APPENDIX F: TIER II CLEANUP GOALS - HUMAN HEALTH EVALUATION

Cleanup goals for chemicals in source media for Tier II are calculated based on a human health evaluation using standard risk assessment assumptions. Cleanup goals are determined for one of two possible land use scenarios; residential or nonresidential. The determination of whether cleanup goals based on a residential or nonresidential scenario apply to a particular site depends on the environmental site setting (i.e., onsite and surrounding land use patterns) and projected future use. However, the use of cleanup goals to remediate a site based on a nonresidential scenario will require some land use restrictions to prevent unrestricted future use of the site.

The methodology for calculation of Tier II, health-based cleanup goals was based on EPA's preliminary remediation goals (EPA, 1991), incorporating changes agreed upon by the Voluntary Remediation Program Technical Standards Subcommittee. The methodology for calculation of Tier II cleanup goals is provided in three parts. This first part presents background information and an overview of the health-based approach for determining preliminary remediation goals. Then detailed calculations are provided which outline the approach for calculating health-based goals specifically for the Tier II assessment. Finally, cleanup goals for selected compounds are presented that are applicable for remediation of sites with a Tier II assessment.

OVERVIEW OF EPA APPROACH FOR DETERMINING PRELIMINARY REMEDIATION GOALS

EPA has identified a standardized approach for calculating cleanup goals or preliminary remediation goals (PRGs) for the remedial investigation and feasibility study (RI/FS) process on federal Superfund sites. PRGs are equivalent in concept to Tier II cleanup goals such that they are health-based acceptable concentrations for chemicals of interest in a particular media. They are also derived independently for a site or sites without requiring a site-specific risk assessment (i.e., a Tier III risk assessment). The method for calculating these PRGs was outlined in the document *Risk Assessment Guidance for Superfund: Volume I - Human Health Evaluation Manual; Part B, Development of Risk-Based Preliminary Remediation Goals* (EPA, 9285.7-01B, December, 1991), an overview of which is discussed below.

EPA's approach for determining PRGS for a site include either applicable or relevant and appropriate requirements (ARARs) and/or health-based acceptable concentrations. This discussion, however, focuses only on the calculation of risk-based PRGs. Risk-based PRGs are calculated separately by chemical and media. The media evaluated in EPA Part B include soils and groundwater (and/or surface water used as a potable water source). However, for Tier II, soils were divided into two separate media based on their potential for exposure: surface soils and subsurface soils. Surface soils are defined as those soils within the top 2 feet of the surface that would be incidentally contacted by a worker, while working, or by residents while playing (young children) and/or landscaping or gardening (adults). Subsurface soils were defined as soils below 2 feet that would only be contacted directly during excavation or construction activities. The potential for contact to subsurface or deeper soils would be less than for surface soils and would occur under different circumstances (i.e., excavation or construction).

The development of risk-based PRGs begins with the determination of the probable future land use of the site and the potential receptor type that would apply. Potential exposure pathways are then identified using assumptions about the behavior and body parameters of the applicable receptor. For calculation of PRGs for each media, EPA identified applicable exposure pathways specific to the land use scenario evaluated. However, EPA only considered those exposure pathways that contribute significantly to the overall exposure and risk in the calculation of PRGs. Other relevant exposure pathways were assumed to contribute insignificantly to the overall exposure and were not included. Relevant exposure pathways were also assumed to vary according to residential and nonresidential use scenarios. For the residential scenario, the exposure pathways considered applicable for groundwater were ingestion and inhalation of volatiles; and for soil was incidental ingestion. For the nonresidential scenario, the exposure pathways considered applicable for determining PRGs for groundwater was ingestion; and for soil were incidental ingestion and inhalation of volatiles and fugitive dusts.

Once exposure pathways are identified, equations quantifying the health risk to the receptor can be developed. There are two general equations used in calculating potential human health effects in a risk assessment, one for carcinogenic effects, the other for noncarcinogenic effects. They are, for the carcinogenic assessment:

$$R_i = SF \times I_i$$

Equation (1)

where: R_i = excess lifetime cancer risk from exposure pathway *i*;
SF = cancer slope factor $(mg/kg/day)^{-1}$;
I_i = total chemical intake from exposure pathway *i* averaged over a lifetime (mg/kg/day)

and, for the noncarcinogenic assessment:

$$HI_i = \frac{I_i}{RfD}$$

Equation (2)

where: HI_i = hazard index from exposure pathway *i*;
I_i = average daily intake from exposure pathway *i* averaged over the period of exposure (mg/kg/day);
RfD = reference dose (mg/kg/day).

Equations 1 and 2 are written in a general form in that chemical intake (I) varies according to exposure pathway and receptor. Total cancer risk and hazard index are then calculated by summing across all exposure pathways to give a total cancer risk (R_{tot}):

$$R_{tot} = \sum R_i$$

Equation (3)

or total hazard index (HI_{tot}):

$$HI_{tot} = \sum HI_i$$

Equation (4)

The equations quantifying the risk from a given chemical concentration in a particular medium can then be inverted to back-calculate a health-based acceptable chemical concentration, given an acceptable risk level. PRGs are then determined by using these equations with standard EPA default exposure factors, available toxicity data and appropriate target health effect levels. EPA designed the PRG methodology to be used initially to calculate PRGs for a site using strictly default parameters, and, at a later time, to be used with site-specific assumptions to update the PRGs. However, application of the PRGs concept for calculating Tier II cleanup goals assumes only the default parameters. Modification based on site-specific data, however, could be implemented as a part of a Tier III risk assessment.

Toxicity data refers to cancer slope factors (SFs) and reference doses (RfDs), collectively termed dose-response factors, used in Equations 1 and 2. Dose-response factors relate the intake or dose of a chemical to a carcinogenic effect or noncarcinogenic systemic effect from exposure to a contaminated medium. Dose-response factors are specific to a chemical and exposure pathway (i.e., oral versus inhalation). SFs and RfDs are obtained first from EPA's Integrated Risk Information System (IRIS), or if not available in IRIS, from EPA's Health Effects Assessment Summary Tables (HEAST).

Target health effect levels refer to the levels of cancer risks or hazard indices that are deemed acceptable by the EPA for a particular site. Target health effect levels are cancer risks and hazards indices below which the potential for effects to human health are assumed to be negligible or inconsequential. Generally, cancer risks are evaluated based on a range of acceptable risk from 1 in 10,000 (10^{-4}) to 1 in a 1,000,000 (10^{-6}). Noncarcinogenic effects are evaluated based on a hazard index of one or below which is generally deemed to be acceptable. The range of acceptable risk for the carcinogenic assessment reflects the range of uncertainty in the analysis and interpretation of the results for a particular site. This range also reflects the range of acceptability for various land uses. For federal Superfund sites investigated under the national contingency plan (NCP), sites with a cumulative total cancer risk level below 10^{-6} for all applicable receptors indicate no remedial action is needed. Whereas, for sites with cancer risk levels above 10^{-4}, some remedial action must be taken to mitigate potential cancer risks. For sites with maximum cancer risks in the range 10^{-4} to 10^{-6}, action is taken on a site-specific basis. Typically on sites with unrestricted future use (i.e., where residential use is possible), the target risk level is closer to 10^{-6}. However, on sites with restricted land uses for current and future nonresidential purposes, target risk levels higher than 10^{-6} are often selected. Therefore, for determining health-based cleanup goals for carcinogens in the Tier II analysis, a "point of departure" for sites with unrestricted future use (i.e., including residential use) was based on a 10^{-6} target cancer risk level. For sites where current and future land use is restricted to nonresidential purposes, the "point of departure" for carcinogens was the 10^{-5} target cancer risk level. The target hazard index used for evaluating noncarcinogenic compounds was 1, for compounds that are not considered bioaccumulative, and 0.2, for compounds that are considered bioaccumulative. Table 1 of Water Quality Criteria for Specific

Substances (Indiana Register, Volume 16, Number 7, April 1, 1993) was the basis for determining whether or not a compound was considered bioaccumulative.

CALCULATION OF HEALTH-BASED CLEANUP GOALS

Health-based cleanup goals were calculated for soils and groundwater according to EPA's PRG approach, with one exception. Cleanup goals for soils were developed separately for surface and subsurface soils since they differ in the potential for direct contact exposure. Cleanup goals for surface soils were based on EPA's PRG approach considering target receptors of either residents, for sites remediated for unrestricted future use, or construction workers, for sites that are remediated for restricted land use for nonresidential purposes. For subsurface or deep soils, applicable receptors are excavation workers (i.e., for utility placement or maintenance) or construction workers. These particular receptors would be exposed to subsurface soils at a higher rate (i.e., higher contact rate per day or event) than a construction worker or resident would be exposed to surface soils, but the exposure would occur over a shorter duration. The following paragraphs provide a discussion of calculating health-based criteria applicable for the nonresidential and residential land use scenarios.

NONRESIDENTIAL LAND USE SCENARIO

Surface Soils: Potential exposure pathways considered applicable for surface soils in the nonresidential scenario were incidental ingestion and inhalation of volatiles and fugitive dusts. The cancer risk, R, and hazard index, HI, for these exposure pathways by a worker are calculated using equations written in the form of Equations 1 and 2, however they are expanded to consider specific formulas for calculating

$$R = \frac{EF \times ED \times C_s \times \left[\left(SF_o \times IR_{soil} \times 10^{-6}\ Kg/mg\right) + \left(SF_i \times IR_{air} \times (1/VF + 1/PEF)\right)\right]}{BW \times AT \times 365 days/yr}$$

Equation (5)

intake (I_i) as follows, for carcinogens:

and for noncarcinogens:

$$HI = \frac{EF \times ED \times C_s \times \left[\left(1/RfD_o \times IR_{soil} \times 10^{-6}\ Kg/mg\right) + \left(1/RfD_i \times IR_{air} \times (1/VF + 1/PEF)\right)\right]}{BW \times AT \times 365 days/yr}$$

Equation (6)

The variables VF (soil to air volatilization factor) and PEF (particulate emissions factor) relate the exposure concentrations for the chemical in air to source concentration in soil. The values of VF and PEF are calculated according to the following equations:

$$VF\ (m^3/kg) = \left(\frac{LS \times V \times DH}{A}\right)\left(\frac{(3.14 \times \tau \times T)^{1/2}}{2 \times D_{ei} \times E \times K_{sa} \times 10^{-3} kg/g}\right.$$

Equation (7)

where:

$$\text{"} \ (cm^2/s) \ \text{'} \ \frac{D \ (\ E}{E \ \% \ \frac{p_s (\ (1\&E)}{K_{sa}}}$$

Equation (8)

and

$$PEF \ (m^3/kg) \ \text{'} \ (\frac{LS \ (\ V \ (\ DH \ (\ 3600 s/h}{A}) \ (\ (\frac{1000 g/kg}{0.036 \ (\ (1\&G) \ (\ (U_m/U_t)^3 \ (\ F(x)}$$

Equation (9)

The definitions of variables in Equations 5 through 9 and their EPA recommended default values are provided in Table 1. Equations 5 and 6 above provide numeric estimates of cancer risk (R) and noncarcinogenic hazard index (HI) as a function of the concentration of a chemical in soil. These equations can be inverted to solve for the soil concentration which becomes the health-based criteria (C_{goal}) for a particular compound, as follows:

$$C_{goal} \ \text{'} \ \frac{BW \ (\ THI \ (\ AT \ (\ 365 days/year}{EF \ (\ ED (\ \left((1/RfD_o) \ (\ 10^{\&6} kg/mg \ (\ IR_{soil} \ \% \ (1/RfD_i) \ (\ IR_{air} \ (\ (\frac{1}{VF} \% \frac{1}{PEF}) \right)}$$

Equation (10)

and

$$C_{goal} \ \text{'} \ \frac{BW \ (\ TR \ (\ AT \ (\ 365 days/year}{EF \ (\ ED (\ \left(SF_o \ (\ 10^{\&6} kg/mg \ (\ IR_{soil} \ \% \ SF_i \ (\ IR_{air} \ (\ (\frac{1}{VF} \% \frac{1}{PEF}) \right)}$$

Equation (11)

where: TR = target cancer risk level; and
THI = target hazard index.

The above expression allows for the explicit calculation of a soil health-based criteria once target cancer risk and hazard index levels are established.

Under the default assumptions presented in Table 1, and assuming a target cancer risk level (TR) of 10^{-5} and target hazard index (THI) of 1 for the nonresidential scenario, the above two equations reduce to:

$$C_{goal} = \frac{2.9 \times 10^{-3}}{5 \times 10^{-5} \times SF_o + SF_i \times \left(\frac{20}{VF} + 4.3 \times 10^{-9}\right)}$$

Equation (12)

and

$$C_{goal} = \frac{102}{5 \times 10^{-5}/RfD_o + 1/RfD_i \times \left(\frac{20}{VF} + 4.3 \times 10^{-9}\right)}$$

Equation (13)

Subsurface Soils: As with surface soils, potential exposure pathways applicable for a construction or excavation worker exposed to subsurface soils are incidental ingestion and inhalation of volatiles and fugitive dusts. The cancer risk and hazard index for constructions workers were calculated and combined for these exposure pathways based on Equation 5 for carcinogens and Equation 6 for noncarcinogens. The parameter definitions for variables specific for construction workers exposed to subsurface soils are provided in Table 2. As with surface soils, health-based criteria (C_{goal}) for subsurface soils are calculated based on inverting Equations 5 and 6 and generating equations similar to 10 and 11.

Under the default assumptions presented in Table 2, and assuming a target cancer risk level (TR) of 10^{-5} and THI of 1 for construction workers in the industrial scenario, Equations 10 and 11 reduce to:

$$C_{goal} = \frac{5.1 \times 10^{-2}}{1 \times 10^{-4} \times SF_o + SF_i \times \left(\frac{20}{VF} + 4.3 \times 10^{-9}\right)}$$

Equation (14)

and

$$C_{goal} = \frac{146}{1 \times 10^{-4}/RfD_o + 1/RfD_i \times \left(\frac{20}{VF} + 4.3 \times 10^{-9}\right)}$$

Equation (15)

Groundwater: The exposure pathway considered applicable for groundwater in the industrial land use scenario is ingestion. Cancer risks and hazard indices from this exposure pathway is calculated in equations that combine these intake assumptions as follows, for potential carcinogens:

$$R = \frac{EF \times ED \times C_w \times SF_o \times IR_w}{BW \times AT \times 365\ days/yr}$$

Equation (16)

and, for noncarcinogens:

$$HI = \frac{EF \times ED \times C_w \times IR_w}{RfD_o \times BW \times AT \times 365\ days/yr}$$

Equation (17)

The definitions of variables in Equations 16 and 17, and the EPA recommended default values are provided in Table 3. Equations 16 and 17 present health effects as a function of concentration of chemical in groundwater. These equations can be inverted to solve for water concentrations or health-based criteria (C_{goal}) for groundwater as follows:

$$C_{goal} = \frac{TR \times BW \times AT \times 365\ days/yr}{EF \times ED \times SF_o \times IR_w}$$

Equation (18)

and

$$C_{goal} = \frac{THI \times RfD_o \times BW \times AT \times 365\ days/yr}{EF \times ED \times IR_w}$$

Equation (19)

If the default assumptions presented in Table 3 are used and a target cancer risk of 10^{-5} and target hazard index of 1 are assumed, the above equations reduce to, for carcinogens:

$$C_{goal} = \frac{2.86 \times 10^{-3}}{SF_o}$$

Equation (20)

and, for noncarcinogens

$$C_{goal} = 102.2 \times RfD_o$$

Equation (21)

RESIDENTIAL LAND USE SCENARIO

Surface Soils: The potential exposure pathway applicable for surface soils in the residential scenario was incidental ingestion. The equations of risk to a resident from soil ingestion are slightly different from the nonresidential scenario as the ingestion rate is weighted to account for the change in body weight and ingestion rate as a resident child ages into a resident adult. The equations to be used to calculate cancer risk and hazard index from soil ingestion under a residential scenario are:

$$R_{ing} = \frac{SF_o \times C_s \times 10^{-6}\ Kg/mg \times EF \times IF_{soil/adj}}{AT \times 365\ days/year}$$

Equation (22)

and for noncarcinogens:

$$HI_{ing} = \frac{C_s \times 10^{-6}\ Kg/mg \times EF \times IF_{soil/adj}}{RfD_o \times AT \times 365\ days/year}$$

Equation (23)

where $IF_{soil/adj}$ is the time-weighted average soil ingestion rate for residents divided body weight. Unlike the soil ingestion rate (IR_{soil}) used for a worker, $IF_{soil/adj}$ is a parameter that accounts for the changing rate of soil intake as a child grows into a young adult in a residential setting. The variable $IF_{soil/adj}$ was calculated by the equation:

$$IF_{soil/adj}(mg-yr/Kg-day) = \frac{IR_{soil/age1-6} \times ED_{age1-6}}{BW_{age1-6}} + \frac{IR_{soil/age\ 7-31} \times ED_{age7-31}}{BW_{age7-31}}$$

Equation (24)

The definitions of parameters in Equations 22, 23 and 24, and the EPA recommended default values are provided in Table 4. Equations 22 and 23 specify cancer risks and hazard indices as a function of soil concentration. These equations can be inverted to solve for soil concentrations or health-based criteria (C_{goal}) for surface soil as follows:

$$C_{goal} = \frac{TR \times AT \times 365 days/year}{SF_o \times 10^{-6} kg/mg \times EF \times IF_{soil/adj}}$$

Equation (25)

and

$$C_{goal} = \frac{THI \times AT \times 365 days/year}{1/RfD_o \times 10^{-6} kg/mg \times EF \times IF_{soil/adj}}$$

Equation (26)

where: TR = target cancer risk level; and
THI = target allowable hazard index.

If the default assumptions presented in Table 4 are used and a target cancer risk of 10^{-6} and target hazard index of 1 are assumed, the above equations reduce to:

$$C_{goal} = \frac{0.64}{SF_o}$$

Equation (27)

and

$$C_{goal} = 2.7 \times 10^{-5} \times (RfD_o)$$

Equation (28)

Subsurface Soils: As with subsurface soils in the nonresidential scenario, subsurface soils in the residential scenario are assumed to only be contacted during excavation or construction activities. Therefore, the assumptions and equations determined for the nonresidential scenario would be applicable for the residential scenario. Thus, cleanup goals for subsurface soils in the residential scenario are the same as those determined for the nonresidential scenario.

