UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

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HUNTERS POINT
SSIC NO.5090.3

16 November 1994

MEMORANDUM

To: Bill Radzevich, Remedial Project Manager
Hunters Point Annex

From: Alydda Mangelsdorf, Remedial Project Manager
Hunters Point Annex

Subject: Parcel A

As per your telephone request of November 15, 1994, I am forwarding on to you the following information to aid in the completion of your review of the Parcel A Sampling and Analysis Plan.

1. Memo from Matt Hagemann to myself regarding the SAP section on well construction.

2. U.S. EPA Region IX Preliminary Remediation Goals (PRG), August 1, 1994.

3. Department of Toxic Substances Control Recommended Outline for using U.S. EPA Region IX PRGs.

I have sent to your contractor Scott Weber of PRC a faxed copy of Matt Hagemann's memo and a mailed copy of the State's recommendations regarding the use of PRGs. I have also confirmed with him that PRC already has the August 1, 1994 update of U.S. EPA's PRGs. If you have any further questions or requests, please contact me at (415) 744-2385. Matt Hagemann and I are both willing to field questions and participate in discussion regarding the Sampling Analysis Plan prior to your submittal of comments as a means of expediting the finalization of the plan. You can reach Matt Hagemann at (415) 744-2326.

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To: amangels
From: Matt Hagemann <R9SUPER/MHAGEMAN>
Date: 9 Nov 94 08:39:43
Subject: Well Const.

Alydda: I have the following comments on PRC's well construction:

(1) A schematic diagram should be included

(2) An effort should be made to keep the well screen to a maximum of 5 feet in length. This may be done if sufficient boring yields are monitored as drilling progresses

(3) The boring should be advanced to a minimum depth that would allow for proper well construction, i.e 14 feet -- 0-5' cement grout; 5-7' bentonite seal; 7-9' filter pack; 9-14' screen (BOH)

(4) the method of drilling should be specified.

Matt

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

August 1, 1994

Subject: Region IX Preliminary Remediation Goals (PRGs) Second Half 1994

From: Stanford J. Smucker, Ph.D.
Regional Toxicologist (H-9-3)
Technical Support Section

To: PRG Table Mailing List

Please find the update to the Region IX PRG table. The table has been revised to reflect the most current EPA toxicological and risk assessment information. Updates to EPA toxicity values were obtained from IRIS through July 1994 and HEAST through March 1994. Age-adjustment factors have been added to better evaluate residential exposures to carcinogens. In addition, the soil saturation equation has been corrected, leading to approximately a ten fold higher saturation concentration in soils.

The PRG table provides useful risk-based information for Region IX risk assessors and managers. However, the table has no official status and may be in conflict with local state requirements. Four problem chemicals (cadmium, chromium, nickel, and DBCP) have been identified by Cal-EPA's Department of Toxic Substances Control. California soil values differ significantly, by a factor of four or more, for these chemicals. To address these concerns, the "Cal-modified PRG" concentrations, based on PEA (1994) guidance, are included with the federal values and should be used in California when screening a site.

In general, PRGs should be used as a predictor of single-contaminant risk estimates for a specific environmental media (e.g. soil, air, and tap water). However, multiple pollutant risks can also be estimated using PRGs (see Screening Risk below). This procedure is somewhat more complicated as it requires gathering additional information, either by downloading the table to display the hidden columns or by using the equations presented in the text for calculating additional concentration terms not provided in the print out.

A contaminant concentration that exceeds a PRG level does not, in itself, mean that there is an unacceptable health threat. However, exceedances should be evaluated further. It is recommended that the reader verify the numbers with a toxicologist because the toxicity/exposure information in the table may contain errors or default assumptions that need to be refined based on further evaluation.

If you are not currently on the PRG mailing list, but would like to be, please make the request through EPA's project manager working on your site. Or, simply download the file (PRG2ND94.ZIP) from California Regional Water Board's BBS [(510) 286-0404]. If you find an error please send me a note via fax at (415) 744-1916.

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1.0 INTRODUCTION

The Region IX PRG Table combines EPA toxicity values, updated biannually, with reasonable maximum exposure (RME) factors to estimate concentrations in environmental media (e.g. soil, air, and water) that are generally agreed to be "safe" for humans. Above these levels, there may be enough concern to warrant further evaluation of risks.

PRG concentrations presented in the Tables can be used to screen pollutants in environmental media, trigger further investigation, and provide an initial cleanup goal if applicable.
When considering PRGs as initial cleanup goals, residential concentrations should be used for maximum beneficial uses of a property. Industrial concentrations for soil only are included in the table as an alternative goal, but industrial concentrations should not be used for screening a site. They are meant to provide the manager with an alternative preliminary goal for sites zoned heavy industrial.

Before applying PRGs as screening tools or initial cleanup goals, the user of the table should consider whether the exposure pathways at the site are fully accounted for in the PRG calculation. **Region IX PRG concentrations are based on direct exposures (i.e. ingestion, dermal contact, and inhalation) for specific land-use conditions and do not consider impact to groundwater or ecological receptors.** To determine the appropriateness of Region IX PRGs, the following questions should be asked:

- Are there potential ecological concerns?
- Is there potential for land use other than those covered by the PRGs (that is, residential and industrial)?
- Are there other likely human exposure pathways that were not considered in development of the PRGs (e.g. impact to groundwater, local fish consumption; raising beef, dairy, or other livestock)?
- Are there unusual site conditions (e.g. large areas of contamination, high fugitive dust levels, potential for indoor air contamination)?

If any of these four conditions exist, the PRG may need to be modified to reflect this new information. In general, PRGs are refined in the site conceptual model developed as part of a site-specific risk assessment.

DISCLAIMER

Preliminary remediation goals (PRGs) focus on dominant exposure pathways and may not consider all exposure pathways encountered at CERCLA/RCRA sites (Exhibit 1-1). PRGs do not consider impact to groundwater or address ecological concerns. PRGs are specifically not intended as a (1) stand-alone decision-making tool, (2) as a substitute for EPA guidance for preparing baseline risk assessments, or (3) a rule to determine if a waste is hazardous under RCRA.

The guidance set out in this document is not final Agency action. It is not intended, nor can it be relied upon to create any rights enforceable by any party in litigation with the United States. EPA officials may decide to follow the guidance provided herein, or act at variance with the guidance, based on an analysis of specific circumstances. The Agency also reserves the right to change this guidance at any time without public notice.

EXHIBIT 1-1
TYPICAL EXPOSURE PATHWAYS BY MEDIUM
FOR RESIDENTIAL AND INDUSTRIAL LAND USES[a]

EXPOSURE PATHWAYS, ASSUMING:		
MEDIUM	RESIDENTIAL LAND USE	INDUSTRIAL LAND USE
Ground Water	***Ingestion from drinking***	Ingestion from drinking
	Inhalation of volatiles	Inhalation of volatiles
	Dermal absorption from bathing	Dermal absorption
Surface Water	***Ingestion from drinking***	Ingestion from drinking
	Inhalation of volatiles	Inhalation of volatiles
	Dermal absorption from bathing	Dermal absorption
	Ingestion during swimming	
	Ingestion of contaminated fish	
Soil	***Ingestion***	***Ingestion***
	Inhalation of particulates	***Inhalation of particulates***
	Inhalation of volatiles	***Inhalation of volatiles***
	Exposure to indoor air from soil gas	Exposure to indoor air from soil gas
	Exposure to ground water contaminated by soil leachate	Exposure to ground water contaminated by soil leachate
	Ingestion via plant uptake	Inhalation of particulates from trucks and heavy equipment
	Dermal absorption	***Dermal absorption***

Footnote:
[a]Exposure pathways considered in the PRG calculations are indicated in boldface italics.

2.0 READING THE PRG TABLE

2.1 General Considerations:

PRGs are health-based concentrations that correspond to either a 1 in a million (10^{-6}) cancer risk or a "safe" reference dose (RfD), whichever is lower. PRG concentrations based on cancer and noncancer concerns are indicated by "ca" and "nc", respectively. Cancer-causing agents may have additional non-cancer PRGs not listed in the Tables. These can be obtained by downloading file (PRG2ND94.ZIP) from California Regional Water Board's Bulletin Board System at [(510)286-0404)] or using the calculations provided below.

In general, PRG concentrations in the table are risk-based but for soil there are two important exceptions: 1) for several volatile chemicals PRGs are based on soil saturation equation ("sat") (see below), and 2) for relatively less toxic inorganic and semivolatile contaminants, a non-risk based "ceiling limit" concentration is given as 10^{+5}mg/kg "max". PRG concentrations that are not risk-based (i.e. either "sat" or "max") should be segregated before screening multiple pollutant risks.

2.2 Toxicity Values:

EPA toxicity values, known as noncarcinogenic reference doses (RfD) and carcinogenic slope factors (SF) were obtained from IRIS through July 1994, HEAST through March 1994, and ECAO-Cincinnati. The priority among sources of toxicological constants used are as follows: (1) IRIS (indicated by "i"), (2) HEAST ("h"), (3) ECAO-Cincinnati ("e"), and (4) withdrawn from IRIS or HEAST ("x"). **Note in some cases, state toxicity values may differ from the federal numbers or even be promulgated as ARARs; these and the resultant PRGs should also be considered as initial cleanup goals.**

Route-to-route extapolations ("r") were frequently used when there were no toxicity values available for a given route. Oral cancer slope factors ("oSF") and reference doses ("oRfD") were used for both oral and inhaled exposures for organic compounds lacking inhalation values. Also, inhalation slope factors ("iSF") and inhalation reference doses ("iRfD") were often used for both inhaled and oral exposures for organic compounds lacking oral values.

An additional route-to-route extrapolation is the use of oral toxicity values for evaluating dermal exposures. Although route-to-route methods are a useful screening procedure, the assumptions may need to be further evaluated in a site-specific risk assessment.

2.3 Soil Factors:

Chemical-specific information for soils, volatilization factors ("VF_s") and skin absorption factors ("ABS"), are listed in the table to provide additional assumptions used to calculate soil PRGs. For volatile chemicals, the "VF_s" term was incorporated into the PRG equations to address long-term inhalation exposures. Volatile organic chemicals (VOCs) are indicated by "1" in the VOC column of the Table and are defined as those chemicals having a Henry's Law constant greater than 10^{-5} (atm-m^3/mol) and a molecular weight less than 200 g/mole).

Chemical-specific "ABS" values are provided for arsenic, cadmium, pentachlorophenol, PCBs, and dioxin as recommended by EPA's Office of Research and Development (1994) for the evaluation of contaminant absorption through the skin. Otherwise, default skin absorption fractions are assumed to be 0.01 and 0.10, for inorganics and organics, respectively.

2.4 Risk Screening:

A suggested stepwise approach for screening sites with PRGs is as follows:

- Perform an extensive records search and compile existing data

- Identify site contaminants in the PRG Table. Record the PRG concentrations for various media and note whether PRG is based on cancer risk (indicated by "ca") or noncancer hazard (indicated by "nc"). Segregate cancer PRGs from non-cancer PRGs and exclude (but don't eliminate) non-risk based PRGs ("sat" or "max").

- For cancer risk estimates, take the site-specific concentration (maximum or 95 UCL) and divide by the PRG concentrations that are designated for cancer evaluation ("ca"). Multiply this ratio by 10^{-6} to estimate chemical-specific risk. For multiple pollutants, simply add the risk for each chemical :

$$Risk = 10^{-6} \cdot \left[\left(\frac{conc_x}{PRG_x} \right) + \left(\frac{conc_y}{PRG_y} \right) + \left(\frac{conc_z}{PRG_z} \right) \right]$$

- For non-cancer hazard estimates. Divide concentration term by its respective non-cancer PRG designated as "nc" and sum the ratios for multiple contaminants. [Note that carcinogens may also have an associated non-cancer PRG that is not listed in the printed copy of the table and these will also need to be obtained in order to complete the non-cancer evaluation.] The non-cancer ratio represents a hazard index (HI). A hazard index of 1 or less is generally considered safe . A ratio greater than 1 suggests further evaluation:

$$Hazard\ Index = \left[\left(\frac{conc_x}{PRG_x} \right) + \left(\frac{conc_y}{PRG_y} \right) + \left(\frac{conc_z}{PRG_z} \right) \right]$$

For more information on screening site risks, the reader should contact EPA Region IX's Technical Support Section.

3.0 TECHNICAL SUPPORT DOCUMENTATION

PRGs consider direct exposure hazards to chemicals from contact with complex media, soils, air, and water. The emphasis of the PRG equations and technical discussion are aimed at developing initial goals for soils, since this is an area where few standards exist. For air and water, additional reference concentrations or standards are available for many chemicals (e.g. MCLGs and NAAQS) and consequently the discussion of these media are brief.

3.1 Volatile Chemicals in Soil and Water:

Volatile chemicals, defined as those chemicals having a Henry's Law constant greater than 10^{-5} (atm-m^3/mol) and a molecular weight less than 200 g/mole, were screened for inhalation exposures using a volatilization factor in the PRG calculations for soil and water (RAGS Part B).

Volatilization factors for soils (VF_s) are chemical-specific and were calculated from physical-chemical information obtained from a number of sources including *Superfund Exposure Assessment Manual* (reference "1")(SEAM, EPA 1988), *Superfund Public Health Evaluation Manual* (reference "2")(EPA 1986), *Subsurface Contamination Reference Guide* (reference "3")(EPA 1990) and *Fate and Exposure Data* (reference "4")(Howard 1991) and are presented in Attachment A. In those cases where Diffusivity Coefficients (Di) were not provided in existing literature, Di's were calculated using Fuller's Method described in SEAM. A surrogate VF for contaminants in soil was required for some chemicals that lacked physico-chemical information. In these cases, a proxy chemical of similar structure was used that may over- or under-estimate the PRG for soils.

The basic principle of the VF model is applicable only if the soil contaminant concentration is at or below soil saturation. If the PRG calculated using VF_s was greater than the calculated "sat", the PRG was set equal to "sat" in accordance with Risk Assessment Guidance for Superfund - Part B (EPA, 1991).

For tap water, an upperbound volatilization constant (VF_w) is used that is based on all uses of household water (e.g showering, laundering, and dish washing). Certain assumptions were made. For example, it is assumed that the volume of water used in a residence for a family of four is 720 L/day, the volume of the dwelling is 150,000 L and the air exchange rate is 0.25 air changes/hour (Andelman in RAGS Part B). Furthermore, it is assumed that the average transfer efficiency weighted by water use is 50 percent [i.e. half of the concentration of each chemical in water will be transfered into air by all water uses. Note: the range of transfer efficiencies extends from 30% for toilets to 90% for dishwashers.

3.2 Dermal Absorption of Contaminants in Soil:

Much uncertainty surrounds the determination of hazards associated with skin contact with soils. Thus far, chemical-specific absorption values for skin have been recommended for only five chemicals by EPA's Office of Research and Development. For all other chemicals, default absorption values for inorganics and organics are assumed to be 1 and 10 percent, respectively. An additional uncertainty is the lack of toxicity values for the dermal route. For screening purposes it is assumed that dermal toxicity values can be route-to-route extrapolated from oral values, but this may not always be an appropriate assumption and should be checked.

At 10 % skin absorption, the dermal dose is estimated to equal an ingestion dose for adults, using the best estimate default values in *Dermal Exposure Assessment: Principles and Applications* (EPA 1992). At 1 % absorption, the dermal dose is estimated to be 10% of the oral dose (i.e. based on an adult

ingestion rate of 100 mg/day). Note: worker and children intake rates, 50 mg/day and 200 mg/day, respectively, yield somewhat different results.

dermal dose = ingestion dose

$$C_{SOIL} \cdot ABS \cdot AF \cdot SA = C_{SOIL} \cdot IR$$

$$ABS = \frac{(100 mg/day)}{[(0.2 mg/cm^2\text{-}day)(5000 cm^2)]} = 0.10$$

3.3 Chemicals Adsorbed to Airborne Particles:

Inhalation of chemicals adsorbed to respirable particles (PM_{10}) were assessed using a default particulate emission factor (PEF) equal to 4.63 x 10^9 m^3/kg that relates the contaminant concentration in soil with the concentration of respirable particles in the air due to fugitive dust emissions from contaminated soils. The relationship is derived by Cowherd (1985) for a rapid assessment procedure applicable to a typical hazardous waste site where the surface contamination provides a relatively continuous and constant potential for emission over an extended period of time (e.g. years). **This may not be an appropriate assumption for all sites.**

With the possible exception of cadmium, chromium, and nickel, inhalation of airborne particles (under typical conditions) does not significantly affect the PRG for soils. For more details regarding specific parameters used in the PEF model, the reader is referred to RAGS Part B (EPA, 1991).

3.4 Exposure Factors:

Default exposure factors were obtained primarily from RAGS Supplemental Guidance Standard Default *Exposure Factors* (OSWER Directive, 9285.6-03) dated March 25, 1991 and supplemented with more recent information from U.S. EPA's Office of Solid Waste and Emergency Response, U.S. EPA's Office of Research and Development, and California EPA's Department of Toxic Substances Control (see Exhibit 3-1).

Because contact rates may be different for children and adults, carcinogenic risks during the first 30 years of life were calculated using age-adjusted factors. Use of age-adjusted factors are especially important for soil ingestion exposures, which are higher during childhood and decrease with age. However, for purposes of combining exposures across pathways, additional age-adjusted factors are used for inhalation and dermal exposures. These factors approximate the integrated exposure from birth until age 30 combining contact rates, body weights, and exposure durations for two age groups - small children and adults. Age-adjusted factors were obtained from RAGS PART B or developed by analogy.

(1) ingestion([mg•yr]/[kg•d]:

$$IFS_{adj} = \frac{ED_c \cdot IRS_c}{BW_c} + \frac{(ED_t - ED_c) \cdot IRS_a}{BW_a}$$

(2) skin contact([mg•yr]/[kg•d]:

$$SFS_{adj} = \frac{ED_c \cdot SL \cdot SA_c}{BW_c} + \frac{(ED_t - ED_c) \cdot SL \cdot SA_a}{BW_a}$$

(3) inhalation ([m^3•yr]/[kg•d]):

$$InhF_{adj} = \frac{ED_c \cdot IRA_c}{BW_c} + \frac{(ED_t - ED_c) \cdot IRA_a}{BW_a}$$

For soils only, noncarcinogenic contaminants are evaluated in children separately from adults. No age-adjustment factor is used in this case. The focus on children is considered protective of the higher daily intake rates of soil by children and their lower body weight. For maintaining consistency, when evaluating soils, dermal and inhalation exposures are also based on childhood contact rates.

3.5 PRG Equations:

The equations used to calculate the PRGs for carcinogenic and noncarcinogenic contaminants are presented in Equations 3-1 thru 3-8. Calculations of PRGs are consistent with RAGS Part B (U.S. EPA 1991) but also consider updates to the RAGS Part B equations. Briefly, the methodology backcalculates a soil, air, or water concentration level from a target risk (for carcinogens) or hazard quotient (for noncarcinogens). The equations for soil combine across pathways for direct exposures (i.e. ingestion, skin contact, and inhalation). To evaluate route-specific contribution to the PRG concentration, the reader may want to download the PRG table from California Regional Water Board's BBS mentioned above and display the hidden columns.

To calculate PRGs for volatile chemicals in soil, a chemical-specific volatilization factor is calculated per Equation 3-9 (page 12). Because of its reliance on Henry's law, the VF model is applicable only when the contaminant concentration in soil water is at or below saturation (i.e. there is no free-phase contaminant present). This corresponds to the contaminant concentration in soil at which the adsorptive limits of the soil particles and the solubility limits of the available soil moisture have been reached. Above this point, pure liquid-phase contaminant is expected in the soil. The updated equation for deriving C_{sat} is presented in Equation 3-10.

