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PROGRAM MANAGER FOR ROCKY MOUNTAIN ARSENAL

U.S. ARMY
MATERIEL COMMAND

— COMMITTED TO PROTECTION OF THE ENVIRONMENT —

FINAL
HUMAN HEALTH EXPOSURE ASSESSMENT
FOR ROCKY MOUNTAIN ARSENAL
STUDY AREA EVALUATIONS
VOLUME VI-G

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SOUTH PLANTS STUDY AREA
EXPOSURE ASSESSMENT
VERSION 4.1

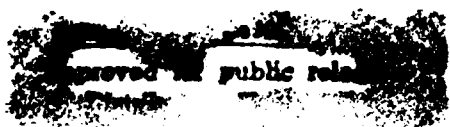
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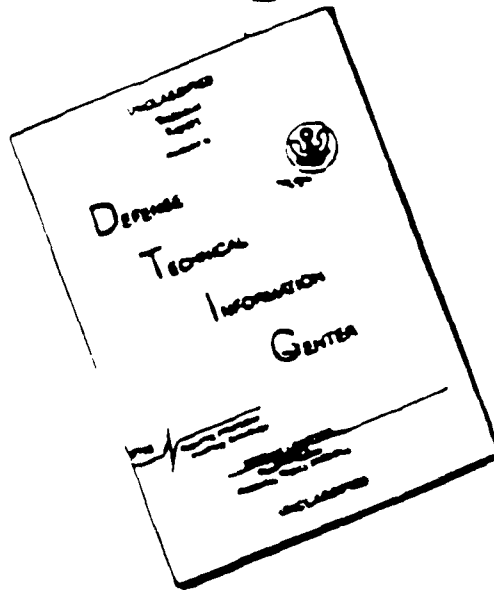
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Prepared for:

U.S. ARMY PROGRAM MANAGER'S OFFICE
FOR THE ROCKY MOUNTAIN ARSENAL CONTAMINATION CLEANUP

THE VIEWS, OPINIONS, AND/OR FINDINGS CONTAINED IN THIS REPORT ARE THOSE OF THE AUTHOR(S) AND SHOULD NOT BE CONSTRUED AS AN OFFICIAL DEPARTMENT OF THE ARMY POSITION, POLICY, OR DECISION UNLESS SO DESIGNATED BY OTHER DOCUMENTATION.

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LIST OF ACRONYMS

CAR	Contamination Assessment Report
COC	contaminant of concern
COS	contaminant of significance
CRL	certified reporting limit
d	depth to the top of the contamination zone
EI	exposure index
h	depth to the bottom of the contamination zone
ICP	Inductively Coupled Plasma
ISCLT	Industrial Source Complex Long Term Plume Dispersion
PPDDE	2,2-bis(Para-chlorophenyl)-1,1-dichloroethene
PPDDT	2,2-bis(Para-chlorophenyl)-1,1,1-trichloroethane
PPLV	preliminary pollutant limit value
RI	remedial investigation
RMA	Rocky Mountain Arsenal
RMACCPMT	Rocky Mountain Arsenal Contamination Control Program Management Team
SAR	Study Area Report
SPPPLV	single pathway preliminary pollutant limit value
SPSA	South Plants Study Area
VEI	vapor exposure index

EXECUTIVE SUMMARY

The South Plants Study Area (SPSA) Exposure Assessment presents detailed exposure analyses for the 35 potentially contaminated areas defined by the South Plants Study Area Report (SAR). The evaluations were based on the soil and sediment contaminant concentrations presented in the site-specific Contamination Assessment Reports (CARs) and the overall SARs and groundwater contaminants from DP Associates Groundwater Database. The maximum concentrations for each contaminant detected were extracted from these data and reported. Draft preliminary pollutant limit values (PPLVs) were computed for each of these site-specific contaminants as described in Volume IV of the Exposure Assessment Report for the direct (soil ingestion, suspended particulate inhalation, and dermal contact) and indirect (open and enclosed space vapor inhalation) exposure pathways. Cumulative PPLVs were computed for the five exposed populations (regulated visitors, casual visitors, recreational visitors, commercial workers, and industrial workers). The site-by-site evaluations consisted of comparisons of the maximum site contaminant concentrations to their corresponding cumulative Draft PPLVs in order to determine exceedances and, hence, established a first screen for determining sites which may be considered as candidates for remedial action during the Feasibility Study. These are ranked into two categories: Priority 1 which consists of sites where available soil contaminant concentration data indicate that the maximum detected concentrations exceed the draft human health based criteria, and Priority 2 which consists of sites where available soil contaminant concentration data indicate that the maximum detected concentrations do not exceed the draft human health based criteria. Site designations will be reconsidered throughout the Endangerment Assessment process as health based criteria are refined and additional data become available.

No samples from the interior of sewer lines present in the SPSA were included in the analysis since these evaluations are based on soil contaminants only. Sewers are being considered for remedial action under the ongoing Feasibility Study.

A groundwater plume has been identified in the SPSA. Therefore, in addition to the direct soil exposure evaluations, the significance of the inhalation of volatile groundwater

contaminants which diffuse through site soils was estimated using the open space and enclosed space vapor inhalation models as described in detail in Volume IV (Sections 4.5 and 4.6, respectively) and the exposure analysis procedures presented in Volume VI-A. The exposure evaluations were performed for the most sensitive exposed population (i.e., the industrial worker).

Of the 35 sites evaluated in the SPSA, 33 were designated Priority 1 sites based on the most sensitive exposed population PPLV (i.e., the industrial worker). These include:

- Army Agents and Shell Pesticides Processing Area (SPSA-1a)
- Mounded Material (SPSA-1b)
- Lime Pits (SPSA-1c)
- Drainage Ditches (SPSA-1d)
- Buried M-1 Pits (SPSA-1e)
- Buried Barrels Containing Hexachlorocyclopentadine (SPSA-1f)
- Balance of SPSA-1 (SPSA-1g)
- South Tank Farm Area (SPSA-2a)
- Open Storage Area (SPSA-2b)
- Salvage Yard (SPSA-2c)
- Drainage Ditches (SPSA-2d)
- Balance of SPSA-2 (SPSA-2e)
- Drainage Ditches (SPSA-3a)
- Salt Storage Pad (SPSA-3b)
- Former Tank Storage Area (SPSA-3c)
- Revetted Tank Storage Area (SPSA-3d)
- Balance of SPSA-3 (SPSA-3e)
- Drainage Ditches (SPSA-4a)
- Balance of SPSA-4 (SPSA-4b)
- Drainage Ditch (SPSA-5a)
- Balance of SPSA-5 (SPSA-5b)
- Hydrazine Facility (SPSA-6)
- Drainage Ditches (SPSA-7a)

- Lagoon (SPSA-7b)
- Balance of SPSA-7 (SPSA-7c)
- Sanitary Landfill (SPSA-8a)
- Drainage Ditches (SPSA-8b)
- Drainage Ditch (SPSA-9a)
- Chemical Sewer System (SPSA-10)
- Sanitary Sewer System (SPSA-11)
- Process Water System (SPSA-12)
- Aeration Basin (SPSA-12a)
- Sedimentation Pond (SPSA-12b)

Of the 35 sites evaluated in the SPSA, 2 were designated as Priority 2 sites based on the most sensitive exposed population PPLV (i.e., the industrial worker). These sites are:

- Balance of SPSA-8 (SPSA-8c)
- Balance of SPSA-9 (SPSA-9b)

The contaminants of concern (COCs) in soil (i.e., those displaying cumulative exposure indices (EIs) greater than 0.1) for the SPSA, based on the most sensitive exposed population PPLV (i.e., the industrial worker), are:

- Aldrin
- Benzene
- Bicycloheptadiene
- Carbon tetrachloride
- Chlordane
- Chloroacetic acid
- Chloroform
- Chlorophenylmethyl sulfide
- Dibromochloropropane
- 1,2-Dichloroethane
- 2,2-bis(Para-chlorophenyl)-1,1-dichloroethene (PPDDE)
- 2,2-bis(Para-chlorophenyl)-1,1,1-trichloroethane (PPDDT)

- Dicyclopentadiene
- Dieldrin
- Endrin
- Hexachlorocyclopentadiene
- Isodrin
- Methylene chloride
- Methylisobutyl ketone^{1/}
- Supona
- 1,1,2,2-Tetrachloroethane
- Tetrachloroethylene
- Trichloroethylene
- Arsenic
- Cadmium
- Chromium
- Lead
- Mercury

The contaminants of significance (COSs) in groundwater (i.e., those displaying vapor exposure indices (VEIs) greater than 1) for the SPSA are:

- Aldrin
- Benzene
- Bicycloheptadiene
- Carbon tetrachloride
- Chlorobenzene
- Chloroform
- Dibromochloropropane
- 1,1-Dichloroethylene
- Dicyclopentadiene
- Dimethyldisulfide

^{1/} Identified as a COC for the commercial worker only (see Volume VII, Section 4.2).

- Hexachlorocyclopentadiene
- Methylene chloride
- Methylisobutyl ketone
- Tetrachloroethylene
- 1,1,2-Trichloroethane
- Trichloroethylene

1.0 INTRODUCTION

The analyses and evaluations performed under the Rocky Mountain Arsenal (RMA) Exposure Assessment are documented in eight report volumes. These include Volume I, Surface Use and Exposed Population Evaluations; Volumes II and III, Toxicity Assessment; Volumes IV and V, Preliminary Pollutant Limit Value (PPLV) Methodology; Volume VI, Study Area Exposure Assessments; Volume VII, Summary Exposure Assessment; and Volume VIII, Response to Comments on the Draft Exposure Assessment.

Volume VI of the Exposure Assessment is a detailed presentation of the study area exposure analyses, consisting of site-by-site comparisons of measured maximum contaminant concentrations to their Draft PPLVs derived for an industrial worker (the most sensitive receptor). Volume VI consists of eight subvolumes, VI-A through VI-H. Subvolume G (this document) constitutes the Study Area Exposure Assessment for the South Plants Study Area (SPSA). The remaining subvolumes are: VI-A, Introduction; VI-B, Western Study Area; VI-C, Southern Study Area; VI-D, North Central Study Area; VI-E, Central Study Area; VI-F, Eastern Study Area; and VI-H, North Plants Study Area. A description of the contents, approach, specific procedures, and format in preparing the Study Area Exposure Assessment documents is presented in Volume VI-A.

The exposure assessment for the SPSA was performed on a site-by-site basis. The site designations are consistent with those used in the remedial investigation (RI) Study Area Report (SAR) for the SPSA (EBASCO, 1989a). The analytical data used for each site were based on the original Rocky Mountain Arsenal Contamination Control Program Management Team (RMACCPMT)/Phase I and II RI site Contamination Assessment Reports (CARs). Additional information on the history of these sites can be found in Section 3.2 of the SAR (EBASCO, 1989a). The SARs present a regional overview of the extent of contamination and migration characteristics throughout the Arsenal. An analogous regional overview of the exposure assessment for the SPSA is presented in the Study Area Exposure Summary, Section 3.0 of this report volume. This regional summary is integrated with the other study area exposure summaries in Volume VII to provide an Arsenal-wide perspective of the significance of the measured contamination.

The sites included in the SPSA Exposure Assessment are as follows:

- SPSA-1a: Army Agents and Shell Pesticides Processing Area
- SPSA-1b: Mounded Material
- SPSA-1c: Lime Pits
- SPSA-1d: Drainage Ditches
- SPSA-1e: Buried M-1 Pits
- SPSA-1f: Buried Barrels Containing Hexachlorocyclopentadiene
- SPSA-1g: Balance of SPSA-1
- SPSA-2a: South Tank Farm Area
- SPSA-2b: Open Storage Area
- SPSA-2c: Salvage Yard
- SPSA-2d: Drainage Ditches
- SPSA-2e: Balance of SPSA-2
- SPSA-3a: Drainage Ditches
- SPSA-3b: Salt Storage Pad
- SPSA-3c: Former Tank Storage Area
- SPSA-3d: Revetted Tank Storage Area
- SPSA-3e: Balance of SPSA-3
- SPSA-4a: Drainage Ditches
- SPSA-4b: Balance of SPSA-4
- SPSA-5a: Drainage Ditch
- SPSA-5b: Balance of SPSA-5
- SPSA-6: Hydrazine Facility
- SPSA-7a: Drainage Ditches
- SPSA-7b: Lagoon
- SPSA-7c: Balance of SPSA-7
- SPSA-8a: Sanitary Landfill
- SPSA-8b: Drainage Ditches
- SPSA-8c: Balance of SPSA-8
- SPSA-9a: Drainage Ditch

- SPSA-9b: Balance of SPSA-9
- SPSA-10: Chemical Sewer System
- SPSA-11: Sanitary Sewer System
- SPSA-12: Process Water System
- SPSA-12a: Aeration Basin
- SPSA-12b: Sedimentation Pond

The locations of each of the sites listed above in the South Plants were depicted in the South Plants SAR (EBASCO, 1989a). The site-by-site exposure assessments for each of the 35 areas investigated are presented in Sections 2.1 through 2.35. A study area exposure summary for the SPSA is presented in Section 3.0.

The Soil Contaminant Concentration Tables in Sections 2.1 through 2.35, list the maximum concentrations that were calculated for each site over two depth intervals, designated as Horizon 1 and Horizon 2. Horizon 1 included depths from 0 to 10 feet (ft), and Horizon 2 accounted for all depths, including 0 to 10 ft. If the maximum concentration for all depths is in Horizon 1, then the listed concentration in Horizon 2 will equal Horizon 1. For a further discussion, see Volume VI-A, Section 2.2.4. The Inductively Coupled Plasma (ICP) metals (i.e., cadmium, chromium, copper, lead, and zinc), arsenic, and mercury identified as site contaminants in the tables include only those which were detected above indicator levels. The following are the indicator levels used:

<u>Contaminant</u>	<u>Indicator Level</u>
Arsenic	CRL ^{1/} -10 ug/g ^{2/}
Cadmium	1-2 ug/g
Chromium	25-40 ug/g
Copper	20-35 ug/g
Lead	25-40 ug/g
Mercury	CRL-0.10 ug/g
Zinc	60-80 ug/g

1/ certified reporting limit
2/ micrograms per gram

As described in Volume VI-A of this report, nontarget contaminants were subjected to two screening processes to determine whether or not they should be evaluated in detail in the site-by-site exposure assessments. The first screening was conducted as part of the RMA Chemical Index (EBASCO, 1988c/RIC 88357R01), and was based on the toxicity, concentration, and frequency of occurrence of the nontarget compounds. Contaminants passing through this first screening were then subjected to a second screening that was conducted on a study area-by-study area basis within Appendix A of each Study Area Exposure Assessment (Volumes VI-B through VI-H). This second screening process considered frequency of occurrence, similarity of the nontarget concentration to that of target contaminants, and co-occurrence of nontarget compounds with target compounds in the soil and sediment samples. The reader is encouraged to consult the RMA Chemical Index and the Study Area Exposure Assessment Appendices for details of the screening processes, as it was judged too repetitive to include this information in each site where nontargets were detected.

Draft PPLVs for each of the site contaminants were computed for the five exposed populations of concern which are regulated visitors, casual visitors, recreational visitors, commercial workers, and industrial workers for the direct (i.e., soil ingestion, dermal contact, and suspended particulate inhalation) and indirect (i.e., open and enclosed space vapor inhalation) exposure pathways, according to the methodology detailed in Volume IV of the Exposure Assessment. Draft PPLVs for each site are presented in the Exposure Evaluation Tables. Figure SPSA-1-0 explains various aspects of the data presented in the Exposure Evaluation Tables. For a further discussion of these tables, see Section 3.0 in Volume VI-A.

The cumulative Draft PPLVs in these tables for ICP metals, arsenic, and mercury do not include the single pathway preliminary pollutant limit values (SPPPLVs) computed for vapor inhalation exposure pathways since the potential for inhalation of vaporized ICP metals, arsenic, and mercury is assumed to be negligible (see Volume VI-A). SPPPLVs for the inhalation pathways are not included in the cumulative Draft PPLVs for chloroacetic acid, 1,2-dichloroethylene, dimethylmethyl phosphonate, Dithiane, fluoroacetic acid,

Figure SP5A-1-0
Sample Exposure Summary

Contaminant	2	3	4	5	6	7	8	9	10
	Direct PPLV	Indirect OSVI 3/	Indirect PPLV 4/	Cumulative PPLV	Direct EI 5/	Indirect EI	Cumulative EI	OPN 9/	VEI 7/ ENC 7/
Aldrin	1.16E-01	1.17E+04	4.20E+01	1.16E-01	6.87E+02*	1.91E+00*	6.89E+02*	2.23E-06	1.68E-03
Carbon Tetrachloride	1.52E+01	0.00E+00	0.00E+00	1.52E+01	0.00E+00	0.00E+00	0.00E+00	6.07E-04	4.58E-01
Chlordane	1.52E+00	1.26E+06	5.17E+00	1.17E+00	5.27E+02*	1.55E+02*	6.81E+02*	0.00E+00	0.00E+00
Chloroform	3.11E+02	0.00E+00	0.00E+00	3.11E+02	0.00E+00	0.00E+00	0.00E+00	1.36E-05	1.02E-02
PPDE	5.72E+00	7.07E+05	1.95E+01	4.42E+00	1.43E-02	4.21E-03	1.85E-02	1.34E-07	1.02E-04
PPDOT	5.72E+00	1.49E+06	1.95E+01	4.42E+00	1.75E+00*	5.14E-01*	2.26E+00*	0.00E+00	0.00E+00
Dieldrin	1.27E-01	5.35E+03	1.92E+01	1.22E-01	2.45E+04*	1.57E+02*	2.47E+04*	0.00E+00	0.00E+00
Diisopropylmethyl Phosphonate	6.77E+04	0.00E+00	0.00E+00	6.77E+04	0.00E+00	0.00E+00	0.00E+00	3.13E-10	2.37E-07
Endrin	2.54E+02	4.33E+06	1.00E+06	2.50E+02	7.88E-02	1.29E-03 a	8.01E-02	0.00E+00	0.00E+00
Hexachlorocyclopentadiene	3.84E+02	5.96E+01	8.34E-01	8.20E-01	7.81E+00*	3.65E+03*	3.66E+03*	0.00E+00	0.00E+00
Isodrin	5.92E+01	8.47E+05	3.04E+03	5.81E+01	8.45E+00*	1.65E-01*	8.61E+00*	0.00E+00	0.00E+00
Supona	1.27E+02	0.00E+00	0.00E+00	1.27E+02	00.E+00	0.00E+00	0.00E+00	1.39E-12	1.05E-09
Arsenic	1.61E+00	0.00E+00	0.00E+00	1.61E+00	1.30E+01*	0.00E+00	1.30E+01*	0.00E+00	0.00E+00
Copper	5.71E+02	0.00E+00	0.00E+00	5.71E+04	6.83E-04	0.00E+00	6.83E-04	0.00E+00	0.00E+00
Mercury	4.61E+02	0.00E+00	0.00E+00	4.61E+02	2.38E-03	0.00E+00	2.38E-03	0.00E+00	0.00E+00
Zinc	1.39E+05	0.00E+00	0.00E+00	1.39E+05	7.17E-04	0.00E+00	7.17E-04	0.00E+00	0.00E+00

Only contaminants found in either the soil or the groundwater are listed.

ORGANICS

METALS

a This contaminant saturates the soil gas and produces a vapor flux that is below one-tenth of the critical flux. The SPPPLV for this contaminant is considered to be equal to pure compound. The SPPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

- 1/ PPLV - preliminary pollutant limit value
 - 2/ VEI - vapor exposure index
 - 3/ OSVI - open space vapor inhalation PPLV
 - 4/ ESVI - enclosed space vapor inhalation PPLV
 - 5/ EI - exposure index
 - 6/ OPN - open
 - 7/ ENC - enclosed
 - 8/ SPPPLV - single pathway preliminary pollutant limit value
- A direct PPLV will be computed even if contaminant does not occur in the soil but only in the groundwater.
- Indirect PPLVs are not computed for the nonvolatile contaminants (metals).
- Contaminants with a Direct EI > 0.1 are denoted with an asterisk.
- Contaminants with an Indirect EI > 0.1 are denoted with an asterisk.
- A contaminant which saturates the soil gas will not show a VEI.
- A contaminant which saturates the soil gas but does not have an Indirect EI exceedance will be denoted with the footnote marker "a." The indirect PPLVs (OSVI, ESVI) are set to 1.00E+06 (pure compound).
- Contaminants which occur in the groundwater, but also occur in the soil may not have a computed VEI if the contamination saturates the soil gas.
- VEIs are not computed for metals or organics if the contaminant does not occur in the groundwater.
- An enclosed space VEI may not be computed if the reported depth to groundwater is less than 10 ft. In such cases, the enclosed space VEI will have "NA" for not applicable. No enclosed space VEI will be computed for lake sites. For lake sites, the enclosed space VEI will have "LS" for lake site.

isopropylmethyl phosphate, isopropylmethyl phosphonic acid, n-nitrosodimethylamine, 1,4-Oxathiane, Sarin, and thiodiglycol. These chemicals are highly soluble (log Kow less than one) and, therefore, are assumed to have low potential for vaporization.

The chemical-specific and site-specific parameters used to calculate the open and enclosed space vapor inhalation PPLVs are included in the RMA Source Data File, provided as part of the PPLV Computer Model for RMA (Volume V). Contaminant-specific parameters for the open space pathways are the depth to the top of the contamination zone (d), and the depth to the bottom of the contamination zone (h), diffusivity and soil concentration. These variables are calculated as described in Volume IV. The site-specific parameter, X/F_0 , represents the wind dispersion factor at the receptor location receiving the maximum concentration. This parameter was generated by the Industrial Source Complex Long Term (ISCLT) model as described in Volume IV. The distance from the center of the site to the critical receptor location, D_{max} , used with the computation of X/F_0 , was calculated as described in Volume IV.

Site-by-site comparisons of the maximum site contaminant concentrations to their corresponding cumulative Draft PPLVs were done in order to determine sites which may be considered for remedial action during the Feasibility Study. These are ranked into two categories: Priority 1 which consists of sites where available soil contaminant concentration data indicate that the maximum detected concentrations exceed the draft human health based criteria, and Priority 2 which consists of sites where available soil contaminant concentration data indicate that the maximum detected concentrations do not exceed the draft human health based criteria. Site designations will be reconsidered throughout the Endangerment Assessment process as health based criteria are refined and additional data become available.