Groundwater: Potential exposure pathways considered applicable for groundwater in the residential land use scenario include ingestion and inhalation of volatiles. Cancer risks and hazard indices from these two exposure pathways are calculated in equations that combine these intake assumptions as follows, for potential carcinogens:

$$R = \frac{EF \times ED \times C_w \times [(SF_o \times IR_w) + (SF_i \times K \times IR_a)]}{BW \times AT \times 365\ days/yr}$$

Equation (29)

and, for noncarcinogens:

$$HI = \frac{EF \times ED \times C_w \times [(1/RfD_o \times IR_w) + (1/RfD_i \times K \times IR_a)]}{BW \times AT \times 365\ days/yr}$$

Equation (30)

The definitions of variables in Equations 29 and 30, and the EPA recommended default values are provided in Table 5. Equations 29 and 30 present health effects as a function of concentration of chemical in groundwater. These equations can be inverted to solve for water concentrations or health-based criteria (C_{goal}) for groundwater as follows:

$$C_{goal} = \frac{TR \times BW \times AT \times 365\ days/yr}{EF \times ED \times \left((SF_o \times IR_w) + (SF_i \times K \times IR_a)\right)}$$

Equation (31)

and

$$C_{goal} = \frac{THI \times BW \times AT \times 365\ days/yr}{EF \times ED \times \left((1/RfD_o \times IR_w) + (1/RfD_i \times K \times IR_a)\right)}$$

Equation (32)

If the default assumptions presented in Table 5 are used and a target cancer risk of 10^{-6} and target hazard index of 1 are assumed, the above equations reduce to, for carcinogens:

$$C_{goal} = \frac{1.7 \times 10^{-4}}{(2 \times SF_o) + (7.5 \times SF_i)}$$

Equation (33)

and, for noncarcinogens

$$C_{goal} = \frac{60.8}{(2/RfD_o) + (7.5/RfD_i)}$$

Equation (34)

TIER II CLEANUP GOALS

Cleanup goals were calculated for a representative set of chemicals for the Tier II Voluntary Remediation Program based on the procedures outlined above. Table 6 presents this list of chemicals along with analytical detection limits and a determination of whether or not the compound is considered bioaccumulative. Table 7 presents appropriate chemical properties and dose-response data used for calculation of health-based criteria. This representative list of chemicals includes semi-volatiles, volatiles, pesticides and PCBs and inorganics (i.e., metals and cyanide). Literature sources for chemical property data include the following:

- Howard, P.H. 1989. *Fate and Exposure Data for Organic Chemicals*. Lewis Publishers, Chelsia Michigan.

- EPA, 1989. *Hazardous Waste Treatment, Storage and Disposal Facilities (TSDF) - Air Emissions Models*. Appendix D: Properties for Chemicals of Interest. EPA-450/3-87-026. November, 1989.

- EPA, 1986. *Superfund Public Health Evaluation Manual*. Appendix A: Summary Tables for Chemical-Specific Data. EPA/540/1-86/060. October, 1986.

- PADER, 1990. *Risk Assessment/Fate and Transport Modeling System*. Appendix B: Selected Parameter Values for Common Contaminants. Bureau of Waste Management, Pennsylvania Dept. of Environmental Resources. July 13, 1990.

Dose-response data were obtained from the Integrated Risk Information System (IRIS, 1993), and if not available in IRIS, from the Health Effects Assessment Summary Tables (HEAST, 1992: with Supplemental Updates Nos. 1 and 2). Only dose-response data for chemicals with toxicity data from IRIS (1993) and HEAST (1992) were used with the exception of potentially carcinogenic PAHs. Seven of the priority pollutant PAHs are classified as B2 probable carcinogens (IRIS, 1992) as follows:

- benzo(a)pyrene;
- chrysene;
- benzo(a)anthracene;
- benzo(k)fluoranthene;
- benzo(b)fluoranthene;
- dibenzo(a,h)anthracene; and
- indeno(1,2,3-c,d)pyrene.

However, EPA-verified CSFs only exist for benzo(a)pyrene (IRIS, 1992). Therefore, cancer slope factors are needed to perform a carcinogenic assessment for the other 6 potentially carcinogenic PAHs. EPA is currently considering evaluating the carcinogenicity of the other potentially carcinogenic compounds based on a toxicity equivalency factor (TEF) approach relative to carcinogenicity of benzo(a)pyrene. An interim draft policy for evaluating the carcinogenicity of the other PAHs was released in 1990 (EPA, 1990. *Draft Interim Policy for Estimating Carcinogenic Risks Associated With Exposures to Polycyclic Aromatic Hydrocarbons (PAHs)*, OSWER Directive #9285-4-02). This draft interim policy first identified the TEF approach for assessing the carcinogenicity of PAHs other than benzo(a)pyrene. This was further supported by a recent EPA memo from Kenneth A. Poirer, Director of Superfund Health Risk Technical Support Center for Chemical Mixtures and Assessment Branch, concerning PAH toxicity (*Risk Assessment for Polyaromatic Hydrocarbons*, Memo to Sarah Levinson, EPA Region 1, January, 1992). Also, the Environmental Criteria and Assessment Office (ECAO) of EPA in Cincinnati was contacted concerning the appropriate methodology for the carcinogenic assessment of PAHs. Dr. Rita Schoeny, Associate Director of Science for ECAO, stated that a TEF approach is appropriate for evaluating the carcinogenicity for the other six potentially carcinogenic PAH

compounds using the TEF factors relative to that of benzo(a)pyrene. These TEF factors are as follows:

	PAH COMPOUND		TEF	CSF
c	benzo(a)pyrene	-	1	7.3
c	benzo(a)anthracene	-	0.1	0.73
c	benzo(b)fluoranthene	-	0.1	0.73
c	benzo(k)fluoranthene	-	0.01	0.073
c	chrysene	-	0.001	0.0073
c	dibenzo(a,h)anthracene	-	1.0	7.3
c	indeno(1,2,3-c,d)pyrene	-	0.1	0.73

Therefore, with the absence of verified EPA CSFs for PAHs other than benzo(a)pyrene, PAHs carcinogenicity were assessed based on the TEF approach, suggested by EPA and recommended by Dr. Schoeny of EPA's ECAO.

An overview of health-based cleanup goals by scenario (residential and nonresidential) and by media are provided below.

NONRESIDENTIAL SCENARIO

Groundwater: Cleanup goals for groundwater in the nonresidential scenario were determined based on health-based criteria from direct contact using the default Equations 20 and 21. However, for implementation purposes for a site remediation program, health-based concentrations were compared to practical quantitation limits (PQLs) and drinking water criteria (i.e., non-zero maximum contaminant level goals [MCLGs] or maximum contaminant levels [MCLs] from the Safe Drinking Water Act) for determination of the cleanup goal. The practical quantitation limit is the lowest level that can be reliably achieved for a particular analyte within specified limits of precision and accuracy during routine laboratory operating conditions for a particular procedure. PQLs were determined based on *Test Methods for Evaluating Solid Waste* (EPA, 1986; SW-846). Representative test methods considered applicable for compounds in water include:

- Method 8270 for semi-volatiles;
- Method 8240 for volatiles;
- Method 8080 for pesticides and PCBs;
- Method Series 200 for metals and inorganics.

However, final PQLs would vary according to the specific analytical method used. Health-based concentrations were first compared to PQLs. For those compounds having health-based concentrations less than the PQL, the PQL was considered the cleanup goal. Finally, health-based concentrations were compared to drinking water quality criteria (i.e., non-zero MCLGs and MCLs). For those compounds with criteria below MCLGs or MCLs, the cleanup goal were based on applicable drinking water criteria.

Table 8 presents applicable drinking water criteria, PQLs and health-based concentrations that were used to determine Tier II cleanup goals for groundwater in the nonresidential scenario (i.e., on sites

remediated for restricted future use). Health-based concentrations for carcinogens in the nonresidential scenario were calculated assuming a 10^{-5} target risk level. Health-based concentrations for noncarcinogens were calculated based on a target hazard index of 1, for non-bioaccumulative compounds, and 0.2 for compounds that are bioaccumulative. Cleanup goals identified as NA for particular compounds indicate appropriate toxicity data is not available or not appropriate for that particular compound. For some compounds, cleanup goals were determined from both the carcinogenic and noncarcinogenic assessment. The appropriate cleanup goal would, therefore, be the lower of the two values. For other compounds, such as lead, no toxicity values were available and therefore, health-based cleanup goals could not be calculated based on this methodology. However, there are data available to assess cleanup goals for compounds such as lead, such as MCLs or other EPA documentation which should be consulted.

Surface Soils: Cleanup goals for surface soils in the nonresidential scenario were determined based on health-based concentrations from direct contact using the default Equations 12 and 13. However, health-based concentrations were compared to practical quantitation limits (PQLs) for determination of the cleanup goal. The consideration of PQLs was considered necessary for application of cleanup goals to site remediation programs. For compounds having health-based concentrations less than the PQL, the PQL was considered the cleanup goal. A maximum upper limit is proposed for each chemical class in surface soil according to the following criteria:

- total semi-volatile compounds not to exceed 10,000 mg/Kg;
- total volatile compounds not to exceed 1,000 mg/Kg;
- total cyanide concentrations of 1,000 mg/Kg; and
- total mercury concentrations of 1,000 mg/Kg.

These limits were established to be protective of other potential exposure pathways not evaluated in the calculation of health-based criteria. No upper limit has been established for metals other than mercury since many are naturally occurring, some of which at high concentrations.

Table 9 presents PQLs and health-based concentrations that were used to determine Tier II cleanup goals for surface soils in the nonresidential land use scenario (i.e., on sites remediated for restricted future use). Cleanup goals for carcinogens in the nonresidential scenario were calculated assuming a 10^{-5} target risk level. Cleanup goals for noncarcinogens were calculated based on a target hazard index of 1, for non-bioaccumulative compounds, and 0.2 for compounds that are bioaccumulative.

Subsurface Soils: Cleanup goals for subsurface soils in the nonresidential scenario were determined based on two health-based criteria: direct contact using the default Equations 14 and 15; and based on leaching to groundwater and protection of a groundwater criteria or standard. The leaching pathway was not considered in the calculation of PRGs, however, the leaching of chemicals from soils to groundwater and the protection of groundwater was deemed an important consideration for establishing cleanup goals for subsurface soils. Soil concentrations that are considered protective of groundwater via leaching were calculated based on EPA's Organic Leaching Model (OLM) [*Final Organic Leaching Model (OLM)*; EPA 51 FR 41082, Nov. 13, 1986], which involves the equation:

$$C_l = 0.00221 \left(C_s^{0.678} \left(Sol^{0.373}$$

Equation (35)

where: C_l = Concentration in the leachate (mg/L);
C_s = Concentration in the soil or solid media (mg/Kg); and
Sol = Aqueous solubility (mg/L).

By substituting a groundwater cleanup goal (C_{gw}) for C_l in Equation 35 and re-arranging term, an acceptable subsurface soil concentration (C_s) is calculated with the equation:

$$C_s = \frac{C_{gw}}{\left(0.00221 \left(Sol^{0.373}\right)\right.}^{1/0.678}$$

Equation (36)

The health-based criteria was the lower of the either the health-based concentration from the direct contact method or from the leaching method. However, as with surface soils, health-based criteria were compared to practical quantitation limits (PQLs) for determination of the final Tier II cleanup goal. This is necessary for implementation purposes in a remediation program on subsurface soils. For compounds having health-based criteria less than the PQL, the PQL was considered the cleanup goal. A maximum upper limit is proposed for each chemical class in subsurface soils, based on the discussion provided above for surface soils, including the following:

- total semi-volatile compounds not to exceed 10,000 mg/Kg;
- total volatile compounds not to exceed 1,000 mg/Kg;
- total cyanide concentrations of 1,000 mg/Kg; and
- total mercury concentrations of 1,000 mg/Kg.

These limits were established to be protective of other potential exposure pathways not evaluated in the calculation of health-based criteria.

Table 10 presents PQLs and health-based concentrations from the direct contact and leaching methods for determination of Tier II cleanup goals for subsurface soils in the nonresidential land use scenario (i.e., on sites remediated for restricted future use). Cleanup goals for carcinogens in subsurface soils from the nonresidential scenario were calculated assuming a 10^{-5} target risk level. Cleanup goals for noncarcinogens were calculated based on a target hazard index of 1, for non-bioaccumulative compounds, and 0.2 for compounds that are bioaccumulative.

RESIDENTIAL SCENARIO

Groundwater: Cleanup goals for groundwater in the residential scenario were determined based on health-based criteria from direct contact using the default Equations 33 and 34. Health-based concentrations were compared to practical quantitation limits (PQLs) and non-zero maximum

contaminant level goals (MCLGs) or maximum contaminant levels (MCLs) from the Safe Drinking Water Act, for determination of the cleanup goal. Health-based concentrations were first compared to PQLs. For those compounds having health-based concentrations less than the PQL, the PQL was considered the cleanup goal. Finally, health-based concentrations were compared to drinking water quality criteria (i.e., non-zero MCLGs and MCLs). For those compounds with criteria below MCLGs or MCLs, the cleanup goal were based on applicable drinking water criteria. Analytical test methods for determining concentrations in residential drinking water detection methods must conform to current U.S. EPA drinking water methodology.

Table 11 presents applicable drinking water criteria, PQLs and health-based concentrations that were used to determine Tier II cleanup goals for groundwater in the residential scenario (i.e., on sites remediated for unrestricted future use). Health-based concentrations for carcinogens in the residential scenario were calculated assuming a 10^{-6} target risk level. Health-based concentrations for noncarcinogens were calculated based on a target hazard index of 1, for non-bioaccumulative compounds, and 0.2 for compounds that are bioaccumulative.

Surface Soils: Cleanup goals for surface soils in the residential scenario were determined based on health-based concentrations from direct contact using the default Equations 27 and 28. Health-based concentrations were compared to practical quantitation limits (PQLs) for determination of the cleanup goal. For compounds having health-based concentrations less than the PQL, the PQL was considered the cleanup goal. A maximum upper limit is proposed for each chemical class in surface soils which include the following:

- total semi-volatile compounds not to exceed 10,000 mg/Kg;
- total volatile compounds not to exceed 1,000 mg/Kg;
- total cyanide concentrations of 1,000 mg/Kg; and
- total mercury concentrations of 1,000 mg/Kg.

These limits were established to be protective of other potential exposure pathways not evaluated in the calculation of health-based criteria.

Table 12 presents PQLs and health-based concentrations that were used to determine Tier II cleanup goals for surface soils in the residential land use scenario (i.e., on sites remediated for unrestricted future use). Cleanup goals for carcinogens in the residential scenario were calculated assuming a 10^{-6} target risk level. Cleanup goals for noncarcinogens were calculated based on a target hazard index of 1, for non-bioaccumulative compounds, and 0.2 for compounds that are bioaccumulative.

Subsurface Soils: Cleanup goals for subsurface soils in the residential scenario were determined based on the discussion provided above for the nonresidential scenario. However, the applicable groundwater criteria for the leaching assessment were based on the groundwater criteria discussed above for the residential scenario. The health-based criteria was the lower of the either the health-based concentration from the direct contact method or from the leaching method. Health-based criteria were then compared to practical quantitation limits (PQLs) for determination of the final Tier II cleanup goal. For compounds having health-based criteria less than the PQL, the PQL was considered the cleanup goal. A maximum upper limit is proposed for each chemical class in subsurface soils which include the

following:

- total semi-volatile compounds not to exceed 10,000 mg/Kg;
- total volatile compounds not to exceed 1,000 mg/Kg;
- total cyanide concentrations of 1,000 mg/Kg; and
- total mercury concentrations of 1,000 mg/Kg.

These limits were established to be protective of other potential exposure pathways not evaluated in the calculation of health-based criteria.

Table 13 presents PQLs and health-based concentrations from the direct contact and leaching methods for determination of Tier II cleanup goals for subsurface soils in the residential land use scenario. Cleanup goals for carcinogens in subsurface soils from the residential scenario were calculated assuming a 10^{-6} target risk level. Cleanup goals for noncarcinogens were calculated based on a target hazard index of 1, for non-bioaccumulative compounds, and 0.2 for compounds that are bioaccumulative.

SUMMARY

This section discussed the calculation of cleanup goals for Tier II in the Voluntary Remediation Program. Cleanup goals were presented for surface soils, subsurface soils and groundwater separately for a residential and nonresidential land use scenario. Tier II cleanup goals were presented for representative compounds. Tables 14 and 15 present cleanup goals for the residential and nonresidential scenarios, respectively. Cleanup goals were determined based on health-based concentrations from a human health risk assessment. However, the determination of cleanup goals also considered practical quantitation limits (PQLs) based on available analytical methods for soils and groundwater. PQLs must be considered when establishing definable cleanup goals to be met in a site remediation program.

TABLE 1
INTAKE ASSUMPTIONS FOR EXPOSURE TO SURFACE SOILS IN THE NONRESIDENTIAL SCENARIO

Parameters	Definition (units)	Default Value
Assumptions For Calculation of Cleanup Goals for Surface Soil		
C_s	chemical concentration in soil (mg/Kg)	-
TR	target excess individual lifetime cancer risk (unitless)	10^{-5} (industrial)
THI	target acceptable hazard index (unitless)	1
Sf_o	oral cancer slope factor (mg/Kg-day)$^{-1}$	chemical-specific
Sf_i	inhalation cancer slope factor (mg/Kg-day)$^{-1}$	chemical-specific
RfD_o	oral reference dose (mg/Kg/day	chemical-specific
RfD_i	inhalation reference dose (mg/Kg/day)	chemical-specific
AT	averaging time (yr)	70yr - carcinogenic 25yr - noncarcinogenic
EF	exposure frequency (days/yr)	50 days/yr
ED	exposure duration (yr)	25 yr
Ir_{soil}	soil ingestion rate (mg/day)	50 mg/day
Ir_{air}	inhalation rate (m^3/day)	20 m^3/day
VF	volatiliztion factor (m^3/Kg)	(see Equation 7 and factors below)
PEF	particulate emissions factor (m3/Kg)	(see Equation 9 and factors below)
Assumptions for Estimation of Volatilization Factor (VF)		
LS	length of side of contaminated area (m)	45 m
V	wind speed in mixing zone (m/s)	2.25 m/s
DH	diffusion height (m)	2 m
A	area of contamination (cm^2)	20,250,000 cm^2
D_{ei}	effective diffusivity (cm^2)	$D_i \times E^{0.33}$
E	true soil porosity (unitless)	0.35
K_{sa}	soil/air partition coefficient (g soil/cm^3 air)	$(H/K_d) \times 41$, where 41 is a units conversion factor
p_s	true soil density or particulate density (g/cm^3)	2.65 g/cm^3
T	exposure interval (s)	7.90e+08 s
D_i	molecular diffusivity (cm^2/s)	chemical-specific
H	Henry's law constant (atm-m^3/mol)	chemical-specific
K_d	soil-water partition coefficient (cm^3/g)	chemical-specific, or $K_{oc} \times OC$
K_{oc}	organic carbon partition coefficient (cm^3/g)	chemical-specific
OC	organic carbon content of soil (fraction)	site-specific, or 0.02

TABLE 1 Cont.
INTAKE ASSUMPTIONS FOR EXPOSURE TO SURFACE SOILS IN THE NONRESIDENTIAL SCENARIO

Parameters	Definition (units)	Default Value
Assumptions for Estimation of Particulate Emission Factor (PEF)		
LS	length of side of contaminated area (m)	45 m
V	wind speed in mixing zone (m/s)	2.25 m/s
DH	diffusion height (m)	2 m
A	area of contamination (m^2)	2,025 m^2
RF	respirable fraction (g/m^2-hr)	0.036 g/m^2-hr
G	fraction of vegetative cover (unitless)	0
U_m	mean annual wind speed (m/s)	4.5 m/s
U_t	equivalent threshold value of windspeed at 10 m (m/s)	12.8 m/s
F(x)	function dependent on U_m/U_t	0.0497