EXHIBIT 3-1
STANDARD DEFAULT FACTORS

Symbol	Definition (units)	Default	Reference
CSFo	Cancer slope factor oral (mg/kg-d)-1	--	IRIS, HEAST, or ECAO
CSFI	Cancer slope factor inhaled (mg/kg-d)-1	--	IRIS, HEAST, or ECAO
RfDo	Reference dose oral (mg/kg-d)	--	IRIS, HEAST, or ECAO
RfDi	Reference dose inhaled (mg/kg-d)	--	IRIS, HEAST, or ECAO
TR	Target cancer risk	10-6	--
THQ	Target hazard quotient	1	--
BWa	Body weight, adult (kg)	70[a]	RAGS (Part A), EPA 1989 (EPA/540/1-89/002)
BWc	Body weight, child (kg)	15	Exposure Factors , EPA 1991 (OSWER No. 9285.6-03)
AT	Averaging time - cancer (years)	70	RAGS(Part A), EPA 1989 (EPA/540/1-89/002)
SAa	25% Surface area, adult (cm^2)	5000	Dermal Assessment, EPA 1992 (EPA/600/8-91/011B)
SAc	25% Surface area, child (cm^2)	2000	Dermal Assessment, EPA 1992 (EPA/ 600/8-9/011B)
AF	Adherence factor (mg/cm^2)	0.2	Dermal Assessment, EPA 1992 (EPA/ 600/8-9/011B)
ABS	Skin absorption (unitless):		
	-- organics	0.1	PEA, Cal-EPA (DTSC, 1994)
	--Inorganics	0.01	PEA, Cal-EPA (DTSC, 1994)
IRAa	Inhalation rate - adult (m^3/day)	20	Exposure Factors , EPA 1991 (OSWER No. 9285.6-03)
IRAc	Inhalation rate - child (m^3/day)	10	RAGS (Part A), EPA 1989 (EPA/540/1-89/002)
IRWa	Drinking water ingestion - adult (L/day	2	RAGS(Part A), EPA 1989 (EPA/540/1-89/002)
IRWc	Drinking water ingestion - child (L/day)	1	PEA, Cal-EPA (DTSC, 1994)
IRSa	Soil ingestion - adult (mg/day)	100	Exposure Factors , EPA 1991 (OSWER No. 9285.6-03)
IRSc	Soil ingestion - child (mg/day),	200	Exposure Factors , EPA 1991 (OSWER No. 9285.6-03)
IRSo	Soil ingestion - occupational (mg/day)	50	Exposure Factors , EPA 1991 (OSWER No. 9285.6-03)
EFr	Exposure frequency - residential (d/y)	350	Exposure Factors , EPA 1991 (OSWER No. 9285.6-03)
EFo	Exposure frequency - occupational (d/y)	250	Exposure Factors , EPA 1991 (OSWER No. 9285.6-03)
EDr	Exposure duration - residential (years)	30[b]	Exposure Factors , EPA 1991 (OSWER No. 9285.6-03)
EDc	Exposure duration - child (years)	6	Exposure Factors , EPA 1991 (OSWER No. 9285.6-03)
EDo	Exposure duration - occupational (years)	25	Exposure Factors , EPA 1991 (OSWER No. 9285.6-03)
	Age-adjusted factors for carcinogens:		
IFSadj	Ingestion factor, soils ([mg-yr]/[kg-d])	114	RAGS(Part B) , EPA 1991 (OSWER No. 9285.7-01B)
SFSadj	Skin contact factor, soils ([mg-yr]/[kg-d])	503	By analogy to RAGS (Part B)
InhFadj	Inhalation factor ([m^3-yr]/[kg-d])	11	By analogy to RAGS (Part B)
VFw	Volatilization factor for water (unitless)	0.5	RAGS(Part B) , EPA 1991 (OSWER No. 9285.7-01B)
PEF	Particulate emission factor (m^3/kg)	See below	RAGS(Part B) , EPA 1991 (OSWER No. 9285.7-01B)
VFs	Volatilization factor for soil (m^3/kg)	See below	OSWER (EPA 1993, communication from Janine Dinan)
Csat	Soil saturation concentration (mg/kg)	See below	OSWER (EPA 1994, communication from Janine Dinan)

Footnote:
[a]Seventy years is the averaging time for carcinogens. For noncarcinogens, the averaging time is set equal to the exposure duration (AT = ED).
[b]Exposure duration for lifetime residents is assumed to be 30 years total. For carcinogens, exposures are combined for children (6 years) and adults (24 years) .

PRG EQUATIONS

Soil Equations: For soils, equations were based on three exposure routes (ingestion, skin contact, and inhalation).

Equation 3-1: Direct Exposures to Carcinogenic Contaminants in Residential Soil

$$C(mg/kg) = \frac{TR \cdot AT \cdot 365 d/y}{EF_r\left[\left(\frac{IFS_{adj} \cdot CSF_o}{10^6 mg/kg}\right) + \left(\frac{SFS_{adj} \cdot ABS \cdot CSF_o}{10^6 mg/kg}\right) + \left(\frac{InhF_{adj} \cdot CSF_i}{VF^a}\right)\right]}$$

Equation 3-2: Direct Exposures to Noncarcinogenic Contaminants in Residential Soil

$$C(mg/kg) = \frac{THQ \cdot BW_c \cdot ED_r \cdot 365 d/y}{EF_r \cdot ED_c\left[\left(\frac{1}{RfD_o} \cdot \frac{IRS_c}{10^6 mg/kg}\right) + \left(\frac{1}{RfD_o} \cdot \frac{SA_c \cdot SL \cdot ABS}{10^6 mg/kg}\right) + \left(\frac{1}{RfD_i} \cdot \frac{IRA_c}{VF^a}\right)\right]}$$

Equation 3-3: Direct Exposures to Carcinogenic Contaminants in Industrial Soil

$$C(mg/kg) = \frac{TR \cdot BW_a \cdot AT 365 d/y}{EF_o \cdot ED_o\left[\left(\frac{IRS_o \cdot CSF_o}{10^6 mg/kg}\right) + \left(\frac{SA_a \cdot SL \cdot ABS}{10^6 mg/kg}\right) + \left(\frac{IRA_a \cdot CSF_i}{VF^a}\right)\right]}$$

Equation 3-4: Direct Exposures to Noncarcinogenic Contaminants in Industrial Soil

$$C(mg/kg) = \frac{THQ \cdot BW_a \cdot ED_o \cdot 365 d/y}{EF_o \cdot ED_o\left[\left(\frac{1}{RfD_o} \cdot \frac{IRS_o}{10^6 mg/kg}\right) + \left(\frac{1}{RfD_o} \cdot \frac{SA_a \cdot SL \cdot ABS}{10^6 mg/kg}\right) + \left(\frac{1}{RfD_i} \cdot \frac{IRA_a}{VF^a}\right)\right]}$$

Footnote:
[a]Use VF for volatile chemicals (defined as having a Henry's Law Constant [atm-m^3/mol] greater than 10^{-6} and a molecular weight less than 200 grams/mol) or PEF for non-volatile chemicals.

Tap Water Equations:

Equation 3-5: Ingestion and Inhalation Exposures to Carcinogenic Contaminants in Tap Water

$$C(ug/L) = \frac{TR \cdot AT \cdot 365d/y \cdot 1000ug/mg}{EF_r[(IFW_{adj} \cdot CSF_o) + (VF_w \cdot InhF_{adj} \cdot CSF_i)]}$$

Equation 3-6: Ingestion and Inhalation Exposures to Noncarcinogenic Contaminants in Tap Water

$$C(ug/L) = \frac{THQ \cdot BW_a \cdot EDr \cdot 365d/y \cdot 1000ug/mg}{EF_r \cdot ED_r[(\frac{IRW_a}{RfD_o}) + (\frac{VF_w \cdot IRA_a}{RfD_i})]}$$

Air Equations:

Equation 3-7: Inhalation Exposures to Carcinogenic Contaminants in Air

$$C(ug/m^3) = \frac{TR \cdot AT \cdot 365d/y \cdot 1000ug/mg}{EF_r \cdot InhF_{adj} \cdot CSF_i}$$

Equation 3-8: Inhalation Exposures to Carcinogenic Contaminants in Air

$$C(ug/m^3) = \frac{THQ \cdot RfD_i \cdot BW_a \cdot ED_r \cdot 365d/y \cdot 1000ug/mg}{EF_r \cdot ED_r \cdot IRA_a}$$

SOIL-TO-AIR VOLATILIZATION FACTOR (VF)

Equation 3-9: Derivation of the Volatilization Factor

$$VF(m^3/kg) = \frac{(LS \cdot V \cdot DH)}{A} \cdot \frac{(3.14 \cdot \alpha \cdot T)^{1/2}}{(2 \cdot D_{ei} \cdot P_a \cdot K_{as} 10^{-3} kg/g)}$$

where:

$$\alpha = \frac{D_{ei} \cdot P_a}{P_a + [(\rho_s)(1-P_a)/K_{as}]}$$

Parameter	Definition (units)	Default
VF	Volatilization factor (m^3/kg)	--
LS	Length of side of contaminated contaminated area (m)	45
V	Windspeed in mixing zone (m/s)	2.25
DH	Diffusion height (m)	2
A	Area of contamination (cm^2)	20,250,000
D_{ei}	Effective diffusivity (cm^2/s)	$D_i(P_a^{2.33}/P_t^2)$
P_a	Air filled soil porosity (unitless)	$P_t - \Theta B$
P_t	Total soil porosity (unitless)	$1-(B/\rho_s)$
Θ	Soil moisture content (cm^3-water/g-soil)	0.1
B	Soil bulk density (g/cm^3)	1.5
ρ_s	True soil density or particle density (g/cm^3)	2.65
K_{as}	Soil-air partition coefficient (g-soil/cm^3-air)	(H/K_d) x 41 (41 is a conversion factor)
T	Exposure interval (s)	7.9 x 10^8
D_i	Diffusivity in air (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)	K_{oc} x OC
K_{oc}	Organic carbon partition coefficient (cm^3/g)	Chemical-specific
OC	Organic carbon content of soil (fraction)	0.02

SOIL SATURATION CONCENTRATION (C_{sat})

Equation 3-10: Derivation of the Soil Saturation Limit

$$C_{sat} = \frac{S}{\beta}\left(K_d\beta + P_w + H'P_a\right)$$

Parameter	Definition (units)	Default
C_{sat}	Soil saturation concentration (mg/kg)	--
K_d	Soil-water partition coefficient (mg/kg-soil per mg/L-water)	Chemical-specific, or K_{oc} x OC
K_{oc}	Organic carbon partition coefficient (mg/kg-OC per mg/L-water)	Chemical-specific
OC	Organic carbon content of soil (kg-OC/kg-soil)	Site-specific or 0.02
S	Solubility in water (mg/L-water)	Chemical-specific
β	Soil dry bulk density (kg-soil/L-soil)	Site-specific or 1.5
P_w	Water filled soil porosity (unitless)	$P_t - P_a$
H'	Henry's Law constant (unitless)	H x 41, where 41 is a units conversion factor
H	Henry's Law constant (atm-m^3/mol)	Chemical-specific
P_a	Air-filled soil porosity (unitless)	$P_t - \Theta\beta$
Θ	Average unsaturated zone soil volumetric water content (L-water/L-soil)	$\Theta_m\beta/r_w$
Θ_m	Average unsaturated zone soil gravimetric water content (kg-water/kg-soil)	Site-specific or 0.1
r_w	Density of water (kg-water/L-water)	1 kg/L
P_t	Total soil porosity (unitless)	$1 - \beta/\rho_s$
ρ_s	True soil density or particle density (kg-soil/L-soil)	2.65 kg/L

ATTACHMENT A

PHYSICAL-CHEMICAL CONSTANTS USED IN CALCULATING SOIL PRGs FOR VOLATILE ORGANIC CHEMICALS

	MW (g/mol)	Henry's Law (atm-m^3/mol)	Diffusivity in Air (cm^2/s)	Koc (ml/g)	Water Solubility (mg/l)	References
Acetone	58	0.000021	0.100	2.2	1000000	1,2
Acrylonitrile	53	0.000088	0.110	0.9	79000	1,2
Ammonia	17	0.000320	0.280	3.1	530000	1,2
Benzene	78	0.005500	0.088	65.0	1800	1,2,3
Benzyl chloride	130	0.000051	0.067	80.0	3300	1,2
Bis(2-chloroethyl)ether	140	0.000290	0.070	14.0	10000	1,2,4
Bis(2-chloroisopropyl)ether	170	0.000110	0.063	61.0	1700	1,2
Bis(chloromethyl)ether	120	0.000200	0.089	1.2	22000	1,2
Bromodichloromethane	160	0.001600	0.080	100.0	4700	2,4
Bromoethene (Surrogate = Bromomethane)	108	0.006200	0.100	130.0	18000	2,4
Bromomethane	95	0.006200	0.100	130.0	18000	2,4
1,3-Butadiene	54	0.180000	0.098	120.0	740	1,2
Carbon disulfide	76	0.012000	0.110	54.0	2900	1,2
Carbon tetrachloride	150	0.024000	0.080	110.0	780	2,3
Chlorine dioxide						
Chloroacetaldehyde						
2-Chloroacetophenone (Surrogate = Chlorobenzene)	150	0.003500	0.072	160.0	470	2,3
Chlorobenzene	110	0.003500	0.072	160.0	470	2,3
2-Chloro-1,3-butadiene	88	0.032000	0.110	80.0	680	2,4
1-Chlorobutane (Surrogate = 2-Chloro-1,3-butadiene)	88	0.032000	0.110	80.0	680	2,4
Chlorodifluoromethane (Surrogate = Dichlorodifluoromethane)	120	0.100000	0.080	88.0	280	1,2,4
1-Chloroethyl vinyl ether						
Chloroform	120	0.003800	0.089	31.0	8200	1,2,4
Chloromethane	51	0.024000	0.110	35.0	6200	1,2,4
2-Chloropropane	78	0.002300	0.080	51.0	2700	1,2
o-Chlorotoluene	127	0.003500	0.072	160.0	470	2,3
Crotonaldehyde (Surrogate = Methyl methacrylate)	70	0.240000	0.091	840.0	20	1,2
Cumene (Surrogate = Ethylbenzene)	120	0.006400	0.075	220.0	150	2,3
1,2-Dibromoethane	190	0.000320	0.073	28.0	3400	2,3
1,2-Dichlorobenzene	150	0.001900	0.130	1100.0	100	2,3
1,3-Dichlorobenzene	150	0.001900	0.130	1200.0	120	2,3
1,4-Dichlorobenzene	150	0.001900	0.130	1200.0	79	2,3
1,4-Dichloro-2-butene (Surrogate = 2-Chloro-1,3-butadiene)	122	0.032000	0.110	80.0	680	1,2
Dichlorodifluoromethane	120	0.100000	0.080	88.0	280	1,2,4
1,1-Dichloroethane	99	0.004300	0.091	30.0	5500	2,3
1,2-Dichloroethane (EDC)	99	0.001200	0.091	14.0	8700	2,3
1,1-Dichloroethylene	97	0.150000	0.079	65.0	400	2,3
1,2-Dichloroethylene (trans)	97	0.009600	0.079	59.0	6300	2,3
1,2-Dichloroethylene (mixture)	97	0.009600	0.079	59.0	6300	2,3
1,2-Dichloropropane	110	0.003600	0.080	51.0	2700	1,2,4
1,3-Dichloropropane	110	0.001300	0.080	48.0	2800	1,2
1,3-Dichloropropene	110	0.001300	0.081	48.0	2800	1,2
Dicyclopentadiene						
Dimethylamine	45	0.000090	0.120	2.2	1000000	1,2
1,4-Dioxane	88	0.000011	0.085	3.5	430000	1,2
Epichlorohydrin	93	0.000032	0.088	3.5	60000	1,2
Ethyl acrylate (Surrogate = Methyl methacrylate)	100	0.240000	0.091	840.0	20	1,2
Ethylbenzene	110	0.007900	0.075	220.0	150	2,3
Ethylene oxide	44	0.000076	0.130	2.2	1000000	1,2
Ethyl chloride	65	0.011000	0.100	15.0	5700	2,3
Ethyl ether	74	0.000013	0.070	14.0	10000	1,2,4
Ethyl methacrylate (Surrogate = Methyl methacrylate)	120	0.240000	0.091	840.0	20	1,2
Hydrogen sulfide						
Methacrylonitrile (Surrogate = Acrylonitrile)	83	0.000088	0.110	0.9	78000	1,2
Methyl acetate (Surrogate = Acetone)	74	0.000021	0.100	2.2	1000000	1,2
Methyl acrylate (Surrogate = Methyl methacrylate)	100	0.240000	0.091	840.0	20	1,2
Methylene chloride	85	0.002600	0.100	8.8	13200	2,3
Methyl ethyl ketone	72	0.000027	0.080	4.5	270000	2,3
Methyl styrene (mixture) (Surrogate = Styrene)	119	0.002300	0.071	380.0	300	2,3
Methyl styrene (alpha) (Surrogate = Styrene)	119	0.002300	0.071	380.0	300	2,3
Nitrogen dioxide						
2-Nitropropane						
Polynuclear aromatic hydrocarbons						
Acenaphthene	150	0.001200	0.064	4600.0	4	2,3
Anthracene	180	0.000034	0.058	13000.0	0	2,3
Fluorene	170	0.000064	0.061	7600.0	2	2,3
Naphthalene	130	0.001300	0.059	1300.0	31	2,3
Phenanthrene	180	0.000040	0.058	14000.0	1	2,3
Propylene oxide	58					
Styrene	100	0.002300	0.071	380.0	300	2,3
1,1,1,2-Tetrachloroethane	170	0.000380	0.073	54.0	2900	1,2
1,1,2,2-Tetrachloroethane	170	0.000500	0.073	220.0	2900	2,3
Tetrachloroethylene (PCE)	170	0.023000	0.072	660.0	150	2,3
Tetrahydrofuran	72	0.000110	0.089			2,3
Toluene	92	0.006600	0.078	260.0	530	2,3
1,2,4-Trichlorobenzene	180	0.002300	0.062	6200.0	30	1,2
1,1,1-Trichloroethane	130	0.002600	0.080	160.0	950	2,3
1,1,2-Trichloroethane	130	0.001200	0.080	56.0	4500	2,3
Trichloroethylene (TCE)	130	0.009620	0.081	130.0	1000	2,3
Trichlorofluoromethane	137	0.087000	0.087	160.0	1100	1,2,4
1,1,2-Trichloropropane (Surrogate = 1,2-Dichloropropane)	147	0.003600	0.080	51.0	2700	1,2
1,2,3-Trichloropropane (Surrogate = 1,2-Dichloropropane)	147	0.003600	0.080	51.0	2700	1,2
1,2,3-Trichloropropene (Surrogate = 1,3-Dichloropropene)	145	0.001300	0.081	48.0	2800	1,2
1,1,2-Trichloro-1,2,2-trifluoroethane (S = Trichlorofluoromethane)	186	0.058000	0.087	160.0	1100	1,2,4
Triethylamine (Surrogate = Dimethylamine)	86	0.000090	0.120	2.2	1000000	1,2
Vinyl chloride	63	0.700000	0.110	57.0	1100	2,3
m-Xylene	110	0.006900	0.087	340.0	200	2,3
o-Xylene	110	0.004800	0.087	340.0	200	2,3
p-Xylene	110	0.007000	0.087	340.0	200	2,3
Xylene (mixed)	110	0.005300	0.087	340.0	200	2,3

Key: i=IRIS h=HEAST e=ECAO x=WITHDRAWN r=ROUTE EXTRAPOLATION ca=CANCER PRG nc=NONCANCER PRG sat=SOIL SATURATION max=CEILING LIMIT *nc= < 100X ca **=nc < 10X ca

