EPA

San Diego Regional Water Quality Control Board

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NTC SAN DIEGO
SSIC NO. 5090.3

Pete Wilson
Governor

November 7, 1996

Commanding Officer
Naval Training Center
33502 Decatur Road, Suite 120
San Diego, CA 92133-1449

Dear Sir:

RE: DRAFT WORK PLAN FOR SITE ASSESSMENT/EXTENDED SITE ASSESSMENT (SA/ESA) FOR POINTS OF INTEREST (POI), NAVAL TRAINING CENTER SAN DIEGO, CALIFORNIA

The Regional Water Quality Control Board (RWQCB), and the Department of Toxic Substances Control (DTSC) have completed our review of the above referenced document, dated September 26,1996. The document was prepared by Bechtel National, Inc. on behalf of Southwest Division Naval Facilities Engineering Command (SWDIV) in accordance with contract task order CTO-0122/0012. The purpose of the SA/ESA is to collect and evaluate data concerning the potential presence of hazardous substance contamination at 17 POI located on NTC, San Diego. Based on our review we have the following comments, see Attachment II for DTSC comments.

GENERAL COMMENTS

The RWQCB acknowledges that subsurface conditions are highly variable and there is always some uncertainty associated with evaluating data from a site. The cost of obtaining additional site assessment data must be weighed against the benefit from obtaining that additional data and the effect the data may have on the certainty of decisions made for the site. Due to the lack of site specific data or information on historic use for the sites under investigation, the proposed P-STL may not always be adequate to protect water quality, human health or the environment. In some cases (i.e. POI 19, 72, and 76 etc.) the proposed P-STLs are not consistent with existing RWQCB guidance entitled *Interim Guidance on Required Cleanup at Low-Risk Fuel Contamination Sites,* dated April 1, 1996. The extent of any subsurface impact should be defined to the degree that is necessary to determine if the site poses a threat to human health, the environment, or other nearby sensitive receptors. The RWQCB does not concur with the proposed decision rules establishing project-specific threshold levels (P-STL) where no further action is recommended, but will evaluate the data collected and any request for no further action based on a site by site basis.

SPECIFIC COMMENTS

1 Page 3-11 Section 3.2.6. POI 8 - Former Dry-Cleaning Trainer

Provide information concerning the location of the sewer pipe lateral for the building and collect two additional soil gas samples along its alignment. Also provide one additional sample location adjacent to flammables locker. Or provide groundwater samples instead of soil gas samples.

2 Page 3-26. Section 3.5.1.2.. POI 16 - Former Navy Exchange Dry Cleaners

Please explain why POI 16 and Site 11 are separate investigations?

3 Page 3-39. Section 3.7.6. POI 19 - Former PWC Aztec Landscape Storage Area

Collect and analyze shallow soil samples (approximately top one foot) and groundwater samples from each boring.

4 Page 3-44. Section 3.8.6. POI 26 - Navy Public Works Center Workshop

Due to the previous site use as an automobile repair shop. Please provide analysis for VOCs in soil and groundwater if this data has not already been collected from the adjacent sample location WS-4 or WS-4A.

5 Page 3-55. Section 3.11.6. POI 26 - Former Auto Hobby Shop No. 1

Provide analysis for VOCs in soil and groundwater and TPH 8015 modified for stoddard solvent.

6 Page 3-59. Section 3.12.6. POI 72 - Marina Building

Collect a groundwater sample from location in or adjacent to "Flammable Materials Storage Shed." Also include a soil sample from the "unsaturated zone near surface."

7 Page 3-64. Section 3.14.6. POI 85 - Former Printing Facility

Provide information concerning the location of the sewer pipe lateral to the building and locate one boring adjacent to this alignment. Collect groundwater samples and provide analysis for VOCs in soil and groundwater.

8 Page A2-10, Section 2.2.3.1. POI 14 - Machinery Repairman School

Define proposed sample depth described by "unsaturated zone near surface."

9 Page A2-29, Section 2.2.13.1. POI 76 - Possible UST

Why are two unsaturated zone near surface soil samples proposed for this UST location? Collect and analyze a groundwater sample for the listed chemicals of concern for the site.

Please contact Corey Walsh at (619) 467-2980 if you have any questions regarding this letter.

Sincerely,

JOHN P. ANDERSON, Senior Engineering Geologist
Site Mitigation and Cleanup Unit

JPA:cmw d:\docs\dod-ntc\poisaesa.ltr

FILE: 30-0092.N02

Attachment I: *Interim Guidance on Required Cleanup at Low-Risk Fuel Contamination Sites,* dated April 1, 1996 (revised February 29, 1996)

Attachment II: DTSC comments and attachments

cc:

Mr. Aaron Yue, Base Closure Team, Office of Military Facilities, Department of Toxic Substances Control, 245 West Broadway, Suite 425, Long Beach, CA 90802-4444 (without Attachment 2)

Mr. Keith Forman, Interim BRAC Environmental Coordinator, NTC-Environmental Office, 33502 Decatur Road, Suite 120 San Diego, CA 92133-1449 (without Attachment 1 or Attachment 2)

Ms. Content Arnold (Code 1832.CA) Remedial Project Manager, Southwest Division Naval Facilities Engineering Command, 1220 Pacific Highway, San Diego, CA 92132-5190

Mr. Martin Hausladen, U.S. EPA, Region IX, (H-9-2), Hazardous Waste Management Division, 75 Hawthorne Street, San Francisco, California 94105-3901 (without Attachment 2 enclosures)

Cal/EPA

Department of
Toxic Substances
Control

245 West Broadway,
Suite 425
Long Beach, CA
90802-4444

October 25, 1996

RECEIVED
OCT 30 1996
SAN DIEGO REGIONAL WATER
QUALITY CONTROL BOARD

Pete Wilson
Governor

James M. Strock
Secretary for
Environmental
Protection

Mr. Corey Walsh
Remedial Project Manager
California Regional Water Quality Control Board
San Diego Region
9771 Clairemont Mesa Blvd., Suite B
San Diego, California 92124-1331

COMMENTS ON DRAFT WORK PLAN FOR SITE ASSESSMENT/
EXTENDED SITE ASSESSMENT FOR POINTS OF INTEREST,
NAVAL TRAINING CENTER, SAN DIEGO

Dear Mr. Walsh:

As per our telephone conversation of October 17, 1996, I am forwarding my comments on the draft Work Plan for NTC's Points of Interest (POI) to you. Please incorporate these comments with the Regional Water Quality Control Board's comments and forward them to the Naval Training Center by November 8, 1996 as agreed.

Based on my review of the draft Workplan, the Department of Toxic Substances Control (DTSC) offers the following comments:

1. Page 1-2, Table 1-1:

   On October 21, 1996, DTSC received a fax addendum to the draft Work Plan from Ms. Content P. Arnold of South West Division. The addendum added POI 93 to be inserted into the draft Work Plan. Based on the addendum received, please revise and include the "POI 93 - Former Vertical Steel Structure (Near Building 49)" in Table 1-1.

2. Page 2-3, Section 2.4, Geology and Hydrogeology:

   Since this section suggests that imported fill soil and dredged fill has been used for the construction throughout NTC, please provide a fill area map detailing the area of NTC that has been potentially effected by fill materials. This map may assist in differentiating between environmental impacts by fill versus operations at NTC.

File:
CW
~~MA~~
~~CA~~

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3. Section 3, Project Specific Threshold Levels for Soil:

According to the "note" for tables throughout Section 3, and Attachment B of this draft report, the Project Specific Threshold Levels are based on the 1996 Region IX preliminary remediation goals (PRGs) for residential land use as revised by U.S.EPA on August 1996. However, upon review of the PRGs, it was found that the threshold levels cited in the draft report do not match the PRGs as published by U.S. EPA; especially for volatile organic compounds. Please revise the Project Specified Threshold Levels in accordance with the published PRGs (see provided Attachment 1).

Please also note that the Department of Toxic Substances Control disagrees with the use of PRGs for site assessments and screening sites for No Further Action (NFA) without considering the additivity of risks and hazards associated with the chemicals of potential concerns (COPCs). In order to use PRGs for screening purposes, an additional evaluation of risk for additivity must be conducted before the NFA nomination. A detailed procedure in the use of PRGs for screening sites is provided in a DTSC memorandum dated October 28, 1994. This memo is provided as Attachment 2. Procedure for calculating additivity is on Page 9, Section G of the Memo. Please revise the workplan in accordance with these procedures.

4. Section 3, Method Detection Limits for Soil:

In general, most of the Method Detection Limits for the stated analytical method in the draft report are too high. For example, according to the Test Methods for Evaluating Solid Waste Physical/ Chemical Methods, SW-846, published by U.S.EPA, the Method Detection Limits for Aluminum using test method 6010 is 45 ppb, not 10 ppm. Similarly, the method detection limits for Vinyl Chloride using 8010 is 0.18 ppb, not 0.05 ppm. If the detection limits as stated in the report are not "Method Detection Limits (MDLs)" but "Practical Quantification Limits (PQLs)", the report should specify the MDLs and the factors used to arrive at the PQLs. The report should also provide the rationale for the factors used. Please revise the report.

5. Page 3-11, Section 3.2.5, Decision Rules for POI 8:

   Since soil and groundwater sampling locations have not been proposed beyond the locations of the soil gas samples, we request that the Navy consult with the regulators on the result of the Phase I investigation and the proposed soil and groundwater sampling locations prior to commencement of sampling under Phase II.

6. Page 3-16, Section 3.3.4, Study Boundaries for POI 14:

   The Site Plan for Building 49 indicated a foundry shop as well as numerous machine shops. It is recommended that this POI be studied for metals contamination as well as TRPH.

7. Page 3-16, Section 3.3.6, Sampling Design for POI 14:

   According to the Site Plan for Building 49, there are numerous machine shops and a foundry shop in this building. We believe that collecting only two soil samples in this building is too limited. Further more, the location of MW-1 is not ideal. MW-1 is located almost directly south of the large machine shop and northeast of the shop area. Assuming that the ground water flows down gradient toward the Boat Channel, the groundwater would be flowing toward southeast. Because of the location of MW-1, it is possible that contaminants in groundwater from the large machine shop and the shop area will flow past MW-1 undetected. To better characterize the potential groundwater contamination from the machine shop and the shop area, we recommend collecting ground water samples from the soil boring areas within the shops. Monitoring of MW-1 is useful to detect any protential contaminants from the smaller shops northwest of its location.

8. Page 3-22, Section 3.4.1.2, Previous Investigations for POI 15:

   In other closing military bases, DTSC has discovered that some medical complexes have disposed of mercury into the sewer system as a past practice. This practice resulted in a high mercury vapor concentration found within the buildings and sewage lines. Please review NTC's records to ensure that mercury is not a COPC at this POI.

9. Page 3-29, Section 3.5.5, Decision Rules for POI 16:

   Since soil and groundwater sampling locations have not been proposed for the potential Phase II investigation, we request that the Navy consult with the regulators on the result of the Phase I investigation and the proposed soil and groundwater sampling locations prior to commencement of sampling under Phase II.

10. Page 3-39, Section 3.7.6, Sampling Design for POI 19:

    Since organochlorine pesticides are relatively immobile in soil, a soil sample should be taken just below ground surface. We recommend that an additional sample be collected at one foot below ground surface.

11. Page 3-44, Section 3.8.6, Sampling Design for POI 26:

    Since the groundwater flow is generally toward the Boat Channel, toward south-east, the rationale for collecting a groundwater sample south-west of the left is unclear.

12. Page 3-48, Section 3.9.5, Decision Rules for POI 29:

    As stated in Section 3.9.1.2, previous investigations have determined that the sand in this POI will require removal action. Instead of focusing on the possibility of removing this POI from removal action, the decision rule should be revised to focus on determining the extent of contamination at this POI.

13. Page 3-49, Section 3.9.6, Sampling Design for POI 29:

    This section states that 4 samples will be collected from each trench. How will the samples be selected? Will the soil within the trench be composited prior to collection of samples? What is the rationale for choosing the location of the two trenches since they still seem to be located 20 feet within the boundaries of the sand trap? How will the trenches determine the extent of contamination?

14. Page 3-50, Section 3.10.2, Identification of Decisions at POI 58:

    According to the first "If-then" statement, site maps will be used to locate borings if the geophysical survey does not identify an

existing UST. Please provide an approximation of the UST location based on the site maps regardless of the geophysical survey result. The rationale for not extrapolating the information from the maps first is unclear.

15. Page 3-55, Section 3.11.6, Sampling Design for POI 71:

Since the actual location of the former building 224 is unknown, 2 angled soil borings and 1 groundwater sample may not be a sufficient indicator of contamination. In addition, groundwater depth is 12 feet below ground surface. The angled borings at 20 - 30 degree from vertical will only reach 4 - 6 feet respectively beyond the footprint of the current building 94 if the angled borings are started immediately adjacent to the footing of the current building. If possible, we recommend the borings be conducted from within the current building.

16. Page 3-59, Section 3.12.6, Sampling Design for POI 72:

The current sampling design states that one soil sample will be collected at the top of the saturated zone at each of the two soil borings. We recommend that an additional soil sample be collected between the concrete and soil interface at the soil boring located within the concrete pad. This sample will determine the need for a removal action for the soil regardless of groundwater conditions.

17. Page 3-64, Section 3.13.6, Sampling Design for POI 76:

As stated in the third sentence of this section, a groundwater sample will be collected only if soil contamination is "obvious" at the top of the saturated zone. Please define "obvious". To avoid judgmental error by field personnel, it is recommended that a groundwater sample be collected for analysis regardless of odor or color of a sample.

According to Figure 3-14, the geophysical survey uncovered two anomalies. Why is a sample not proposed for the second anomaly?

18. Page 3-68, Section 3.15.1.1, Site Description:

This section states that building 519 burned down in 1995. Please explain the cause of the fire. Was it related to the materials stored within the storage area? What was stored in the area during the fire?

Figure 3-16 shows a large tank (tank 346) adjacent to building 519. Please describe the function of the tank and whether contamination, if found, could be attributed to the presence of the tank.

19. Page 3-76, Section 3.16.6, Sampling Design

Almost all the proposed direct push groundwater sampling locations are very near the NTC steam tunnels. The results from these samples may further complicate the interpretation of data from POI 38 (steam tunnels). Perhaps some groundwater sampling locations could be modified to areas that are less influenced by the steam tunnels. The analytical results can then be compared with results obtained from the POI 38 study.

20. Page 3-78, Section 3.17, Other Sampling:

Building 490 and 491 are not identified in a site map. Please include a map to identify the locations of the two buildings in relations to other POIs.

21. Page 3-87, Section 3.18, Data Quality Objectives Summary:

Table 3-19 has identified numerous COPCs that do not have established criteria under the California Enclosed Bays and Estuaries Plan or the U.S. EPA National Ambient Water Quality Criterion. For these COPCs, please state if a project action level will be proposed, with the decision rules governing these chemicals. Similarly, please explain the decision rules to be followed for chemicals in soil which do not have established criteria.

22. Fax Addendum for POI 93, Sampling Design:

The second paragraph indicated that the locations of sample points along the pipe will be chosen after file review and geophysical

survey. We recommend that the Navy consults with the regulators on the result of the review and survey. We also request that the Navy discuss all proposed sampling locations with us prior to commencement of activities.

For this POI, please provide Sampling Location and Sampling Rationale similar to other POIs. In addition, we request that the sampling symbols used in the figure remain consistent with the other figures. Please replace the dotted circle with a dotted triangle for soil boring with groundwater sampling. Furthermore, we recommend 1 additional groundwater sample be taken inside the structure to confirm the presence of organochlorine pesticides and for risk analysis purposes.

23. Page 4-3, Section 4.4.1, Direct-Push Rig Borings:

Please further describe the procedures to be followed in field screening the recovered samples for VOCs using a photoionization detector (PID) or flame ionization detector (FID). Any recovered samples to be analyzed for VOCs should be sealed quickly to minimize the exposure of the sample to ambient air and light to avoid volatilization and UV destruction.

24. Page A2-10, Section 2.2.3.2, Sample Rationale for POI 14:

The objective for sampling is to locate potential contamination. Sampling locations chosen based on number of machines present may not be appropriate. The sampling location should be based also on cracks found within the area, visible stains, and/ or the lowest elevation of the flooring within the area. Please also see comment 7 above regarding the location of MW-1.

25. Page A2-22, Section 2.2.7.2, Sample Rationale for POI 19:

The sample location of the west boring should be based on cracks observed on flooring, visible stains or lowest elevation of the floor. We recommend an additional soil sample at the flooring/ soil interface to determine any surface soil contamination.

26. Page A2-22, Section 2.2.8.1, Sample Location for POI 26:

If the ground penetrating radar anomaly is as located on figure 2-8, why is the proposed soil sampling 10 feet north and upgradient from the anomaly? It would be more logical to obtain a sample directly from the area of the anomaly.

Furthermore, it is DTSC's impression that the general groundwater gradient is sloped toward the boat channel, which is at a southeastern direction. The proposed groundwater sample location is southwest of the anomaly; therefore, this may not be the best location to detect COPCs from this POI.

27. Page A2-24, Section 2.2.9.2, Sample Rationale for POI 29:

We disagree with this sample rationale. If the proposed trenches were to allow observation of the subsurface to determine if the sand trap had already been excavated, the trenches should be located at areas previously sampled, rather than at the fringe of the small arms range. Furthermore, according to section 3.9.1.2, the two soil samples taken during a soil investigation conducted by BNI in 1995 still show that the soil exceeded the project-specific threshold limits. Therefore, we believe that for this round of investigation, the purpose should be to determine the extent of contamination for a removal action. The trenches should be placed closer to the edge of the small arms range to define the boundaries of contamination.