TABLE 2
INTAKE ASSUMPTIONS FOR EXPOSURE TO SUBSURFACE SOILS
IN THE NONRESIDENTIAL AND RESIDENTIAL SCENARIOS

Parameters	Definition (units)	Default Value
Assumptions For Calculation of Cleanup Goals for Subsurface Soil		
C_s	chemical concentration in soil (mg/Kg)	-
TR	target excess individual lifetime cancer risk (unitless)	10^{-5} (industrial)
THI	target acceptable hazard index (unitless)	1
Sf_o	oral cancer slope factor (mg/Kg-day)$^{-1}$	chemical-specific
Sf_i	inhalation cancer slope factor (mg/Kg-day)$^{-1}$	chemical-specific
RfD_o	oral reference dose (mg/Kg/day)	chemical-specific
RfD_i	inhalation reference dose (mg/Kg/day)	chemical-specific
AT	averaging time (yr)	70 yr - carcinogenic 2 yr - noncarcinogenic
EF	exposure frequency (days/yr)	175 5 days/wk, 35 weeks/yr
ED	exposure duration (yr)	2 yr
Ir_{soil}	soil ingestion rate (mg/day)	100 mg/day
Ir_{air}	inhalation rate (m^3/day)	20 m^3/day
VF	volatiliztion factor (m^3/Kg)	(see Equation 7 and factors below)
PEF	particulate emissions factor (m^3/Kg)	(see Equation 9 and factors below)
Assumptions for Estimation of Volatilization Factor (VF)		
LS	length of side of contaminated area (m)	45 m
V	wind speed in mixing zone (m/s)	2.25 m/s
DH	diffusion height (m)	2 m
A	area of contamination (cm^2)	20,250,000 cm^2
D_{ei}	effective diffusivity (cm^2)	$D_i \times E^{0.33}$
E	true soil porosity (unitless)	0.35
K_{sa}	soil/air partition coefficient (g soil/cm^3 air)	$(H/K_d) \times 41$, where 41 is a units conversion factor
p_s	true soil density or particulate density (g/cm^3)	2.65 g/cm^3
T	exposure interval (s)	7.90e+08 s
Di	molecular diffusivity (cm^2/s)	chemical-specific
H	Henry's law constant (atm-m^3/mol)	chemical-specific
K_d	soil-water partition coefficient (cm^3/g)	chemical-specific, or $K_{oc} \times OC$
K_{oc}	organic carbon partition coefficient (cm^3/g)	chemical-specific
OC	organic carbon content of soil (fraction)	site-specific, or 0.02

TABLE 2 Cont.
INTAKE ASSUMPTIONS FOR EXPOSURE TO SUBSURFACE SOILS
IN THE NONRESIDENTIAL AND RESIDENTIAL SCENARIOS

Parameters	Definition (units)	Default Value
Assumptions for Estimation of Particulate Emission Factor (PEF)		
LS	length of side of contaminated area (m)	45 m
V	wind speed in mixing zone (m/s)	2.25 m/s
DH	diffusion height (m)	2 m
A	area of contamination (m^2)	2,025 m^2
RF	respirable fraction (g/m^2-hr)	0.036 g/m^2-hr
G	fraction of vegetative cover (unitless)	0
U_m	mean annual wind speed (m/s)	4.5 m/s
U_t	equivalent threshold value of windspeed at 10 m (m/s)	12.8 m/s
F(x)	function dependent on U_m/U_t	0.0497

TABLE 3
INTAKE ASSUMPTIONS FOR EXPOSURE TO GROUNDWATER
IN THE NONRESIDENTIAL SCENARIO

Parameters	Definition (units)	Default Value
Assumptions For Calculation of Cleanup Goals for Groundwater		
CW	chemical concentration in water (mg/L)	-
TR	target excess individual lifetime cancer risk (unitless)	10^{-5} (industrial)
THI	target acceptable hazard index (unitless)	1
Sf_o	oral cancer slope factor ((mg/Kg-day)$^{-1}$)	chemical-specific
RfD_o	oral reference dose (mg/Kg/day)	chemical-specific
BW	adult body weight (Kg)	70 Kg
AT	averaging time (yr)	70 yr - carcinogenic 25 yr - noncarcinogenic
EF	exposure frequency (days/yr)	250 days/yr
ED	exposure duration (yr)	25 yr
Ir_w	daily water ingestion rate (L/day)	1 L/day

TABLE 4
INTAKE ASSUMPTIONS FOR EXPOSURE TO SURFACE SOILS
IN THE RESIDENTIAL SCENARIO

Parameters	Definition (units)	Default Value
Assumptions For Calculation of Cleanup Goals for Surface Soil		
C_s	chemical concentration in soil (mg/Kg)	-
TR	target excess individual lifetime cancer risk (unitless)	10^{-6} (residential)
THI	target acceptable hazard index (unitless)	1
Sf_o	oral cancer slope factor (mg/Kg-day)$^{-1}$	chemical-specific
RfD_o	oral reference dose (mg/Kg/day)	chemical-specific
AT	averaging time (yr)	70 yr - carcinogenic 30 yr - noncarcinogenic
EF	exposure frequency (days/yr)	350 days/yr
ED	exposure duration (yr)	30 yr
$If_{soil/adj}$	age-adjusted ingestion factor(mg-yr/Kg-day)	114 mg-yr/Kg-day
Assumptions for Calculation of $IF_{soil/adj}$		
$BW_{age\ 1-6}$	average body weight from ages 1-6 (Kg)	15 Kg
$BW_{age\ 7-31}$	average body weight from ages 7-31 (Kg)	70 Kg
$ED_{ages\ 1-6}$	exposure duration during ages 1-6 (yr)	6 yr
$ED_{ages\ 7-31}$	exposure duration during ages 7-31 (yr)	24 yr
$IR_{soil/ages\ 1-6}$	ingestion rate of soil age 1 to 6 (mg/day)	200 mg/day
$IR_{soil/ages\ 7-31}$	ingestion rate of soil all other ages (mg/day)	100 mg/day

TABLE 5
INTAKE ASSUMPTIONS FOR EXPOSURE TO GROUNDWATER
IN THE RESIDENTIAL SCENARIO

Parameters	Definition (units)	Default Value
Assumptions For Calculation of Cleanup Goals for Groundwater		
C_W	chemical concentration in water (mg/L)	-
TR	target excess individual lifetime cancer risk (unitless)	10^{-6} (residential)
THI	target acceptable hazard index (unitless)	1
Sf_o	oral cancer slope factor ((mg/Kg-day)$^{-1}$)	chemical-specific
RfD_o	oral reference dose (mg/Kg/day)	chemical-specific
SF_i	inhalation cancer slope factor ((mg/Kg-day)$^{-1}$)	chemical-specific
RfD_i	inhalation reference dose (mg/Kg/day)	chemical-specific
BW	adult body weight (Kg)	70 Kg
AT	averaging time (yr)	70 yr - carcinogenic 25 yr - noncarcinogenic
EF	exposure frequency (days/yr)	350 days/yr
ED	exposure duration (yr)	30 yr
IR_a	daily indoor inhalation rate (m^3/day)	15m^3/day
Ir_w	daily water ingestion rate (L/day)	2 L/day
K	volatilization factor (unitless)	.0005 x 1000 L/m^3 (Andelman 1990)

TABLE 6
REPRESENTATIVE COMPOUNDS AND CHARACTERISTICS

Chemical Name	Compound Type [a]	Compound is Considered Bioaccumulatable [b] (yes/no)	Maximum Contaminant Level (MCL) (mg/L)	Maximum Contaminant Level Goal (MCLG) (mg/L)	Practical or Estimated Quantitation Limits [c]			
					Low Contaminated Soil		Groundwater	
					Value (mg/Kg)	Method	Value (mg/L)	Method
naphthalene	semivolatile	no			0.660	SW846 - 8270	0.01000	SW846 - 8270
acenaphthylene	semivolatile	no			0.660	SW846 - 8270	0.01000	SW846 - 8270
acenaphthene	semivolatile	no			0.660	SW846 - 8270	0.01000	SW846 - 8270
fluorene	semivolatile	no			0.660	SW846 - 8270	0.01000	SW846 - 8270
phenanthrene	semivolatile	no			0.660	SW846 - 8270	0.01000	SW846 - 8270
anthracene	semivolatile	no			0.660	SW846 - 8270	0.01000	SW846 - 8270
fluoranthene	semivolatile	yes			0.660	SW846 - 8270	0.01000	SW846 - 8270
pyrene	semivolatile	no			0.660	SW846 - 8270	0.01000	SW846 - 8270
benzo(a)anthracene*	semivolatile	yes	0.0001	0	0.660	SW846 - 8270	0.01000	SW846 - 8270
chrysene*	semivolatile	yes	0.0002	0	0.660	SW846 - 8270	0.01000	SW846 - 8270
benzo(b)fluoranthene*	semivolatile	yes	0.0002	0	0.660	SW846 - 8270	0.01000	SW846 - 8270
benzo(k)fluoranthene*	semivolatile	yes	0.0002	0	0.660	SW846 - 8270	0.01000	SW846 - 8270
benzo(a)pyrene	semivolatile	yes	0.0002	0	0.660	SW846 - 8270	0.01000	SW846 - 8270
indeno(1,2,3-cd)pyrene*	semivolatile	yes	0.0004	0	0.660	SW846 - 8270	0.01000	SW846 - 8270
dibenzo(a,h)anthracene*	semivolatile	yes	0.0003	0	0.660	SW846 - 8270	0.01000	SW846 - 8270
benzo(g,h,i)perylene	semivolatile	yes			0.660	SW846 - 8270	0.01000	SW846 - 8270
3,3'-dichlorobenzidine	semivolatile	no			1.300	SW846 - 8270	0.02000	SW846 - 8270
n-nitroso-di-n-propylamine	semivolatile	no			0.660	SW846 - 8270	0.01000	SW846 - 8270
bis(2-chloroisopropyl)ether	semivolatile	no			0.660	SW846 - 8270	0.01000	SW846 - 8270
4-chloroaniline	semivolatile	no			1.300	SW846 - 8270	0.02000	SW846 - 8270
2-chloronaphthalene	semivolatile	no			0.660	SW846 - 8270	0.01000	SW846 - 8270
2,4-dinitrotoluene	semivolatile	no			0.660	SW846 - 8270	0.01000	SW846 - 8270
hexachlorobutadiene	semivolatile	yes			0.660	SW846 - 8270	0.01000	SW846 - 8270
hexachloroethane	semivolatile	yes			0.660	SW846 - 8270	0.01000	SW846 - 8270
isophorone	semivolatile	no			0.660	SW846 - 8270	0.01000	SW846 - 8270
benzyl alcohol	semivolatile	no			1.300	SW846 - 8270	0.02000	SW846 - 8270
bis(2-chloroethyl)ether	semivolatile	no			0.660	SW846 - 8270	0.01000	SW846 - 8270

TABLE 6
REPRESENTATIVE COMPOUNDS AND CHARACTERISTICS

Chemical Name	Compound Type [a]	Compound is Considered Bioaccumulatable [b] (yes/no)	Maximum Contaminant Level (MCL) (mg/L)	Maximum Contaminant Level Goal (MCLG) (mg/L)	Practical or Estimated Quantitation Limits [c]			
					Low Contaminated Soil		Groundwater	
					Value (mg/Kg)	Method	Value (mg/L)	Method
nitrobenzene	semivolatile	no			0.660	SW846 - 8270	0.01000	SW846 - 8270
1,2-dichlorobenzene	semivolatile	no	0.6000	0.6000	0.660	SW846 - 8270	0.01000	SW846 - 8270
1,3-dichlorobenzene	semivolatile	no	0.6000	0.6000	0.660	SW846 - 8270	0.01000	SW846 - 8270
1,4-dichlorobenzene	semivolatile	no	0.0750	0.0750	0.660	SW846 - 8270	0.01000	SW846 - 8270
1,2,4-trichlorobenzene	semivolatile	no	0.0700	0.0700	0.660	SW846 - 8270	0.01000	SW846 - 8270
hexachlorobenzene	semivolatile	no	0.0010	0	0.660	SW846 - 8270	0.01000	SW846 - 8270
hexachlorocyclopentadiene	semivolatile	no	0.0500	0.0500	0.660	SW846 - 8270	0.01000	SW846 - 8270
n-nitrosodiphenylamine	semivolatile	no			0.660	SW846 - 8270	0.01000	SW846 - 8270
benzoic acid	semivolatile	no			3.300	SW846 - 8270	0.05000	SW846 - 8270
2-nitroaniline	semivolatile	no			3.300	SW846 - 8270	0.05000	SW846 - 8270
phenol	semivolatile	yes			0.660	SW846 - 8270	0.01000	SW846 - 8270
2-methylphenol	semivolatile	no			0.660	SW846 - 8270	0.01000	SW846 - 8270
3-methylphenol	semivolatile	no			0.660	SW846 - 8270	0.01000	SW846 - 8270
4-methylphenol	semivolatile	no			0.660	SW846 - 8270	0.01000	SW846 - 8270
2-chlorophenol	semivolatile	no			0.660	SW846 - 8270	0.01000	SW846 - 8270
2,4-dichlorophenol	semivolatile	no			0.660	SW846 - 8270	0.01000	SW846 - 8270
2,4,5-trichlorophenol	semivolatile	no			0.660	SW846 - 8270	0.01000	SW846 - 8270
2,4,6-trichlorophenol	semivolatile	no			0.660	SW846 - 8270	0.01000	SW846 - 8270
pentachlorophenol	semivolatile	no	0.0010	0	3.300	SW846 - 8270	0.05000	SW846 - 8270
2,4-dinitrophenol	semivolatile	no			3.300	SW846 - 8270	0.05000	SW846 - 8270
bis(2-ethylhexyl)phthalate	semivolatile	yes	0.0060	0	0.660	SW846 - 8270	0.01000	SW846 - 8270
butylbenzylphthalate	semivolatile	no	0.1000	0	0.660	SW846 - 8270	0.01000	SW846 - 8270
di-n-butylphthalate	semivolatile	yes			0.660	SW846 - 8270	0.01000	SW846 - 8270
diethylphthalate	semivolatile	no			0.660	SW846 - 8270	0.01000	SW846 - 8270
di methyl phthalate	semivolatile	no			0.660	SW846 - 8270	0.01000	SW846 - 8270
di-n-octyl phthalate	semivolatile	no			0.660	SW846 - 8270	0.01000	SW846 - 8270
benzene	volatile	no	0.0050	0	0.005	SW846 - 8240	0.00500	SW846 - 8240

TABLE 6
REPRESENTATIVE COMPOUNDS AND CHARACTERISTICS

Chemical Name	Compound Type [a]	Compound is Considered Bioaccumulatable [b] (yes/no)	Maximum Contaminant Level (MCL) (mg/L)	Maximum Contaminant Level Goal (MCLG) (mg/L)	Practical or Estimated Quantitation Limits [c] Low Contaminated Soil Value (mg/Kg)	Low Contaminated Soil Method	Groundwater Value (mg/L)	Groundwater Method
toluene	volatile	no	1.0000	1.0000	0.005	SW846 - 8240	0.00500	SW846 - 8240
ethylbenzene	volatile	no	0.7000	0.7000	0.005	SW846 - 8240	0.00500	SW846 - 8240
xylenes	volatile	no	10.0000	10.0000	0.005	SW846 - 8240	0.00500	SW846 - 8240
vinyl chloride	volatile	no	0.0020	0	0.010	SW846 - 8240	0.01000	SW846 - 8240
chloroethane	volatile	no			0.010	SW846 - 8240	0.01000	SW846 - 8240
1,1-dichloroethylene	volatile	no	0.0070	0.0070	0.005	SW846 - 8240	0.00500	SW846 - 8240
1,1-dichloroethane	volatile	no			0.005	SW846 - 8240	0.00500	SW846 - 8240
1,2-dichloroethylene (cis)	volatile	no	0.0700	0.0700	0.005	SW846 - 8240	0.00500	SW846 - 8240
1,2-dichloroethane	volatile	no	0.0050	0	0.005	SW846 - 8240	0.00500	SW846 - 8240
trichloroethylene	volatile	no	0.0050	0	0.005	SW846 - 8240	0.00500	SW846 - 8240
1,1,1-trichloroethane	volatile	no	0.2000	0.2000	0.005	SW846 - 8240	0.00500	SW846 - 8240
1,1,2-trichloroethane	volatile	no	0.0050	0.0030	0.005	SW846 - 8240	0.00500	SW846 - 8240
tetrachloroethylene	volatile	no	0.0050	0	0.005	SW846 - 8240	0.00500	SW846 - 8240
1,1,1,2-tetrachloroethane	volatile	no			0.005	SW846 - 8240	0.00500	SW846 - 8240
1,1,2,2-tetrachloroethane	volatile	no			0.005	SW846 - 8240	0.00500	SW846 - 8240
chloroform	volatile	no	0.1000	0	0.005	SW846 - 8240	0.00500	SW846 - 8240
acetone	volatile	no			0.100	SW846 - 8240	0.10000	SW846 - 8240
4-methyl-2-pentanone	volatile	no			0.050	SW846 - 8240	0.05000	SW846 - 8240
methyl ethyl ketone	volatile	no			0.100	SW846 - 8240	0.10000	SW846 - 8240
Aldrin	pest/herb/PCB	yes			0.003	SW846 - 8080	0.00004	SW846 - 8080
gamma-BHC (Lindane)	pest/herb/PCB	yes	0.0002	0.0002	0.006	SW846 - 8080	0.00009	SW846 - 8080
chlordane	pest/herb/PCB	yes	0.0020	0	0.009	SW846 - 8080	0.00014	SW846 - 8080
DDD	pest/herb/PCB	yes			0.007	SW846 - 8080	0.00011	SW846 - 8080
DDE	pest/herb/PCB	yes			0.003	SW846 - 8080	0.00004	SW846 - 8080
DDT	pest/herb/PCB	yes			0.008	SW846 - 8080	0.00012	SW846 - 8080
dieldrin	pest/herb/PCB	yes			0.001	SW846 - 8080	0.00002	SW846 - 8080
endosulfan sulfate	pest/herb/PCB	no			0.044	SW846 - 8080	0.00066	SW846 - 8080

TABLE 6
REPRESENTATIVE COMPOUNDS AND CHARACTERISTICS

Chemical Name	Compound Type [a]	Compound is Considered Bioaccumulatable [b] (yes/no)	Maximum Contaminant Level (MCL) (mg/L)	Maximum Contaminant Level Goal (MCLG) (mg/L)	Practical or Estimated Quantitation Limits [c] Low Contaminated Soil Value (mg/Kg)	Low Contaminated Soil Method	Groundwater Value (mg/L)	Groundwater Method
endrin	pest/herb/PCB	yes	0.0020	0.0020	0.004	SW846 - 8080	0.00006	SW846 - 8080
heptachlor	pest/herb/PCB	yes	0.0004	0	0.002	SW846 - 8080	0.00003	SW846 - 8080
heptachlor epoxide	pest/herb/PCB	no	0.0002	0	0.056	SW846 - 8080	0.00083	SW846 - 8080
PCBs	pest/herb/PCB	yes	0.0005	0	0.044	SW846 - 8080	0.00065	SW846 - 8080
lead	inorganic	no	0.0150	0	0.500	SW846 - 7421	0.00300	SW846-200.7
cadmium	inorganic	no	0.0050	0.0050	0.500	SW846 - 6010	0.00500	SW846-200.7
silver	inorganic	no			1.000	SW846 - 6010	0.01000	SW846-200.7
mercury	inorganic	yes	0.0020	0.0020	0.100	SW846 - 7471	0.00020	SW846-245.1
chromium vi	inorganic	no	0.1000	0.1000	1.000	SW846 - 7196	0.01000	SW846-7196
chromium iii	inorganic	no	0.1000	0.1000	1.000	SW846 - 6010	0.01000	SW846-200.7
barium	inorganic	no	2.0000	2.0000	20.000	SW846 - 6010	0.20000	SW846-200.7
arsenic	inorganic	no	0.0500		1.000	SW846 - 7060	0.01000	SW846-206.2
antimony	inorganic	no	0.0060	0.0060	6.000	SW846 - 7041	0.06000	SW846-204.2
beryllium	inorganic	no	0.0040	0.0040	0.500	SW846 - 6010	0.00500	SW846-200.7
cyanide	inorganic	no	0.2000	0.2000	0.125	SW846 - 9012	0.01000	SW846-335.3
nickel	inorganic	no	0.1000	0.1000	4.000	SW846 - 6010	0.04000	SW846-200.7
selenium	inorganic	no	0.0500	0.0500	0.500	SW846 - 7740	0.00500	SW846-270.2
vanadium	inorganic	no			5.000	SW846 - 6010	0.05000	SW846-200.7
zinc	inorganic	no			2.000	SW846 - 6010	0.02000	SW846-200.7

NOTES: a - Determined according to analytical methods summarized in *Test Methods for Evaluating Solid Waste*, EPA SW-846.

b - Determined according to *Water Quality Criteria for Specific Substances*, Ind. Reg. Vol 17, No. 7, April 1, 1993.

c - Practical quantitation limits based on *Test Methods for Evaluating Solid Waste*, EPA SW-846, 1986 for GC/MS methods. However, PQLs will change according to the specific analytical method used.

