA	Dacthal [or DCPA]	1861-32-1
DEHP	Bis(2-ethylhexyl)phthalate [or DEHP]	117-81-7
Dicrotophos	Bidrin [or Dicrotophos]	141-66-2
Diphenyl	Biphenyl, 1,1- [or Diphenyl]	92-52-4
Dyrene	Anilazine [or Dyrene]	101-05-3
EDB	Dibromoethane, 1,2- [or EDB]	106-93-4
EDC	Dichloroethane, 1,2- [or EDC]	107-06-2
EPEG	Ethylphthalyl ethylglycolate [or EPEG]	84-72-0
EPN	Ethyl p-nitrophenyl phenylphosphorothioate [or EPN]	2104-64-5
EPTC	Ethyl dipropylthiocarbamate, S- [or EPTC]	759-94-4
ETU	Ethylene thiourea [or ETU]	96-45-7
Fenvalerate	Pydrin [or Fenvalerate]	51630-58-1
HMX	Octahydro-1,3,5,7-tetranitro-tetrazocine [or HMX]	2691-41-0
Isopropyl benzene	Cumene [or Isopropyl benzene]	98-82-8
Karate	Cyhalothrin, lambda [or Karate]	68085-85-8
Kelthane	Dicofol [or Kelthane]	115-32-2
Lindane	Hexachlorocyclohexane, gamma- [or Lindane]	58-89-9
MEK	Butanone, 2- [or MEK]	78-93-3
Methyl bromide	Bromomethane [or Methyl bromide]	74-83-9
Methyl butyl ketone	Hexanone, 2- [or Methyl butyl ketone]	591-78-6
Methyl chloroform	Trichloroethane, 1,1,1- [or Methyl chloroform]	71-55-6
MIBK	Methyl isobutyl ketone [or MIBK]	108-10-1
MTBE	Methyl tert-butyl ether [or MTBE]	1634-04-4
Parathion, methy-	Methyl parathion [or Parathion, methyl]	298-00-0
PCBs	PCBs [Aroclor miture]	1336-36-3
PCE	Tetrachloroethene [or PCE]	127-18-4
RDX	Hexahydro-1,3,5-trinitro-1,3,5-triazine [or RDX]	121-82-4
Roundup	Glyphosate [or Roundup]	1071-83-6
Sevin	Carbaryl [or Sevin]	63-25-2
Silvex	Trichlorophenoxy propionic acid [or Silvex]	93-72-1
TCDD, 2,3,7,8-	Dioxin [or 2,3,7,8-TCDD]	1746-01-6
TCE	Trichloroethene [or TCE]	79-01-6
TDS	Total dissolved solids [or TDS]	C-010
Temik	Aldicarb [or Temik]	116-06-3
Trithion	Carbophenothion [or Trithion]	786-19-6

C_{sat} Chemicals of Concern for Chapter 62-777, F.A.C.

Contaminant	CAS #	C_{sat} (mg/kg)
Acetone	67-64-1	100000
Acetonitrile	75-05-8	100000
Acetophenone	98-86-2	2100
Acrolein	107-02-8	23000
Acrylonitrile	107-13-1	8200
Allyl alcohol	107-18-6	110000
Aniline	62-53-3	5500
Benzaldehyde	100-52-7	1600
Benzene	71-43-2	870
Benzenethiol	108-98-5	1300
Benzotrichloride	98-08-7	730
Benzyl alcohol	100-51-6	7000
Benzyl chloride	100-44-7	620
Bidrin [or Dicrotophos]	141-66-2	540000
Bis(2-chloroethyl)ether	111-44-4	3300
Bis(2-chloroisopropyl)ether	108-60-1	710
Bis(2-ethylhexyl)phthalate [or DEHP]	117-81-7	31000
Bromochloromethane	74-97-5	7300
Bromodichloromethane	75-27-4	3000
Bromoform	75-25-2	1900
Butanol, 1-	71-36-3	11000
Butanone, 2- [or MEK]	78-93-3	25000
Butyl benzyl phthalate, n-	85-68-7	890
Butylate	2008-41-5	75
Butylphthalyl butylglycolate	85-70-1	11000
Carbon tetrachloride	56-23-5	1100
Carbophenothion [or Trithion]	786-19-6	80
Chloro-1,3-butadiene [or Chloroprene]	126-99-8	1800
Chlorobenzene	108-90-7	680
Chloroform	67-66-3	2900
Chlorophenol, 2-	95-57-8	53000
Chlorotoluene, o-	95-49-8	920
Chlorotoluene, p-	106-43-4	230
Crotonaldehyde	123-73-9	21000
Cumene [or Isopropyl benzene]	98-82-8	1800
Cyanogen	460-19-5	250000
Cycloate	1134-23-2	180
Cyclohexanone	108-94-1	700
Di-n-butylphthalate	84-74-2	110
Diazinon	333-41-5	130
Dibromo-3-chloropropane, 1-2- [or DBCP]	96-12-8	750
Dibromochloromethane	124-48-1	1300
Dibromoethane, 1,2- [or EDB]	106-93-4	1500
Dichloroacetic acid	79-43-6	550000
Dichlorobenzene, 1,2-	95-50-1	590
Dichlorobenzene, 1,3-	541-73-1	600
Dichlorodifluoromethane	75-71-8	880
Dichloroethane, 1,1-	75-34-3	1700

C_{sat} Chemicals of Concern for Chapter 62-777, F.A.C.

Contaminant	CAS #	C_{sat} (mg/kg)
Dichloroethane, 1,2- [or EDC]	107-06-2	1800
Dichloroethene, 1,1-	75-35-4	1500
Dichloroethene, cis-1,2-	156-59-2	1200
Dichloroethene, trans-1,2-	156-60-5	3100
Dichloropropane, 1,2-	78-87-5	1100
Dichloropropene, 1,3-	542-75-6	1400
Dichlorvos	62-73-7	2100
Diethylphthalate	84-66-2	2000
Dimethylformamide, N,N-	68-12-2	140000
Dimethylphenol, 2,4-	105-67-9	11000
Dimethylphthalate	131-11-3	1200
Dioxane, 1,4-	123-91-1	100000
Disulfoton	298-04-4	780
Epichlorohydrin	106-89-8	55000
Ethion	563-12-2	44
Ethoprop	13194-48-4	500
Ethoxyethanol, 2-	110-80-5	200000
Ethyl acetate	141-78-6	10000
Ethyl acrylate	140-88-5	3500
Ethyl chloride [or Chloroethane]	75-00-3	1500
Ethyl dipropylthiocarbamate, S- [or EPTC]	759-94-4	3300
Ethyl methacrylate	97-63-2	1200
Ethylbenzene	100-41-4	400
Ethylene diamine	107-15-3	100000
Ethylene glycol	107-21-1	100000
Fonofos	944-22-9	54
Formaldehyde	50-00-0	58000
Furfural	98-01-1	13000
Hexachloro-1,3-butadiene	87-68-3	1100
Hexachlorocyclopentadiene	77-47-4	2200
Hexane, n-	110-54-3	640
Hexanone, 2- [or Methyl butyl ketone]	591-78-6	4200
Isobutyl alcohol	78-83-1	11000
Isophorone	78-59-1	4600
Malathion	121-75-5	570
Mercury	7439-97-6	2.9
Methacrylonitrile	126-98-7	3100
Methanol	67-56-1	100000
Methyl acetate	79-20-9	69000
Methyl acrylate	96-33-3	9400
Methyl isobutyl ketone [or MIBK]	108-10-1	3600
Methyl methacrylate	80-62-6	3600
Methyl tert-butyl ether [or MTBE]	1634-04-4	8800
Methylaniline, 2-	95-53-4	7600
Methylene bromide	74-95-3	2900
Methylene chloride	75-09-2	2400
Methylnaphthalene, 1-	90-12-0	410
Methylphenol, 3- [or m-Cresol]	108-39-4	14000

C_{sat} Chemicals of Concern for Chapter 62-777, F.A.C.