2.0 SITE-BY-SITE EXPOSURE ASSESSMENT

2.1 **SITE SPSA-1a: ARMY AGENTS AND SHELL PESTICIDES PROCESSING AREA** (formerly Site 1-13/2-18: South Plants Manufacturing Complex/Shell Company Spill Sites; EBASCO, 1988y/RIC 88286R07; Army Spill Sites South Plants Manufacturing Complex; EBASCO, 1988aa/RIC 88286R10; South Plants Regional Study Area South Plants Manufacturing Complex; EBASCO, 1988z/RIC 88306R01)

2.1.1 Site-Specific Considerations

Figures SPSA-1a-1 and SPSA-1a-2 and Tables SPSA-1a-1 and SPSA-1a-2 depict the target contaminants for Site SPSA-1a. The borings that were included in this exposure assessment but were too numerous to list, are consistent with the South Plants SAR. The historical search conducted under the contaminant assessment revealed that numerous spills and leaks of various chemicals were suspected to have occurred at Site SPSA-1a and some of these chemicals were detected in the soil during the Phase I and Phase II investigations (EBASCO, 1988y/RIC 88286R07; EBASCO, 1988aa/RIC 88286R10, and EBASCO, 1988z/RIC 88306R01).

2.1.2 Spatial Distribution of Measured Contaminant Concentrations

The locations and concentrations of the target contaminants that were detected in Site SPSA-1a are shown in Figures SPSA-1a-1 and SPSA-1a-2. The following contaminants were not included in these figures, since they were not considered target contaminants during the Phase I and Phase II investigations: Dimethylmethyl phosphonate, occurring in Boring 49 (9-10 ft); ethylbenzene, occurring in Boring 19 (0-1 and 4-5 ft); fluoranthene, occurring in Borings 19 (0-1 ft), 44 (0-1 ft); hexachlorobutadiene, occurring in Borings N301 (8.3-9.3 ft), B101 (4-5 and 8.2-9.2 ft), C101 (0.3-1.3 ft), C103 (0.3-1.3 ft), I201 (0-1 ft), J701 (0-1 ft), K101 (0.3-1.3 ft), K102 (0.3-1.3 ft), L101 (0-1, 4-5, 9-10, 12.7-13 and 14-15 ft), L102 (0-1 and 4-5 ft), N201 (4-5 ft), 34 (19-20 ft), 49 (9-10 ft), and 10 (1.5-2.5 ft); hexachlorobenzene, occurring in Borings L101 (0-1, 4-5, and 14-15 ft) and L102 (0-1 ft); methyl cyclohexane, occurring in Borings O301 (9-10 ft) and 10 (19-20 ft); pyrene, occurring in Boring 19 (0-1 ft); tetrachlorobenzene, occurring in Boring J201 (0-1 ft) and 9 (0.2-1.2 ft); 1,1,2,2-tetrachloroethane, occurring in Borings A102 (0-1 and 4-5 ft), B101 (0-1 ft), D301 (4-5 ft), E101 (9-10 ft), E102 (4-5 and 9-10 ft), G602 (4-5 and 9-10 ft), J701 (9-10 ft), and J902 (0.3-1.3 ft, methyl naphthalene, occurring

in Boring 24 (0-1 ft). Although not shown in these figures, these nontarget compounds were included in the South Plants SAR and in this exposure assessment because they passed through the screening process performed in the RMA Chemical Index (EBASCO, 1988c/RIC 88357R01). Dimethylmethyl phosphonate, ethylbenzene, and hexachlorocyclopentadiene were detected as target and nontarget analytes in the Phase I and Phase II investigations, but are still considered target contaminants for this exposure assessment. Since the maximum values for ethylbenzene and hexachlorocyclopentadiene occurred in the target analysis they are listed in Table SPSA-1a-1.

Table SPSA-1a-1 summarizes the maximum concentrations of contaminants measured in soil above indicator levels for the ICP metals, arsenic, and mercury and certified reporting limits (CRLs) for organic contaminants from the Phase I and Phase II investigations. The boring number and depth where the maximum value was observed are shown. No data were included for ICP metals, arsenic, and mercury in Horizon 2 because direct soil exposure below 10 ft is assumed to be negligible (see Volume VI-A). Table SPSA-1a-2 summarizes the maximum concentrations detected in groundwater together with the well number, location, sampling interval, and depth to groundwater.

2.1.3 Site Exposure Summary

Tables SPSA-1a-3 through SPSA-1a-7 present Draft PPLVs and EIs for each site contaminant. The COCs are summarized below for each exposed population and with the critical exposure pathway identified. The depth to groundwater below Site SPSA-1a is less than 10 ft, therefore, the enclosed space vapor inhalation exposure pathway is not included in the calculation of the cumulative quantities.

Contaminants of Concern	Regulated Visitor	Casual Visitor	Recreational Visitor	Commercial Worker	Industrial Worker
Aldrin	Dir/Ind	Dir/Ind	Dir/Ind	Direct	Dir/Ind
Carbon tetrachloride	Dir/Ind	Dir/Ind	Dir/Ind	Direct	Dir/Ind
Chlordane	Direct	Direct	Direct	Direct	Direct
Chloroform	Dir/Ind	Dir/Ind	Dir/Ind	Direct	Dir/Ind
PPDDE	Direct	Direct	Direct	Direct	Direct
PPDDT	Direct	Direct	Direct	Direct	Direct

Contaminants of Concern	Regulated Visitor	Casual Visitor	Recreational Visitor	Commercial Worker	Industrial Worker
Dibromochloropropane	Dir/Ind	Dir/Ind	Dir/Ind	Direct	Dir/Ind
Dicyclopentadiene	Indirect	Indirect	Dir/Ind	Direct	Dir/Ind
Dieldrin	Dir/Ind	Dir/Ind	Dir/Ind	Direct	Dir/Ind
Endrin	Direct	Direct	Direct	Direct	Direct
Hexachlorocyclopentadiene	Dir/Ind	Dir/Ind	Dir/Ind	Direct	Dir/Ind
Isodrin	Direct	Direct	Direct	Direct	Direct
Methylene chloride	Indirect	Indirect	Indirect	--	Indirect
1,1,2,2-Tetrachloroethane	Dir/Ind	Dir/Ind	Dir/Ind	Direct	Dir/Ind
Arsenic	Direct	Direct	Direct	Direct	Direct
Cadmium	Direct	Direct	Direct	Direct	Direct
Chromium	Direct	Direct	Direct	Direct	Direct
Lead	Direct	Direct	Direct	Direct	Direct
Mercury	Direct	Direct	Direct	Direct	Direct
Benzene	--	--	Indirect	--	Dir/Ind
Tetrachloroethylene	--	--	Dir/Ind	--	Dir/Ind
Chloroacetic acid	--	--	--	--	Direct

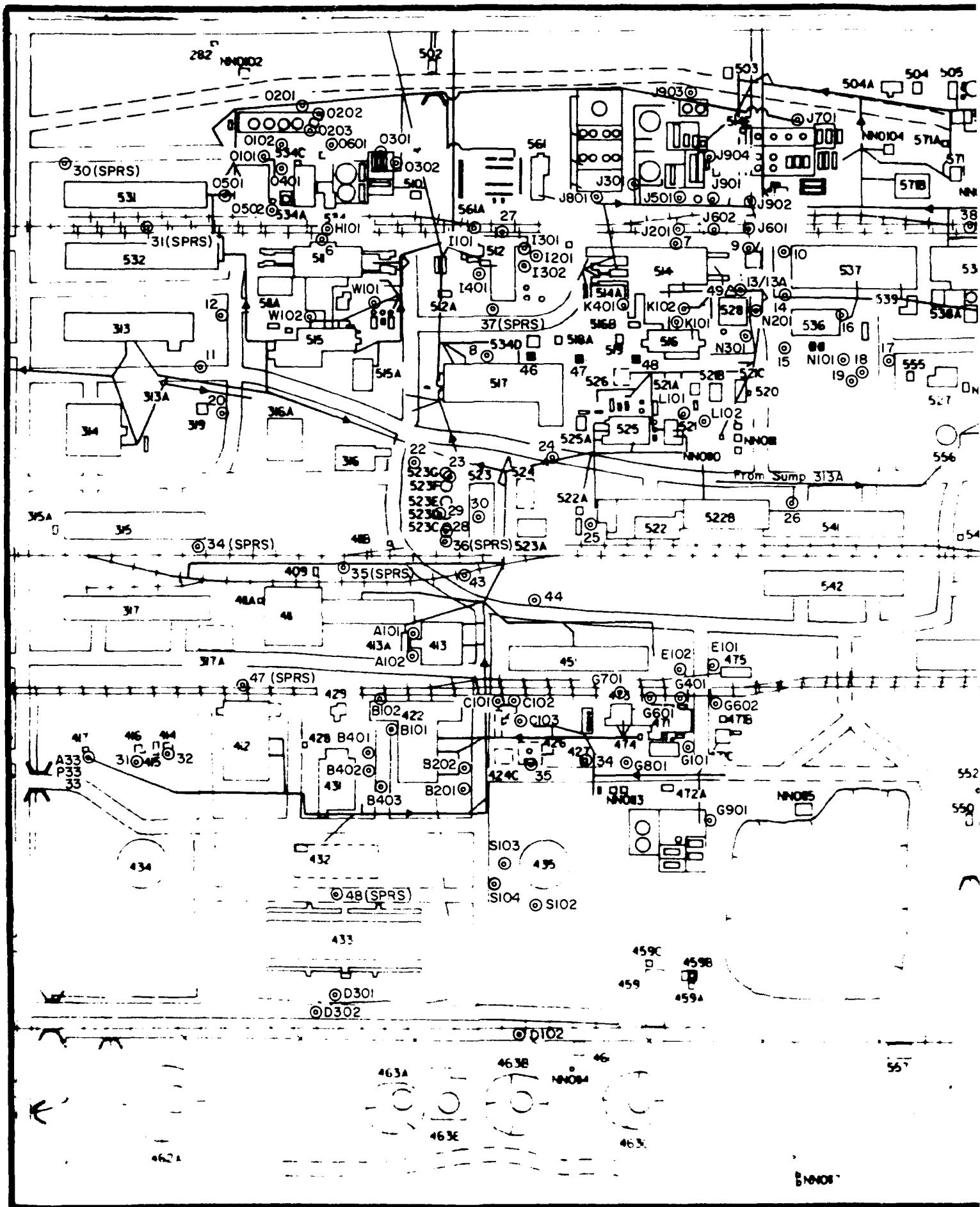
Note: Direct exposure pathways for soils include soil ingestion, suspended particulate inhalation, and dermal contact.

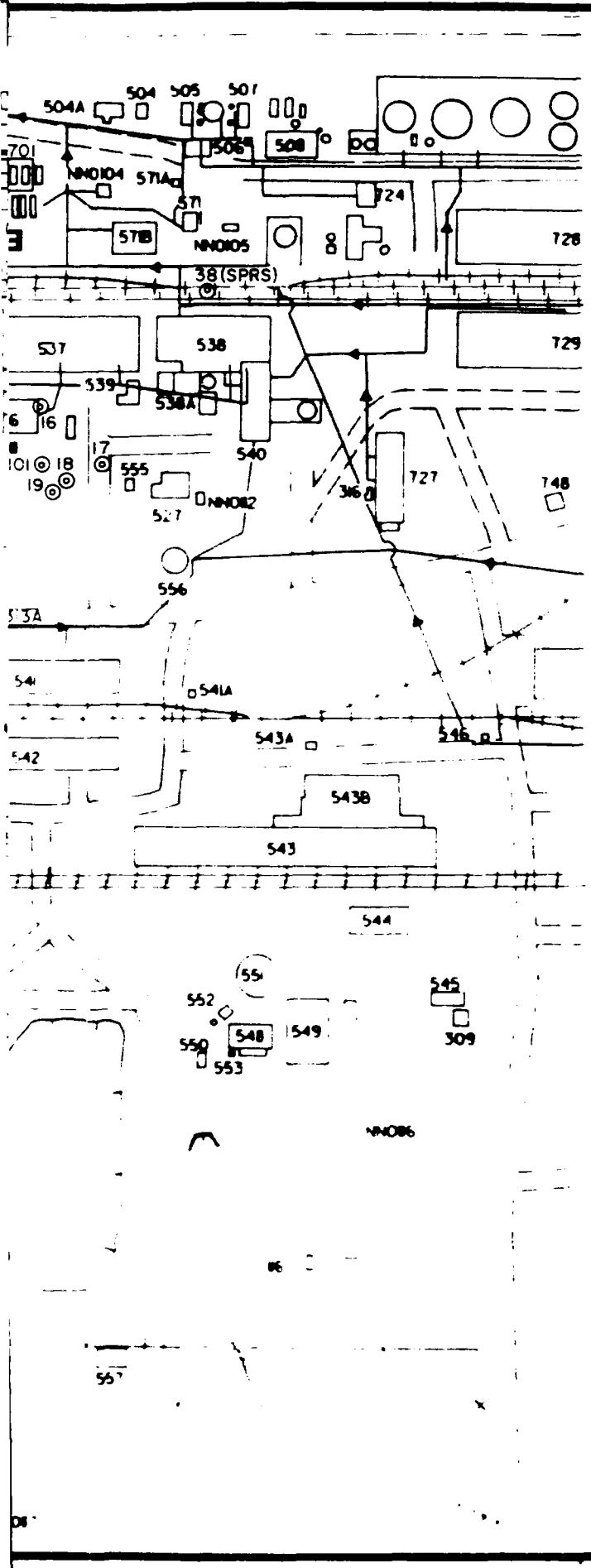
Indirect exposure pathways include open and enclosed space vapor inhalation.

The results of the soil exposure summary indicate that exposure to contamination from the direct and indirect pathways both contribute to the exceedance of the cumulative PPLVs. Site SPSA-1a is designated as a Priority 1 site, based on the most sensitive exposed population PPLV (i.e., the industrial worker).

The following groundwater contaminants result in an unacceptable exposure due to vapor inhalation as indicated by a VEI value greater than 1:

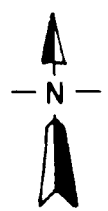
- Benzene (open)
- Carbon tetrachloride (open)
- 1,1-Dichloroethylene (open)





Legend

- 4 ⊙ Phase I Borings
- 46 ■ Surface Trench Sample
- 49 △ Grab Sample



Prepared for:

Program Manager's Office for
 Rocky Mountain Arsenal Cleanup
 Aberdeen Proving Ground, Maryland

FIGURE SPSA-1a-1

Phase I and Phase II Analytes
 Detected Within or Above
 Indicator Levels

Rocky Mountain Arsenal
 Prepared by: Ebasco Services Incorporated

1201 0-1 Aldrin 0.5 Dieldrin 10 As 11 Cd 1 Cu 68 Hg 1.8 Pb 31 Zn 86 1301 0-1 Aldrin 1 Dieldrin 3 As 3.9 Hg 0.23 Pb 64 4-5 MEC6H5 0.6 1501 0-1 Aldrin 2 Dieldrin 201 As 6.2 Cd 1.7 Cu 66 Hg 1.1 Pb 830 Zn 1200 1601 0-1 Dieldrin 4 As 2.9 Hg 0.24 4-5 BCPD 1 Benzene 1 DCPD 3000 (VO) 600 (SVO) Dieldrin 8 MEC6H5 1 As 3.1 Hg 0.38 1602 0-1 No Sample 4-5 BK PD 100 Dieldrin 10 Isodrin 10 Pb 25 Hg 0.31 1701 4-5 CH2CL2 2 9-10 CHCL3 30 1801 0-1 Aldrin 8 CLDAN 9 Dieldrin 10 Endrin 70 Isodrin 10 As 18 Hg 2.1 Pb 24 4-5 CH2CL2 1 9-10 CHCL3 2 Endrin 5 As 3.6 0-1-1.3 BIL 2-3 Aldrin 1 BCHPD 0.3 DCPD 0.6 Dieldrin 2 As 7.4 Hg 0.80 0-1-1.3 As 9.2 Cd 0.95 Hg 0.84 4-5 DCPD 0.5 9-10 CH2CL2 1 CPMSO 10 DCPD 70 As 3.8 1903 0-1 As 29 Hg 0.061 4-5 BIL	1904 0-1 Dieldrin 6 Hg 2.1 Pb 27 Zn 61 2.5-3.1 Dieldrin 0.7 As 6.2 Hg 0.66 Zn 61 K101 0.3-1.3 Aldrin 30 Dieldrin 60 Cu 120 Cd 0.95 Hg 1.1 Zn 120 4-5 CHCL3 70 Benzene 0.8 9-10 MEC6H5 2 CPMSO2 10 Dieldrin 5 Cu 49 Hg 0.084 K102 0.3-1.3 Aldrin 100 Dieldrin 1000 Isodrin 5 As 48 Cd 1.3 Cu 210 Pb 53 Hg 7.3 Zn 79 4-5 CHCL3 9 Benzene 0.4 DCPD 0.9 MEC6H5 5 CPMSO2 10 Dieldrin 0.9 DBCP 0.0094 As 91 Cd 3 Cu 250 Hg 8.1 Zn 83 K401 0-1 Aldrin 200 Dieldrin 10 Isodrin 40 As 6.1 Hg 1.5 Zn 61 4-5 Aldrin 20 Hg 0.14	L102 0-1 CLDAN 10 Dieldrin 3 Endrin 1 As 4.3 Pb 31 Hg 7.4 Zn 83 4-5 CLDAN 5 Dieldrin 0.6 As 26 Cd 1.2 Hg 7.4 9-10 As 7 Hg 0.082 N101 0-1 Dithione 10 Dieldrin 1 As 18 Cd 9 Cr 39 Cu 130 Hg 110 Pb 65 Zn 250 N201 0-1 DCPD 3 Dieldrin 0.6 DBCP 0.019 As 50 Hg 6.4 4-5 Aldrin 0.4 Dieldrin 0.4 Hg 0.092 N301 0-1 Dieldrin 40 As 8.7 Cu 80 Pb 53 Hg 0.63 Zn 110 4-5 TCLEE 0.6 CL6CP 2 CPMSO2 5 As 3.2 Hg 0.13 8.3-9.3 Carbon Tetrachloride 40 CHCL3 3 Benzene 3 DBCP 18 DCPD 10 TCLEE 30 Hg 0.091 Zn 83	O301 0-1 Dieldrin 1 Endrin 6 Isodrin 8 PPDDE 0.7 As 10 Cu 22 Pb 27 Hg 0.22 Zn 68 4-5 DBCP 0.020 9-10 CLC6H5 40 Benzene 4 DCPD 20 ETC6H5 30 MEC6H5 2 MIBK 10 XYLEN 40 13DDB 60 Dieldrin 0.5 Endrin 10 Isodrin 10 As 3.2 O302 0-1 Aldrin 0.4 Atrazine 0.3 As 8.0 Hg 0.12 4-5 BIL O303 0.7-1.6 As 49 Cd 1.2 Hg 0.55 4-5 CPMSO2 0.6 O501 0-1 As 3.8 Hg 0.091 4-5 1111CE 0.6 As 3.1 Hg 0.13 Zn 67 9-10 Cu 29 Zn 86 O502 0-1 As 4.9 Cu 20 4-5 BIL O601 0.6-1.6 MIBK 0.8 As 7.6 Hg 0.54 Bedrock → 9-10 XYLEN 30 13DDB 10 ETC6H5 7 CLC6H5 4
1903 0-1 As 29 Hg 0.061 4-5 BIL	L101 0-1 Aldrin 20 CLDAN 50 CL6CP 100 DCPD 200 Dieldrin 30 As 5 Cu 20 Hg 2.3 Zn 110 4-5 TCLEE 2 CLDAN 20 DCPD 40 (VO) 5 (SVO) Hg 0.10 ← Bedrock 9-10 CL6CP 2 DCPD 1 As 4.4 12.7-13 TCLEE 0.5 CL6CP 20 DCPD 100 (VO) 40 (SVO) Cu 41 Zn 94 14-15 Aldrin 2 CL6CP 20 DCPD 9 (VO) 0.6 (SVO) MLTHN 0.3 Cu 3.0 Hg 0.27 Zn 68	O101 0.5-1.5 Aldrin 1 CPMSO2 0.3 Dieldrin 4 Isodrin 0.6 4-5 CPMSO2 3.0 9-10 CPMSO2 30 O102 0.6-1.6 As 1.2 Hg 0.084 4-5 BIL 9-10 CPMSO2 1 O201 0-1 Atrazine 0.5 Dieldrin 0.4 3.5-3.6 Aldrin 0.4 Dieldrin 2 O202 0-1 Aldrin 0.6 Atrazine 0.8 Dieldrin 1 Isodrin 0.8 4-5 Atrazine 2 5.4-6 Atrazine 0.7 6.7-8 CH2CL2 2 Aldrin 0.1 Atrazine 0.9 Dieldrin 0.4 O203 0-1 Dieldrin 0.5 4-5 Aldrin 4.0 9-10 As 29 Hg 0.48	S102 0-1 Aldrin 3 Dieldrin 10 Pb 41 Hg 0.42 4-5 Aldrin 0.3 Dieldrin 2 Cd 1.7 Cu 32 Pb 58 Zn 540 S103 0-1 BIL 4-5 Cu 37 Zn 79 S104 0-1 Cu 75 Zn 71 3.5-4.5 Aldrin 3000 Dieldrin 300 Isodrin 200 Cu 33 Zn 63

34 (SPRS)

0-1	Dieldrin	0.7
	Pb	46
	Hg	0.075
4-5	Cu	40
	Zn	100

35

**	0-1	BIL
**	3-4	BIL
**	9-10	BIL
**	13-14	BIL
**	16.5-17.5	BIL

35 (SPRS)

0-1	Cd	2.4
	Cu	47
	Pb	51
	Zn	150
	As	41
	Hg	0.10
4-5	Cu	39

36 (SPRS)

0-1	Aldrin	0.1
	Dieldrin	0.6
	CHCP	4
	Cd	760
	Cu	21
	Pb	88
	Zn	130
	As	21,000
	Hg	2.9
4-5	Cd	12
	As	150

37 (SPRS)

0-1	As	7.9
	Hg	0.17
2-3	As	1.2
4-5	Cu	12
	Zn	110

38 (SPRS)

0-1	Dieldrin	1
	Cd	8.8
	Cr	190
	Cu	160
	Pb	11,000
	Zn	610
	As	10
	Hg	1.7
4-5	BIL	

41

2-1	Aldrin	20
	Dieldrin	10
	Cd	4.4
	Cu	51
	Pb	180
	Zn	230
	As	94
	Hg	0.64
4-5	Cu	36
	Zn	100
	As	17
9-10	Cu	41
	Zn	110
	As	16
14-15	Cu	38
	Zn	98
	As	1.9
19-20	Cu	35
	Zn	100

D102

0-1	DCPD	1000
4-5	DCPD	300 (VCL)
		100 (SVC)
5-10	DCPD	20
	Benzene	10
	Cu	21
	Zn	60

G401

0-1	Aldrin	20
	DCCP	400 (VCL)
		111,000 (SVC)
	Dieldrin	100
	PPDDE	20
	As	8.7
	Pb	42
4-5	DCCP	7.3