TOXICITY VALUES								SOIL FACTORS			CONTAMINANT	PRELIMINARY REMEDIAL GOALS (PRGs)							
oSF 1/(mg/kg-d)		oRfD (mg/kg-d)		iSF 1/(mg/kg-d)		iRfD (mg/kg-d)		V O C	skin ABS	VF (m^3/kg)		Residential Soil (mg/kg)		Industrial Soil (mg/kg)		Ambient Air (ug/m^3)		Tap Water (ug/l)	
8.7E-03	i	4.0E-03	i	8.7E-03	r	4.0E-03	r	0	0.10		Acephate	5.1E+01	ca**	2.2E+02	ca	7.7E-01	ca*	7.7E+00	ca*
		2.6E-03	r			2.6E-03	i	0	0.10		Acetaldehyde	1.7E+02	nc	1.8E+03	nc	9.4E+00	nc	9.5E+01	nc
		2.0E-02	h			2.0E-02	r	0	0.10		Acetochlor	1.3E+03	nc	1.2E+04	nc	7.3E+01	nc	7.3E+02	nc
		1.0E-01	i			1.0E-01	r	1	0.10	2.7E+04	Acetone	2.6E+03	nc	1.1E+04	nc	3.7E+02	nc	6.1E+02	nc
		7.0E-02	h			2.9E-03	h	0	0.10		Acetone cyanohydrin	4.6E+03	nc	4.8E+04	nc	1.0E+01	nc	2.6E+03	nc
		6.0E-03	i			1.4E-02	h	0	0.10		Acetonitrile	3.9E+02	nc	4.1E+03	nc	5.2E+01	nc	2.2E+02	nc
		1.0E-01	i			5.7E-06	x	0	0.10		Acetophenone	5.6E+03	nc	4.5E+04	nc	2.1E-02	nc	3.7E+03	nc
		1.3E-02	i			1.3E-02	r	0	0.10		Acifluorfen	8.5E+02	nc*	8.9E+03	nc	4.7E+01	nc	4.7E+02	nc
		2.0E-02	h			5.7E-06	i	0	0.10		Acrolein	1.3E+03	nc	1.2E+04	nc	2.1E-02	nc	7.3E+02	nc
4.5E+00	i	2.0E-04	i	4.5E+00	i	2.0E-04	r	0	0.10		Acrylamide	9.8E-02	ca*	4.2E-01	ca	1.5E-03	ca	1.5E-02	ca
		5.0E-01	i			8.6E-04	i	0	0.10		Acrylic acid	3.2E+04	nc	3.4E+05	nc	3.1E+00	nc	1.8E+04	nc
5.4E-01	i	1.0E-03	h	2.4E-01	i	5.7E-04	i	1	0.10	7.8E+03	Acrylonitrile	1.7E-01	ca*	4.1E-01	ca*	2.8E-02	ca*	3.7E+00	ca*
8.1E-02	h	1.0E-02	i	8.0E-02	r	1.0E-02	r	0	0.10		Alachlor	8.5E+00	ca*	2.4E+01	ca	8.4E-02	ca	8.4E-01	ca
		1.5E-01	i			1.5E-01	r	0	0.10		Alar	9.8E+03	nc	1.0E+05	nc	5.5E+02	nc	5.5E+03	nc
		1.0E-03	i			1.0E-03	r	0	0.10		Aldicarb	6.5E+01	nc	6.8E+02	nc	3.7E+00	nc	3.7E+01	nc
		1.0E-03	i			1.0E-03	r	0	0.10		Aldicarb sulfone	6.5E+01	nc	6.8E+02	nc	3.7E+00	nc	3.7E+01	nc
1.7E+01	i	3.0E-05	i	1.7E+01	i	3.0E-05	r	0	0.10		Aldrin	2.6E-02	ca*	1.1E-01	ca	3.9E-04	ca	4.0E-03	ca
		2.5E-01	i			2.5E-01	r	0	0.10		Ally	1.6E+04	nc	1.0E+05	max	9.1E+02	nc	9.1E+03	nc
		5.0E-03	x			5.0E-03	r	0	0.10		Allyl alcohol	3.3E+02	nc	3.4E+03	nc	1.8E+01	nc	1.8E+02	nc
		5.0E-02	h			2.9E-04	i	0	0.10		Allyl chloride	3.3E+03	nc	3.4E+04	nc	1.0E+00	nc	1.8E+03	nc
		1.0E+00	e					0	0.01		Aluminum	7.7E+04	nc	1.0E+05	max			3.7E+04	nc
		4.0E-04	i					0	0.01		Aluminum phosphide	3.1E+01	nc	6.8E+02	nc			1.5E+01	nc
		3.0E-04	i			3.0E-04	r	0	0.10		Amdro	2.0E+01	nc	2.0E+02	nc	1.1E+00	nc	1.1E+01	nc
		9.0E-03	i			9.0E-03	r	0	0.10		Ametryn	5.9E+02	nc	6.1E+03	nc	3.3E+01	nc	3.3E+02	nc
		7.0E-02	h			7.0E-02	r	0	0.10		m-Aminophenol	4.6E+03	nc	4.8E+04	nc	2.6E+02	nc	2.6E+03	nc
		2.0E-05	h			2.0E-05	r	0	0.10		4-Aminopyridine	1.3E+00	nc	1.4E+01	nc	7.3E-02	nc	7.3E-01	nc
		2.5E-03	i			2.5E-03	r	0	0.10		Amitraz	1.6E+02	nc	1.7E+03	nc	9.1E+00	nc	9.1E+01	nc
						2.9E-02	i	0	0.10	[illegible]E+03	Ammonia					1.0E+02	nc		
		2.0E-01	i					0	0.10		Ammonium sulfamate	1.3E+04	nc	1.0E+05	max			7.3E+03	nc
5.7E-03	i	2.9E-04	r	5.7E-03	r	2.9E-04	i	0	0.10		Aniline	1.9E+01	nc	2.0E+02	nc	1.0E+00	nc	1.1E+01	nc
		4.0E-04	i					0	0.01		Antimony and compounds	3.1E+01	nc	6.8E+02	nc			1.5E+01	nc
		5.0E-04	h					0	0.01		Antimony pentoxide	3.8E+01	nc	8.5E+02	nc			1.8E+01	nc
		9.0E-04	h					0	0.01		Antimony potassium tartrate	6.9E+01	nc	1.5E+03	nc			3.3E+01	nc
		4.0E-04	h					0	0.01		Antimony tetroxide	3.1E+01	nc	6.8E+02	nc			1.5E+01	nc
		4.0E-04	h					0	0.01		Antimony trioxide	3.1E+01	nc	6.8E+02	nc			1.5E+01	nc
		1.3E-02	i			1.3E-02	r	0	0.10		Apollo	8.5E+02	nc	8.9E+03	nc	4.7E+01	nc	4.7E+02	nc
2.5E-02	i	6.0E-02	h	2.5E-02	i	6.0E-02	r	0	0.10		Aramite	1.8E+01	ca*	7.6E+01	ca	2.7E-01	ca	2.7E+00	ca
		3.0E-04	i					0	0.03		Arsenic (noncancer endpoint)	2.2E+01	nc						
1.8E+00	i	3.0E-04	i	1.5E+01	i			0	0.03		Arsenic (cancer endpoint)	3.2E-01	ca*	2.0E+00	ca	4.5E-04	ca	3.8E-02	ca
						1.4E-05	i	0	NA		Arsine					5.2E-02	nc		
		9.0E-03	i			9.0E-03	r	0	0.10		Assure	5.9E+02	nc	6.1E+03	nc	3.3E+01	nc	3.3E+02	nc
		5.0E-02	i			5.0E-02	r	0	0.10		Asulam	3.3E+03	nc	3.4E+04	nc	1.8E+02	nc	1.8E+03	nc
2.2E-01	h	3.5E-02	h	2.2E-01	r	3.5E-02	h	0	0.10		Atrazine	2.0E+00	ca	8.6E+00	ca	3.1E-02	ca	3.0E-01	ca
		4.0E-04	i			4.0E-04	r	0	0.10		Avermectin B1	2.6E+01	nc	2.7E+02	nc	1.5E+00	nc	1.5E+01	nc
1.1E-01	i			1.1E-01	i			0	0.10		Azobenzene	4.0E+00	ca	1.7E+01	ca	6.2E-02	ca	6.1E-01	ca
		7.0E-02	i			1.4E-04	h	0	0.01		Barium and compounds	5.3E+03	nc	1.0E+05	max	5.2E-01	nc	2.6E+03	nc
		4.0E-03	i			4.0E-03	r	0	0.10		Baygon	2.6E+02	nc	2.7E+03	nc	1.5E+01	nc	1.5E+02	nc
		3.0E-02	i			3.0E-02	r	0	0.10		Bayleton	2.0E+03	nc	2.0E+04	nc	1.1E+02	nc	1.1E+03	nc
		2.5E-02	i			2.5E-02	r	0	0.10		Baythroid	1.6E+03	nc	1.7E+04	nc	9.1E+01	nc	9.1E+02	nc
		3.0E-01	i			3.0E-01	r	0	0.10		Benefin	2.0E+04	nc	1.0E+05	max	1.1E+03	nc	1.1E+04	nc
		5.0E-02	i			5.0E-02	r	0	0.10		Benomyl	3.3E+03	nc	3.4E+04	nc	1.8E+02	nc	1.8E+03	nc
		2.5E-03	i			2.5E-03	r	0	0.10		Bentazon	1.6E+02	nc	1.7E+03	nc	9.1E+00	nc	9.1E+01	nc
		1.0E-01	i			1.0E-01	r	0	0.10		Benzaldehyde	6.5E+03	nc	6.8E+04	nc	3.7E+02	nc	3.7E+03	nc
2.9E-02	i			2.9E-02	i			1	0.10	9.6E+03	Benzene	1.9E+00	ca	4.4E+00	ca	2.3E-01	ca	3.9E-01	ca
2.3E+02	i	3.0E-03	i	2.3E+02	i	3.0E-03	r	0	0.10		Benzidine	1.9E-03	ca	8.3E-03	ca	2.9E-05	ca	2.9E-04	ca

Key: i=IRIS h=HEAST e=FECAO x=WITHDRAWN r=ROUTE EXTRAPOLATION ca=CANCER PRG nc=NONCANCER PRG sat=SOIL SATURATION max=CEILING LIMIT nc= < 100X ca **=nc < 10X ca

TOXICITY VALUES				SOIL FACTORS			CONTAMINANT	PRELIMINARY REMEDIAL GOALS (PRGs)							
oSF 1/(mg/kg-d)	oRfD (mg/kg-d)	iSF 1/(mg/kg-d)	iRfD (mg/kg-d)	V O C	skin ABS	Vf (m^3/kg)		Residential Soil (mg/kg)		Industrial Soil (mg/kg)		Ambient Air (ug/m^3)		Tap Water (ug/l)	
	4.0E+00 i		4.0E+00 i	0	0.10		Benzoic acid	1.0E+05	max	1.0E+05	max	1.8E+04	nc	1.5E+05	nc
1.3E+01 i		1.3E+01 r		0	0.10		Benzotrichloride	3.4E-02	ca	1.5E-01	ca	5.2E-04	ca	5.2E-03	ca
	3.0E-01 h		3.0E-01 r	0	0.10		Benzyl alcohol	2.0E+04	nc	1.0E+05	max	1.1E+03	nc	1.1E+04	nc
1.7E-01 i		1.7E-01 r		1	0.10	1.0E+05	Benzyl chloride	1.6E+00	ca	4.8E+00	ca	4.0E-02	ca	6.6E-02	ca
4.3E+00 i	5.0E-03 i	8.4E+00 i		0	0.01		Beryllium and compounds	1.4E-01	ca	1.1E+00	ca	8.0E-04	ca	1.6E-02	ca
	1.0E-04 i		1.0E-04 r	0	0.10		Bidrin	6.5E+00	nc	6.8E+01	nc	3.7E-01	nc	3.7E+00	nc
	1.5E-02 i		1.5E-02 r	0	0.10		Biphenthrin (Talstar)	9.8E+02	nc	1.0E+04	nc	5.5E+01	nc	5.5E+02	nc
	5.0E-02 i		5.0E-02 r	0	0.10		1,1-Biphenyl	3.3E+03	nc	3.4E+04	nc	1.8E+02	nc	1.8E+03	nc
1.1E+00 i		1.2E+00 i		1	0.10	2.2E+04	Bis(2-chloroethyl)ether	9.7E-02	ca	2.4E-01	ca	5.8E-03	ca	9.8E-03	ca
7.0E-02 h	4.0E-02 i	3.5E-02 h	4.0E-02 r	1	0.10	7.7E+04	Bis(2-chloroisopropyl)ether	4.4E+00	ca	1.5E+01	ca	1.9E-01	ca	2.7E-01	ca
2.2E+02 i		2.2E+02 i		1	0.10	6.7E+03	Bis(chloromethyl)ether	1.9E-04	ca	4.2E-04	ca	3.1E-05	ca	5.2E-05	ca
7.0E-02 x		7.0E-02 x		0	0.10		Bis(2-chloro-1-methylethyl)ether	6.3E+00	ca	2.7E+01	ca	9.6E-02	ca	9.6E-01	ca
1.4E-02 i	2.0E-02 i	1.4E-02 r	2.2E-02 r	0	0.10		Bis(2-ethylhexyl)phthalate (DERP)	3.2E+01	ca*	1.4E+02	ca	4.8E-01	ca	4.8E+00	ca
	5.0E-02 i		5.0E-02 r	0	0.10		Bisphenol A	3.3E+03	nc	3.4E+04	nc	1.8E+02	nc	1.8E+03	nc
	9.0E-02 i		5.7E-03 h	0	0.10		Boron	5.9E+03	nc	6.1E+04	nc	2.1E+01	nc	3.3E+03	nc
			2.0E-04 h	0	0.10		Boron trifluoride					7.3E-01	nc		
6.2E-02 i	2.0E-02 i	6.2E-02 r	2.0E-02 r	1	0.10	2.3E+04	Bromodichloromethane	1.9E+00	ca	4.6E+00	ca	1.1E-01	ca	1.8E-01	ca
1.1E-01 r	8.6E-04 r	1.1E-01 h	8.6E-04 i	1	0.10	1.2E+04	Bromoethene (vinyl bromide)	6.1E-01	ca*	1.4E+00	ca*	6.1E-02	ca*	1.0E-01	ca*
7.9E-03 i	2.0E-02 i	3.9E-03 i	2.0E-02 r	0	0.10		Bromoform (tribromomethane)	5.6E+01	ca**	2.4E+02	ca*	1.7E+00	ca*	8.5E+00	ca*
	1.4E-03 i		1.4E-03 i	1	0.10	1.2E+04	Bromomethane	2.0E+01	nc	7.9E+01	nc	5.2E+00	nc	8.7E+00	nc
				0	0.10		4-Bromophenyl phenyl ether								
	5.0E-03 h		5.0E-03 r	0	0.10		Bromophos	3.3E+02	nc	3.4E+03	nc	1.8E+01	nc	1.8E+02	nc
	2.0E-02 i		2.0E-02 r	0	0.10		Bromoxynil	1.3E+03	nc	1.4E+04	nc	7.3E+01	nc	1.8E+02	nc
	2.0E-02 i		2.0E-02 r	0	0.10		Bromoxynil octanoate	1.3E+03	nc	1.4E+04	nc	7.3E+01	nc	7.3E+02	nc
9.8E-01 r		9.8E-01 i		1	0.10	1.8E+03	1,3-Butadiene					6.9E-03	ca	1.1E-02	ca
	1.0E-01 i		1.0E-01 r	0	0.10		1-Butanol	6.5E+03	nc	6.8E+04	nc	3.7E+02	nc	3.7E+03	nc
	5.0E-02 i		5.0E-02 r	0	0.10		Butylate	3.3E+03	nc	3.4E+04	nc	1.8E+02	nc	1.8E+03	nc
	2.0E-01 i		2.0E-01 r	0	0.10		Butyl benzyl phthalate	1.3E+04	nc	1.0E+05	max	7.3E+02	nc	7.3E+03	nc
	1.0E+00 i		1.0E+00 r	0	0.10		Butylphthalyl butylglycolate	6.5E+04	nc	1.0E+05	max	3.7E+03	nc	3.7E+04	nc
	3.0E-03 h		3.0E-03 r	0	0.10		Cacodylic acid	2.0E+02	nc	2.0E+03	nc	1.1E+01	nc	1.1E+02	nc
	5.0E-04 i	6.3E+00 i		0	0.01		Cadmium and compounds	3.8E+01	nc	8.5E+02	nc	1.1E-03	ca	1.8E+01	nc
							"CAL-Modified PRG" (PEA, 1994)	9.0E+00							
	5.0E-01 i		5.0E-01 r	0	0.10		Caprolactam	3.3E+04	nc	1.0E+05	max	1.8E+03	nc	1.8E+04	nc
8.6E-03 h	2.0E-03 i	8.6E-03 r	2.0E-03 r	0	0.10		Captafol	5.2E+01	nc	2.2E+02	ca*	7.8E-01	ca*	7.8E+00	ca*
3.5E-03 h	1.3E-01 i	3.5E-03 r	1.3E-01 r	0	0.10		Captan	1.3E+02	ca*	5.5E+02	ca	1.9E+00	ca	1.9E+01	ca
	1.0E-01 i		1.1E-01 r	0	0.10		Carbaryl	6.5E+03	nc	6.8E+04	nc	4.0E+02	nc	3.7E+03	nc
2.0E-02 h		2.0E-02 r		0	0.10		Carbazole	2.2E+01	ca	9.5E+01	ca	3.4E-01	ca	3.4E+00	ca
	5.0E-03 i		5.0E-03 r	0	0.10		Carbofuran	3.3E+02	nc	3.4E+03	nc	1.8E+01	nc	1.8E+02	nc
	1.0E-01 i		2.0E-03 h	1	0.10	5.1E+03	Carbon disulfide	2.3E+01	nc	7.4E+01	nc	1.0E+01	nc	2.1E+01	nc
1.3E-01 i	7.0E-04 i	5.3E-02 i	5.7E-04 e	1	0.10	6.1E+03	Carbon tetrachloride	6.4E-01	ca*	1.5E+00	ca*	1.3E-01	ca*	1.7E-01	ca*
	1.0E-02 i		1.0E-02 r	0	0.10		Carbosulfan	6.5E+02	nc	6.8E+03	nc	3.7E+01	nc	3.7E+02	nc
	1.0E-01 i		1.0E-01 r	0	0.10		Carboxin	6.5E+03	nc	6.8E+04	nc	3.7E+02	nc	3.7E+03	nc
	2.0E-03 i		2.0E-03 r	0	0.10		Chloral	1.3E+02	nc	1.4E+03	nc	7.3E+00	nc	7.3E+01	nc
	1.5E-02 i		1.5E-02 r	0	0.10		Chloramben	9.8E+02	nc	1.0E+04	nc	5.5E+01	nc	5.5E+02	nc
4.0E-01 h		4.0E-01 r		0	0.10		Chloranil	1.1E+00	ca	4.7E+00	ca	1.7E-02	ca	1.7E-01	ca
1.3E+00 i	6.0E-05 i	1.3E+00 i	6.0E-05 r	0	0.10		Chlordane	3.4E-01	ca**	1.5E+00	ca*	5.2E-03	ca*	5.2E-02	ca*
	2.0E-02 i		2.0E-02 r	0	0.10		Chlorimuron-ethyl	1.3E+03	nc	1.4E+04	nc	7.3E+01	nc	7.3E+02	nc
	1.0E-01 i			0	0.01		Chlorine	7.7E+03	nc	1.7E+05	nc			3.7E+03	nc
			5.7E-05 i	1	0.10		Chlorine dioxide					2.1E-01	nc		
				1	0.10		Chloroacetaldehyde								
	2.0E-03 h		2.0E-03 r	0	0.10		Chloroacetic acid	1.3E+02	nc	1.4E+03	nc	7.3E+00	nc	7.3E+01	nc
	8.6E-06 r		8.6E-06 i	1	0.10	9.2E+03	2-Chloroacetophenone	1.0E-01	nc	3.8E-01	nc	3.1E-02	nc	5.2E-02	nc
	4.0E-03 i		4.0E-03 r	0	0.10		4-Chloroaniline	2.6E+02	nc	2.7E+03	nc	1.5E+01	nc	1.5E+02	nc
	2.0E-02 i		5.7E-03 h	1	0.10	2.9E+04	Chlorobenzene	2.2E+02	nc	8.1E+02	nc	2.1E+01	nc	3.9E+01	nc
2.7E-01 h	2.0E-02 i	2.7E-01 h	2.0E-02 r	0	0.10		Chlorobenzilate	1.6E+00	ca	7.1E+00	ca	2.5E-02	ca	2.5E-01	ca
	2.0E-01 h		2.0E-01 r	0	0.10		p-Chlorobenzoic acid	1.3E+04	nc	1.0E+05	max	7.3E+02	nc	7.3E+03	nc

Key: F=IRIS h=HEAST e=ECAO x=WITHDRAWN r=ROUTE EXTRAPOLATION ca=CANCER PRG nc=NONCANCER PRG sat=SOIL SATURATION max=CEILING LIMIT *nc= < 100X ca **=nc < 10X ca