28. Page A2-32, Section 2.2.14.1, Sample Location for POI 85:

Instead of angled borings, we prefer vertical borings within the building, if possible. The reason is that the groundwater is at 15 feet below ground surface. Assuming the angled boring begins at the edge of the building, the lateral reach of the borings at 20-30 degrees from vertical will only be 5-7 feet beyond the footprint of the building before reaching ground water. With two proposed samples within the unsaturated zone, the lateral reach of the two samples may still be under the walls of the building which would not be the usual location of contamination.

29. Page A3-4, Section 3.3.1, Direct-Push Borings:

According to the third paragraph of this section, the recovered samples will be field screened for VOCs using a PID or FID. Will all recovered samples be field screened first? If so, will the samples be exposed to ambient air? How much handling of the sample will occur prior to being sealed and preserved? In general, VOC samples must be properly handled to avoid volatility which can affect the precision and accuracy of the analytical results due to concentration change. Field personnel should minimize the exposure time of VOC samples to air.

30. Page A3-11, Section 3.6.1, Field Screening of Soil Samples:

Since a PID is proposed for field screening, please provide a table of COPCs with their ionization potentials and the appropriate detector lamp to be used. Please note that the use of FID and PID for qualitative field screening is subject to interferences from other chemicals. In addition, as proposed, the result from field screening of samples for a duration of 3 to 5 seconds with a PID or FID 3 inches away will not provide good results. Within 3 to 5 seconds, the PID and FID may not even have enough time to stabilize. Also, at 3 inches above the sample, a great deal of air mixing will have occurred between the sample and the detector, especially if the field screens are conducted outdoors.

Based on the above limitations, the rationale for conducting field screens is unclear. In fact, due to the exposure of the sample to ambient air, and the time required to conduct the field screening, a decrease in the concentration of VOCs in the sample may occur because of volatilization. This will introduce additional errors in the laboratory analysis results. We request that the Navy reconsider the necessity in conducting the field screen and revise the workplan accordingly.

If you have any questions regarding this letter, please feel free to contact me at (310) 590-4897.

Sincerely,

Aaron Yue
EAR Specialist/ Interim RPM
Base Closure and Conversion
Office of Military Facilities

Enclosures

N00247.000441
NTC SAN DIEGO
SSIC # 5090.3

ATTACHMENT I: INTERIM GUIDANCE ON REQUIRED CLEANUP AT LOW-RISK FUEL CONTAMINATION SITES, DATED APRIL 1, 1996 (REVISED FEBRUARY 29, 1996)

THE ABOVE IDENTIFIED ATTACHMENT WAS NOT SUBMITTED WITH THIS DOCUMENT. REGION 9 PRELIMINARY REMEDIATION GOALS (PRGs) 1996 WAS SUBMITTED AS ATTACHMENT I.

QUESTIONS MAY BE DIRECTED TO:

DIANE C. SILVA
RECORDS MANAGEMENT SPECIALIST
SOUTHWEST DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
1220 PACIFIC HIGHWAY
SAN DIEGO, CA 92132

TELEPHONE: (619) 532-3676

ATTACHMENT 1

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

August 1, 1996

Subject: Region 9 Preliminary Remediation Goals (PRGs) 1996

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

To: PRG Table Mailing List

Please find the annual update to the Region 9 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 1996, HEAST through May 1995, and EPA's National Center for Environmental Assessment (NCEA, formerly ECAO).

Region 9 PRGs are "evergreen" and have evolved as new methodologies and parameters have been developed. In several cases the models, equations, and assumptions presented in RAGS HHEM, *Part B, Development of Risk-Based Preliminary Remediation Goals* (1991) have been replaced with new information that is consistent with the document, *Soil Screening Guidance*, recently issued by the Office of Solid Waste and Emergency Response (OSWER), dated April 1996.

The updated PRG table also contains soil screening levels (SSLs) for protection of groundwater. The SSLs were obtained directly from EPA/OSWER's *Soil Screening Guidance* document which is available from NTIS as EPA/540/R-96/018 and EPA/540/R-95/128. Please note that because R 9 PRGs currently evaluate intermedia transfer of volatile organic chemicals (VOCs) and heavy metals from soil to air, the PRG table does not include a separate list of SSLs for the air pathway.

To help users rapidly identify substances with new PRGs, these contaminants are printed in boldface type. Changes in PRG values are either due to new toxicity constants or new physico-chemical information. This version of the table contains revised toxicity values for acetaldehyde, chlorine cyanide, 1,3-dichlorobenzene, 2-dichloroethane, endosulfan, manganese, phosphoric acid, and 1,1,1-trichloroethane. Also, 23 additional VOCs have been identified and evaluated for inhalation exposures resulting from intermedia transfer from soil and water to air.

EPA Region 9 has established a homepage on the World Wide Web which you can find at http://www.epa.gov/region 9/. Our homepage will soon include the PRG table in downloadable form. The electronic table contains additional information not presented in the printed table (e.g. physico-chemical constants, non-cancer PRGs for carcinogens, pathway-specific PRGs, and volatilization factors for VOCs). Meanwhile, we still provide the electronic PRG table (PRG96.zip) on California Regional Water Board's BBS (510.286.0404) for those of you who have a modem.

Before relying on any number in the table, it is recommended that the user verify the numbers with an agency toxicologist or risk assessor 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 find an error please send me a note via email at Smucker.Stan@epamail.epa.gov or fax at 415.744.1916.

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DISCLAIMER

Preliminary remediation goals (PRGs) focus on common 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.

1.0 INTRODUCTION

The Region 9 PRG table combines current EPA toxicity values with "standard" exposure factors to estimate contaminant concentrations in environmental media (soil, air, and water) that are protective of humans, including sensitive groups, over a lifetime. Chemical concentrations above these levels would not automatically designate a site as "dirty" or trigger a response action. However, exceeding a PRG suggests that further evaluation of the potential risks that may be posed by site contaminants is appropriate. Further evaluation may include additional sampling, consideration of ambient levels in the environment, or a reassessment of the assumptions contained in these screening-level estimates (e.g. appropriateness of route-to-route extrapolations).

The PRG concentrations presented in the table can be used to screen pollutants in environmental media, trigger further investigation, and provide an initial cleanup goal if applicable. When considering PRGs as preliminary goals, residential concentrations should be used for maximum beneficial uses of a property. Industrial concentrations are included in the table as an alternative cleanup goal for soils, but it is not recommended that industrial concentrations be used for screening sites.

Before applying PRGs as screening tools or initial goals, the user of the table should consider whether the exposure pathways and exposure scenarios at the site are fully accounted for in the PRG calculation. Region 9 PRG concentrations are based on exposure pathways for which generally accepted methods, models, and assumptions have been developed (i.e. ingestion, dermal contact, and inhalation) for specific land-use conditions and do not consider impact to groundwater or ecological receptors (see Developing a Conceptual Site Model below).

EXHIBIT 1-1
TYPICAL EXPOSURE PATHWAYS BY MEDIUM
FOR RESIDENTIAL AND INDUSTRIAL LAND USES*

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, meat, or dairy products	Inhalation of particulates from trucks and heavy equipment
	Dermal absorption	***Dermal absorption***

Footnote:
*Exposure pathways considered in the PRG calculations are indicated in boldface italics.

2.0 READING THE PRG TABLE

2.1 General Considerations

With the exceptions described below, PRGs are chemical concentrations that correspond to fixed levels of risk (i.e.either a one-in-one million [10^{-6}] cancer risk or a noncarcinogenic hazard quotient of one, whichever occurs at a lower concentration) in soil, air, and water. In most cases, where a substance causes both cancer and noncancer or systemic effects, the 10^{-6} cancer risk will result in a more stringent criteria and consequently this value is presented in the table. PRG concentrations based on cancer risk are indicated by "ca". PRG concentrations based on noncarcinogenic health threats are indicated by "nc".

If the risk-based concentrations are to be used to screen sites, it is recommended that both cancer and noncancer-based PRGs be obtained even though the printed list contains only the more restrictive of the two values. To obtain additional values (e.g. noncancer PRGs for a carcinogenic substance), the user has the following options:

- download an electronic copy of the PRG table from EPA Region 9's homepage at http://www.epa.gov/region 9/
- download the file (PRG96.zip) from California Regional Water Board's BBS at 510.286.0404
- use the equations presented in Section 4.0 to calculate additional PRG values

It has come to my attention that some users have been multiplying the cancer PRG concentrations by 10 or 100 to set "action levels" for triggering remediation or to set less stringent cleanup levels for a specific site after considering non-risk-based factors such as (ambient levels, detection limits, or technological feasibility). This practice recognizes that there may be a range of values that may be "acceptable" for carcinogenic risk (EPA's cancer risk range is from 10^{-6} to 10^{-4}). However, this practice could lead one to overlook serious noncancer health threats and it is strongly recommended that the user consult with a toxicologist or Regional risk assessor before doing this. For carcinogens, I have indicated by asterisk ("ca*") in the PRG table where the noncancer PRGs would be exceeded if the cancer value that is listed is multiplied by 100. Two stars ("ca**") indicate that the noncancer values would be exceeded if the cancer PRG were multiplied by 10. There is no range of "acceptable" noncarcinogenic "risk" so that under no circumstances should noncancer PRGs be multiplied by 10 or 100, when setting final cleanup criteria.

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 the soil saturation equation ("sat") 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.

In addition to Region 9 PRGs, the PRG table also includes California EPA PRGs ("CAL-Modified PRGs") for specific chemicals where CAL-EPA values may be more restrictive than the federal values; and, soil screening levels (SSLs) for protection of groundwater (see Section 2.3 below).

2.2 Toxicity Values

EPA toxicity values, known as noncarcinogenic reference doses (RfD) and carcinogenic slope factors (SF) were obtained from IRIS through July 1996, HEAST through May 1995, and EPA's National Center for Environmental Assessment (NCEA, formerly ECAO). The priority among sources of toxicological constants used are as follows: (1) IRIS (indicated by "i"), (2) HEAST ("h"), (3) NCEA ("n"), and (4) withdrawn from IRIS or HEAST and under review ("x").

Route-to-route extrapolations ("r") were frequently used when there were no toxicity values available for a given route of exposure. Oral cancer slope factors ("SFo") and reference doses ("RfDo") were used for both oral and inhaled exposures for organic compounds lacking inhalation values. Inhalation slope factors ("SFi") and inhalation reference doses ("RfDi") were used for both inhaled and oral exposures for organic compounds lacking oral values. An additional route extrapolation is the use of oral toxicity values for evaluating dermal exposures. **Although route-to-route methods are a useful screening procedure, the appropriateness of these default assumptions for specific contaminants should be verified by a toxicologist.**

To help users rapidly identify substances with new PRGs, these contaminants are printed in boldface type. This version of the table contains revised toxicity values for acetaldehyde, chlorine cyanide, 1,3-dichlorobenzene, 2-dichloroethane, endosulfan, manganese, phosphoric acid, and 1,1,1-trichloroethane.

2.3 Soil Screening Levels

Generic soil screening levels (SSLs) for the protection of groundwater have been included in the PRG table for 100 of the most common contaminants at Superfund sites. Generic SSLs are derived using default values in standardized equations presented in *Soil Screening Guidance* (available from NTIS as document numbers PB96-963502 and PB96-963505 or EPA/540/R-95/128 and EPA/540/R-96/018).

The SSLs were developed using a default dilution-attenuation factor (DAF) of 20 to account for natural processes that reduce contaminant concentrations in the subsurface. Also included are generic SSLs that assume no dilution or attenuation between the source and the receptor well (i.e., a DAF of 1). These values can be used at sites where little or no dilution or attenuation of soil leachate concentrations is expected at a site (e.g., sites with shallow water

tables, fractured media, karst topography, or source size greater than 30 acres).

Generally, if an SSL is not exceeded for the migration to groundwater pathway, the user may eliminate this pathway from further investigation.

2.4 Miscellaneous

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). These contaminants are evaluated for potential volatilization from soil / water to air using volatilization factors (see Section 4.1). Since the 1995 PRG table, 23 additional VOCs have been identified and evaluated for inhalation exposures resulting from intermedia transfer from soil and water to air. These are indicated in boldface type.

Chemical-specific dermal absorption values for contaminants in soil and dust are presented for arsenic, cadmium, pentachlorophenol, PCBs, and dioxin as recommended by EPA's Office of Research and Development (USEPA 1992a). Otherwise, default skin absorption fractions are assumed to be 0.01 and 0.10, for inorganics and organics, respectively.

3.0 USING THE PRG TABLE

The decision to use PRGs at a site will be driven by the potential benefits of having generic risk-based concentrations in the absence of site-specific risk assessments. The original intended use of PRGs was to provide initial cleanup goals for individual chemicals given specific medium and land-use combinations (see RAGS Part B, 1991), however risk-based PRGs actually have several uses in addition to providing initial goals. These include:

- Screening sites to determine further evaluation
- Prioritizing areas of concern at megasites (e.g. federal facilities)
- Calculating risks associated with multiple contaminants

A few basic procedures are recommended for using PRGs properly. These are briefly described below. Potential problems with the use of PRGs are also identified.

3.1 Developing a Conceptual Site Model

The primary condition for use of PRGs is that exposure pathways of concern and conditions at the site match those taken into account by the PRG framework. Thus, it is always necessary to develop a conceptual site model (CSM) to identify likely contaminant source areas, exposure pathways, and potential receptors. This information can be used to determine the applicability of PRGs at the site and the need for additional information. For those pathways not covered by PRGs, a risk assessment specific to these additional pathways may be necessary. Nonetheless, the PRG lookup values will still be useful in such situations for focusing further investigative efforts on the exposure pathways not addressed.

To develop a site-specific CSM, perform an extensive records search and compile existing data (e.g. available site sampling data, historical records, aerial photographs, and hydrogeologic information). Once this information is obtained, CSM worksheets such as those provided in ASTM's *Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites* (1995) can be used to tailor the generic worksheet model to a site-specific CSM. The final CSM diagram represents linkages among contaminant sources, release mechanisms, exposure pathways and routes and receptors. It summarizes our understanding of the contamination problem.

As a final check, the CSM should answer the following questions:

- 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 adjusted to reflect this new information. Suggested references for evaluating pathways not currently evaluated by Region 9 PRG's are presented in Exhibit 3-1.

EXHIBIT 3-1
SUGGESTED READINGS FOR EVALUATING SOIL CONTAMINANT PATHWAYS NOT CURRENTLY ADDRESSED BY REGION 9 PRGs

EXPOSURE PATHWAY	REFERENCE
Migration of contaminants to an underlying potable aquifer	*Soil Screening Guidance: User's Guide and Technical Background Document* (USEPA 1996a,b)
Ingestion via plant uptake	*Technical Support Document for Land Application of Sewage Sludge (USEPA 1992a)*
Ingestion via meat or dairy products	*Estimating Exposure to Dioxin-Like Compounds - Review Draft* (1994a)
Inhalation of volatiles that have migrated into basements	*Soil Screening Guidance: User's Guide and Technical Background Document* (USEPA 1996a,b)
Terrestrial environmental pathways	*Role of the Ecological Risk Assessment in the Baseline Risk Assessment* (USEPA 1994b)

3.2 Background Levels Evaluation

A necessary step in determining the usefulness of Region 9 PRGs is the consideration of background contaminant concentrations. EPA may be concerned with two types of background at sites: naturally occurring and anthropogenic. Natural background is usually limited to metals whereas anthropogenic (i.e. human-made) background includes both organic and inorganic contaminants. Before embarking on an extensive sampling and analysis program to determine local background concentrations in the area, one should first compile existing data on the subject. Far too often there is pertinent information in the literature that gets ignored, resulting in needless expenditures of time and money.

Generally EPA does not clean up below natural background. If natural background concentrations are higher than the PRGs, the generic PRGs may not be the best tool for site decisionmaking. Or, an adjustment of the PRG may be needed. For example, naturally occurring arsenic frequently is higher than the soil PRG set equal to a one-in-one-million cancer risk (the point of departure), thus an alternative PRG for arsenic is provided in the lookup tables based on non-cancer endpoints that is still protective of cancer risks as well (i.e. falls within EPA's "acceptable" risk range). Because of the problems associated with adjusting PRGs to an alternate risk level, this procedure is not recommended without first

consulting a staff toxicologist at state and / or federal regulatory agencies.

Where anthropogenic background levels exceed PRGs and EPA has determined that a response action is necessary and feasible, EPA's goal will be to develop a comprehensive response to the widespread contamination. This will often require coordination with different authorities that have jurisdiction over the sources of contamination in the area.

3.3 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 :

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

- 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:

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

For more information on screening site risks, the reader should contact EPA Region 9's Technical Support Team.

3. 4 Potential Problems

As with any risk-based tool, the potential exists for misapplication. In most cases the root cause will be a lack of understanding of the intended use of Region 9 PRGs. In order to prevent misuse of PRGs, the following should be avoided:

- Applying PRGs to a site without adequately developing a conceptual site model that identifies relevant exposure pathways and exposure scenarios,
- Not considering background concentrations when choosing PRGs as cleanup goals,
- Use of PRGs as cleanup levels without the nine-criteria analysis specified in the National Contingency Plan (or, comparable analysis for programs outside of Superfund),
- Use of PRGs as cleanup levels without verifying numbers with a toxicologist,
- Use of antiquated PRG tables that have been superseded by more recent publications,
- Not considering the effects of additivity when screening multiple chemicals, and
- Adjusting PRGs upward by factors of 10 or 100 without consulting a toxicologist.

4.0 TECHNICAL SUPPORT DOCUMENTATION

Region 9 PRGs consider human exposure hazards to chemicals from contact with contaminated 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. non-zero MCLGs, AWQC, and NAAQS) and consequently the discussion of these media are brief.