TABLE 7
SUMMARY OF CHEMICAL PROPERTIES AND DOSE-RESPONSE

	CHEMICAL PROPERTIES						DOSE-RESPONSE DATA			
							Reference Doses		Cancer Slope Factors	
Chemical Name	Molecular Weight [MW] (g/g-mol)	Org Car Part-Koc [KOC] (L/Kg)	Oct Wat Part-Kow [KOW] (mg/L|mg/L)	Aqueous Solubility [SOL] (mg/L)	Henry Law [H] (atm/mol)	Vapor Phase Diffus Coeff. [Di] (cm2/s)	Oral mg/kg/day	Inhalation mg/kg/day	Oral (mg/kg/day	Inhalation (mg/kg/day)-1
naphthalene	128.20	1.28E+03	2.70E+03	31.7000	1.18E-03	5.90E-02	0.04000			
acenaphthylene	152.21	4.79E+03	1.17E+04	3.9300	1.14E-04	6.60E-02				
acenaphthene	154.21	1.78E+01	1.33E+04	3.4200	7.71E-03	6.50E-02	0.06000			
fluorene	166.00	5.01E+03	1.69E+04	1.6900	1.17E-04	6.20E-02	0.04000			
phenanthrene	178.22	1.67E+04	2.68E+04	1.0000	6.05E-03	5.90E-02				
anthracene	178.23	2.17E+04	2.78E+04	0.0450	8.60E-05	5.90E-02	0.30000			
fluoranthene	202.00	4.17E+04	1.66E+05	0.2600	6.73E-02	5.60E-02	0.04000			
pyrene	202.30	6.90E+04	1.31E+05	0.1320	7.00E-09	5.50E-02	0.03000			
benzo(a)anthracene*	228.30	1.38E+06	6.41E+05	0.0140	1.38E-09	4.30E-02			0.7300	
chrysene*	228.20	2.45E+05	5.09E+05	0.0020	1.18E-09	5.10E-02			0.0073	
benzo(b)fluoranthene*	252.32	5.50E+05	3.72E+06	0.0015	1.19E-05	5.00E-02			0.7300	
benzo(k)fluoranthene*	252.32	4.37E+06	7.08E+06	0.0008	3.94E-05	4.70E-02			0.0730	
benzo(a)pyrene	252.30	8.81E+05	1.16E+06	0.0038	1.38E-09	4.30E-02			7.3000	6.1000
indeno(1,2,3-cd)pyrene*	276.34	3.09E+07	6.84E+06	0.0005	6.86E-08	4.60E-02			0.7300	
dibenzo(a,h)anthracene*	278.35	1.84E+06	3.20E+06	0.0005	7.33E-08	4.50E-02			7.3000	
benzo(g,h,i)perylene	276.34	7.76E+06	1.40E+07	0.0003	5.34E-08	4.80E-02				
3,3'-dichlorobenzidine	253.13	2.00E+03	3.24E+03	4.0000	8.33E-07	NA			0.4500	
n-nitroso-di-n-propylamine	130.19	1.02E+01	2.04E+01	9900.0000	NA	NA			7.0000	
bis(2-chloroisopropyl)ether	171.10	6.17E+01	3.80E+02	1700.0000	1.13E-04	6.02E-02	0.04000		0.0700	0.0350
4-chloroaniline	127.47	3.23E+02	2.02E+02	3.9000	1.07E-05	7.50E-02	0.00400			
2-chloronaphthalene	162.62	8.51E+03	1.17E+04	6.7400	1.82E-02	6.60E-02	0.08000			
2,4-dinitrotoluene	182.10	6.17E+01	9.55E+01	270.0000	4.07E-06	2.03E-01	0.00200			
hexachlorobutadiene	260.80	4.68E+03	6.03E+04	2.0000	4.57E+00	5.61E-02	0.00200		0.0780	0.0780
hexachloroethane	237.00	2.19E+03	1.10E+04	50.0000	2.49E-06	6.50E-02	0.00100		0.0142	0.0142
isophorone	138.21	3.09E+01	4.84E+01	12000.0000	5.76E-06	6.23E-02	0.20000		0.0010	
benzyl alcohol	108.15	9.55E+01	1.26E+01	35000.0000	6.10E-07	7.90E-02	0.30000			
bis(2-chloroethyl)ether	143.00	1.41E+01	2.24E+01	10200.0000	1.30E-05	6.92E-02			1.1000	1.1000
nitrobenzene	123.10	9.72E+01	6.89E+01	1900.0000	1.31E-05	7.60E-02	0.00050			

TABLE 7
SUMMARY OF CHEMICAL PROPERTIES AND DOSE-RESPONSE

Chemical Name	CHEMICAL PROPERTIES						DOSE-RESPONSE DATA			
	Molecular Weight [MW] (g/g-mol)	Org Car Part-Koc [KOC] (L/Kg)	Oct Wat Part-Kow [KOW] (mg/L|mg/L)	Aqueous Solubility [SOL] (mg/L)	Henry Law [H] (atm/mol)	Vapor Phase Diffus Coeff. [Di] (cm2/s)	Reference Doses		Cancer Slope Factors	
							Oral mg/kg/day	Inhalation mg/kg/day	Oral (mg/kg/day	Inhalation (mg/kg/day)-1
1,2-dichlorobenzene	147.00	3.66E+02	2.78E+03	145.0000	1.94E-03	6.90E-02	0.09000			
1,3-dichlorobenzene	147.01	4.40E+02	3.00E+03	123.0000	3.61E-03	6.98E-02				
1,4-dichlorobenzene	147.00	2.09E+02	2.87E+03	79.0000	1.60E-03	6.90E-02		0.19999	0.0240	
1,2,4-trichlorobenzene	181.50	9.39E+02	1.20E+04	30.0000	1.42E-03	6.80E-02	0.01000			
hexachlorobenzene	284.80	4.55E+03	3.91E+05	0.0060	6.80E-04	5.42E-02	0.00080		1.6000	1.6000
hexachlorocyclopentadiene	272.77	4.27E+03	7.08E+04	1.8000	1.37E-02	5.61E-02	0.00700	0.00002		
n-nitrosodiphenylamine	198.23	5.75E+02	1.35E+03	34.7000	NA	9.70E-02			0.0049	
benzoic acid	122.13	1.40E+02	7.90E+01	2700.0000	1.82E-08	7.40E-02	4.00000			
2-nitroaniline	138.14	2.66E+01	4.86E+01	1280.0000	5.00E-07	7.30E-02	0.00006	0.00006		
phenol	94.10	2.19E+01	2.95E+01	93000.0000	4.54E-07	8.20E-02	0.60000			
2-methylphenol	108.10	2.19E+01	9.05E+01	24660.0000	2.60E-06	7.40E-02	0.05000			
3-methylphenol	108.10	3.50E+01	9.33E+01	21928.0000	4.43E-07	7.40E-02				
4-methylphenol	108.10	1.57E+02	1.36E+02	19543.0000	4.43E-07	7.90E-02	0.05000			
2-chlorophenol	128.60	3.63E+02	1.47E+02	28500.0000	1.78E-05	7.90E-02	0.00500			
2,4-dichlorophenol	163.01	7.00E+02	1.35E+03	4500.0000	4.80E-06	7.10E-02	0.00300			
2,4,5-trichlorophenol	197.45	1.74E+03	8.13E+03	1202.0000	2.18E-04	6.50E-02	0.10000			
2,4,6-trichlorophenol	197.46	7.19E+02	1.77E+03	800.0000	1.77E-05	6.60E-02			0.0110	0.0100
pentachlorophenol	266.40	2.63E+03	1.70E+05	14.0000	2.80E-06	5.60E-02	0.03000		0.1200	
2,4-dinitrophenol	184.00	1.78E+01	3.65E+01	5600.0000	1.53E-07	2.73E-02	0.00200			
bis(2-ethylhexyl)phthalate	391.07	1.00E+05	4.52E+04	0.4000	3.00E-07	3.51E-02	0.02000		0.0140	
butylbenzylphthalate	312.39	1.53E+02	4.24E+04	2.9000	1.08E-02	4.30E-02	0.20000			
di-n-butylphthalate	278.30	1.38E+03	3.60E+04	13.0000	2.80E-07	4.38E-02	0.10000			
diethylphthalate	222.00	6.92E+01	1.96E+02	896.0000	1.11E-02	5.30E-02	0.80000			
di methyl phthalate	194.20	1.91E+02	4.70E+01	4320.0000	2.15E-06	5.68E-02	10.00000			
di-n-octyl phthalate	390.58	9.77E+08	1.58E+09	3.0000	1.37E-01	3.60E-02	0.02000			
benzene	78.10	7.91E+01	1.01E+02	1750.0000	5.50E-03	8.80E-02			0.0290	0.0290
toluene	92.40	1.62E+02	3.70E+02	535.0000	6.68E-03	8.70E-02	0.20000	0.11428		
ethylbenzene	106.20	1.81E+02	1.29E+03	152.0000	6.44E-03	7.50E-02	0.10000	0.28571		

TABLE 7
SUMMARY OF CHEMICAL PROPERTIES AND DOSE-RESPONSE

Chemical Name	CHEMICAL PROPERTIES: Molecular Weight [MW] (g/g-mol)	Org Car Part-Koc [KOC] (L/Kg)	Oct Wat Part-Kow [KOW] (mg/L|mg/L)	Aqueous Solubility [SOL] (mg/L)	Henry Law [H] (atm/mol)	Vapor Phase Diffus Coeff. [Di] (cm2/s)	DOSE-RESPONSE DATA: Reference Doses Oral mg/kg/day	Reference Doses Inhalation mg/kg/day	Cancer Slope Factors Oral (mg/kg/day	Cancer Slope Factors Inhalation (mg/kg/day)-1
xylenes	106.20	3.32E+02	1.26E+03	198.0000	7.04E-03	7.47E-02	2.00000			
vinyl chloride	62.50	2.45E+00	3.98E+00	2670.0000	8.60E-02	1.06E-01			1.9000	0.3000
chloroethane	64.52	3.24E+00	2.69E+01	5740.0000	1.11E-02	2.71E-01		2.85700		
1,1-dichloroethylene	97.00	6.46E+01	6.38E+01	2250.0000	2.61E-02	1.00E-01	0.00900		0.6000	1.2000
1,1-dichloroethane	98.96	3.02E+01	6.10E+01	5500.0000	5.62E-03	9.60E-02	0.10000	0.10000		
1,2-dichloroethylene (cis)	96.95	4.90E+01	1.00E+00	3500.0000	4.08E-03	7.36E-02	0.01000			
1,2-dichloroethane	99.00	1.64E+01	2.92E+01	8520.0000	9.78E-04	1.04E-01	0.30000		0.0910	0.0910
trichloroethylene	131.40	9.63E+01	5.28E+02	1100.0000	9.58E-03	7.90E-02	0.00600		0.0110	0.0170
1,1,1-trichloroethane	133.40	1.42E+02	2.28E+02	1500.0000	1.72E-02	7.80E-02	0.09000	0.30000		
1,1,2-trichloroethane	133.40	6.87E+01	1.51E+02	4500.0000	7.42E-04	7.80E-02	0.00400		0.0570	0.0570
tetrachloroethylene	165.83	6.69E+01	3.37E+02	150.0000	2.87E-02	7.20E-02	0.01000		0.0510	0.0018
1,1,1,2-tetrachloroethane	168.00	3.99E+02	1.07E+03	1099.0000	2.00E-03	7.10E-02	0.03000		0.0260	0.0260
1,1,2,2-tetrachloroethane	168.00	7.55E+01	2.99E+02	2900.0000	3.80E-04	7.10E-02			0.2000	0.0200
chloroform	119.40	4.42E+01	8.71E+01	8200.0000	3.39E-03	1.04E-01	0.01000		0.0061	0.0805
acetone	58.00	3.72E-01	5.75E-01	1000000.0000	2.50E-05	1.24E-01	0.10000			
4-methyl-2-pentanone	100.16	6.17E+00	1.23E+01	21300.0000	4.95E-05	7.50E-02	0.05000			
methyl ethyl ketone	72.10	1.23E+00	1.88E+00	137190.0000	4.35E-05	8.08E-02	0.05000	0.28570		
Aldrin	364.93	4.07E+02	2.82E+05	0.1800	4.96E-04	5.00E-02	0.00003		17.0000	17.1000
gamma-BHC (Lindane)	290.83	1.32E+03	4.09E+03	7.8000	4.93E-07	5.30E-02	0.00030		1.3000	
chlordane	410.00	2.29E+05	1.00E+06	0.0560	3.67E-05	4.80E-02	0.00006		1.3000	1.2900
DDD	320.05	4.37E+04	4.90E+05	0.0900	3.89E-05	5.00E-02			0.2400	
DDE	318.03	4.93E+05	5.78E+05	0.0140	3.89E-05	4.90E-02			0.3400	
DDT	354.49	3.13E+05	9.64E+05	0.0050	3.89E-05	4.70E-02	0.00050		0.3400	0.3400
dieldrin	380.93	2.07E+04	4.05E+04	0.1950	5.84E-05	NA	0.00005		16.0000	16.1000
endosulfan sulfate	422.90	2.34E+03	4.57E+03	0.1170	NA	NA	0.00005			
endrin	380.93	8.32E+03	3.69E+04	0.2600	NA	4.70E-02	0.00030			
heptachlor	373.35	2.19E+04	8.32E+04	0.1800	8.19E-04	5.10E-02	0.00050		4.5000	4.5500
heptachlor epoxide	389.20	2.09E+04	3.35E+04	0.3500	3.50E-01	NA	0.00001		9.1000	9.1000

TABLE 7
SUMMARY OF CHEMICAL PROPERTIES AND DOSE-RESPONSE

Chemical Name	CHEMICAL PROPERTIES: Molecular Weight [MW] (g/g-mol)	Org Car Part-Koc [KOC] (L/Kg)	Oct Wat Part-Kow [KOW] (mg/L|mg/L)	Aqueous Solubility [SOL] (mg/L)	Henry Law [H] (atm/mol)	Vapor Phase Diffus Coeff. [Di] (cm2/s)	DOSE-RESPONSE DATA: Reference Doses Oral mg/kg/day	Reference Doses Inhalation mg/kg/day	Cancer Slope Factors Oral (mg/kg/day	Cancer Slope Factors Inhalation (mg/kg/day)-1
PCBs	328.00	5.30E+05	1.10E+06	0.0031	1.07E-03	4.80E-02			7.7000	
lead	207.19	NA	NA	NA	NA	5.50E-02				
cadmium	112.00	NA	NA	NA	NA	5.50E-02	0.00050			6.1000
silver	107.90	NA	NA	NA	NA	NA	0.00500			
mercury	200.59	NA	1.00	NA	1.14E-02	2.76E-02	0.00030	0.00009		
chromium vi	52.00	NA	NA	NA	NA	NA	0.00500			41.0000
chromium iii	52.00	NA	NA	NA	NA	NA	1.00000			
barium	137.00	NA	NA	NA	NA	NA	0.07000			
arsenic	74.92	NA	NA	NA	NA	5.50E-02	0.00030			50.0000
antimony	121.80	NA	NA	NA	NA	NA	0.00040			
beryllium	9.01	NA	NA	0.2000	NA	NA	0.00500		4.3000	8.4000
cyanide	27.00	1.00E+00	5.00E-01	1000000.0000	2.70E-06	NA	0.02000			
nickel	58.70	NA	NA	NA	NA	NA	0.02000			0.8400
selenium	78.96	NA	NA	NA	NA	NA	0.00500			
vanadium	51.00	NA	NA	NA	NA	NA	0.00700			
zinc	65.00	NA	NA	NA	NA	5.50E-02	0.30000			

NOTES: * - Assumes TEF approach.

NA - Data not available or not applicable.