Contaminant	CAS #	C_{sat} (mg/kg)
Metolachlor	51218-45-2	610
Mevinphos	7786-34-7	240000
Molinate	2212-67-1	670
Nitrobenzene	98-95-3	1000
Nitroso-di-ethylamine, N-	55-18-5	11000
Nitroso-di-n-butylamine, N-	924-16-3	1900
Nitroso-di-n-propylamine, N-	621-64-7	8900
Nitroso-dimethylamine, N-	62-75-9	100000
Nitroso-N-methylethylamine, N-	10595-95-6	2100
Nitrotoluene, m-	99-08-1	480
Nitrotoluene, o-	88-72-2	930
Octamethylpyrophosphoramide	152-16-9	100000
Parathion	56-38-2	240
Pebulate	1114-71-2	190
Phorate	298-02-2	1700
Propylene glycol	57-55-6	100000
Propylene oxide	75-56-9	80000
Pyridine	110-86-1	130000
Styrene	100-42-5	1500
Terbufos	13071-79-9	220
Tetrachloroethane, 1,1,1,2-	630-20-6	1100
Tetrachloroethane, 1,1,2,2-	79-34-5	2000
Tetrachloroethene [or PCE]	127-18-4	230
Toluene	108-88-3	650
Tributyltin oxide	56-35-9	4900
Trichloro-1,2,2-trifluoroethane, 1,1,2- [or CFC 113]	76-13-1	1000
Trichlorobenzene, 1,2,4-	120-82-1	370
Trichloroethane, 1,1,1- [or Methyl chloroform]	71-55-6	1200
Trichloroethane, 1,1,2-	79-00-5	1800
Trichloroethene [or TCE]	79-01-6	1300
Trichloropropane, 1,2,3-	96-18-4	940
Trimethyl phosphate	512-56-1	69000
Trimethylbenzene, 1,2,3-	526-73-8	250
Trimethylbenzene, 1,2,4-	95-63-6	250
Trimethylbenzene, 1,3,5-	108-67-8	130
Vernam	1929-77-7	170
Vinyl acetate	108-05-4	2700
Xylenes, total	1330-20-7	140

Figure 1
Equation for Deriving Site-Specific Cleanup Target Levels
for Carcinogens in Groundwater

The formula for calculation is:

$$GWCTL = \frac{LRL \times BW \times CF}{[SF] \times Wconsp.}$$

Parameter	Definition	Default Value
GWCTL	groundwater cleanup target level (µg/L)	-
LRL	lifetime risk level (unitless)	1×10^{-6}
BW	average body weight (kg)	70[a]
CF	conversion factor (µg/mg)	1000
SF	oral slope factor $(mg/kg/day)^{-1}$	Chemical-specific[b]
Wconsp.	water ingestion rate (L/day)	2

[a]Equations and default parameters from FDEP 'Ground Water Guidance Concentration Manual,' Bureau of Drinking Water and Ground Water Resources, June 1994.
[b]Toxicity values from IRIS, HEAST or other sources as provided in Tables 5a and 5b of the Technical Manual: Sources and Derivation of Toxicity Values Used in Calculations.

Note: For those parameters where the derived GWCTL is lower than what can reasonably be measured in a laboratory, the PQL will be designated as the groundwater cleanup target level.

Example: hexachloro-1,3-butadiene, $SF_{oral} = 0.078\ (mg/kg/day)^{-1}$

$$GWCTL\ (\mu g/L) = \frac{1 \times 10^{-6} \times 70kg \times 1000\mu g/mg}{0.078(mg/kg/day)^{-1} \times 2L/day}$$

$$GWCTL = 0.5\ \mu g/L$$

Figure 2
Equation for Deriving Site-Specific Cleanup Target Levels
For Non-Carcinogens in Groundwater

The formula for calculation is:

$$GWCTL\ (\mu g/L) = \frac{RfD_{oral} \times BW \times RSC \times CF}{Wconsp.}$$

Parameter	Definition (units)	Default Value
GWCTL	groundwater cleanup target level (µg/L)	-
RfD_{oral}	chronic oral reference dose (mg/kg/day)	Chemical-specific[b]
BW	average body weight (kg)	70[a]
RSC	relative source contribution (%)	20%
CF	conversion factor (µg/mg)	1000
Wconsp.	average water consumption (L/day)	2

Equations and default parameters from FDEP 'Ground Water Guidance Concentration Manual', Bureau of Drinking Water and Ground Water Resources, June 1994.
[b]Toxicity values from IRIS, HEAST, or other sources as provided in Tables 4a and 4b: Sources and Derivation of Toxicity Values Used in Calculations.

Note: For those parameters where the derived GWCTL is lower than what can reasonably be measured in a laboratory, the PQL will be designated as the groundwater cleanup target level.

Example: 2-chlorophenol, RfD_{oral} = 0.005 mg/kg/day

$$GWCTL\ (\mu g/L) = \frac{0.005\ mg/kg/day \times 70kg \times 0.20 \times 1000 \mu g/mg}{2L/day}$$

$$GWCTL = 35\ \mu g/L$$

Figure 3A
Equations[a] Used to Calculate Freshwater or Marine Surface Water Criteria
Based on Human Health Endpoints

For Non-Carcinogens:

$$\text{Water Criteria } (\mu g/L) = \frac{(RfD_{oral} \times BW)}{(FI \times BCF)} \times CF$$

For Carcinogens:

$$\text{Water Criteria } (\mu g/L) = \frac{(TR \times BW)}{(SF_{oral} \times [FI \times BCF])} \times CF$$

Parameter	Definition	Default Value
Water Criteria	surface water criterion (µg/L)	n/a
CF	conversion factor (µg/mg)	1000
BW	body weight (kg)	70[a]
FI	fish ingestion rate (kg/day)	0.0065[a]
BCF	bioconcentration factor (mg toxicant/kg fish per mg toxicant/L water)	chemical-specific[a]
RfD_{oral}	oral reference dose (mg/kg/day)	chemical-specific[b]
SF_{oral}	oral slope factor $(mg/kg/day)^{-1}$	chemical-specific[b]
TR	target risk (unitless)	1×10^{-6}

[a]Equations, default parameters, and BCFs from USEPA 'Technical Support Document for Water Quality-Based Toxics Control, EPA/505/2-90-001, 1991.
[b]Toxicity values from IRIS, HEAST, or other sources as provided in Tables 4a and 4b: Sources and Derivation of Toxicity Values Used in Calculations.

Example: Cyhalothrin (karate), RfD_{oral} = 0.005 mg/kg/day and BCF = 10700 L/kg

$$\text{Water Criteria } (\mu g/L) = \frac{0.005 \text{ mg/kg/day} \times 70 \text{ kg}}{0.0065 kg/day \times 10700 L/kg} \times 1000 \ \mu g/mg$$

$$\text{Water Criteria} = 5 \ \mu g/L$$

Example: Acrylonitrile, SF_{oral} = 0.54 $(mg/kg/day)^{-1}$ and BCF 0.4 L/kg

$$\text{Water Criteria } (\mu g/L) = \frac{1x10^{-6} \times 70 \text{ kg}}{0.54(mg/kg/day)^{-1} \times (0.0065 kg/day \times 0.4 L/kg)} \times 1000 \ \mu g/mg$$

$$\text{Water Criteria} = 49.9 \ \mu g/L$$

Figure 3B
Methodology Used to Calculate Freshwater and Marine Surface Water Criteria Based on Chronic Toxicity

Steps:

1. Select data with document codes of "C" or "M" from EPA Aquatic Toxicity Information Retrieval (AQUIRE) Database.

2. Take no action for substances for which insufficient data are retrieved to allow a reasonable choice of sensitive organisms.

3. Select only animal LC_{50} data, except that plant data should be selected in the case of substances in which plant EC_{50} values for growth or photosynthesis, or LC_{50} values for biomass, are several orders of magnitude lower than animal LC_{50} values.

4. Ignore data from salmonid fishes (salmon and freshwater trout).

5. Select the test and organism showing the greatest sensitivity to the toxicant. Extreme outliers should be ignored during this procedure, and several other types of data (such as data in which the endpoint or concentration had to be recalculated by EPA for entry into the database, and data based only on active ingredients) should also be removed from consideration if more clearly applicable data are available for sensitive organisms.

5. A factor of 5% (1/20) should be applied to the animal LC_{50} data to generate a surface water cleanup target level. If a plant LC_{50} or EC_{50} value was chosen, then that value becomes the guideline, without the use of a factor.