4.1 Inhalation of Volatiles and Fugitive Dusts

Agency toxicity criteria indicate that risks from exposure to some chemicals via inhalation far outweigh the risk via ingestion; therefore soil PRGs have been designed to address this pathway as well. The models used to calculate PRGs for inhalation of volatiles / particulates are updates of risk assessment methods presented in RAGS Part B (USEPA 1991a) and are consistent with the *Soil Screening Guidance: User's Guide and Technical Background*

Document (USEPA 1996a,b).

To address the soil-to-air pathways the PRG calculations incorporate volatilization factors (VF_s) for volatile contaminants and particulate emission factors (PEF) for nonvolatile contaminants. These factors relate soil contaminant concentrations to air contaminant concentrations that may be inhaled on-site. The VF_s and PEF equations can be broken into two separate models: an emission model to estimate emissions of the contaminant from the soil and a dispersion model to simulate the dispersion of the contaminant in the atmosphere.

It should be noted that the box model in RAGS Part B has been replaced with a dispersion term (Q/C) derived from a modeling exercise using meteorological data from 29 locations across the United States because the box model may not be applicable to a broad range of site types and meteorology and does not utilize state-of-the-art techniques developed for regulatory dispersion modeling. The dispersion model for both volatiles and particulates is the AREA-ST, an updated version of the Office of Air Quality Planning and Standards, Industrial Source Complex Model, ISC2. However, different Q/C terms are used in the VF and PEF equations. Los Angeles was selected as the 90th percentile data set for volatiles and Minneapolis was selected as the 90th percentile data set for fugitive dusts (USEPA 1996 a,b). A default source size of 0.5 acres was chosen for the PRG calculations. This is consistent with the default exposure area over which Region 9 typically averages contaminant concentrations in soils. If unusual site conditions exist such that the area source is substantially larger than the default source size assumed here, an alternative Q/C could be applied (see USEPA 1996a,b).

Volatilization Factor for Soils

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 for soils (VF_s). Please note that VF_s's are available in the electronic version of the PRG table.

The emission terms used in the VF_s are chemical-specific and were calculated from physical-chemical information obtained from a number of sources including *Superfund Exposure Assessment Manual* (SEAM, EPA 1988), *Subsurface Contamination Reference Guide* (EPA 1990a), *Fate and Exposure Data* (Howard 1991), and *Superfund Chemical Data Matrix* (USEPA 1994c). 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 term 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. Physico-chemical information is available in the electronic version of the PRG table. To access this information, the user should display the hidden columns in the table.

Equation 4-9 forms the basis for deriving generic soil PRGs for the inhalation pathway. The following parameters in the standardized equation can be replaced with specific site data to

develop a simple site-specific PRG

- Source area
- Average soil moisture content
- Average fraction organic carbon content
- Dry soil bulk density

The basic principle of the VF_s model is applicable only if the soil contaminant concentration is at or below soil saturation. Above this level, the model cannot predict an accurate VF_s. If the PRG calculated using VF_s was greater than the calculated "sat" (Equation 4-10), the PRG was set equal to "sat" in accordance with *Soil Screening Guidance* (USEPA 1996 a,b).

Volatilization Factor for Tap Water

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 transferred into air by all water uses). Note: the range of transfer efficiencies extends from 30% for toilets to 90% for dishwashers.

Particulate Emission Factor for Soils

Inhalation of chemicals adsorbed to respirable particles (PM_{10}) were assessed using a default PEF equal to 1.316×10^9 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 generic PEF was derived using default values in Equation 4-11, which corresponds to a receptor point concentration of approximately 0.76 ug/m^3. 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 represents an annual average emission rate based on wind erosion that should be compared with chronic health criteria; it is not appropriate for evaluating the potential for more acute exposures.

The impact of the PEF on the resultant PRG concentration (that combines soil exposure pathways for ingestion, skin contact, and inhalation) can be assessed by downloading the PRG tables and displaying the hidden columns. With the exception of specific heavy metals, the PEF does not appear to significantly affect most soil PRGs. Equation 4-11 forms the basis for deriving a generic PEF for the inhalation pathway. For more details regarding specific parameters used in the PEF model, the reader is referred to *Soil Screening Guidance: Technical Background Document* (USEPA 1996a).

Note: the generic PEF evaluates windborne emissions and does not consider dust emissions from traffic or other forms of mechanical disturbance that could lead to greater emissions than assumed here.

4.2 Dermal Contact with Contaminants in Soil

Much uncertainty surrounds the determination of hazards associated with skin contact with soils. One important data gap is the lack of EPA verified 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.

Thus far, chemical-specific absorption values for skin have been recommended for only five chemicals (arsenic, cadmium, pentachlorophenol, PCBs, and dioxin) 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. 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 per day). Note: worker and children intake rates (50 and 200 mg per day, respectively) yield somewhat different results.

dermal dose = ingestion dose

$$C_{soil} \times ABS \times AF \times SA = C_{soil} \times IR$$

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

4.3 SSLs for the Migration to Groundwater Pathway

The methodology for calculating SSLs for the migration to groundwater was developed to identify chemical concentrations in soil that have the potential to contaminate groundwater. Migration of contaminants from soil to groundwater can be envisioned as a two-stage process: (1) release of contaminant in soil leachate and (2) transport of the contaminant through the underlying soil and aquifer to a receptor well. The SSL methodology considers both of these fate and transport mechanisms.

SSLs are backcalculated from acceptable ground water concentrations (i.e. nonzero MCLGs, MCLs, or risk-based PRGs). First, the acceptable groundwater concentration is multiplied by a dilution factor to obtain a target leachate concentration. For example, if the dilution factor

is 10 and the acceptable ground water concentration is 0.05 mg/L, the target soil leachate concentration would be 0.5 mg/L. The partition equation (presented in the *Soil Screening Guidance* document) is then used to calculate the total soil concentration (i.e. SSL) corresponding to this soil leachate concentration.

The SSL methodology was designed for use during the early stages of a site evaluation when information about subsurface conditions may be limited. Because of this constraint, the methodology is based on conservative, simplifying assumptions about the release and transport of contaminants in the subsurface. For more on SSLs, and how to calculate site-specific SSLs versus generic SSLs presented in the PRG table, the reader is referred to the *Soil Screening Guidance* document (USEPA 1996a,b).

4.4 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 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 4-1).

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 ("adj"). 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 (see derivations next page).

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.

(1) ingestion([mg•yr]/[kg•d]:

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

(2) skin contact([mg•yr]/[kg•d]:

$$SFS_{adj} = \frac{ED_c \times AF \times SA_c}{BW_c} + \frac{(ED_r - ED_c) \times AF \times SA_a}{BW_a}$$

(3) inhalation ([m^3•yr]/[kg•d]):

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

4.5 PRG Equations

The equations used to calculate the PRGs for carcinogenic and noncarcinogenic contaminants are presented in Equations 4-1 through 4-8. The PRG equations update RAGS Part B equations. Briefly, PRGs are risk assessments run in reverse. The methodology backcalculates a soil, air, or water concentration level from a target risk (for carcinogens) or hazard quotient (for noncarcinogens). For completeness, the soil equations combine risks from ingestion, skin contact, and inhalation simultaneously. Note: the electronic version of the table also includes pathway-specific PRGs, should the user decide against combining specific exposure pathways; or, the user wants to identify the relative contribution of each pathway to exposure.

To calculate PRGs for volatile chemicals in soil, a chemical-specific volatilization factor is calculated per Equation 4-9. Because of its reliance on Henry's law, the VF_s model is applicable only when the contaminant concentration in soil is at or below saturation (i.e. there is no free-phase contaminant present). Soil saturation ("sat") 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. If the PRG calculated using VF_s was greater than the calculated sat, the PRG was set equal to sat, in accordance with *Soil Screening Guidance* (USEPA 1996 a,b). The updated equation for deriving sat is presented in Equation 4-10.

EXHIBIT 4-1
STANDARD DEFAULT FACTORS

Symbol	Definition (units)	Default	Reference
CSFo	Cancer slope factor oral (mg/kg-d)-1	–	IRIS, HEAST, or NCEA
CSFI	Cancer slope factor inhaled (mg/kg-d)-1	–	IRIS, HEAST, or NCEA
RfDo	Reference dose oral (mg/kg-d)	–	IRIS, HEAST, or NCEA
RfDI	Reference dose inhaled (mg/kg-d)	–	IRIS, HEAST, or NCEA
TR	Target cancer risk	10^{-6}	–
THQ	Target hazard quotient	1	–
BWa	Body weight, adult (kg)	70	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)
ATc	Averaging time - carcinogens (days)	25550	RAGS(Part A), EPA 1989 (EPA/540/1-89/002)
ATn	Averaging time - noncarcinogens (days)	ED*365	
SAa	25% Surface area, adult (cm^2/day)	5000	Dermal Assessment, EPA 1992 (EPA/600/8-91/011B)
SAc	25% Surface area, child (cm^2/day)	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*	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)
IFWadj	Ingestion factor, water ([l•yr]/[kg•d])	1.1	By analogy to RAGS (Part B)
VFw	Volatilization factor for water (L/m^3)	0.5	RAGS(Part B) , EPA 1991 (OSWER No. 9285.7-01B)
PEF	Particulate emission factor (m^3/kg)	See below	Soil Screening Guidance (EPA 1996a,b)
VFs	Volatilization factor for soil (m^3/kg)	See below	Soil Screening Guidance (EPA 1996a,b)
sat	Soil saturation concentration (mg/kg)	See below	Soil Screening Guidance (EPA 1996a,b)

Footnote:
*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 4-1: Combined Exposures to Carcinogenic Contaminants in Residential Soil

$$C(mg/kg) = \frac{TR \times AT_c}{EF_r \left[\left(\frac{IFS_{adj} \times CSF_o}{10^6 mg/kg} \right) + \left(\frac{SFS_{adj} \times ABS \times CSF_o}{10^6 mg/kg} \right) + \left(\frac{InhF_{adj} \times CSF_i}{VF_s^a} \right) \right]}$$

Equation 4-2: Combined Exposures to Noncarcinogenic Contaminants in Residential Soil

$$C(mg/kg) = \frac{THQ \times BW_c \times AT_n}{EF_r \times ED_c \left[\left(\frac{1}{RfD_o} \times \frac{IRS_c}{10^6 mg/kg} \right) + \left(\frac{1}{RfD_o} \times \frac{SA_c \times AF \times ABS}{10^6 mg/kg} \right) + \left(\frac{1}{RfD_i} \times \frac{IRA_c}{VF_s^a} \right) \right]}$$

Equation 4-3: Combined Exposures to Carcinogenic Contaminants in Industrial Soil

$$C(mg/kg) = \frac{TR \times BW_a \times AT_c}{EF_o \times ED_o \left[\left(\frac{IRS_o \times CSF_o}{10^6 mg/kg} \right) + \left(\frac{SA_a \times AF \times ABS \times CSF_o}{10^6 mg/kg} \right) + \left(\frac{IRA_a \times CSF_i}{VF_s^a} \right) \right]}$$

Equation 4-4: Combined Exposures to Noncarcinogenic Contaminants in Industrial Soil

$$C(mg/kg) = \frac{THQ \times BW_a \times AT_n}{EF_o \times ED_o \left[\left(\frac{1}{RfD_o} \times \frac{IRS_o}{10^6 mg/kg} \right) + \left(\frac{1}{RfD_o} \times \frac{SA_a \times AF \times ABS}{10^6 mg/kg} \right) + \left(\frac{1}{RfD_i} \times \frac{IRA_a}{VF_s^a} \right) \right]}$$

Footnote:
[a]Use VF_s for volatile chemicals (defined as having a Henry's Law Constant [atm-m^3/mol] greater than 10^{-5} and a molecular weight less than 200 grams/mol) or PEF for non-volatile chemicals.

Tap Water Equations:

Equation 4-5: Ingestion and Inhalation Exposures to Carcinogenic Contaminants in Water

$$C(ug/L) = \frac{TR \times AT_c \times 1000ug/mg}{EF_r\ [(IFW_{adj} \times CSF_o) + (VF_w \times InhF_{adj} \times CSF_i)]}$$

Equation 4-6: Ingestion and Inhalation Exposures to Noncarcinogenic Contaminants in Water

$$C(ug/L) = \frac{THQ \times BW_a \times AT_n \times 1000ug/mg}{EF_r \times ED_r\ [(\frac{IRW_a}{RfD_o}) + (\frac{VF_w \times IRA_a}{RfD_i})]}$$

Air Equations:

Equation 4-7: Inhalation Exposures to Carcinogenic Contaminants in Air

$$C(ug/m^3) = \frac{TR \times AT_c \times 1000ug/mg}{EF_r \times InhF_{adj} \times CSF_i}$$

Equation 4-8: Inhalation Exposures to Noncarcinogenic Contaminants in Air

$$C(ug/m^3) = \frac{THQ \times RfD_i \times BW_a \times AT_n \times 1000ug/mg}{EF_r \times ED_r \times IRA_a}$$

SOIL-TO-AIR VOLATILIZATION FACTOR (VF_s)

Equation 4-9: Derivation of the Volatilization Factor

$$VF_s(m^3/kg) = (Q/C) \times \frac{(3.14 \times D_A \times T)^{1/2}}{(2 \times \rho_b \times D_A)} \times 10^{-4}(m^2/cm^2)$$

where:

$$D_A = \frac{[(\Theta_a^{10/3} D_i H' + \Theta_w^{10/3} D_w)/n^2]}{\rho_B K_d + \Theta_w + \Theta_a H'}$$

Parameter	Definition (units)	Default
VF_s	Volatilization factor (m^3/kg)	–
D_A	Apparent diffusivity (cm^2/s)	–
Q/C	Inverse of the mean conc. at the center of a 0.5-acre square source (g/m^2-s per kg/m^3)	68.81
T	Exposure interval (s)	9.5×10^8
ρ_b	Dry soil bulk density (g/cm^3)	1.5
Θ_a	Air filled soil porosity (L_{air}/L_{soil})	0.28 or $n-\Theta_w$
n	Total soil porosity (L_{pore}/L_{soil})	0.43 or $1 - (\rho_b/\rho_s)$
Θ_w	Water-filled soil porosity (L_{water}/L_{soil})	0.15
ρ_s	Soil particle density (g/cm^3)	2.65
Di	Diffusivity in air (cm^2/s)	Chemical-specific
H	Henry's Law constant (atm-m^3/mol)	Chemical-specific
H'	Dimensionless Henry's Law constant	Calculated from H by multiplying by 41 (USEPA 1991a)
D_w	Diffusivity in water (cm^2/s)	Chemical-specific
K_d	Soil-water partition coefficient (cm^3/g) = $K_{oc}f_{oc}$	Chemical-specific
K_{oc}	Soil organic carbon-water partition coefficient (cm^3/g)	Chemical-specific
f_{oc}	Fraction organic carbon in soil (g/g)	0.006 (0.6%)

SOIL SATURATION CONCENTRATION (sat)

Equation 4-10: Derivation of the Soil Saturation Limit

$$sat = \frac{S}{\rho_b} (K_d \rho_b + \Theta_w + H' \Theta_a)$$

Parameter	Definition (units)	Default
sat	Soil saturation concentration (mg/kg)	–
S	Solubility in water (mg/L-water)	Chemical-specific
ρ_b	Dry soil bulk density (kg/L)	1.5
n	Total soil porosity (L_{pore}/L_{soil})	0.43 or 1 - (ρ_b/ρ_s)
ρ_s	Soil particle density (kg/L)	2.65
K_d	Soil-water partition coefficient (L/kg)	K_{oc} x f_{oc} (chemical-specific)
k_{oc}	Soil organic carbon/water partition coefficient (L/kg)	Chemical-specific
f_{oc}	Fraction organic carbon content of soil (g/g)	0.006 or site-specific
Θ_w	Water-filled soil porosity (L_{water}/L_{soil})	0.15
Θ_a	Air filled soil porosity (L_{air}/L_{soil})	0.28 or n-Θ_w
w	Average soil moisture content (kg_{water}/kg_{soil} or L_{water}/kg_{soil})	0.1
H	Henry's Law constant (atm-m^3/mol)	Chemical-specific
H'	Dimensionless Henry's Law constant	H x 41, where 41 is a units conversion factor

SOIL-TO-AIR PARTICULATE EMISSION FACTOR (PEF)

Equation 4-11: Derivation of the Particulate Emission Factor

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

Parameter	Definition (units)	Default
PEF	Particulate emission factor (m^3/kg)	1.316×10^9
Q/C	Inverse of the mean concentration at the center of a 0.5-acre-square source (g/m^2-s per kg/m^3)	90.80
V	Fraction of vegetative cover (unitless)	0.5
U_m	Mean annual windspeed (m/s)	4.69
U_t	Equivalent threshold value of windspeed at 7 m (m/s)	11.32
F(x)	Function dependent on U_m/U_t derived using Cowherd (1985) (unitless)	0.194