TOXICITY VALUES								SOIL FACTORS				CONTAMINANT	PRELIMINARY REMEDIAL GOALS (PRGs)							
OSF 1/(mg/kg-d)		ORfD (mg/kg-d)		ISF 1/(mg/kg-d)		IRfD (mg/kg-d)		V O C	skin ABS	VF (m^3/kg)			Residential Soil (mg/kg)		Industrial Soil (mg/kg)		Ambient Air (ug/m^3)		Tap Water (ug/l)	
		2.0E-02	h			2.0E-02	r	0	0.10			4-Chlorobenzotrifluoride	1.3E+03	nc	1.4E+04	nc	7.3E+01	nc	7.3E+02	nc
		2.0E-02	h			2.0E-03	h	1	0.10	2.9E+03		2-Chloro-1,3-butadiene	9.0E+00	nc	2.9E+01	nc	7.3E+00	nc	1.4E+01	nc
		4.0E-01	h			4.0E-01	r	1	0.10	2.9E+03		1-Chlorobutane	8.1E+02	sat	8.1E+02	sat	1.5E+03	nc	2.4E+03	nc
								1	0.10			2-Chloroethyl vinyl ether								
		1.4E+01	r			1.4E+01	r	1	0.10	1.8E+03		Chlorodifluoromethane	3.5E+02	sat	3.5E+02	sat	5.1E+04	nc	8.5E+04	nc
6.1E-03	r	1.0E-02	r	6.1E-02	r	1.0E-02	r	1	0.10	9.1E+03		Chloroform	7.5E-01	ca	1.6E+00	ca	8.4E-02	ca	1.6E-01	ca
1.3E-02	h			6.3E-03	h			1	0.10	2.8E+03		Chloromethane	2.7E+00	ca	6.1E+00	ca	1.1E+00	ca	1.5E+00	ca
5.8E-01	h			5.8E-01	r			0	0.10			4-Chloro-2-methylaniline	7.7E-01	ca	3.3E+00	ca	1.2E-02	ca	1.2E-01	ca
4.6E-01	h			4.6E-01	r			0	0.10			4-Chloro-2,2-methylaniline hydrochloride	9.7E-01	ca	4.1E+00	ca	1.5E-02	ca	1.5E-01	ca
		8.0E-02	r			8.0E-02	r	0	0.10			beta-Chloronaphthalene	5.2E+03	nc	5.5E+04	nc	2.9E+02	nc	2.9E+03	nc
2.5E-02	h			2.5E-02	r		r	0	0.10			o-Chloronitrobenzene	1.8E+01	ca	7.6E+01	ca	2.7E-01	ca	2.7E+00	ca
1.8E-02	h			1.8E-02	r		r	0	0.10			p-Chloronitrobenzene	2.5E+01	ca	1.1E+02	ca	3.7E-01	ca	3.7E+00	ca
		5.0E-03	r			5.0E-03	r	0	0.10			2-Chlorophenol	3.3E+02	nc	3.4E+03	nc	1.8E+01	nc	1.8E+02	nc
		2.9E-02	r			2.9E-02	h	1	0.10	1.4E+04		2-Chloropropane	4.7E+02	nc	1.8E+03	nc	1.0E+02	nc	1.7E+02	nc
1.1E-02	h	1.5E-02	r	1.1E-02	r	1.5E-02	r	0	0.10			Chlorothalonil	4.0E+01	ca**	1.7E+02	ca*	6.1E-01	ca*	6.1E+00	ca*
		2.0E-02	r			2.0E-02	r	1	0.10	2.1E+04		o-Chlorotoluene	4.4E+02	nc	1.6E+03	sat	7.3E+01	nc	1.2E+02	nc
		2.0E-01	r			2.0E-01	r	0	0.10			Chlorpropham	1.3E+04	nc	1.0E+05	max	7.3E+02	nc	7.3E+03	nc
		3.0E-03	r			3.0E-03	r	0	0.10			Chlorpyrifos	2.0E+02	nc	2.0E+03	nc	1.1E+01	nc	1.1E+02	nc
		1.0E-02	h			1.0E-02	r	0	0.10			Chlorpyrifos-methyl	6.5E+02	nc	6.8E+03	nc	3.7E+01	nc	3.7E+02	nc
		5.0E-02	r			5.0E-02	r	0	0.10			Chlorsulfuron	3.3E+03	nc	3.4E+04	nc	1.8E+02	nc	1.8E+03	nc
		8.0E-04	h			8.0E-04	r	0	0.10			Chlorthiophos	5.2E+01	nc	5.5E+02	nc	2.9E+00	nc	2.9E+01	nc
		1.0E+00	r					0	0.01			Chromium III and compounds								
		5.0E-03	r	4.2E+01	r			0	0.01			Chromium VI and compounds	3.8E+02	nc	1.6E+03	ca	1.8E-04	ca	1.8E+02	nc
												"CAL-Modified PRG" (PEA, 1994)	2.0E-01				1.3E-05		1.6E-01	
						2.9E-04	e	0	0.01			Cobalt					1.0E+00	nc		
				2.2E+00	r			0	0.01			Coke Oven Emissions					3.1E-03	ca		
		3.7E-02	h					0	0.01			Copper and compounds	2.8E+03	nc	6.3E+04	nc			1.4E+03	nc
1.9E+00	h	1.0E-02	x	1.9E+00	x	1.0E-02	r	1	0.10	4.9E+03		Crotonaldehyde	1.6E-02	ca	3.6E-02	ca	3.5E-03	ca	5.9E-03	ca
		4.0E-02	r			2.6E-03	h	1	0.10	1.8E+04		Cumene	7.0E+01	nc	2.3E+02	nc	9.4E+00	nc	1.9E+01	nc
8.4E-01	h	2.0E-03	h	8.4E-01	r	2.0E-03	r	0	0.10			Cyanazine	1.3E+02	ca*	2.3E+00	ca	8.0E-03	ca	8.0E-02	ca
									0.01			Cyanides								
		1.0E-01	h					0	0.01			Barium cyanide	7.7E+03	nc	1.0E+05	max			3.7E+03	nc
		5.0E-03	r					0	0.01			Copper cyanide	3.8E+02	nc	8.5E+03	nc			1.8E+02	nc
		4.0E-02	r					0	0.01			Calcium cyanide	3.1E+03	nc	6.8E+04	nc			1.5E+03	nc
		4.0E-02	r					0	0.10			Cyanogen	2.6E+03	nc	2.7E+04	nc			1.5E+03	nc
		9.0E-02	r					0	0.10			Cyanogen bromide	5.9E+03	nc	1.0E+05	max			3.3E+03	nc
		5.0E-02	r					0	0.10			Cyanogen chloride	3.3E+03	nc	3.4E+04	nc			1.8E+03	nc
		2.0E-02	r					0	0.10			Free cyanide	1.3E+03	nc	1.4E+04	nc			7.3E+02	nc
		2.0E-02	r					0	0.10			Hydrogen cyanide	1.3E+03	nc	1.4E+04	nc			7.3E+02	nc
		5.0E-02	r					0	0.10			Potassium cyanide	3.3E+03	nc	3.4E+04	nc			1.8E+03	nc
		2.0E-01	r					0	0.10			Potassium silver cyanide	1.3E+04	nc	1.0E+05	max			7.3E+03	nc
		1.0E-01	r					0	0.10			Silver cyanide	6.5E+03	nc	1.0E+05	max			3.7E+03	nc
		4.0E-02	r					0	0.10			Sodium cyanide	2.6E+03	nc	2.7E+04	nc			1.5E+03	nc
		5.0E-02	r					0	0.10			Zinc cyanide	3.3E+03	nc	3.4E+04	nc			1.8E+03	nc
		5.0E+00	r			5.0E+00	r	0	0.10			Cyclohexanone	1.0E+05	max	1.0E+05	max	1.8E+04	nc	1.8E+05	nc
		2.0E-01	r			2.0E-01	r	0	0.10			Cyclohexlamine	1.3E+04	nc	1.0E+05	max	7.3E+02	nc	7.3E+03	nc
		5.0E-03	r			5.0E-03	r	0	0.10			Cyhalothrin/Karate	3.3E+02	nc	3.4E+03	nc	1.8E+01	nc	1.8E+02	nc
		1.0E-02	r			1.0E-02	r	0	0.10			Cypermethrin	6.5E+02	nc	6.8E+03	nc	3.7E+01	nc	3.7E+02	nc
		7.5E-03	r			7.5E-03	r	0	0.10			Cyromazine	4.9E+02	nc	5.1E+03	nc	2.7E+01	nc	2.7E+02	nc
		5.0E-01	r			5.0E-01	r	0	0.10			Dacthal	3.3E+04	nc	1.0E+05	max	1.8E+03	nc	1.8E+04	nc
		3.0E-02	r			3.0E-02	r	0	0.10			Dalapon	2.0E+03	nc	2.0E+04	nc	1.1E+02	nc	1.1E+03	nc
		5.0E-04	x			5.0E-04	r	0	0.10			Danitol	3.3E+01	nc	3.4E+02	nc	1.8E+00	nc	1.8E+01	nc
2.4E-01	r			2.4E-01	r			0	0.10			DDD	1.9E+00	ca	7.9E+00	ca	2.8E-02	ca	2.8E-01	ca
3.4E-01	r			3.4E-01	r			0	0.10			DDE	1.3E+00	ca	5.6E+00	ca	2.0E-02	ca	2.0E-01	ca
3.4E-01	r	5.0E-04	r	3.4E-01	r	5.0E-04	r	0	0.10			DDT	1.3E+00	ca**	5.6E+00	ca*	2.0E-02	ca*	2.0E-01	ca*
		1.0E-02	r			1.0E-02	r	0	0.10			Decabromodiphenyl ether	6.5E+02	nc	6.8E+03	nc	3.7E+01	nc	3.7E+02	nc

Key: i=IRIS h=HEAST e=ECAO x=WITHDRAWN r=ROUTE EXTRAPOLATION ca=CANCER PRG nc=NONCANCER PRG sat=SOIL SATURATION max=CEILING LIMIT *nc= < 100X ca **=nc < 10X ca

TOXICITY VALUES								SOIL FACTORS		CONTAMINANT	PRELIMINARY REMEDIAL GOALS (PRGs)							
oSF 1/(mg/kg-d)		oRfD (mg/kg-d)		iSF 1/(mg/kg-d)		iRfD (mg/kg-d)		V O C	skin ABS	VF (m^3/kg)		Residential Soil (mg/kg)		Industrial Soil (mg/kg)		Ambient Air (ug/m^3)		Tap Water (ug/l)	
		4.0E-05	i			4.0E-05	r	0	0.10		Demeton	2.6E+00	nc	2.7E+01	nc	1.8E-01	nc	1.5E+00	nc
6.1E-02	h			6.1E-02	r			0	0.10		Diallate	7.3E+00	ca	3.1E+01	ca	1.1E-01	ca	1.1E+00	ca
		9.0E-04	h			9.0E-04	r	0	0.10		Diazinon	5.9E+01	nc	6.1E+02	nc	3.3E+00	nc	3.3E+01	nc
		1.0E-02	i			1.0E-02	r	0	0.10		1,4-Dibromobenzene	6.5E+02	nc	6.8E+03	nc	3.7E+01	nc	3.7E+02	nc
8.4E-02	i	2.0E-02	i	8.4E-02	r	2.0E-02	r	0	0.10		Dibromochloromethane	5.3E+00	ca**	2.3E+01	ca	8.0E-02	ca	1.0E+00	ca
1.4E+00	h	5.7E-05	r	2.4E-03	h	5.7E-05	i	0	0.10		1,2-Dibromo-3-chloropropane	3.2E-01	ca**	1.4E+00	ca*	2.1E-01	nc	4.8E-02	ca*
											"CAL-Modified PRG" (PEA, 1994)	6.0E-02				9.6E-04		4.7E-03	
8.5E+01	i	5.7E-05	r	7.7E-01	i	5.7E-05	h	1	0.10	2.9E+04	1,2-Dibromoethane	5.1E-03	ca**	2.2E-02	ca	8.7E-03	ca*	7.6E-04	ca
		1.0E-01	i			1.0E-01	r	0	0.10		Dibutyl phthalate	6.5E+03	nc	6.8E+04	nc	3.7E+02	nc	3.7E+03	nc
		3.0E-02	i			3.0E-02	r	0	0.10		Dicamba	2.0E+03	nc	2.0E+04	nc	1.1E+02	nc	1.1E+03	nc
		9.0E-02	i			5.7E-02	x	1	0.10	5.7E+04	1,2-Dichlorobenzene	2.3E+03	sat	2.3E+03	sat	2.1E+02	nc	3.7E+02	nc
								1	0.10	5.7E+04	1,3-Dichlorobenzene	2.8E+03	sat	2.8E+03	sat				
2.4E-02	h	2.3E-01	r	2.4E-02	r	2.3E-01	i	1	0.10	6.3E+04	1,4-Dichlorobenzene	9.0E+00	ca	2.5E+01	ca	2.8E-01	ca	4.7E-01	ca
4.5E-01	i			4.5E-01	r			0	0.10		3,3-Dichlorobenzidine	9.9E-01	ca	4.2E+00	ca	1.5E-02	ca	1.5E-01	ca
9.3E+00	r			9.3E+00	h			1	0.10	1.8E+04	1,4-Dichloro-2-butene	1.0E-02	ca	2.4E-02	ca	7.2E-04	ca	1.2E-03	ca
		2.0E-01	i			5.7E-02	h	1	0.10	1.8E+03	Dichlorodifluoromethane	1.6E+02	nc	3.5E+02	sat	2.1E+02	nc	3.9E+02	nc
		1.0E-01	h			1.4E-01	h	1	0.10	6.2E+03	1,1-Dichloroethane	1.1E+03	nc	3.9E+03	sat	5.2E+02	nc	8.1E+02	nc
9.1E-02	i			9.1E-02	i			1	0.10	9.3E+03	1,2-Dichloroethane (EDC)	6.1E-01	ca	1.4E+00	ca	7.4E-02	ca	1.2E-01	ca
6.0E-01	i	9.0E-03	i	1.8E-01	i	9.0E-03	r	1	0.10	1.5E+03	1,1-Dichloroethylene	5.2E-02	ca	1.2E-01	ca	3.8E-02	ca	4.6E-02	ca
		1.0E-02	h			1.0E-02	r	1	0.10	5.9E+03	1,2-Dichloroethylene (cis)	8.1E+01	nc	2.9E+02	nc	3.7E+01	nc	6.1E+01	nc
		2.0E-02	i			2.0E-02	r	1	0.10	8.7E+03	1,2-Dichloroethylene (trans)	2.3E+02	nc	8.4E+02	nc	7.3E+01	nc	1.2E+02	nc
		9.0E-03	h			9.0E-03	r	1	0.10	8.8E+03	1,2-Dichloroethylene (mixture)	1.0E+02	nc	3.8E+02	nc	3.3E+01	nc	5.5E+01	nc
		3.0E-03	i			3.0E-03	r	0	0.10		2,4-Dichlorophenol	2.0E+02	nc	2.0E+03	nc	1.1E+01	nc	1.1E+02	nc
		8.0E-03	i			8.0E-03	r	0	0.10		4-(2,4-Dichlorophenoxy)butyric Acid (2,4-DB)	5.2E+02	nc	5.5E+03	nc	2.9E+01	nc	2.9E+02	nc
		1.0E-02	i			1.0E-02	r	0	0.10		2,4-Dichlorophenoxyacetic Acid (2,4-D)	6.5E+02	nc	6.8E+03	nc	3.7E+01	nc	3.7E+02	nc
6.8E-02	h	1.1E-03	r	6.8E-02	r	1.1E-03	i	1	0.10	1.1E+04	1,2-Dichloropropane	9.3E-01	ca*	2.1E+00	ca*	9.9E-02	ca*	1.6E-01	ca*
1.8E-01	h	3.0E-04	i	1.3E-01	h	5.7E-03	i	1	0.10	1.8E+04	1,3-Dichloropropene	6.7E-01	ca	1.6E+00	ca	5.2E-02	ca	8.1E-02	ca
		3.0E-03	i			3.0E-03	r	0	0.10		2,3-Dichloropropanol	2.0E+02	nc	2.0E+03	nc	1.1E+01	nc	1.1E+02	nc
2.9E-01	i	5.0E-04	i	2.9E-01	r	1.4E-04	i	0	0.10		Dichlorvos	1.5E+00	ca**	6.6E+00	ca*	2.3E-02	ca*	2.3E-01	ca*
4.4E-01	x			4.4E-01	r			0	0.10		Dicofol	1.0E+00	ca	4.3E+00	ca	1.5E-02	ca	1.5E-01	ca
		3.0E-02	h			5.7E-05	h	0	0.10		Dicyclopentadiene					2.1E-01	nc	4.2E-01	nc
1.6E+01	i	5.0E-05	i	1.6E+01	i	5.0E-05	r	0	0.10		Dieldrin	2.8E-02	ca*	1.2E-01	ca	4.2E-04	ca	4.2E-03	ca
		5.7E-03	h			5.7E-03	x	0	0.10		Diethylene glycol, monobutyl ether	3.7E+02	nc	3.9E+03	nc	2.1E+01	nc	2.1E+02	nc
		2.0E+00	h			2.0E+00	r	0	0.10		Diethylene glycol, monoethyl ether	1.0E+05	max	1.0E+05	max	7.3E+03	nc	7.3E+04	nc
		1.1E-02	h			1.1E-02	r	0	0.10		Diethylforamide	7.2E+02	nc	7.5E+03	nc	4.0E+01	nc	4.0E+02	nc
1.2E-03	i	6.0E-01	i	1.2E-03	i	6.0E-01	r	0	0.10		Di(2-ethylhexyl)adipate	3.7E+02	nc	1.6E+03	nc	5.6E+00	nc	5.6E+01	nc
		8.0E-01	i			8.0E-01	r	0	0.10		Diethyl phthalate	5.2E+04	nc	1.0E+05	max	2.9E+03	nc	2.9E+04	nc
4.7E+03	h			4.7E+03	r			0	0.10		Diethylstilbestrol	9.5E-05	ca	4.1E-04	ca	1.4E-06	ca	1.4E-05	ca
		8.0E-02	i			8.0E-02	r	0	0.10		Difenzoquat (Avenge)	5.2E+03	nc	5.5E+04	nc	2.9E+02	nc	2.9E+03	nc
		2.0E-02	i			2.0E-02	r	0	0.10		Diflubenzuron	1.3E+03	nc	1.4E+04	nc	7.3E+01	nc	7.3E+02	nc
		8.0E-02	i			8.0E-02	r	0	0.10		Diisopropyl methylphosphonate	5.2E+03	nc	5.5E+04	nc	2.9E+02	nc	2.9E+03	nc
		2.0E-02	i			2.0E-02	r	0	0.10		Dimethipin	1.3E+03	nc	1.4E+04	nc	7.3E+01	nc	7.3E+02	nc
		2.0E-04	i			2.0E-04	r	0	0.10		Dimethoate	1.3E+01	nc	1.4E+02	nc	7.3E-01	nc	7.3E+00	nc
1.4E-02	h			1.4E-02	r			0	0.10		3,3'-Dimethoxybenzidine	3.2E+01	ca	1.4E+02	ca	4.8E-01	ca	4.8E+00	ca
		5.7E-06	r			5.7E-06	x	1	0.10	1.2E+04	Dimethylamine	8.3E-02	nc	3.2E-01	nc	2.1E-02	nc	3.5E-02	nc
		2.0E-03	i			2.0E-03	r	0	0.10		N-N-Dimethylaniline	1.3E+02	nc	1.4E+03	nc	7.3E+00	nc	7.3E+01	nc
7.5E-01	h			7.5E-01	r			0	0.10		2,4-Dimethylaniline	5.9E-01	ca	2.5E+00	ca	9.0E-03	ca	9.0E-02	ca
5.8E-01	h			5.8E-01	r			0	0.10		2,4-Dimethylaniline hydrochloride	7.7E-01	ca	3.3E+00	ca	1.2E-02	ca	1.2E-01	ca
9.2E+00	h			9.2E+00	r			0	0.10		3,3'-Dimethylbenzidine	4.8E-02	ca	2.1E-01	ca	7.3E-04	ca	7.3E-03	ca
2.6E+00	x			3.5E+00	x			0	0.10		1,1-Dimethylhydrazine	1.7E-01	ca	7.3E-01	ca	1.9E-03	ca	2.6E-02	ca
3.7E+01	x			3.7E+01	x			0	0.10		1,2-Dimethylhydrazine	1.2E-02	ca	5.2E-02	ca	1.8E-04	ca	1.8E-03	ca
		1.0E-01	h			8.8E-03	i	0	0.10		N,N-Dimethylformamide	6.5E+03	nc	6.8E+04	nc	3.1E+01	nc	3.7E+03	nc
		2.0E-02	i			2.0E-02	r	0	0.10		2,4-Dimethylphenol	1.3E+03	nc	1.4E+04	nc	7.3E+01	nc	7.3E+02	nc
		6.0E-04	i			6.0E-04	r	0	0.10		2,6-Dimethylphenol	3.9E+01	nc	4.1E+02	nc	2.2E+00	nc	2.2E+01	nc
		1.0E-03	i			1.0E-03	r	0	0.10		3,4-Dimethylphenol	6.5E+01	nc	6.8E+02	nc	3.7E+00	nc	3.7E+01	nc
		1.0E+01	h			1.0E+01	r	0	0.10		Dimethyl phthalate	1.0E+05	max	1.0E+05	max	3.7E+04	nc	3.7E+05	nc

Key: F=IRIS h=HEAST e=ECAO x=WITHDRAWN r=ROUTE EXTRAPOLATION ca=CANCER PRG nc=NONCANCER PRG sat=SOIL SATURATION max=CEILING LIMIT *nc= < 100X ca **=nc < 10X ca