Figure 4
Model Equation for Developing Acceptable Risk-Based Concentrations in Soil

Acceptable Soil Cleanup Target Levels for Carcinogens

$$SCTL = \frac{TR \times BW \times AT}{EF \times ED \times FC \times \left[\left(SF_o \times IR_o \times 10^{-6}\,kg/mg\right) + \left(SF_d \times SA \times AF \times DA \times 10^{-6}\,kg/mg\right) + \left(SF_i \times IR_i \times \left(\frac{1}{VF} + \frac{1}{PEF}\right)\right)\right]}$$

SCTL = Soil Cleanup Target Level
TR = target cancer risk (unitless)
BW = body weight (kg)
AT = averaging time (days)
EF = exposure frequency (days/yr)
ED = exposure duration (years)
FC = fraction from contaminated source (unitless)

IR_o = ingestion rate, oral (mg/day)
SA = surface area of skin exposed (cm^2/day)
AF = adherence factor (mg/cm^2)
DA = dermal absorption (unitless)
IR_i = inhalation rate (m^3/day)
VF = volatilization factor (m^3/kg)
PEF = particulate emission factor (m^3/kg)

SF = slope factor $(mg/kg/day)^{-1}$
SF_o = oral
SF_d = dermal
SF_i = inhalation

Sample SCTL Calculation for Direct Exposure (Aggregate Resident): BENZENE

$$SCTL = \frac{0.000001 \times 59kg \times 25550days}{350d/yr \times 30yr \times 1 \times \left[\left(0.029(mg/kg/d)^{-1} \times 120mg/d \times 1x10^{-6}\,kg/mg\right) + \left(0.032(mg/kg/d)^{-1} \times 3674cm^2/d \times 0.2mg/cm^2 \times 0.01 \times 1x10^{-6}\,kg/mg\right) + \left(0.0273(mg/kg/d)^{-1} \times 15m^3/d \times \left(\frac{1}{3.3572x10^3} + \frac{1}{1.24x10^9}\right)\right)\right]}$$

$$SCTL = \frac{1.5075}{10500 \times \left[\left(3.48 \times 10^{-6}\right) + \left(2.3514 \times 10^{-7}\right) + \left(1.2198 \times 10^{-4}\right)\right]} = \frac{1.5075}{10500 \times 1.2561x10^{-4}} = \frac{1.5075}{1.3198} = 1.1mg/kg\ ‡$$

Given: $SF_o = 0.029\ (mg/kg/day)^{-1}$
$SF_d = 0.032\ (mg/kg/day)^{-1}$
$SF_i = 0.0273\ (mg/kg/day)^{-1}$
$VF = 3.3572 \times 10^3\ m^3/kg$
$PEF = 1.24 \times 10^9\ m^3/kg$

‡All calculations carried out to 18 decimal places. For simplicity of demonstration, the calculated values above are not shown to the same precision. Final SCTL value is rounded to two significant figures if >1 and to one significant figure if <1.

Figure 5
Model Equation for Developing Acceptable Risk-Based Concentrations in Soil

Acceptable Soil Cleanup Target Levels for Non-Carcinogens

$$SCTL = \frac{THI \times BW \times AT}{EF \times ED \times FC \times \left[\left(\frac{1}{RfD_o} \times IR_o \times 10^{-6}\,kg/mg\right) + \left(\frac{1}{RfD_d} \times SA \times AF \times DA \times 10^{-6}\,kg/mg\right) + \left(\frac{1}{RfD_i} \times IR_i \times \left(\frac{1}{VF} + \frac{1}{PEF}\right)\right)\right]}$$

SCTL = Soil Cleanup Target Level
THI = target hazard index (unitless)
BW = body weight (kg)
AT = averaging time (days)
EF = exposure frequency (days/yr)
ED = exposure duration (years)
FC = fraction from contaminated source (unitless)

IR_o = ingestion rate, oral (mg/day)
SA = surface area of skin exposed (cm^2/day)
AF = adherence factor (mg/cm^2)
DA = dermal absorption (unitless)
IR_i = inhalation rate (m^3/day)
VF = volatilization factor (m^3/kg)
PEF = particulate emission factor (m^3/kg)

RfD = reference dose (mg/kg/day)
RfD_o = oral
RfD_d = dermal
RfD_i = inhalation

Sample SCTL Calculation for Direct Exposure (Child Resident): FLUORENE

$$SCTL = \frac{1.00 \times 15kg \times 2190days}{350d/yr \times 6yr \times 1 \times \left[\left(\frac{1}{0.04mg/kg/d} \times 200mg/d \times 1x10^{-6}\,kg/mg\right) + \left(\frac{1}{0.02mg/kg/d} \times 1800cm^2/d \times 0.2mg/cm^2 \times 0.01 \times 1x10^{-6}\,kg/mg\right) + \left(\frac{1}{0.02mg/kg/d} \times 10m^3/d \times \left(\frac{1}{2.80802 \times 10^5} + \frac{1}{1.24 \times 10^9}\right)\right)\right]}$$

$$SCTL = \frac{3.2850 \times 10^4}{2100 \times \left[\left(5.00 \times 10^{-3}\right) + \left(1.80 \times 10^{-4}\right) + \left(1.7810 \times 10^{-3}\right)\right]} = \frac{3.2850 \times 10^4}{2100 \times 6.9610 \times 10^{-3}} = \frac{3.2850 \times 10^4}{14.6181} = 2200mg/kg\ ‡$$

Given: RfD_o = 0.04 mg/kg/day
RfD_d = 0.02 mg/kg/day
RfD_i = 0.02 mg/kg/day
VF = 2.80802×10^5 m^3/kg
PEF = 1.24×10^9 m^3/kg

‡All calculations carried out to 18 decimal places. For simplicity of demonstration, the calculated values above are not shown to the same precision. Final SCTL value is rounded to two significant figures if >1 and to one significant figure if <1.

Figure 6
Derivation of the Particulate Emission Factor[a]

$$PEF\ (m^3/kg) = Q/C \times \frac{3600\ sec/hr}{0.036 \times (1-V) \times (U_m/U_t)^3 \times F(x)}$$

Parameter	Definition (units)	Default
PEF	particulate emission factor (m^3/kg)	1.241005×10^9
Q/C	inverse of mean conc. at center of a 0.5-acre-square source (g/m^2-s per kg/m^3)	85.61[b]
V	fraction of vegetative cover (unitless)	0.5 (50%)‡
U_m	mean annual windspeed (m/s)	4.69‡
U_t	equivalent threshold value of windspeed at 7m (m/s)	11.32
F(x)	function dependent on U_m/U_t, derived using Cowherd et al. (1985)[c] (unitless)	0.194

[a]Equation taken from USEPA (1996b) 'Soil Screening Guidance: Technical Background Document' EPA/540/R-95/128.
[b]Based on Q/C Value for Zone IX (Miami, FL) as listed in USEPA 'Soil Screening Guidance'. The default is for 0.5 acre sites with undisturbed soil. Site-specific PEFs must be calculated for sites with contaminated areas which are significantly larger in size or if warranted based on site-specific conditions.
[c]Cowherd, C., Muleski, G., Engelhardt, P., and Gillette, D. (1985). 'Rapid Assessment of Exposure to Particulate Emissions from Surface Contamination.' EPA/600/8-85/002.
‡Value may be substituted with documented, FDEP accepted site-specific information.
**All calculations carried out to 18 decimal places. For simplicity of demonstration, the calculated values below are not shown to the same precision.