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

FOR PLANNING PURPOSES

TOXICITY INFORMATION							CONTAMINANT	PRELIMINARY REMEDIAL GOALS (PRGs)				SOIL SCREENING LEVELS	
SFo 1/(mg/kg-d)	RfDo (mg/kg-d)	SFI 1/(mg/kg-d)	RfDi (mg/kg-d)	V. O C	skin abs. soils	CAS No.		Residential Soil (mg/kg)	Industrial Soil (mg/kg)	Ambient Air (ug/m^3)	Tap Water (ug/l)	Migration to Ground Water DAF 20 (mg/kg)	DAF 1 (mg/kg)
8.7E-03 i	4.0E-03 i	8.7E-03 r	4.0E-03 r	0	0.10	30560-19-1	Acephate	5.1E+01 ca**	2.2E+02 ca*	7.7E-01 ca*	7.7E+00 ca*		
7.7E-03 r	2.6E-03 r	7.7E-03 i	2.6E-03 i	1	0.10	75-07-0	Acetaldehyde	9.2E+00 ca**	2.1E+01 ca**	8.7E-01 ca*	1.5E+00 ca*		
	2.0E-02 i		2.0E-02 r	0	0.10	34256-82-1	Acetochlor	1.3E+03 nc	1.4E+04 nc	7.3E+01 nc	7.3E+02 nc		
	1.0E-01 i		1.0E-01 r	1	0.10	67-64-1	Acetone	2.1E+03 nc	8.8E+03 nc	3.7E+02 nc	6.1E+02 nc	1.6E+01	8.0E-01
	8.0E-04 h		2.9E-03 x	0	0.10	75-86-5	Acetone cyanohydrin	5.2E+01 nc	5.5E+02 nc	1.0E+01 nc	2.9E+01 nc		
	6.0E-03 i		1.4E-02 h	1	0.10	75-05-8	Acetonitrile	2.2E+02 nc	1.2E+03 nc	5.2E+01 nc	7.1E+01 nc		
	1.0E-01 i		5.7E-06 x	1	0.10	98-86-2	Acetophenone	4.9E-01 nc	1.6E+00 nc	2.1E-02 nc	4.2E-02 nc		
	1.3E-02 i		1.3E-02 r	0	0.10	50594-66-6	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	1	0.10	107-02-8	Acrolein	1.0E-01 nc	3.4E-01 nc	2.1E-02 nc	4.2E-02 nc		
4.6E+00 i	2.0E-04 i	4.6E+00 i	2.0E-04 r	0	0.10	79-06-1	Acrylamide	9.8E-02 ca*	4.2E-01 ca	1.5E-03 ca	1.5E-02 ca		
	5.0E-01 i		2.9E-04 i	0	0.10	79-10-7	Acrylic acid	3.1E+04 nc	2.9E+05 nc	1.0E+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	107-13-1	Acrylonitrile	1.9E-01 ca*	4.7E-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	15972-60-8	Alachlor	5.5E+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	1596-84-5	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	116-06-3	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	1646-88-4	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	309-00-2	Aldrin	2.6E-02 ca*	1.1E-01 ca	3.9E-04 ca	4.0E-03 ca	1.2E+04	5.9E+02
	2.5E-01 i		2.5E-01 r	0	0.10	5585-64-8	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	107-18-6	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	107-05-1	Allyl chloride	3.2E+03 nc	3.3E+04 nc	1.0E+00 nc	1.8E+03 nc		
	1.0E+00 n			0	0.01	7429-90-5	Aluminum	7.7E+04 nc	1.0E+05 max		3.7E+04 nc		
	4.0E-04 i			0	0.01	20859-73-8	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	67485-29-4	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	834-12-8	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	591-27-5	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	504-24-5	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	33089-61-1	Amitraz	1.6E+02 nc	1.7E+03 nc	9.1E+00 nc	9.1E+01 nc		
			2.9E-02 i	n/a	n/a	7664-41-7	Ammonia			1.0E+02 nc			
	2.0E-01 i			0	0.10	7773-06-0	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	62-53-3	Aniline	1.9E+01 nc	2.0E+02 nc	1.0E+00 nc	1.1E+01 nc		
	4.0E-04 i			0	0.01	7440-36-0	Antimony and compounds	3.1E+01 nc	6.8E+02 nc		1.5E+01 nc	5.0E+00	3.0E-01
	5.0E-04 h			0	0.01	1314-60-9	Antimony pentoxide	3.8E+01 nc	8.5E+02 nc		1.8E+01 nc		
	9.0E-04 h			0	0.01	28300-74-5	Antimony potassium tartrate	6.9E+01 nc	1.5E+03 nc		3.3E+01 nc		
	4.0E-04 h			0	0.01	1332-81-6	Antimony tetroxide	3.1E+01 nc	6.8E+02 nc		1.5E+01 nc		
	4.0E-04 h			0	0.01	1309-64-4	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	74115-24-5	Apollo	8.5E+02 nc	8.9E+03 nc	4.7E+01 nc	4.7E+02 nc		
2.5E-02 i	5.0E-02 h	2.5E-02 i	5.0E-02 r	0	0.10	140-57-8	Aramite	1.8E+01 ca*	7.6E+01 ca	2.7E-01 ca	2.7E+00 ca		
	3.0E-04 i			0	0.03	7440-38-2	Arsenic (noncancer endpoint)	2.2E+01 nc					
1.5E+00 i	3.0E-04 i	1.5E+01 i		0	0.03	7440-38-2	Arsenic (cancer endpoint)	3.8E-01 ca*	2.4E+00 ca	4.5E-04 ca	4.5E-02 ca	2.9E+01	1.0E+00
			1.4E-05 i	n/a	n/a	7784-42-1	Arsine			5.2E-02 nc			
	9.0E-03 i		9.0E-03 r	0	0.10	76578-12-6	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	3337-71-1	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	1912-24-9	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	71751-41-2	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	103-33-3	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	7440-39-3	Barium and compounds	5.3E+03 nc	1.0E+05 max	5.2E-01 nc	2.6E+03 nc	1.6E+03	8.2E+01
	4.0E-03 i		4.0E-03 r	0	0.10	114-26-1	Baygon	2.6E+02 nc	2.7E+03 nc	1.5E+01 nc	1.5E+02 nc		

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FOR PLANNING PURPOSES

TOXICITY INFORMATION								CONTAMINANT	PRELIMINARY REMEDIAL GOALS (PRGs)				SOIL SCREENING LEVELS	
SFo 1/(mg/kg-d)	RfDo (mg/kg-d)	SFi 1/(mg/kg-d)	RfDi (mg/kg-d)	V O C	skin abs. soils	CAS No.			Residential Soil (mg/kg)	Industrial Soil (mg/kg)	Ambient Air (ug/m^3)	Tap Water (ug/l)	Migration to Ground Water DAF 20 (mg/kg)	DAF 1 (mg/kg)
	3.0E-02 i		3.0E-02 r	0	0.10	43121-43-3		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	68359-37-5		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	1861-40-1		Benefin	2.0E+04 nc	1.0E+05 max	1.1E+03 nc	1.1E+04 nc		
	6.0E-02 i		6.0E-02 r	0	0.10	17804-35-2		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	25057-89-0		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	100-52-7		Benzaldehyde	6.5E+03 nc	6.8E+04 nc	3.7E+02 nc	3.7E+03 nc		
2.9E-02 i	1.7E-03 r	2.9E-02 i	1.7E-03 n	1	0.10	71-43-2		Benzene	6.3E-01 ca*	1.4E+00 ca*	2.3E-01 ca*	3.9E-01 ca*	3.0E-02	2.0E-03
2.3E+02 i	3.0E-03 i	2.3E+02 i	3.0E-03 r	0	0.10	92-87-5		Benzidine	1.9E-03 ca	8.3E-03 ca	2.9E-05 ca	2.9E-04 ca		
	4.0E+00 i		4.0E+00 i	0	0.10	65-85-0		Benzoic acid	1.0E+05 max	1.0E+05 max	1.5E+04 nc	1.5E+05 nc	4.0E+02	2.0E+01
1.3E+01 i		1.3E+01 r		0	0.10	98-07-7		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	100-51-6		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	100-44-7		Benzyl chloride	8.1E-01 ca	2.0E+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	7440-41-7		Beryllium and compounds	1.4E-01 ca	1.1E+00 ca	8.0E-04 ca	1.6E-02 ca	6.3E+01	3.0E+00
	1.0E-04 i		1.0E-04 r	0	0.10	141-66-2		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	82657-04-3		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	1	0.10	92-52-4		1,1-Biphenyl	3.5E+02 sat	3.5E+02 sat	1.8E+02 nc	3.0E+02 nc		
1.1E+00 i		1.2E+00 i		1	0.10	111-44-4		Bis(2-chloroethyl)ether	4.3E-02 ca	9.7E-02 ca	5.8E-03 ca	9.8E-03 ca	4.0E-04	2.0E-05
7.0E-02 h	4.0E-02 i	3.5E-02 h	4.0E-02 r	1	0.10	39638-32-9		Bis(2-chloroisopropyl)ether	2.5E+00 ca	6.7E+00 ca	1.9E-01 ca	2.7E-01 ca		
2.2E+02 i		2.2E+02 i		1	0.10	542-88-1		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	108-60-1		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	117-81-7		Bis(2-ethylhexyl)phthalate (DEHP)	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	80-05-7		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	7440-42-8		Boron	5.9E+03 nc	6.1E+04 nc	2.1E+01 nc	3.3E+03 nc		
			2.0E-04 h	0	0.10	7637-07-2		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	75-27-4		Bromodichloromethane	6.3E-01 ca	1.4E+00 ca	1.1E-01 ca	1.8E-01 ca	6.0E-01	3.0E-02
7.9E-03 i	2.0E-02 i	3.9E-03 i	2.0E-02 r	0	0.10	75-25-2		Bromoform (tribromomethane)	5.6E+01 ca**	2.4E+02 ca*	1.7E+00 ca*	8.5E+00 ca*	8.0E-01	4.0E-02
	1.4E-03 i		1.4E-03 i	1	0.10	74-83-9		Bromomethane	6.8E+00 nc	2.3E+01 nc	5.2E+00 nc	8.7E+00 nc	2.0E-01	1.0E-02
				0	0.10	101-55-3		4-Bromophenyl phenyl ether						
	5.0E-03 h		5.0E-03 r	0	0.10	2104-96-3		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	1689-84-5		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	1689-99-2		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	106-99-0		1,3-Butadiene	6.5E-03 ca	1.4E-02 ca	6.9E-03 ca	1.1E-02 ca		
	1.0E-01 i		1.0E-01 r	0	0.10	71-36-3		1-Butanol	6.5E+03 nc	6.8E+04 nc	3.7E+02 nc	3.7E+03 nc	1.7E+01	9.0E-01
	6.0E-02 i		6.0E-02 r	0	0.10	2008-41-5		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	85-68-7		Butyl benzyl phthalate	9.3E+02 sat	9.3E+02 sat	7.3E+02 nc	7.3E+03 nc	9.3E+02	8.1E+02
	1.0E+00 i		1.0E+00 r	0	0.10	85-70-1		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	75-60-5		Cacodylic acid	2.0E+02 nc	2.0E+03 nc	1.1E+01 nc	1.1E+02 nc		
	6.0E-04 i	6.3E+00 i	5.7E-05 x	0	0.01	7440-43-9		Cadmium and compounds	3.8E+01 nc	8.5E+02 nc	1.1E-03 ca	1.8E+01 nc	8.0E+00	4.0E-01
								"CAL-Modified PRG" (PEA, 1994)	9.0E+00					
	5.0E-01 i		5.0E-01 r	0	0.10	105-60-2		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	2425-06-1		Captafol	5.2E+01 ca**	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	133-06-2		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	63-25-2		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	86-74-8		Carbazole	2.2E+01 ca	9.5E+01 ca	3.4E-01 ca	3.4E+00 ca	6.0E-01	3.0E-02
	5.0E-03 i		5.0E-03 r	0	0.10	1563-66-2		Carbofuran	3.3E+02 nc	3.4E+03 nc	1.8E+01 nc	1.8E+02 nc		
	1.0E-01 i		2.9E-03 h	1	0.10	75-15-0		Carbon disulfide	7.5E+00 nc	2.4E+01 nc	1.0E+01 nc	2.1E+01 nc	3.2E+01	2.0E+00
1.3E-01 i	7.0E-04 i	5.3E-02 i	5.7E-04 n	1	0.10	56-23-5		Carbon tetrachloride	2.3E-01 ca*	5.0E-01 ca*	1.3E-01 ca*	1.7E-01 ca*	7.0E-02	3.0E-03

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

FOR PLANNING PURPOSES

TOXICITY INFORMATION							CONTAMINANT	PRELIMINARY REMEDIAL GOALS (PRGs)				SOIL SCREENING LEVELS	
SFo 1/(mg/kg-d)	RfDo (mg/kg-d)	SFI 1/(mg/kg-d)	RfDi (mg/kg-d)	VOC	skin abs. soils	CAS No.		Residential Soil (mg/kg)	Industrial Soil (mg/kg)	Ambient Air (ug/m^3)	Tap Water (ug/l)	Migration to Ground Water DAF 20 (mg/kg)	DAF 1 (mg/kg)
	1.0E-02 i		1.0E-02 r	0	0.10	55285-14-8	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	5234-68-4	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	302-17-0	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	133-90-4	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	118-75-2	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	57-74-9	Chlordane	3.4E-01 ca**	1.5E+00 ca*	5.2E-03 ca*	5.2E-02 ca*	1.0E+01	5.0E-01
	2.0E-02 i		2.0E-02 r	0	0.10	90982-32-4	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	7782-50-5	Chlorine	7.7E+03 nc	1.7E+05 nc		3.7E+03 nc		
			5.7E-05 i	n/a	n/a	10049-04-4	Chlorine dioxide			2.1E-01 nc			
				1	0.10	107-20-0	Chloroacetaldehyde						
	2.0E-03 h		2.0E-03 r	0	0.10	79-11-8	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	532-27-4	2-Chloroacetophenone	3.2E-02 nc	1.1E-01 nc	3.1E-02 nc	5.2E-02 nc		
	4.0E-03 i		4.0E-03 r	0	0.10	106-47-8	4-Chloroaniline	2.6E+02 nc	2.7E+03 nc	1.5E+01 nc	1.5E+02 nc	7.0E-01	3.0E-02
	2.0E-02 i		5.7E-03 h	1	0.10	108-90-7	Chlorobenzene	6.5E+01 nc	2.2E+02 nc	2.1E+01 nc	3.9E+01 nc	1.0E+00	7.0E-02
2.7E-01 h	2.0E-02 i	2.7E-01 h	2.0E-02 r	0	0.10	510-15-6	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	74-11-3	p-Chlorobenzoic acid	1.3E+04 nc	1.0E+05 max	7.3E+02 nc	7.3E+03 nc		
	2.0E-02 h		2.0E-02 r	0	0.10	98-56-6	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	126-99-8	2-Chloro-1,3-butadiene	3.6E+00 nc	1.2E+01 nc	7.3E+00 nc	1.4E+01 nc		
	4.0E-01 h		4.0E-01 r	1	0.10	109-69-3	1-Chlorobutane	4.8E+02 sat	4.8E+02 sat	1.5E+03 nc	2.4E+03 nc		
	1.4E+01 r		1.4E+01 i	1	0.10	75-68-3	1-Chloro-1,1-difluoroethane (HCFC-142b)	3.4E+02 sat	3.4E+02 sat	5.2E+04 nc	8.7E+04 nc		
				1	0.10	110-75-8	2-Chloroethyl vinyl ether						
	1.4E+01 r		1.4E+01 i	1	0.10	75-45-6	Chlorodifluoromethane	3.4E+02 sat	3.4E+02 sat	5.1E+04 nc	8.5E+04 nc		
6.1E-03 i	1.0E-02 i	6.1E-02 i	1.0E-02 r	1	0.10	67-66-3	Chloroform	2.5E-01 ca	5.3E-01 ca	8.4E-02 ca	1.6E-01 ca	6.0E-01	3.0E-02
1.3E-02 h		6.3E-03 h		1	0.10	74-87-3	Chloromethane	1.2E+00 ca	2.6E+00 ca	1.1E+00 ca	1.5E+00 ca		
5.8E-01 h		5.8E-01 r		0	0.10	95-69-2	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	3165-93-3	4-Chloro-2-methylaniline hydrochloride	9.7E-01 ca	4.1E+00 ca	1.5E-02 ca	1.5E-01 ca		
	8.0E-02 i		8.0E-02 r	1	0.10	91-58-7	beta-Chloronaphthalene	1.1E+02 sat	1.1E+02 sat	2.9E+02 nc	4.9E+02 nc		
2.5E-02 h		2.5E-02 r	r	0	0.10	88-73-3	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	100-00-5	p-Chloronitrobenzene	2.5E+01 ca	1.1E+02 ca	3.7E-01 ca	3.7E+00 ca		
	5.0E-03 i		5.0E-03 r	1	0.10	95-57-8	2-Chlorophenol	9.1E+01 nc	3.7E+02 nc	1.8E+01 nc	3.8E+01 nc	4.0E+00	2.0E-01
	2.9E-02 r		2.9E-02 h	1	0.10	75-29-6	2-Chloropropane	1.7E+02 nc	5.8E+02 nc	1.0E+02 nc	1.7E+02 nc		
1.1E-02 h	1.5E-02 i	1.1E-02 r	1.5E-02 r	0	0.10	1897-45-6	Chlorothalonil	4.0E+01 ca**	1.7E+02 ca*	6.1E-01 ca*	6.1E+00 ca*		
	2.0E-02 i		2.0E-02 r	1	0.10	95-49-8	o-Chlorotoluene	1.6E+02 nc	5.5E+02 nc	7.3E+01 nc	1.2E+02 nc		
	2.0E-01 i		2.0E-01 r	0	0.10	101-21-3	Chlorpropham	1.3E+04 nc	1.0E+05 max	7.3E+02 nc	7.3E+03 nc		
	3.0E-03 i		3.0E-03 r	0	0.10	2921-88-2	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	5598-13-0	Chlorpyrifos-methyl	6.5E+02 nc	6.8E+03 nc	3.7E+01 nc	3.7E+02 nc		
	5.0E-02 i		5.0E-02 r	0	0.10	64902-72-3	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	602-38-56-4	Chlorthiophos	5.2E+01 nc	5.5E+02 nc	2.9E+00 nc	2.9E+01 nc		
		4.2E+01 i		0	0.01	n/a	Total Chromium (1/6 ratio Cr VI/Cr III)	2.1E+02 ca	4.5E+02 ca	1.6E-04 ca		3.8E+01	2.0E+00
	5.0E-03 i	2.9E+02 i		0	0.01	7440-47-3	Chromium VI	3.0E+01 ca	6.4E+01 ca	2.3E-05 ca	1.8E+02 nc	3.8E+01	2.0E+00
							"CAL-Modified PRG" (PEA, 1994)	2.0E-01			1.6E-01		
	6.0E-02 n		2.9E-04 n	0	0.01	7440-48-4	Cobalt	4.6E+03 nc	9.7E+04 nc	1.0E+00 nc	2.2E+03 nc		
		2.2E+00 i		0	0.01	8007-45-2	Coke Oven Emissions			3.1E-03 ca			
	3.7E-02 h			0	0.01	7440-50-8	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	123-73-9	Crotonaldehyde	5.3E-03 ca	1.1E-02 ca	3.5E-03 ca	5.9E-03 ca		
	4.0E-02 i		2.8E-03 h	1	0.10	98-82-8	Cumene	1.9E+01 nc	6.2E+01 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	21725-46-2	Cyanazine	5.3E-01 ca*	2.3E+00 ca	8.0E-03 ca	8.0E-02 ca		