TOXICITY VALUES						SOIL FACTORS			CONTAMINANT	PRELIMINARY REMEDIAL GOALS (PRGs)							
OSF 1/(mg/kg-d)		RfD (mg/kg-d)		ISF 1/(mg/kg-d)		IRfD (mg/kg-d)		V O C	skin ABS	VF (m^3/kg)		Residential Soil (mg/kg)		Industrial Soil (mg/kg)		Ambient Air (ug/m^3)		Tap Water (ug/l)	
		1.0E-01	h			1.0E-01	r	0	0.10		Dimethyl terephthalate	6.5E+03	nc	6.8E+04	nc	3.7E+02	nc	3.7E+03	nc
		2.0E-03	h			2.0E-03	r	0	0.10		4,6-Dinitro-o-cyclohexyl phenol	1.3E+02	nc	1.4E+03	nc	7.3E+00	nc	7.3E+01	nc
		1.0E-04	h			1.0E-04	r	0	0.10		1,3-Dinitrobenzene	6.5E+00	nc	6.8E+01	nc	3.7E-01	nc	3.7E+00	nc
		4.0E-04	h			4.0E-04	r	0	0.10		1,2-Dinitrobenzene	2.6E+01	nc	2.7E+02	nc	1.5E+00	nc	1.5E+01	nc
		4.0E-04	h			4.0E-04	r	0	0.10		1,4-Dinitrobenzene	2.6E+01	nc	2.7E+02	nc	1.5E+00	nc	1.5E+01	nc
		2.0E-03	h			2.0E-03	r	0	0.10		2,4-Dinitrophenol	1.3E+02	nc	1.4E+03	nc	7.3E+00	nc	7.3E+01	nc
6.8E-01	h			6.8E-01	r			0	0.10		Dinitrotoluene mixture	6.5E-01	ca	6.8E+00	ca	9.9E-03	ca	9.9E-02	ca
		2.0E-03	h			2.0E-03	r	0	0.10		2,4-Dinitrotoluene	1.3E+02	nc	1.4E+03	nc	7.3E+00	nc	7.3E+01	nc
		1.0E-03	h			1.0E-03	r	0	0.10		2,6-Dinitrotoluene	6.5E+01	ca*	6.8E+02	ca	3.7E+00	ca	3.7E+01	ca
		1.0E-03	h			1.0E-03	r	0	0.10		Dinoseb	6.5E+01	nc	6.8E+02	nc	3.7E+00	nc	3.7E+01	nc
		2.0E-02	h			2.0E-02	r	0	0.10		di-n-Octyl phthalate	1.3E+03	nc	1.4E+04	nc	7.3E+01	nc	7.3E+02	nc
1.1E-02	h			1.1E-02	r			1	0.10	5.2E+04	1,4-Dioxane	1.8E+01	ca	4.9E+01	ca	6.1E-01	ca	1.0E+00	ca
		3.0E-02	h			3.0E-02	r	0	0.10		Diphenamid	2.0E+03	nc	2.0E+04	nc	1.1E+02	nc	1.1E+03	nc
		2.5E-02	h			2.5E-02	r	0	0.10		Diphenylamine	1.6E+03	nc	1.7E+04	nc	9.1E+01	nc	9.1E+02	nc
8.0E-01	h			7.7E-01	h			0	0.10		1,2-Diphenylhydrazine	5.6E-01	ca	2.4E+00	ca	6.7E-03	ca	6.4E-02	ca
		2.2E-03	h			2.2E-03	r	0	0.10		Diquat	1.4E+02	nc	1.5E+03	nc	8.0E+00	nc	8.0E+01	nc
8.8E+00	h			8.8E+00	r			0	0.10		Direct black 38	5.2E-02	ca	2.2E-01	ca	7.8E-04	ca	7.8E-03	ca
8.1E+00	h			8.1E+00	r			0	0.10		Direct blue 6	5.5E-02	ca	2.4E-01	ca	8.3E-04	ca	8.3E-03	ca
9.3E+00	h			9.3E+00	r			0	0.10		Direct brown 35	4.8E-02	ca	2.1E-01	ca	7.2E-04	ca	7.2E-03	ca
		4.0E-05	h			4.0E-05	r	0	0.10		Disulfoton	2.6E+00	nc	2.7E+01	nc	1.5E-01	nc	1.5E+00	nc
		1.0E-02	h			1.0E-02	r	0	0.10		1,4-Dithiane	6.5E+02	nc	6.8E+03	nc	3.7E+01	nc	3.7E+02	nc
		2.0E-03	h			2.0E-03	r	0	0.10		Diuron	1.3E+02	nc	1.4E+03	nc	7.3E+00	nc	7.3E+01	nc
		4.0E-03	h			4.0E-03	r	0	0.10		Dodine	2.6E+02	nc	2.7E+03	nc	1.5E+01	nc	1.5E+02	nc
		5.0E-05	h			5.0E-05	r	0	0.10		Endosulfan	3.3E+00	nc	3.4E+01	nc	1.8E-01	nc	1.8E+00	nc
		2.0E-02	h			2.0E-02	r	0	0.10		Endothall	1.3E+03	nc	1.4E+04	nc	7.3E+01	nc	7.3E+02	nc
		3.0E-04	h			3.0E-04	r	0	0.10		Endrin	2.0E+01	nc	2.0E+02	nc	1.1E+00	nc	1.1E+01	nc
9.9E-03	h	2.0E-03	h	4.2E-03	h	2.9E-04	h	1	0.10	3.0E+04	Epichlorohydrin	1.2E+01	nc	4.2E+01	nc	1.0E+00	nc	2.0E+00	nc
		5.7E-03	r			5.7E-03	r	0	0.10		1,2-Epoxybutane	3.7E+02	nc	3.9E+03	nc	2.1E+01	nc	2.1E+02	nc
		2.5E-02	h			2.5E-02	r	0	0.10		EPTC (S-Ethyl dipropylthiocarbamate)	1.6E+03	nc	1.7E+04	nc	9.1E+01	nc	9.1E+02	nc
		5.0E-03	h			5.0E-03	r	0	0.10		Ethephon (2-chloroethyl phosphonic acid)	3.3E+02	nc	3.4E+03	nc	1.8E+01	nc	1.8E+02	nc
		5.0E-04	h			5.0E-04	r	0	0.10		Ethion	3.3E+01	nc	3.4E+02	nc	1.8E+00	nc	1.8E+01	nc
		4.0E-01	h			5.7E-02	h	0	0.10		2-Ethoxyethanol	2.6E+04	nc	1.0E+05	max	2.1E+02	nc	1.5E+04	nc
		3.0E-01	h			3.0E-01	r	0	0.10		2-Ethoxyethanol acetate	2.0E+04	nc	1.0E+05	max	1.1E+03	nc	1.1E+04	nc
		9.0E-01	h			9.0E-01	r	0	0.10		Ethyl acetate	5.9E+04	nc	1.0E+05	max	3.3E+03	nc	3.3E+04	nc
4.8E-02	h			4.8E-02	r			1	0.10	5.0E+03	Ethyl acrylate	6.5E-01	ca	1.4E+00	ca	1.4E-01	ca	2.3E-01	ca
		1.0E-01	h			2.9E-01	h	1	0.10	1.6E+04	Ethylbenzene	3.4E+03	sat	3.1E+03	sat	1.1E+03	nc	1.3E+03	nc
		3.0E-01	h			3.0E-01	r	0	0.10		Ethylene cyanohydrin	2.0E+04	nc	1.0E+05	max	1.1E+03	nc	1.1E+04	nc
		2.0E-02	h			2.0E-02	r	0	0.10		Ethylene diamine	1.3E+03	nc	1.4E+04	nc	7.3E+01	nc	7.3E+02	nc
		2.0E+00	h			2.0E+00	r	0	0.10		Ethylene glycol	1.3E+05	nc	1.0E+05	max	7.3E+03	nc	7.3E+04	nc
		5.7E-03	r			5.7E-03	h	0	0.10		Ethylene glycol, monobutyl ether	3.7E+02	nc	3.9E+03	nc	2.1E+01	nc	2.1E+02	nc
1.0E+00	h			3.5E-01	h			1	0.10	1.3E+04	Ethylene oxide	1.6E-01	ca	4.1E-01	ca	1.9E-02	ca	2.4E-02	ca
8.0E-01	h	8.0E-05	h	8.0E-01	r	8.0E-05	r	0	0.10		Ethylene thiourea (ETU)	7.4E-01	ca**	3.2E+00	ca*	1.1E-02	ca*	1.1E-01	ca*
		2.0E-02	e			2.9E+00	h	1	0.10	2.7E+03	Ethyl chloride	1.2E+03	nc	2.2E+03	sat	1.0E+04	nc	7.1E+02	nc
		2.0E-01	h			2.0E-01	r	1	0.10	1.0E+05	Ethyl ether	3.8E+03	sat	3.8E+03	sat	7.3E+02	nc	1.2E+03	nc
		9.0E-02	h			9.0E-02	r	1	0.10	4.9E+03	Ethyl methacrylate	3.4E+02	sat	3.4E+02	sat	3.3E+02	nc	5.5E+02	nc
		1.0E-05	h			1.0E-05	r	0	0.10		Ethyl p-nitrophenyl phenylphosphorothioate	6.5E-01	nc	6.8E+00	nc	3.7E-02	nc	3.7E-01	nc
		3.0E+00	h			3.0E+00	r	0	0.10		Ethylphthalyl ethyl glycolate	1.0E+05	max	1.0E+05	max	1.1E+04	nc	1.1E+05	nc
		8.0E-03	h			8.0E-03	r	0	0.10		Express	5.2E+02	nc	5.5E+03	nc	2.9E+01	nc	2.9E+02	nc
		2.5E-04	h			2.5E-04	r	0	0.10		Fenamiphos	1.6E+01	nc	1.7E+02	nc	9.1E-01	nc	9.1E+00	nc
		1.3E-02	h			1.3E-02	r	0	0.10		Fluometuron	8.5E+02	nc	8.9E+03	nc	4.7E+01	nc	4.7E+02	nc
		6.0E-02	h			6.0E-02	r	0	0.10		Fluoride	3.9E+03	nc	4.1E+04	nc	2.2E+02	nc	2.2E+03	nc
		6.0E-02	h			6.0E-02	r	0	0.10		Fluoridone	5.2E+03	nc	5.5E+04	nc	2.9E+02	nc	2.9E+03	nc
		2.0E-02	h			2.0E-02	r	0	0.10		Flurprimidol	1.3E+03	nc	1.4E+04	nc	7.3E+01	nc	7.3E+02	nc
		6.0E-02	h			6.0E-02	r	0	0.10		Flutolanil	3.9E+03	nc	4.1E+04	nc	2.2E+02	nc	2.2E+03	nc
		1.0E-02	h			1.0E-02	r	0	0.10		Fluvalinate	6.5E+02	nc	6.8E+03	nc	3.7E+01	nc	3.7E+02	nc
3.5E-03	h	1.0E-01	h	3.5E-03	r	1.0E-01	r	0	0.10		Folpet	1.3E+02	ca*	5.5E+02	ca	1.9E+00	ca	1.9E+01	ca

Key: i=IRIS h=HEAST e=ECAO x=WITHDRAWN r=ROUTE EXTRAPOLATION ca=CANCER PRG nc=NONCANCER PRG sat=SOIL SATURATION max=CEILING LIMIT *nc= < 100X ca **=nc < 10X ca

TOXICITY VALUES						SOIL FACTORS			CONTAMINANT	PRELIMINARY REMEDIAL GOALS (PRGs)							
oSF 1/(mg/kg-d)		oRfD (mg/kg-d)		iSF 1/(mg/kg-d)		iRfD (mg/kg-d)		V O C	skin ABS	VF (m^3/kg)		Residential Soil (mg/kg)		Industrial Soil (mg/kg)		Ambient Air (ug/m^3)		Tap Water (ug/l)	
1.9E-01	i			1.9E-01	r			0	0.10		Fomesafen	2.3E+00	ca	1.0E+01	ca	3.8E-02	ca	3.5E-01	ca
		2.0E-03	i			2.0E-03	r	0	0.10		Fonofos	1.3E+02	nc	1.4E+03	nc	7.3E+00	nc	7.3E+01	nc
4.6E-02	r	2.0E-01	i	4.6E-02	i	2.0E-01	r	0	0.10		Formaldehyde	9.8E+00	ca	4.2E+01	ca	1.5E-01	ca	1.5E+00	ca
		2.0E+00	h			2.0E+00	r	0	0.10		Formic Acid	1.3E+05	nc	1.0E+05	max	7.3E+03	nc	7.3E+04	nc
		3.0E+00	i			3.0E+00	r	0	0.10		Foselyl-al	1.0E+05	max	1.0E+05	max	1.1E+04	nc	1.1E+05	nc
		1.0E-03	i			1.0E-03	r	0	0.10		Furan	6.5E+01	nc	6.8E+02	nc	3.7E+00	nc	3.7E+01	nc
3.8E+00	h							0	0.10		Furazolidone	1.2E-01	ca	5.0E-01	ca	1.0E+09	ca	1.8E-02	ca
		3.0E-03	i			1.4E-02	h	0	0.10		Furfural	2.0E+02	nc	2.0E+03	nc	5.2E+01	nc	1.1E+02	nc
5.0E+01	h			5.0E+01	r			0	0.10		Furium	8.9E-03	ca	3.8E-02	ca	1.3E-04	ca	1.3E-03	ca
3.0E-02	i			3.0E-02	r			0	0.10		Furmecyclox	1.5E+01	ca	6.4E+01	ca	2.2E-01	ca	2.2E+00	ca
		4.0E-04	i			4.0E-04	r	0	0.10		Glufosinate-ammonium	2.6E+01	nc	2.7E+02	nc	1.5E+00	nc	1.5E+01	nc
		4.0E-04	i			2.9E-04	h	0	0.10		Glycidaldehyde	2.6E+01	nc	2.7E+02	nc	1.0E+00	nc	1.5E+01	nc
		1.0E-01	i			1.0E-01	r	0	0.10		Glyphosate	6.5E+03	nc	6.8E+04	nc	3.7E+02	nc	3.7E+03	nc
		5.0E-05	i			5.0E-05	r	0	0.10		Haloxyfop-methyl	3.3E+00	nc	3.4E+01	nc	1.8E-01	nc	1.8E+00	nc
		1.3E-02	i			1.3E-02	r	0	0.10		Harmony	8.5E+02	nc	8.9E+03	nc	4.7E+01	nc	4.7E+02	nc
4.5E+00	i	5.0E-04	i	4.6E+00	i	5.0E-04	r	0	0.10		Heptachlor	9.9E-02	ca	4.2E-01	ca	1.5E-03	ca	1.5E-02	ca
9.1E+00	i	1.3E-05	i	9.1E+00	i	1.3E-05	r	0	0.10		Heptachlor epoxide	4.9E-02	ca**	2.1E-01	ca*	7.4E-04	ca*	7.4E-03	ca*
		2.0E-03	i			2.0E-03	r	0	0.10		Hexabromobenzene	1.3E+02	nc	1.4E+03	nc	7.3E+00	nc	7.3E+01	nc
1.6E+00	i	8.0E-04	i	1.6E+00	i	8.0E-04	r	0	0.10		Hexachlorobenzene	2.8E-01	ca*	1.2E+00	ca	4.2E-03	ca	4.2E-02	ca
7.8E-02	i	2.0E-03	x	7.7E-02	i	2.0E-03	r	0	0.10		Hexachlorobutadiene	5.7E+00	ca**	2.4E+01	ca*	8.7E-02	ca*	8.6E-01	ca*
6.3E+00	i			6.3E+00	i			0	0.10		HCH (alpha)	7.1E-02	ca	3.0E-01	ca	1.1E-03	ca	1.1E-02	ca
1.8E+00	i			1.8E+00	i			0	0.10		HCH (beta)	2.5E-01	ca	1.1E+00	ca	3.7E-03	ca	3.7E-02	ca
1.3E+00	h	3.0E-04	i	1.3E+00	r	3.0E-04	r	0	0.10		HCH (gamma) Lindane	3.4E-01	ca*	1.5E+00	ca	5.2E-03	ca	5.2E-02	ca
1.8E+00	i			1.8E+00	i			0	0.10		HCH-technical	2.5E-01	ca	1.1E+00	ca	3.8E-03	ca	3.7E-02	ca
		7.0E-03	i			2.0E-05	h	0	0.10		Hexachlorocyclopentadiene	4.5E+02	nc	4.7E+03	nc	7.3E-02	nc	2.6E+02	nc
6.2E+03	i			4.6E+03	i			0	0.10		Hexachlorodibenzo-p-dioxin mixture (HxCDD)	7.2E-05	ca	3.1E-04	ca	1.5E-06	ca	1.1E-05	ca
1.4E-02	i	1.0E-03	i	1.4E-02	i	1.0E-03	r	0	0.10		Hexachloroethane	3.2E+01	nc	1.4E+02	ca	4.8E-01	ca	4.8E+00	ca
		3.0E-04	i			3.0E-04	r	0	0.10		Hexachlorophene	2.0E+01	nc	2.0E+02	nc	1.1E+00	nc	1.1E+01	nc
1.1E-01	i	3.0E-03	i	1.1E-01	r	3.0E-03	r	0	0.10		Hexahydro-1,3,5-trinitro-1,3,5-triazine	4.0E+00	ca*	1.7E+01	ca	6.1E-02	ca	6.1E-01	ca
		6.0E-02	h			5.7E-02	i	0	0.10		n-Hexane	3.9E+03	nc	4.1E+04	nc	2.1E+02	nc	2.2E+03	nc
		3.3E-02	i			3.3E-02	r	0	0.10		Hexazinone	2.2E+03	nc	2.2E+04	nc	1.2E+02	nc	1.2E+03	nc
3.0E+00	i			1.7E+01	i			0	0.10		Hydrazine, hydrazine sulfate	1.5E-01	ca	6.4E-01	ca	3.9E-04	ca	2.2E-02	ca
						2.0E-03	i	0	0.10		Hydrogen chloride					7.3E+00	nc		
		3.0E-03	i			2.6E-04	i	1	0.10		Hydrogen sulfide					9.4E-01	nc	1.8E+00	nc
		4.0E-02	h			4.0E-02	r	0	0.10		p-Hydroquinone	2.6E+03	nc	2.7E+04	nc	1.5E+02	nc	1.5E+03	nc
		1.3E-02	i			1.3E-02	r	0	0.10		Imazalil	8.5E+02	nc	8.9E+03	nc	4.7E+01	nc	4.7E+02	nc
		2.5E-01	i			2.5E-01	r	0	0.10		Imazaquin	1.6E+04	nc	1.0E+05	max	9.1E+02	nc	9.1E+03	nc
		4.0E-02	i			4.0E-02	r	0	0.10		Iprodione	2.6E+03	nc	2.7E+04	nc	1.5E+02	nc	1.5E+03	nc
		3.0E-01	i			3.0E-01	r	0	0.10		Isobutanol	2.0E+04	nc	1.0E+05	max	1.1E+03	nc	1.1E+04	nc
9.5E-04	i	2.0E-01	i	9.5E-04	i	2.0E-01	r	0	0.10		Isophorone	4.7E+02	ca**	2.0E+03	ca*	7.1E+00	ca*	7.1E+01	ca*
		1.5E-02	i			1.5E-02	r	0	0.10		Isopropalin	9.8E+02	nc	1.0E+04	nc	5.5E+01	nc	5.5E+02	nc
		1.0E-01	i			1.1E-01	r	0	0.10		Isopropyl methyl phosphonic acid	6.5E+03	nc	6.8E+04	nc	4.0E+02	nc	3.7E+03	nc
		5.0E-02	i			5.0E-02	r	0	0.10		Isoxaben	3.3E+03	nc	3.4E+04	nc	1.8E+02	nc	1.8E+03	nc
1.8E+01	e			1.8E+01	r			0	0.10		Kepone	2.5E-02	ca	1.1E-01	ca	3.7E-04	ca	3.7E-03	ca
		2.0E-03	i			2.0E-03	r	0	0.10		Lactofen	1.3E+02	nc	1.4E+03	nc	7.3E+00	nc	7.3E+01	nc
PRG Based on Uptake Biokinetic Model								0	NA		Lead	4.0E+02	nc	1.2E+03	nc			4.0E+00	nc
		2.0E-03	i			2.0E-03	r	0	0.10		Linuron	1.3E+02	nc	1.4E+03	nc	7.3E+00	nc	7.3E+01	nc
		2.0E-02	e					0	0.01		Lithium	1.5E+03	nc	3.4E+04	nc			7.3E+02	nc
		2.0E-01	i			2.0E-01	r	0	0.10		Londax	1.3E+04	nc	1.0E+05	max	7.3E+02	nc	7.3E+03	nc
		2.0E-02	i			2.0E-02	r	0	0.10		Malathion	1.3E+03	nc	1.4E+04	nc	7.3E+01	nc	7.3E+02	nc
		1.0E-01	i			1.0E-01	r	0	0.10		Maleic anhydride	6.5E+03	nc	6.8E+04	nc	3.7E+02	nc	3.7E+03	nc
		5.0E-01	i			5.0E-01	r	0	0.10		Maleic hydrazide	3.3E+04	nc	1.0E+05	max	1.8E+03	nc	1.8E+04	nc
		2.0E-05	h			2.0E-05	r	0	0.10		Malononitrile	1.3E+00	nc	1.4E+01	nc	7.3E-02	nc	7.3E-01	nc
		3.0E-02	h			3.0E-02	r	0	0.10		Mancozeb	2.0E+03	nc	2.0E+04	nc	1.1E+02	nc	1.1E+03	nc
		5.0E-03	i			5.0E-03	r	0	0.10		Maneb	3.3E+02	nc	3.4E+03	nc	1.8E+01	nc	1.8E+02	nc
		5.0E-03	i			1.4E-05	i	0	0.01		Manganese and compounds	3.8E+02	nc	8.3E+03	nc	5.1E-02	nc	1.8E+02	nc