44

0-1	Aldrin	30
	PPDDE	0.8
	Dieldrin	6
	Cd	12
	Cr	49
	Cu	310
	Pb	600
	Zn	910
	As	370
	Hg	35
4-5	Cd	1.1
	Cu	37
	Zn	97
	As	32
9-10	Cu	39
	Zn	97
	As	16
10-11	Cu	41
	Zn	100
	As	12

46

***0-5-1	BIL
----------	-----

47

***0-5-1	BIL
----------	-----

47 (SPRS)

0-1	Dieldrin	0.9
	Cu	28
	Pb	44
	Zn	120
	As	1.6
	Hg	0.48
4-5	Cu	16
	Zn	96

48

***0-5-1	BIL
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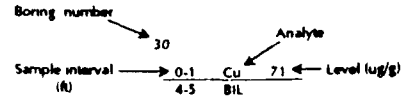
48 (SPRS)

0-1	Aldrin	5
	PPDDE	30
	PPDDT	60
	Dieldrin	40
	Pb	64
	Zn	120
	As	3.1
	Hg	0.73
4-5	Cu	21
	Zn	68

49

9-10	CHCL3	90000 +
	Aldrin	100
	Dieldrin	7000
	Endrin	5000 +
	Isodrin	100
	Cr	26
	Cu	91
	Pb	120
	Hg	0.14
	CLC2A	340

Legend



- Results of redrilling
- ** Samples analyzed for arsenic, mercury and thiodiglycol only
- *** Samples analyzed for thiodiglycol only
- **** Samples analyzed for arsenic and thiodiglycol only
- † Instrument reading value is greater than the upper limit of the Certified Reporting Limit

- BCSPD - Bicycloheptadiene
- CHCL3 - Chloroform
- CLOSH5 - Chlorobenzene
- CLDAN - Chloroacene
- CPMS - Chlorophenylmethyl sulfide
- CPMSO2 - Chlorophenylmethyl sulfone
- CPMSO - Chlorophenylmethyl sulfonide
- DBCP - Dibromochloropropane
- PPDDE - 2,2-bis(Para-chlorophenyl)-1,1-dichloroethane
- PPDDT - 2,2-bis(Para-chlorophenyl)-1,1,1-trichloroethane
- DCPD - Dicyclohexadiene
- CLC2A - Chloroacetic acid
- ETOSH5 - Ethylbenzene
- CLACP - Hexachlorocyclopentadiene
- MELTHN - Malathion
- MIBK - Methylisobutyl ketone
- CH2CL2 - Methylene chloride
- OXAT - 1,4-Oxathane
- 111TCE - 1,1,1-Trichloroethane
- 13DMB - m-Xylene
- TCLCE - Tetrachloroethylene
- MEC615 - Toluene
- XYLEN - o- and p-Xylene
- As - Arsenic
- Cd - Cadmium
- Cr - Chromium
- Cu - Copper
- Pb - Lead
- Hg - Mercury
- Zn - Zinc
- BIL - Below indicator level
- VO - Volatile organics
- SVO - Semivolatile organics

Prepared for:
 Program Manager's Office for
 Rocky Mountain Arsenal Cleanup
 Aberdeen Proving Ground, Maryland

FIGURE SPSA-1a-2
 Phase I and Phase II Analytes
 Detected Within or Above
 Indicator Levels

Rocky Mountain Arsenal
 Prepared by Ebasco Services Incorporated

1302

0-1	As	5.4
	Hg	2
1-1.2	BIL	
2-2.3	BIL	
4-5	BIL	
6.4-6.5	CPMSO	80
	PPDDE	1
8-10	Cu	20

Bedrock →

TABLE SPSA-1a-1
SOIL CONTAMINANT CONCENTRATIONS
FOR SITE SPSA-1a

Contaminant	Horizon 1			Horizon 2		
	Max. (ug/g)	Depth (ft)	Boring Number	Max. (ug/g)	Depth (ft)	Boring Number
Aldrin	8000+ ^{1/}	9-10	34	8000+	9-10	34
Atrazene	2	4-5	O202	2	4-5	O202
Benzene	10	9-10	D102	10	9-10	D102
Bicycloheptadiene	--	--	--	--	19-20	10
	1	4-5	J601	2	14-15	34
		8.2-9.2	B101		19-20	34
Carbon tetrachloride	40	8.3-9.3	N301	40	8.3-9.3	N301
Chlordane	1000+	0.2-1.2	34	1000+	0.2-1.2	34
Chloroacetic acid	340	9-10	49	340	9-10	49
Chlorobenzene	40	9-10	O301	40	9-10	O301
Chloroform	90000+	9-10	49	90000+	9-10	49
Chlorophenylmethyl sulfide	60+	2-3	34	60+	2-3	34
Chlorophenylmethyl sulfone	30	9-10	O101	30	9-10	O101
Chlorophenylmethyl sulfoxide	80	6.4-6.5	I302	80	6.4-6.5	I302
Dibromochloropropane	111000	0-1	G401	111000	0-1	G401
PPDDE ^{2/}	30	0-1	48(SPRS) ^{4/}	30	0-1	48(SPRS)
PPDDT ^{3/}	60	0-1	48(SPRS)	60	0-1	48(SPRS)
Dicyclopentadiene	3000	4-5	J601	3000	4-5	J601
Dieldrin	7000	9-10	49	7000	9-10	49
Dimethylmethyl phosphonate	40	9-10	49	40	9-10	49
Dithiane	10	0-1	N101	10	0-1	N101
Endrin	5000+	9-10	49	5000+	9-10	49
Ethylbenzene	30	9-10	O301	30	9-10	O301
Fluoranthene ^{5/}	9	0-1	19	9	0-1	19
Hexachlorobutadiene ^{5/}	90	0-1	L101	90	0-1	L101
Hexachlorobenzene ^{5/}	60	0-1	L101	60	0-1	L101

TABLE SPSA-1a-1 (Continued)
SOIL CONTAMINANT CONCENTRATIONS
FOR SITE SPSA-1a

Contaminant	Horizon 1			Horizon 2		
	Max. (ug/g)	Depth (ft)	Boring Number	Max. (ug/g)	Depth (ft)	Boring Number
Hexachlorocyclopentadiene	7000+	9-10	34	7000+	9-10	34
Isodrin	200	3.5-4.5	S104	200	3.5-4.5	S104
Malathion	--	--	--	0.3	14-15	L101
Methyl cyclohexane st	0.9	9-10	O301	0.9	9-10	O301
Methylisobutyl ketone	--	--	--	--	19-20	10A
Methyl naphthalene st	40	4-5	W101	90+	19-20	10
Methylene chloride	0.5	0-1	24	0.5	0-1	24
1,4-Oxathiane	4	9-10	34	50+	19-20	34
Pyrene st	2	8.3-9.3	B401	2	8.3-9.3	B401
Tetrachlorobenzene st	0.2	0-1	19	0.2	0-1	19
1,1,2,2-Tetrachloroethane st	1.1	0-1	J201	1.1	0-1	J201
Tetrachloroethylene	23	4-5	G602	23	4-5	G602
1,1,1-Trichloroethane	30	8.3-9.3	N301	30	8.3-9.3	N301
Toluene	0.6	4-5	O501	0.6	4-5	O501
m-Xylene	60+	9-10	34	60+	9-10	34
o,p-Xylene	80	9-10	O301	80	9-10	O301
Arsenic	40	9-10	O301	40	9-10	O301
Cadmium	21000	0-1	36(SPRS)	--	--	--
Chromium	760	0-1	36(SPRS)	--	--	--
Copper	280	3-6	P33	--	--	--
Lead	880	5-5.4	25	--	--	--
Mercury	11000	0-1	38(SPRS)	--	--	--
Zinc	17000	3-6	P33	--	--	--
	3300	5-5.4	25	--	--	--

TABLE SPSA-1a-1 (Continued)
SOIL CONTAMINANT CONCENTRATIONS
FOR SITE SPSA-1a

- 1/ + Value is greater than the upper Certified Reporting Limit
- 2/ PPDE 2,2-bis(Para-chlorophenyl)-1,1-dichloroethene
- 3/ PPDDT 2,2-bis(Para-chlorophenyl)-1,1,1-trichloroethane
- 4/ SPRS South Plants Regional Study
- 5/ Nontarget contaminant. Refer to the exposure assessment nontarget screen in Appendix A.

SPSA South Plants Study Area
Max. Maximum
ug/g microgram per gram
ft foot/feet

TABLE SPSA-1a-2
GROUNDWATER CONTAMINANT CONCENTRATIONS (UG/L)
FOR SITE SPSA-1a
AVERAGE SITE DEPTH TO GROUNDWATER: 8 Feet

CHEMICAL	CONCENTRATION MAXIMUM	LOCATION (WELL NUMBER)	SAMPLE DATE
1,1,1-TRICHLOROETHANE	510	01517	01/8/88
1,1,2-TRICHLOROETHANE	3.7	01517	01/8/88
1,1-DICHLOROETHYLENE	150	01078	02/10/89
1,1-DICHLOROETHANE	14	01068	12/21/88
1,2-DICHLOROETHYLENE	990	01524	01/10/89
M-XYLENE	300	01078	02/10/89
ALDRIN	GT 52	01513	05/6/88
ATRAZINE	180	01516	01/8/88
BICYCLOHEPTADIENE	16000	01517	01/8/88
BENZOTHIAZOLE	820	01525	12/16/88
BENZENE	97000	01525	02/19/88
CARBON TETRACHLORIDE	3500	01517	01/8/88
METHYLENE CHLORIDE	11000	01068	12/21/88
CHLOROFORM	1200000	01525	12/16/88
HEXACHLOROCYCLOPENTADIENE	GT 100	01514	04/1/88
CHLOROBENZENE	35000	01524	02/17/88
CHLORDANE	3.6	01525	12/16/88

EACH VALUE PRESENTED IS THE MAXIMUM CONCENTRATION FOR THE LISTED ANALYTE FOR THE PERIOD March 17, 1987 TO February 28, 1989.
DATA SOURCE: DP ASSOCIATES, RMA Database, July 19, 1990

TABLE SPSA-1a-2
GROUNDWATER CONTAMINANT CONCENTRATIONS (UG/L)
FOR SITE SPSA-1a

AVERAGE SITE DEPTH TO GROUNDWATER: 8 Feet

CHEMICAL	CONCENTRATION MAXIMUM	LOCATION (WELL NUMBER)	SAMPLE DATE
CHLOROPHENYLMETHYL SULFIDE	1700	01525	02/19/88
CHLOROPHENYLMETHYL SULFOXIDE	440	01525	12/16/88
CHLOROPHENYLMETHYL SULFONE	7700	01525	12/16/88
DIBROMOCHLOROPROPANE	57000	01517	01/8/88
DICYCLOPENTADIENE	600	01517	01/10/89
VAPONA	37	01078	02/10/89
DIISOPROPYLMETHYL PHOSPHONATE	460	01525	12/16/88
DITHIANE	94	01525	12/16/88
DIELDRIN	80	01513	05/6/88
DIMETHYL DISULFIDE	5300	01525	02/19/88
DIMETHYLMETHYL PHOSPHONATE	870	01525	02/19/88
ENDRIN	GT 20	01513	05/6/88
ETHYLBENZENE	150	01525	02/19/88
ISODRIN	0.37	01078	02/10/89
TOLUENE	92000	01517	01/8/88
METHYLISOBUTYL KETONE	110000	01525	12/16/88
MALATHION	12	01517	01/10/89

EACH VALUE PRESENTED IS THE MAXIMUM CONCENTRATION FOR THE LISTED ANALYTE FOR THE PERIOD March 17, 1987 TO February 28, 1989.
DATA SOURCE: DP ASSOCIATES, RMA Database, July 19, 1990

TABLE SPSA-1a-2

GROUNDWATER CONTAMINANT CONCENTRATIONS (UG/L)
FOR SITE SPSA-1a

AVERAGE SITE DEPTH TO GROUNDWATER: 8 Feet

CHEMICAL	CONCENTRATION MAXIMUM	LOCATION (WELL NUMBER)	SAMPLE DATE
1,4-OXATHIANE	21	01517	01/8/88
PPDDE	3.6	01517	01/10/89
PPDDT	1.5	01524	01/10/89
PARATHION	24	01525	12/16/88
SUPONA	130	01517	01/10/89
TETRACHLOROETHYLENE	2700	01516	01/8/88
TRICHLOROETHYLENE	1500	01524	02/17/88
O,P-XYLENE	270	01078	02/10/89

EACH VALUE PRESENTED IS THE MAXIMUM CONCENTRATION FOR THE LISTED ANALYTE
FOR THE PERIOD March 17, 1987 TO February 28, 1989.
DATA SOURCE: DP ASSOCIATES, RMA Database, July 19, 1990

SPSA-1a-3

EXPOSURE EVALUATIONS FOR REGULATED VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI
	PPLV	PPLV	PPLV	EI	EI	EI	OPN
	(mg/kg)	(mg/kg)	(mg/kg)				
ALDRIN	1.5E+00	2.2E+04	1.5E+00	5.3E+03*	3.7E-01*	5.3E+03*	0.0E+00
ATRAZINE	4.1E+04	3.7E+07	4.1E+04	4.8E-05	5.4E-08	4.8E-05	1.7E-11
BENZENE	8.6E+02	1.6E+02	1.3E+02	1.2E-02	6.4E-02	7.6E-02	2.8E+00
BENZOTHAZOLE	3.9E+04	0.0E+00	3.9E+04	0.0E+00	0.0E+00	0.0E+00	1.0E-05
BICYCLOHEPTADIENE	3.2E+05	8.6E+04	6.8E+04	3.1E-06	2.3E-05	2.6E-05	3.8E-03
CARBON TETRACHLORIDE	2.0E+02	3.0E+02	1.2E+02	2.0E-01*	1.3E-01*	3.4E-01*	1.8E+00
CHLORDANE	2.0E+01	1.0E+06	2.0E+01	5.1E+01*	4.2E-04*	5.1E+01*	0.0E+00
CHLOROACETIC ACID	1.7E+04	0.0E+00	1.7E+04	2.1E-02	0.0E+00	2.1E-02	0.0E+00
CHLOROBENZENE	1.6E+05	1.6E+04	1.5E+04	2.5E-04	2.5E-03	2.7E-03	8.8E-03
CHLOROFORM	4.0E+03	6.3E+02	5.4E+02	2.2E+01*	1.4E+02*	1.7E+02*	0.0E+00
CHLOROPHENYLMETHYL SULFIDE	1.6E+05	3.3E+05	1.1E+05	3.7E-04	1.8E-04	5.5E-04	1.7E-05
CHLOROPHENYLMETHYL SULFONE	1.6E+05	3.5E+05	1.1E+05	1.8E-04	8.5E-05	2.7E-04	9.4E-07
CHLOROPHENYLMETHYL SULFOXIDE	1.6E+05	2.2E+05	9.3E+04	4.9E-04	3.7E-04	8.6E-04	1.0E-07
PPDE	7.4E+01	1.0E+06	7.4E+01	4.1E-01*	2.3E-05a	4.1E-01*	0.0E+00
PPDT	7.4E+01	1.0E+06	7.4E+01	8.2E-01*	2.2E-05a	8.2E-01*	0.0E+00
DIBROMOCHLOROPROPANE	1.8E+01	2.1E+01	9.6E+00	6.2E+03*	5.3E+03*	1.2E+04*	0.0E+00
1,1-DICHLOROETHANE	2.8E+02	0.0E+00	2.8E+02	0.0E+00	0.0E+00	0.0E+00	1.1E-07
1,1-DICHLOROETHYLENE	4.3E+01	0.0E+00	4.3E+01	0.0E+00	0.0E+00	0.0E+00	9.9E-01
1,2-DICHLOROETHYLENE	1.7E+05	0.0E+00	1.7E+05	0.0E+00	0.0E+00	0.0E+00	0.0E+00
DICYCLOPENTADIENE	5.4E+04	1.7E+02	1.7E+02	5.5E-02	1.7E+01*	1.7E+01*	0.0E+00
DIELDRI	1.6E+00	1.0E+04	1.6E+00	4.4E+03*	7.0E-01*	4.4E+03*	0.0E+00
DIISOPROPYLMETHYL PHOSPHONATE	6.6E+05	0.0E+00	6.6E+05	0.0E+00	0.0E+00	0.0E+00	3.1E-07
DIMETHYLDISULFIDE	6.7E+04	0.0E+00	6.7E+04	0.0E+00	0.0E+00	0.0E+00	1.4E-03
DIMETHYLMETHYL PHOSPHONATE	1.5E+05	0.0E+00	1.5E+05	2.7E-04	0.0E+00	2.7E-04	0.0E+00
DITHIANE	8.3E+04	0.0E+00	8.3E+04	1.2E-04	0.0E+00	1.2E-04	0.0E+00
ENDRIN	2.5E+03	1.0E+06	2.5E+03	2.0E+00*	6.2E-04a	2.0E+00*	0.0E+00
ETHYLBENZENE	8.3E+05	2.2E+05	1.8E+05	3.6E-05	1.3E-04	1.7E-04	3.1E-06
HEXACHLOROCYCLOPENTADIENE	1.7E+04	8.4E+03	5.6E+03	4.2E-01*	8.3E-01*	1.3E+00*	0.0E+00
ISODRIN	5.8E+02	1.0E+06	5.8E+02	3.5E-01*	1.3E-04a	3.5E-01*	0.0E+00
MALATHION	1.7E+05	7.4E+10	1.7E+05	0.0E+00	4.1E-12	4.1E-12	1.6E-11
METHYLISOBUTYL KETONE	4.1E+05	2.7E+04	2.6E+04	9.8E-05	3.3E-03	3.4E-03	2.1E-04
METHYLENE CHLORIDE	3.3E+03	3.3E+02	3.0E+02	1.2E-03	1.5E-01*	1.5E-01*	6.5E-02
1,4-OXATHIANE	2.5E+05	0.0E+00	2.5E+05	8.1E-06	0.0E+00	8.1E-06	0.0E+00
PARATHION	5.0E+04	0.0E+00	5.0E+04	0.0E+00	0.0E+00	0.0E+00	7.5E-10
SUPONA	1.2E+03	0.0E+00	1.2E+03	0.0E+00	0.0E+00	0.0E+00	1.4E-10
1,1,2,2-TETRACHLOROETHANE	1.3E+02	2.1E+02	7.9E+01	1.8E-01*	1.1E-01*	2.9E-01*	0.0E+00
TETRACHLOROETHYLENE	5.1E+02	1.6E+03	3.9E+02	5.9E-02	1.9E-02	7.8E-02	3.5E-02
TOLUENE	2.5E+06	1.3E+06	8.6E+05	2.4E-05	4.6E-05	7.0E-05	4.1E-04
1,1,1-TRICHLOROETHANE	7.5E+05	9.9E+05	4.3E+05	8.0E-07	6.1E-07	1.4E-06	9.1E-06
1,1,2-TRICHLOROETHANE	4.3E+02	0.0E+00	4.3E+02	0.0E+00	0.0E+00	0.0E+00	4.3E-05
TRICHLOROETHYLENE	2.3E+03	0.0E+00	2.3E+03	0.0E+00	0.0E+00	0.0E+00	3.8E-02
VAPONA	8.6E+01	0.0E+00	8.6E+01	0.0E+00	0.0E+00	0.0E+00	4.0E-07
M-XYLENE	1.4E+07	1.9E+05	1.9E+05	5.6E-06	4.2E-04	4.2E-04	8.4E-06
O,P-XYLENE	1.4E+07	1.9E+05	1.9E+05	2.8E-06	2.1E-04	2.1E-04	7.5E-06