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FOR PLANNING PURPOSES

TOXICITY INFORMATION							CONTAMINANT	PRELIMINARY REMEDIAL GOALS (PRGs)				SOIL SCREENING LEVELS	
SFo 1/(mg/kg-d)	RfDo (mg/kg-d)	SFi 1/(mg/kg-d)	RfDi (mg/kg-d)	V O C	skin abs. soils	CAS No.		Residential Soil (mg/kg)	Industrial Soil (mg/kg)	Ambient Air (ug/m^3)	Tap Water (ug/l)	Migration to Ground Water DAF 20 (mg/kg)	DAF 1 (mg/kg)
					0.01	n/a	Cyanides						
	1.0E-01 h			0	0.01	542-62-1	Barium cyanide	7.7E+03 nc	1.0E+05 max		3.7E+03 nc		
	4.0E-02 I			0	0.01	592-01-8	Calcium cyanide	3.1E+03 nc	6.8E+04 nc		1.5E+03 nc		
	5.0E-02 I			0	0.01	506-77-4	Chlorine cyanide	3.8E+03 nc	8.5E+04 nc		1.8E+03 nc		
	5.0E-03 I			0	0.01	544-92-3	Copper cyanide	3.8E+02 nc	8.5E+03 nc		1.8E+02 nc		
	4.0E-02 I			0	0.10	460-19-5	Cyanogen	2.6E+03 nc	2.7E+04 nc		1.5E+03 nc		
	9.0E-02 I			0	0.10	506-68-3	Cyanogen bromide	5.9E+03 nc	1.0E+05 max		3.3E+03 nc		
	5.0E-02 I			0	0.10	506-77-4	Cyanogen chloride	3.3E+03 nc	3.4E+04 nc		1.8E+03 nc		
	2.0E-02 I			0	0.10	57-12-5	Free cyanide	1.3E+03 nc	1.4E+04 nc		7.3E+02 nc	4.0E+01	2.0E+00
	2.0E-02 I		8.6E-04 I	1	0.10	74-90-8	Hydrogen cyanide	1.1E+01 nc	3.5E+01 nc	3.1E+00 nc	6.2E+00 nc		
	5.0E-02 I			0	0.10	151-50-8	Potassium cyanide	3.3E+03 nc	3.4E+04 nc		1.8E+03 nc		
	2.0E-01 I			0	0.10	506-61-6	Potassium silver cyanide	1.3E+04 nc	1.0E+05 max		7.3E+03 nc		
	1.0E-01 I			0	0.10	506-64-9	Silver cyanide	6.5E+03 nc	1.0E+05 max		3.7E+03 nc		
	4.0E-02 I			0	0.10	143-33-9	Sodium cyanide	2.6E+03 nc	2.7E+04 nc		1.5E+03 nc		
	5.0E-02 I			0	0.10	557-21-1	Zinc cyanide	3.3E+03 nc	3.4E+04 nc		1.8E+03 nc		
	5.0E+00 I		5.0E+00 r	0	0.10	108-94-1	Cyclohexanone	1.0E+05 max	1.0E+05 max	1.8E+04 nc	1.8E+05 nc		
	2.0E-01 I		2.0E-01 r	0	0.10	108-91-8	Cyclohexylamine	1.3E+04 nc	1.0E+05 max	7.3E+02 nc	7.3E+03 nc		
	5.0E-03 I		5.0E-03 r	0	0.10	68085-85-8	Cyhalothrin/Karate	3.3E+02 nc	3.4E+03 nc	1.8E+01 nc	1.8E+02 nc		
	1.0E-02 I		1.0E-02 r	0	0.10	52315-07-8	Cypermethrin	6.5E+02 nc	6.8E+03 nc	3.7E+01 nc	3.7E+02 nc		
	7.5E-03 I		7.5E-03 r	0	0.10	66215-27-8	Cyromazine	4.9E+02 nc	5.1E+03 nc	2.7E+01 nc	2.7E+02 nc		
	1.0E-02 I		1.0E-02 r	0	0.10	1861-32-1	Dacthal	6.5E+02 nc	1.0E+05 max	3.7E+01 nc	3.7E+02 nc		
	3.0E-02 I		3.0E-02 r	0	0.10	75-99-0	Dalapon	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	39515-41-8	Danitol	1.6E+03 nc	1.7E+04 nc	9.1E+01 nc	9.1E+02 nc		
2.4E-01 I		2.4E-01 r		0	0.10	72-54-8	DDD	1.9E+00 ca	7.9E+00 ca	2.8E-02 ca	2.8E-01 ca	1.6E+01	8.0E-01
3.4E-01 I		3.4E-01 r		0	0.10	72-55-9	DDE	1.3E+00 ca	5.6E+00 ca	2.0E-02 ca	2.0E-01 ca	5.4E+01	3.0E+00
3.4E-01 I	5.0E-04 I	3.4E-01 I	5.0E-04 r	0	0.10	50-29-3	DDT	1.3E+00 ca*	5.6E+00 ca*	2.0E-02 ca*	2.0E-01 ca*	3.2E+01	2.0E+00
	1.0E-02 I		1.0E-02 r	0	0.10	1163-19-5	Decabromodiphenyl ether	6.5E+02 nc	6.8E+03 nc	3.7E+01 nc	3.7E+02 nc		
	4.0E-05 I		4.0E-05 r	0	0.10	8065-48-3	Demeton	2.6E+00 nc	2.7E+01 nc	1.5E-01 nc	1.5E+00 nc		
6.1E-02 h		6.1E-02 r		0	0.10	2303-16-4	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	333-41-5	Diazinon	5.9E+01 nc	6.1E+02 nc	3.3E+00 nc	3.3E+01 nc		
	4.0E-03 n		4.0E-03 r	1	0.10	132-64-9	Dibenzofuran	1.4E+02 sat	1.4E+02 sat	1.5E+01 nc	2.4E+01 nc		
	1.0E-02 I		1.0E-02 r	0	0.10	106-37-6	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	124-48-1	Dibromochloromethane	5.3E+00 ca*	2.3E+01 ca	8.0E-02 ca	1.0E+00 ca	4.0E-01	2.0E-02
1.4E+00 h	5.7E-05 r	2.4E-03 h	5.7E-05 I	0	0.10	96-12-8	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	106-93-4	1,2-Dibromoethane	4.9E-03 ca	2.0E-02 ca	8.7E-03 ca*	7.6E-04 ca		
	1.0E-01 I		1.0E-01 r	0	0.10	84-74-2	Dibutyl phthalate	6.5E+03 nc	6.8E+04 nc	3.7E+02 nc	3.7E+03 nc	2.3E+03	2.7E+02
	3.0E-02 I		3.0E-02 r	0	0.10	1918-00-9	Dicamba	2.0E+03 nc	2.0E+04 nc	1.1E+02 nc	1.1E+03 nc		
	9.0E-02 I		5.7E-02 h	1	0.10	95-50-1	1,2-Dichlorobenzene	7.0E+02 sat	7.0E+02 sat	2.1E+02 nc	3.7E+02 nc	1.7E+01	9.0E-01
	3.0E-02 e		3.0E-02 r	1	0.10	541-73-1	1,3-Dichlorobenzene	5.0E+02 nc	8.6E+02 sat	1.1E+02 nc	1.8E+02 nc		
2.4E-02 h	2.3E-01 r	2.4E-02 r	2.3E-01 I	1	0.10	106-46-7	1,4-Dichlorobenzene	3.6E+00 ca	8.5E+00 ca	2.8E-01 ca	4.7E-01 ca	2.0E+00	1.0E-01
4.5E-01 I		4.5E-01 r		0	0.10	91-94-1	3,3-Dichlorobenzidine	9.9E-01 ca	4.2E+00 ca	1.5E-02 ca	1.5E-01 ca	7.0E-03	3.0E-04
9.3E+00 r		9.3E+00 h		1	0.10	764-41-0	1,4-Dichloro-2-butene	7.5E-03 ca	1.7E-02 ca	7.2E-04 ca	1.2E-03 ca		
	2.0E-01 I		5.7E-02 h	1	0.10	75-71-8	Dichlorodifluoromethane	9.4E+01 nc	3.1E+02 nc	2.1E+02 nc	3.9E+02 nc		
	1.0E-01 h		1.4E-01 h	1	0.10	75-34-3	1,1-Dichloroethane	5.0E+02 nc	1.7E+03 nc	5.2E+02 nc	8.1E+02 nc	2.3E+01	1.0E+00
9.1E-02 I	2.9E-03 r	9.1E-02 I	2.9E-03 n	1	0.10	107-06-2	1,2-Dichloroethane (EDC)	2.5E-01 ca*	5.5E-01 ca*	7.4E-02 ca	1.2E-01 ca	2.0E-02	1.0E-03
6.0E-01 I	9.0E-03 I	1.8E-01 I	9.0E-03 r	1	0.10	75-35-4	1,1-Dichloroethylene	3.7E-02 ca	8.0E-02 ca	3.8E-02 ca	4.6E-02 ca	6.0E-02	3.0E-03

Key: I=IRIS h=HEAST n=NCEA x=WITHDRAWN r=ROUTE EXTRAPOLATION ca=CANCER PRG nc=NONCANCER PRG sat=SOIL SATURATION max=CEILING LIMIT *(where: nc < 100X ca) **(where: nc < 10X ca)

FOR PLANNING PURPOSES

TOXICITY INFORMATION							CONTAMINANT	PRELIMINARY REMEDIAL GOALS (PRGs)				SOIL SCREENING LEVELS	
SFo 1/(mg/kg-d)	RfDo (mg/kg-d)	SFi 1/(mg/kg-d)	RfDi (mg/kg-d)	V O C	skin abs. soils	CAS No.		Residential Soil (mg/kg)	Industrial Soil (mg/kg)	Ambient Air (ug/m^3)	Tap Water (ug/l)	Migration to Ground Water DAF 20 (mg/kg)	Migration to Ground Water DAF 1 (mg/kg)
	1.0E-02 h		1.0E-02 r	1	0.10	156-59-2	1,2-Dichloroethylene (cis)	3.1E+01 nc	1.0E+02 nc	3.7E+01 nc	6.1E+01 nc	4.0E-01	2.0E-02
	2.0E-02 I		2.0E-02 r	1	0.10	156-60-5	1,2-Dichloroethylene (trans)	7.8E+01 nc	2.7E+02 nc	7.3E+01 nc	1.2E+02 nc	7.0E-01	3.0E-02
	9.0E-03 h		9.0E-03 r	1	0.10	540-59-0	1,2-Dichloroethylene (mixture)	3.5E+01 nc	1.2E+02 nc	3.3E+01 nc	5.5E+01 nc		
	3.0E-03 I		3.0E-03 r	0	0.10	120-83-2	2,4-Dichlorophenol	2.0E+02 nc	2.0E+03 nc	1.1E+01 nc	1.1E+02 nc	1.0E+00	5.0E-02
	8.0E-03 I		8.0E-03 r	0	0.10	94-82-6	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	94-75-7	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	78-87-5	1,2-Dichloropropane	3.1E-01 ca*	6.8E-01 ca*	9.9E-02 ca*	1.6E-01 ca*	3.0E-02	1.0E-03
1.8E-01 h	3.0E-04 I	1.3E-01 h	5.7E-03 I	1	0.10	542-75-6	1,3-Dichloropropene	2.5E-01 ca*	5.5E-01 ca	5.2E-02 ca	8.1E-02 ca	4.0E-03	2.0E-04
	3.0E-03 I		3.0E-03 r	0	0.10	616-23-9	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	62-73-7	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	115-32-2	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	1	0.10	77-73-6	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	60-57-1	Dieldrin	2.8E-02 ca*	1.2E-01 ca	4.2E-04 ca	4.2E-03 ca	4.0E-03	2.0E-04
	5.7E-03 h		5.7E-03 x	0	0.10	112-34-5	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	111-90-0	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	617-84-5	Diethylformamide	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 r	6.0E-01 r	0	0.10	103-23-1	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	84-66-2	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	56-53-1	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	43222-48-6	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	35367-38-5	Diflubenzuron	1.3E+03 nc	1.4E+04 nc	7.3E+01 nc	7.3E+02 nc		
	1.1E+01 r		1.1E+01 I	1	0.10	75-37-6	1,1-Difluoroethane			4.2E+04 nc	6.9E+04 nc		
	8.0E-02 I		8.0E-02 r	0	0.10	1445-75-6	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	55290-64-7	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	60-51-5	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	119-90-4	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	124-40-3	Dimethylamine	6.5E-02 nc	2.4E-01 nc	2.1E-02 nc	3.5E-02 nc		
	2.0E-03 I		2.0E-03 r	0	0.10	121-69-7	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	95-68-1	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	21436-96-4	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	119-93-7	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	57-14-7	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	540-73-8	1,2-Dimethylhydrazine	1.2E-02 ca	5.2E-02 ca	1.8E-04 ca	1.8E-03 ca		
	1.0E-01 h		8.6E-03 I	0	0.10	68-12-2	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	105-67-9	2,4-Dimethylphenol	1.3E+03 nc	1.4E+04 nc	7.3E+01 nc	7.3E+02 nc	9.0E+00	4.0E-01
	8.0E-04 I		8.0E-04 r	0	0.10	576-26-1	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	95-65-8	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	131-11-3	Dimethyl phthalate	1.0E+05 max	1.0E+05 max	3.7E+04 nc	3.7E+05 nc		
	1.0E-01 I		1.0E-01 r	0	0.10	120-61-6	Dimethyl terephthalate	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	131-89-5	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 I		1.0E-04 r	0	0.10	99-65-0	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	528-29-0	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	100-25-4	1,4-Dinitrobenzene	2.6E+01 nc	2.7E+02 nc	1.5E+00 nc	1.5E+01 nc		
	2.0E-03 I		2.0E-03 r	0	0.10	51-28-5	2,4-Dinitrophenol	1.3E+02 nc	1.4E+03 nc	7.3E+00 nc	7.3E+01 nc	3.0E-01	1.0E-02
6.8E-01 I		6.8E-01 r		0	0.10	25321-14-6	Dinitrotoluene mixture	6.5E-01 ca	2.8E+00 ca	9.9E-03 ca	9.9E-02 ca	8.0E-04	4.0E-05
	2.0E-03 I		2.0E-03 r	0	0.10	121-14-2	2,4-Dinitrotoluene (also see Dinitrotoluene mixture)	1.3E+02 nc	1.4E+03 nc	7.3E+00 nc	7.3E+01 nc	8.0E-04	4.0E-05
	1.0E-03 h		1.0E-03 r	0	0.10	606-20-2	2,6-Dinitrotoluene (also see Dinitrotoluene mixture)	6.5E+01 nc	6.8E+02 nc	3.7E+00 nc	3.7E+01 nc	7.0E-04	3.0E-05