Calculation of PEF based on Zone IX Q/C Value**:

$$PEF\ (m^3/kg) = 85.61\left(\frac{g \cdot m^3}{kg \cdot m^2 \cdot s}\right) \times \frac{3600\ sec/hr}{0.036 \times (1-0.5) \times (4.69\ m/s / 11.32\ m/s)^3 \times 0.194} = 1.241005 \times 10^9\ (m^3/kg)$$

Figure 7
Equation Used for the Determination of the Volatilization Factor[a]

$$VF = Q/C \times CF \times \frac{(3.14 \times D_A \times T)^{1/2}}{2 \times \rho_b \times D_A}$$

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

WHERE:

Model Parameters (Units)		Default Value
VF	Volatilization factor (m^3/kg)	-
D_A	Apparent diffusivity (cm^2/s)	-
CF	Conversion factor (m^2/cm^2)	10^{-4}
Q/C	Inverse of the mean concentration[b] (g/m^2-s per kg/m^3)	85.61[c]
T	Exposure interval (s)	ED × 3.1536x10^7 s/yr
ED	Exposure duration (years)	Exposure-specific[e]
N	Total soil porosity (L_{pore}/L_{soil})	1- (ρ_b/ρ_s)‡
W	Average soil moisture content (g_{water}/g_{soil})	0.1 (10%)‡
ρ_b	Dry soil bulk density (g/cm^3)	1.5‡
ρ_s	Soil particle density (g/cm^3)	2.65
θ_a	Air-filled soil porosity (L_{air}/L_{soil})	n - θ_w
θ_w	Water-filled soil porosity (L_{water}/L_{soil})	wρ_b
K_d	Soil-water partition coefficient L/kg)	$K_{oc} \times f_{oc}$
D_i	Diffusivity in air (cm^2/s)	Chemical-specific[d]
D_w	Diffusivity in water (cm^2/s)	Chemical-specific[d]
H	Henry's Law constant (atm-m^3/mol)	Chemical-specific[d]
H'	Dimensionless Henry's Law constant	H × 41
K_{oc}	Soil-organic carbon partition coefficient (L/kg)	Chemical-specific[d]
f_{oc}	Organic carbon content of soil (g/g)	0.006 (0.6%)‡

[a] Model equation taken from USEPA 1996 'Soil Screening Guidance: Technical Background Document.' EPA/540/R-95/128.
[b] Assumes the center of a 0.5 acre plot.
[c] Based on Q/C Value for Zone IX (Miami, FL) as listed in USEPA 'Soil Screening Guidance.' Based on a 0.5 acre site; site-specific PEFs must be calculated for sites which are significantly larger in size.
[d] Listed in Table 3.
[e] Based on Aggregate Resident exposure for a duration of 30 years (ED).
‡Value may be substituted with documented FDEP accepted site-specific information.

Sample VF Calculation for Benzene Exposure**

**All calculations carried out to 18 decimal places. For simplicity of demonstration, the calculated values below are not shown to the same precision.

Given:
$D_i = 0.088\ cm^2/s$
$D_w = 9.80 \times 10^{-6}\ cm^2/s$
$H' = 0.22755000$
$T = 9.460800 \times 10^8\ s$[e]
$K_{oc} = 59\ L/kg$
$K_d = 0.35400\ L/kg$

Then:

$$D_A = \frac{\left[\left(1.504996\text{x}10^{-2} \times 0.088 \times 2.27550\text{x}10^{-1}\right) + \left(1.793236\text{x}10^{-3} \times 9.80\text{x}10^{-6}\right) / 1.883232\text{x}10^{-1}\right]}{\left(1.5 \times 3.3540\text{x}10^{-1}\right) + (0.15) + (0.2839362 \times 0.2755)}$$

$$= \frac{1.600262\text{x}10^{-3}}{7.456097\text{x}10^{-1}}\ cm^2/s = 2.146\text{x}10^{-3}\ cm^2/s$$

And:

$$VF = 85.61\left(\frac{g \cdot m^3}{kg \cdot m^2 \cdot s}\right) \times 1\text{x}10^{-4}\left(\frac{m^2}{cm^2}\right) \times \frac{\left(3.14 \times 2.1462\text{x}10^{-3}\left(\frac{cm^2}{s}\right) \times 9.46080\text{x}10^{8}(s)\right)^{\frac{1}{2}}}{2 \times 1.5 \times 2.1462\text{x}10^{-3}\left(\frac{cm^2}{s}\right)}$$

$$= \frac{2.1617\text{x}10^{1}}{6.4390\text{x}10^{-3}} = 3.3572\text{x}10^{3}\left(\frac{m^3}{kg}\right)$$

Figure 8
Equation for the Determination of Soil Cleanup Target Levels (SCTLs)
Based on Leachability

$$SCTL(mg/kg) = GWCTL(\mu g/L) \times CF(mg/\mu g) \times DF \times \left[K_{OC}\,(L/kg) \times f_{OC}\,(g/g) + \frac{\theta_w (L_{water}/L_{soil}) + \theta_a (L_{air}/L_{soil}) \times H'}{\rho_b\,(g/cm^3)} \right]$$

Parameter	Definition (units)	Variables and Default
GWCTL	Groundwater cleanup target level (µg/L)	Table-specific value[1]
CF	Conversion factor (mg/µg)	0.001
DF	Dilution factor (unitless)	20[2]
K_{oc}	Soil-organic carbon partition coefficient (L/kg)	Chemical-specific value
f_{oc}	Fraction organic carbon in soil (g/g)	0.002‡
Θ_w	Water-filled soil porosity (L_{water}/L_{soil})	$w\rho_b$
Θ_a	Air-filled soil porosity (L_{air}/L_{soil})	$n - \Theta_w$
H	Henry's Law constant (atm-m^3/mol)	Chemical-specific value[2]
H'	Henry's Law constant (unitless)	$H \times 41$
ρ_b	Dry soil bulk density (g/cm^3)	1.5‡
w	Average soil moisture content (g_{water}/g_{soil})	0.2 (20%)‡
n	Total soil porosity (L_{pore}/L_{soil})	$1-(\rho_b/\rho_s)$ ‡
ρ_s	Soil particle density (g/cm^3)	2.65

[1]Groundwater Cleanup Target Levels (see Table 1).
[2]If the site is significantly larger than 0.5 acres or if warranted by site-specific conditions (such as a shallow water table), a lower DF may be required.
‡ Value may be substituted with documented, FDEP accepted site-specific information. It should be noted that the default values for f_{oc}, w, and Θ_w in the calculation of leachability-based SCTLs differ from those used to calculate the VF and C_{sat} as per guidance in the USEPA *Soil Screening Guidance: Technical Background Document* (EPA/540/R-95/128).
**All calculations carried out to 18 decimal places. For simplicity of demonstration, the calculated values below are not shown to the same precision. Final SCTL is rounded to two significant figures if >1 and to one significant figure if <1.

Sample SCTL Calculation for Benzene Migration into Groundwater:

Given: GWCTL = 1 µg/L
K_{oc} = 59 L/kg
H' = 0.227550

Then:

$$SCTL(mg/kg) = 1.0\ \mu g/L \times 0.001\ mg/\mu g \times 20 \times \left[59\ L/kg \times 0.002\ g/g + \frac{0.3\ L_{water}/L_{soil} + \left(0.13396\ L_{air}/L_{soil} \times 0.22755\right)}{1.5\ g/cm^3} \right] =$$

$$SCTL = 0.007\ mg/kg\ **$$

Figure 9
Equation[a] Used for the Determination of C_{sat}

$$C_{sat} = \frac{S}{\rho_b}\left(K_d \rho_b + \theta_w + H'\theta_a\right)$$

Parameter	Definition (Units)	Default Value
C_{sat}	Soil saturation concentration (mg/kg)	-
S	Solubility in water (mg/L)	Chemical-specific[b]
ρ_s	Soil particle density (g/cm^3)	2.65
ρ_b	Dry soil bulk density(g/cm^3)	1.5‡
n	Total soil porosity (L_{pore}/L_{soil})	$1 - (\rho_b/\rho_s)$ ‡
θ_a	Air-filled soil porosity (L_{air}/L_{soil})	$n - \theta_w$
θ_w	Water-filled soil porosity (L_{water}/L_{soil})	$w\rho_b$
K_d	Soil-water partition coefficient (cm^3/g)	$K_{oc} \times f_{oc}$
w	Average soil moisture content (kg_{water}/kg_{soil})	0.1 (10%) ‡
H	Henry's Law constant ($atm\text{-}m^3/mol$)	Chemical-specific[b]
H'	Dimensionless Henry's Law constant	$H \times 41$
K_{oc}	Soil-organic carbon partition coefficient (L/kg)	Chemical-specific[b]
f_{oc}	Fraction organic carbon in soil (g/g)	0.006 (0.6%)‡

[a] Model equation taken from USEPA 1996b *Soil Screening Guidance: Technical Background Document.* EPA/540/R-95/128.

[b] Listed in Table 3.

‡ Value may be substituted with documented, FDEP accepted site-specific information.