SPSA-1a-3
EXPOSURE EVALUATIONS FOR REGULATED VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI
	PPLV	PPLV	PPLV	EI	EI	EI	OPN
	(mg/kg)	(mg/kg)	(mg/kg)				
ARSENIC	2.2E+01	0.0E+00	2.2E+01	9.7E+02*	0.0E+00	9.7E+02*	0.0E+00
CADMIUM	4.5E+02	0.0E+00	4.5E+02	1.7E+00*	0.0E+00	1.7E+00*	0.0E+00
CHROMIUM	6.9E+01	0.0E+00	6.9E+01	4.0E+00*	0.0E+00	4.0E+00*	0.0E+00
COPPER	4.2E+05	0.0E+00	4.2E+05	2.1E-03	0.0E+00	2.1E-03	0.0E+00
LEAD	1.5E+04	0.0E+00	1.5E+04	7.1E-01*	0.0E+00	7.1E-01*	0.0E+00
MERCURY	3.3E+03	0.0E+00	3.3E+03	5.1E+00*	0.0E+00	5.1E+00*	0.0E+00
ZINC	2.0E+06	0.0E+00	2.0E+06	1.7E-03	0.0E+00	1.7E-03	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPPLV for this contaminant is considered to be equal to pure compound. The SPPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-1a-4
EXPOSURE EVALUATIONS FOR CASUAL VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	OPN
ALDRIN	1.5E+00	2.2E+04	1.5E+00	5.3E+03*	3.7E-01*	5.3E+03*	0.0E+00
ATRAZINE	4.1E+04	3.7E+07	4.1E+04	4.8E-05	5.4E-08	4.8E-05	1.7E-11
BENZENE	8.6E+02	1.6E+02	1.3E+02	1.2E-02	6.4E-02	7.6E-02	2.8E+00
BENZOTHIAZOLE	3.9E+04	0.0E+00	3.9E+04	0.0E+00	0.0E+00	0.0E+00	1.0E-05
BICYCLOHEPTADIENE	3.2E+05	8.6E+04	6.8E+04	3.1E-06	2.3E-05	2.6E-05	3.8E-03
CARBON TETRACHLORIDE	2.0E+02	3.0E+02	1.2E+02	2.0E-01*	1.3E-01*	3.4E-01*	1.8E+00
CHLORDANE	2.0E+01	1.0E+06	2.0E+01	5.1E+01*	4.2E-04*	5.1E+01*	0.0E+00
CHLOROACETIC ACID	1.7E+04	0.0E+00	1.7E+04	2.1E-02	0.0E+00	2.1E-02	0.0E+00
CHLOROBENZENE	1.6E+05	1.6E+04	1.5E+04	2.5E-04	2.5E-03	2.7E-03	8.8E-03
CHLOROFORM	4.0E+03	6.3E+02	5.4E+02	2.2E+01*	1.4E+02*	1.7E+02*	0.0E+00
CHLOROPHENYLMETHYL SULFIDE	1.6E+05	3.3E+05	1.1E+05	3.7E-04	1.8E-04	5.5E-04	1.7E-05
CHLOROPHENYLMETHYL SULFONE	1.6E+05	3.5E+05	1.1E+05	1.8E-04	8.5E-05	2.7E-04	9.4E-07
CHLOROPHENYLMETHYL SULFOXIDE	1.6E+05	2.2E+05	9.3E+04	4.9E-04	3.7E-04	8.6E-04	1.0E-07
PPDDE	7.4E+01	1.0E+06	7.4E+01	4.1E-01*	2.3E-05*	4.1E-01*	0.0E+00
PPDDT	7.4E+01	1.0E+06	7.4E+01	8.2E-01*	2.2E-05*	8.2E-01*	0.0E+00
DIBROMOCHLOROPROPANE	1.8E+01	2.1E+01	9.6E+00	6.2E+03*	5.3E+03*	1.2E+04*	0.0E+00
1,1-DICHLOROETHANE	2.8E+02	0.0E+00	2.8E+02	0.0E+00	0.0E+00	0.0E+00	1.1E-07
1,1-DICHLOROETHYLENE	4.3E+01	0.0E+00	4.3E+01	0.0E+00	0.0E+00	0.0E+00	9.9E-01
1,2-DICHLOROETHYLENE	1.7E+05	0.0E+00	1.7E+05	0.0E+00	0.0E+00	0.0E+00	0.0E+00
DICYCLOPENTADIENE	5.4E+04	1.7E+02	1.7E+02	5.5E-02	1.7E+01*	1.7E+01*	0.0E+00
DIELDRIN	1.6E+00	1.0E+04	1.6E+00	4.4E+03*	7.0E-01*	4.4E+03*	0.0E+00
DIISOPROPYLMETHYL PHOSPHONATE	6.6E+05	0.0E+00	6.6E+05	0.0E+00	0.0E+00	0.0E+00	3.1E-07
DIMETHYLDISULFIDE	6.7E+04	0.0E+00	6.7E+04	0.0E+00	0.0E+00	0.0E+00	1.4E-03
DIMETHYLMETHYL PHOSPHONATE	1.5E+05	0.0E+00	1.5E+05	2.7E-04	0.0E+00	2.7E-04	0.0E+00
DITHIANE	8.3E+04	0.0E+00	8.3E+04	1.2E-04	0.0E+00	1.2E-04	0.0E+00
ENDRIN	2.5E+03	1.0E+06	2.5E+03	2.0E+00*	6.2E-04*	2.0E+00*	0.0E+00
ETHYLBENZENE	8.3E+05	2.2E+05	1.8E+05	3.6E-05	1.3E-04	1.7E-04	3.1E-06
HEXACHLOROCCYCLOPENTADIENE	1.7E+04	8.4E+03	5.6E+03	4.2E-01*	8.3E-01*	1.3E+00*	0.0E+00
ISODRIN	5.8E+02	1.0E+06	5.8E+02	3.5E-01*	1.3E-04*	3.5E-01*	0.0E+00
MALATHION	1.7E+05	7.4E+10	1.7E+05	0.0E+00	4.1E-12	4.1E-12	1.6E-11
METHYLISOBUTYL KETONE	4.1E+05	2.7E+04	2.6E+04	9.8E-05	3.3E-03	3.4E-03	2.1E-04
METHYLENE CHLORIDE	3.3E+03	3.3E+02	3.0E+02	1.2E-03	1.5E-01*	1.5E-01*	6.5E-02
1,4-OXATHIANE	2.5E+05	0.0E+00	2.5E+05	8.1E-06	0.0E+00	8.1E-06	0.0E+00
PARATHION	5.0E+04	0.0E+00	5.0E+04	0.0E+00	0.0E+00	0.0E+00	7.5E-10
SUPONA	1.2E+03	0.0E+00	1.2E+03	0.0E+00	0.0E+00	0.0E+00	1.4E-10
1,1,2,2-TETRACHLOROETHANE	1.3E+02	2.1E+02	7.9E+01	1.8E-01*	1.1E-01*	2.9E-01*	0.0E+00
TETRACHLOROETHYLENE	5.1E+02	1.6E+03	3.9E+02	5.9E-02	1.9E-02	7.8E-02	3.5E-02
TOLUENE	2.5E+06	1.3E+06	8.6E+05	2.4E-05	4.6E-05	7.0E-05	4.1E-04
1,1,1-TRICHLOROETHANE	7.5E+05	9.9E+05	4.3E+05	8.0E-07	6.1E-07	1.4E-06	9.1E-06
1,1,2-TRICHLOROETHANE	4.3E+02	0.0E+00	4.3E+02	0.0E+00	0.0E+00	0.0E+00	4.3E-05
TRICHLOROETHYLENE	2.3E+03	0.0E+00	2.3E+03	0.0E+00	0.0E+00	0.0E+00	3.8E-02
VAPONA	8.6E+01	0.0E+00	8.6E+01	0.0E+00	0.0E+00	0.0E+00	4.0E-07
M-XYLENE	1.4E+07	1.9E+05	1.9E+05	5.6E-06	4.2E-04	4.2E-04	8.4E-06
O,P-XYLENE	1.4E+07	1.9E+05	1.9E+05	2.8E-06	2.1E-04	2.1E-04	7.5E-06

SPSA-1a-4
EXPOSURE EVALUATIONS FOR CASUAL VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI OPN
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	
ARSENIC	2.2E+01	0.0E+00	2.2E+01	9.7E+02*	0.0E+00	9.7E+02*	0.0E+00
CADMIUM	4.5E+02	0.0E+00	4.5E+02	1.7E+00*	0.0E+00	1.7E+00*	0.0E+00
CHROMIUM	6.9E+01	0.0E+00	6.9E+01	4.0E+00*	0.0E+00	4.0E+00*	0.0E+00
COPPER	4.2E+05	0.0E+00	4.2E+05	2.1E-03	0.0E+00	2.1E-03	0.0E+00
LEAD	1.5E+04	0.0E+00	1.5E+04	7.1E-01*	0.0E+00	7.1E-01*	0.0E+00
MERCURY	3.3E+03	0.0E+00	3.3E+03	5.1E+00*	0.0E+00	5.1E+00*	0.0E+00
ZINC	2.0E+06	0.0E+00	2.0E+06	1.7E-03	0.0E+00	1.7E-03	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPPLV for this contaminant is considered to be equal to pure compound. The SPPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-1a-5
EXPOSURE EVALUATIONS FOR RECREATIONAL VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	- EI	OPN
ALDRIN	2.1E-01	1.4E+03	2.1E-01	3.9E+04*	5.5E+00*	3.9E+04*	0.0E+00
ATRAZINE	1.8E+04	5.7E+06	1.8E+04	1.1E-04	3.5E-07	1.1E-04	1.1E-10
BENZENE	1.2E+02	2.4E+01	2.0E+01	8.4E-02	4.1E-01*	5.0E-01*	4.3E+01
BENZOTHAZOLE	1.7E+04	0.0E+00	1.7E+04	0.0E+00	0.0E+00	0.0E+00	6.6E-05
BICYCLOHEPTADIENE	1.4E+05	3.1E+04	2.5E+04	7.4E-06	6.4E-05	7.2E-05	2.4E-02
CARBON TETRACHLORIDE	2.7E+01	4.6E+01	1.7E+01	1.5E+00*	8.7E-01*	2.3E+00*	2.7E+01
CHLORDANE	2.7E+00	1.0E+06	2.7E+00	3.7E+02*	6.4E-03a	3.7E+02*	0.0E+00
CHLOROACETIC ACID	7.0E+03	0.0E+00	7.0E+03	4.8E-02	0.0E+00	4.8E-02	0.0E+00
CHLOROBENZENE	6.8E+04	5.9E+03	5.4E+03	5.8E-04	6.8E-03	7.4E-03	5.7E-02
CHLOROFORM	5.6E+02	9.7E+01	8.3E+01	1.6E+02*	9.3E+02*	1.1E+03*	0.0E+00
CHLOROPHENYLMETHYL SULFIDE	7.0E+04	1.2E+05	4.4E+04	8.6E-04	5.1E-04	1.4E-03	1.1E-04
CHLOROPHENYLMETHYL SULFONE	7.0E+04	5.4E+04	3.1E+04	4.3E-04	5.5E-04	9.8E-04	6.1E-06
CHLOROPHENYLMETHYL SULFOXIDE	7.0E+04	3.3E+04	2.3E+04	1.1E-03	2.4E-03	3.5E-03	6.6E-07
PPDDE	1.0E+01	1.0E+06	1.0E+01	2.9E+00*	3.4E-04a	2.9E+00*	0.0E+00
PPDDT	1.0E+01	1.0E+06	1.0E+01	5.9E+00*	3.3E-04a	5.9E+00*	0.0E+00
DIBROMOCHLOROPROPANE	2.5E+00	1.4E+00	8.9E-01	4.4E+04*	8.1E+04*	1.2E+05*	0.0E+00
1,1-DICHLOROETHANE	3.9E+01	0.0E+00	3.9E+01	0.0E+00	0.0E+00	0.0E+00	1.7E-06
1,1-DICHLOROETHYLENE	5.9E+00	0.0E+00	5.9E+00	0.0E+00	0.0E+00	0.0E+00	1.5E+01
1,2-DICHLOROETHYLENE	7.0E+04	0.0E+00	7.0E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
DICYCLOPENTADIENE	1.8E+04	6.2E+01	6.2E+01	1.6E-01*	4.8E+01*	4.8E+01*	0.0E+00
DIELDRIN	2.2E-01	6.6E+02	2.2E-01	3.2E+04*	1.1E+01*	3.2E+04*	0.0E+00
DIISOPROPYLMETHYL PHOSPHONATE	2.8E+05	0.0E+00	2.8E+05	0.0E+00	0.0E+00	0.0E+00	2.0E-06
DIMETHYLDISULFIDE	2.9E+04	0.0E+00	2.9E+04	0.0E+00	0.0E+00	0.0E+00	9.3E-03
DIMETHYLMETHYL PHOSPHONATE	6.3E+04	0.0E+00	6.3E+04	6.3E-04	0.0E+00	6.3E-04	0.0E+00
DITHIANE	3.5E+04	0.0E+00	3.5E+04	2.8E-04	0.0E+00	2.8E-04	0.0E+00
ENDRIN	1.1E+03	1.0E+06	1.1E+03	4.7E+00*	4.0E-03a	4.7E+00*	0.0E+00
ETHYLBENZENE	3.5E+05	8.1E+04	6.6E+04	8.5E-05	3.7E-04	4.6E-04	2.0E-05
HEXACHLOROCHLOROPENTADIENE	5.7E+03	1.3E+03	1.1E+03	1.2E+00*	5.4E+00*	6.6E+00*	0.0E+00
ISODRIN	2.5E+02	1.0E+06	2.5E+02	8.1E-01*	8.2E-04a	8.1E-01*	0.0E+00
MALATHION	7.0E+04	1.1E+10	7.0E+04	0.0E+00	2.6E-11	2.6E-11	1.0E-10
METHYLISOBUTYL KETONE	1.7E+05	4.2E+03	4.1E+03	2.3E-04	2.1E-02	2.2E-02	1.4E-03
METHYLENE CHLORIDE	4.5E+02	5.0E+01	4.5E+01	8.8E-03	9.9E-01*	1.0E+00*	9.7E-01
1,4-OXATHIANE	1.1E+05	0.0E+00	1.1E+05	1.9E-05	0.0E+00	1.9E-05	0.0E+00
PARATHION	2.1E+04	0.0E+00	2.1E+04	0.0E+00	0.0E+00	0.0E+00	4.9E-09
SUPONA	5.3E+02	0.0E+00	5.3E+02	0.0E+00	0.0E+00	0.0E+00	8.8E-10
1,1,2,2-TETRACHLOROETHANE	1.8E+01	1.4E+01	7.8E+00	1.3E+00*	1.6E+00*	3.0E+00*	0.0E+00
TETRACHLOROETHYLENE	7.1E+01	2.5E+02	5.5E+01	4.2E-01*	1.2E-01*	5.4E-01*	5.3E-01
TOLUENE	1.1E+06	4.7E+05	3.3E+05	5.7E-05	1.3E-04	1.8E-04	2.7E-03
1,1,1-TRICHLOROETHANE	3.2E+05	3.6E+05	1.7E+05	1.9E-06	1.7E-06	3.6E-06	5.9E-05
1,1,2-TRICHLOROETHANE	6.0E+01	0.0E+00	6.0E+01	0.0E+00	0.0E+00	0.0E+00	6.5E-04
TRICHLOROETHYLENE	3.2E+02	0.0E+00	3.2E+02	0.0E+00	0.0E+00	0.0E+00	5.8E-01
VAPONA	1.2E+01	0.0E+00	1.2E+01	0.0E+00	0.0E+00	0.0E+00	6.1E-06
M-XYLENE	5.8E+06	6.9E+04	6.9E+04	1.4E-05	1.2E-03	1.2E-03	5.4E-05
O,P-XYLENE	5.8E+06	6.9E+04	6.9E+04	6.9E-06	5.8E-04	5.8E-04	4.9E-05

SPSA-1a-5
EXPOSURE EVALUATIONS FOR RECREATIONAL VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	OPN
ARSENIC	3.9E+00	0.0E+00	3.9E+00	5.3E+03*	0.0E+00	5.3E+03*	0.0E+00
CADMIUM	5.8E+01	0.0E+00	5.8E+01	1.3E+01*	0.0E+00	1.3E+01*	0.0E+00
CHROMIUM	8.8E+00	0.0E+00	8.8E+00	3.2E+01*	0.0E+00	3.2E+01*	0.0E+00
COPPER	2.5E+05	0.0E+00	2.5E+05	3.5E-03	0.0E+00	3.5E-03	0.0E+00
LEAD	9.2E+03	0.0E+00	9.2E+03	1.2E+00*	0.0E+00	1.2E+00*	0.0E+00
MERCURY	2.0E+03	0.0E+00	2.0E+03	8.6E+00*	0.0E+00	8.6E+00*	0.0E+00
ZINC	1.1E+06	0.0E+00	1.1E+06	3.1E-03	0.0E+00	3.1E-03	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPPLV for this contaminant is considered to be equal to pure compound. The SPPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-1a-6
EXPOSURE EVALUATIONS FOR COMMERCIAL WORKERS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI ENC
	PPLV	PPLV	PPLV	EI	EI	EI	
	(mg/kg)	(mg/kg)	(mg/kg)				
ALDRIN	1.9E+00	0.0E+00	1.9E+00	4.2E+03*	0.0E+00	4.2E+03*	NA
ATRAZINE	2.3E+04	0.0E+00	2.3E+04	8.7E-05	0.0E+00	8.7E-05	NA
BENZENE	1.1E+03	0.0E+00	1.1E+03	9.2E-03	0.0E+00	9.2E-03	NA
BENZOTHAZOLE	2.2E+04	0.0E+00	2.2E+04	0.0E+00	0.0E+00	0.0E+00	NA
BICYCLOHEPTADIENE	1.8E+05	0.0E+00	1.8E+05	5.7E-06	0.0E+00	5.7E-06	NA
CARBON TETRACHLORIDE	2.5E+02	0.0E+00	2.5E+02	1.6E-01*	0.0E+00	1.6E-01*	NA
CHLORDANE	2.5E+01	0.0E+00	2.5E+01	4.0E+01*	0.0E+00	4.0E+01*	NA
CHLOROACETIC ACID	9.2E+03	0.0E+00	9.2E+03	3.7E-02	0.0E+00	3.7E-02	NA
CHLOROBENZENE	8.8E+04	0.0E+00	8.8E+04	4.5E-04	0.0E+00	4.5E-04	NA
CHLOROFORM	5.1E+03	0.0E+00	5.1E+03	1.8E+01*	0.0E+00	1.8E+01*	NA
CHLOROPHENYLMETHYL SULFIDE	9.1E+04	0.0E+00	9.1E+04	6.6E-04	0.0E+00	6.6E-04	NA
CHLOROPHENYLMETHYL SULFONE	9.1E+04	0.0E+00	9.1E+04	3.3E-04	0.0E+00	3.3E-04	NA
CHLOROPHENYLMETHYL SULFOXIDE	9.1E+04	0.0E+00	9.1E+04	8.8E-04	0.0E+00	8.8E-04	NA
PPDE	9.3E+01	0.0E+00	9.3E+01	3.2E-01*	0.0E+00	3.2E-01*	NA
PPDT	9.3E+01	0.0E+00	9.3E+01	6.4E-01*	0.0E+00	6.4E-01*	NA
DIBROMOCHLOROPROPANE	2.3E+01	0.0E+00	2.3E+01	4.9E+03*	0.0E+00	4.9E+03*	NA
1,1-DICHLOROETHANE	3.6E+02	0.0E+00	3.6E+02	0.0E+00	0.0E+00	0.0E+00	NA
1,1-DICHLOROETHYLENE	5.4E+01	0.0E+00	5.4E+01	0.0E+00	0.0E+00	0.0E+00	NA
1,2-DICHLOROETHYLENE	9.2E+04	0.0E+00	9.2E+04	0.0E+00	0.0E+00	0.0E+00	NA
DICYCLOPENTADIENE	1.7E+04	0.0E+00	1.7E+04	1.7E-01*	0.0E+00	1.7E-01*	NA
DIELDRIN	2.0E+00	0.0E+00	2.0E+00	3.5E+03*	0.0E+00	3.5E+03*	NA
DIISOPROPYLMETHYL PHOSPHONATE	3.7E+05	0.0E+00	3.7E+05	0.0E+00	0.0E+00	0.0E+00	NA
DIMETHYLDISULFIDE	3.7E+04	0.0E+00	3.7E+04	0.0E+00	0.0E+00	0.0E+00	NA
DIMETHYLMETHYL PHOSPHONATE	8.2E+04	0.0E+00	8.2E+04	4.8E-04	0.0E+00	4.8E-04	NA
DITHIANE	4.6E+04	0.0E+00	4.6E+04	2.2E-04	0.0E+00	2.2E-04	NA
ENDRIN	1.4E+03	0.0E+00	1.4E+03	3.6E+00*	0.0E+00	3.6E+00*	NA
ETHYLBENZENE	4.6E+05	0.0E+00	4.6E+05	6.5E-05	0.0E+00	6.5E-05	NA
HEXACHLOROCCYCLOPENTADIENE	5.5E+03	0.0E+00	5.5E+03	1.3E+00*	0.0E+00	1.3E+00*	NA
ISODRIN	3.2E+02	0.0E+00	3.2E+02	6.2E-01*	0.0E+00	6.2E-01*	NA
MALATHION	9.2E+04	0.0E+00	9.2E+04	0.0E+00	0.0E+00	0.0E+00	NA
METHYLISOBUTYL KETONE	2.2E+05	0.0E+00	2.2E+05	1.8E-04	0.0E+00	1.8E-04	NA
METHYLENE CHLORIDE	4.1E+03	0.0E+00	4.1E+03	9.7E-04	0.0E+00	9.7E-04	NA
1,4-OXATHIANE	1.4E+05	0.0E+00	1.4E+05	1.5E-05	0.0E+00	1.5E-05	NA
PARATHION	2.7E+04	0.0E+00	2.7E+04	0.0E+00	0.0E+00	0.0E+00	NA
SUPONA	6.9E+02	0.0E+00	6.9E+02	0.0E+00	0.0E+00	0.0E+00	NA
1,1,2,2-TETRACHLOROETHANE	1.6E+02	0.0E+00	1.6E+02	1.4E-01*	0.0E+00	1.4E-01*	NA
TETRACHLOROETHYLENE	6.5E+02	0.0E+00	6.5E+02	4.6E-02	0.0E+00	4.6E-02	NA
TOLUENE	1.4E+06	0.0E+00	1.4E+06	4.3E-05	0.0E+00	4.3E-05	NA
1,1,1-TRICHLOROETHANE	4.2E+05	0.0E+00	4.2E+05	1.4E-06	0.0E+00	1.4E-06	NA
1,1,2-TRICHLOROETHANE	5.5E+02	0.0E+00	5.5E+02	0.0E+00	0.0E+00	0.0E+00	NA
TRICHLOROETHYLENE	2.9E+03	0.0E+00	2.9E+03	0.0E+00	0.0E+00	0.0E+00	NA
VAPONA	1.1E+02	0.0E+00	1.1E+02	0.0E+00	0.0E+00	0.0E+00	NA
M-XYLENE	7.0E+06	0.0E+00	7.0E+06	1.1E-05	0.0E+00	1.1E-05	NA
O,P-XYLENE	7.0E+06	0.0E+00	7.0E+06	5.7E-06	0.0E+00	5.7E-06	NA
ARSENIC	2.0E+01	0.0E+00	2.0E+01	1.1E+03*	0.0E+00	1.1E+03*	NA
CADMIUM	3.6E+02	0.0E+00	3.6E+02	2.1E+00*	0.0E+00	2.1E+00*	NA
CHROMIUM	5.5E+01	0.0E+00	5.5E+01	5.1E+00*	0.0E+00	5.1E+00*	NA
COPPER	1.8E+05	0.0E+00	1.8E+05	5.0E-03	0.0E+00	5.0E-03	NA
LEAD	6.5E+03	0.0E+00	6.5E+03	1.7E+00*	0.0E+00	1.7E+00*	NA
MERCURY	1.4E+03	0.0E+00	1.4E+03	1.2E+01*	0.0E+00	1.2E+01*	NA
ZINC	7.8E+05	0.0E+00	7.8E+05	4.2E-03	0.0E+00	4.2E-03	NA