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FOR PLANNING PURPOSES

TOXICITY INFORMATION							CONTAMINANT	PRELIMINARY REMEDIAL GOALS (PRGs)				SOIL SCREENING LEVELS	
SFo 1/(mg/kg-d)	RfDo (mg/kg-d)	SFi 1/(mg/kg-d)	RfDi (mg/kg-d)	V O C	skin abs. soils	CAS No.		Residential Soil (mg/kg)	Industrial Soil (mg/kg)	Ambient Air (ug/m^3)	Tap Water (ug/l)	Migration to Ground Water DAF 20 (mg/kg)	DAF 1 (mg/kg)
	1.0E-03 i		1.0E-03 r	0	0.10	88-85-7	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	117-84-0	di-n-Octyl phthalate	1.3E+03 nc	1.0E+04 sat	7.3E+01 nc	7.3E+02 nc	1.0E+04	1.0E+04
1.1E-02 i		1.1E-02 r		0	0.10	123-91-1	1,4-Dioxane	4.0E+01 ca	1.7E+02 ca	6.1E-01 ca	6.1E+00 ca		
	3.0E-02 i		3.0E-02 r	0	0.10	957-51-7	Diphenamid	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	122-39-4	Diphenylamine	1.6E+03 nc	1.7E+04 nc	9.1E+01 nc	9.1E+02 nc		
8.0E-01 i		7.7E-01 i		0	0.10	122-66-7	1,2-Diphenylhydrazine	5.6E-01 ca	2.4E+00 ca	8.7E-03 ca	8.4E-02 ca		
	2.2E-03 i		2.2E-03 r	0	0.10	85-00-7	Diquat	1.4E+02 nc	1.5E+03 nc	8.0E+00 nc	8.0E+01 nc		
8.6E+00 h		8.6E+00 r		0	0.10	1937-37-7	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	2602-46-2	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	16071-86-6	Direct brown 95	4.8E-02 ca	2.1E-01 ca	7.2E-04 ca	7.2E-03 ca		
	4.0E-05 i		4.0E-05 r	0	0.10	298-04-4	Disulfoton	2.6E+00 nc	2.7E+01 nc	1.5E-01 nc	1.5E+00 nc		
	1.0E-02 i		1.0E-02 r	0	0.10	505-29-3	1,4-Dithiane	6.5E+02 nc	6.8E+03 nc	3.7E+01 nc	3.7E+02 nc		
	2.0E-03 i		2.0E-03 r	0	0.10	330-54-1	Diuron	1.3E+02 nc	1.4E+03 nc	7.3E+00 nc	7.3E+01 nc		
	4.0E-03 i		4.0E-03 r	0	0.10	2439-10-3	Dodine	2.6E+02 nc	2.7E+03 nc	1.5E+01 nc	1.5E+02 nc		
	6.0E-03 i		6.0E-03 r	0	0.10	115-29-7	Endosulfan	3.9E+02 nc	4.1E+03 nc	2.2E+01 nc	2.2E+02 nc	1.8E+01	9.0E-01
	2.0E-02 i		2.0E-02 r	0	0.10	145-73-3	Endothall	1.3E+03 nc	1.4E+04 nc	7.3E+01 nc	7.3E+02 nc		
	3.0E-04 i		3.0E-04 r	0	0.10	72-20-8	Endrin	2.0E+01 nc	2.0E+02 nc	1.1E+00 nc	1.1E+01 nc	1.0E+00	5.0E-02
9.9E-03 i	2.0E-03 h	4.2E-03 i	2.9E-04 i	1	0.10	106-89-8	Epichlorohydrin	7.5E+00 nc	2.5E+01 nc	1.0E+00 nc	2.0E+00 nc		
	5.7E-03 r		5.7E-03 i	0	0.10	106-88-7	1,2-Epoxybutane	3.7E+02 nc	3.9E+03 nc	2.1E+01 nc	2.1E+02 nc		
	2.5E-02 i		2.5E-02 r	0	0.10	759-94-4	EPTC (S-Ethyl dipropylthiocarbamate)	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	16672-87-0	Ethephon (2-chloroethyl phosphonic acid)	3.3E+02 nc	3.4E+03 nc	1.8E+01 nc	1.8E+02 nc		
	6.0E-04 i		6.0E-04 r	0	0.10	563-12-2	Ethion	3.3E+01 nc	3.4E+02 nc	1.8E+00 nc	1.8E+01 nc		
	4.0E-01 h		5.7E-02 i	0	0.10	110-80-5	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	111-15-9	2-Ethoxyethanol acetate	2.0E+04 nc	1.0E+05 max	1.1E+03 nc	1.1E+04 nc		
	9.0E-01 i		9.0E-01 r	1	0.10	141-78-6	Ethyl acetate	1.8E+04 nc	1.0E+05 max	3.3E+03 nc	5.5E+03 nc		
4.8E-02 h		4.8E-02 r		1	0.10	140-88-5	Ethyl acrylate	2.1E-01 ca	4.5E-01 ca	1.4E-01 ca	2.3E-01 ca		
	1.0E-01 i		2.9E-01 i	1	0.10	100-41-4	Ethylbenzene	2.3E+02 sat	2.3E+02 sat	1.1E+03 nc	1.3E+03 nc	1.3E+01	7.0E-01
	3.0E-01 h		3.0E-01 r	0	0.10	109-78-4	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	107-15-3	Ethylene diamine	1.3E+03 nc	1.4E+04 nc	7.3E+01 nc	7.3E+02 nc		
	2.0E+00 i		2.0E+00 r	0	0.10	107-21-1	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	111-76-2	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	75-21-8	Ethylene oxide	1.3E-01 ca	3.2E-01 ca	1.9E-02 ca	2.4E-02 ca		
1.1E-01 h	8.0E-05 i	1.1E-01 r	8.0E-05 r	0	0.10	96-45-7	Ethylene thiourea (ETU)	4.0E+00 ca**	1.7E+01 ca*	6.1E-02 ca*	6.1E-01 ca*		
	2.0E-02 n		2.9E+00 i	1	0.10	75-00-3	Ethyl chloride	1.1E+03 nc	1.6E+03 sat	1.0E+04 nc	7.1E+02 nc		
	2.0E-01 i		2.0E-01 r	1	0.10	60-29-7	Ethyl ether	1.8E+03 sat	1.8E+03 sat	7.3E+02 nc	1.2E+03 nc		
	9.0E-02 h		9.0E-02 r	1	0.10	97-63-2	Ethyl methacrylate	1.4E+02 sat	1.4E+02 sat	3.3E+02 nc	5.5E+02 nc		
	1.0E-05 i		1.0E-05 r	0	0.10	2104-64-5	Ethyl p-nitrophenyl phenylphosphorothioate	6.5E-01 nc	6.8E+00 nc	3.7E-02 nc	3.7E-01 nc		
	3.0E+00 i		3.0E+00 r	0	0.10	84-72-0	Ethylphthalyl ethyl glycolate	1.0E+05 max	1.0E+05 max	1.1E+04 nc	1.1E+05 nc		
	8.0E-03 i		8.0E-03 r	0	0.10	101200-48-0	Express	5.2E+02 nc	5.5E+03 nc	2.9E+01 nc	2.9E+02 nc		
	2.5E-04 i		2.5E-04 r	0	0.10	22224-92-6	Fenamiphos	1.6E+01 nc	1.7E+02 nc	9.1E-01 nc	9.1E+01 nc		
	1.3E-02 i		1.3E-02 r	0	0.10	2164-17-2	Fluometuron	8.5E+02 nc	8.9E+03 nc	4.7E+01 nc	4.7E+02 nc		
	6.0E-02 i		6.0E-02 r	0	0.10	7782-41-4	Fluorine (soluble fluoride)	3.9E+03 nc	4.1E+04 nc	2.2E+02 nc	2.2E+03 nc		
	6.0E-02 i		6.0E-02 r	0	0.10	59756-60-4	Fluoridone	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	56425-91-3	Flurprimidol	1.3E+03 nc	1.4E+04 nc	7.3E+01 nc	7.3E+02 nc		
	6.0E-02 i		6.0E-02 r	0	0.10	66332-96-5	Flutolanil	3.9E+03 nc	4.1E+04 nc	2.2E+02 nc	2.2E+03 nc		
	1.0E-02 i		1.0E-02 r	0	0.10	69409-94-5	Fluvalinate	6.5E+02 nc	6.8E+03 nc	3.7E+01 nc	3.7E+02 nc		
3.5E-03 i	1.0E-01 i	3.5E-03 r	1.0E-01 r	0	0.10	133-07-3	Folpet	1.3E+02 ca*	5.5E+02 ca	1.9E+00 ca	1.9E+01 ca		

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

FOR PLANNING PURPOSES

TOXICITY INFORMATION							CONTAMINANT	PRELIMINARY REMEDIAL GOALS (PRGs)				SOIL SCREENING LEVELS	
SFo 1/(mg/kg-d)	RfDo (mg/kg-d)	SFi 1/(mg/kg-d)	RfDi (mg/kg-d)	V O C	skin abs. soils	CAS No.		Residential Soil (mg/kg)	Industrial Soil (mg/kg)	Ambient Air (ug/m^3)	Tap Water (ug/l)	Migration to Ground Water DAF 20 (mg/kg)	DAF 1 (mg/kg)
1.9E-01 i		1.9E-01 r		0	0.10	72178-02-0	Fomesafen	2.3E+00 ca	1.0E+01 ca	3.5E-02 ca	3.5E-01 ca		
	2.0E-03 i		2.0E-03 r	0	0.10	944-22-9	Fonofos	1.3E+02 nc	1.4E+03 nc	7.3E+00 nc	7.3E+01 nc		
	1.5E-01 i	4.6E-02 i		0	0.10	50-00-0	Formaldehyde	9.8E+03 nc	1.0E+05 nc	1.5E-01 ca	5.5E+03 nc		
	2.0E+00 h		2.0E+00 r	0	0.10	64-18-6	Formic Acid	1.0E+05 max	1.0E+05 max	7.3E+03 nc	7.3E+04 nc		
	3.0E+00 i		3.0E+00 r	0	0.10	39148-24-8	Fosetyl-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	1	0.10	110-00-9	Furan	2.5E+00 nc	8.5E+00 nc	3.7E+00 nc	6.1E+00 nc		
3.8E+00 h		3.8E+00 r		0	0.10	67-45-8	Furazolidone	1.2E-01 ca	5.0E-01 ca	1.8E-03 ca	1.8E-02 ca		
	3.0E-03 i		1.4E-02 h	0	0.10	98-01-1	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	531-82-8	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	60568-05-0	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	77182-82-2	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	765-34-4	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	1071-83-6	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	69806-40-2	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	79277-27-3	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	76-44-8	Heptachlor	9.9E-02 ca	4.2E-01 ca	1.5E-03 ca	1.5E-02 ca	2.3E+01	1.0E+00
9.1E+00 i	1.3E-05 i	9.1E+00 i	1.3E-05 r	0	0.10	1024-57-3	Heptachlor epoxide	4.9E-02 ca**	2.1E-01 ca*	7.4E-04 ca*	7.4E-03 ca*	7.0E-01	3.0E-02
	2.0E-03 i		2.0E-03 r	0	0.10	87-62-1	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	118-74-1	Hexachlorobenzene	2.8E-01 ca*	1.2E+00 ca	4.2E-03 ca	4.2E-02 ca	2.0E+00	1.0E-01
7.8E-02 i	2.0E-04 h	7.7E-02 i	2.0E-04 r	0	0.10	87-68-3	Hexachlorobutadiene	5.7E+00 ca**	2.4E+01 ca*	8.7E-02 ca*	8.6E-01 ca*	2.0E+00	1.0E-01
6.3E+00 i		6.3E+00 i		0	0.10	319-84-6	HCH (alpha)	7.1E-02 ca	3.0E-01 ca	1.1E-03 ca	1.1E-02 ca	5.0E-04	3.0E-05
1.8E+00 i		1.8E+00 i		0	0.10	319-85-7	HCH (beta)	2.5E-01 ca	1.1E+00 ca	3.7E-03 ca	3.7E-02 ca	3.0E-03	1.0E-04
1.3E+00 h	3.0E-04 i	1.3E+00 r	3.0E-04 r	0	0.10	58-89-9	HCH (gamma) Lindane	3.4E-01 ca*	1.5E+00 ca	5.2E-03 ca	5.2E-02 ca	9.0E-03	5.0E-04
1.8E+00 i		1.8E+00 i		0	0.10	58-89-9	HCH-technical	2.5E-01 ca	1.1E+00 ca	3.8E-03 ca	3.7E-02 ca	3.0E-03	1.0E-04
	7.0E-03 i		2.0E-05 h	0	0.10	77-47-4	Hexachlorocyclopentadiene	4.5E+02 nc	4.6E+03 nc	7.3E-02 nc	2.6E+02 nc	4.0E+02	2.0E+01
6.2E+03 i		4.6E+03 i		0	0.10	19408-74-3	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	67-72-1	Hexachloroethane	3.2E+01 ca**	1.4E+02 ca**	4.8E-01 ca**	4.8E+00 ca**	5.0E-01	2.0E-02
	3.0E-04 i		3.0E-04 r	0	0.10	70-30-4	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	121-82-4	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		
	2.9E-06 r		2.9E-06 i	0	0.10	822-06-0	1,6-Hexamethylene diisocyanate			1.0E-02 nc	1.0E-01 nc		
	6.0E-02 h		5.7E-02 i	1	0.10	110-54-3	n-Hexane	1.1E+02 sat	1.1E+02 sat	2.1E+02 nc	3.5E+02 nc		
	3.3E-02 i		3.3E-02 r	0	0.10	51235-04-2	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	302-01-2	Hydrazine, hydrazine sulfate	1.5E-01 ca	6.4E-01 ca	3.9E-04 ca	2.2E-02 ca		
			5.7E-03 i	0	0.10	7647-01-0	Hydrogen chloride			2.1E+01 nc			
	3.0E-03 i		2.9E-04 i	1	0.10	7783-06-4	Hydrogen sulfide			1.0E+00 nc	2.0E+00 nc		
	4.0E-02 h		4.0E-02 r	0	0.10	123-31-9	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	35554-44-0	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	81335-37-7	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	36734-19-7	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	1	0.10	78-83-1	Isobutanol	1.1E+04 nc	1.0E+05 max	1.1E+03 nc	1.8E+03 nc		
9.5E-04 i	2.0E-01 i	9.5E-04 r	2.0E-01 r	0	0.10	78-59-1	Isophorone	4.7E+02 ca*	2.0E+03 ca*	7.1E+00 ca	7.1E+01 ca	5.0E-01	3.0E-02
	1.5E-02 i		1.5E-02 r	0	0.10	33820-53-0	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	1832-54-8	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	82558-50-7	Isoxaben	3.3E+03 nc	3.4E+04 nc	1.8E+02 nc	1.8E+03 nc		
1.8E+01 n		1.8E+01 r		0	0.10	143-50-0	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	77501-63-4	Lactofen	1.3E+02 nc	1.4E+03 nc	7.3E+00 nc	7.3E+01 nc		

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FOR PLANNING PURPOSES

TOXICITY INFORMATION							CONTAMINANT	PRELIMINARY REMEDIAL GOALS (PRGs)				SOIL SCREENING LEVELS	
SFo 1/(mg/kg-d)	RfDo (mg/kg-d)	SFi 1/(mg/kg-d)	RfDi (mg/kg-d)	V O C	skin abs. soils	CAS No.		Residential Soil (mg/kg)	Industrial Soil (mg/kg)	Ambient Air (ug/m^3)	Tap Water (ug/l)	Migration to Ground Water DAF 20 (mg/kg)	DAF 1 (mg/kg)
esidential PRG Based on Uptake Biokinetic Model				0	n/a	7439-92-1	Lead	4.0E+02 nc	1.0E+03 nc		4.0E+00 nc		
							"CAL-Modified PRG" (PEA, 1994)	1.3E+02					
	1.0E-07 I			0	0.10	78-00-2	Lead (tetraethyl)	6.5E-03 nc	6.8E-02 nc		3.7E-03 nc		
	2.0E-03 I		2.0E-03 r	0	0.10	330-55-2	Linuron	1.3E+02 nc	1.4E+03 nc	7.3E+00 nc	7.3E+01 nc		
	2.0E-02 n			0	0.01	7439-93-2	Lithium	1.5E+03 nc	3.4E+04 nc		7.3E+02 nc		
	2.0E-01 I		2.0E-01 r	0	0.10	63055-99-6	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	121-75-5	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	108-31-6	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	1	0.10	123-33-1	Maleic hydrazide	1.7E+03 nc	2.4E+03 sat	1.8E+03 nc	3.0E+03 nc		
	2.0E-05 h		2.0E-05 r	0	0.10	109-77-3	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	8018-01-7	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	12427-38-2	Maneb	3.3E+02 nc	3.4E+03 nc	1.8E+01 nc	1.8E+02 nc		
	4.7E-02 I		1.4E-05 I	0	0.01	7439-96-5	Manganese and compounds	3.2E+03 nc	4.3E+04 nc	5.1E-02 nc	1.7E+03 nc		
	9.0E-05 h		9.0E-05 r	0	0.10	950-10-7	Mephosfolan	5.9E+00 nc	6.1E+01 nc	3.3E-01 nc	3.3E+00 nc		
	3.0E-02 I		3.0E-02 r	0	0.10	24307-26-4	Mepiquat	2.0E+03 nc	2.0E+04 nc	1.1E+02 nc	1.1E+03 nc		
	3.0E-04 I			0	0.01	7439-97-6	Mercuric chloride	2.3E+01 nc	5.1E+02 nc		1.1E+01 nc		
			8.6E-05 I	n/a	n/a	7439-97-6	Mercury (elemental)			3.1E-01 nc			
	1.0E-04 I			0	0.10	22967-92-6	Mercury (methyl)	6.5E+00 nc	6.8E+01 nc		3.7E+00 nc		
	3.0E-05 I		3.0E-05 r	0	0.10	150-50-5	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	78-48-8	Merphos oxide	2.0E+00 nc	2.0E+01 nc	1.1E-01 nc	1.1E+00 nc		
	6.0E-02 I		6.0E-02 r	0	0.10	57837-19-1	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	126-98-7	Methacrylonitrile	2.0E+00 nc	8.1E+00 nc	7.3E-01 nc	1.0E+00 nc		
	5.0E-05 I		5.0E-05 r	0	0.10	10265-92-6	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	67-56-1	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	950-37-8	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	1	0.10	16752-77-5	Methomyl	4.4E+01 nc	1.5E+02 nc	9.1E+01 nc	1.5E+02 nc		
	5.0E-03 I		5.0E-03 r	0	0.10	72-43-5	Methoxychlor	3.3E+02 nc	3.4E+03 nc	1.8E+01 nc	1.8E+02 nc	1.6E+02	8.0E+00
	1.0E-03 h		5.7E-03 I	0	0.10	109-86-4	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	110-49-6	2-Methoxyethanol acetate	1.3E+02 nc	1.4E+03 nc	7.3E+00 nc	7.3E+01 nc		
.6E-02 h		4.6E-02 r		0	0.10	99-59-2	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	79-20-9	Methyl acetate	2.1E+04 nc	8.8E+04 nc	3.7E+03 nc	6.1E+03 nc		
	3.0E-02 h		3.0E-02 r	1	0.10	96-33-3	Methyl acrylate	6.9E+01 nc	2.3E+02 nc	1.1E+02 nc	1.8E+02 nc		
.4E-01 h		2.4E-01 r		0	0.10	100-61-8	2-Methylaniline (o-toluidine)	1.9E+00 ca	7.9E+00 ca	2.8E-02 ca	2.8E-01 ca		
.8E-01 h		1.8E-01 r		0	0.10	636-21-5	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	79-22-1	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	94-74-6	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	94-81-5	4-(2-Methyl-4-chlorophenoxy) butyric acid	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	93-65-2	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	16484-77-8	2-(2-Methyl-1,4-chlorophenoxy) propionic acid	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	108-87-2	Methylcyclohexane	5.6E+04 nc	1.0E+05 max	3.1E+03 nc	3.1E+04 nc		
.5E-01 h		2.5E-01 r		0	0.10	101-77-9	4,4'-Methylenebisbenzeneamine	1.8E+00 ca	7.6E+00 ca	2.7E-02 ca	2.7E-01 ca		
.3E-01 h	7.0E-04 h	1.3E-01 h	7.0E-04 r	0	0.10	101-14-4	4,4'-Methylene bis(2-chloroaniline)	3.4E+00 ca*	1.5E+01 ca*	5.2E-02 ca*	5.2E-01 ca*		
.6E-02 I		4.6E-02 r		0	0.10	101-61-1	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	74-95-3	Methylene bromide	6.5E+02 nc	6.8E+03 nc	3.7E+01 nc	3.7E+02 nc		
.5E-03 I	6.0E-02 I	1.6E-03 I	8.6E-01 h	1	0.10	75-09-2	Methylene chloride	7.8E+00 ca	1.8E+01 ca	4.1E+00 ca	4.3E+00 ca	2.0E-02	1.0E-03
			5.7E-06 I	0	n/a	101-68-8	4,4'-Methylenediphenyl isocyanate			2.1E-02 nc			
	6.0E-01 I		2.9E-01 I	1	0.10	78-93-3	Methyl ethyl ketone	7.1E+03 nc	2.7E+04 nc	1.0E+03 nc	1.9E+03 nc		