**All calculations carried out to 18 decimal places. For simplicity of demonstration, the calculated values below are not shown to the same precision. C_{sat} values used as SCTLs are rounded to two significant figures if > 1 and to one significant figure if < 1.

Sample C_{sat} Calculation for Ethylbenzene**

Given:

$S = 169$ mg/L
$K_d = 2.178$ L/kg
$K_{oc} = 363$ L/kg
$H' = 0.32308$

Then:

$$C_{sat} = \frac{169 \text{ mg/L}}{1.5 \text{ g/cm}^3}\left(\left(2.178 \text{ L/kg} \times 1.5 \text{g/cm}^3\right) + (0.15) + (0.32308 \times 0.2839362)\right)$$

$$C_{sat} = 112.6667 \text{ mg/L} \times 3.5087 \text{ L/kg}$$

$$C_{sat} = 400 \text{ mg/kg}$$

Appendix A

Derivation of Inhalation Rates and

Dermal Surface Areas

A. Derivation of an Inhalation Rate (m^3/day) for an Aggregate Resident

The Exposure Factors Handbook (USEPA, 1989b) provided inhalation rates (L/min) for all activity levels listed in the following categories: 6, 10, and 13 year old males, an adult female and an adult male (Table A1) and provided the amount of time spent at each activity level (found on pages 3-8 of USEPA, 1989b) (Table A2).

Table A1:
Minute Inhalation (L/min) by Activity Level

Activity Level	Infant	Male 6yr	Male 10yr	Male 13yr	Male Adult	Female Adult
Resting	0.84	6.5	7.1	8.9	12.2	5.7
Light	-	13.9	17.2	16.4	13.8	8.1
Moderate	-	33.3	53.4	32.8	40.9	26.5
Heavy	-	40.3	70.5	57.9	80.0	47.9

Table A2:
Percent Time at Activity Level

Activity Level	Outdoor		Indoor	
	Average	RME	Average	RME
Resting	0.28	0	0.48	0.25
Light	0.28	0	0.48	0.60
Moderate	0.37	0.50	0.03	0.10
Heavy	0.07	0.50	0.01	0.05

RME = Reasonable Maximum Exposure

Using the values from Table A1, minute inhalation rates (L/min) were converted to daily inhalation rates (m^3/day) with the equation below. These values are listed in Table A3.

m^3/day = L/min * 60 min/hr * 24 hr/day * 1 cm^3/mL * 1000 mL/L * 1E-06 m^3/cm^3

Table A3:
Inhalation Rates (m^3/day)

Activity Level	Infant	Male 6yr	Male 10yr	Male 13yr	Male Adult	Female Adult
Resting	1.21	9.36	10.22	12.82	17.57	8.21
Light	-	20.02	24.77	23.62	19.87	11.66
Moderate	-	47.95	76.90	47.23	58.90	38.16
Heavy	-	58.03	101.52	83.38	115.20	68.98

Indoor and outdoor daily inhalation rates (presented in Table A4) were calculated for each receptor using the average values for percent of time spent at each activity level (Table A2).

Daily Inhalation Rate (m^3/day) = (% of time spent resting*resting inhalation rate) +
+ (% of time spent in light activity*light inhalation rate) +
+ (% of time spent in moderate activity*moderate inhalation rate) +
+ (% of time spent in heavy activity*heavy inhalation rate)

Table A4:
Daily Inhalation Rates (m^3/day) for Each Age Level

	Infant	Male 6yr	Male 10yr	Male 13yr	Male Adult	Female Adult
Average						
Outdoor	0.34	30.03	45.36	33.51	40.34	24.51
Indoor	0.58	16.12	20.12	19.74	20.89	11.37
RME						
Outdoor	0.51*	52.99	89.21	65.30	87.05	53.57
Indoor	1*	22.05	30.18	26.26	27.96	16.32

* Information is not presented in the Exposure Factors Handbook for light, moderate, or heavy inhalation rates for infants. Using only the resting inhalation rate of 1.21 m^3/day (Table A3) to calculate the outdoor and indoor RME inhalation rates results in "worst case" values that are less than "average" values. Therefore, an alternative method was used to calculate the infant indoor and outdoor RME inhalation rates. The ratio between the "average outdoor" and the "RME outdoor" for each of the other age groups was calculated and then the mean of these ratios was multiplied by the infant outdoor "average" inhalation rate to derive an estimated outdoor "RME" inhalation rate. For example, the mean ratio of RME/average for outdoor values is 1.5, so 0.34 x 1.5 = 0.51 is the estimated RME outdoor-infant daily inhalation rate. The same method was used with the indoor values to derive an estimated indoor "RME" inhalation rate.

To calculate an inhalation rate for an aggregate resident, an exposure duration of 30 years was assumed. Due to the limited data, it was assumed that a person spends four years each at the infant, 6 year old, 10 year old, and 13 year old inhalation rates. The remaining 14 years are spent at the adult inhalation rate. Indoor and outdoor average inhalation rates for an aggregate resident (Table A5) were calculated using the following equation:

Indoor or Outdoor Inhalation Rate (m^3/day) =

= [(4 yr * Infant IR (m^3/day)) + (4 yr * 6 yr old IR (m^3/day)) +
+ (4 yr * 10 yr old IR (m^3/day)) + (4 yr * 13 yr old IR (m^3/day)) +
+ (14 yr * {(Adult Male IR (m^3/day) + Adult Female IR (m^3/day))/2})]/30 yrs

The average person is estimated to spend 3.07 hours per week outside (pages 1 – 21, USEPA, 1989b). This value is equal to 0.44 hours per day. Therefore, the average time spent inside is 23.56 hours per day. Using these assumptions, total (includes indoor and outdoor) average inhalation rates for the aggregate resident (Table A5) were calculated using the following equation:

Aggregate Resident Total Inhalation Rate (m^3/day) =

$$= \frac{[(\text{Outdoor IR } m^3/\text{day} * 0.44 \text{ hr/day}) + (\text{Indoor IR } m^3/\text{day} * 23.56 \text{ hr/day})]}{24 \text{ hr/day}}$$

Table A5:
Inhalation Rates for an Aggregate Resident

	Inhalation Rate (m^3/day)
AVERAGE	
Outdoor	29.70
Indoor	15.07
Total (In + Out)	15.34*
RME	
Outdoor	60.54
Indoor	20.93
Total (In + Out)	21.66

*The aggregate resident inhalation rate used to calculate the SCTL is rounded to 15 m^3/day.

B. Derivation of a Dermal Surface Area for the Aggregate Resident

Values presented in the Exposure Factors Handbook (USEPA, 1989b) were used to calculate the surface area available for dermal exposure of an aggregate resident. Median total body surface areas for children, as presented in the Exposure Factors Handbook, are presented in Table A6, with the exception for children under two, for which values are unavailable. The percentage of total body surface area by part for children, as presented in the Exposure Factors Handbook, is presented in Table A7.

Table A6:
Median Total Body Surface Area (cm^2)

	Surface Area (cm^2)		
Age (yr)	Male	Female	Average
2 < 3	6030	5790	5910
3 < 6	7280	7110	7195
6 < 9	9310	9190	9250
9 < 12	11600	11600	11600
12 < 15	14900	14800	14850
15 < 18	17500	16000	16750

Table A7:
Percentage of Total Body Surface Area by Part for Children

	Percent of Total Body Surface Area (%)					
Age	Head	Trunk	Arms	Hands	Legs	Feet
2 < 3	14.20	38.50	11.80	5.30	23.20	7.07
3 < 4	13.60	31.90	14.40	6.07	26.80	7.21
4 < 5	13.80	31.50	14.00	5.70	27.80	7.29
6 < 7	13.10	35.10	13.10	4.71	27.10	6.90
9 < 10	12.00	34.20	12.30	5.30	28.70	7.58
12 < 13	8.74	34.70	13.70	5.39	30.50	7.03
13 < 14	9.97	32.70	12.10	5.11	32.00	8.02
16 < 17	7.96	32.70	13.10	5.68	33.60	6.93
17 < 18	7.58	31.70	17.50	5.13	30.80	7.28

Body surface areas by part for children (Table A8) were calculated using the following equation:

Surface Area (cm^2) = Total body surface area (cm^2) x
% of Total body surface area for the body part