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SP5A-1a-7
EXPOSURE EVALUATIONS FOR INDUSTRIAL WORKERS

CONTAMINANT	DIRECT	INDIRECT		CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI	
	PPLV (mg/kg)	OSVI (mg/kg)	ESVI (mg/kg)	PPLV (mg/kg)	EI	EI	EI	OPN	ENC
ALDRIN	1.2E-01	2.9E+03	0.0E+00	1.2E-01	6.9E+04*	2.7E+00*	6.9E+04*	0.0E+00	NA
ATRAZINE	4.2E+03	4.9E+06	0.0E+00	4.2E+03	4.7E-04	4.1E-07	4.7E-04	1.3E-10	NA
BENZENE	6.7E+01	2.1E+01	0.0E+00	1.6E+01	1.5E-01*	4.8E-01*	6.3E-01*	2.1E+01	NA
BENZOTHIAZOLE	4.0E+03	0.0E+00	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	7.6E-05	NA
BICYCLOHEPTADIENE	3.3E+04	1.1E+04	0.0E+00	8.5E+03	3.1E-05	1.7E-04	2.1E-04	2.8E-02	NA
CARBON TETRACHLORIDE	1.5E+01	4.0E+01	0.0E+00	1.1E+01	2.6E+00*	1.0E+00*	3.6E+00*	1.3E+01	NA
CHLORDANE	1.5E+00	1.0E+06	1.0E+06	1.5E+00	6.6E+02*	3.2E-03a	6.6E+02*	0.0E+00	NA
CHLOROACETIC ACID	1.7E+03	0.0E+00	0.0E+00	1.7E+03	2.0E-01*	0.0E+00	2.0E-01*	0.0E+00	NA
CHLOROBENZENE	1.5E+04	2.2E+03	0.0E+00	1.9E+03	2.7E-03	1.8E-02	2.1E-02	6.6E-02	NA
CHLOROFORM	3.1E+02	8.3E+01	0.0E+00	6.6E+01	2.9E+02*	1.1E+03*	1.4E+03*	0.0E+00	NA
CHLOROPHENYLMETHYL SULFIDE	1.7E+04	4.4E+04	0.0E+00	1.2E+04	3.6E-03	1.4E-03	5.0E-03	1.3E-04	NA
CHLOROPHENYLMETHYL SULFONE	1.7E+04	4.7E+04	0.0E+00	1.2E+04	1.8E-03	6.4E-04	2.4E-03	7.0E-06	NA
CHLOROPHENYLMETHYL SULFOXIDE	1.7E+04	2.9E+04	0.0E+00	1.1E+04	4.8E-03	2.8E-03	7.6E-03	7.7E-07	NA
PPDE	5.7E+00	1.0E+06	1.0E+06	5.7E+00	5.2E+00*	1.7E-04a	5.2E+00*	0.0E+00	NA
PPDT	5.7E+00	1.0E+06	1.0E+06	5.7E+00	1.0E+01*	1.6E-04a	1.0E+01*	0.0E+00	NA
DIBROMOCHLOROPROPANE	1.4E+00	2.8E+00	0.0E+00	9.3E-01	7.9E+04*	4.0E+04*	1.2E+05*	0.0E+00	NA
1,1-DICHLOROETHANE	2.3E+01	0.0E+00	0.0E+00	2.3E+01	0.0E+00	0.0E+00	0.0E+00	8.2E-07	NA
1,1-DICHLOROETHYLENE	3.2E+00	0.0E+00	0.0E+00	3.2E+00	0.0E+00	0.0E+00	0.0E+00	7.5E+00	NA
1,2-DICHLOROETHYLENE	1.7E+04	0.0E+00	0.0E+00	1.7E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA
DICYCLOPENTADIENE	1.2E+03	2.3E+01	0.0E+00	2.3E+01	2.6E+00*	1.3E+02*	1.3E+02*	0.0E+00	NA
ENDRIN	1.2E-01	1.3E+03	0.0E+00	1.2E-01	5.7E+04*	5.3E+00*	5.7E+04*	0.0E+00	NA
ISOPROPYLMETHYL PHOSPHONATE	6.8E+04	0.0E+00	0.0E+00	6.8E+04	0.0E+00	0.0E+00	0.0E+00	2.3E-06	NA
DIMETHYLDISULFIDE	6.9E+03	0.0E+00	0.0E+00	6.9E+03	0.0E+00	0.0E+00	0.0E+00	1.1E-02	NA
DIMETHYLMETHYL PHOSPHONATE	1.5E+04	0.0E+00	0.0E+00	1.5E+04	2.6E-03	0.0E+00	2.6E-03	0.0E+00	NA
DITHIANE	8.5E+03	0.0E+00	0.0E+00	8.5E+03	1.2E-03	0.0E+00	1.2E-03	0.0E+00	NA
ENDRIN	2.5E+02	1.0E+06	1.0E+06	2.5E+02	2.0E+01*	4.6E-03a	2.0E+01*	0.0E+00	NA
ETHYLBENZENE	8.5E+04	3.0E+04	0.0E+00	2.2E+04	3.5E-04	1.0E-03	1.4E-03	2.3E-05	NA
HEXACHLOROCYCLOPENTADIENE	3.8E+02	1.1E+03	0.0E+00	2.9E+02	1.8E+01*	6.2E+00*	2.4E+01*	0.0E+00	NA
ISODRIN	5.9E+01	1.0E+06	1.0E+06	5.9E+01	3.4E+00*	9.5E-04a	3.4E+00*	0.0E+00	NA
MALATHION	1.7E+04	9.8E+09	0.0E+00	1.7E+04	0.0E+00	3.0E-11	3.0E-11	1.2E-10	NA
METHYL ISOBUTYL KETONE	4.0E+04	3.6E+03	0.0E+00	3.3E+03	1.0E-03	2.5E-02	2.6E-02	1.6E-03	NA
METHYLENE CHLORIDE	2.5E+02	4.4E+01	0.0E+00	3.7E+01	1.6E-02	1.1E+00*	1.2E+00*	4.8E-01	NA
1,4-OXATHIANE	2.5E+04	0.0E+00	0.0E+00	2.5E+04	7.9E-05	0.0E+00	7.9E-05	0.0E+00	NA
PARATHION	5.1E+03	0.0E+00	0.0E+00	5.1E+03	0.0E+00	0.0E+00	0.0E+00	5.7E-09	NA
SUPONA	1.3E+02	0.0E+00	0.0E+00	1.3E+02	0.0E+00	0.0E+00	0.0E+00	1.0E-09	NA
1,1,2,2-TETRACHLOROETHANE	9.9E+00	2.8E+01	0.0E+00	7.3E+00	2.3E+00*	8.2E-01*	3.1E+00*	0.0E+00	NA
TETRACHLOROETHYLENE	4.1E+01	2.1E+02	0.0E+00	3.4E+01	7.3E-01*	1.4E-01*	8.7E-01*	2.6E-01	NA
TOLUENE	2.6E+05	1.7E+05	0.0E+00	1.0E+05	2.3E-04	3.4E-04	5.8E-04	3.1E-03	NA
1,1,1-TRICHLOROETHANE	7.8E+04	1.3E+05	0.0E+00	4.9E+04	7.7E-06	4.6E-06	1.2E-05	6.8E-05	NA
1,1,2-TRICHLOROETHANE	3.4E+01	0.0E+00	0.0E+00	3.4E+01	0.0E+00	0.0E+00	0.0E+00	3.2E-04	NA
TRICHLOROETHYLENE	1.8E+02	0.0E+00	0.0E+00	1.8E+02	0.0E+00	0.0E+00	0.0E+00	2.9E-01	NA
VAPONA	6.7E+00	0.0E+00	0.0E+00	6.7E+00	0.0E+00	0.0E+00	0.0E+00	3.0E-06	NA
M-XYLENE	8.8E+05	2.6E+04	0.0E+00	2.5E+04	9.1E-05	3.1E-03	3.2E-03	6.3E-05	NA
O,P-XYLENE	8.8E+05	2.6E+04	0.0E+00	2.5E+04	4.5E-05	1.6E-03	1.6E-03	5.6E-05	NA

SPSA-1a-7
EXPOSURE EVALUATIONS FOR INDUSTRIAL WORKERS

CONTAMINANT	DIRECT	INDIRECT		CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI	
	PPLV (mg/kg)	OSVI (mg/kg)	ESVI (mg/kg)	PPLV (mg/kg)	EI EI	EI EI	EI EI	OPN	ENC
ARSENIC	1.6E+00	0.0E+00	0.0E+00	1.6E+00	1.3E+04*	0.0E+00	1.3E+04*	0.0E+00	NA
CADMIUM	7.6E+00	0.0E+00	0.0E+00	7.6E+00	1.0E+02*	0.0E+00	1.0E+02*	0.0E+00	NA
CHROMIUM	1.1E+00	0.0E+00	0.0E+00	1.1E+00	2.4E+02*	0.0E+00	2.4E+02*	0.0E+00	NA
COPPER	5.7E+04	0.0E+00	0.0E+00	5.7E+04	1.5E-02	0.0E+00	1.5E-02	0.0E+00	NA
LEAD	2.2E+03	0.0E+00	0.0E+00	2.2E+03	5.0E+00*	0.0E+00	5.0E+00*	0.0E+00	NA
MERCURY	4.6E+02	0.0E+00	0.0E+00	4.6E+02	3.7E+01*	0.0E+00	3.7E+01*	0.0E+00	NA
ZINC	1.4E+05	0.0E+00	0.0E+00	1.4E+05	2.4E-02	0.0E+00	2.4E-02	0.0E+00	NA

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPPLV for this contaminant is considered to be equal to pure compound. The SPPPLV has therefore been set to 1.00E+06 mg/m³q (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

2.2 SITE SPSA-1b: MOUNDED MATERIAL (formerly Site 1-3: Mounded Material; EBASCO, 1988a/RIC 88046R04 and EBASCO, 1988b/RIC 88046R04A)

2.2.1 Site-Specific Considerations

Figure SPSA-1b-1 and Tables SPSA-1b-1 and SPSA-1b-2 depict the target contaminants for Site SPSA-1b. Borings 1 through 22 were included in this exposure assessment, consistent with the South Plants SAR. The historical search conducted under the contamination assessment revealed that storage of Leinweinst mustard-filled shells occurred in Site SPSA-1b (EBASCO, 1988a/RIC 88046R04). According to site history, no other chemicals from the RMA target contaminant list were suspected to be present in Site SPSA-1b (EBASCO, 1988a/RIC 88046R04).

2.2.2 Spatial Distribution of Measured Contaminant Concentrations

The locations and concentrations of the target contaminants that were detected in Site SPSA-1b are shown in Figure SPSA-1b-1. 2-Pentanone, occurring in Boring 8 (4-5 ft) was not included in this figure since it was not considered a target contaminant during Phase I and Phase II investigations. Although not shown in this figure, this compound was included in the South Plants SAR and in this exposure assessment because it passed through the screening process performed in the RMA Chemical Index (EBASCO, 1988c/RIC 88357R01).

Table SPSA-1b-1 summarizes the maximum concentrations of contaminants measured in soil above indicator levels for the ICP metals, arsenic, and mercury and CRLs for organic contaminants from the Phase I and Phase II investigations. The boring number and depth where the maximum value was observed are shown. No data were included for ICP metals, arsenic, and mercury in Horizon 2 because direct soil exposure below 10 ft is assumed to be negligible (see Volume VI-A). Table SPSA-1b-2 summarizes the maximum concentrations detected in groundwater together with the well number, location, sampling interval, and depth to groundwater.

2.2.3 Site Exposure Summary

Tables SPSA-1b-3 through SPSA-1b-7 present Draft PPLVs, EIs, and VEIs for each site contaminant. Since the depth to groundwater below Site SPSA-1b is at 10 ft, the enclosed space vapor inhalation SPPPLV is included in the calculation of the cumulative quantity.

The COCs are summarized below for each exposed population and with the critical exposure pathway identified.

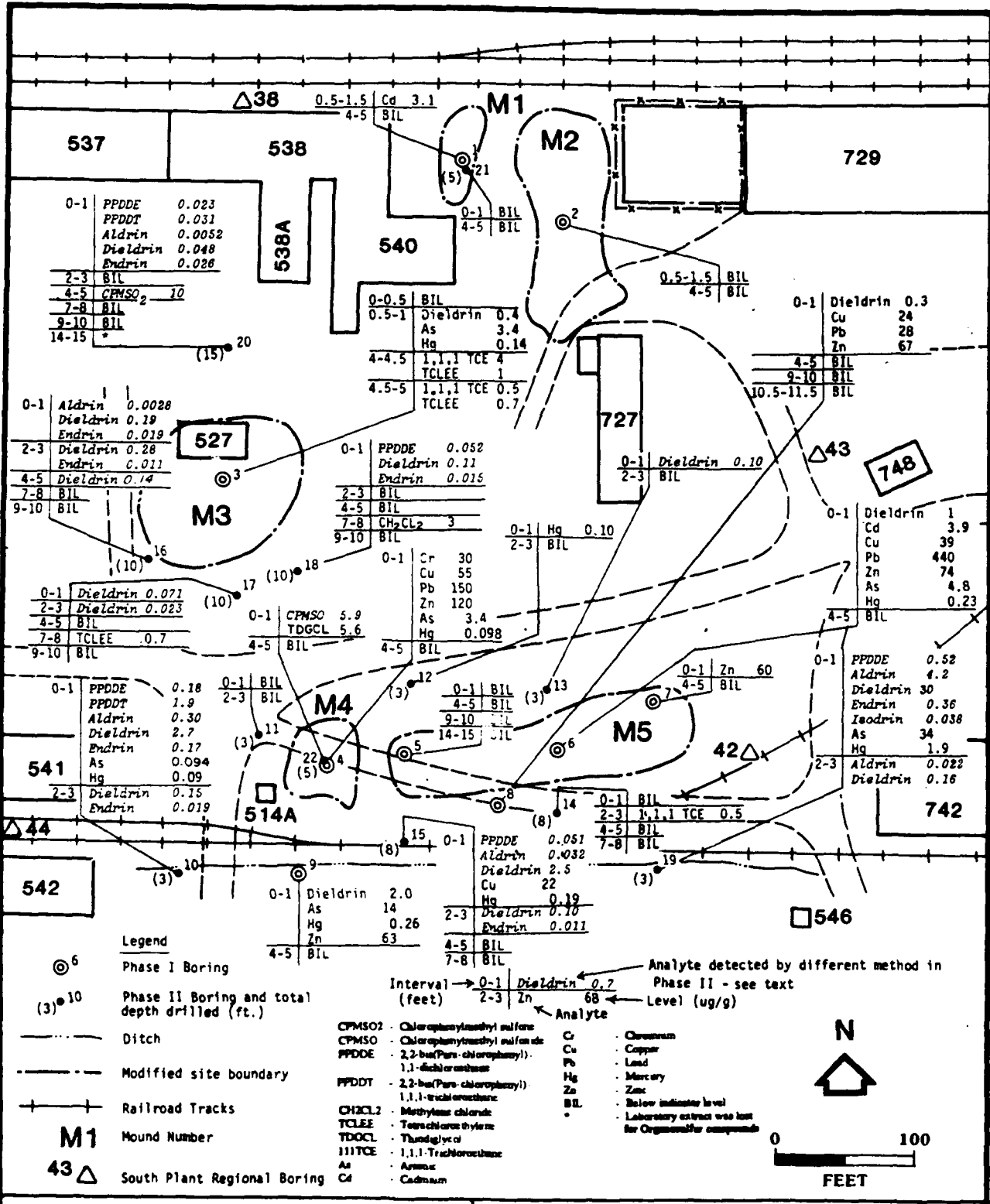
Contaminants of Concern	Regulated Visitor	Casual Visitor	Recreational Visitor	Commercial Worker	Industrial Worker
Aldrin	Direct	Direct	Direct	Dir/Ind	Dir/Ind
Dieldrin	Direct	Direct	Direct	Dir/Ind	Dir/Ind
Arsenic	Direct	Direct	Direct	Direct	Direct
PPDDT	--	--	Direct	Cumulative	Direct
Methylene chloride	--	--	--	Indirect	Indirect
PPDDE	--	--	--	--	Cumulative
Cadmium	--	--	--	--	Direct
Lead	--	--	--	--	Direct

Note: Direct exposure pathways for soils include soil ingestion, suspended particulate inhalation, and dermal contact.
Indirect exposure pathways include open and enclosed space vapor inhalation.

The results of the soil exposure summary indicate that exposure to contamination from the direct and indirect pathways both contribute to the exceedance of the cumulative PPLVs. It should be noted for PPDDT and PPDDE, the cumulative EI exceeds 0.1 for a commercial worker and an industrial worker but direct and indirect EIs do not exceed 0.1. Site SPSA-1b is designated as a Priority 1 site, based on the most sensitive exposed population PPLV (i.e., the industrial worker).

The following groundwater contaminants result in an unacceptable exposure due to vapor inhalation as indicated by a VEI value greater than 1:

- Aldrin (enclosed)
- Benzene (enclosed)
- Carbon tetrachloride (enclosed)
- Chloroform (enclosed)
- Dibromochloropropane (enclosed)
- Tetrachloroethylene (enclosed)
- Trichloroethylene (enclosed)



Prepared for:
 Program Manager's Office for
 Rocky Mountain Arsenal Cleanup
 Aberdeen Proving Ground, Maryland

FIGURE SPSA-Ib-I
 Phase I and Phase II Analytes Detected
 Within or Above Indicator Levels
 Rocky Mountain Arsenal
 Prepared by Ebasco Services Incorporated

TABLE SPSA-1b-1
SOIL CONTAMINANT CONCENTRATIONS
FOR SITE SPSA-1b

Contaminant	Horizon 1			Horizon 2		
	Max. (ug/g)	Depth (ft)	Boring Number	Max. (ug/g)	Depth (ft)	Boring Number
Aldrin	4.2	0-1	19	4.2	0-1	19
Chlorophenylmethyl sulfone	10	4-5	20	10	4-5	20
Chlorophenylmethyl sulfoxide	5.9	0-1	22	5.9	0-1	22
PPDDE ^{1/}	0.52	0-1	19	0.52	0-1	19
PPDDT ^{2/}	1.9	0-1	10	1.9	0-1	10
Dieldrin	30	0-1	19	30	0-1	19
Endrin	0.36	0-1	19	0.36	0-1	19
Isodrin	0.038	0-1	19	0.038	0-1	19
Methylene chloride	3	7-8	18	3	7-8	18
2-Pentanone ^{3/}	2.0	4-5	8	2.0	4-5	8
Tetrachloroethylene	1	4-4.5	3	1	4-4.5	3
Thiodiglycol	5.6	0-1	22	5.6	0-1	22
1,1,1-Trichloroethane	4	4-4.5	3	4	4-4.5	3
Arsenic	34	0-1	19	--	--	--
Cadmium	3.9	0-1	6	--	--	--
Copper	55	0-1	4	--	--	--
Lead	440	0-1	6	--	--	--
Mercury	1.9	0-1	19	--	--	--
Zinc	120	0-1	4	--	--	--

1/ PPDDE 2,2-bis(Para-chlorophenyl)-1,1-dichloroethene

2/ PPDDT 2,2-bis(Para-chlorophenyl)-1,1,1-trichloroethane

3/ Nontarget contaminant. Refer to the exposure assessment nontarget screen in Appendix A.

SPSA South Plants Study Area

Max. Maximum

ug/g microgram per gram

ft foot/feet

REA4/TBL0061.REA VI-G 9/12/90 9:11 am sma

TABLE SPSA-1b-2
GROUNDWATER CONTAMINANT CONCENTRATIONS (UG/L)
FOR SITE SPSA-1b
AVERAGE SITE DEPTH TO GROUNDWATER: 10 Feet

CHEMICAL	CONCENTRATION MAXIMUM	LOCATION (WELL NUMBER)	SAMPLE DATE
1,1,1-TRICHLOROETHANE	28	01511	12/22/87
M-XYLENE	1.8	01511	01/10/89
ALDRIN	0.73	01511	01/10/89
BENZENE	9.9	01511	01/10/89
CARBON TETRACHLORIDE	79	01511	01/10/89
CHLOROFORM	410	01511	12/22/87
CHLOROBENZENE	21	01511	01/10/89
DIBROMOCHLOROPROPANE	34	01511	12/22/87
DIISOPROPYLMETHYL PHOSPHONATE	0.92	01511	01/10/89
DIELDRIN	0.50	01511	12/22/87
ENDRIN	0.080	01511	01/10/89
ISODRIN	0.081	01511	01/10/89
TOLUENE	300	01511	01/10/89
PPDDT	0.14	01511	01/10/89
SUPONA	1.7	01511	01/10/89
TETRACHLOROETHYLENE	18	01511	01/10/89
TRICHLOROETHYLENE	16	01511	12/22/87

EACH VALUE PRESENTED IS THE MAXIMUM CONCENTRATION FOR THE LISTED ANALYTE FOR THE PERIOD March 17, 1987 TO February 28, 1989.
DATA SOURCE: DP ASSOCIATES, RMA Database, July 19, 1990

TABLE SPSA-1b-2
GROUNDWATER CONTAMINANT CONCENTRATIONS (UG/L)
FOR SITE SPSA-1b

AVERAGE SITE DEPTH TO GROUNDWATER: 10 Feet

CHEMICAL	CONCENTRATION MAXIMUM	LOCATION (WELL NUMBER)	SAMPLE DATE
O,P-XYLENE	2.1	01511	01/10/89

EACH VALUE PRESENTED IS THE MAXIMUM CONCENTRATION FOR THE LISTED ANALYTE
FOR THE PERIOD March 17, 1987 TO February 28, 1989.
DATA SOURCE: DP ASSOCIATES, RMA Database, July 19, 1990