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TOXICITY VALUES								SOIL FACTORS		CONTAMINANT	PRELIMINARY REMEDIAL GOALS (PRGs)							
oSF 1/(mg/kg-d)		oRfD (mg/kg-d)		iSF 1/(mg/kg-d)		iRfD (mg/kg-d)		VOC	skin ABS	VF (m^3/kg)		Residential Soil (mg/kg)		Industrial Soil (mg/kg)		Ambient Air (ug/m^3)		Tap Water (ug/l)	
		9.0E-05	h			9.0E-05	r	0	0.10		Mephosfolan	5.9E+00	nc						
		3.0E-02	i			3.0E-02	r	0	0.10		Mepiquat	2.0E+03	nc						
		3.0E-04	i					0	0.10		Mercury and compounds (methyl)	2.0E+01	nc						
		3.0E-04	h			8.6E-05	h	0	0.01		Mercury and compounds (inorganic)	2.3E+01	nc	5.1E+02	nc	3.1E-01	nc	1.1E+01	nc
		3.0E-05	i			3.0E-05	r	0	0.10		Merphos	2.0E+00	nc	2.0E+01	nc	1.1E-01	nc	1.1E+00	nc
		3.0E-05	i			3.0E-05	r	0	0.10		Merphos oxide	2.0E+00	nc	2.0E+01	nc	1.1E-01	nc	1.1E+00	nc
		8.0E-02	i			8.0E-02	r	0	0.10		Metalaxyl	3.9E+03	nc	4.1E+04	nc	2.2E+02	nc	2.2E+03	nc
		1.0E-04	i			2.0E-04	h	1	0.10	2.2E+03	Methacrylonitrile	6.3E-01	nc	2.2E+00	nc	7.3E-01	nc	1.0E+00	nc
		5.0E-05	i			5.0E-05	r	0	0.10		Methamidophos	3.3E+00	nc	3.4E+01	nc	1.8E-01	nc	1.8E+00	nc
		5.0E-01	i			5.0E-01	r	0	0.10		Methanol	3.3E+04	nc	1.0E+05	max	1.8E+03	nc	1.8E+04	nc
		1.0E-03	i			1.0E-03	r	0	0.10		Methidathion	6.5E+01	nc	6.8E+02	nc	3.7E+00	nc	3.7E+01	nc
		2.5E-02	i			2.5E-02	r	0	0.10		Methomyl	1.6E+03	nc	1.7E+04	nc	9.1E+01	nc	9.1E+02	nc
		5.0E-03	i			5.0E-03	r	0	0.10		Methoxychlor	3.3E+02	nc	3.4E+03	nc	1.8E+01	nc	1.8E+02	nc
		1.0E-03	h			5.7E-03	i	0	0.10		2-Methoxyethanol	6.5E+01	nc	6.8E+02	nc	2.1E+01	nc	3.7E+01	nc
		2.0E-03	h			2.0E-03	r	0	0.10		2-Methoxyethanol acetate	1.3E+02	nc	1.4E+03	nc	7.3E+00	nc	7.3E+01	nc
4.6E-02	h			4.6E-02	r			0	0.10		2-Methoxy-5-nitroaniline	9.7E+00	ca	4.1E+01	ca	1.5E-01	ca	1.5E+00	ca
		1.0E+00	h			1.0E+00	r	1	0.10	7.9E+03	Methyl acetate	1.0E+04	nc	3.8E+04	nc	3.7E+03	nc	6.1E+03	nc
		3.0E-02	h			3.0E-02	r	1	0.10	1.4E+03	Methyl acrylate	6.4E+01	nc	2.1E+02	nc	1.1E+02	nc	1.8E+02	nc
2.4E-01	h			2.4E-01	r			0	0.10		2-Methylaniline (o-toluidine)	1.9E+00	ca	7.9E+00	ca	2.8E-02	ca	2.8E-01	ca
1.8E-01	h			1.8E-01	r			0	0.10		2-Methylaniline hydrochloride	2.5E+00	ca	1.1E+01	ca	3.7E-02	ca	3.7E-01	ca
		1.0E+00	x			1.0E+00	r	0	0.10		Methyl chlorocarbonate	6.5E+04	nc	1.0E+05	max	3.7E+03	nc	3.7E+04	nc
		5.0E-04	i			5.0E-04	r	0	0.10		2-Methyl-4-chlorophenoxyacetic acid	3.3E+01	nc	3.4E+02	nc	1.8E+00	nc	1.8E+01	nc
		1.0E-02	i			1.0E-02	r	0	0.10		4-(2-Methyl-4-chlorophenoxy) butyric acid (MCPB)	6.5E+02	nc	6.8E+03	nc	3.7E+01	nc	3.7E+02	nc
		1.0E-03	i			1.0E-03	r	0	0.10		2-(2-Methyl-4-chlorophenoxy) propionic acid	6.5E+01	nc	6.8E+02	nc	3.7E+00	nc	3.7E+01	nc
		1.0E-03	i			1.0E-03	r	0	0.10		2-(2-Methyl-1,4-chlorophenoxy) propionic acid (MCPP)	6.5E+01	nc	6.8E+02	nc	3.7E+00	nc	3.7E+01	nc
		8.6E-01	r			8.6E-01	h	0	0.10		Methylcyclohexane	5.6E+04	nc	1.0E+05	max	3.1E+03	nc	3.1E+04	nc
		5.7E-06	r			5.7E-06	h	0	0.10		4,4'-Methylenediphenyl isocyanate	3.7E-01	nc	3.9E+00	nc	2.1E-02	nc	2.1E-01	nc
2.5E-01	h			2.5E-01	r			0	0.10		4,4'-Methylenebisbenzeneamine	1.8E+00	ca	7.6E+00	ca	2.7E-02	ca	2.7E-01	ca
1.3E-01	h	7.0E-04	h	1.3E-01	h	7.0E-04	r	0	0.10		4,4'-Methylene bis(2-chloroaniline)	3.4E+00	ca**	1.5E+01	ca*	5.2E-02	ca	5.2E-01	ca
4.6E-02	i			4.6E-02	r			0	0.10		4,4'-Methylene bis(N,N'-dimethyl)aniline	9.7E+00	ca	4.1E+01	ca	1.5E-01	ca	1.5E+00	ca
		1.0E-02	h			1.0E-02	r	0	0.10		Methylene bromide	6.5E+02	nc	6.8E+03	nc	3.7E+01	nc	3.7E+02	nc
7.5E-03	i	6.0E-02	i	1.6E-03	i	8.6E-01	h	1	0.10	1.9E+03	Methylene chloride	4.9E+00	ca	1.1E+01	ca	4.1E+00	ca	4.3E+00	ca
						5.7E-06	r	0	NA		4,4'-Methylenediphenyl isocyanate					2.1E-02	ca		
		6.0E-01	i			2.9E-01	i	1	0.30	1.1E+04	Methyl ethyl ketone	4.2E+03	nc	1.5E+04	nc	1.0E+03	nc	1.9E+03	nc
1.1E+00	h			1.1E+00	r			0	0.10		Methyl hydrazine	4.0E-01	ca	1.7E+00	ca	6.1E-03	ca	6.1E-02	ca
		6.0E-02	h			2.3E-02	h	0	0.10		Methyl isobutyl ketone	5.2E+03	nc	5.5E+04	nc	8.3E+01	nc	2.9E+03	nc
		8.0E-02	h			8.0E-02	r	0	0.10		Methyl methacrylate	5.2E+03	nc	5.5E+04	nc	2.9E+02	nc	2.9E+03	nc
3.3E-02	h			3.3E-02	r			0	0.10		2-Methyl-5-nitroaniline	1.3E+01	ca	5.8E+01	ca	2.0E-01	ca	2.0E+00	ca
		2.5E-04	i			2.8E-04	r	0	0.10		Methyl parathion	1.6E+01	nc	1.7E+02	nc	9.1E-01	nc	9.1E+00	nc
		5.0E-02	x			5.0E-02	r	0	0.10		2-Methylphenol	3.3E+03	nc	3.4E+04	nc	1.8E+02	nc	1.8E+03	nc
		5.0E-02	x			5.0E-02	r	0	0.10		3-Methylphenol	3.3E+03	nc	3.4E+04	nc	1.8E+02	nc	1.8E+03	nc
		5.0E-03	h			5.0E-03	r	0	0.10		4-Methylphenol	3.3E+02	nc	3.4E+03	nc	1.8E+01	nc	1.8E+02	nc
		6.0E-03	h			1.1E-02	h	1	0.10	1.2E+04	Methyl styrene (mixture)	1.3E+02	nc	5.8E+02	nc	4.2E+01	nc	6.0E+01	nc
		7.0E-02	h			7.0E-02	r	1	0.10	1.2E+04	Methyl styrene (alpha)	9.9E+02	nc	3.8E+03	nc	2.6E+02	nc	4.3E+02	nc
		5.0E-03	e			8.6E-01	i	0	0.10		Methyl tertbutyl ether (MTBE)	3.3E+02	nc	3.4E+03	nc	3.1E+03	nc	1.8E+02	nc
		1.5E-01	i			1.5E-01	r	0	0.10		Metolachlor (Dual)	9.8E+03	nc	1.0E+05	max	5.5E+02	nc	5.5E+03	nc
		2.5E-02	i			2.5E-02	r	0	0.10		Metribuzin	1.6E+03	nc	1.7E+04	nc	9.1E+01	nc	9.1E+02	nc
1.6E+00	h	2.0E-04	i	1.6E+00	r	2.0E-04	r	0	0.10		Mirex	2.5E-01	ca*	1.1E+00	ca	3.7E-03	ca	3.7E-02	ca
		2.0E-03	i			2.0E-03	r	0	0.10		Molinate	1.3E+02	nc	1.4E+03	nc	7.3E+00	nc	7.3E+01	nc
		5.0E-03	h			5.0E-03	r	0	0.01		Molybdenum	3.8E+02	nc	8.5E+03	nc	1.8E+01	nc	1.8E+02	nc
		1.0E-01	h			1.0E-01	h	0	0.10		Monochloramine	6.5E+03	nc	6.8E+04	nc	3.7E+02	nc	3.7E+03	nc
		2.0E-03	i			2.0E-03	r	0	0.10		Naled	1.3E+02	nc	1.4E+03	nc	7.3E+00	nc	7.3E+01	nc
		1.0E-01	i			1.0E-01	r	0	0.10		Napropamide	6.5E+03	nc	6.8E+04	nc	3.7E+02	nc	3.7E+03	nc
		2.0E-02	i					0	0.01		Nickel and compounds	1.5E+03	nc	3.4E+04	nc			7.3E+02	nc
											"CAL-Modified PRG" (PEA, 1994)	1.5E+02							
				4.2E-01	i			0	0.01		Nickel refinery dust					8.0E-03	ca		

Key: i=IRIS h=HEAST e=ECAO x=WITHDRAWN r=ROUTE EXTRAPOLATION ca=CANCER PRG nc=NONCANCER PRG sat=SOIL SATURATION max=CEILING LIMIT *nc= < 100X ca **=nc < 10X ca

TOXICITY VALUES						SOIL FACTORS			CONTAMINANT	PRELIMINARY REMEDIAL GOALS (PRGs)							
oSF 1/(mg/kg-d)		oRfD (mg/kg-d)		iSF 1/(mg/kg-d)		iRfD (mg/kg-d)		VOC	skin ABS	VF (m^3/kg)		Residential Soil (mg/kg)		Industrial Soil (mg/kg)		Ambient Air (ug/m^3)		Tap Water (ug/l)	
				1.7E+00	i			0	0.01		Nickel subsulfide			3.9E+04	ca	4.0E-03	ca		
		1.5E-03	x			1.5E-03	r	0	0.10		Nitrapyrin	9.8E+01	nc	1.0E+03	nc	5.5E+00	nc	5.5E+01	nc
		1.6E+00	i					0	0.10		Nitrate	1.0E+05	max	1.0E+05	max			5.8E+04	nc
		1.0E-01	i					0	0.10		Nitric Oxide	6.5E+03	nc	1.0E+05	max			3.7E+03	nc
		1.0E-01	i					0	0.10		Nitrile	6.5E+03	nc	1.0E+05	max			3.7E+03	nc
		6.0E-05	r			5.7E-05	h	0	0.10		2-Nitroaniline	3.9E+00	nc	4.1E+01	nc	2.1E-01	nc	2.2E+00	nc
								0	0.10		3-Nitroaniline								
								0	0.10		4-Nitroaniline								
		5.0E-04	i			5.7E-04	h	0	0.10		Nitrobenzene	3.3E+01	nc	3.4E+02	nc	2.1E+00	nc	1.8E+01	nc
		7.0E-02	h			7.0E-02	r	0	0.10		Nitrofurantoin	4.6E+03	nc	4.8E+04	nc	2.6E+02	nc	2.6E+03	nc
1.5E+00	h			9.4E+00	h			0	0.10		Nitrofurazone	3.0E-01	ca	1.3E+00	ca	7.2E-04	ca	4.5E-02	ca
		1.0E+00	i					0	0.10		Nitrogen dioxide								
		1.0E-01	i			1.0E-01	r	0	0.10		Nitroguanidine	6.5E+03	nc	6.8E+04	nc	3.7E+02	nc	3.7E+03	nc
								0	0.10		4-Nitrophenol								
9.4E+00	r	5.7E-03	r	9.4E+00	h	5.7E-03	i	1	0.10		2-Nitropropane								
5.4E+00	i			5.6E+00	i			0	0.10		N-Nitrosodi-n-butylamine					7.2E-04	ca	3.5E+01	ca
2.8E+00	i			2.8E+00	r			0	0.10		N-Nitrosodiethanolamine	8.2E-02	ca	3.5E-01	ca	1.2E-03	ca	1.2E-02	ca
1.5E+02	i			1.5E+02	i			0	0.10		N-Nitrosodiethylamine	1.6E-01	ca	6.8E-01	ca	2.4E-03	ca	2.4E-02	ca
5.1E+01	i			4.9E+01	i			0	0.10		N-Nitrosodimethylamine	3.0E-03	ca	1.3E-02	ca	4.5E-05	ca	4.5E-04	ca
4.9E-03	i			4.9E-03	r			0	0.10		N-Nitrosodiphenylamine	8.7E-03	ca	3.7E-02	ca	1.4E-04	ca	1.3E-03	ca
7.0E+00	i			7.0E+00	r			0	0.10		N-Nitroso di-n-propylamine	9.1E+01	ca	3.9E+02	ca	1.4E+00	ca	1.4E+01	ca
2.2E+01	i			2.2E+01	r			0	0.10		N-Nitroso-N-methylethylamine	6.3E-02	ca	2.7E-01	ca	9.6E-04	ca	9.6E-03	ca
2.1E+00	i			2.1E+00	i			0	0.10		N-Nitrosopyrrolidine	2.0E-02	ca	8.7E-02	ca	3.1E-04	ca	3.1E-03	ca
		1.0E-02	h			1.0E-02	r	0	0.10		m-Nitrotoluene	2.1E-01	ca	9.1E-01	ca	3.1E-03	ca	3.2E-02	ca
		1.0E-02	h			1.0E-02	r	0	0.10		p-Nitrotoluene	6.5E+02	nc	6.8E+03	nc	3.7E+01	nc	3.7E+02	nc
		4.0E-02	i			4.0E-02	r	0	0.10		Nitrofurazon	6.5E+02	nc	6.8E+03	nc	3.7E+01	nc	3.7E+02	nc
		7.0E-04	i			7.0E-04	r	0	0.10		NuStar								
		3.0E-03	i			3.0E-03	r	0	0.10		Octabromodiphenyl ether	4.6E+01	nc	4.8E+02	nc	2.6E+00	nc	2.6E+01	nc
		5.0E-02	i			5.0E-02	r	0	0.10		Octahydro-1357-tetranitro-1357-tetrazocine (HMX)	2.0E+02	nc	2.0E+03	nc	1.1E+01	nc	1.1E+02	nc
		2.0E-03	h			2.0E-03	r	0	0.10		Octamethylpyrophosphoramide	3.3E+03	nc	3.4E+04	nc	1.8E+02	nc	1.8E+03	nc
		5.0E-02	i			5.0E-02	r	0	0.10		Oryzalin	1.3E+02	nc	1.4E+03	nc	7.3E+00	nc	7.3E+01	nc
		5.0E-03	i			5.0E-03	r	0	0.10		Oxadiazon	3.3E+03	nc	3.4E+04	nc	1.8E+02	nc	1.8E+03	nc
		2.5E-02	i			2.5E-02	r	0	0.10		Oxamyl	3.3E+02	nc	3.4E+03	nc	1.8E+01	nc	1.8E+02	nc
		3.0E-03	i			3.0E-03	r	0	0.10		Oxyfluorfen	1.6E+03	nc	1.7E+04	nc	9.1E+01	nc	9.1E+02	nc
		1.3E-02	i			1.3E-02	r	0	0.10		Paclobutrazol	2.0E+02	nc	2.0E+03	nc	1.1E+01	nc	1.1E+02	nc
		4.5E-03	i			4.5E-03	r	0	0.10		Paraquat	8.5E+02	nc	8.9E+03	nc	4.7E+01	nc	4.7E+02	nc
		6.0E-03	h			6.0E-03	r	0	0.10		Parathion	2.9E+02	nc	3.1E+03	nc	1.6E+01	nc	1.6E+02	nc
		5.0E-02	h			5.0E-02	r	0	0.10		Pebulate	3.9E+02	nc	4.1E+03	nc	2.2E+01	nc	2.2E+02	nc
		4.0E-02	i			4.0E-02	r	0	0.10		Pendimethalin	3.3E+03	nc	3.4E+04	nc	1.8E+02	nc	1.8E+03	nc
2.3E-02	h			2.3E-02	r			0	0.10		Pentabromo-6-chloro cyclohexane	2.6E+03	nc	2.7E+04	nc	1.0E+09	nc	1.5E+03	nc
		2.0E-03	i			2.0E-03	r	0	0.10		Pentabromodiphenyl ether	1.9E+01	ca	8.3E+01	ca	2.9E-01	ca	2.9E+00	ca
		8.0E-04	i			8.0E-04	r	0	0.10		Pentachlorobenzene	1.3E+02	nc	1.4E+03	nc	7.3E+00	nc	7.3E+01	nc
2.6E-01	h	3.0E-03	i	2.6E-01	r	3.0E-03	r	0	0.10		Pentachloronitrobenzene	5.2E+01	nc	5.5E+02	nc	2.9E+00	nc	2.9E+01	nc
1.2E-01	i	3.0E-02	i	1.2E-01	r	3.0E-02	r	0	0.25		Pentachlorophenol	1.7E+00	ca*	7.3E+00	ca	2.6E-02	ca	2.6E-01	ca
		5.0E-02	i			5.0E-02	r	0	0.10		Permethrin	2.5E+00	ca	7.9E+00	ca	5.6E-02	ca	5.6E-01	ca
		2.5E-01	i			2.5E-01	r	0	0.10		Phenmedipham	3.3E+03	nc	3.4E+04	nc	1.8E+02	nc	1.8E+03	nc
		6.0E-01	i			6.0E-01	r	0	0.10		Phenol	1.6E+04	nc	1.0E+05	max	9.1E+02	nc	9.1E+03	nc
		6.0E-03	i			6.0E-03	r	0	0.10		m-Phenylenediamine	3.9E+04	nc	1.0E+05	max	2.2E+03	nc	2.2E+04	nc
		1.9E-01	h			1.9E-01	r	0	0.10		p-Phenylenediamine	3.9E+02	nc	4.1E+03	nc	2.2E+01	nc	2.2E+02	nc
		8.0E-05	i			8.0E-05	r	0	0.10		Phenylmercuric acetate	1.2E+04	nc	1.0E+05	max	6.9E+02	nc	6.9E+03	nc
1.9E-03	h			1.9E-03	r			0	0.10		Phenylphenol	5.2E+00	nc	5.5E+01	nc	2.9E-01	nc	2.9E+00	nc
		2.0E-04	h			2.0E-04	r	0	0.10		Phorate	2.3E+02	ca	9.8E+02	ca	3.5E+00	ca	3.5E+01	ca
		2.0E-02	i			2.0E-02	r	0	0.10		Phosmet	1.3E+01	nc	1.4E+02	nc	7.3E-01	nc	7.3E+00	nc
		3.0E-04	h			8.6E-06	h	0	0.10		Phosphine	1.3E+03	nc	1.4E+04	nc	7.3E+01	nc	7.3E+02	nc
		2.0E-05	i			2.0E-05	r	0	0.10		Phosphorus (white)	2.0E+01	nc	2.0E+02	nc	3.1E-02	nc	1.1E+01	nc
		1.0E+00	h			1.0E+00	r	0	0.10		p-Phthalic acid					7.3E-02	nc		
																3.7E+03	nc		