It was assumed that an aggregate resident would have his hands, half of his arms, and half of his legs available for dermal exposure. Using this assumption, a total surface area was calculated for each age group using the following equation (Table A8):

Total Surface Area (cm^2) = Hands SA (cm^2) + [(Arms SA + Legs SA (cm^2))/2]

Table A8:
Body Surface Area by Part for Children

	Body Surface Area (cm^2)						
Age	**Head**	**Trunk**	**Arms**	**Hands**	**Legs**	**Feet**	**Available SA***
2 < 3	839	2275	697	313	1371	418	1347
3 < 4	979	2295	1036	437	1928	519	1919
4 < 5	993	2266	1007	410	2000	525	1914
6 < 7	1212	3247	1212	436	2507	638	2295
9 < 10	1392	3967	1427	615	3329	879	2993
12 < 13	1298	5153	2034	800	4529	1044	4082
13 < 14	1481	4856	1797	759	4752	1191	4034
16 < 17	1333	5477	2194	951	5628	1161	4862
17 < 18	1270	5310	2931	859	5159	1219	4904

Available Child (age 1-6) SA* (cm^2) = 1789 = 1800**

*Assume exposed surface area of 1/2 of arms, 1/2 of legs, and hands
**Child Surface Area rounded to two significant figures

Surface area by body part and total surface areas for adults are presented in Table A9. The adult surface area available for dermal exposure was calculated using the same equation used for the child.

Table A9: Average Surface Area by Body Part for Adults

	Surface Area (cm^2)		
Body Part	Men	Women	Average
Head	1180	1100	1140
Trunk	5690	5420	5555
Upper Extremities	3190	2760	2975
Arms	2280	2100	2190
Upper Arms	1430	-	1430
Forearms	1140	-	1140
Hands	840	746	793
Lower Extremities	6360	6260	6310
Legs	5050	4880	4965
Thighs	1980	2580	2280
Lower Legs	2070	1940	2005
Feet	1120	975	1048
Whole Body	19400	16900	18150

Available Adult SA* (cm^2) = 4371

*Assume exposed surface area of 1/2 of arms, 1/2 of legs, and hands

The aggregate resident surface area available for dermal exposure was calculated using the following equation:

$$\text{Aggregate Resident Surface Area } (cm^2) =$$
$$= [(2\text{ yr} * 2\text{<}3\text{ yr old SA } cm^2) + (1\text{ yr} * 3\text{<}4\text{ yr old SA } cm^2) +$$
$$+ (2\text{ yr} * 4\text{<}5\text{ yr old SA } cm^2) + (2\text{ yr} * 6\text{<}7\text{ yr old SA } cm^2) +$$
$$+ (3\text{ yr} * 9\text{<}10\text{ yr old SA } cm^2) + (2\text{ yr} * 12\text{<}13\text{ yr old SA } cm^2) +$$
$$+ (2\text{ yr} * 13\text{<}14\text{ yr old SA } cm^2) + (2\text{ yr} * 16\text{<}17\text{ yr old SA } cm^2) +$$
$$+ (2\text{ yr} * 17\text{<}18\text{ yr old SA } cm^2) + (12\text{ yr} * \text{Adult SA } cm^2)] * 1/30\text{ yr}$$

No specific age group data are presented in the Exposure Factors Handbook for children at ages 1, 5, 7, 8, 10, 11, 14, 15, and 18 years. Therefore, the surface area information for these ages was alternately taken from either the next previous or following age group. The age ranges applied as factors in the above equation are shown in the table below. The numbers in parentheses under the "age" column represents the age of a person with a particular surface area. The age range in each group corresponds to years spent with a specific surface area ("years" column), which is then multiplied by the corresponding available surface area. For example, there is no information for 1 yr-olds, so the SA value for 2 yr-olds from the Exposure Factors Handbook is assumed to apply to both 1 and 2 year-olds. Since this value is applicable for two years (out of 30 total), the SA value of 2186 is multiplied by 2. The alternate assignment of ages without SA values to higher and lower age groups is intended to minimize biasing the surface area estimate either high or low.

Table A10:
Aggregate Surface Area

Age	Years	Available SA (cm^2)*
2 < 3 (1-2)	2	1347
3 < 4 (3)	1	1919
4 < 5 (4-5)	2	1914
6 < 7 (6-7)	2	2295
9 < 10 (8-10)	3	2993
12 < 13 (11-12)	2	4082
13 < 14 (13-14)	2	4034
16 < 17 (15-16)	2	4862
17 < 18 (17-18)	2	4904
Adult: 19 < 30 (19 - 30)	12	4371
Aggregate SA =		**3674**

*Assume exposed surface area of 1/2 of arms, 1/2 of legs, and hands

Available On-Site Worker SA (cm^2) = 2000

The value of 2,000 cm^2 for the On-Site Worker Available Surface Area is derived from the USEPA Dermal Exposure Assessment: Principles and Applications, January 1992 (EPA/600/8-91/011B).

Appendix B

Derivation of Inhalation and Dermal Toxicity Values

A. Inhalation Toxicity Values

For evaluating hazard from the inhalation of a chemical of concern, the USEPA develops toxicity values in the form of Reference Doses (RfDs) or Reference Concentrations (RfCs). While the USEPA has recently shown preference for RfCs, the equations for the methods described in this report use RfDs exclusively. The reason for this decision is that it is well recognized that children have much higher ventilation rates relative to body weight than adults. Consequently, they will receive a higher dosage of a chemical of concern from air than an adult at the same air concentration. The use of RfDs allows this difference to be taken into consideration, whereas the use of RfCs involves the implicit assumption that adults and children are equally sensitive to contamination in air. For the same reason, the equation for carcinogenicity utilizes Inhalation Slope Factors (ISFs) rather than Inhalation Unit Risk (IUR) values (which are expressed as recognized air concentrations).

In situations where the USEPA lists both an inhalation RfD and an inhalation RfC for a non-carcinogen or alternatively, an ISF and an IUR for a carcinogen, the RfD or ISF in question has been converted from the RfC or IUR, respectively. The USEPA reports these converted toxicity values to 1 significant figure for inhalation RfDs or 2 significant figures for ISFs. In the development of the SCTLs, inhalation RfDs and ISFs converted from RfCs and IUR without rounding of the final value were used in preference to the rounded USEPA inhalation RfDs or ISFs.

1) Reference Dose (RfD)

When an inhalation RfC was available, it was converted to an inhalation RfD for the calculation of a soil target level. The conversion from RfC to inhalation RfD assumed a 70 kg individual breathing 20 m^3/day. Thus, the RfC was multiplied by 20 m^3/day and divided by 70 kg to obtain a value with the units mg/kg/day. The final value was not rounded.

e.g., Methyl *tert*-butyl ether: Inhalation RfC = 3 mg/m^3

thus, (3 mg/m^3 x 20 m^3/day) / 70 kg = 8.57142857 x 10^{-1} mg/kg/day = RfD_i

When an RfC was not available, the second choice was to develop an inhalation RfD from the oral RfD using route-to-route extrapolation. Such extrapolation was only done when the toxic endpoint being addressed was systemic in nature. Oral RfDs that were known or likely to be route-specific (e.g., where the toxic endpoint involved the gastrointestinal tract) were not extrapolated.

The formula for the conversion of an oral RfD to an inhalation RfD was as follows:

$$RfD_i = RfD_o \times GI\ Absorption$$

e.g., Anthracene: $RfD_o = 3.0 \times 10^{-1}$ mg/kg/day
Chemical Specific GI Abs Factor = 0.5

thus, $(3.0 \times 10^{-1}$ mg/kg/day) x (0.5) = 1.5×10^{-1} mg/kg/day

2) Slope Factor (SF)

When a carcinogen had an inhalation unit risk (IUR), the IUR was converted to an ISF for the calculation of a soil target level. The conversion assumes a 70 kg individual breathing 20 m^3/day. Thus, the IUR (Unit Risk/$\mu g/m^3$) is divided by 20 m^3/day and multiplied by 70 kg and a conversion factor of 1000 μg/mg to obtain a value with the units $(mg/kg/day)^{-1}$. The final value was not rounded.

e.g., Benzene: IUR = 7.8×10^{-6} UR/$\mu g/m^3$

thus, $[((7.8 \times 10^{-6}$ UR/$\mu g/m^3) / 20 m^3$/day) x 70 kg x 1000 μg/mg] =
$= 2.73 \times 10^{-2}$ $(mg/kg/day)^{-1}$ = ISF

If an IUR was not available and the chemical was regarded as likely producing carcinogenicity via a systemic effect, an ISF was derived from the oral slope factor (OSF), if available. This route-to-route extrapolation was accomplished by using the following formula:

$$ISF = OSF / GI\ Absorption$$

In general, route-to-route extrapolation from the OSF was not performed if the OSF was known or presumed to reflect route-specific toxicity. When a chemical exhibits route-specific toxicity, it exerts its toxic effect (i.e., cancer) only by a specific exposure route. For example, chromium only causes lung cancer if it is inhaled, thus the toxic effect (lung cancer) is route-specific and target organ-specific. No other exposure route for chromium has been shown to cause cancer.