SPSA-1b-3
EXPOSURE EVALUATIONS FOR REGULATED VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	OPN
ALDRIN	1.5E+00	7.3E+05	1.5E+00	2.8E+00*	5.8E-06	2.8E+00*	4.2E-07
BENZENE	8.6E+02	0.0E+00	8.6E+02	0.0E+00	0.0E+00	0.0E+00	7.0E-06
CARBON TETRACHLORIDE	2.0E+02	0.0E+00	2.0E+02	0.0E+00	0.0E+00	0.0E+00	9.7E-04
CHLOROBENZENE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	1.3E-07
CHLOROFORM	4.0E+03	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	4.3E-05
CHLOROPHENYLMETHYL SULFONE	1.6E+05	2.2E+07	1.6E+05	6.1E-05	4.5E-07	6.2E-05	0.0E+00
CHLOROPHENYLMETHYL SULFOXIDE	1.6E+05	1.3E+07	1.6E+05	3.6E-05	4.5E-07	3.7E-05	0.0E+00
PPDE	7.4E+01	4.4E+07	7.4E+01	7.1E-03	1.2E-08	7.1E-03	0.0E+00
PPDDT	7.4E+01	9.2E+07	7.4E+01	2.6E-02	2.1E-08	2.6E-02	5.4E-08
DIBROMOCHLOROPROPANE	1.8E+01	0.0E+00	1.8E+01	0.0E+00	0.0E+00	0.0E+00	4.9E-05
DIELDRIN	1.6E+00	1.0E+06	1.6E+00	1.9E+01*	9.1E-05 ^a	1.9E+01*	0.0E+00
DIISOPROPYLMETHYL PHOSPHONATE	6.6E+05	0.0E+00	6.6E+05	0.0E+00	0.0E+00	0.0E+00	1.5E-11
ENDRIN	2.5E+03	2.3E+08	2.5E+03	1.5E-04	1.6E-09	1.5E-04	3.1E-12
ISODRIN	5.8E+02	5.1E+07	5.8E+02	6.6E-05	7.5E-10	6.6E-05	1.9E-09
METHYLENE CHLORIDE	3.3E+03	1.0E+05	3.2E+03	9.2E-04	2.9E-05	9.5E-04	0.0E+00
SUPONA	1.2E+03	0.0E+00	1.2E+03	0.0E+00	0.0E+00	0.0E+00	4.3E-14
TETRACHLOROETHYLENE	5.1E+02	2.3E+05	5.1E+02	2.0E-03	4.3E-06	2.0E-03	5.7E-06
THIODIGLYCOL	3.3E+05	0.0E+00	3.3E+05	1.7E-05	0.0E+00	1.7E-05	0.0E+00
TOLUENE	2.5E+06	0.0E+00	2.5E+06	0.0E+00	0.0E+00	0.0E+00	3.2E-08
1,1,1-TRICHLOROETHANE	7.5E+05	8.3E+07	7.4E+05	5.4E-06	4.8E-08	5.4E-06	1.2E-08
TRICHLOROETHYLENE	2.3E+03	0.0E+00	2.3E+03	0.0E+00	0.0E+00	0.0E+00	9.7E-06
M-XYLENE	1.4E+07	0.0E+00	1.4E+07	0.0E+00	0.0E+00	0.0E+00	1.2E-09
O,P-XYLENE	1.4E+07	0.0E+00	1.4E+07	0.0E+00	0.0E+00	0.0E+00	1.4E-09
ARSENIC	2.2E+01	0.0E+00	2.2E+01	1.6E+00*	0.0E+00	1.6E+00*	0.0E+00
CADMIUM	4.5E+02	0.0E+00	4.5E+02	8.6E-03	0.0E+00	8.6E-03	0.0E+00
COPPER	4.2E+05	0.0E+00	4.2E+05	1.3E-04	0.0E+00	1.3E-04	0.0E+00
LEAD	1.5E+04	0.0E+00	1.5E+04	2.8E-02	0.0E+00	2.8E-02	0.0E+00
MERCURY	3.3E+03	0.0E+00	3.3E+03	5.7E-04	0.0E+00	5.7E-04	0.0E+00
ZINC	2.0E+06	0.0E+00	2.0E+06	6.0E-05	0.0E+00	6.0E-05	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPPLV for this contaminant is considered to be equal to pure compound. The SPPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-1b-4
EXPOSURE EVALUATIONS FOR CASUAL VISITORS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI OPN
ALDRIN	1.5E+00	7.3E+05	1.5E+00	2.8E+00*	5.8E-06	2.8E+00*	4.2E-07
BENZENE	8.6E+02	0.0E+00	8.6E+02	0.0E+00	0.0E+00	0.0E+00	7.0E-06
CARBON TETRACHLORIDE	2.0E+02	0.0E+00	2.0E+02	0.0E+00	0.0E+00	0.0E+00	9.7E-04
CHLOROBENZENE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	1.3E-07
CHLOROFORM	4.0E+03	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	4.3E-05
CHLOROPHENYLMETHYL SULFONE	1.6E+05	2.2E+07	1.6E+05	6.1E-05	4.5E-07	6.2E-05	0.0E+00
CHLOROPHENYLMETHYL SULFOXIDE	1.6E+05	1.3E+07	1.6E+05	3.6E-05	4.5E-07	3.7E-05	0.0E+00
PPDE	7.4E+01	4.4E+07	7.4E+01	7.1E-03	1.2E-08	7.1E-03	0.0E+00
PPDT	7.4E+01	9.2E+07	7.4E+01	2.6E-02	2.1E-08	2.6E-02	5.4E-08
DIBROMOCHLOROPROPANE	1.8E+01	0.0E+00	1.8E+01	0.0E+00	0.0E+00	0.0E+00	4.9E-05
DIELDRIN	1.6E+00	1.0E+06	1.6E+00	1.9E+01*	9.1E-05a	1.9E+01*	0.0E+00
DIISOPROPYLMETHYL PHOSPHONATE	6.6E+05	0.0E+00	6.6E+05	0.0E+00	0.0E+00	0.0E+00	1.5E-11
ENDRIN	2.5E+03	2.3E+08	2.5E+03	1.5E-04	1.6E-09	1.5E-04	3.1E-12
ISODRIN	5.8E+02	5.1E+07	5.8E+02	6.6E-05	7.5E-10	6.6E-05	1.9E-09
METHYLENE CHLORIDE	3.3E+03	1.0E+05	3.2E+03	9.2E-04	2.9E-05	9.5E-04	0.0E+00
SUPONA	1.2E+03	0.0E+00	1.2E+03	0.0E+00	0.0E+00	0.0E+00	4.3E-14
TETRACHLOROETHYLENE	5.1E+02	2.3E+05	5.1E+02	2.0E-03	4.3E-06	2.0E-03	5.7E-06
THIODIGLYCOL	3.3E+05	0.0E+00	3.3E+05	1.7E-05	0.0E+00	1.7E-05	0.0E+00
TOLUENE	2.5E+06	0.0E+00	2.5E+06	0.0E+00	0.0E+00	0.0E+00	3.2E-08
1,1,1-TRICHLOROETHANE	7.5E+05	8.3E+07	7.4E+05	5.4E-06	4.8E-08	5.4E-06	1.2E-08
TRICHLOROETHYLENE	2.3E+03	0.0E+00	2.3E+03	0.0E+00	0.0E+00	0.0E+00	9.7E-06
M-XYLENE	1.4E+07	0.0E+00	1.4E+07	0.0E+00	0.0E+00	0.0E+00	1.2E-09
O,P-XYLENE	1.4E+07	0.0E+00	1.4E+07	0.0E+00	0.0E+00	0.0E+00	1.4E-09
ARSENIC	2.2E+01	0.0E+00	2.2E+01	1.6E+00*	0.0E+00	1.6E+00*	0.0E+00
CADMIUM	4.5E+02	0.0E+00	4.5E+02	8.6E-03	0.0E+00	8.6E-03	0.0E+00
COPPER	4.2E+05	0.0E+00	4.2E+05	1.3E-04	0.0E+00	1.3E-04	0.0E+00
LEAD	1.5E+04	0.0E+00	1.5E+04	2.8E-02	0.0E+00	2.8E-02	0.0E+00
MERCURY	3.3E+03	0.0E+00	3.3E+03	5.7E-04	0.0E+00	5.7E-04	0.0E+00
ZINC	2.0E+06	0.0E+00	2.0E+06	6.0E-05	0.0E+00	6.0E-05	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPPLV for this contaminant is considered to be equal to pure compound. The SPPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-1b-5
EXPOSURE EVALUATIONS FOR RECREATIONAL VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	OPN
ALDRIN	2.1E-01	4.8E+04	2.1E-01	2.0E+01*	8.7E-05	2.0E+01*	6.4E-06
BENZENE	1.2E+02	0.0E+00	1.2E+02	0.0E+00	0.0E+00	0.0E+00	1.1E-04
CARBON TETRACHLORIDE	2.7E+01	0.0E+00	2.7E+01	0.0E+00	0.0E+00	0.0E+00	1.5E-02
CHLOROBENZENE	6.8E+04	0.0E+00	6.8E+04	0.0E+00	0.0E+00	0.0E+00	8.4E-07
CHLOROFORM	5.6E+02	0.0E+00	5.6E+02	0.0E+00	0.0E+00	0.0E+00	6.5E-04
CHLOROPHENYLMETHYL SULFONE	7.0E+04	3.5E+06	6.8E+04	1.4E-04	2.9E-06	1.5E-04	0.0E+00
CHLOROPHENYLMETHYL SULFOXIDE	7.0E+04	4.7E+06	6.9E+04	8.5E-05	1.2E-06	8.6E-05	0.0E+00
PPDDE	1.0E+01	2.9E+06	1.0E+01	5.1E-02	1.8E-07	5.1E-02	0.0E+00
PPDDT	1.0E+01	6.1E+06	1.0E+01	1.9E-01*	3.1E-07	1.9E-01*	8.1E-07
DIBROMOCHLOROPROPANE	2.5E+00	0.0E+00	2.5E+00	0.0E+00	0.0E+00	0.0E+00	7.4E-04
DIELDRIN	2.2E-01	1.0E+06	2.2E-01	1.4E+02*	1.4E-03a	1.4E+02*	0.0E+00
DIISOPROPYLMETHYL PHOSPHONATE	2.8E+05	0.0E+00	2.8E+05	0.0E+00	0.0E+00	0.0E+00	9.6E-11
ENDRIN	1.1E+03	3.5E+07	1.1E+03	3.4E-04	1.0E-08	3.4E-04	2.0E-11
ISODRIN	2.5E+02	7.9E+06	2.5E+02	1.5E-04	4.8E-09	1.5E-04	1.2E-08
METHYLENE CHLORIDE	4.5E+02	1.6E+04	4.4E+02	6.6E-03	1.9E-04	6.8E-03	0.0E+00
SUPONA	5.3E+02	0.0E+00	5.3E+02	0.0E+00	0.0E+00	0.0E+00	2.8E-13
TETRACHLOROETHYLENE	7.1E+01	3.6E+04	7.1E+01	1.4E-02	2.8E-05	1.4E-02	8.6E-05
THIODIGLYCOL	1.4E+05	0.0E+00	1.4E+05	4.0E-05	0.0E+00	4.0E-05	0.0E+00
TOLUENE	1.1E+06	0.0E+00	1.1E+06	0.0E+00	0.0E+00	0.0E+00	2.1E-07
1,1,1-TRICHLOROETHANE	3.2E+05	3.0E+07	3.2E+05	1.3E-05	1.3E-07	1.3E-05	7.6E-08
TRICHLOROETHYLENE	3.2E+02	0.0E+00	3.2E+02	0.0E+00	0.0E+00	0.0E+00	1.5E-04
M-XYLENE	5.8E+06	0.0E+00	5.8E+06	0.0E+00	0.0E+00	0.0E+00	7.7E-09
O,P-XYLENE	5.8E+06	0.0E+00	5.8E+06	0.0E+00	0.0E+00	0.0E+00	9.3E-09
ARSENIC	3.9E+00	0.0E+00	3.9E+00	8.6E+00*	0.0E+00	8.6E+00*	0.0E+00
CADMIUM	5.8E+01	0.0E+00	5.8E+01	6.8E-02	0.0E+00	6.8E-02	0.0E+00
COPPER	2.5E+05	0.0E+00	2.5E+05	2.2E-04	0.0E+00	2.2E-04	0.0E+00
LEAD	9.2E+03	0.0E+00	9.2E+03	4.8E-02	0.0E+00	4.8E-02	0.0E+00
MERCURY	2.0E+03	0.0E+00	2.0E+03	9.6E-04	0.0E+00	9.6E-04	0.0E+00
ZINC	1.1E+06	0.0E+00	1.1E+06	1.1E-04	0.0E+00	1.1E-04	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPPLV for this contaminant is considered to be equal to pure compound. The SPPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-1b-6
EXPOSURE EVALUATIONS FOR COMMERCIAL WORKERS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI ENC
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	
ALDRIN	1.9E+00	4.0E-01	3.3E-01	2.2E+00*	1.1E+01*	1.3E+01*	7.4E-01
BENZENE	1.1E+03	0.0E+00	1.1E+03	0.0E+00	0.0E+00	0.0E+00	1.2E+01
CARBON TETRACHLORIDE	2.5E+02	0.0E+00	2.5E+02	0.0E+00	0.0E+00	0.0E+00	1.7E+03
CHLOROBENZENE	8.8E+04	0.0E+00	8.8E+04	0.0E+00	0.0E+00	0.0E+00	6.8E-01
CHLOROFORM	5.1E+03	0.0E+00	5.1E+03	0.0E+00	0.0E+00	0.0E+00	7.6E+01
CHLOROPHENYLMETHYL SULFONE	9.1E+04	6.8E+02	6.7E+02	1.1E-04	1.5E-02	1.5E-02	0.0E+00
CHLOROPHENYLMETHYL SULFOXIDE	9.1E+04	1.9E+04	1.6E+04	6.5E-05	3.1E-04	3.8E-04	0.0E+00
PPDDE	9.3E+01	1.9E+01	1.6E+01	5.6E-03	2.7E-02	3.2E-02	0.0E+00
PPDDT	9.3E+01	1.9E+01	1.6E+01	2.0E-02	9.8E-02	1.2E-01*	9.5E-02
DIBROMOCHLOROPROPANE	2.3E+01	0.0E+00	2.3E+01	0.0E+00	0.0E+00	0.0E+00	8.7E+01
DIELDRIN	2.0E+00	5.8E+01	1.9E+00	1.5E+01*	5.2E-01*	1.6E+01*	0.0E+00
DIISOPROPYLMETHYL PHOSPHONATE	3.7E+05	0.0E+00	3.7E+05	0.0E+00	0.0E+00	0.0E+00	7.8E-05
ENDRIN	1.4E+03	2.9E+02	2.4E+02	2.6E-04	1.3E-03	1.5E-03	1.6E-05
ISODRIN	3.2E+02	6.7E+01	5.5E+01	1.2E-04	5.7E-04	6.8E-04	1.0E-02
METHYLENE CHLORIDE	4.1E+03	8.1E+00	8.1E+00	7.3E-04	3.7E-01*	3.7E-01*	0.0E+00
SUPONA	6.9E+02	0.0E+00	6.9E+02	0.0E+00	0.0E+00	0.0E+00	2.3E-07
TETRACHLOROETHYLENE	6.5E+02	3.4E+01	3.2E+01	1.5E-03	2.9E-02	3.1E-02	1.0E+01
THIODIGLYCOL	1.8E+05	0.0E+00	1.8E+05	3.1E-05	0.0E+00	3.1E-05	0.0E+00
TOLUENE	1.4E+06	0.0E+00	1.4E+06	0.0E+00	0.0E+00	0.0E+00	1.7E-01
1,1,1-TRICHLOROETHANE	4.2E+05	2.9E+05	1.7E+05	9.6E-06	1.4E-05	2.4E-05	6.2E-02
TRICHLOROETHYLENE	2.9E+03	0.0E+00	2.9E+03	0.0E+00	0.0E+00	0.0E+00	1.7E+01
M-XYLENE	7.0E+06	0.0E+00	7.0E+06	0.0E+00	0.0E+00	0.0E+00	6.2E-03
O,P-XYLENE	7.0E+06	0.0E+00	7.0E+06	0.0E+00	0.0E+00	0.0E+00	7.6E-03
ARSENIC	2.0E+01	0.0E+00	2.0E+01	1.7E+00*	0.0E+00	1.7E+00*	0.0E+00
CADMIUM	3.6E+02	0.0E+00	3.6E+02	1.1E-02	0.0E+00	1.1E-02	0.0E+00
COPPER	1.8E+05	0.0E+00	1.8E+05	3.1E-04	0.0E+00	3.1E-04	0.0E+00
LEAD	6.5E+03	0.0E+00	6.5E+03	6.7E-02	0.0E+00	6.7E-02	0.0E+00
MERCURY	1.4E+03	0.0E+00	1.4E+03	1.4E-03	0.0E+00	1.4E-03	0.0E+00
ZINC	7.8E+05	0.0E+00	7.8E+05	1.5E-04	0.0E+00	1.5E-04	0.0E+00

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-1b-7
EXPOSURE EVALUATIONS FOR INDUSTRIAL WORKERS

CONTAMINANT	DIRECT	INDIRECT		CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI	
	PPLV (mg/kg)	OSVI (mg/kg)	ESVI (mg/kg)	PPLV (mg/kg)	EI	EI	EI	OPN	ENC
ALDRIN	1.2E-01	9.7E+04	4.0E-01	9.0E-02	3.6E+01*	1.1E+01*	4.7E+01*	3.2E-06	2.2E+00
BENZENE	6.7E+01	0.0E+00	0.0E+00	6.7E+01	0.0E+00	0.0E+00	0.0E+00	5.3E-05	3.7E+01
CARBON TETRACHLORIDE	1.5E+01	0.0E+00	0.0E+00	1.5E+01	0.0E+00	0.0E+00	0.0E+00	7.3E-03	5.1E+03
CHLOROBENZENE	1.5E+04	0.0E+00	0.0E+00	1.5E+04	0.0E+00	0.0E+00	0.0E+00	9.7E-07	6.8E-01
CHLOROFORM	3.1E+02	0.0E+00	0.0E+00	3.1E+02	0.0E+00	0.0E+00	0.0E+00	3.2E-04	2.3E+02
CHLOROPHENYLMETHYL SULFONE	1.7E+04	3.0E+06	9.7E+02	9.1E+02	6.0E-04	1.0E-02	1.1E-02	0.0E+00	0.0E+00
CHLOROPHENYLMETHYL SULFOXIDE	1.7E+04	1.7E+06	5.7E+04	1.3E+04	3.5E-04	1.1E-04	4.6E-04	0.0E+00	0.0E+00
PPDE	5.7E+00	5.8E+06	1.9E+01	4.4E+00	9.1E-02	2.7E-02	1.2E-01*	0.0E+00	0.0E+00
PPDT	5.7E+00	1.2E+07	1.9E+01	4.4E+00	3.3E-01*	9.8E-02	4.3E-01*	4.0E-07	2.8E-01
DIBROMOCHLOROPROPANE	1.4E+00	0.0E+00	0.0E+00	1.4E+00	0.0E+00	0.0E+00	0.0E+00	3.7E-04	2.6E+02
DIELDRIN	1.2E-01	4.4E+04	1.9E+01	1.2E-01	2.5E+02*	1.6E+00*	2.5E+02*	0.0E+00	0.0E+00
DIISOPROPYLMETHYL PHOSPHONATE	6.8E+04	0.0E+00	0.0E+00	6.8E+04	0.0E+00	0.0E+00	0.0E+00	1.1E-10	7.8E-05
ENDRIN	2.5E+02	3.0E+07	8.6E+02	2.0E+02	1.4E-03	4.2E-04	1.8E-03	2.3E-11	1.6E-05
ISODRIN	5.9E+01	6.8E+06	2.0E+02	4.6E+01	6.4E-04	1.9E-04	8.3E-04	1.4E-08	1.0E-02
METHYLENE CHLORIDE	2.5E+02	1.4E+04	8.1E+00	7.8E+00	1.2E-02	3.7E-01*	3.8E-01*	0.0E+00	0.0E+00
SUPONA	1.3E+02	0.0E+00	0.0E+00	1.3E+02	0.0E+00	0.0E+00	0.0E+00	3.2E-13	2.3E-07
TETRACHLOROETHYLENE	4.1E+01	3.1E+04	3.4E+01	1.9E+01	2.4E-02	2.9E-02	5.4E-02	4.3E-05	3.0E+01
THIODIGLYCOL	3.4E+04	0.0E+00	0.0E+00	3.4E+04	1.7E-04	0.0E+00	1.7E-04	0.0E+00	0.0E+00
TOLUENE	2.6E+05	0.0E+00	0.0E+00	2.6E+05	0.0E+00	0.0E+00	0.0E+00	2.4E-07	1.7E-01
1,1,1-TRICHLOROETHANE	7.8E+04	1.1E+07	8.6E+05	7.1E+04	5.1E-05	5.0E-06	5.6E-05	8.8E-08	6.2E-02
1,1,2-TRICHLOROETHYLENE	1.8E+02	0.0E+00	0.0E+00	1.8E+02	0.0E+00	0.0E+00	0.0E+00	7.3E-05	5.1E+01
M-XYLENE	8.8E+05	0.0E+00	0.0E+00	8.8E+05	0.0E+00	0.0E+00	0.0E+00	8.9E-09	6.2E-03
O,P-XYLENE	8.8E+05	0.0E+00	0.0E+00	8.8E+05	0.0E+00	0.0E+00	0.0E+00	1.1E-08	7.6E-03
ARSENIC	1.6E+00	0.0E+00	0.0E+00	1.6E+00	2.1E+01*	0.0E+00	2.1E+01*	0.0E+00	0.0E+00
CADMIUM	7.6E+00	0.0E+00	0.0E+00	7.6E+00	5.1E-01*	0.0E+00	5.1E-01*	0.0E+00	0.0E+00
COPPER	5.7E+04	0.0E+00	0.0E+00	5.7E+04	9.6E-04	0.0E+00	9.6E-04	0.0E+00	0.0E+00
LEAD	2.2E+03	0.0E+00	0.0E+00	2.2E+03	2.0E-01*	0.0E+00	2.0E-01*	0.0E+00	0.0E+00
MERCURY	4.6E+02	0.0E+00	0.0E+00	4.6E+02	4.1E-03	0.0E+00	4.1E-03	0.0E+00	0.0E+00
ZINC	1.4E+05	0.0E+00	0.0E+00	1.4E+05	8.6E-04	0.0E+00	8.6E-04	0.0E+00	0.0E+00

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

2.3 SITE SPSA-1c: LIME PITS (formerly Site 1-5: Lime Pits; EBASCO, 1987a/RIC 87006R15 and EBASCO, 1988d/RIC 87006R15A)

2.3.1 Site-Specific Considerations

Figure SPSA-1c-1 and Tables SPSA-1c-1 and SPSA-1c-2 depict the target contaminants for Site SPSA-1c. Borings 1 through 14, and 11B through 14B were included in this exposure assessment, consistent with the South Plants SAR. This site was used as an evaporation or storage basin for lime slurries, generated from the production of acetylene gas, for neutralizing acidic materials, and for disposal of chemicals from the planavin unit. Therefore, chemicals from the RMA target contaminant lists that are associated with these activities were suspected to be present in Site SPSA-1c (EBASCO, 1987a/RIC 87006R15).

2.3.2 Spatial Distribution of Measured Contaminant Concentrations

The locations and concentrations of the target contaminants that were detected in Site SPSA-1c are shown in Figure SPSA-1c-1. Table SPSA-1c-1 summarizes the maximum concentrations of contaminants measured in soil above indicator levels for the ICP metals, arsenic, and mercury and CRLs for organic contaminants from the Phase I and Phase II investigations. The boring number and depth where the maximum value was observed are shown. Methylene chloride, shown in table SPSA-1c-1 is excluded from consideration in the exposure analysis for this site because it was considered a laboratory contaminant in the samples analyzed. No data were included for ICP metals, arsenic, and mercury in Horizon 2 because direct soil exposure below 10 ft is assumed to be negligible (see Volume VI-A). Table SPSA-1c-2 summarizes the maximum concentrations detected in groundwater together with the well number, location, sampling interval, and depth to groundwater.