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TOXICITY VALUES								SOIL FACTORS		CONTAMINANT	PRELIMINARY REMEDIAL GOALS (PRGs)							
							V											
oSF 1/(mg/kg-d)		oRfD (mg/kg-d)		iSF 1/(mg/kg-d)		iRfD (mg/kg-d)		O C	skin ABS	VF (m^3/kg)		Residential Soil (mg/kg)		Industrial Soil (mg/kg)		Ambient Air (ug/m^3)		Tap Water (ug/l)	
		2.0E+00	i			3.4E-02	h	0	0.10		Phthalic anhydride								
		7.0E-02	i			7.0E-02	r	0	0.10		Picloram	4.6E+03	nc	4.6E+04	nc	1.2E+02	nc		
		1.0E-02	i			1.0E-02	r	0	0.10		Pirimphos-methyl	6.5E+02	nc	6.8E+03	nc	2.6E+02	nc	2.6E+03	nc
8.9E+00	h	7.0E-06	h	8.9E+00	r	7.0E-06	r	0	0.10		Polybrominated biphenyls	5.0E-02	ca**	2.1E-01	ca*	3.7E+01	nc	3.7E+02	nc
7.7E+00	i			7.7E+00	r			0	0.06		Polychlorinated biphenyls (PCBs)	6.6E-02	ca	3.4E-01	ca	7.6E-04	ca*	7.6E-03	ca*
		7.0E-05	i			7.0E-05	r	0	0.06		Arochlor 1016	4.9E+00	nc	8.5E+01	nc	8.7E-04	ca	8.7E-03	ca
4.5E+00	e			4.5E+00	r			0	0.10		Polychlorinated terphenyls (PCTs)	9.9E-02	ca	4.2E-01	ca	2.6E-01	nc	2.6E+00	nc
									0.10		Polynuclear aromatic hydrocarbons					1.5E-03	ca	1.5E-02	ca
		6.0E-02	i			6.0E-02	r	1	0.10	8.0E+04	Acenaphthene	3.6E+02	sat	3.6E+02	sat	2.2E+02	nc	3.7E+02	nc
		3.0E-01	i			3.0E-01	r	1	0.10	6.2E+05	Anthracene	1.9E+01	sat	1.9E+01	sat	1.1E+03	nc	1.8E+03	nc
7.3E-01	e			7.3E-01	r			0	0.10		Benz[a]anthracene	6.1E-01	ca	2.6E+00	ca	9.2E-03	ca	9.2E-02	ca
7.3E-01	e			7.3E-01	r			0	0.10		Benzo[b]fluoranthene	6.1E-01	ca	2.6E+00	ca	9.2E-03	ca	9.2E-02	ca
7.3E-02	e			7.3E-02	r			0	0.10		Benzo[k]fluoranthene	6.1E+00	ca	2.6E+01	ca	9.2E-02	ca	9.2E-01	ca
7.3E+00	i			7.3E+00	r			0	0.10		Benzo[a]pyrene	6.1E-02	ca	2.6E-01	ca	9.2E-04	ca	9.2E-03	ca
											"CAL-Modified PRG" (PEA, 1994)							1.5E-03	
7.3E-03	e			7.3E-03	r			0	0.10	1.6E+07	Chrysene	2.4E+01	sat	2.4E+01	sat	9.2E-01	ca	9.2E+00	ca
7.3E+00	e			7.3E+00	r			0	0.10		Dibenz[ah]anthracene	6.1E-02	ca	2.6E-01	ca	9.2E-04	ca	9.2E-03	ca
		4.0E-02	i			4.0E-02	r	0	0.10		Fludranthene	2.6E+03	nc	2.7E+04	nc	1.5E+02	nc	1.5E+03	nc
		4.0E-02	i			4.0E-02	r	1	0.10	3.2E+05	Fluorene	3.0E+02	sat	3.0E+02	sat	1.5E+02	nc	2.4E+02	nc
7.3E-01	e			7.3E-01	r			0	0.10		Indeno[1,2,3-cd]pyrene	6.1E-01	ca	2.6E+00	ca	9.2E-03	ca	9.2E-02	ca
		4.0E-02	e			4.0E-02	r	1	0.10	3.0E+04	Naphthalene	8.0E+02	sat	8.0E+02	sat	1.5E+02	nc	2.4E+02	nc
								1	0.10	6.0E+05	Phenanthrene								
		3.0E-02	i			3.0E-02	r	0	0.10		Pyrene	2.0E+03	nc	2.0E+04	nc	1.1E+02	nc	1.1E+03	nc
1.5E-01	i	9.0E-03	i	1.5E-01	r	9.0E-03	r	0	0.10		Prochloraz	3.0E+00	ca	1.3E+01	ca	4.5E-02	ca	3.3E+02	ca
		6.0E-03	h			6.0E-03	r	0	0.10		Profluralin	3.9E+02	nc	4.1E+03	nc	2.2E+01	nc	2.2E+02	nc
		1.5E-02	i			1.5E-02	r	0	0.10		Prometon	9.8E+02	nc	1.0E+04	nc	5.5E+01	nc	5.5E+02	nc
		4.0E-03	i			4.0E-03	r	0	0.10		Prometryn	2.6E+02	nc	2.7E+03	nc	1.5E+01	nc	1.5E+02	nc
		7.5E-02	i			7.5E-02	r	0	0.10		Pronamide	4.9E+03	nc	5.1E+04	nc	2.7E+02	nc	2.7E+03	nc
		1.3E-02	i			1.3E-02	r	0	0.10		Propachlor	8.5E+02	nc	8.9E+03	nc	4.7E+01	nc	4.7E+02	nc
		5.0E-03	i			5.0E-03	r	0	0.10		Propanil	3.3E+02	nc	3.4E+03	nc	1.8E+01	nc	1.8E+02	nc
		2.0E-02	i			2.0E-02	r	0	0.10		Propargite	1.3E+03	nc	1.4E+04	nc	7.3E+01	nc	7.3E+02	nc
		2.0E-03	i			2.0E-03	r	0	0.10		Propargyl alcohol	1.3E+02	nc	1.4E+03	nc	7.3E+00	nc	7.3E+01	nc
		2.0E-02	i			2.0E-02	r	0	0.10		Propazine	1.3E+03	nc	1.4E+04	nc	7.3E+01	nc	7.3E+02	nc
		2.0E-02	i			2.0E-02	r	0	0.10		Propham	1.3E+03	nc	1.4E+04	nc	7.3E+01	nc	7.3E+02	nc
		1.3E-02	i			1.3E-02	r	0	0.10		Propiconazole	8.5E+02	nc	8.9E+03	nc	4.7E+01	nc	4.7E+02	nc
		2.0E+01	h			2.0E+01	r	0	0.10		Propylene glycol	1.0E+05	max	1.0E+05	max	7.3E+04	nc	7.3E+05	nc
		7.0E-01	h			7.0E-01	r	0	0.10		Propylene glycol, monoethyl ether	4.6E+04	nc	1.0E+05	max	2.6E+03	nc	2.6E+04	nc
		7.0E-01	h			5.7E-01	i	0	0.10		Propylene glycol, monomethyl ether	4.6E+04	nc	1.0E+05	max	2.1E+03	nc	2.6E+04	nc
2.4E-01	i	8.6E-03	r	2.4E-02	i	8.6E-03	i	1	0.10		Propylene oxide					5.2E-01	ca	2.2E-01	ca
		2.5E-01	i			2.5E-01	r	0	0.10		Pursuit	1.6E+04	nc	1.0E+05	max	9.1E+02	nc	9.1E+03	nc
		2.5E-02	i			2.5E-02	r	0	0.10		Pydrin	1.6E+03	nc	1.7E+04	nc	9.1E+01	nc	9.1E+02	nc
		1.0E-03	i			1.0E-03	r	0	0.10		Pyridine	8.5E+01	nc	8.8E+02	nc	3.7E+00	nc	3.7E+01	nc
		5.0E-04	i			5.0E-04	r	0	0.10		Quinalphos	3.3E+01	nc	3.4E+02	nc	1.8E+00	nc	1.8E+01	nc
1.2E+01	h			1.2E+01	r			0	0.10		Quinoline	3.7E-02	ca	1.6E-01	ca	5.6E-04	ca	5.6E-03	ca
1.1E-01	i	3.0E-03	i	1.1E-01	r	3.0E-03	r	0	0.10		RDX (Cyclonite)	4.0E+00	ca	1.7E+01	ca	6.1E-02	ca	6.1E-01	ca
		3.0E-02	i			3.0E-02	r	0	0.10		Resmethrin	2.0E+03	nc	2.0E+04	nc	1.1E+02	nc	1.1E+03	nc
		5.0E-02	h			5.0E-02	r	0	0.10		Ronnel	3.3E+03	nc	3.4E+04	nc	1.8E+02	nc	1.8E+03	nc
		4.0E-03	i			4.0E-03	r	0	0.10		Rotenone	2.6E+02	nc	2.7E+03	nc	1.5E+01	nc	1.5E+02	nc
		2.5E-02	i			2.5E-02	r	0	0.10		Savey	1.6E+03	nc	1.7E+04	nc	9.1E+01	nc	9.1E+02	nc
		5.0E-03	i					0	0.10		Selenious Acid	3.3E+02	nc	3.4E+03	nc			1.8E+02	nc
		5.0E-03	i					0	0.01		Selenium	3.8E+02	nc	8.5E+03	nc			1.8E+02	nc
		5.0E-03	h					0	0.10		Selenourea	3.3E+02	nc	3.4E+03	nc			1.8E+02	nc
		9.0E-02	i			9.0E-02	r	0	0.10		Sethoxydim	5.9E+03	nc	6.1E+04	nc	3.3E+02	nc	3.3E+03	nc
		5.0E-03	i					0	0.01		Silver and compounds	3.8E+02	nc	8.5E+03	nc			1.8E+02	nc
1.2E-01	h	5.0E-03	i	1.2E-01	r	2.0E-03	r	0	0.10		Simazine	3.7E+00	ca*	1.6E+01	ca*	5.6E-02	ca	5.6E-01	ca
		4.0E-03	i			4.0E-03	r	0	0.10		Sodium azide	2.6E+02	nc	2.7E+03	nc	1.5E+01	nc	1.5E+02	nc

Key: i=IRIS h=HEAST e=ECAO x=WITHDRAWN r=RDUTE EXTRAPOLATION ca=CANCER PRG nc=NONCANCER PRG sat=SOIL SATURATION max=CEILING LIMIT *nc= < 100X ca **=nc < 10X ca

TOXICITY VALUES								SOIL FACTORS		CONTAMINANT	PRELIMINARY REMEDIAL GOALS (PRGs)							
oSF 1/(mg/kg-d)		oRfD (mg/kg-d)		iSF 1/(mg/kg-d)		iRfD (mg/kg-d)		V O C	skin ABS	VF (m^3/kg)		Residential Soil (mg/kg)		Industrial Soil (mg/kg)		Ambient Air (ug/m^3)		Tap Water (ug/l)	
2.7E-01	h	3.0E-02	i	2.7E-01	r	3.0E-02	r	0	0.10		Sodium diethyldithiocarbamate	1.6E+00	ca	7.1E+00	ca	2.5E-02	ca	2.5E-01	ca
		2.0E-05	i			2.0E-05	r	0	0.10		Sodium fluoroacetate	1.3E+00	nc	1.4E+01	nc	7.3E-02	nc	7.3E-01	nc
		1.0E-03	h			1.0E-03	r	0	0.10		Sodium metavanadate	6.5E+01	nc	6.8E+02	nc	3.7E+00	nc	3.7E+01	nc
		6.0E-01	i					0	0.01		Strontium, stable	4.6E+04	nc	1.0E+05	max			2.2E+04	nc
		3.0E-04	i			3.0E-04	r	0	0.10		Strychnine	2.0E+01	nc	2.0E+02	nc	1.1E+00	nc	1.1E+01	nc
		2.0E-01	i			2.9E-01	i	1	0.10	1.2E+04	Styrene	2.2E+03	sat	2.2E+03	sat	1.1E+03	nc	1.6E+03	nc
		2.5E-02	i			2.5E-02	r	0	0.10		Systhane	1.6E+03	nc	1.7E+04	nc	9.1E+01	nc	9.1E+02	nc
1.5E+05	h			1.5E+05	h			0	0.03		2,3,7,8-TCDD (dioxin)	3.8E-06	ca	2.4E-05	ca	4.5E-08	ca	4.5E-07	ca
		7.0E-02	i			7.0E-02	r	0	0.10		Tebuthiuron	4.6E+03	nc	4.8E+04	nc	2.6E+02	nc	2.6E+03	nc
		2.0E-02	h			2.0E-02	r	0	0.10		Temephos	1.3E+03	nc	1.4E+04	nc	7.3E+01	nc	7.3E+02	nc
		1.3E-02	i			1.3E-02	r	0	0.10		Terbacil	8.5E+02	nc	8.9E+03	nc	4.7E+01	nc	4.7E+02	nc
		2.5E-05	h			2.5E-05	r	0	0.10		Terbufos	1.6E+00	nc	1.7E+01	nc	9.1E-02	nc	9.1E-01	nc
		1.0E-03	i			1.0E-03	r	0	0.10		Terbutryn	6.5E+01	nc	6.8E+02	nc	3.7E+00	nc	3.7E+01	nc
		3.0E-04	i			3.0E-04	r	0	0.10		1,2,4,5-Tetrachlorobenzene	2.0E+01	nc	2.0E+02	nc	1.1E+00	nc	1.1E+01	nc
2.6E-02	i	3.0E-02	i	2.6E-02	i	3.0E-02	r	1	0.10	1.1E+04	1,1,1,2-Tetrachloroethane	2.4E+00	ca	5.5E+00	ca	2.6E-01	ca	4.3E-01	ca
2.0E-01	i			2.0E-01	i			1	0.10	1.9E+04	1,1,2,2-Tetrachloroethane	4.9E-01	ca	1.2E+00	ca	3.3E-02	ca	5.5E-02	ca
5.2E-02	e	1.0E-02	i	2.0E-03	e	1.0E-02	r	1	0.10	4.9E+03	Tetrachloroethylene (PCE)	5.6E+00	ca	1.8E+01	ca	3.3E+00	ca	1.1E+00	ca
											"CAL-Modified PRG" (PEA, 1994)					3.2E-01			
		3.0E-02	i			3.0E-02	r	0	0.10		2,3,4,6-Tetrachlorophenol	2.0E+03	nc	2.0E+04	nc	1.1E+02	nc	1.1E+03	nc
2.0E+01	h			2.0E+01	r			0	0.10		p,a,a,a-Tetrachlorotoluene	2.2E-02	ca	9.5E-02	ca	3.4E-04	ca	3.4E-03	ca
2.4E-02	h	3.0E-02	i	2.4E-02	r	3.0E-02	r	0	0.10		Tetrachlorovinphos	1.9E+01	ca	7.9E+01	ca	2.8E-01	ca	2.8E+00	ca
		5.0E-04	i			5.0E-04	r	0	0.10		Tetraethyldithiopyrophosphate	3.3E+01	nc	3.4E+02	nc	1.8E+00	nc	1.8E+01	nc
								1	0.10		Tetrahydrofuran								
		7.0E-05	h					0	0.01		Thallic oxide	5.4E+00	nc	1.2E+02	nc			2.6E+00	nc
		9.0E-05	i					0	0.01		Thallium acetate	6.9E+00	nc	1.5E+02	nc			3.3E+00	nc
		8.0E-05	i					0	0.01		Thallium carbonate	6.1E+00	nc	1.4E+02	nc			2.9E+00	nc
		8.0E-05	i					0	0.01		Thallium chloride	6.1E+00	nc	1.4E+02	nc			2.9E+00	nc
		9.0E-05	i					0	0.01		Thallium nitrate	6.9E+00	nc	1.5E+02	nc			3.3E+00	nc
		9.0E-05	x					0	0.01		Thallium selenite	6.9E+00	nc	1.5E+02	nc			3.3E+00	nc
		8.0E-05	i					0	0.01		Thallium sulfate	6.1E+00	nc	1.4E+02	nc			2.9E+00	nc
		1.0E-02	i			1.0E-02	r	0	0.10		Thiobencarb	6.5E+02	nc	6.8E+03	nc	3.7E+01	nc	3.7E+02	nc
		3.0E-02	x			3.0E-02	r	0	0.10		2-(Thiocyanomethylthio)- benzothiazole (TCMTB)	2.0E+03	nc	2.0E+04	nc	1.1E+02	nc	1.1E+03	nc
		3.0E-04	h			3.0E-04	r	0	0.10		Thiofanox	2.0E+01	nc	2.0E+02	nc	1.1E+00	nc	1.1E+01	nc
		8.0E-02	i			8.0E-02	r	0	0.10		Thiophanate-methyl	5.2E+03	nc	5.5E+04	nc	2.9E+02	nc	2.9E+03	nc
		5.0E-03	i			5.0E-03	r	0	0.10		Thiram	3.3E+02	nc	3.4E+03	nc	1.8E+01	nc	1.8E+02	nc
		6.0E-01	h					0	0.01		Tin and compounds	4.6E+04	nc	1.0E+05	max			2.2E+04	nc
		2.0E-01	i			1.1E-01	h	1	0.10	5.4E+03	Toluene	8.7E+02	nc	2.7E+03	sat	4.0E+02	nc	7.2E+02	nc
3.2E+00	h			3.2E+00	r			0	0.10		Toluene-2,4-diamine	1.4E-01	ca	6.0E-01	ca	2.1E-03	ca	2.1E-02	ca
		6.0E-01	h			6.0E-01	r	0	0.10		Toluene-2,5-diamine	3.9E+04	nc	1.0E+05	max	2.2E+03	nc	2.2E+04	nc
		2.0E-01	h			2.0E-01	r	0	0.10		Toluene-2,6-diamine	1.3E+04	nc	1.0E+05	max	7.3E+02	nc	7.3E+03	nc
1.9E-01	i			1.9E-01	r			0	0.10		p-Toluidine	2.3E+00	ca	1.0E+01	ca	3.5E-02	ca	3.5E-01	ca
1.1E+00	i			1.1E+00	i			0	0.10		Toxaphene	4.0E-01	ca	1.7E+00	ca	6.0E-03	ca	6.1E-02	ca
		7.5E-03	i			7.5E-03	r	0	0.10		Tralomethrin	4.9E+02	nc	5.1E+03	nc	2.7E+01	nc	2.7E+02	nc
		1.3E-02	i			1.3E-02	r	0	0.10		Triallate	8.5E+02	nc	8.9E+03	nc	4.7E+01	nc	4.7E+02	nc
		1.0E-02	i			1.0E-02	r	0	0.10		Triasulfuron	6.5E+02	nc	6.8E+03	nc	3.7E+01	nc	3.7E+02	nc
		5.0E-03	i			5.0E-03	r	0	0.10		1,2,4-Tribromobenzene	3.3E+02	nc	3.4E+03	nc	1.8E+01	nc	1.8E+02	nc
		3.0E-05	i			3.0E-05	r	0	0.10		Tributyltin oxide (TBTO)	2.0E+00	nc	2.0E+01	nc	1.1E-01	nc	1.1E+00	nc
3.4E-02	h			3.4E-02	r			0	0.10		2,4,6-Trichloroaniline	1.3E+01	ca	5.6E+01	ca	2.0E-01	ca	2.0E+00	ca
2.9E-02	h			2.9E-02	r			0	0.10		2,4,6-Trichloroaniline hydrochloride	1.5E+01	ca	6.6E+01	ca	2.3E-01	ca	2.3E+00	ca
		1.0E-02	i			5.7E-02	h	1	0.10	6.2E+04	1,2,4-Trichlorobenzene	5.8E+02	nc	5.0E+03	nc	2.1E+02	nc	1.9E+02	nc
		9.0E-02	h			2.9E-01	x	1	0.10	6.4E+03	1,1,1-Trichloroethane	1.9E+03	nc	3.0E+03	sat	1.0E+03	nc	1.3E+03	nc
5.7E-02	i	4.0E-03	i	5.6E-02	i	4.0E-03	r	1	0.10	6.0E+03	1,1,2-Trichloroethane	6.6E-01	ca	1.5E+00	ca	1.2E-01	ca	2.0E-01	ca
1.1E-02	e	6.0E-03	e	6.0E-03	e	6.0E-03	r	1	0.10	3.2E+03	Trichloroethylene (TCE)	3.3E+00	ca*	7.3E+00	ca*	1.1E+00	ca*	1.6E+00	ca*
		3.0E-01	i			2.0E-01	h	1	0.10	9.2E+02	Trichlorofluoromethane	2.8E+02	nc	9.3E+02	nc	7.3E+02	nc	1.3E+03	nc
		1.0E-01	i			1.0E-01	r	0	0.10		2,4,5-Trichlorophenol	6.5E+03	nc	6.8E+04	nc	3.7E+02	nc	3.7E+03	nc
1.1E-02				1.1E-02	i			0	0.10		2,4,6-Trichlorophenol	4.0E+01	ca	1.7E+02	ca	6.2E-01	ca	6.1E+00	ca

EPA Region IX Preliminary Remediation Goals: S.J. Smucker (08/01/94)

Key : i=IRIS h=HEAST e=ECAO x=WITHDRAWN r=ROUTE EXTRAPOLATION ca=CANCER PRG nc=NONCANCER PRG sat=SOIL SATURATION max=CEILING LIMIT *nc= < 100X ca **=nc < 10X ca

TOXICITY VALUES						SOIL FACTORS			CONTAMINANT	PRELIMINARY REMEDIAL GOALS (PRGs)							
oSF 1/(mg/kg-d)		oRfD (mg/kg-d)		iSF 1/(mg/kg-d)		iRfD (mg/kg-d)		VOC	skin ABS	VF (m^3/kg)		Residential Soil (mg/kg)		Industrial Soil (mg/kg)		Ambient Air (ug/m^3)		Tap Water (ug/l)	
		1.0E-02	i			1.0E-02	r	0	0.10		2,4,5-Trichlorophenoxyacetic Acid	6.5E+02	nc	6.8E+03	nc	3.7E+01	nc	3.7E+02	nc
		8.0E-03	i			8.0E-03	r	0	0.10		2-(2,4,5-Trichlorophenoxy) propionic acid	5.2E+02	nc	5.5E+03	nc	2.9E+01	nc	2.9E+02	nc
		5.0E-03	i			5.0E-03	r	1	0.10	3.2E+03	1,1,2-Trichloropropane	2.3E+01	nc	8.0E+01	nc	1.8E+01	nc	3.0E+01	nc
7.0E+00	h	6.0E-03	i	7.0E+00	r	5.0E-03	r	1	0.10	3.2E+03	1,2,3-Trichloropropane	2.9E-03	ca	6.4E-03	ca	9.6E-04	ca	3.1E+01	ca
								0	0.10		Ethyl acetate								
		5.0E-03	h			5.0E-03	r	1	0.10	5.2E+03	1,2,3-Trichloropropene	3.6E+01	nc	1.3E+02	nc	1.8E+01	nc	3.0E+01	nc
		3.0E+01	i			8.6E+00	h	1	0.10	1.3E+03	1,1,2-Trichloro-1,2,2-trifluoroethane	3.6E+03	sat	3.6E+03	sat	3.1E+04	nc	5.9E+04	nc
		3.0E-03	i			3.0E-03	r	0	0.10		Tridiphane	2.0E+02	nc	2.0E+03	nc	1.1E+01	nc	1.1E+02	nc
		2.0E-03	r			2.0E-03	i	1	0.10	3.5E+03	Triethylamine	1.0E+01	nc	3.5E+01	nc	7.3E+00	nc	1.2E+01	nc
7.7E-03	i	7.5E-03	i	7.7E-03	r	7.5E-03	r	0	0.10		Trifluralin	5.8E+01	ca**	2.5E+02	ca*	8.7E-01	ca*	8.7E+00	ca*
3.7E-02	h			3.7E-02	r			0	0.10		Trimethyl phosphate	1.2E+01	ca	5.2E+01	ca	1.8E-01	ca	1.8E+00	ca
		5.0E-05	i			5.0E-05	r	0	0.10		1,3,5-Trinitrobenzene	3.3E+00	nc	3.4E+01	nc	1.8E-01	nc	1.8E+00	nc
		1.0E-02	h			1.0E-02	r	0	0.10		Trinitrophenylmethylnitramine	6.5E+02	nc	6.8E+03	nc	3.7E+01	nc	3.7E+02	nc
3.0E-02	i	5.0E-04	i	3.0E-02	r	5.0E-04	r	0	0.10		2,4,6-Trinitrotoluene	4.8E+01	ca	6.4E+01	ca	2.2E-01	ca	2.2E+00	ca
		3.0E-03	i					0	0.01		Uranium (soluble salts)	2.3E+02	nc	5.1E+03	nc			1.1E+02	nc
		7.0E-03	h					0	0.01		Vanadium	5.4E+02	nc	1.2E+04	nc			2.6E+02	nc
		9.0E-03	i					0	0.01		Vanadium pentoxide	6.9E+02	nc	1.5E+04	nc			3.3E+02	nc
		2.0E-02	h					0	0.01		Vanadyl sulfate	1.5E+03	nc	3.4E+04	nc			7.3E+02	nc
		2.0E-02	h					0	0.01		Vanadium sulfate	1.5E+03	nc	3.4E+04	nc			7.3E+02	nc
		1.0E-03	i			1.0E-03	r	0	0.10		Vernam	6.5E+01	nc	6.8E+02	nc	3.7E+00	nc	3.7E+01	nc
		2.5E-02	i			2.5E-02	r	0	0.10		Vinclozolin	1.6E+03	nc	1.7E+04	nc	9.1E+01	nc	9.1E+02	nc
		1.0E+00	h			5.7E-02	i	0	0.10		Vinyl acetate	6.5E+04	nc	1.0E+05	max	2.1E+02	nc	3.7E+04	nc
1.9E+00	h			3.0E-01	h			1	0.10	7.4E+01	Vinyl chloride	1.7E-03	ca	3.5E-03	ca	2.2E-02	ca	2.0E-02	ca
		3.0E-04	i			3.0E-04	r	0	0.10		Warfarin	2.0E+01	nc	2.0E+02	nc	1.1E+00	nc	1.1E+01	nc
		2.0E+00	i			2.0E-01	x	1	0.10	1.7E+04	m-Xylene	9.8E+02	sat	9.8E+02	sat	7.3E+02	nc	1.4E+03	nc
		2.0E+00	i			2.0E-01	x	1	0.10	2.4E+04	o-Xylene	9.8E+02	sat	9.8E+02	sat	7.3E+02	nc	1.4E+03	nc
								1	0.10	1.7E+04	p-Xylene	9.8E+02	sat	9.8E+02	sat				
		2.0E+00	i			2.0E-01	r	1	0.10	2.0E+04	Xylene (mixed)	9.8E+02	sat	9.8E+02	sat	7.3E+02	nc	1.4E+03	nc
		3.0E-01	i					0	0.01		Zinc	2.3E+04	nc	1.0E+05	max			1.1E+04	nc
		3.0E-04	i					0	0.01		Zinc phosphide	2.3E+01	nc	5.1E+02	nc			1.1E+01	nc
		5.0E-02	i			5.0E-02	r	0	0.10		Zineb	3.3E+03	nc	3.4E+04	nc	1.8E+02	nc	1.8E+03	nc

FOR PLANNING PURPOSES ONLY

STATE OF CALIFORNIA—CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

PETE WILSON, Governor

DEPARTMENT OF TOXIC SUBSTANCES CONTROL

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MEMORANDUM

TO: Ken Smith, Chief
Office of Military Facilities

VIA: Richard A. Becker, Ph.D., DABT, Chief
Human and Ecological Risk Section (HERS)
Office of Scientific Affairs (OSA)

FROM: Michael J. Wade, Ph.D., DABT
Senior Toxicologist, HERS

Laura Valoppi, M.S.,
Associate Toxicologist, HERS

John P. Christopher, Ph.D., DABT,
Staff Toxicologist, HERS

DATE: October 28, 1994

SUBJECT: RECOMMENDED OUTLINE FOR USING U. S. ENVIRONMENTAL PROTECTION AGENCY REGION IX PRELIMINARY REMEDIATION GOALS IN SCREENING RISK ASSESSMENTS AT MILITARY FACILITIES

Outcome: 02 PCA: 14765 Site: 914600-45

BACKGROUND

Anthony Landis of Office of Military Facilities (OMF) requested that Office of Scientific Affairs (OSA) provide guidance on the use of Preliminary Remediation Goals (PRGs) published by U. S. Environmental Protection Agency (EPA), Region IX for the purpose of screening sites or prioritizing sites for remedial action at military facilities. This request is a follow-up to our memorandum to you of August 26, 1994, in which Human and Ecological Risk Assessment Section (HERS) outlined three acceptable approaches to performing risk assessment at open military facilities.