TABLE 8
SUMMARY OF HEALTH-BASED CRITERIA FOR GROUNDWATER
NONRESIDENTIAL LAND USE SCENARIO

Chemical Name	Compound is Bioaccumulatable [a] (yes/no)	MCL or Nonzero MCLG (mg/L)	Practical Quantitation Limit [b] (mg/L)	Groundwater Carcinogenic Effects @10-5 (mg/L)	Groundwater Noncarcinogenic Effects (mg/L)	Groundwater Criteria (mg/L)
naphthalene	no		0.01000	NA	4.0880	4.0880
acenaphthylene	no		0.01000	NA	NA	NA
acenaphthene	no		0.01000	NA	6.1320	6.1320
fluorene	no		0.01000	NA	4.0880	4.0880
phenanthrene	no		0.01000	NA	NA	NA
anthracene	no		0.01000	NA	30.6600	30.6600
fluoranthene	yes		0.01000	NA	0.8176	0.8176
pyrene	no		0.01000	NA	3.0660	3.0660
benzo(a)anthracene*	yes	0.0001	0.01000	0.0039	NA	0.0100
chrysene*	yes	0.0002	0.01000	0.3918	NA	0.3918
benzo(b)fluoranthene*	yes	0.0002	0.01000	0.0039	NA	0.0100
benzo(k)fluoranthene*	yes	0.0002	0.01000	0.0392	NA	0.0392
benzo(a)pyrene	yes	0.0002	0.01000	0.0004	NA	0.0100
indeno(1,2,3-cd)pyrene*	yes	0.0004	0.01000	0.0039	NA	0.0100
dibenzo(a,h)anthracene*	yes	0.0003	0.01000	0.0004	NA	0.0100
benzo(g,h,i)perylene	yes		0.01000	NA	NA	NA
3,3'-dichlorobenzidine	no		0.02000	0.0064	NA	0.0200
n-nitroso-di-n-propylamine	no		0.01000	0.0004	NA	0.0100
bis(2-chloroisopropyl)ether	no		0.01000	0.0409	4.0880	0.0409
4-chloroaniline	no		0.02000	NA	0.4088	0.4088
2-chloronaphthalene	no		0.01000	NA	8.1760	8.1760
2,4-dinitrotoluene	no		0.01000	NA	0.2044	0.2044
hexachlorobutadiene	yes		0.01000	0.0367	0.0409	0.0367
hexachloroethane	yes		0.01000	0.2014	0.0204	0.0204
isophorone	no		0.01000	3.0105	20.4400	3.0105
benzyl alcohol	no		0.02000	NA	30.6600	30.6600
bis(2-chloroethyl)ether	no		0.01000	0.0026	NA	0.0100

TABLE 8
SUMMARY OF HEALTH-BASED CRITERIA FOR GROUNDWATER

NONRESIDENTIAL LAND USE SCENARIO

Chemical Name	Compound is Bioaccumulatable [a] (yes/no)	MCL or Nonzero MCLG (mg/L)	Practical Quantitation Limit [b] (mg/L)	Groundwater Carcinogenic Effects @10-5 (mg/L)	Groundwater Noncarcinogenic Effects (mg/L)	Groundwater Criteria (mg/L)
nitrobenzene	no		0.01000	NA	0.0511	0.0511
1,2-dichlorobenzene	no	0.6000	0.01000	NA	9.1980	9.1980
1,3-dichlorobenzene	no	0.6000	0.01000	NA	NA	NA
1,4-dichlorobenzene	no	0.0750	0.01000	0.1192	NA	0.1192
1,2,4-trichlorobenzene	no	0.0700	0.01000	NA	1.0220	1.0220
hexachlorobenzene	no	0.0010	0.01000	0.0018	0.0818	0.0100
hexachlorocyclopentadiene	no	0.0500	0.01000	NA	0.7154	0.7154
n-nitrosodiphenylamine	no		0.01000	0.5837	NA	0.5837
benzoic acid	no		0.05000	NA	408.8000	408.8000
2-nitroaniline	no		0.05000	NA	0.0061	0.0500
phenol	yes		0.01000	NA	12.2640	12.2640
2-methylphenol	no		0.01000	NA	5.1100	5.1100
3-methylphenol	no		0.01000	NA	NA	NA
4-methylphenol	no		0.01000	NA	5.1100	5.1100
2-chlorophenol	no		0.01000	NA	0.5110	0.5110
2,4-dichlorophenol	no		0.01000	NA	0.3066	0.3066
2,4,5-trichlorophenol	no		0.01000	NA	10.2200	10.2200
2,4,6-trichlorophenol	no		0.01000	0.2600	NA	0.2600
pentachlorophenol	no	0.0010	0.05000	0.0238	3.0660	0.0500
2,4-dinitrophenol	no		0.05000	NA	0.2044	0.2044
bis(2-ethylhexyl)phthalate	yes	0.0060	0.01000	0.2043	0.4088	0.2043
butylbenzylphthalate	no	0.1000	0.01000	NA	20.4400	20.4400
di-n-butylphthalate	yes		0.01000	NA	2.0440	2.0440
diethylphthalate	no		0.01000	NA	81.7600	81.7600
di methyl phthalate	no		0.01000	NA	1022.0000	1022.0000
di-n-octyl phthalate	no		0.01000	NA	2.0440	2.0440
benzene	no	0.0050	0.00500	0.0986	NA	0.0986

TABLE 8
SUMMARY OF HEALTH-BASED CRITERIA FOR GROUNDWATER
NONRESIDENTIAL LAND USE SCENARIO

Chemical Name	Compound is Bioaccumulatable [a] (yes/no)	MCL or Nonzero MCLG (mg/L)	Practical Quantitation Limit [b] (mg/L)	Groundwater: Carcinogenic Effects @10-5 (mg/L)	Groundwater: Noncarcinogenic Effects (mg/L)	Groundwater Criteria (mg/L)
toluene	no	1.0000	0.00500	NA	20.4400	20.4400
ethylbenzene	no	0.7000	0.00500	NA	10.2200	10.2200
xylenes	no	10.0000	0.00500	NA	204.4000	204.4000
vinyl chloride	no	0.0020	0.01000	0.0015	NA	0.0100
chloroethane	no		0.01000	NA	NA	NA
1,1-dichloroethylene	no	0.0070	0.00500	0.0048	0.9198	0.0070
1,1-dichloroethane	no		0.00500	NA	10.2200	10.2200
1,2-dichloroethylene (cis)	no	0.0700	0.00500	NA	1.0220	1.0220
1,2-dichloroethane	no	0.0050	0.00500	0.0314	30.6600	0.0314
trichloroethylene	no	0.0050	0.00500	0.2600	0.6132	0.2600
1,1,1-trichloroethane	no	0.2000	0.00500	NA	9.1980	9.1980
1,1,2-trichloroethane	no	0.0050	0.00500	0.0502	0.4088	0.0502
tetrachloroethylene	no	0.0050	0.00500	0.0561	1.0220	0.0561
1,1,1,2-tetrachloroethane	no		0.00500	0.1100	3.0660	0.1100
1,1,2,2-tetrachloroethane	no		0.00500	0.0143	NA	0.0143
chloroform	no	0.1000	0.00500	0.4689	1.0220	0.4689
acetone	no		0.10000	NA	10.2200	10.2200
4-methyl-2-pentanone	no		0.05000	NA	5.1100	5.1100
methyl ethyl ketone	no		0.10000	NA	5.1100	5.1100
Aldrin	yes		0.00004	0.0002	0.0006	0.0002
gamma-BHC (Lindane)	yes	0.0002	0.00009	0.0022	0.0061	0.0022
chlordane	yes	0.0020	0.00014	0.0022	0.0012	0.0020
DDD	yes		0.00011	0.0119	NA	0.0119
DDE	yes		0.00004	0.0084	NA	0.0084
DDT	yes		0.00012	0.0084	0.0102	0.0084
dieldrin	yes		0.00002	0.0002	0.0010	0.0002
endosulfan sulfate	no		0.00066	NA	0.0051	0.0051

TABLE 8
SUMMARY OF HEALTH-BASED CRITERIA FOR GROUNDWATER

NONRESIDENTIAL LAND USE SCENARIO

Chemical Name	Compound is Bioaccumulatable [a] (yes/no)	MCL or Nonzero MCLG (mg/L)	Practical Quantitation Limit [b] (mg/L)	Groundwater: Carcinogenic Effects @10-5 (mg/L)	Groundwater: Noncarcinogenic Effects (mg/L)	Groundwater Criteria (mg/L)
endrin	yes	0.0020	0.00006	NA	0.0061	0.0061
heptachlor	yes	0.0004	0.00003	0.0006	0.0102	0.0006
heptachlor epoxide	no	0.0002	0.00083	0.0003	0.0013	0.0008
PCBs	yes	0.0005	0.00065	0.0004	NA	0.0007
lead	no	0.0150	0.00300	NA	NA	NA
cadmium	no	0.0050	0.00500	NA	0.0511	0.0511
silver	no		0.01000	NA	0.5110	0.5110
mercury	yes	0.0020	0.00020	NA	0.0061	0.0061
chromium vi	no	0.1000	0.01000	NA	0.5110	0.5110
chromium iii	no	0.1000	0.01000	NA	102.2000	102.2000
barium	no	2.0000	0.20000	NA	7.1540	7.1540
arsenic	no	0.0500	0.01000	NA	0.0307	0.0500
antimony	no	0.0060	0.06000	NA	0.0409	0.0600
beryllium	no	0.0040	0.00500	0.0007	0.5110	0.0050
cyanide	no	0.2000	0.01000	NA	2.0440	2.0440
nickel	no	0.1000	0.04000	NA	2.0440	2.0440
selenium	no	0.0500	0.00500	NA	0.5110	0.5110
vanadium	no		0.05000	NA	0.7154	0.7154
zinc	no		0.02000	NA	30.6600	30.6600

NOTES: a - Compounds that are assumed to be bioaccumulative have an acceptable hazard index of 0.2 versus 1, as determined based on Indiana Register, 16:7, April 1, 1993.

b - Practical quantitation limits based EPA SW-846, 1986 for GC/MS. PQLs will change according to the specific analytical method used.

* - Assumes TEF approach.

NA - Data not available or not applicable.

TABLE 9
SUMMARY OF HEALTH-BASED CRITERIA FOR SURFACE SOILS

NONRESIDENTIAL LAND USE SCENARIO

Chemical Name	Compound is Bioaccumulatable [a] (yes/no)	Practical Quantitation Limit [b] (mg/Kg)	Surface Soils		Surface Soil Criteria (mg/Kg)
			Carcinogenic Effects @10-5 (mg/Kg)	Noncarcinogenic Effects (mg/Kg)	
naphthalene	no	0.660	NA	81,600.00	10,000.00
acenaphthylene	no	0.660	NA	NA	NA
acenaphthene	no	0.660	NA	122,400.00	10,000.00
fluorene	no	0.660	NA	81,600.00	10,000.00
phenanthrene	no	0.660	NA	NA	NA
anthracene	no	0.660	NA	612,000.00	10,000.00
fluoranthene	yes	0.660	NA	16,320.00	10,000.00
pyrene	no	0.660	NA	61,200.00	10,000.00
benzo(a)anthracene*	yes	0.660	79.45	NA	79.45
chrysene*	yes	0.660	7,945.21	NA	7,945.21
benzo(b)fluoranthene*	yes	0.660	79.45	NA	79.45
benzo(k)fluoranthene*	yes	0.660	794.52	NA	794.52
benzo(a)pyrene	yes	0.660	7.94	NA	7.94
indeno(1,2,3-cd)pyrene*	yes	0.660	79.45	NA	79.45
dibenzo(a,h)anthracene*	yes	0.660	7.95	NA	7.95
benzo(g,h,i)perylene	yes	0.660	NA	NA	NA
3,3'-dichlorobenzidine	no	1.300	128.89	NA	128.89
n-nitroso-di-n-propylamine	no	0.660	8.29	NA	8.29
bis(2-chloroisopropyl)ether	no	0.660	93.12	81,600.00	93.12
4-chloroaniline	no	1.300	NA	8,160.00	8,160.00
2-chloronaphthalene	no	0.660	NA	163,200.00	10,000.00
2,4-dinitrotoluene	no	0.660	NA	4,080.00	4,080.00
hexachlorobutadiene	yes	0.660	1.78	816.00	1.78
hexachloroethane	yes	0.660	2,898.99	408.00	408.00
isophorone	no	0.660	61,052.63	408,000.00	10,000.00
benzyl alcohol	no	1.300	NA	612,000.00	10,000.00
bis(2-chloroethyl)ether	no	0.660	4.06	NA	4.06

TABLE 9
SUMMARY OF HEALTH-BASED CRITERIA FOR SURFACE SOILS

NONRESIDENTIAL LAND USE SCENARIO

Chemical Name	Compound is Bioaccumulatable [a] (yes/no)	Practical Quantitation Limit [b] (mg/Kg)	Surface Soils		Surface Soil Criteria (mg/Kg)
			Carcinogenic Effects @10-5 (mg/Kg)	Noncarcinogenic Effects (mg/Kg)	
nitrobenzene	no	0.660	NA	1,020.00	1,020.00
1,2-dichlorobenzene	no	0.660	NA	183,600.00	10,000.00
1,3-dichlorobenzene	no	0.660	NA	NA	NA
1,4-dichlorobenzene	no	0.660	2,416.67	11,788.20	2,416.67
1,2,4-trichlorobenzene	no	0.660	NA	20,400.00	10,000.00
hexachlorobenzene	no	0.660	6.87	1,632.00	6.87
hexachlorocyclopentadiene	no	0.660	NA	2.02	2.02
n-nitrosodiphenylamine	no	0.660	11,836.73	NA	10,000.00
benzoic acid	no	3.300	NA	8,160,000.00	10,000.00
2-nitroaniline	no	3.300	NA	42.90	42.90
phenol	yes	0.660	NA	244,800.00	10,000.00
2-methylphenol	no	0.660	NA	102,000.00	10,000.00
3-methylphenol	no	0.660	NA	NA	NA
4-methylphenol	no	0.660	NA	102,000.00	10,000.00
2-chlorophenol	no	0.660	NA	10,200.00	10,000.00
2,4-dichlorophenol	no	0.660	NA	6,120.00	6,120.00
2,4,5-trichlorophenol	no	0.660	NA	204,000.00	10,000.00
2,4,6-trichlorophenol	no	0.660	1,922.89	NA	1,922.89
pentachlorophenol	no	3.300	483.33	61,200.00	483.33
2,4-dinitrophenol	no	3.300	NA	4,080.00	4,080.00
bis(2-ethylhexyl)phthalate	yes	0.660	4,142.86	8,160.00	4,142.86
butylbenzylphthalate	no	0.660	NA	408,000.00	10,000.00
di-n-butylphthalate	yes	0.660	NA	40,800.00	10,000.00
diethylphthalate	no	0.660	NA	1,632,000.00	10,000.00
di methyl phthalate	no	0.660	NA	20,400,000.00	10,000.00
di-n-octyl phthalate	no	0.660	NA	40,800.00	10,000.00
benzene	no	0.005	16.63	NA	16.63

TABLE 9
SUMMARY OF HEALTH-BASED CRITERIA FOR SURFACE SOILS

NONRESIDENTIAL LAND USE SCENARIO

Chemical Name	Compound is Bioaccumulatable [a] (yes/no)	Practical Quantitation Limit [b] (mg/Kg)	Surface Soils		Surface Soil Criteria (mg/Kg)
			Carcinogenic Effects @10-5 (mg/Kg)	Noncarcinogenic Effects (mg/Kg)	
toluene	no	0.005	NA	2,552.81	1,000.00
ethylbenzene	no	0.005	NA	7,180.32	1,000.00
xylenes	no	0.005	NA	4,080,000.00	1,000.00
vinyl chloride	no	0.010	0.02	NA	0.02
chloroethane	no	0.010	NA	2,580.36	1,000.00
1,1-dichloroethylene	no	0.005	0.15	18,360.00	0.15
1,1-dichloroethane	no	0.005	NA	973.47	973.47
1,2-dichloroethylene (cis)	no	0.005	NA	20,400.00	1,000.00
1,2-dichloroethane	no	0.005	5.27	612,000.00	5.27
trichloroethylene	no	0.005	24.97	12,240.00	24.97
1,1,1-trichloroethane	no	0.005	NA	3,998.01	1,000.00
1,1,2-trichloroethane	no	0.005	22.74	8,160.00	22.74
tetrachloroethylene	no	0.005	101.23	20,400.00	101.23
1,1,1,2-tetrachloroethane	no	0.005	75.91	61,200.00	75.91
1,1,2,2-tetrachloroethane	no	0.005	75.41	NA	75.41
chloroform	no	0.005	5.28	20,400.00	5.28
acetone	no	0.100	NA	204,000.00	1,000.00
4-methyl-2-pentanone	no	0.050	NA	102,000.00	1,000.00
methyl ethyl ketone	no	0.100	NA	6,726.27	1,000.00
Aldrin	yes	0.003	0.27	12.24	0.27
gamma-BHC (Lindane)	yes	0.006	44.62	122.40	44.62
chlordane	yes	0.009	39.45	24.48	24.48
DDD	yes	0.007	241.67	NA	241.67
DDE	yes	0.003	170.59	NA	170.59
DDT	yes	0.008	153.01	204.00	153.01
dieldrin	yes	0.001	3.63	20.40	3.63
endosulfan sulfate	no	0.044	NA	102.00	102.00

TABLE 9
SUMMARY OF HEALTH-BASED CRITERIA FOR SURFACE SOILS

NONRESIDENTIAL LAND USE SCENARIO

Chemical Name	Compound is Bioaccumulatable [a] (yes/no)	Practical Quantitation Limit [b] (mg/Kg)	Surface Soils		Surface Soil Criteria (mg/Kg)
			Carcinogenic Effects @10-5 (mg/Kg)	Noncarcinogenic Effects (mg/Kg)	
endrin	yes	0.004	NA	122.40	122.40
heptachlor	yes	0.002	4.16	204.00	4.16
heptachlor epoxide	no	0.056	6.37	26.52	6.37
PCBs	yes	0.044	7.53	NA	7.53
lead	no	0.500	NA	NA	NA
cadmium	no	0.500	NA	1,020.00	1,020.00
silver	no	1.000	NA	10,200.00	10,000.00
mercury	yes	0.100	NA	122.40	122.40
chromium vi	no	1.000	NA	10,200.00	10,000.00
chromium iii	no	1.000	NA	2,040,000.00	10,000.00
barium	no	20.000	NA	142,800.00	10,000.00
arsenic	no	1.000	NA	612.00	612.00
antimony	no	6.000	NA	816.00	816.00
beryllium	no	0.500	13.49	10,200.00	13.49
cyanide	no	0.125	NA	40,800.00	1,000.00
nickel	no	4.000	NA	40,800.00	10,000.00
selenium	no	0.500	NA	10,200.00	10,000.00
vanadium	no	5.000	NA	14,280.00	10,000.00
zinc	no	2.000	NA	612,000.00	10,000.00

NOTES: a - Compounds that are assumed to be bioaccumulative have an acceptable hazard index of 0.2 versus 1, as determined based on Indiana Register, 16:7, April 1, 1993.

b - Practical quantitation limits based EPA SW-846, 1986 for GC/MS. PQLs will change according to the specific analytical method used.

* - Assumes TEF approach.

NA - Data not available or not applicable.