Key: I=IRIS h=HEAST n=ICEA x=WITHDRAWN r=ROUTE EXTRAPOLATION ca=CANCER PRG nc=NONCANCER PRG sat=SOIL SATURATION max=CEILING LIMIT *(where: nc < 100X ca) **(where: nc < 10X ca)

FOR PLANNING PURPOSES

TOXICITY INFORMATION							CONTAMINANT	PRELIMINARY REMEDIAL GOALS (PRGs)				SOIL SCREENING LEVELS	
SFo 1/(mg/kg-d)	RfDo (mg/kg-d)	SFi 1/(mg/kg-d)	RfDi (mg/kg-d)	V O C	skin abs. solls	CAS No.		Residential Soil (mg/kg)	Industrial Soil (mg/kg)	Ambient Air (ug/m^3)	Tap Water (ug/l)	Migration to Ground Water DAF 20 (mg/kg)	DAF 1 (mg/kg)
1.1E+00 h		1.1E+00 r		0	0.10	60-34-4	Methyl hydrazine	4.0E-01 ca	1.7E+00 ca	6.1E-03 ca	6.1E-02 ca		
	8.0E-02 h		2.3E-02 h	1	0.10	108-10-1	Methyl isobutyl ketone	7.7E+02 nc	2.8E+03 nc	8.3E+01 nc	1.6E+02 nc		
	8.0E-02 h		8.0E-02 r	1	0.10	80-62-6	Methyl methacrylate	7.6E+02 nc	2.8E+03 nc	2.9E+02 nc	4.9E+02 nc		
3.3E-02 h		3.3E-02 r		0	0.10	99-55-8	2-Methyl-5-nitroaniline	1.3E+01 ca	5.8E+01 ca	2.0E-01 ca	2.0E+00 ca		
	2.5E-04 i		2.5E-04 r	0	0.10	298-00-0	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	95-48-7	2-Methylphenol	3.3E+03 nc	3.4E+04 nc	1.8E+02 nc	1.8E+03 nc	1.5E+01	8.0E-01
	5.0E-02 x		5.0E-02 r	0	0.10	108-39-4	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	106-44-5	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	25013-15-4	Methyl styrene (mixture)	1.2E+02 nc	5.2E+02 nc	4.2E+01 nc	6.0E+01 nc		
	7.0E-02 h		7.0E-02 r	1	0.10	98-83-9	Methyl styrene (alpha)	6.8E+02 sat	6.8E+02 sat	2.6E+02 nc	4.3E+02 nc		
	8.0E-03 n		8.6E-01 i	1	0.10	1634-04-4	Methyl tertbutyl ether (MTBE)			3.1E+03 nc	1.8E+02 nc		
	1.5E-01 i		1.5E-01 r	0	0.10	51218-45-2	Metolaclor (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	21087-64-9	Metribuzin	1.6E+03 nc	1.7E+04 nc	9.1E+01 nc	9.1E+02 nc		
1.8E+00 h	2.0E-04 i	1.8E+00 r	2.0E-04 r	0	0.10	2385-85-5	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	2212-67-1	Molinate	1.3E+02 nc	1.4E+03 nc	7.3E+00 nc	7.3E+01 nc		
	5.0E-03 h			0	0.01	7439-98-7	Molybdenum	3.8E+02 nc	8.5E+03 nc		1.8E+02 nc		
	1.0E-01 h		1.0E-01 h	0	0.10	10599-90-3	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	300-76-5	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	15299-99-7	Napropamide	6.5E+03 nc	6.8E+04 nc	3.7E+02 nc	3.7E+03 nc		
	2.0E-02 i			0	0.01	7440-02-0	Nickel (soluble salts)	1.5E+03 nc	3.4E+04 nc		7.3E+02 nc	1.3E+02	7.0E+00
							"CAL-Modified PRG" (PEA, 1994)	1.5E+02					
		8.4E-01 i		0	0.01	n/a	Nickel refinery dust			8.0E-03 ca			
		1.7E+00 i		0	0.01	12035-72-2	Nickel subsulfide		1.1E+04 ca	4.0E-03 ca			
	1.5E-03 x		1.5E-03 r	0	0.10	1929-82-4	Nitrapyrin	9.8E+01 nc	1.0E+03 nc	5.5E+00 nc	5.5E+01 nc		
	1.6E+00 i			0	0.10	14797-55-8	Nitrate				5.8E+04 nc		
	1.0E-01 x			0	0.10	10102-43-9	Nitric Oxide	6.5E+03 nc	1.0E+05 max		3.7E+03 nc		
	1.0E-01 i			0	0.10	14797-65-0	Nitrite	6.5E+03 nc	1.0E+05 max		3.7E+03 nc		
	6.0E-05 r		5.7E-05 h	0	0.10	88-74-4	2-Nitroaniline	3.9E+00 nc	4.1E+01 nc	2.1E-01 nc	2.2E+00 nc		
				0	0.10	99-09-2	3-Nitroaniline						
				0	0.10	100-01-6	4-Nitroaniline						
	5.0E-04 i		5.7E-04 h	1	0.10	98-95-3	Nitrobenzene	1.8E+01 nc	9.4E+01 nc	2.1E+00 nc	3.4E+00 nc	1.0E-01	7.0E-03
	7.0E-02 h		7.0E-02 r	0	0.10	67-20-9	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	59-87-0	Nitrofurazone	3.0E-01 ca	1.3E+00 ca	7.2E-04 ca	4.5E-02 ca		
	1.0E+00 x			0	0.10	101102-44-0	Nitrogen dioxide						
	1.0E-01 i		1.0E-01 r	0	0.10	556-88-7	Nitroguanidine	6.5E+03 nc	6.8E+04 nc	3.7E+02 nc	3.7E+03 nc		
				0	0.10	100-02-7	4-Nitrophenol						
9.4E+00 r	6.7E-03 r	9.4E+00 h	6.7E-03 i	1	0.10	79-46-9	2-Nitropropane			7.2E-04 ca	3.5E+01 ca		
5.4E+00 i		5.6E+00 i		1	0.10	924-16-3	N-Nitrosodi-n-butylamine	2.2E-02 ca	5.5E-02 ca	1.2E-03 ca	2.0E-03 ca		
2.6E+00 i		2.6E+00 r		0	0.10	1116-54-7	N-Nitrosodiethanolamine	1.6E-01 ca	6.8E-01 ca	2.4E-03 ca	2.4E-02 ca		
1.5E+02 i		1.5E+02 i		0	0.10	55-18-5	N-Nitrosodiethylamine	3.0E-03 ca	1.3E-02 ca	4.5E-05 ca	4.5E-04 ca		
5.1E+01 i		4.9E+01 i		0	0.10	62-75-9	N-Nitrosodimethylamine	8.7E-03 ca	3.7E-02 ca	1.4E-04 ca	1.3E-03 ca		
4.9E-03 i		4.9E-03 r		0	0.10	86-30-6	N-Nitrosodiphenylamine	9.1E+01 ca	3.9E+02 ca	1.4E+00 ca	1.4E+01 ca	1.0E+00	6.0E-02
7.0E+00 i		7.0E+00 r		0	0.10	621-64-7	N-Nitroso di-n-propylamine	6.3E-02 ca	2.7E-01 ca	9.6E-04 ca	9.6E-03 ca	5.0E-05	2.0E-06
2.2E+01 i		2.2E+01 r		0	0.10	10595-95-6	N-Nitroso-N-methylethylamine	2.0E-02 ca	8.7E-02 ca	3.1E-04 ca	3.1E-03 ca		
2.1E+00 i		2.1E+00 i		0	0.10	930-55-2	N-Nitrosopyrrolidine	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	99-08-1	m-Nitrotoluene	6.5E+02 nc	6.8E+03 nc	3.7E+01 nc	3.7E+02 nc		
	1.0E-02 h		1.0E-02 r	0	0.10	99-99-0	p-Nitrotoluene	6.5E+02 nc	6.8E+03 nc	3.7E+01 nc	3.7E+02 nc		

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FOR PLANNING PURPOSES

TOXICITY INFORMATION								CONTAMINANT	PRELIMINARY REMEDIAL GOALS (PRGs)				SOIL SCREENING LEVELS	
SFo (mg/kg-d)	RfDo (mg/kg-d)	SFi 1/(mg/kg-d)	RfDi (mg/kg-d)	V O C	skin abs. soils	CAS No.			Residential Soil (mg/kg)	Industrial Soil (mg/kg)	Ambient Air (ug/m^3)	Tap Water (ug/l)	Migration to Ground Water DAF 20 (mg/kg)	DAF 1 (mg/kg)
	4.0E-02 I		4.0E-02 r	0	0.10	27314-13-2		Norflurazon						
	7.0E-04 I		7.0E-04 r	0	0.10	85509-19-9		NuStar	4.6E+01 nc	4.8E+02 nc	2.6E+00 nc	2.6E+01 nc		
	3.0E-03 I		3.0E-03 r	0	0.10	32536-52-0		Octabromodiphenyl ether	2.0E+02 nc	2.0E+03 nc	1.1E+01 nc	1.1E+02 nc		
	5.0E-02 I		5.0E-02 r	0	0.10	2691-41-0		Octahydro-1357-tetranitro-1357- tetrazocine (HMX)	3.3E+03 nc	3.4E+04 nc	1.8E+02 nc	1.8E+03 nc		
	2.0E-03 h		2.0E-03 r	0	0.10	152-16-9		Octamethylpyrophosphoramide	1.3E+02 nc	1.4E+03 nc	7.3E+00 nc	7.3E+01 nc		
	5.0E-02 I		5.0E-02 r	0	0.10	19044-88-3		Oryzalin	3.3E+03 nc	3.4E+04 nc	1.8E+02 nc	1.8E+03 nc		
	5.0E-03 I		5.0E-03 r	0	0.10	19666-30-9		Oxadiazon	3.3E+02 nc	3.4E+03 nc	1.8E+01 nc	1.8E+02 nc		
	2.5E-02 I		2.5E-02 r	0	0.10	23135-22-0		Oxamyl	1.6E+03 nc	1.7E+04 nc	9.1E+01 nc	9.1E+02 nc		
	3.0E-03 I		3.0E-03 r	0	0.10	42874-03-3		Oxyfluorfen	2.0E+02 nc	2.0E+03 nc	1.1E+01 nc	1.1E+02 nc		
	1.3E-02 I		1.3E-02 r	0	0.10	76738-62-0		Paclobutrazol	8.5E+02 nc	8.9E+03 nc	4.7E+01 nc	4.7E+02 nc		
	4.5E-03 I		4.5E-03 r	0	0.10	4685-14-7		Paraquat	2.9E+02 nc	3.1E+03 nc	1.6E+01 nc	1.6E+02 nc		
	6.0E-03 h		6.0E-03 r	0	0.10	56-38-2		Parathion	3.9E+02 nc	4.1E+03 nc	2.2E+01 nc	2.2E+02 nc		
	5.0E-02 h		5.0E-02 r	0	0.10	1114-71-2		Pebulate	3.3E+03 nc	3.4E+04 nc	1.8E+02 nc	1.8E+03 nc		
	4.0E-02 I		4.0E-02 r	0	0.10	40487-42-1		Pendimethalin	2.6E+03 nc	2.7E+04 nc	1.5E+02 nc	1.5E+03 nc		
2.3E-02 h		2.3E-02 r		0	0.10	87-84-3		Pentabromo-6-chloro cyclohexane	1.9E+01 ca	8.3E+01 ca	2.9E-01 ca	2.9E+00 ca		
	2.0E-03 I		2.0E-03 r	0	0.10	32534-81-9		Pentabromodiphenyl ether	1.3E+02 nc	1.4E+03 nc	7.3E+00 nc	7.3E+01 nc		
	8.0E-04 I		8.0E-04 r	0	0.10	608-93-5		Pentachlorobenzene	5.2E+01 nc	5.5E+02 nc	2.9E+00 nc	2.9E+01 nc		
2.6E-01 h	3.0E-03 I	2.6E-01 r	3.0E-03 r	0	0.10	82-68-8		Pentachloronitrobenzene	1.7E+00 ca*	7.3E+00 ca	2.6E-02 ca	2.6E-01 ca		
1.2E-01 I	3.0E-02 I	1.2E-01 r	3.0E-02 r	0	0.25	87-86-5		Pentachlorophenol	2.5E+00 ca	7.9E+00 ca	5.6E-02 ca	5.6E-01 ca	3.0E-02	1.0E-03
	5.0E-02 I		5.0E-02 r	0	0.10	52645-53-1		Permethrin	3.3E+03 nc	3.4E+04 nc	1.8E+02 nc	1.8E+03 nc		
	2.5E-01 I		2.5E-01 r	0	0.10	13684-63-4		Phenmedipham	1.6E+04 nc	1.0E+05 max	9.1E+02 nc	9.1E+03 nc		
	6.0E-01 I		6.0E-01 r	0	0.10	108-95-2		Phenol	3.9E+04 nc	1.0E+05 max	2.2E+03 nc	2.2E+04 nc	1.0E+02	5.0E+00
	6.0E-03 I		6.0E-03 r	0	0.10	108-45-2		m-Phenylenediamine	3.9E+02 nc	4.1E+03 nc	2.2E+01 nc	2.2E+02 nc		
	1.9E-01 h		1.9E-01 r	0	0.10	106-50-3		p-Phenylenediamine	1.2E+04 nc	1.0E+05 max	6.9E+02 nc	6.9E+03 nc		
	8.0E-05 I		8.0E-05 r	0	0.10	62-38-4		Phenylmercuric acetate	5.2E+00 nc	5.5E+01 nc	2.9E-01 nc	2.9E+00 nc		
1.9E-03 h		1.9E-03 r		0	0.10	90-43-7		2-Phenylphenol	2.3E+02 ca	9.8E+02 ca	3.5E+00 ca	3.5E+01 ca		
	2.0E-04 h		2.0E-04 r	0	0.10	298-02-2		Phorate	1.3E+01 nc	1.4E+02 nc	7.3E-01 nc	7.3E+00 nc		
	2.0E-02 I		2.0E-02 r	0	0.10	732-11-6		Phosmet	1.3E+03 nc	1.4E+04 nc	7.3E+01 nc	7.3E+02 nc		
	3.0E-04 h		8.6E-05 I	0	0.10	7803-51-2		Phosphine	2.0E+01 nc	2.0E+02 nc	3.1E-01 nc	1.1E+01 nc		
			2.9E-03 I	n/a	n/a	7664-38-2		Phosphoric acid			1.0E+01 nc			
	2.0E-05 I		2.0E-05 r	0	0.10	7723-14-0		Phosphorus (white)			7.3E-02 nc			
	1.0E+00 h		1.0E+00 r	0	0.10	100-21-0		p-Phthalic acid			3.7E+03 nc			
	2.0E+00 I		3.4E-02 h	0	0.10	85-44-9		Phthalic anhydride			1.2E+02 nc			
	7.0E-02 I		7.0E-02 r	0	0.10	1918-02-1		Picloram	4.6E+03 nc	4.8E+04 nc	2.6E+02 nc	2.6E+03 nc		
	1.0E-02 I		1.0E-02 r	0	0.10	23505-41-1		Pirimiphos-methyl	6.5E+02 nc	6.8E+03 nc	3.7E+01 nc	3.7E+02 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*	7.6E-04 ca*	7.6E-03 ca*		
7.7E+00 I		7.7E+00 r		0	0.06	1336-36-3		Polychlorinated biphenyls (PCBs)	6.6E-02 ca*	3.4E-01 ca*	8.7E-04 ca*	8.7E-03 ca*		
	7.0E-05 I		7.0E-05 r	0	0.06	12674-11-2		Aroclor 1016 (see PCBs for cancer endpoint)	4.9E+00 nc	6.5E+01 nc	2.6E-01 nc	2.6E+00 nc		
	2.0E-05 I		2.0E-05 r	0	0.06	11097-69-1		Aroclor 1254 (see PCBs for cancer endpoint)	1.4E+00 nc	1.9E+01 nc	7.3E-02 nc	7.3E-01 nc		
					0.10			Polynuclear aromatic hydrocarbons (PAHs)						
	6.0E-02 I		6.0E-02 r	1	0.10	83-32-9		Acenaphthene	1.1E+02 sat	1.1E+02 sat	2.2E+02 nc	3.7E+02 nc	5.7E+02	2.9E+01
	3.0E-01 I		3.0E-01 r	1	0.10	120-12-7		Anthracene	5.7E+00 sat	5.7E+00 sat	1.1E+03 nc	1.8E+03 nc	1.2E+04	5.9E+02
7.3E-01 n		7.3E-01 r		0	0.10	56-55-3		Benz[a]anthracene	6.1E-01 ca	2.6E+00 ca	9.2E-03 ca	9.2E-02 ca	2.0E+00	8.0E-02
7.3E-01 n		7.3E-01 r		0	0.10	205-99-2		Benzo[b]fluoranthene	6.1E-01 ca	2.6E+00 ca	9.2E-03 ca	9.2E-02 ca	5.0E+00	2.0E-01
7.3E-02 n		7.3E-02 r		0	0.10	207-08-9		Benzo[k]fluoranthene	6.1E+00 ca	2.6E+01 ca	9.2E-02 ca	9.2E-01 ca	4.9E+01	2.0E+00
								"CAL-Modified PRG" (PEA, 1994)	6.1E-01					