2.3.3 Site Exposure Summary

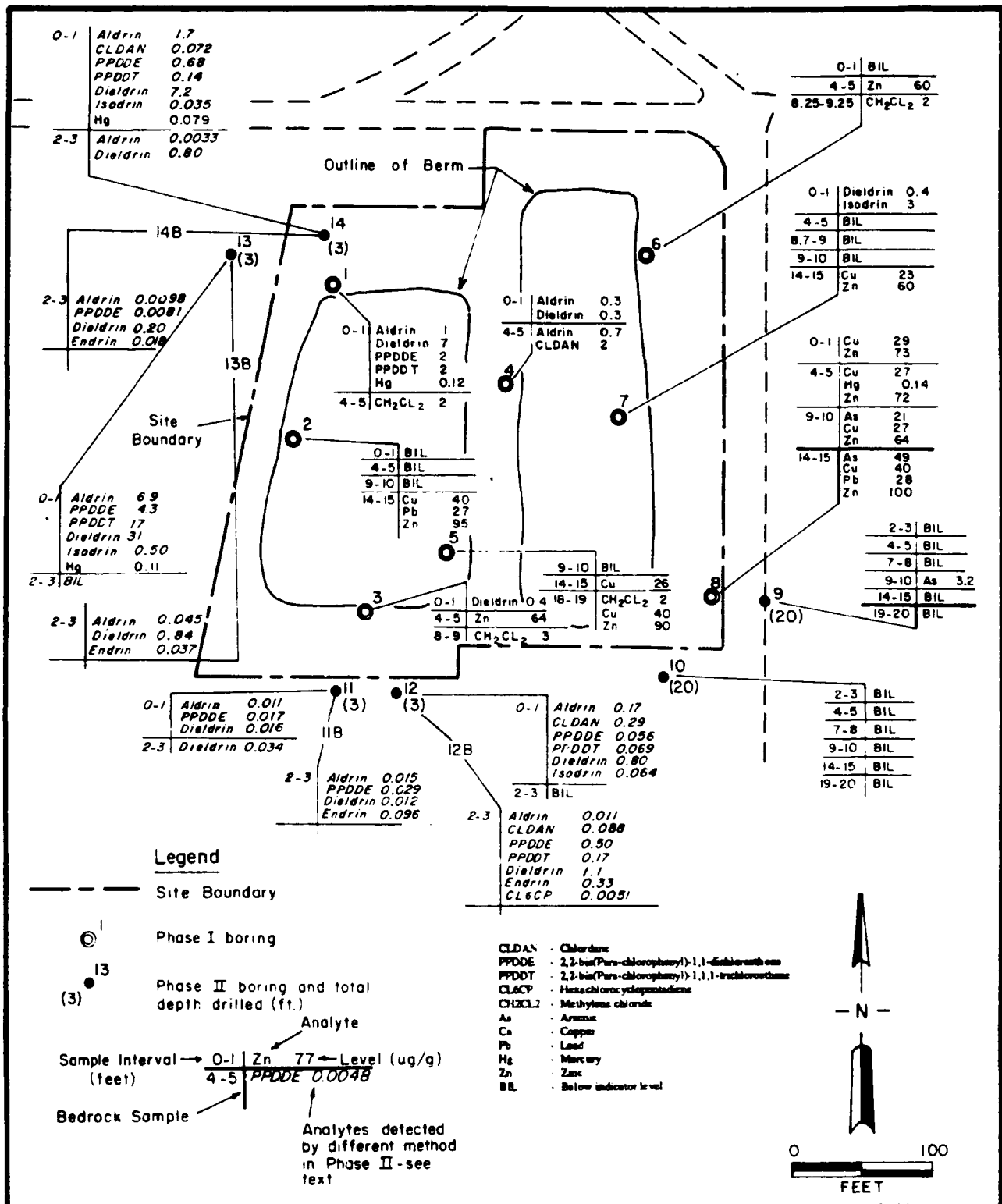
Tables SPSA-1c-3 through SPSA-1c-7 present Draft PPLVs and EIs for each site contaminant. The COCs are summarized below for each exposed population and with the critical exposure pathway identified. The depth to groundwater below Site SPSA-1c is less than 10 ft, therefore, the enclosed space vapor inhalation exposure pathway is not included in the calculation of the cumulative quantities.

Contaminants of Concern	Regulated Visitor	Casual Visitor	Recreational Visitor	Commercial Worker	Industrial Worker
Aldrin	Direct	Direct	Direct	Direct	Direct
Chlordane	Direct	Direct	Direct	--	Direct
PPDDT	Direct	Direct	Direct	Direct	Direct
Dieldrin	Direct	Direct	Direct	Direct	Direct
Arsenic	Direct	Direct	Direct	Direct	Direct
PPDDE	--	--	Direct	--	Direct

Note: Direct exposure pathways for soils include soil ingestion, suspended particulate inhalation, and dermal contact.

The results of the soil exposure summary indicate that exposure to contamination from the direct pathways are the primary contributors to the exceedance of the cumulative PPLVs. Site SPSA-1c is designated as a Priority 1 site, based on the most sensitive exposed population PPLV (i.e., the industrial worker).

No groundwater contaminants result in an unacceptable exposure due to vapor inhalation as indicated by VEI values less than 1.



Prepared for:

Program Manager's Office for
Rocky Mountain Arsenal Cleanup
Aberdeen Proving Ground, Maryland

FIGURE SPSA-1c-1

**Phase I and Phase II Analytes Detected
Within or Above Indicator Levels**

Rocky Mountain Arsenal

Prepared by: Ebasco Services Incorporated

TABLE SPSA-1c-1
SOIL CONTAMINANT CONCENTRATIONS
FOR SITE SPSA-1c

Contaminant	Horizon 1			Horizon 2		
	Max. (ug/g)	Depth (ft)	Boring Number	Max. (ug/g)	Depth (ft)	Boring Number
Aldrin	6.9	0-1	13	6.9	0-1	13
Chlordane	2	4-5	4	2	4-5	4
PPDDE ^{1/}	4.3	0-1	13	4.3	0-1	13
PPDDT ^{2/}	17	0-1	13	17	0-1	13
Dieldrin	31	0-1	13	31	0-1	13
Endrin	0.33	2-3	12B	0.33	2-3	12B
Hexachlorocyclopentadiene	0.0051	2-3	12B	0.0051	2-3	12B
Isodrin	3	0-1	7	3	0-1	7
Methylene chloride ^{3/}	3	8-9	3	3	8-9	3
Arsenic	21	9-10	8	--	--	--
Mercury	0.14	4-5	8	--	--	--

1/ PPDDE 2,2-bis(Para-chlorophenyl)-1,1-dichloroethene
2/ PPDDT 2,2-bis(Para-chlorophenyl)-1,1-trichloroethane
3/ Suspected laboratory contaminant.

SPSA South Plants Study Area
Max. Maximum
ug/g microgram per gram
ft foot/feet

TABLE SPSA-1c-2

GROUNDWATER CONTAMINANT CONCENTRATIONS (UG/L)
FOR SITE SPSA-1c

AVERAGE SITE DEPTH TO GROUNDWATER: 9 Feet

CHEMICAL	CONCENTRATION MAXIMUM	LOCATION (WELL NUMBER)	SAMPLE DATE
BICYCLOHEPTADIENE	17000	01519	03/15/88
BENZENE	5700	01519	03/15/88
CHLOROFORM	10000	01519	03/15/88
CHLOROPHENYLMETHYL SULFIDE	9.8	01519	03/15/88
CHLOROPHENYLMETHYL SULFONE	200	01519	03/15/88
DIBROMOCHLOROPROPANE	280	01519	03/15/88
DICYCLOPENTADIENE	11	01519	03/15/88
TOLUENE	8200	01519	03/15/88

EACH VALUE PRESENTED IS THE MAXIMUM CONCENTRATION FOR THE LISTED ANALYTE
FOR THE PERIOD March 17, 1987 TO February 28, 1989.
DATA SOURCE: DP ASSOCIATES, RMA Database, July 19, 1990

SPSA-1c-3
EXPOSURE EVALUATIONS FOR REGULATED VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI OPM
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	
ALDRIN	1.5E+00	1.7E+05	1.5E+00	4.6E+00*	4.0E-05	4.6E+00*	0.0E+00
BENZENE	8.6E+02	0.0E+00	8.6E+02	0.0E+00	0.0E+00	0.0E+00	1.9E-02
BICYCLOHEPTADIENE	3.2E+05	0.0E+00	3.2E+05	0.0E+00	0.0E+00	0.0E+00	4.6E-04
CHLORDANE	2.0E+01	1.8E+07	2.0E+01	1.0E-01*	1.1E-07	1.0E-01*	0.0E+00
CHLOROFORM	4.0E+03	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	5.2E-03
CHLOROPHENYLMETHYL SULFIDE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	1.1E-08
CHLOROPHENYLMETHYL SULFONE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	2.8E-09
PPDDE	7.4E+01	1.0E+07	7.4E+01	5.8E-02	4.2E-07	5.8E-02	0.0E+00
PPDDT	7.4E+01	1.0E+06	7.4E+01	2.3E-01*	7.8E-07a	2.3E-01*	0.0E+00
DIBROMOCHLOROPROPANE	1.8E+01	0.0E+00	1.8E+01	0.0E+00	0.0E+00	0.0E+00	1.9E-03
DICYCLOPENTADIENE	5.4E+04	0.0E+00	5.4E+04	0.0E+00	0.0E+00	0.0E+00	1.2E-04
DIELDRIN	1.6E+00	1.0E+06	1.6E+00	2.0E+01*	4.0E-04a	2.0E+01*	0.0E+00
ENDRIN	2.5E+03	8.6E+08	2.5E+03	1.3E-04	3.9E-10	1.3E-04	0.0E+00
HEXACHLOROCYCLOPENTADIENE	1.7E+04	3.7E+03	3.0E+03	3.1E-07	1.4E-06	1.7E-06	0.0E+00
ISODRIN	5.8E+02	1.2E+07	5.8E+02	5.2E-03	2.4E-07	5.2E-03	0.0E+00
TOLUENE	2.5E+06	0.0E+00	2.5E+06	0.0E+00	0.0E+00	0.0E+00	4.1E-06
ARSENIC	2.2E+01	0.0E+00	2.2E+01	9.7E-01*	0.0E+00	9.7E-01*	0.0E+00
MERCURY	3.3E+03	0.0E+00	3.3E+03	4.2E-05	0.0E+00	4.2E-05	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPPLV for this contaminant is considered to be equal to pure compound. The SPPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-1c-4
EXPOSURE EVALUATIONS FOR CASUAL VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI EI	EI EI	EI EI	OPN
ALDRIN	1.5E+00	1.7E+05	1.5E+00	4.6E+00*	4.0E-05	4.6E+00*	0.0E+00
BENZENE	8.6E+02	0.0E+00	8.6E+02	0.0E+00	0.0E+00	0.0E+00	1.9E-02
BICYCLOHEPTADIENE	3.2E+05	0.0E+00	3.2E+05	0.0E+00	0.0E+00	0.0E+00	4.6E-04
CHLORDANE	2.0E+01	1.8E+07	2.0E+01	1.0E-01*	1.1E-07	1.0E-01*	0.0E+00
CHLOROFORM	4.0E+03	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	5.2E-03
CHLOROPHENYLMETHYL SULFIDE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	1.1E-08
CHLOROPHENYLMETHYL SULFONE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	2.8E-09
PPDDE	7.4E+01	1.0E+07	7.4E+01	5.8E-02	4.2E-07	5.8E-02	0.0E+00
PPDOT	7.4E+01	1.0E+06	7.4E+01	2.3E-01*	7.8E-07a	2.3E-01*	0.0E+00
DIBROMOCHLOROPROPANE	1.8E+01	0.0E+00	1.8E+01	0.0E+00	0.0E+00	0.0E+00	1.9E-03
DICYCLOPENTADIENE	5.4E+04	0.0E+00	5.4E+04	0.0E+00	0.0E+00	0.0E+00	1.2E-04
DIELDRIN	1.6E+00	1.0E+06	1.6E+00	2.0E+01*	4.0E-04a	2.0E+01*	0.0E+00
ENDRIN	2.5E+03	8.6E+08	2.5E+03	1.3E-04	3.9E-10	1.3E-04	0.0E+00
HEXACHLOROCYCLOPENTADIENE	1.7E+04	3.7E+03	3.0E+03	3.1E-07	1.4E-06	1.7E-06	0.0E+00
ISODRIN	5.8E+02	1.2E+07	5.8E+02	5.2E-03	2.4E-07	5.2E-03	0.0E+00
TOLUENE	2.5E+06	0.0E+00	2.5E+06	0.0E+00	0.0E+00	0.0E+00	4.1E-06
ARSENIC	2.2E+01	0.0E+00	2.2E+01	9.7E-01*	0.0E+00	9.7E-01*	0.0E+00
MERCURY	3.3E+03	0.0E+00	3.3E+03	4.2E-05	0.0E+00	4.2E-05	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPPLV for this contaminant is considered to be equal to pure compound. The SPPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-1c-5
EXPOSURE EVALUATIONS FOR RECREATIONAL VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI OPN
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	
ALDRIN	2.1E-01	1.1E+04	2.1E-01	3.3E+01*	6.1E-04	3.3E+01*	0.0E+00
BENZENE	1.2E+02	0.0E+00	1.2E+02	0.0E+00	0.0E+00	0.0E+00	2.8E-01
BICYCLOHEPTADIENE	1.4E+05	0.0E+00	1.4E+05	0.0E+00	0.0E+00	0.0E+00	3.0E-03
CHLORDANE	2.7E+00	1.2E+06	2.7E+00	7.4E-01*	1.6E-06	7.4E-01*	0.0E+00
CHLOROFORM	5.6E+02	0.0E+00	5.6E+02	0.0E+00	0.0E+00	0.0E+00	7.8E-02
CHLOROPHENYLMETHYL SULFIDE	7.0E+04	0.0E+00	7.0E+04	0.0E+00	0.0E+00	0.0E+00	7.3E-08
CHLOROPHENYLMETHYL SULFONE	7.0E+04	0.0E+00	7.0E+04	0.0E+00	0.0E+00	0.0E+00	1.8E-08
PPDDE	1.0E+01	6.9E+05	1.0E+01	4.2E-01*	6.3E-06	4.2E-01*	0.0E+00
PPDDT	1.0E+01	1.0E+06	1.0E+01	1.7E+00*	1.2E-05a	1.7E+00*	0.0E+00
DIBROMOCHLOROPROPANE	2.5E+00	0.0E+00	2.5E+00	0.0E+00	0.0E+00	0.0E+00	2.9E-02
DICYCLOPENTADIENE	1.8E+04	0.0E+00	1.8E+04	0.0E+00	0.0E+00	0.0E+00	7.5E-04
DIELDRIN	2.2E-01	1.0E+06	2.2E-01	1.4E+02*	6.0E-03a	1.4E+02*	0.0E+00
ENDRIN	1.1E+03	1.3E+08	1.1E+03	3.1E-04	2.5E-09	3.1E-04	0.0E+00
HEXACHLOROCYCLOPENTADIENE	5.7E+03	1.3E+03	1.1E+03	9.0E-07	3.9E-06	4.8E-06	0.0E+00
ISODRIN	2.5E+02	1.9E+06	2.5E+02	1.2E-02	1.6E-06	1.2E-02	0.0E+00
TOLUENE	1.1E+06	0.0E+00	1.1E+06	0.0E+00	0.0E+00	0.0E+00	2.7E-05
ARSENIC	3.9E+00	0.0E+00	3.9E+00	5.3E+00*	0.0E+00	5.3E+00*	0.0E+00
MERCURY	2.0E+03	0.0E+00	2.0E+03	7.1E-05	0.0E+00	7.1E-05	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPPLV for this contaminant is considered to be equal to pure compound. The SPPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-1c-6
EXPOSURE EVALUATIONS FOR COMMERCIAL WORKERS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI ENC
ALDRIN	1.9E+00	0.0E+00	1.9E+00	3.6E+00*	0.0E+00	3.6E+00*	NA
BENZENE	1.1E+03	0.0E+00	1.1E+03	0.0E+00	0.0E+00	0.0E+00	NA
BICYCLOHEPTADIENE	1.8E+05	0.0E+00	1.8E+05	0.0E+00	0.0E+00	0.0E+00	NA
CHLORDANE	2.5E+01	0.0E+00	2.5E+01	8.1E-02	0.0E+00	8.1E-02	NA
CHLOROFORM	5.1E+03	0.0E+00	5.1E+03	0.0E+00	0.0E+00	0.0E+00	NA
CHLOROPHENYLMETHYL SULFIDE	9.1E+04	0.0E+00	9.1E+04	0.0E+00	0.0E+00	0.0E+00	NA
CHLOROPHENYLMETHYL SULFONE	9.1E+04	0.0E+00	9.1E+04	0.0E+00	0.0E+00	0.0E+00	NA
PPDDE	9.3E+01	0.0E+00	9.3E+01	4.6E-02	0.0E+00	4.6E-02	NA
PPDDT	9.3E+01	0.0E+00	9.3E+01	1.8E-01*	0.0E+00	1.8E-01*	NA
DIBROMOCHLOROPROPANE	2.3E+01	0.0E+00	2.3E+01	0.0E+00	0.0E+00	0.0E+00	NA
DICYCLOPENTADIENE	1.7E+04	0.0E+00	1.7E+04	0.0E+00	0.0E+00	0.0E+00	NA
DIELDRIN	2.0E+00	0.0E+00	2.0E+00	1.6E+01*	0.0E+00	1.6E+01*	NA
ENDRIN	1.4E+03	0.0E+00	1.4E+03	2.4E-04	0.0E+00	2.4E-04	NA
HEXACHLOROCYCLOPENTADIENE	5.5E+03	0.0E+00	5.5E+03	9.4E-07	0.0E+00	9.4E-07	NA
ISODRIN	3.2E+02	0.0E+00	3.2E+02	9.4E-03	0.0E+00	9.4E-03	NA
TOLUENE	1.4E+06	0.0E+00	1.4E+06	0.0E+00	0.0E+00	0.0E+00	NA
ARSENIC	2.0E+01	0.0E+00	2.0E+01	1.1E+00*	0.0E+00	1.1E+00*	NA
MERCURY	1.4E+03	0.0E+00	1.4E+03	1.0E-04	0.0E+00	1.0E-04	NA

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-1c-7
EXPOSURE EVALUATIONS FOR INDUSTRIAL WORKERS

CONTAMINANT	DIRECT			INDIRECT			CUMULATIVE			VEI	
	PPLV (mg/kg)	OSVI (mg/kg)	ESVI (mg/kg)	PPLV (mg/kg)	EI	EI	EI	OPN	ENC		
ALDRIN	1.2E-01	2.3E+04	0.0E+00	1.2E-01	5.9E+01*	3.0E-04	5.9E+01*	0.0E+00	NA		
BENZENE	6.7E+01	0.0E+00	0.0E+00	6.7E+01	0.0E+00	0.0E+00	0.0E+00	1.4E-01	NA		
BICYCLOHEPTADIENE	3.3E+04	0.0E+00	0.0E+00	3.3E+04	0.0E+00	0.0E+00	0.0E+00	3.4E-03	NA		
CHLORDANE	1.5E+00	2.5E+06	0.0E+00	1.5E+00	1.3E+00*	8.1E-07	1.3E+00*	0.0E+00	NA		
CHLOROFORM	3.1E+02	0.0E+00	0.0E+00	3.1E+02	0.0E+00	0.0E+00	0.0E+00	3.9E-02	NA		
CHLOROPHENYLMETHYL SULFIDE	1.7E+04	0.0E+00	0.0E+00	1.7E+04	0.0E+00	0.0E+00	0.0E+00	8.5E-08	NA		
CHLOROPHENYLMETHYL SULFONE	1.7E+04	0.0E+00	0.0E+00	1.7E+04	0.0E+00	0.0E+00	0.0E+00	2.1E-08	NA		
PPDE	5.7E+00	1.4E+06	0.0E+00	5.7E+00	7.5E-01*	3.1E-06	7.5E-01*	0.0E+00	NA		
PPDT	5.7E+00	1.0E+06	1.0E+06	5.7E+00	3.0E+00*	5.8E-06a	3.0E+00*	0.0E+00	NA		
DIBROMOCHLOROPROPANE	1.4E+00	0.0E+00	0.0E+00	1.4E+00	0.0E+00	0.0E+00	0.0E+00	1.4E-02	NA		
DICYCLOPENTADIENE	1.2E+03	0.0E+00	0.0E+00	1.2E+03	0.0E+00	0.0E+00	0.0E+00	8.7E-04	NA		
DIELDRIN	1.2E-01	1.0E+08	1.0E+06	1.2E-01	2.5E+02*	3.0E-03a	2.5E+02*	0.0E+00	NA		
ENDRIN	2.5E+02	1.1E+08	0.0E+00	2.5E+02	1.3E-03	2.9E-09	1.3E-03	0.0E+00	NA		
HEXACHLOROCYCLOPENTADIENE	3.8E+02	4.9E+02	0.0E+00	2.2E+02	1.3E-05	1.0E-05	2.4E-05	0.0E+00	NA		
ISODRIN	5.9E+01	1.7E+06	0.0E+00	5.9E+01	5.1E-02	1.8E-06	5.1E-02	0.0E+00	NA		
TOLUENE	2.6E+05	0.0E+00	0.0E+00	2.6E+05	0.0E+00	0.0E+00	0.0E+00	3.1E-05	NA		
ARSENIC	1.6E+00	0.0E+00	0.0E+00	1.6E+00	1.3E+01*	0.0E+00	1.3E+01*	0.0E+00	NA		
MERCURY	4.6E+02	0.0E+00	0.0E+00	4.6E+02	3.0E-04	0.0E+00	3.0E-04	0.0E+00	NA		

This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPPLV for this contaminant is considered to be equal to pure compound. The SPPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

2.4 SITE SPSA-1d: DRAINAGE DITCHES (formerly Site 1-1: Drainage Ditches; EBASCO, 1987b/RIC 87196R01 and EBASCO, 1988e/RIC 87196R01A)

2.4.1 Site-Specific Considerations

Figure SPSA-1d-1 and Tables SPSA-1d-1 and SPSA-1d-2 depict the target contaminants for Site SPSA-1d. Site SPSA-1d lies within both the SPSA and the Southern Study Area. It was therefore split, and the data from Borings 2, 3, and 10 were included in the analysis. Although evaluated as a single site in this exposure assessment, the South Plants SAR discusses this site in SPSA-1d, SPSA-2d, SPSA-5a, and SPSA-9a. According to site history, many of the chemicals from the RMA target contaminant list were suspected to be present in Site SPSA-1d (EBASCO, 1987b/RIC 87196R01).

2.4.2 Spatial Distribution of Measured Contaminant Concentrations

The locations and concentrations of the target contaminants that were detected in Site SPSA-1d are shown in Figure SPSA-1d-1. Table SPSA-1d-1 summarizes the maximum concentrations of contaminants measured in soil above indicator levels for the ICP metals, arsenic, and mercury and CRLs for organic contaminants from the Phase I and Phase II investigations. The boring number and depth where the maximum value was observed are shown. No data were included for ICP metals, arsenic, and mercury in Horizon 2 because direct soil exposure below 10 ft is assumed to be negligible (see Volume VI-A). Table SPSA-1d-2 summarizes the maximum concentrations detected in groundwater together with the well number, location, sampling interval, and depth to groundwater.