TABLE 10
SUMMARY OF HEALTH-BASED CRITERIA FOR SUBSURFACE SOILS
NONRESIDENTIAL LAND USE SCENARIO

Chemical Name	Compound is Bioaccumulatable [a] (yes/no)	Practical Quantitation Limit [b] (mg/Kg)	Subsurface Soils		Leaching to Groundwater		Subsurface Soil Criteria (mg/Kg)
			Carcinogenic Effects @10-5 (mg/Kg)	Noncarcinogenic Effects (mg/Kg)	Groundwater Criteria (mg/L)	Subsurface Soil Criteria (mg/Kg)	
naphthalene	no	0.660	NA	58,400.00	4.0880	10,534.54	10,000.00
acenaphthylene	no	0.660	NA	NA	NA	NA	NA
acenaphthene	no	0.660	NA	87,600.00	6.1320	65,215.08	10,000.00
fluorene	no	0.660	NA	58,400.00	4.0880	52,850.39	10,000.00
phenanthrene	no	0.660	NA	NA	NA	NA	NA
anthracene	no	0.660	NA	438,000.00	30.6600	7,585,812.53	10,000.00
fluoranthene	yes	0.660	NA	11,680.00	0.8176	13,782.92	10,000.00
pyrene	no	0.660	NA	43,800.00	3.0660	140,591.20	10,000.00
benzo(a)anthracene*	yes	0.660	698.63	NA	0.0100	103.88	103.88
chrysene*	yes	0.660	69,863.01	NA	0.3918	67,777.62	10,000.00
benzo(b)fluoranthene*	yes	0.660	698.63	NA	0.0100	354.98	354.98
benzo(k)fluoranthene*	yes	0.660	6,986.30	NA	0.0392	3,759.12	3,759.12
benzo(a)pyrene	yes	0.660	69.85	NA	0.0100	212.87	69.85
indeno(1,2,3-cd)pyrene*	yes	0.660	698.63	NA	0.0100	629.17	629.17
dibenzo(a,h)anthracene*	yes	0.660	69.86	NA	0.0100	649.66	69.86
benzo(g,h,i)perylene	yes	0.660	NA	NA	NA	NA	NA
3,3'-dichlorobenzidine	no	1.300	1,133.33	NA	0.0200	12.86	12.86
n-nitroso-di-n-propylamine	no	0.660	72.86	NA	0.0100	0.06	0.66
bis(2-chloroisopropyl)ether	no	0.660	1,472.23	58,400.00	0.0409	1.32	1.32
4-chloroaniline	no	1.300	NA	5,840.00	0.4088	1,117.69	1,117.69
2-chloronaphthalene	no	0.660	NA	116,800.00	8.1760	68,632.75	10,000.00
2,4-dinitrotoluene	no	0.660	NA	2,920.00	0.2044	39.07	39.07
hexachlorobutadiene	yes	0.660	31.18	584.00	0.0367	46.06	31.18
hexachloroethane	yes	0.660	29,818.48	292.00	0.0204	3.31	3.31
isophorone	no	0.660	536,842.11	292,000.00	3.0105	256.03	256.03
benzyl alcohol	no	1.300	NA	438,000.00	30.6600	4,356.75	4,356.75
bis(2-chloroethyl)ether	no	0.660	66.24	NA	0.0100	0.06	0.66

TABLE 10
SUMMARY OF HEALTH-BASED CRITERIA FOR SUBSURFACE SOILS

NONRESIDENTIAL LAND USE SCENARIO

Chemical Name	Compound is Bioaccumulatable [a] (yes/no)	Practical Quantitation Limit [b] (mg/Kg)	Subsurface Soils		Leaching to Groundwater		
			Carcinogenic Effects @10-5 (mg/Kg)	Noncarcinogenic Effects (mg/Kg)	Groundwater Criteria (mg/L)	Subsurface Soil Criteria (mg/Kg)	Subsurface Soil Criteria (mg/Kg)
nitrobenzene	no	0.660	NA	730.00	0.0511	1.73	1.73
1,2-dichlorobenzene	no	0.660	NA	131,400.00	9.1980	15,093.56	10,000.00
1,3-dichlorobenzene	no	0.660	NA	NA	NA	NA	NA
1,4-dichlorobenzene	no	0.660	21,250.00	16,873.31	0.1192	34.67	34.67
1,2,4-trichlorobenzene	no	0.660	NA	14,600.00	1.0220	1,405.37	1,405.37
hexachlorobenzene	no	0.660	101.56	1,168.00	0.0100	165.57	101.56
hexachlorocyclopentadiene	no	0.660	NA	2.89	0.7154	3,904.08	2.89
n-nitrosodiphenylamine	no	0.660	104,081.63	NA	0.5837	567.80	567.80
benzoic acid	no	3.300	NA	5,840,000.00	408.8000	813,796.56	10,000.00
2-nitroaniline	no	3.300	NA	45.47	0.0500	2.08	3.30
phenol	yes	0.660	NA	175,200.00	12.2640	658.78	658.78
2-methylphenol	no	0.660	NA	73,000.00	5.1100	375.93	375.93
3-methylphenol	no	0.660	NA	NA	NA	NA	NA
4-methylphenol	no	0.660	NA	73,000.00	5.1100	427.24	427.24
2-chlorophenol	no	0.660	NA	7,300.00	0.5110	11.63	11.63
2,4-dichlorophenol	no	0.660	NA	4,380.00	0.3066	15.12	15.12
2,4,5-trichlorophenol	no	0.660	NA	146,000.00	10.2200	5,507.44	5,507.44
2,4,6-trichlorophenol	no	0.660	24,779.61	NA	0.2600	30.65	30.65
pentachlorophenol	no	3.300	4,250.00	43,800.00	0.0500	24.95	24.95
2,4-dinitrophenol	no	3.300	NA	2,920.00	0.2044	7.37	7.37
bis(2-ethylhexyl)phthalate	yes	0.660	36,428.57	5,840.00	0.2043	1,406.25	1,406.25
butylbenzylphthalate	no	0.660	NA	292,000.00	20.4400	421,659.24	10,000.00
di-n-butylphthalate	yes	0.660	NA	29,200.00	2.0440	6,188.56	6,188.56
diethylphthalate	no	0.660	NA	1,168,000.00	81.7600	139,039.43	10,000.00
di methyl phthalate	no	0.660	NA	14,600,000.00	1022.0000	2,427,459.10	10,000.00
di-n-octyl phthalate	no	0.660	NA	29,200.00	2.0440	13,865.50	10,000.00
benzene	no	0.005	289.96	NA	0.0986	4.77	4.77

TABLE 10
SUMMARY OF HEALTH-BASED CRITERIA FOR SUBSURFACE SOILS

NONRESIDENTIAL LAND USE SCENARIO

Chemical Name	Compound is Bioaccumulatable [a] (yes/no)	Practical Quantitation Limit [b] (mg/Kg)	Subsurface Soils		Leaching to Groundwater		Subsurface Soil Criteria (mg/Kg)
			Carcinogenic Effects @10-5 (mg/Kg)	Noncarcinogenic Effects (mg/Kg)	Groundwater Criteria (mg/L)	Subsurface Soil Criteria (mg/Kg)	
toluene	no	0.005	NA	3,631.30	20.4400	23,897.46	1,000.00
ethylbenzene	no	0.005	NA	9,928.27	10.2200	17,179.71	1,000.00
xylenes	no	0.005	NA	2,920,000.00	204.4000	1,232,453.05	1,000.00
vinyl chloride	no	0.010	0.30	NA	0.0100	0.13	0.13
chloroethane	no	0.010	NA	3,693.46	NA	NA	1,000.00
1,1-dichloroethylene	no	0.005	2.59	13,140.00	0.0070	0.08	0.08
1,1-dichloroethane	no	0.005	NA	1,386.78	10.2200	2,385.62	1,000.00
1,2-dichloroethylene (cis)	no	0.005	NA	14,600.00	1.0220	102.49	102.49
1,2-dichloroethane	no	0.005	91.96	438,000.00	0.0314	0.37	0.37
trichloroethylene	no	0.005	437.11	8,760.00	0.2600	25.73	25.73
1,1,1-trichloroethane	no	0.005	NA	5,600.68	9.1980	4,173.92	1,000.00
1,1,2-trichloroethane	no	0.005	391.20	5,840.00	0.0502	1.05	1.05
tetrachloroethylene	no	0.005	1,634.72	14,600.00	0.0561	8.01	8.01
1,1,1,2-tetrachloroethane	no	0.005	1,291.02	43,800.00	0.1100	7.24	7.24
1,1,2,2-tetrachloroethane	no	0.005	1,052.52	NA	0.0143	0.21	0.21
chloroform	no	0.005	92.76	14,600.00	0.4689	20.33	20.33
acetone	no	0.100	NA	146,000.00	10.2200	136.29	136.29
4-methyl-2-pentanone	no	0.050	NA	73,000.00	5.1100	407.48	407.48
methyl ethyl ketone	no	0.100	NA	9,032.18	5.1100	146.24	146.24
Aldrin	yes	0.003	4.35	8.76	0.0002	0.06	0.06
gamma-BHC (Lindane)	yes	0.006	392.31	87.60	0.0022	0.34	0.34
chlordane	yes	0.009	368.21	17.52	0.0020	4.51	4.51
DDD	yes	0.007	2,125.00	NA	0.0119	48.34	48.34
DDE	yes	0.003	1,500.00	NA	0.0084	80.49	80.49
DDT	yes	0.008	1,418.50	146.00	0.0084	141.83	141.83
dieldrin	yes	0.001	31.88	14.60	0.0002	0.06	0.06
endosulfan sulfate	no	0.044	NA	73.00	0.0051	12.00	12.00

TABLE 10
SUMMARY OF HEALTH-BASED CRITERIA FOR SUBSURFACE SOILS

NONRESIDENTIAL LAND USE SCENARIO

Chemical Name	Compound is Bioaccumulatable [a] (yes/no)	Practical Quantitation Limit [b] (mg/Kg)	Subsurface Soils		Leaching to Groundwater		
			Carcinogenic Effects @10-5 (mg/Kg)	Noncarcinogenic Effects (mg/Kg)	Groundwater Criteria (mg/L)	Subsurface Soil Criteria (mg/Kg)	Subsurface Soil Criteria (mg/Kg)
endrin	yes	0.004	NA	87.60	0.0061	10.12	10.12
heptachlor	yes	0.002	55.28	146.00	0.0006	0.44	0.44
heptachlor epoxide	no	0.056	56.04	18.98	0.0008	0.45	0.45
PCBs	yes	0.044	66.23	NA	0.0007	4.23	4.23
lead	no	0.500	NA	NA	NA	NA	NA
cadmium	no	0.500	NA	730.00	0.0511	NA	730.00
silver	no	1.000	NA	7,300.00	0.5110	NA	7,300.00
mercury	yes	0.100	NA	87.60	0.0061	NA	87.60
chromium vi	no	1.000	NA	7,300.00	0.5110	NA	7,300.00
chromium iii	no	1.000	NA	1,460,000.00	102.2000	NA	10,000.00
barium	no	20.000	NA	102,200.00	7.1540	NA	10,000.00
arsenic	no	1.000	NA	438.00	0.0500	NA	438.00
antimony	no	6.000	NA	584.00	0.0600	NA	584.00
beryllium	no	0.500	118.60	7,300.00	0.0050	NA	118.60
cyanide	no	0.125	NA	29,200.00	2.0440	NA	10,000.00
nickel	no	4.000	NA	29,200.00	2.0440	NA	10,000.00
selenium	no	0.500	NA	7,300.00	0.5110	NA	7,300.00
vanadium	no	5.000	NA	10,220.00	0.7154	NA	10,000.00
zinc	no	2.000	NA	438,000.00	30.6600	NA	10,000.00

NOTES: a - Compounds that are assumed to be bioaccumulative have an acceptable hazard index of 0.2 versus 1, as determined based on Indiana Register, 16:7, April 1, 1993.

b - Practical quantitation limits based EPA SW-846, 1986 for GC/MS. PQLs will change according to the specific analytical method used.

* - Assumes TEF approach.

NA - Data not available or not applicable.

TABLE 11
SUMMARY OF HEALTH-BASED CRITERIA FOR GROUNDWATER
RESIDENTIAL LAND USE SCENARIO

Chemical Name	Compound is Bioaccumulatable [a] (yes/no)	MCL or Nonzero MCLG (mg/L)	Practical Quantitation Limit [b] (mg/L)	Groundwater		Groundwater Criteria (mg/L)
				Carcinogenic Effects @10-6 (mg/L)	Noncarcinogenic Effects (mg/L)	
naphthalene	no		0.01000	NA	1.21600	1.21600
acenaphthylene	no		0.01000	NA	NA	NA
acenaphthene	no		0.01000	NA	1.82400	1.82400
fluorene	no		0.01000	NA	1.21600	1.21600
phenanthrene	no		0.01000	NA	NA	NA
anthracene	no		0.01000	NA	9.12000	9.12000
fluoranthene	yes		0.01000	NA	0.24320	0.24320
pyrene	no		0.01000	NA	0.91200	0.91200
benzo(a)anthracene*	yes	0.00010	0.01000	0.00012	NA	0.00010
chrysene*	yes	0.00020	0.01000	0.01164	NA	0.00020
benzo(b)fluoranthene*	yes	0.00020	0.01000	0.00012	NA	0.00020
benzo(k)fluoranthene*	yes	0.00020	0.01000	0.00116	NA	0.00020
benzo(a)pyrene	yes	0.00020	0.01000	0.00001	NA	0.00020
indeno(1,2,3-cd)pyrene*	yes	0.00040	0.01000	0.00012	NA	0.00040
dibenzo(a,h)anthracene*	yes	0.00030	0.01000	0.00001	NA	0.00030
benzo(g,h,i)perylene	yes		0.01000	NA	NA	NA
3,3'-dichlorobenzidine	no		0.02000	0.00019	NA	0.02000
n-nitroso-di-n-propylamine	no		0.01000	0.00001	NA	0.01000
bis(2-chloroisopropyl)ether	no		0.01000	0.00042	1.21600	0.01000
4-chloroaniline	no		0.02000	NA	0.12160	0.12160
2-chloronaphthalene	no		0.01000	NA	2.43200	2.43200
2,4-dinitrotoluene	no		0.01000	NA	0.06080	0.06080
hexachlorobutadiene	yes		0.01000	0.00109	0.01216	0.01000
hexachloroethane	yes		0.01000	0.00599	0.00608	0.01000
isophorone	no		0.01000	0.08947	6.08000	0.08947
benzyl alcohol	no		0.02000	NA	9.12000	9.12000
bis(2-chloroethyl)ether	no		0.01000	0.00002	NA	0.01000
nitrobenzene	no		0.01000	NA	0.01520	0.01520

TABLE 11
SUMMARY OF HEALTH-BASED CRITERIA FOR GROUNDWATER

RESIDENTIAL LAND USE SCENARIO

Chemical Name	Compound is Bioaccumulatable [a] (yes/no)	MCL or Nonzero MCLG (mg/L)	Practical Quantitation Limit [b] (mg/L)	Groundwater: Carcinogenic Effects @10-6 (mg/L)	Groundwater: Noncarcinogenic Effects (mg/L)	Groundwater Criteria (mg/L)
1,2-dichlorobenzene	no	0.60000	0.01000	NA	2.73600	0.60000
1,3-dichlorobenzene	no	0.60000	0.01000	NA	NA	0.60000
1,4-dichlorobenzene	no	0.07500	0.01000	0.00354	1.62125	0.07500
1,2,4-trichlorobenzene	no	0.07000	0.01000	NA	0.30400	0.07000
hexachlorobenzene	no	0.00100	0.01000	0.00005	0.02432	0.00100
hexachlorocyclopentadiene	no	0.05000	0.01000	NA	0.21280	0.05000
n-nitrosodiphenylamine	no		0.01000	0.01735	NA	0.01735
benzoic acid	no		0.05000	NA	121.60000	121.60000
2-nitroaniline	no		0.05000	NA	0.00182	0.05000
phenol	yes		0.01000	NA	3.64800	3.64800
2-methylphenol	no		0.01000	NA	1.52000	1.52000
3-methylphenol	no		0.01000	NA	NA	NA
4-methylphenol	no		0.01000	NA	1.52000	1.52000
2-chlorophenol	no		0.01000	NA	0.15200	0.15200
2,4-dichlorophenol	no		0.01000	NA	0.09120	0.09120
2,4,5-trichlorophenol	no		0.01000	NA	3.04000	3.04000
2,4,6-trichlorophenol	no		0.01000	0.00175	NA	0.01000
pentachlorophenol	no	0.00100	0.05000	0.00071	0.91200	0.00100
2,4-dinitrophenol	no		0.05000	NA	0.06080	0.06080
bis(2-ethylhexyl)phthalate	yes	0.00600	0.01000	0.00607	0.12160	0.00600
butylbenzylphthalate	no	0.10000	0.01000	NA	6.08000	0.10000
di-n-butylphthalate	yes		0.01000	NA	0.60800	0.60800
diethylphthalate	no		0.01000	NA	24.32000	24.32000
di methyl phthalate	no		0.01000	NA	304.00000	304.00000
di-n-octyl phthalate	no		0.01000	NA	0.60800	0.60800
benzene	no	0.00500	0.00500	0.00062	NA	0.00500
toluene	no	1.00000	0.00500	NA	0.80393	1.00000
ethylbenzene	no	0.70000	0.00500	NA	1.31459	0.70000

TABLE 11
SUMMARY OF HEALTH-BASED CRITERIA FOR GROUNDWATER

RESIDENTIAL LAND USE SCENARIO

Chemical Name	Compound is Bioaccumulatable (yes/no)	MCL or Nonzero MCLG (mg/L)	Practical Quantitation Limit (mg/L)	Groundwater		Groundwater Criteria (mg/L)
				Carcinogenic Effects @10-6 (mg/L)	Noncarcinogenic Effects (mg/L)	
xylenes	no	10.00000	0.00500	NA	60.80000	10.00000
vinyl chloride	no	0.00200	0.01000	0.00003	NA	0.00200
chloroethane	no		0.01000	NA	23.16075	23.16075
1,1-dichloroethylene	no	0.00700	0.00500	0.00002	0.27360	0.00700
1,1-dichloroethane	no		0.00500	NA	0.64000	0.64000
1,2-dichloroethylene (cis)	no	0.07000	0.00500	NA	0.30400	0.07000
1,2-dichloroethane	no	0.00500	0.00500	0.00020	9.12000	0.00500
trichloroethylene	no	0.00500	0.00500	0.00114	0.18240	0.00500
1,1,1-trichloroethane	no	0.20000	0.00500	NA	1.28753	0.20000
1,1,2-trichloroethane	no	0.00500	0.00500	0.00031	0.12160	0.00500
tetrachloroethylene	no	0.00500	0.00500	0.00147	0.30400	0.00500
1,1,1,2-tetrachloroethane	no		0.00500	0.00069	0.91200	0.00500
1,1,2,2-tetrachloroethane	no		0.00500	0.00031	NA	0.00500
chloroform	no	0.10000	0.00500	0.00028	0.30400	0.10000
acetone	no		0.10000	NA	3.04000	3.04000
4-methyl-2-pentanone	no		0.05000	NA	1.52000	1.52000
methyl ethyl ketone	no		0.10000	NA	0.91772	0.91772
Aldrin	yes		0.00004	0.00001	0.00018	0.00004
gamma-BHC (Lindane)	yes	0.00020	0.00009	0.00007	0.00182	0.00020
chlordane	yes	0.00200	0.00014	0.00007	0.00036	0.00200
DDD	yes		0.00011	0.00035	NA	0.00035
DDE	yes		0.00004	0.00025	NA	0.00025
DDT	yes		0.00012	0.00025	0.00304	0.00025
dieldrin	yes		0.00002	0.00001	0.00030	0.00002
endosulfan sulfate	no		0.00066	NA	0.00152	0.00152
endrin	yes	0.00200	0.00006	NA	0.00182	0.00200
heptachlor	yes	0.00040	0.00003	0.00002	0.00304	0.00040
heptachlor epoxide	no	0.00020	0.00083	0.00001	0.00040	0.00020

TABLE 11
SUMMARY OF HEALTH-BASED CRITERIA FOR GROUNDWATER

RESIDENTIAL LAND USE SCENARIO

Chemical Name	Compound is Bioaccumulatable [a] (yes/no)	MCL or Nonzero MCLG (mg/L)	Practical Quantitation Limit [b] (mg/L)	Groundwater: Carcinogenic Effects @10-6 (mg/L)	Groundwater: Noncarcinogenic Effects (mg/L)	Groundwater Criteria (mg/L)
PCBs	yes	0.00050	0.00065	0.00001	NA	0.00050
lead	no	0.01500	0.00300	NA	NA	NA
cadmium	no	0.00500	0.00500	NA	0.01520	0.00500
silver	no		0.01000	NA	0.15200	0.15200
mercury	yes	0.00200	0.00020	NA	0:00182	0.00200
chromium vi	no	0.10000	0.01000	NA	0.15200	0.10000
chromium iii	no	0.10000	0.01000	NA	30.40000	0.10000
barium	no	2.00000	0.20000	NA	2.12800	2.00000
arsenic	no	0.05000	0.01000	NA	0.00912	0.05000
antimony	no	0.00600	0.06000	NA	0.01216	0.00600
beryllium	no	0.00400	0.00500	0.00002	0.15200	0.00400
cyanide	no	0.20000	0.01000	NA	0.60800	0.20000
nickel	no	0.10000	0.04000	NA	0.60800	0.10000
selenium	no	0.05000	0.00500	NA	0.15200	0.05000
vanadium	no		0.05000	NA	0.21280	0.21280
zinc	no		0.02000	NA	9.12000	9.12000

NOTES: a - Compounds that are assumed to be bioaccumulative have an acceptable hazard index of 0.2 versus 1, as determined based on Indiana Register, 16:7, April 1, 1993.

b - Practical quantitation limits based EPA SW-846, 1986 for GC/MS. PQLs will change according to the specific analytical method used.