B. Dermal Toxicity Values

1) Reference Dose (RfD)

Dermal RfDs were derived from either the oral or inhalation RfD (if both were available and suitable, preference was given to the oral RfD). The following formula was used:

$$RfD_d = RfD_o \times GI\ Absorption$$

If an RfD (either oral or inhalation) was known or presumed to be route-specific, it was not regarded as suitable for route-to-route extrapolation.

2) Slope Factor (SF)

Dermal slope factors (DSFs) were derived from OSFs using route-to-route extrapolation:

$$DSF = OSF / GI\ Absorption$$

e.g., Benzene: OSF = 2.9×10^{-2} $(mg/kg/day)^{-1}$
Chemical-Specific GI Abs = 0.9

thus, $(2.9 \times 10^{-2}\ (mg/kg/day)^{-1}) \div (0.9) =$
$= 3.2 \times 10^{-2}\ (mg/kg/day)^{-1} = DSF$

In general, OSFs were not extrapolated to produce DSFs if they were thought to reflect route-specific toxicity.*

* In the case of carcinogenic PAHs the toxic endpoint (cancer) occurs regardless of the route of exposure. This effect is clearly evidenced by the fact that while the OSF for benzo(a)pyrene is based on data in which oral dosing resulted in GI tract tumors in rodents, arguably a route-specific cancer, benzo(a)pyrene has also been observed to produce other types of cancer in several species when administered by a variety of routes, including inhalation and dermal contact. Although no slope factor has yet been derived for these routes, the rather strong evidence that benzo(a)pyrene (and, by implication, other carcinogenic PAHs) is carcinogenic by a variety of routes, indicates that PAH induced cancer is not wholly route-specific. Because of this property, route-to-route extrapolation was performed to derive both inhalation and dermal slope factors from the OSF for this group of chemicals.

Appendix C

Technical Basis for the TRPH

Soil Cleanup Target Levels

Technical Basis for the TRPH Soil Cleanup Target Levels

The following calculations for total petroleum hydrocarbon (TRPH) values were adopted essentially as described in the Total Petroleum Hydrocarbon Criteria Working Group (TPHCWG, 1997a, 1997b, and 1999c; Volumes III and IV, and the Technical Overview).

The application of a general standard for TRPHs is difficult because of the variation in mobility and toxicity of the chemicals included. To overcome this problem, TPHCWG (1997a) suggests a sub-classification methodology in which aromatics and aliphatics are considered separately because these groups vary considerably in their environmental behavior. Each of these groups was then further subdivided on the basis of equivalent carbon number index (EC). The EC is a function of the molecular weight (MW) and boiling point (BP) of a chemical normalized to the BP of the n-alkanes, or its retention time in a BP gas chromatographic column. This approach is used since it is consistent with methods routinely used in the petroleum industry for separating complex mixtures and is a more appropriate differentiation technique than the actual carbon number of the chemical.

Range of Equivalent Carbon Number (EC)	Avg EC	Classification
C_5-C_7	6.5	Aromatic
>C_7-C_8	7.5	Aromatic
>C_8-C_{10}	9.0	Aromatic
>C_{10}-C_{12}	11	Aromatic
>C_{12}-C_{16}	14	Aromatic
>C_{16}-C_{21}	18.5	Aromatic
>C_{21}-C_{35}	28.5	Aromatic
C_5-C_6	5.5	Aliphatic
>C_6-C_8	7.0	Aliphatic
>C_8-C_{10}	9.0	Aliphatic
>C_{10}- C_{12}	11	Aliphatic
>C_{12}- C_{16}	14	Aliphatic
>C_{16}- C_{21}	18.5	Aliphatic

Calculation of TRPH Fraction-Specific Physical Properties

Several alternatives for estimating representative physical/chemical properties for each fraction were reviewed by the TPHCWG. They included simple averaging of all available property data, composition-based averaging in which a weighted average of the available property data was computed based on the relative mass of each component in gasoline, and correlation to relative boiling point index in which the properties were developed based on EC values. While all of the approaches had similar results, it was determined that the correlations approach was most useful, because if the definition of the fractions change, new properties can be easily computed.

Utilizing the values correlations approach, the TRPHs are grouped into EC fractions, a method which allows for the calculation of the fate and transport characteristics of solubility (S), organic carbon partition coefficient (K_{oc}) and vapor pressure (atm). While Henry's Law constant (HLC) could also be estimated from a similar type of equation, TPHCWG determined that using the estimated molecular weights, solubilities and vapor pressures to calculate HLC allowed for internal consistency with the other estimated values. The formulas provided by TPHCWG (1997a) are as follows:

Aromatics:

$$\text{Log } S = (-0.21 \times EC) + 3.7$$
$$\text{Log } Koc = (0.10 \times EC) + 2.3$$

Aliphatics:

$$\text{Log } S = (-0.55 \times EC) + 4.58$$
$$\text{Log } Koc = (0.45 \times EC) + 0.43$$

Aliphatics and Aromatics

$$\text{Log VP} = (-0.5 \times EC) + 2.3, \text{ for } EC \leq 12$$
$$\text{Log VP} = (-0.36 \times EC) + 0.72, \text{ for } EC > 12$$

$$H'(\text{unitless})^{*} = \frac{\text{Vapor Pressure (atm)} \times \text{Molecular Weight (g/mol)}}{\text{Solubility (mg/L)} \times 8.2\text{x}10^{-5}\ (\text{atm} \cdot \text{m}^3/\text{mol} \cdot \text{K}) \times 293\text{K}}$$

$$\text{Henry's Law constant (atm} \cdot \text{m}^3/\text{mol})^{*} = H'(\text{unitless})/41$$

(*rounded to two significant figures)

When diffusivity in air or water was plotted as a function of equivalent carbon number, TPHCWG found that the values did not vary significantly from compound to compound. Thus, a conservative, reasonable assumption was to set $D_{air} = 10^{-1}$ cm^2/sec and $D_{water} = 10^{-5}$ cm^2/sec for all fractions.

Using the models above, the following chemical values for the TRPH classes have been assigned:

Table C1:
Assigned Chemical Properties of TRPH Classes
Based on an Equivalent Carbon Number[a]

TRPH Class	Avg. EC	Proposed Value				
		H(atm-m³/mol)[b]	MW (g/mol)	K_{oc} (mL/g	S (mg/L)	VP(atm)
C_5-C_7 Aromatic	6.5	5.61 E-3	NC	NC	NC	NC
>C_7-C_8 Aromatic	7.5	6.64 E-3	NC	NC	NC	NC
>C_8-C_{10} Aromatic	9.0	1.17 E-2	1.2 E+2	1.58 E+3	6.5 E+1	6.3 E-3
>C_{10}-C_{12} Aromatic	11	3.41 E-3	1.3 E+2	2.51 E+3	2.5 E+1	6.3 E-4
>C_{12}-C_{16} Aromatic	14	1.29 E-3	1.5 E+2	5.01 E+3	5.8 E+0	4.8 E-5
>C_{16} -C_{21} Aromatic	18.5	3.17 E-4	1.9 E+2	1.58 E+4	6.5 E-1	1.1 E-6
>C_{21} -C_{35} Aromatic	28.5	1.63 E-5	2.4 E+2	1.26 E+5	6.6 E-3	4.4 E-10
C_5-C_6 Aliphatic	5.5	8.05 E-1	8.1 E+1	7.94 E+2	3.6 E+1	3.5 E-1
>C_6-C_8 Aliphatic	7.0	1.22 E+0	1.0 E+2	3.98 E+3	5.4 E+0	6.3 E-2
>C_8-C_{10} Aliphatic	9.0	1.93 E+0	1.3 E+2	3.16 E+4	4.3 E-1	6.3 E-3
>C_{10}-C_{12} Aliphatic	11	2.93 E+0	1.6 E+2	2.51 E+5	3.4 E-2	6.3 E-4
>C_{12}-C_{16} Aliphatic	14	1.29 E+1	2.0 E+2	5.01 E+6	7.6 E-4	4.8 E-5
>C_{16}-C_{21} Aliphatic	18.5	1.20 E+2	2.7 E+2	6.30 E+8	2.5 E-6	1.1 E-6

NC: Values for the C_5-C_7 and >C_7-C_8 aromatics, which correspond to benzene and toluene, were not calculated according to the TPHCWG methods. Chemical-specific values for these fractions were assumed to be equal to those of benzene and toluene, thus the K_{oc} and H values from Table 3a of the Technical Report were used.