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FOR PLANNING PURPOSES

TOXICITY INFORMATION							CONTAMINANT	PRELIMINARY REMEDIAL GOALS (PRGs)				SOIL SCREENING LEVELS	
SFo 1/(mg/kg-d)	RfDo (mg/kg-d)	SFi 1/(mg/kg-d)	RfDi (mg/kg-d)	V O C	skin abs. soils	CAS No.		Residential Soil (mg/kg)	Industrial Soil (mg/kg)	Ambient Air (ug/m^3)	Tap Water (ug/l)	Migration to Ground Water DAF 20 (mg/kg)	DAF 1 (mg/kg)
							PAHs continued						
7.3E+00 I		7.3E+00 r		0	0.10	50-32-8	Benzo[a]pyrene	6.1E-02 ca	2.6E-01 ca	9.2E-04 ca	9.2E-03 ca	8.0E+00	4.0E-01
							"CAL-Modified PRG" (PEA, 1994)				1.5E-03		
7.3E-03 n		7.3E-03 r		0	0.10	218-01-9	Chrysene	7.2E+00 sat	7.2E+00 sat	9.2E-01 ca	9.2E+00 ca	1.6E+02	8.0E+00
							"CAL-Modified PRG" (PEA, 1994)	6.1E+00					
7.3E+00 n		7.3E+00 r		0	0.10	53-70-3	Dibenz[ah]anthracene	6.1E-02 ca	2.6E-01 ca	9.2E-04 ca	9.2E-03 ca	2.0E+00	8.0E-02
	4.0E-02 I		4.0E-02 r	0	0.10	206-44-0	Fluoranthene	2.6E+03 nc	2.7E+04 nc	1.5E+02 nc	1.5E+03 nc	4.3E+03	2.1E+02
	4.0E-02 I		4.0E-02 r	1	0.10	86-73-7	Fluorene	9.0E+01 sat	9.0E+01 sat	1.5E+02 nc	2.4E+02 nc	5.6E+02	2.8E+01
7.3E-01 n		7.3E-01 r		0	0.10	193-39-5	Indeno[1,2,3-cd]pyrene	6.1E-01 ca	2.6E+00 ca	9.2E-03 ca	9.2E-02 ca	1.4E+01	7.0E-01
	4.0E-02 n		4.0E-02 r	1	0.10	91-20-3	Naphthalene	2.4E+02 sat	2.4E+02 sat	1.5E+02 nc	2.4E+02 nc	8.4E+01	4.0E+00
	3.0E-02 I		3.0E-02 r	1	0.10	129-00-0	Pyrene	1.0E+02 sat	1.0E+02 sat	1.1E+02 nc	1.8E+02 nc	4.2E+03	2.1E+02
1.5E-01 I	9.0E-03 I	1.5E-01 r	9.0E-03 r	0	0.10	67747-09-5	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	26399-36-0	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	1610-18-0	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	7287-19-6	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	23950-58-5	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	1918-16-7	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	709-98-8	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	2312-35-8	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	107-19-7	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	139-40-2	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	122-42-9	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	60207-90-1	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	57-55-6	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	111-35-3	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	107-98-2	Propylene glycol, monomethyl ether	4.6E+04 nc	1.0E+05 max	2.1E+03 nc	2.6E+04 nc		
2.4E-01 I	8.0E-03 r	1.3E-02 I	8.0E-03 I	1	0.10	75-56-9	Propylene oxide			5.2E-01 ca	2.2E-01 ca		
	2.5E-01 I		2.5E-01 r	0	0.10	81335-77-5	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	51630-58-1	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	110-86-1	Pyridine	6.5E+01 nc	6.8E+02 nc	3.7E+00 nc	3.7E+01 nc		
	5.0E-04 I		5.0E-04 r	0	0.10	13593-03-8	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	91-22-5	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	121-82-4	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	10453-86-8	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	299-84-3	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	83-79-4	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	78578-05-0	Savey	1.6E+03 nc	1.7E+04 nc	9.1E+01 nc	9.1E+02 nc		
	5.0E-03 I			0	0.10	7783-00-8	Selenious Acid	3.3E+02 nc	3.4E+03 nc		1.8E+02 nc		
	5.0E-03 I			0	0.01	7782-49-2	Selenium	3.8E+02 nc	8.5E+03 nc		1.8E+02 nc	5.0E+00	3.0E-01
	5.0E-03 h			0	0.10	630-10-4	Selenourea	3.3E+02 nc	3.4E+03 nc		1.8E+02 nc		
	9.0E-02 I		9.0E-02 r	0	0.10	74051-80-2	Sethoxydim	5.9E+03 nc	6.1E+04 nc	3.3E+02 nc	3.3E+03 nc		
	5.0E-03 I			0	0.01	7440-22-4	Silver and compounds	3.8E+02 nc	8.5E+03 nc		1.8E+02 nc	3.4E+01	2.0E+00
1.2E-01 h	5.0E-03 I	1.2E-01 r	2.0E-03 r	0	0.10	122-34-9	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	26628-22-8	Sodium azide	2.6E+02 nc	2.7E+03 nc	1.5E+01 nc	1.5E+02 nc		
2.7E-01 h	3.0E-02 I	2.7E-01 r	3.0E-02 r	0	0.10	148-18-5	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	62-74-8	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	13718-26-8	Sodium metavanadate	6.5E+01 nc	6.8E+02 nc	3.7E+00 nc	3.7E+01 nc		

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FOR PLANNING PURPOSES

TOXICITY INFORMATION							CONTAMINANT	PRELIMINARY REMEDIAL GOALS (PRGs)				SOIL SCREENING LEVELS	
SFo (mg/kg-d)	RfDo (mg/kg-d)	SFi 1/(mg/kg-d)	RfDi (mg/kg-d)	V O C	skin abs. soils	CAS No.		Residential Soil (mg/kg)	Industrial Soil (mg/kg)	Ambient Air (ug/m^3)	Tap Water (ug/l)	Migration to Ground Water DAF 20 (mg/kg)	DAF 1 (mg/kg)
	6.0E-01 i			0	0.01	7440-24-6	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	57-24-9	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	100-42-5	Styrene	6.8E+02 sat	6.8E+02 sat	1.1E+03 nc	1.6E+03 nc	4.0E+00	2.0E-01
	2.5E-02 i		2.5E-02 r	0	0.10	86671-89-0	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	1746-01-6	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	34014-18-1	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	3383-96-8	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	5902-51-2	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	13071-79-9	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	886-50-0	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	95-94-3	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	630-20-6	1,1,1,2-Tetrachloroethane	2.4E+00 ca	5.4E+00 ca	2.6E-01 ca	4.3E-01 ca		
2.0E-01 i		2.0E-01 i		1	0.10	79-34-5	1,1,2,2-Tetrachloroethane	4.5E-01 ca	1.1E+00 ca	3.3E-02 ca	5.5E-02 ca	3.0E-03	2.0E-04
5.2E-02 n	1.0E-02 i	2.0E-03 n	1.0E-02 r	1	0.10	127-18-4	Tetrachloroethylene (PCE)	5.4E+00 ca	1.7E+01 ca	3.3E+00 ca	1.1E+00 ca	6.0E-02	3.0E-03
							"CAL-Modified PRG" (PEA, 1994)			3.2E-01			
	3.0E-02 i		3.0E-02 r	0	0.10	58-90-2	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	5216-25-1	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	961-11-5	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	3689-24-5	Tetraethyldithiopyrophosphate	3.3E+01 nc	3.4E+02 nc	1.8E+00 nc	1.8E+01 nc		
	7.0E-05 h			0	0.01	1314-32-5	Thallic oxide	5.4E+00 nc	1.2E+02 nc		2.6E+00 nc		
	9.0E-05 i			0	0.01	563-68-8	Thallium acetate	6.9E+00 nc	1.5E+02 nc		3.3E+00 nc	7.0E-01	4.0E-01
	8.0E-05 i			0	0.01	6533-73-9	Thallium carbonate	6.1E+00 nc	1.4E+02 nc		2.9E+00 nc	7.0E-01	4.0E-01
	8.0E-05 i			0	0.01	7791-12-0	Thallium chloride	6.1E+00 nc	1.4E+02 nc		2.9E+00 nc	7.0E-01	4.0E-01
	9.0E-05 i			0	0.01	10102-45-1	Thallium nitrate	6.9E+00 nc	1.5E+02 nc		3.3E+00 nc	7.0E-01	4.0E-01
	9.0E-05 x			0	0.01	12039-52-0	Thallium selenite	6.9E+00 nc	1.5E+02 nc		3.3E+00 nc	7.0E-01	4.0E-01
	8.0E-05 i			0	0.01	7446-18-6	Thallium sulfate	6.1E+00 nc	1.4E+02 nc		2.9E+00 nc	7.0E-01	4.0E-01
	1.0E-02 i		1.0E-02 r	0	0.10	28249-77-6	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	3689-24-5	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	39196-18-4	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	23564-05-8	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	137-26-8	Thiram	3.3E+02 nc	3.4E+03 nc	1.8E+01 nc	1.8E+02 nc		
	8.0E-01 h			0	0.01	n/a	Tin (inorganic, see tributyltin oxide for organic tin)	4.6E+04 nc	1.0E+05 max		2.2E+04 nc		
	2.0E-01 i		1.1E-01 h	1	0.10	108-88-3	Toluene	7.9E+02 nc	8.8E+02 sat	4.0E+02 nc	7.2E+02 nc	1.2E+01	6.0E-01
3.2E+00 h		3.2E+00 r		0	0.10	95-80-7	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	95-70-5	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	823-40-5	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	106-49-0	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	8001-35-2	Toxaphene	4.0E-01 ca	1.7E+00 ca	6.0E-03 ca	6.1E-02 ca	3.1E+01	2.0E+00
	7.5E-03 i		7.5E-03 r	0	0.10	66841-25-6	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	2303-17-5	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	82097-50-5	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	615-54-3	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	56-35-9	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	634-93-5	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	33663-50-2	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	120-82-1	1,2,4-Trichlorobenzene	5.7E+02 nc	5.5E+03 sat	2.1E+02 nc	1.9E+02 nc	5.0E+00	3.0E-01
	3.5E-02 n		2.9E-01 x	1	0.10	71-55-6	1,1,1-Trichloroethane	1.2E+03 nc	3.0E+03 sat	1.0E+03 nc	7.9E+02 nc	2.0E+00	1.0E-01

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FOR PLANNING PURPOSES

TOXICITY INFORMATION							CONTAMINANT	PRELIMINARY REMEDIAL GOALS (PRGs)				SOIL SCREENING LEVELS	
				V O C	skin abs. soils	CAS No.		Residential Soil (mg/kg)	Industrial Soil (mg/kg)	Ambient Air (ug/m^3)	Tap Water (ug/l)	Migration to Ground Water DAF 20 (mg/kg)	DAF 1 (mg/kg)
SFo 1/(mg/kg-d)	RfDo (mg/kg-d)	SFi 1/(mg/kg-d)	RfDi (mg/kg-d)										
5.7E-02 i	4.0E-03 i	5.6E-02 i	4.0E-03 r	1	0.10	79-00-5	1,1,2-Trichloroethane	6.5E-01 ca	1.6E+00 ca	1.2E-01 ca	2.0E-01 ca	2.0E-02	9.0E-04
1.1E-02 n	6.0E-03 n	6.0E-03 n	6.0E-03 r	1	0.10	79-01-6	Trichloroethylene (TCE)	3.2E+00 ca*	7.0E+00 ca*	1.1E+00 ca*	1.6E+00 ca*	6.0E-02	3.0E-03
	3.0E-01 i		2.0E-01 h	1	0.10	75-69-4	Trichlorofluoromethane	3.8E+02 nc	1.8E+03 nc	7.3E+02 nc	1.3E+03 nc		
	1.0E-01 i		1.0E-01 r	0	0.10	95-95-4	2,4,5-Trichlorophenol	6.5E+03 nc	6.8E+04 nc	3.7E+02 nc	3.7E+03 nc	2.7E+02	1.4E+01
1.1E-02 i		1.1E-02 i		0	0.10	88-06-2	2,4,6-Trichlorophenol	4.0E+01 ca	1.7E+02 ca	6.2E-01 ca	6.1E+00 ca	2.0E-01	8.0E-03
	1.0E-02 i		1.0E-02 r	0	0.10	93-76-5	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	93-72-1	2-(2,4,5-Trichlorophenoxy) propionic acid	5.2E+02 nc	5.6E+03 nc	2.9E+01 nc	2.9E+02 nc		
	5.0E-03 i		5.0E-03 r	1	0.10	598-77-6	1,1,2-Trichloropropane	1.5E+01 nc	5.0E+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	96-18-4	1,2,3-Trichloropropane	1.4E-03 ca	3.1E-03 ca	9.6E-04 ca	1.6E-03 ca		
	5.0E-03 h		5.0E-03 r	1	0.10	96-19-5	1,2,3-Trichloropropene	1.1E+01 nc	3.8E+01 nc	1.8E+01 nc	3.0E+01 nc		
	3.0E+01 i		8.6E+00 h	1	0.10	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	5.6E+03 sat	5.6E+03 sat	3.1E+04 nc	5.9E+04 nc		
	3.0E-03 i		3.0E-03 r	0	0.10	58138-08-2	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	121-44-8	Triethylamine	2.3E+01 nc	8.4E+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	1582-09-8	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	512-56-1	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	99-35-4	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	479-45-8	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	118-96-7	2,4,6-Trinitrotoluene	1.5E+01 ca**	6.4E+01 ca**	2.2E-01 ca**	2.2E+00 ca**		
	3.0E-03 i			0	0.01	7440-61-1	Uranium (soluble salts)						
	7.0E-03 h			0	0.01	7440-62-2	Vanadium	5.4E+02 nc	1.2E+04 nc		2.6E+02 nc	6.0E+03	3.0E+02
	9.0E-03 i			0	0.01	1314-62-1	Vanadium pentoxide	6.9E+02 nc	1.5E+04 nc		3.3E+02 nc	6.0E+03	3.0E+02
	2.0E-02 h			0	0.01	13701-70-7	Vanadium sulfate	1.5E+03 nc	3.4E+04 nc		7.3E+02 nc	6.0E+03	3.0E+02
	1.0E-03 i		1.0E-03 r	0	0.10	1929-77-7	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	50471-44-8	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	1	0.10	108-05-4	Vinyl acetate	7.8E+02 nc	2.6E+03 nc	2.1E+02 nc	4.1E+02 nc	1.7E+02	8.0E+00
1.1E-01 r	8.6E-04 r	1.1E-01 h	8.6E-04 i	1	0.10	593-60-2	Vinyl bromide (bromoethene)	1.9E-01 ca*	4.1E-01 ca*	6.1E-02 ca*	1.0E-01 ca*		
1.9E+00 h		3.0E-01 h		1	0.10	75-01-4	Vinyl chloride	1.6E-02 ca	3.5E-02 ca	2.2E-02 ca	2.0E-02 ca	1.0E-02	7.0E-04
	3.0E-04 i		3.0E-04 r	0	0.10	81-81-2	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	108-38-3	m-Xylene	3.2E+02 sat	3.2E+02 sat	7.3E+02 nc	1.4E+03 nc	2.1E+02	1.0E+01
	2.0E+00 i		2.0E-01 x	1	0.10	95-47-6	o-Xylene	3.2E+02 sat	3.2E+02 sat	7.3E+02 nc	1.4E+03 nc	1.9E+02	9.0E+00
				1	0.10	106-42-3	p-Xylene	3.2E+02 sat	3.2E+02 sat			2.0E+02	1.0E+01
	2.0E+00 i		2.0E-01 x	1	0.10	1330-20-7	Xylene (mixed)	3.2E+02 sat	3.2E+02 sat	7.3E+02 nc	1.4E+03 nc	2.0E+02	1.0E+01
	3.0E-01 i			0	0.01	7440-66-6	Zinc	2.3E+04 nc	1.0E+05 max		1.1E+04 nc	1.2E+04	6.2E+02
	3.0E-04 i			0	0.01	1314-84-7	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	12122-67-7	Zineb	3.3E+03 nc	3.4E+04 nc	1.8E+02 nc	1.8E+03 nc		

DEPT OF TOXIC SUBSTANCES
CONTROL, LONG BEACH

SEP 25 1996

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ATTACHMENT 2

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

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.

E. 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).

cc: David Wang
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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 PAEs 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 $(mg/kg\text{-}day)^{-1}$.