* - Assumes TEF approach.

NA - Data not available or not applicable.

TABLE 12
SUMMARY OF HEALTH-BASED CRITERIA FOR SURFACE SOILS
RESIDENTIAL LAND USE SCENARIO

Chemical Name	Compound is Bioaccumulatable [a] (yes/no)	Practical Quantitation Limit [b] (mg/Kg)	Surface Soils		Surface Soil Criteria (mg/Kg)
			Carcinogenic Effects @10-6 (mg/Kg)	Noncarcinogenic Effects (mg/Kg)	
naphthalene	no	0.660	NA	10,800.00	10,000.00
acenaphthylene	no	0.660	NA	NA	NA
acenaphthene	no	0.660	NA	16,200.00	10,000.00
fluorene	no	0.660	NA	10,800.00	10,000.00
phenanthrene	no	0.660	NA	NA	NA
anthracene	no	0.660	NA	81,000.00	10,000.00
fluoranthene	yes	0.660	NA	2,160.00	2,160.00
pyrene	no	0.660	NA	8,100.00	8,100.00
benzo(a)anthracene*	yes	0.660	0.88	NA	0.88
chrysene*	yes	0.660	87.67	NA	87.67
benzo(b)fluoranthene*	yes	0.660	0.88	NA	0.88
benzo(k)fluoranthene*	yes	0.660	8.77	NA	8.77
benzo(a)pyrene	yes	0.660	0.09	NA	0.66
indeno(1,2,3-cd)pyrene*	yes	0.660	0.88	NA	0.88
dibenzo(a,h)anthracene*	yes	0.660	0.09	NA	0.66
benzo(g,h,i)perylene	yes	0.660	NA	NA	NA
3,3'-dichlorobenzidine	no	1.300	1.42	NA	1.42
n-nitroso-di-n-propylamine	no	0.660	0.09	NA	0.66
bis(2-chloroisopropyl)ether	no	0.660	9.14	10,800.00	9.14
4-chloroaniline	no	1.300	NA	1,080.00	1,080.00
2-chloronaphthalene	no	0.660	NA	21,600.00	10,000.00
2,4-dinitrotoluene	no	0.660	NA	540.00	540.00
hexachlorobutadiene	yes	0.660	8.21	108.00	8.21
hexachloroethane	yes	0.660	45.07	54.00	45.07
isophorone	no	0.660	673.68	54,000.00	673.68
benzyl alcohol	no	1.300	NA	81,000.00	10,000.00
bis(2-chloroethyl)ether	no	0.660	0.58	NA	0.66

TABLE 12
SUMMARY OF HEALTH-BASED CRITERIA FOR SURFACE SOILS

RESIDENTIAL LAND USE SCENARIO

Chemical Name	Compound is Bioaccumulatable [a] (yes/no)	Practical Quantitation Limit [b] (mg/Kg)	Surface Soils		Surface Soil Criteria (mg/Kg)
			Carcinogenic Effects @10-6 (mg/Kg)	Noncarcinogenic Effects (mg/Kg)	
nitrobenzene	no	0.660	NA	135.00	135.00
1,2-dichlorobenzene	no	0.660	NA	24,300.00	10,000.00
1,3-dichlorobenzene	no	0.660	NA	NA	NA
1,4-dichlorobenzene	no	0.660	26.67	NA	26.67
1,2,4-trichlorobenzene	no	0.660	NA	2,700.00	2,700.00
hexachlorobenzene	no	0.660	0.40	216.00	0.66
hexachlorocyclopentadiene	no	0.660	NA	1,890.00	1,890.00
n-nitrosodiphenylamine	no	0.660	130.61	NA	130.61
benzoic acid	no	3.300	NA	1,080,000.00	10,000.00
2-nitroaniline	no	3.300	NA	16.20	16.20
phenol	yes	0.660	NA	32,400.00	10,000.00
2-methylphenol	no	0.660	NA	13,500.00	10,000.00
3-methylphenol	no	0.660	NA	NA	NA
4-methylphenol	no	0.660	NA	13,500.00	10,000.00
2-chlorophenol	no	0.660	NA	1,350.00	1,350.00
2,4-dichlorophenol	no	0.660	NA	810.00	810.00
2,4,5-trichlorophenol	no	0.660	NA	27,000.00	10,000.00
2,4,6-trichlorophenol	no	0.660	58.18	NA	58.18
pentachlorophenol	no	3.300	5.33	8,100.00	5.33
2,4-dinitrophenol	no	3.300	NA	540.00	540.00
bis(2-ethylhexyl)phthalate	yes	0.660	45.71	1,080.00	45.71
butylbenzylphthalate	no	0.660	NA	54,000.00	10,000.00
di-n-butylphthalate	yes	0.660	NA	5,400.00	5,400.00
diethylphthalate	no	0.660	NA	216,000.00	10,000.00
di methyl phthalate	no	0.660	NA	2,700,000.00	10,000.00
di-n-octyl phthalate	no	0.660	NA	5,400.00	5,400.00
benzene	no	0.005	22.07	NA	22.07

TABLE 12
SUMMARY OF HEALTH-BASED CRITERIA FOR SURFACE SOILS

RESIDENTIAL LAND USE SCENARIO

Chemical Name	Compound is Bioaccumulatable [a] (yes/no)	Practical Quantitation Limit [b] (mg/Kg)	Surface Soils		Surface Soil Criteria (mg/Kg)
			Carcinogenic Effects @10-6 (mg/Kg)	Noncarcinogenic Effects (mg/Kg)	
toluene	no	0.005	NA	54,000.00	1,000.00
ethylbenzene	no	0.005	NA	27,000.00	1,000.00
xylenes	no	0.005	NA	540,000.00	1,000.00
vinyl chloride	no	0.010	0.34	NA	0.34
chloroethane	no	0.010	NA	NA	NA
1,1-dichloroethylene	no	0.005	1.07	2,430.00	1.07
1,1-dichloroethane	no	0.005	NA	27,000.00	1,000.00
1,2-dichloroethylene (cis)	no	0.005	NA	2,700.00	1,000.00
1,2-dichloroethane	no	0.005	7.03	81,000.00	7.03
trichloroethylene	no	0.005	58.18	1,620.00	58.18
1,1,1-trichloroethane	no	0.005	NA	24,300.00	1,000.00
1,1,2-trichloroethane	no	0.005	11.23	1,080.00	11.23
tetrachloroethylene	no	0.005	12.55	2,700.00	12.55
1,1,1,2-tetrachloroethane	no	0.005	24.62	8,100.00	24.62
1,1,2,2-tetrachloroethane	no	0.005	3.20	NA	3.20
chloroform	no	0.005	104.92	2,700.00	104.92
acetone	no	0.100	NA	27,000.00	1,000.00
4-methyl-2-pentanone	no	0.050	NA	13,500.00	1,000.00
methyl ethyl ketone	no	0.100	NA	13,500.00	1,000.00
Aldrin	yes	0.003	0.04	1.62	0.04
gamma-BHC (Lindane)	yes	0.006	0.49	16.20	0.49
chlordane	yes	0.009	0.49	3.24	0.49
DDD	yes	0.007	2.67	NA	2.67
DDE	yes	0.003	1.88	NA	1.88
DDT	yes	0.008	1.88	27.00	1.88
dieldrin	yes	0.001	0.04	2.70	0.04
endosulfan sulfate	no	0.044	NA	13.50	13.50

TABLE 12
SUMMARY OF HEALTH-BASED CRITERIA FOR SURFACE SOILS

RESIDENTIAL LAND USE SCENARIO

Chemical Name	Compound is Bioaccumulatable [a] (yes/no)	Practical Quantitation Limit [b] (mg/Kg)	Surface Soils		Surface Soil Criteria (mg/Kg)
			Carcinogenic Effects @10-6 (mg/Kg)	Noncarcinogenic Effects (mg/Kg)	
endrin	yes	0.004	NA	16.20	16.20
heptachlor	yes	0.002	0.14	27.00	0.14
heptachlor epoxide	no	0.056	0.07	3.51	0.07
PCBs	yes	0.044	0.08	NA	0.08
lead	no	0.500	NA	NA	NA
cadmium	no	0.500	NA	135.00	135.00
silver	no	1.000	NA	1,350.00	1,350.00
mercury	yes	0.100	NA	16.20	16.20
chromium vi	no	1.000	NA	1,350.00	1,350.00
chromium iii	no	1.000	NA	270,000.00	10,000.00
barium	no	20.000	NA	18,900.00	10,000.00
arsenic	no	1.000	NA	81.00	81.00
antimony	no	6.000	NA	108.00	108.00
beryllium	no	0.500	0.15	1,350.00	0.50
cyanide	no	0.125	NA	5,400.00	1,000.00
nickel	no	4.000	NA	5,400.00	5,400.00
selenium	no	0.500	NA	1,350.00	1,350.00
vanadium	no	5.000	NA	1,890.00	1,890.00
zinc	no	2.000	NA	81,000.00	10,000.00

NOTES: a - Compounds that are assumed to be bioaccumulative have an acceptable hazard index of 0.2 versus 1, as determined based on Indiana Register, 16:7, April 1, 1993.

b - Practical quantitation limits based EPA SW-846, 1986 for GC/MS. PQLs will change according to the specific analytical method used.

* - Assumes TEF approach.

NA - Data not available or not applicable.

TABLE 13
SUMMARY OF HEALTH-BASED CRITERIA FOR SUBSURFACE SOILS
RESIDENTIAL LAND USE SCENARIO

Chemical Name	Compound is Bioaccumulatable [a] (yes/no)	Practical Quantitation Limit [b] (mg/Kg)	Subsurface Soils		Leaching to Groundwater		Subsurface Soil Criteria (mg/Kg)
			Carcinogenic Effects @10-6 (mg/Kg)	Noncarcinogenic Effects (mg/Kg)	Groundwater Criteria (mg/L)	Subsurface Soil Criteria (mg/Kg)	
naphthalene	no	0.660	NA	58,400.00	1.21600	1,761.785	1,761.785
acenaphthylene	no	0.660	NA	NA	NA	NA	NA
acenaphthene	no	0.660	NA	87,600.00	1.82400	10,906.498	10,000.000
fluorene	no	0.660	NA	58,400.00	1.21600	8,838.641	8,838.641
phenanthrene	no	0.660	NA	NA	NA	NA	NA
anthracene	no	0.660	NA	438,000.00	9.12000	1,268,642.929	10,000.000
fluoranthene	yes	0.660	NA	11,680.00	0.24320	2,305.040	2,305.040
pyrene	no	0.660	NA	43,800.00	0.91200	23,512.317	10,000.000
benzo(a)anthracene*	yes	0.660	698.63	NA	0.01000	103.881	103.881
chrysene*	yes	0.660	69,863.01	NA	0.01164	379.273	379.273
benzo(b)fluoranthene*	yes	0.660	698.63	NA	0.01000	354.977	354.977
benzo(k)fluoranthene*	yes	0.660	6,986.30	NA	0.01000	501.638	501.638
benzo(a)pyrene	yes	0.660	69.85	NA	0.01000	212.868	69.849
indeno(1,2,3-cd)pyrene*	yes	0.660	698.63	NA	0.01000	629.166	629.166
dibenzo(a,h)anthracene*	yes	0.660	69.86	NA	0.01000	649.661	69.863
benzo(g,h,i)perylene	yes	0.660	NA	NA	NA	NA	NA
3,3'-dichlorobenzidine	no	1.300	1,133.33	NA	0.02000	12.865	12.865
n-nitroso-di-n-propylamine	no	0.660	72.86	NA	0.01000	0.063	0.660
bis(2-chloroisopropyl)ether	no	0.660	1,472.23	58,400.00	0.01000	0.166	0.660
4-chloroaniline	no	1.300	NA	5,840.00	0.12160	186.921	186.921
2-chloronaphthalene	no	0.660	NA	116,800.00	2.43200	11,478.065	10,000.000
2,4-dinitrotoluene	no	0.660	NA	2,920.00	0.06080	6.535	6.535
hexachlorobutadiene	yes	0.660	31.18	584.00	0.01000	6.777	6.777
hexachloroethane	yes	0.660	29,818.48	292.00	0.01000	1.153	1.153
isophorone	no	0.660	536,842.11	292,000.00	0.08947	1.433	1.433
benzyl alcohol	no	1.300	NA	438,000.00	9.12000	728.618	728.618
bis(2-chloroethyl)ether	no	0.660	66.24	NA	0.01000	0.062	0.660
nitrobenzene	no	0.660	NA	730.00	0.01520	0.289	0.660

TABLE 13
SUMMARY OF HEALTH-BASED CRITERIA FOR SUBSURFACE SOILS

RESIDENTIAL LAND USE SCENARIO

Chemical Name	Compound is Bioaccumulatable [a] (yes/no)	Practical Quantitation Limit [b] (mg/Kg)	Subsurface Soils		Leaching to Groundwater		Subsurface Soil Criteria (mg/Kg)
			Carcinogenic Effects @10-6 (mg/Kg)	Noncarcinogenic Effects (mg/Kg)	Groundwater Criteria (mg/L)	Subsurface Soil Criteria (mg/Kg)	
1,2-dichlorobenzene	no	0.660	NA	131,400.00	2.73600	2,524.230	2,524.230
1,3-dichlorobenzene	no	0.660	NA	NA	NA	NA	NA
1,4-dichlorobenzene	no	0.660	21,250.00	16,873.31	0.01000	0.897	0.897
1,2,4-trichlorobenzene	no	0.660	NA	14,600.00	0.30400	235.033	235.033
hexachlorobenzene	no	0.660	101.56	1,168.00	0.01000	165.569	101.564
hexachlorocyclopentadiene	no	0.660	NA	2.89	0.21280	652.914	2.891
n-nitrosodiphenylamine	no	0.660	104,081.63	NA	0.01735	3.177	3.177
benzoic acid	no	3.300	NA	5,840,000.00	121.60000	136,098.441	10,000.000
2-nitroaniline	no	3.300	NA	45.47	0.05000	2.080	3.300
phenol	yes	0.660	NA	175,200.00	3.64800	110.173	110.173
2-methylphenol	no	0.660	NA	73,000.00	1.52000	62.871	62.871
3-methylphenol	no	0.660	NA	NA	NA	NA	NA
4-methylphenol	no	0.660	NA	73,000.00	1.52000	71.452	71.452
2-chlorophenol	no	0.660	NA	7,300.00	0.15200	1.945	1.945
2,4-dichlorophenol	no	0.660	NA	4,380.00	0.09120	2.528	2.528
2,4,5-trichlorophenol	no	0.660	NA	146,000.00	3.04000	921.059	921.059
2,4,6-trichlorophenol	no	0.660	24,779.61	NA	0.01000	0.251	0.660
pentachlorophenol	no	3.300	4,250.00	43,800.00	0.05000	24.947	24.947
2,4-dinitrophenol	no	3.300	NA	2,920.00	0.06080	1.232	3.300
bis(2-ethylhexyl)phthalate	yes	0.660	36,428.57	5,840.00	0.01000	16.427	16.427
butylbenzylphthalate	no	0.660	NA	292,000.00	6.08000	70,517.828	10,000.000
di-n-butylphthalate	yes	0.660	NA	29,200.00	0.60800	1,034.967	1,034.967
diethylphthalate	no	0.660	NA	1,168,000.00	24.32000	23,252.800	10,000.000
di methyl phthalate	no	0.660	NA	14,600,000.00	304.00000	405,965.586	10,000.000
di-n-octyl phthalate	no	0.660	NA	29,200.00	0.60800	2,318.850	2,318.850
benzene	no	0.005	289.96	NA	0.00500	0.059	0.059
toluene	no	0.005	NA	3,631.30	1.00000	278.926	278.926
ethylbenzene	no	0.005	NA	9,928.27	1.31459	834.372	834.372

TABLE 13
SUMMARY OF HEALTH-BASED CRITERIA FOR SUBSURFACE SOILS
RESIDENTIAL LAND USE SCENARIO

Chemical Name	Compound is Bioaccumulatable [a] (yes/no)	Practical Quantitation Limit [b] (mg/Kg)	Subsurface Soils		Leaching to Groundwater		Subsurface Soil Criteria (mg/Kg)
			Carcinogenic Effects @10-6 (mg/Kg)	Noncarcinogenic Effects (mg/Kg)	Groundwater Criteria (mg/L)	Subsurface Soil Criteria (mg/Kg)	
xylenes	no	0.005	NA	2,920,000.00	60.80000	206,114.090	1000.000
vinyl chloride	no	0.010	0.30	NA	0.01000	0.129	0.129
chloroethane	no	0.010	NA	3,693.46	23.16075	7,788.243	1000.000
1,1-dichloroethylene	no	0.005	2.59	13,140.00	0.00700	0.084	0.084
1,1-dichloroethane	no	0.005	NA	1,386.78	0.64000	40.074	40.074
1,2-dichloroethylene (cis)	no	0.005	NA	14,600.00	0.30400	17.140	17.140
1,2-dichloroethane	no	0.005	91.96	438,000.00	0.00500	0.025	0.025
trichloroethylene	no	0.005	437.11	8,760.00	0.00500	0.076	0.076
1,1,1-trichloroethane	no	0.005	NA	5,600.68	1.28753	229.642	229.642
1,1,2-trichloroethane	no	0.005	391.20	5,840.00	0.00500	0.035	0.035
tetrachloroethylene	no	0.005	1,634.72	14,600.00	0.00500	0.227	0.227
1,1,1,2-tetrachloroethane	no	0.005	1,291.02	43,800.00	0.00500	0.076	0.076
1,1,2,2-tetrachloroethane	no	0.005	1,052.52	NA	0.00500	0.044	0.044
chloroform	no	0.005	92.76	14,600.00	0.10000	2.082	2.082
acetone	no	0.100	NA	146,000.00	3.04000	22.793	22.793
4-methyl-2-pentanone	no	0.050	NA	73,000.00	1.52000	68.147	68.147
methyl ethyl ketone	no	0.100	NA	9,032.18	0.91772	11.620	11.620
Aldrin	yes	0.003	4.35	8.76	0.00004	0.007	0.007
gamma-BHC (Lindane)	yes	0.006	392.31	87.60	0.00020	0.010	0.010
chlordane	yes	0.009	368.21	17.52	0.00200	4.512	4.512
DDD	yes	0.007	2,125.00	NA	0.00035	0.270	0.270
DDE	yes	0.003	1,500.00	NA	0.00025	0.450	0.450
DDT	yes	0.008	1,418.50	146.00	0.00025	0.794	0.794
dieldrin	yes	0.001	31.88	14.60	0.00002	0.003	0.003
endosulfan sulfate	no	0.044	NA	73.00	0.00152	2.007	2.007
endrin	yes	0.004	NA	87.60	0.00200	1.939	1.939
heptachlor	yes	0.002	55.28	146.00	0.00040	0.221	0.221
heptachlor epoxide	no	0.056	56.04	18.98	0.00083	0.450	0.450