[a] Solubility (mg/L), Vapor Pressure (atm), and K_{oc} (mL/g) values calculated according to formulas in Tables 7, 9, and 12 of TPHCWG 1997a. H'(unitless) was calculated according to the formula presented above.

[b] Henry's Law constant calculated using methods described above. Final values rounded to two significant figures.

Table C2:
Calculated Chemical Properties of TRPH Classes

TRPH Class	Calculated Fraction-Specific Values*		
	D_a(cm²/sec)	Volatilization Factor** (m³/kg)	
		Residential	Industrial
C_5-C_7 Aromatic	2.16753 E-3	3.34080 E+3	3.04971 E+3
>C_7-C_8 Aromatic	1.01478 E-3	4.88255 E+3	4.45713 E+3
>C_8-C_{10} Aromatic	2.64276 E-4	9.56760 E+3	8.73399 E+3
>C_{10}-C_{12} Aromatic	4.90522 E-5	2.22077 E+4	2.02727 E+4
>C_{12}-C_{16} Aromatic	9.34192 E-6	5.08878 E+4	4.64540 E+4
>C_{16} -C_{21} Aromatic	7.30304 E-7	1.82004 E+5	1.66146 E+5
>C_{21} -C_{35} Aromatic	4.79300 E-9	2.24661 E+6	2.05087 E+6
C_5-C_6 Aliphatic	1.58243 E-2	1.23643 E+3	1.12870 E+3
>C_6-C_8 Aliphatic	7.96707 E-3	1.74254 E+3	1.59071 E+3
>C_8-C_{10} Aliphatic	2.05971 E-3	3.42712 E+3	3.12852 E+3
>C_{10}-C_{12} Aliphatic	4.18629 E-4	7.60182 E+3	6.93948 E+3
>C_{12}-C_{16} Aliphatic	9.34285 E-5	1.60913 E+4	1.46893 E+4
>C_{16}-C_{21} Aliphatic	6.93277 E-6	5.90716 E+4	5.39247 E+4

*All calculations carried out to 18 decimal places. Values provided have been rounded for presentation in this table.

**For residential exposure to non-carcinogens, VFs are based on an exposure duration of six years. Industrial exposure duration is 25 years.

Derivation of TRPH Fraction Toxicological Values

The toxicity values for the various TRPH fractions were obtained from TPHCWG (1997c) and are as follows:

Table C3:
Toxicity Values of TRPH Classes[w]

TRPH Class	RfD_o (mg/kg-day)	RfD_d (mg/kg-day)[x]	RfD_i (mg/kg-day)[y]
C_5-C_7 Aromatic	0.2	0.18	0.1143
>C_7-C_8 Aromatic	0.2	0.16	0.1143
>C_8-C_{10} Aromatic	0.04	0.032	0.05714
>C_{10}-C_{12} Aromatic	0.04	0.032	0.05714
>C_{12}-C_{16} Aromatic	0.04	0.032	0.05714
>C_{16}-C_{21} Aromatic	0.03	0.024	0.024[z]
>C_{21}-C_{35} Aromatic	0.03	0.024	0.024[z]
C_5-C_6 Aliphatic	5.0	2.5	5.257
>C_6-C_8 Aliphatic	5.0	2.5	5.257
>C_8-C_{10} Aliphatic	0.1	0.05	0.2857
>C_{10}-C_{12} Aliphatic	0.1	0.05	0.2857
>C_{12}-C_{16} Aliphatic	0.1	0.05	0.2857
>C_{16}-C_{35} Aliphatic	2.0	1.0	1.0[z]

[w] Toxicity Values from TPHCWG 1997c.
[x] RfD_d values extrapolated from RfD_o, GI absorption assumed to be 0.5 (see Appendix B).
[y] RfD_i values extrapolated from RfC_i values when available, GI absorption assumed to be 0.5 (see Appendix B).
[z] RfD_i values extrapolated from RfD_o, GI absorption assumed to be 0.5 (see Appendix B).

Derivation of TRPH SCTLs

The Florida TRPH SCTLs will be based on a 2-tiered approach. First, there will be a primary TRPH soil cleanup target level (SCTL). This SCTL is based on the assumption that the TRPHs consist exclusively of aromatic hydrocarbons in the >C_8-C_{10} range. Second, if the primary SCTL is exceeded, then the TRPHs may be sub-classified with each class possessing its own SCTL. Given the potential for the subclassification methodology to yield relatively high SCTLs, it is possible that the human health SCTLs for some constituents, particularly those with relatively low toxicity and low mobility potential (such as TRPHs) could result in staining, odors and /or nuisance conditions.

The primary TRPH SCTL is based on the >C_8-C_{10} carbon range as a result of two factors. First, the analytical method identified by the Florida Department of Environmental Protection for the purpose of measuring petroleum hydrocarbons in water and soil is limited to the detection of products within a carbon chain range of C_8-C_{40}. This method, the Florida Petroleum Residual Organic (FL-PRO) — Alternative Method to Total Recoverable Petroleum Hydrocarbons, 418.1 or 9073 — combines several of the commonly used methods so that the targeted range of petroleum hydrocarbons can be analyzed in a single step. However, because of its limitations, the smallest detectable C-range using the FL-PRO Method is the >C_8-C_{10} grouping. [This method is available for immediate use and may be obtained by calling the FDEP Quality Assurance Section at (850) 488-2796.] Secondly, the TRPH SCTL value was selected based on the identification of the most conservative values. The calculation of the

SCTLs (listed below) using standard FDEP and USEPA protocols results in the most conservative values for the C_5-C_7 aromatics. However, due to the limitations of the TRPH Method of Analysis, and since the most toxic and prevalent COCs within this range are addressed by other analyses and individual cleanup target levels, the values in this group are not used as TRPH SCTLs. The next most conservative values for residential and industrial direct exposure that occur within a carbon range that can be analyzed by FL-PRO are found in the >C_8-C_{10} aromatics grouping. Therefore, the TRPH SCTL values are based on this group of total petroleum hydrocarbons.

Calculation of the SCTLs

With the assignment of the above chemical and toxicological values, the determination of risk-based SCTLs follows the same methodology as that used for individual compounds.

use for TPHCWG speciation

Table C4: Calculated SCTLs for TRPH Classes

TRPH Class	SCTL (mg/kg_{soil})		
	Residential	Industrial	Leachability[a]
C_5-C_7 Aromatic	260	1800	34
>C_7-C_8 Aromatic	380	2600	59
>C_8-C_{10} Aromatic	**340**	**2500**	**340**
>C_{10}-C_{12} Aromatic	690	5400	520
>C_{12}-C_{16} Aromatic	1200	11000	1000
>C_{16}-C_{21} Aromatic	1300	14000	3200
>C_{21}-C_{35} Aromatic	2200	40000	25000
C_5-C_6 Aliphatic	4500	30000	470
>C_6-C_8 Aliphatic	6300	42000	1300
>C_8-C_{10} Aliphatic	630	4400	7000
>C_{10}-C_{12} Aliphatic	1300	9400	51000
>C_{12}-C_{16} Aliphatic	2300	19000	1000000
>C_{16}-C_{35} Aliphatic	32000	250000	1000000

[a] Based on an acceptable groundwater concentration of 5000 µg/L.