HERS continues to recommend that the *Preliminary Endangerment Assessment (PEA) Guidance Manual* (Department of Toxic Substances Control (DTSC), 1994) be used to screen sites for "no further action", based upon the potential for adverse effects on human health and the environment. We understand that military facilities in California have expressed interest in

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using U. S. EPA Region IX PRGs. In the past, HERS has expressed concern that the U. S. EPA Region IX PRGs omit important exposure pathways and other components specified in the PEA. Thus, we have often stated that PRGs were not appropriate for screening sites.

U. S. EPA Region IX published new PRGs on August 1, 1994 which differ from earlier versions. The August 1, 1994 PRGs from U. S. EPA Region IX were modified to consider more pathways and factors. The derivation of the "Soil PRGs" shown in the August 1, 1994 list from U. S. EPA Region IX now more closely conforms to the PEA process. As explained below in **Section C**, "Cal Modified" PRGs" are provided for six chemicals in the August 1 PRG list which differ by more than four fold from values calculated using the PEA process. Nevertheless, using this most recent August 1 list of PRGs requires a complete guidance context, such as that provided in the PEA.

In our previous memorandum to you of August 26, 1994, HERS outlined three acceptable approaches to performing risk assessment at open and closing military facilities:

1. Use the 1994 PEA process;

2. Use the August 1, 1994 PRGs from U. S. EPA Region IX (or subsequent lists), provided a protocol is submitted and accepted specifying how these PRGs are to be used; or

3. Perform a complete multipathway risk assessment using DTSC and U. S. EPA guidance for risk assessment.

The purpose of this memorandum is to provide OMF with a framework of important elements to be included in the protocol for Number 2 above. What we provide below is largely the logic of the PEA process to supplement the August 1, 1994 PRGs from U. S. EPA Region IX.

REQUIRED ELEMENTS FOR USING U. S. EPA REGION IX PRGs

The following are elements which must be addressed in any work plan or protocol which makes use of the August 1, 1994 U. S. EPA Region IX PRGs, or subsequent lists. All of these elements must be addressed.

A. Land Use

In general, HERS strongly recommends that an unrestricted

land use scenario, similar to a residential scenario, be used for site screening, unless a recorded deed restriction prevents such land use. This recommendation is based on our experience that screening evaluations are conducted to determine whether a finding of "no further action" is warranted. We make this recommendation for screening risk assessments at all military facilities, both active and closing.

In nearly all cases, the unrestricted (residential like) setting provides the greatest potential exposures to contaminants. Therefore, sites found to have acceptable risk for unrestricted land use will also have acceptable risks for other uses, such as industrial. However, sites found acceptable for industrial use might not be acceptable for other uses. For military facilities which are closing or have closed, HERS recommends that the unrestricted setting be used for site screening. We assume that reuse of these facilities will result in a change of ownership and land use. The unrestricted scenario is the most appropriate for screening sites at open facilities as well, because this health-conservative analysis provides the risk manager with enough information to approve "no further action" or to require additional investigation. Use of an unrestricted exposure scenario in no way obligates the risk manager to clean up to this level. If ultimately industrial use is seen to be the probable land use, then the site can be remediated to this level. The unrestricted scenario can then provide documentation to restrict land use to industrial.

PRGs for an industrial setting are provided in the August 1, 1994 publication from U. S. EPA Region IX. The protocol should clearly document the basis for assuming unrestricted land use (such as residential) will not occur in the future; the results of screening against residential PRGs should be included to document the need for any restrictions on future land use.

The Project Manager should be aware that several exposure pathways are <u>not</u> included in U. S. EPA Region IX's calculation of Industrial PRGs. The excluded pathways are:

1. All uses of surface and groundwater;

2. Exposure to soil gas which infiltrates indoor air;

3. Exposure to surface and goundwater contaminated by soil leachate; and

4. Inhalation of particulates from trucks and heavy equipment.

The protocol must address the rationale for eliminating each of these pathways for use of the Industrial PRGs to be acceptable.

B. Background, Detection Limits, Exposure Point Concentrations, and Key Chemical Groups

Inorganic constituents present at levels above the PRGs but at or below site background may be eliminated from the screening procedure. However, the fact that they are present above the PRGs should be noted in the assessment, along with the levels at which they were found. Preparers of protocols should consult with the DTSC Project Manager on the adequacy and representativeness of background sampling.

The protocol must include evaluation of the adequacy of the method detection limits (e.g., can the media-specific PRGs be detected?).

For site related chemicals remaining after comparison against background, the choice of the exposure point concentration should be specified in the protocol as either the maximum concentration observed or the 95 percent upper confidence limit on the arithmetic mean concentration (95 percent UCL). The 95 percent UCL may be used only with the approval of the DTSC Project Manager.

Several chemical groups occur repeatedly as "risk drivers" for military sites. The protocol should include how the following chemical groups will be assessed:

1. Polycyclic aromatic hydrocarbons (PAHs),

2. Polychlorinated biphenyls (PCBs),

3. Polychlorinated dibenzo-*p*-dioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs),

4. DDT and its congeners DDE and DDD; and

5. Hexavalent chromium.

Analytical results for total petroleum hydrocarbons (TPH) may not be used at any level of risk assessment. Instead, the principal toxic constituents must be quantified and their concentrations compared against the August 1, 1994 PRGs from U. S. EPA Region IX. The principal toxic constituents of hydrocarbon fuels are certain metals benzene, toluene, ethylbenzene, xylene(s), and PAHs.

C. California Modified PRGs

With the exception of nine substances (the six compounds listed immediately below, two PAHs listed in a following paragraph and lead, described on the next page), the August 1, 1994 PRGs from U. S. EPA Region IX now differ by no more than four-fold from values calculated using the PEA process and Cal/EPA cancer potency factors. U. S. EPA Region IX has published "CAL-Modified PRGs" for the following six chemicals in its August 1, 1994 PRGs:

1. Cadmium,
2. Hexavalent chromium,
3. 1,2-dibromo-3-chloropropane (DBCP),
4. Nickel and compounds,
5. Benzo(a)pyrene (in water only), and
6. Tetrachloroethene (PCE).

These "CAL-Modified PRGs" should be used when screening sites at Federal facilities in California.

In the August 1, 1994 Region IX list, PRGs for two additional substances, chrysene and benzo(k)fluoranthene differ by more than a factor of four as calculated by the PEA process and by Region IX. CAL-Modified PRGs for chrysene and benzo(k)fluoranthene (both are PAHs) are given in Appendix A-1, to be included with the Region IX PRG list. *These should be used when screening sites at Federal facilities in California.* It is expected that the CAL-modified PRGs for these two chemicals will be added to the body of the Region IX PRG list at its next iteration. Also contained in Appendix A-1 are PRGs for all Carcinogenic PAHs for which Region IX has calculated a PRG.

Appendix A-2 contains Provisional PRGs for all PAHs that

have Cal/EPA Potency Slopes or Potency Equivalency Factors available, but for which Region IX has not calculated a PRG. These Provisional PRGs were derived by OSA using Cal/EPA Potency Equivalency or Cancer Slope Factors and U.S. EPA Region IX PRG methodology. These Provisional PRGs are available for screening sites at Federal Facilities in California upon consultation with OSA and Region IX toxicologists.

The PRG for naphthalene is currently under discussion with Region IX. Please consult with Michael Wade at OSA regarding a PRG for this substance. A finalized PRG for naphthalene should be available by the next iteration of the Region IX PRG list.

The U. S. EPA Region IX soil PRG of 400 parts per million (ppm) for inorganic lead under residential scenario, does not conform to DTSC policy. The PEA (1994) screening level of 130 ppm inorganic lead in soil should be used at Federal facilities in California.

D. Impacts to Water

The August 1, 1994 publication from U. S. EPA Region IX also contains "Tap Water PRGs". These "Tap Water PRGs" can only be used if an exposure point concentration for the contaminant in groundwater or surface water is available or can be estimated. It is important to understand that the "Soil PRGs" are not calculated to include the potential for the contaminant to move to groundwater or surface water. Neither do they assess the likelihood that groundwater or surface water has been impacted by past releases. Such a determination requires the preparer of the protocol and the DTSC Project Manager to consider the complexities of geology and soil characteristics, disposal history, and chemical fate and transport to make an informed determination based on professional judgment.

The protocol should describe how impacts to groundwater and surface waters will be assessed, considering not only past releases, which could have resulted in existing impacts to groundwater, but also the potential for additional releases which may result in future impacts.

Preparers of protocols must gain the concurrence of the DTSC Project Manager that impacts to groundwater and surface waters are adequately addressed. This approval should be given prior to any calculation of risks/hazards to human

health. If site-specific information is insufficient to judge the potential impact of contaminants on surface water and groundwater, then the calculation of risks/hazards cannot proceed. Estimates of risks/hazards are not useful if they do not reflect the true risk from site contaminants. If it has been determined that no threat exists now or in the future to surface water or groundwater, and if DTSC staff concur with this determination, then the protocol must contain the rationale for eliminating this pathway.

In some instances, information may be limited on threats to surface water and groundwater, but available data do not fully represent the nature and extent of the contamination in water. In such an instance, the "Tap Water PRGs" from U. S. EPA Region IX's August 1, 1994 document can be used to compare against concentrations in waters at the site; however, such comparisons must be accompanied by a qualifying statement indicating that the risk estimates from the water pathway may be underestimated.

The "Tap Water PRGs" are for screening levels for human health only; protection of aquatic organisms was not considered in their derivations. It cannot be assumed that levels protective of humans are protective of aquatic organisms and wildlife.

E. Excluded Pathways

Certain pathways were excluded in the derivation of the August 1, 1994 PRGs from U. S. EPA Region IX. The protocol must provide a rationale for why these pathways can be excluded at the site in question.

1. **Water**: The August 1, 1994 "Tap Water PRGs" from U. S. EPA do not consider dermal absorption from bathing/showering for groundwater and surface water exposures. The "Tap Water PRGs" include neither ingestion of water while swimming nor transfer of contaminants in the water column to aquatic organisms or terrestrial plants, with subsequent ingestion by humans. This is not consistent with the PEA (1994), which does add this route of exposure. If this pathway is expected to result in a significant exposure, HERS should be contacted.

2. **Soil**: The "Soil PRGs" include neither inhalation of soil gases which infiltrate indoor air nor ingestion of contaminants by humans via uptake by plants (home-grown

fruits and vegetables) or animals (milk, meat, eggs). If these pathways are expected to result in a significant exposure, HERS should be contacted.

F. Air Models

Several issues regarding air are covered in the PEA but not in the August 1, 1994 PRGs from U. S. EPA Region IX. The following limitations should be noted when using these PRGs:

1. **Volatile Compounds**: The models used to calculate the "Ambient Air PRGs" and "Soil PRGs" do not represent the enhanced volatilization of compounds which can occur in the presence of landfill gases such as methane. For example, when solid waste is disposed along with hazardous wastes, the generation of methane formed from the decomposition of the solid waste can increase the emission rate of other volatile compounds. The air model for volatile compounds is based on the soil as the only source; shallow groundwater which contains volatile compounds may be an additional source to the ambient air. The August 1, 1994 PRGs from U. S. EPA Region IX were derived with a volatile emissions model using an industrial area of 2025 m^2, while the PEA manual used an area of 484 m^2 for a residential setting. This may result in different air concentrations from the two methods.

   Sometimes calculation of the "Soil PRG" resulted in a concentration which would exceed the theoretical saturation concentration in soil; in these cases U. S. EPA Region IX notes the "Soil PRG" as a "max" or "sat". This means that the "Soil PRG" is based not on risk or hazard but on the maximum soil concentration that is predicted to be absorbed onto the soil (without free product present). Above this predicted saturation concentration, the air model employed by U. S. EPA Region IX is no longer applicable, and the potential presence of free product implies a predicted threat to surface or groundwater. The protocol should indicate how exceedances of the saturation concentration will be dealt with.

2. **Fugitive Dusts**: The dust model used in the "Soil PRGs" and "Ambient Air PRGs" is a rapid assessment method which assumes a continuous and constant source for emissions. If the source at the site is actually small

and will deplete over the time frame of the exposure, then risks/hazards will be overestimated.

G. Additivity of Risk and Hazards

For each site-related chemical, concentrations in soil, air and water (if all these pathways are relevant) should be divided by the corresponding "Soil PRG", "Tap Water PRG", or "Ambient Air PRG"; these ratios must then be added across media. This summed ratio provides an estimate of the total risk or hazard for that compound in multiple media. In addition, the risk or hazard for multiple compounds at the site must also be accounted for according to the following:

1. **Compounds with Non-threshold Effects (Carcinogens)**: Chemicals whose PRGs are based on carcinogenic effects are designated with "ca" in the August 1, 1994 PRGs from U. S. EPA Region IX. All concentrations of carcinogens are thought to be associated with at least some risk, i.e., no threshold. Section 2.4 of the August 1, 1994 PRGs from U. S. EPA Region IX suggests adding the risk ratios together for multiple carcinogens to provide an estimate of risk for the total site. The magnitude of the risk will be the sum of the ratios times 10^{-6}. This provision must be included in the protocol.

2. **Threshold Compounds (Non-carcinogens)**: Chemicals whose PRGs are designated with "nc" in the August 1, 1994 PRGs from U. S. EPA Region IX are thought to exert toxic effects which display a threshold, i.e., a level below which no toxicity is expected. Section 2.4 of the August 1, 1994 PRGs from U. S. EPA Region IX suggests that hazard ratios (non-cancer endpoints) be summed to provide a hazard index. U. S. EPA Region IX does not provide PRGs for the threshold effects of carcinogens.

   If the summed hazard index is greater than one, then the hazard index may be recalculated for chemicals which have the same toxic manifestation or which affect the same target organ. The protocol must provide a discussion of which chemicals will be grouped, if any, and provide a rationale for the grouping.

H. Ecological Assessment

The August 1, 1994 PRGs from U. S. EPA Region IX only apply to human receptors. It cannot be assumed that levels protective of humans will also protect ecological receptors. The protocol must describe how the ecological assessment will be conducted. The protocol must address the potential for impacts to ecological receptors within the site boundary, as well as the potential for impacts off-site due to movement of contaminants (e.g., conveyance off-site via a storm drainage system) or intermedin transfers (e.g., food-chain transfers to animals residing off-site but using the site as a forage area). HERS recommends a screening level ecological evaluation, either one which follows the guidance outlined in Section 2.6 of the PEA, or one which follows the recently published *Draft Guidance for Ecological Risk Assessment at Hazardous Waste Sites and Permitted Facilities, Parts A and B: Scoping Assessment* (DTSC, September 1994).

SUMMARY

HERS provides in this memorandum a framework similar to the PEA within which the August 1, 1994 PRGs from U. S. EPA Region IX may be used for screening sites at military bases in California. If it is determined that a full-scale baseline risk assessment is needed, chemicals cannot be eliminated because they are below PRG or PEA levels due to the need to add risk and hazard for all chemicals.

We emphasize to OMF that sites which fail this screening process require further investigation, and <u>do not necessarily require removal actions</u>. Such further investigation might be very limited in scope. For example, further characterization of certain compounds may be needed, such as speciation for hexavalent chromium, or further refinement of the risk estimates could be conducted, such as use of a different air model based on site characteristics.

If you have any questions on this memorandum, please contact HERS liaison for Federal facilities, Dr. Michael Wade, at (916) 327-2496 (CALNET 467-2496).

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REFERENCES

1. Department of Toxic Substances Control. January 1994. Preliminary Endangerment Assessment Guidance Manual. State of California, Environmental Protection Agency. Sacramento, California.

2. Department of Toxic Substances Control. September 1994. Guidance for Ecological Risk Assessment at Hazardous Waste Sites and Permitted Facilities, Part B: Scoping Assessment. Draft guidance for review and comment. State of California, Environmental Protection Agency, Office of Scientific Affairs, Human and Ecological Risk Section. Sacramento, California.

3. United States Environmental Protection Agency, Region IX. August 1, 1994. Memorandum from Stanford J. Smucker, Ph.D., Regional Toxicologist, Technical Support Section, Subject: Region IX Preliminary Remediation Goals (PRGs) Second Half 1994.

APPENDIX A-1
SOIL PRGs FOR CARCINOGENIC PAHs

COMPOUND	CAL/EPA POTENCY EQUIVALANCY FACTOR	U.S. EPA REGION IX RESIDENTIAL SOIL PRG (ppm)
benzo(a)pyrene	1.0 (index compound)	6.1 E-02
dibenz(a,h)anthracene	0.4[a]	6.1 E-02
benzo(a)anthracene	0.1	6.1 E-01
benzo(b)fluoranthene	0.1	6.1 E-01
benzo(k)fluoranthene	0.1	6.1 E-01[b]
indeno(1,2,3-c,d)pyrene	0.1	6.1 E-01
chrysene	0.01	6.1 E+00[b]

[a]Toxicity Equivalency Factor calculated from CAL/EPA Cancer Slope Factor of 11.5 $(mg/kg\text{-}day)^{-1}$ for benzo(a)pyrene and 4.1 $(mg/kg\text{-}day)^{-1}$ for dibenz(a,h)anthracene.

[b]Cal-Modified PRGs based on Cal/EPA Potency Equivalency Factors and U.S. EPA Region IX PRG methodology.

Appendix A-2
CARCINOGENIC PAHs WITHOUT U.S. EPA REGION IX PRGs

COMPOUND	CAL/EPA POTENCY EQUIVALENCY FACTOR OR CANCER SLOPE FACTOR	PROVISIONAL SOIL PRG[a,b]
benzo(j)fluoranthene	0.1	6.1 E-01
dibenz(a,j)acridine	0.1	6.1 E-01
dibenz(a,h)acridine	0.1	6.1 E-01
7H-dibenzo(c,g)carbazole	1.0	6.1 E-02
dibenzo(a,e)pyrene	1.0	6.1 E-02
dibenzo(a,h)pyrene	10.0	6.1 E-03
dibenzo(a,i)pyrene	10.0	6.1 E-03
dibenzo(a,l)pyrene	10.0	6.1 E-03
5-methylchrysene	1.0	6.1 E-02
1-nitropyrene	0.1	6.1 E-01
4-nitropyrene	0.1	6.1 E-01
1,6-dinitropyrene	10.0	6.1 E-03
1,8-dinitropyrene	1.0	6.1 E-02
6-nitrochrysene	10.0	6.1 E-03
2-nitrofluorene	0.01	6.1 E+00
7,12-dimethylbenzanthracene	(250)[c]	2.8 E-03
3-methylcholanthrene	(22)	3.2 E-02
5-nitroacenaphthene	(0.13)	5.4 E+00

[a]Derived by OSA using CAL/EPA Potency Equivalancy Factors or Cancer Slope Factors and U.S. EPA Region IX PRG Methodology.

[b]Please contact OSA should you have a question regarding PRGs for these compounds.

[c]Parentheses signify Cancer Potency Slopes given in units of $(mg/kg\text{-}day)^{-1}$.