TABLE 13
SUMMARY OF HEALTH-BASED CRITERIA FOR SUBSURFACE SOILS

RESIDENTIAL LAND USE SCENARIO

Chemical Name	Compound is Bioaccumulatable [a] (yes/no)	Practical Quantitation Limit [b] (mg/Kg)	Subsurface Soils		Leaching to Groundwater		
			Carcinogenic Effects @10-6 (mg/Kg)	Noncarcinogenic Effects - (mg/Kg)	Groundwater Criteria (mg/L)	Subsurface Soil Criteria (mg/Kg)	Subsurface Soil Criteria (mg/Kg)
PCBs	yes	0.044	66.23	NA	0.00065	4.226	4.226
lead	no	0.500	NA	NA	NA	NA	NA
cadmium	no	0.500	NA	730.00	0.01520	NA	730.000
silver	no	1.000	NA	7,300.00	0.15200	NA	7,300.000
mercury	yes	0.100	NA	87.60	0.00182	NA	87.600
chromium vi	no	1.000	NA	7,300.00	0.15200	NA	7,300.000
chromium iii	no	1.000	NA	1,460,000.00	30.40000	NA	10,000.000
barium	no	20.000	NA	102,200.00	2.12800	NA	10,000.000
arsenic	no	1.000	NA	438.00	0.01000	NA	438.000
antimony	no	6.000	NA	584.00	0.06000	NA	584.000
beryllium	no	0.500	118.60	7,300.00	0.00500	NA	118.605
cyanide	no	0.125	NA	29,200.00	0.60800	NA	10,000.000
nickel	no	4.000	NA	29,200.00	0.60800	NA	10,000.000
selenium	no	0.500	NA	7,300.00	0.15200	NA	7,300.000
vanadium	no	5.000	NA	10,220.00	0.21280	NA	10,000.000
zinc	no	2.000	NA	438,000.00	9.12000	NA	10,000.000

NOTES: a - Compounds that are assumed to be bioaccumulative have an acceptable hazard index of 0.2 versus 1, as determined based on Indiana Register, 16:7, April 1, 1993.

b - Practical quantitation limits based EPA SW-846, 1986 for GC/MS. PQLs will change according to the specific analytical method used.

* - Assumes TEF approach.

NA - Data not available or not applicable.

TABLE 14
SUMMARY OF TIER II CLEANUP GOALS
FOR THE NONRESIDENTIAL SCENARIO

Chemical Name	Compound is Bioaccumulatable (yes/no)	Surface Soils (mg/Kg)	Subsurface Soils (mg/Kg)	Groundwater (mg/L)
naphthalene	no	10,000.00	10,000.00	4.0880
acenaphthylene	no	NA	NA	NA
acenaphthene	no	10,000.00	10,000.00	6.1320
fluorene	no	10,000.00	10,000.00	4.0880
phenanthrene	no	NA	NA	NA
anthracene	no	10,000.00	10,000.00	30.6600
fluoranthene	yes	10,000.00	10,000.00	0.8176
pyrene	no	10,000.00	10,000.00	3.0660
benzo(a)anthracene*	yes	79.45	103.88	0.0100
chrysene*	yes	7,945.21	10,000.00	0.3918
benzo(b)fluoranthene*	yes	79.45	354.98	0.0100
benzo(k)fluoranthene*	yes	794.52	3,759.12	0.0392
benzo(a)pyrene	yes	7.94	69.85	0.0100
indeno(1,2,3-cd)pyrene*	yes	79.45	629.17	0.0100
dibenzo(a,h)anthracene*	yes	7.95	69.86	0.0100
benzo(g,h,i)perylene	yes	NA	NA	NA
3,3'-dichlorobenzidine	no	128.89	12.86	0.0200
n-nitroso-di-n-propylamine	no	8.29	0.66	0.0100
bis(2-chloroisopropyl)ether	no	93.12	1.32	0.0409
4-chloroaniline	no	8,160.00	1,117.69	0.4088
2-chloronaphthalene	no	10,000.00	10,000.00	8.1760
2,4-dinitrotoluene	no	4,080.00	39.07	0.2044
hexachlorobutadiene	yes	1.78	31.18	0.0367
hexachloroethane	yes	408.00	3.31	0.0204
isophorone	no	10,000.00	256.03	3.0105
benzyl alcohol	no	10,000.00	4,356.75	30.6600
bis(2-chloroethyl)ether	no	4.06	0.66	0.0100

TABLE 14
SUMMARY OF TIER II CLEANUP GOALS
FOR THE NONRESIDENTIAL SCENARIO

Chemical Name	Compound is Bioaccumulatable (yes/no)	Surface Soils (mg/Kg)	Subsurface Soils (mg/Kg)	Groundwater (mg/L)
nitrobenzene	no	1,020.00	1.73	0.0511
1,2-dichlorobenzene	no	10,000.00	10,000.00	9.1980
1,3-dichlorobenzene	no	NA	NA	NA
1,4-dichlorobenzene	no	2,416.67	34.67	0.1192
1,2,4-trichlorobenzene	no	10,000.00	1,405.37	1.0220
hexachlorobenzene	no	6.87	101.56	0.0100
hexachlorocyclopentadiene	no	2.02	2.89	0.7154
n-nitrosodiphenylamine	no	10,000.00	567.80	0.5837
benzoic acid	no	10,000.00	10,000.00	408.8000
2-nitroaniline	no	42.90	3.30	0.0500
phenol	yes	10,000.00	658.78	12.2640
2-methylphenol	no	10,000.00	375.93	5.1100
3-methylphenol	no	NA	NA	NA
4-methylphenol	no	10,000.00	427.24	5.1100
2-chlorophenol	no	10,000.00	11.63	0.5110
2,4-dichlorophenol	no	6,120.00	15.12	0.3066
2,4,5-trichlorophenol	no	10,000.00	5,507.44	10.2200
2,4,6-trichlorophenol	no	1,922.89	30.65	0.2600
pentachlorophenol	no	483.33	24.95	0.0500
2,4-dinitrophenol	no	4,080.00	7.37	0.2044
bis(2-ethylhexyl)phthalate	yes	4,142.86	1,406.25	0.2043
butylbenzylphthalate	no	10,000.00	10,000.00	20.4400
di-n-butylphthalate	yes	10,000.00	6,188.56	2.0440
diethylphthalate	no	10,000.00	10,000.00	81.7600
di methyl phthalate	no	10,000.00	10,000.00	1,022.0000
di-n-octyl phthalate	no	10,000.00	10,000.00	2.0440
benzene	no	16.63	4.77	0.0986

TABLE 14
SUMMARY OF TIER II CLEANUP GOALS
FOR THE NONRESIDENTIAL SCENARIO

Chemical Name	Compound is Bioaccumulatable (yes/no)	Surface Soils (mg/Kg)	Subsurface Soils (mg/Kg)	Groundwater (mg/L)
toluene	no	1,000.00	1,000.00	20.4400
ethylbenzene	no	1,000.00	1,000.00	10.2200
xylenes	no	1,000.00	1,000.00	204.4000
vinyl chloride	no	0.02	0.13	0.0100
chloroethane	no	1,000.00	1,000.00	NA
1,1-dichloroethylene	no	0.15	0.08	0.0070
1,1-dichloroethane	no	973.47	1,000.00	10.2200
1,2-dichloroethylene (cis)	no	1,000.00	102.49	1.0220
1,2-dichloroethane	no	5.27	0.37	0.0314
trichloroethylene	no	24.97	25.73	0.2600
1,1,1-trichloroethane	no	1,000.00	1,000.00	9.1980
1,1,2-trichloroethane	no	22.74	1.05	0.0502
tetrachloroethylene	no	101.23	8.01	0.0561
1,1,1,2-tetrachloroethane	no	75.91	7.24	0.1100
1,1,2,2-tetrachloroethane	no	75.41	0.21	0.0143
chloroform	no	5.28	20.33	0.4689
acetone	no	1,000.00	136.29	10.2200
4-methyl-2-pentanone	no	1,000.00	407.48	5.1100
methyl ethyl ketone	no	1,000.00	146.24	5.1100
Aldrin	yes	0.27	0.06	0.0002
gamma-BHC (Lindane)	yes	44.62	0.34	0.0022
chlordane	yes	24.48	4.51	0.0020
DDD	yes	241.67	48.34	0.0119
DDE	yes	170.59	80.49	0.0084
DDT	yes	153.01	141.83	0.0084
dieldrin	yes	3.63	0.06	0.0002
endosulfan sulfate	no	102.00	12.00	0.0051

TABLE 14
SUMMARY OF TIER II CLEANUP GOALS FOR THE NONRESIDENTIAL SCENARIO

Chemical Name	Compound is Bioaccumulatable [a] (yes/no)	Surface Soils (mg/Kg)	Subsurface Soils (mg/Kg)	Groundwater (mg/L)
endrin	yes	122.40	10.12	0.0061
heptachlor	yes	4.16	0.44	0.0006
heptachlor epoxide	no	6.37	0.45	0.0008
PCBs	yes	7.53	4.23	0.0007
lead	no	NA	NA	NA
cadmium	no	1,020.00	730.00	0.0511
silver	no	10,000.00	7,300.00	0.5110
mercury	yes	122.40	87.60	0.0061
chromium vi	no	10,000.00	7,300.00	0.5110
chromium iii	no	10,000.00	10,000.00	102.2000
barium	no	10,000.00	10,000.00	7.1540
arsenic	no	612.00	438.00	0.0500
antimony	no	816.00	584.00	0.0600
beryllium	no	13.49	118.60	0.0050
cyanide	no	1,000.00	10,000.00	2.0440
nickel	no	10,000.00	10,000.00	2.0440
selenium	no	10,000.00	7,300.00	0.5110
vanadium	no	10,000.00	10,000.00	0.7154
zinc	no	10,000.00	10,000.00	30.6600

NOTES: a - Compounds that are assumed to be bioaccumulative have an acceptable hazard index of 0.2 versus 1, as determined based on Indiana Register, 16:7, April 1, 1993.

b - Practical quantitation limits based EPA SW-846, 1986 for GC/MS. PQLs will change according to the specific analytical method used.

* - Assumes TEF approach.

NA - Data not available or not applicable.

TABLE 15
SUMMARY OF TIER II CLEANUP GOALS
FOR THE RESIDENTIAL SCENARIO

Chemical Name	Compound is Bioaccumulatable (yes/no)	Surface Soils (mg/Kg)	Subsurface Soils (mg/Kg)	Groundwater (mg/L)
naphthalene	no	10,000.00	1,761.785	1.21600
acenaphthylene	no	NA	NA	NA
acenaphthene	no	10,000.00	10,000.000	1.82400
fluorene	no	10,000.00	8,838.641	1.21600
phenanthrene	no	NA	NA	NA
anthracene	no	10,000.00	10,000.000	9.12000
fluoranthene	yes	2,160.00	2,305.040	0.24320
pyrene	no	8,100.00	10,000.000	0.91200
benzo(a)anthracene*	yes	0.88	103.881	0.00010
chrysene*	yes	87.67	379.273	0.00020
benzo(b)fluoranthene*	yes	0.88	354.977	0.00020
benzo(k)fluoranthene*	yes	8.77	501.638	0.00020
benzo(a)pyrene	yes	0.66	69.849	0.00020
indeno(1,2,3-cd)pyrene*	yes	0.88	629.166	0.00040
dibenzo(a,h)anthracene*	yes	0.66	69.863	0.00030
benzo(g,h,i)perylene	yes	NA	NA	NA
3,3'-dichlorobenzidine	no	1.42	12.865	0.02000
n-nitroso-di-n-propylamine	no	0.66	0.660	0.01000
bis(2-chloroisopropyl)ether	no	9.14	0.660	0.01000
4-chloroaniline	no	1,080.00	186.921	0.12160
2-chloronaphthalene	no	10,000.00	10,000.000	2.43200
2,4-dinitrotoluene	no	540.00	6.535	0.06080
hexachlorobutadiene	yes	8.21	6.777	0.01000
hexachloroethane	yes	45.07	1.153	0.01000
isophorone	no	673.68	1.433	0.08947
benzyl alcohol	no	10,000.00	728.618	9.12000
bis(2-chloroethyl)ether	no	0.66	0.660	0.01000

TABLE 15
SUMMARY OF TIER II CLEANUP GOALS
FOR THE RESIDENTIAL SCENARIO

Chemical Name	Compound is Bioaccumulatable (yes/no)	Surface Soils (mg/Kg)	Subsurface Soils (mg/Kg)	Groundwater (mg/L)
nitrobenzene	no	135.00	0.660	0.01520
1,2-dichlorobenzene	no	10,000.00	2,524.230	0.60000
1,3-dichlorobenzene	no	NA	NA	0.60000
1,4-dichlorobenzene	no	26.67	0.897	0.07500
1,2,4-trichlorobenzene	no	2,700.00	235.033	0.07000
hexachlorobenzene	no	0.66	101.564	0.00100
hexachlorocyclopentadiene	no	1,890.00	2.891	0.05000
n-nitrosodiphenylamine	no	130.61	3.177	0.01735
benzoic acid	no	10,000.00	10,000.000	121.60000
2-nitroaniline	no	16.20	3.300	0.05000
phenol	yes	10,000.00	110.173	3.64800
2-methylphenol	no	10,000.00	62.871	1.52000
3-methylphenol	no	NA	NA	NA
4-methylphenol	no	10,000.00	71.452	1.52000
2-chlorophenol	no	1,350.00	1.945	0.15200
2,4-dichlorophenol	no	810.00	2.528	0.09120
2,4,5-trichlorophenol	no	10,000.00	921.059	3.04000
2,4,6-trichlorophenol	no	58.18	0.660	0.01000
pentachlorophenol	no	5.33	24.947	0.00100
2,4-dinitrophenol	no	540.00	3.300	0.06080
bis(2-ethylhexyl)phthalate	yes	45.71	16.427	0.00600
butylbenzylphthalate	no	10,000.00	10,000.000	0.10000
di-n-butylphthalate	yes	5,400.00	1,034.967	0.60800
diethylphthalate	no	10,000.00	10,000.000	24.32000
di methyl phthalate	no	10,000.00	10,000.000	304.00000
di-n-octyl phthalate	no	5,400.00	2,318.850	0.60800
benzene	no	22.07	0.059	0.00500

TABLE 15
SUMMARY OF TIER II CLEANUP GOALS
FOR THE RESIDENTIAL SCENARIO

Chemical Name	Compound is Bioaccumulatable [a] (yes/no)	Surface Soils (mg/Kg)	Subsurface Soils (mg/Kg)	Groundwater (mg/L)
toluene	no	1,000.00	278.926	1.00000
ethylbenzene	no	1,000.00	834.372	0.70000
xylenes	no	1,000.00	1,000.000	10.00000
vinyl chloride	no	0.34	0.129	0.00200
chloroethane	no	NA	1,000.000	23.16075
1,1-dichloroethylene	no	1.07	0.084	0.00700
1,1-dichloroethane	no	1,000.00	40.074	0.64000
1,2-dichloroethylene (cis)	no	1,000.00	17.140	0.07000
1,2-dichloroethane	no	7.03	0.025	0.00500
trichloroethylene	no	58.18	0.076	0.00500
1,1,1-trichloroethane	no	1,000.00	229.642	0.20000
1,1,2-trichloroethane	no	11.23	0.035	0.00500
tetrachloroethylene	no	12.55	0.227	0.00500
1,1,1,2-tetrachloroethane	no	24.62	0.076	0.00500
1,1,2,2-tetrachloroethane	no	3.20	0.044	0.00500
chloroform	no	104.92	2.082	0.10000
acetone	no	1,000.00	22.793	3.04000
4-methyl-2-pentanone	no	1,000.00	68.147	1.52000
methyl ethyl ketone	no	1,000.00	11.620	0.91772
Aldrin	yes	0.04	0.007	0.00004
gamma-BHC (Lindane)	yes	0.49	0.010	0.00020
chlordane	yes	0.49	4.512	0.00200
DDD	yes	2.67	0.270	0.00035
DDE	yes	1.88	0.450	0.00025
DDT	yes	1.88	0.794	0.00025
dieldrin	yes	0.04	0.003	0.00002
endosulfan sulfate	no	13.50	2.007	0.00152

TABLE 15
SUMMARY OF TIER II CLEANUP GOALS
FOR THE RESIDENTIAL SCENARIO

Chemical Name	Compound is Bioaccumulatable [a] (yes/no)	Surface Soils (mg/Kg)	Subsurface Soils (mg/Kg)	Groundwater (mg/L)
endrin	yes	16.20	1.939	0.00200
heptachlor	yes	0.14	0.221	0.00040
heptachlor epoxide	no	0.07	0.450	0.00020
PCBs	yes	0.08	4.226	0.00050
lead	no	NA	NA	NA
cadmium	no	135.00	730.000	0.00500
silver	no	1,350.00	7,300.000	0.15200
mercury	yes	16.20	87.600	0.00200
chromium vi	no	1,350.00	7,300.000	0.10000
chromium iii	no	10,000.00	10,000.000	0.10000
barium	no	10,000.00	10,000.000	2.00000
arsenic	no	81.00	438.000	0.05000
antimony	no	108.00	584.000	0.00600
beryllium	no	0.50	118.605	0.00400
cyanide	no	1,000.00	10,000.000	0.20000
nickel	no	5,400.00	10,000.000	0.10000
selenium	no	1,350.00	7,300.000	0.05000
vanadium	no	1,890.00	10,000.000	0.21280
zinc	no	10,000.00	10,000.000	9.12000

NOTES: a - Compounds that are assumed to be bioaccumulative have an acceptable hazard index of 0.2 versus 1, as determined based on Indiana Register, 16:7, April 1, 1993.

b - Practical quantitation limits based EPA SW-846, 1986 for GC/MS. PQLs will change according to the specific analytical method used.

* - Assumes TEF approach.

NA - Data not available or not applicable.