2.4.3 Site Exposure Summary

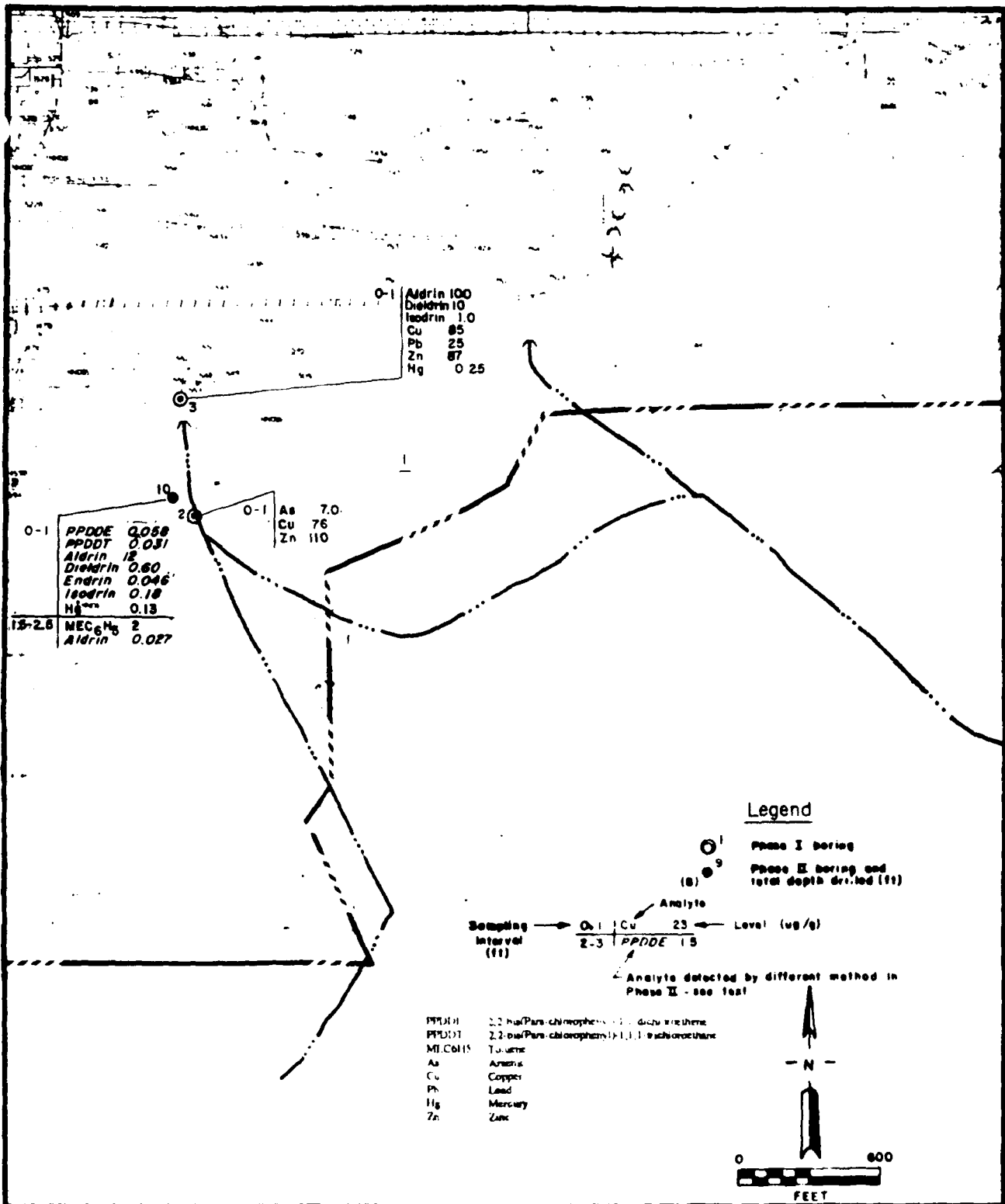
Tables SPSA-1d-3 through SPSA-1d-7 present Draft PPLVs and EIs for each site contaminant. The COCs are summarized below for each exposed population and with the critical exposure pathway identified. The depth to groundwater below Site SPSA-1d is less than 10 ft, therefore, the enclosed space vapor inhalation exposure pathway is not included in the calculation of the cumulative quantities.

Contaminants of Concern	Regulated Visitor	Casual Visitor	Recreational Visitor	Commercial Worker	Industrial Worker
Aldrin	Direct	Direct	Direct	Direct	Direct
Dieldrin	Direct	Direct	Direct	Direct	Direct

Note: Direct exposure pathways for soils include soil ingestion, suspended particulate inhalation, and dermal contact.

The results of the soil exposure summary indicate that exposure to contamination from the direct pathways are the primary contributors to the exceedance of the cumulative PPLVs. Site SPSA-1d is designated as a Priority 1 site, based on the most sensitive exposed population PPLV (i.e., the industrial worker).

No groundwater contaminants result in an unacceptable exposure due to vapor inhalation as indicated by VEI values less than 1.



Prepared for:

Program Manager's Office for
Rocky Mountain Arsenal Cleanup
Aberdeen Proving Ground, Maryland

FIGURE SPSA-1d-1

Phase I and Phase II Analytes Detected
Within or Above Indicator Levels

Rocky Mountain Arsenal

Prepared by: Ebasco Services - Incorporated

TABLE SPSA-1d-1
SOIL CONTAMINANT CONCENTRATIONS
FOR SITE SPSA-1d

Contaminant	Horizon 1			Horizon 2		
	Max. (ug/g)	Depth (ft)	Boring Number	Max. (ug/g)	Depth (ft)	Boring Number
Aldrin	100	0-1	3	100	0-1	3
Dieldrin	10	0-1	3	10	0-1	3
PPDDE ^{1/}	0.058	0-1	10	0.058	0-1	10
PPDDT ^{2/}	0.031	0-1	10	0.031	0-1	10
Endrin	0.046	0-1	10	0.046	0-1	10
Isodrin	1.0	0-1	3	1.0	0-1	3
Toluene	2	1.5-2.5	10	2	1.5-2.5	10
Copper	85	0-1	3	--	--	--
Mercury	0.25	0-1	3	--	--	--
Zinc	110	0-1	2	--	--	--

1/ PPDDE 2,2-bis(Para-chlorophenyl)-1,1-dichloroethene
2/ PPDDT 2,2-bis(Para-chlorophenyl)-1,1,1-trichloroethane

SPSA South Plants Study Area
Max. Maximum
ug/g microgram per gram
ft foot/feet

TABLE SPSA-1d-2
GROUNDWATER CONTAMINANT CONCENTRATIONS (UG/L)
FOR SITE SPSA-1d

AVERAGE SITE DEPTH TO GROUNDWATER: 9 Feet

CHEMICAL	CONCENTRATION MAXIMUM	LOCATION (WELL NUMBER)	SAMPLE DATE
BICYCLOHEPTADIENE	17000	01519	03/15/88
BENZENE	5700	01519	03/15/88
CHLOROFORM	10000	01519	03/15/88
CHLOROPHENYLMETHYL SULFIDE	9.8	01519	03/15/88
CHLOROPHENYLMETHYL SULFONE	200	01519	03/15/88
DIBROMOCHLOROPROPANE	280	01519	03/15/88
DICYCLOPENTADIENE	11	01519	03/15/88
TOLUENE	8200	01519	03/15/88

! EACH VALUE PRESENTED IS THE MAXIMUM CONCENTRATION FOR THE LISTED ANALYTE
FOR THE PERIOD March 17, 1987 TO February 28, 1989.
DATA SOURCE: DP ASSOCIATES, RMA Database, July 19, 1990

SPSA-1d-3
EXPOSURE EVALUATIONS FOR REGULATED VISITORS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI OPN
ALDRIN	1.5E+00	3.7E+06	1.5E+00	6.7E+01*	2.7E-05	6.7E+01*	0.0E+00
BENZENE	8.6E+02	0.0E+00	8.6E+02	0.0E+00	0.0E+00	0.0E+00	8.6E-04
BICYCLOHEPTADIENE	3.2E+05	0.0E+00	3.2E+05	0.0E+00	0.0E+00	0.0E+00	2.1E-05
CHLOROFORM	4.0E+03	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	2.4E-04
CHLOROPHENYLMETHYL SULFIDE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	5.2E-10
CHLOROPHENYLMETHYL SULFONE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	1.3E-10
PPDE	7.4E+01	2.3E+08	7.4E+01	7.9E-04	2.6E-10	7.9E-04	0.0E+00
PPDT	7.4E+01	4.8E+08	7.4E+01	4.2E-04	6.5E-11	4.2E-04	0.0E+00
DIBROMOCHLOROPROPANE	1.8E+01	0.0E+00	1.8E+01	0.0E+00	0.0E+00	0.0E+00	8.7E-05
DICYCLOPENTADIENE	5.4E+04	0.0E+00	5.4E+04	0.0E+00	0.0E+00	0.0E+00	5.3E-06
DIELDRIN	1.6E+00	1.0E+06	1.6E+00	6.4E+00*	5.8E-06a	6.4E+00*	0.0E+00
ENDRIN	2.5E+03	1.4E+09	2.5E+03	1.9E-05	3.3E-11	1.9E-05	0.0E+00
ISODRIN	5.8E+02	2.7E+08	5.8E+02	1.7E-03	3.7E-09	1.7E-03	0.0E+00
TOLUENE	2.5E+06	2.0E+09	2.5E+06	8.0E-07	1.0E-09	8.1E-07	1.9E-07
COPPER	4.2E+05	0.0E+00	4.2E+05	2.0E-04	0.0E+00	2.0E-04	0.0E+00
MERCURY	3.3E+03	0.0E+00	3.3E+03	7.6E-05	0.0E+00	7.6E-05	0.0E+00
ZINC	2.0E+06	0.0E+00	2.0E+06	5.5E-05	0.0E+00	5.5E-05	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPPLV for this contaminant is considered to be equal to pure compound. The SPPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-1d-4
EXPOSURE EVALUATIONS FOR CASUAL VISITORS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI OPN
ALDRIN	1.5E+00	3.7E+06	1.5E+00	6.7E+01*	2.7E-05	6.7E+01*	0.0E+00
BENZENE	8.6E+02	0.0E+00	8.6E+02	0.0E+00	0.0E+00	0.0E+00	8.6E-04
BICYCLOHEPTADIENE	3.2E+05	0.0E+00	3.2E+05	0.0E+00	0.0E+00	0.0E+00	2.1E-05
CHLOROFORM	4.0E+03	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	2.4E-04
CHLOROPHENYLMETHYL SULFIDE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	5.2E-10
CHLOROPHENYLMETHYL SULFONE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	1.3E-10
PPDDE	7.4E+01	2.3E+08	7.4E+01	7.9E-04	2.6E-10	7.9E-04	0.0E+00
PPDDT	7.4E+01	4.8E+08	7.4E+01	4.2E-04	6.5E-11	4.2E-04	0.0E+00
DIBROMOCHLOROPROPANE	1.8E+01	0.0E+00	1.8E+01	0.0E+00	0.0E+00	0.0E+00	8.7E-05
DICYCLOPENTADIENE	5.4E+04	0.0E+00	5.4E+04	0.0E+00	0.0E+00	0.0E+00	5.3E-06
DIELDRIN	1.6E+00	1.0E+06	1.6E+00	6.4E+00*	5.8E-06a	6.4E+00*	0.0E+00
ENDRIN	2.5E+03	1.4E+09	2.5E+03	1.9E-05	3.3E-11	1.9E-05	0.0E+00
ISODRIN	5.8E+02	2.7E+08	5.8E+02	1.7E-03	3.7E-09	1.7E-03	0.0E+00
TOLUENE	2.5E+06	2.0E+09	2.5E+06	8.0E-07	1.0E-09	8.1E-07	1.9E-07
COPPER	4.2E+05	0.0E+00	4.2E+05	2.0E-04	0.0E+00	2.0E-04	0.0E+00
MERCURY	3.3E+03	0.0E+00	3.3E+03	7.6E-05	0.0E+00	7.6E-05	0.0E+00
ZINC	2.0E+06	0.0E+00	2.0E+06	5.5E-05	0.0E+00	5.5E-05	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPPLV for this contaminant is considered to be equal to pure compound. The SPPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-1d-5
EXPOSURE EVALUATIONS FOR RECREATIONAL VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI OPN
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	
ALDRIN	2.1E-01	2.5E+05	2.1E-01	4.8E+02*	4.0E-04	4.8E+02*	0.0E+00
BENZENE	1.2E+02	0.0E+00	1.2E+02	0.0E+00	0.0E+00	0.0E+00	1.3E-02
BICYCLOHEPTADIENE	1.4E+05	0.0E+00	1.4E+05	0.0E+00	0.0E+00	0.0E+00	1.4E-04
CHLOROFORM	5.6E+02	0.0E+00	5.6E+02	0.0E+00	0.0E+00	0.0E+00	3.6E-03
CHLOROPHENYLMETHYL SULFIDE	7.0E+04	0.0E+00	7.0E+04	0.0E+00	0.0E+00	0.0E+00	3.3E-09
CHLOROPHENYLMETHYL SULFONE	7.0E+04	0.0E+00	7.0E+04	0.0E+00	0.0E+00	0.0E+00	8.2E-10
PPDDF	1.0E+01	1.5E+07	1.0E+01	5.7E-03	3.9E-09	5.7E-03	0.0E+00
PPDDT	1.0E+01	3.2E+07	1.0E+01	3.0E-03	9.8E-10	3.0E-03	0.0E+00
DIBROMOCHLOROPROPANE	2.5E+00	0.0E+00	2.5E+00	0.0E+00	0.0E+00	0.0E+00	1.3E-03
DICYCLOPENTADIENE	1.8E+04	0.0E+00	1.8E+04	0.0E+00	0.0E+00	0.0E+00	3.4E-05
DIELDRIIN	2.2E-01	1.0E+06	2.2E-01	4.6E+01*	8.8E-05 ^a	4.6E+01*	0.0E+00
ENDRIN	1.1E+03	2.1E+08	1.1E+03	4.4E-05	2.1E-10	4.4E-05	0.0E+00
ISODRIN	2.5E+02	4.2E+07	2.5E+02	4.1E-03	2.4E-08	4.1E-03	0.0E+00
TOLUENE	1.1E+06	7.0E+08	1.1E+06	1.9E-06	2.8E-09	1.9E-06	1.2E-06
COPPER	2.5E+05	0.0E+00	2.5E+05	3.4E-04	0.0E+00	3.4E-04	0.0E+00
MERCURY	2.0E+03	0.0E+00	2.0E+03	1.3E-04	0.0E+00	1.3E-04	0.0E+00
ZINC	1.1E+06	0.0E+00	1.1E+06	1.0E-04	0.0E+00	1.0E-04	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPPLV for this contaminant is considered to be equal to pure compound. The SPPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-1d-6
EXPOSURE EVALUATIONS FOR COMMERCIAL WORKERS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI ENC
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	
ALDRIN	1.9E+00	0.0E+00	1.9E+00	5.3E+01*	0.0E+00	5.3E+01*	NA
BENZENE	1.1E+03	0.0E+00	1.1E+03	0.0E+00	0.0E+00	0.0E+00	NA
BICYCLOHEPTADIENE	1.8E+05	0.0E+00	1.8E+05	0.0E+00	0.0E+00	0.0E+00	NA
CHLOROFORM	5.1E+03	0.0E+00	5.1E+03	0.0E+00	0.0E+00	0.0E+00	NA
CHLOROPHENYLMETHYL SULFIDE	9.1E+04	0.0E+00	9.1E+04	0.0E+00	0.0E+00	0.0E+00	NA
CHLOROPHENYLMETHYL SULFONE	9.1E+04	0.0E+00	9.1E+04	0.0E+00	0.0E+00	0.0E+00	NA
PPDDE	9.3E+01	0.0E+00	9.3E+01	6.2E-04	0.0E+00	6.2E-04	NA
PPDDT	9.3E+01	0.0E+00	9.3E+01	3.3E-04	0.0E+00	3.3E-04	NA
DIBROMOCHLOROPROPANE	2.3E+01	0.0E+00	2.3E+01	0.0E+00	0.0E+00	0.0E+00	NA
DICYCLOPENTADIENE	1.7E+04	0.0E+00	1.7E+04	0.0E+00	0.0E+00	0.0E+00	NA
DIELDRIN	2.0E+00	0.0E+00	2.0E+00	5.0E+00*	0.0E+00	5.0E+00*	NA
ENDRIN	1.4E+03	0.0E+00	1.4E+03	3.3E-05	0.0E+00	3.3E-05	NA
ISODRIN	3.2E+02	0.0E+00	3.2E+02	3.1E-03	0.0E+00	3.1E-03	NA
TOLUENE	1.4E+06	0.0E+00	1.4E+06	1.4E-06	0.0E+00	1.4E-06	NA
COPPER	1.8E+05	0.0E+00	1.8E+05	4.8E-04	0.0E+00	4.8E-04	NA
MERCURY	1.4E+03	0.0E+00	1.4E+03	1.8E-04	0.0E+00	1.8E-04	NA
ZINC	7.8E+05	0.0E+00	7.8E+05	1.4E-04	0.0E+00	1.4E-04	NA

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-1d-7
EXPOSURE EVALUATIONS FOR INDUSTRIAL WORKERS

CONTAMINANT	DIRECT	INDIRECT		CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI	
	PPLV (mg/kg)	OSVI (mg/kg)	ESVI (mg/kg)	PPLV (mg/kg)	EI EI	EI EI	EI EI	OPN	ENC
ALDRIN	1.2E-01	5.0E+05	0.0E+00	1.2E-01	8.6E+02*	2.0E-04	8.6E+02*	0.0E+00	NA
BENZENE	6.7E+01	0.0E+00	0.0E+00	6.7E+01	0.0E+00	0.0E+00	0.0E+00	6.4E-03	NA
BICYCLOHEPTADIENE	3.3E+04	0.0E+00	0.0E+00	3.3E+04	0.0E+00	0.0E+00	0.0E+00	1.6E-04	NA
CHLOROFORM	3.1E+02	0.0E+00	0.0E+00	3.1E+02	0.0E+00	0.0E+00	0.0E+00	1.8E-03	NA
CHLOROPHENYLMETHYL SULFIDE	1.7E+04	0.0E+00	0.0E+00	1.7E+04	0.0E+00	0.0E+00	0.0E+00	3.9E-09	NA
CHLOROPHENYLMETHYL SULFONE	1.7E+04	0.0E+00	0.0E+00	1.7E+04	0.0E+00	0.0E+00	0.0E+00	9.5E-10	NA
PPDE	5.7E+00	3.0E+07	0.0E+00	5.7E+00	1.0E-02	1.9E-09	1.0E-02	0.0E+00	NA
PPDDT	5.7E+00	6.4E+07	0.0E+00	5.7E+00	5.4E-03	4.9E-10	5.4E-03	0.0E+00	NA
DIBROMOCHLOROPROPANE	1.4E+00	0.0E+00	0.0E+00	1.4E+00	0.0E+00	0.0E+00	0.0E+00	6.5E-04	NA
DICYCLOPENTADIENE	1.2E+03	0.0E+00	0.0E+00	1.2E+03	0.0E+00	0.0E+00	0.0E+00	4.0E-05	NA
DIELDRIN	1.2E-01	1.0E+06	1.0E+06	1.2E-01	8.2E+01*	4.4E-05a	8.2E+01*	0.0E+00	NA
ENDRIN	2.5E+02	1.8E+08	0.0E+00	2.5E+02	1.8E-04	2.5E-10	1.8E-04	0.0E+00	NA
ISODRIN	5.9E+01	3.6E+07	0.0E+00	5.9E+01	1.7E-02	2.8E-08	1.7E-02	0.0E+00	NA
TOLUENE	2.6E+05	2.6E+08	0.0E+00	2.6E+05	7.7E-06	7.7E-09	7.7E-06	1.4E-06	NA
COPPER	5.7E+04	0.0E+00	0.0E+00	5.7E+04	1.5E-03	0.0E+00	1.5E-03	0.0E+00	NA
MERCURY	4.6E+02	0.0E+00	0.0E+00	4.6E+02	5.4E-04	0.0E+00	5.4E-04	0.0E+00	NA
ZINC	1.4E+05	0.0E+00	0.0E+00	1.4E+05	7.9E-04	0.0E+00	7.9E-04	0.0E+00	NA

This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPPLV for this contaminant is considered to be equal to pure compound. The SPPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

2.5 SITE SPSA-1e: BURIED M-1 PITS (formerly Site 1-13/2-18: South Plants Manufacturing Complex/Shell Chemical Company Spill Sites; EBASCO, 1988y/RIC 88286R07)

2.5.1 Site-Specific Considerations

Figure SPSA-1e-1 and Tables SPSA-1e-1 and SPSA-1e-2 depict the target contaminants for Site SPSA-1e. Borings 1, 4, 5, and J802 were included in this exposure assessment, consistent with the South Plants SAR. The historical search conducted under the contaminant assessment revealed that the M-1 Pits received neutralized waste streams from lewisite production and related activities (EBASCO, 1988y/RIC 88286R07). Some of the chemicals involved in Lewisite production were detected in the soil during the Phase I and Phase II investigations in the immediate vicinity of SPSA-1e. According to site history, no other chemicals from the RMA target contaminant list were suspected to be present in Site SPSA-1e (EBASCO, 1988y/RIC 88286R07).

2.5.2 Spatial Distribution of Measured Contaminant Concentrations

The locations and concentrations of the target contaminants that were detected in Site SPSA-1e are shown in Figure SPSA-1e-1. Table SPSA-1e-1 summarizes the maximum concentrations of contaminants measured in soil above indicator levels for the ICP metals, arsenic, and mercury and CRLs for organic contaminants from the Phase I and Phase II investigations. The boring number and depth where the maximum value was observed are shown. No data were included for ICP metals, arsenic, and mercury because direct soil exposure below 10 ft is assumed to be negligible. Table SPSA-1e-2 summarizes the maximum concentrations detected in groundwater together with the well number, location, sampling interval, and depth to groundwater.

2.5.3 Site Exposure Summary

Tables SPSA-1e-3 through SPSA-1e-7 present Draft PPLVs, EIs, and VEIs for each site contaminant. Since the depth to groundwater below Site SPSA-1e is greater than 10 ft, the enclosed space vapor inhalation SPPPLV is included in the calculation of the cumulative quantity. The COCs are summarized below for each exposed population and with the critical exposure pathway identified.

Contaminants of Concern	Regulated Visitor	Casual Visitor	Recreational Visitor	Commercial Worker	Industrial Worker
Aldrin	Direct	Direct	Direct	Dir/Ind	Dir/Ind
Chlordane	Direct	Direct	Direct	--	Dir/Ind
Dicyclopentadiene	Cumulative	Cumulative	Dir/Ind	Dir/Ind	Dir/Ind
Dieldrin	Direct	Direct	Direct	Dir/Ind	Dir/Ind
Arsenic	Direct	Direct	Direct	Direct	Direct
Cadmium	Direct	Direct	Direct	Direct	Direct
Mercury	Direct	Direct	Direct	Direct	Direct
Bicycloheptadiene	--	--	--	Indirect	Dir/Ind
Isodrin	--	--	--	Indirect	Direct
Hexachlorocyclopentadiene	Direct	Direct	Dir/Ind	Dir/Ind	Dir/Ind

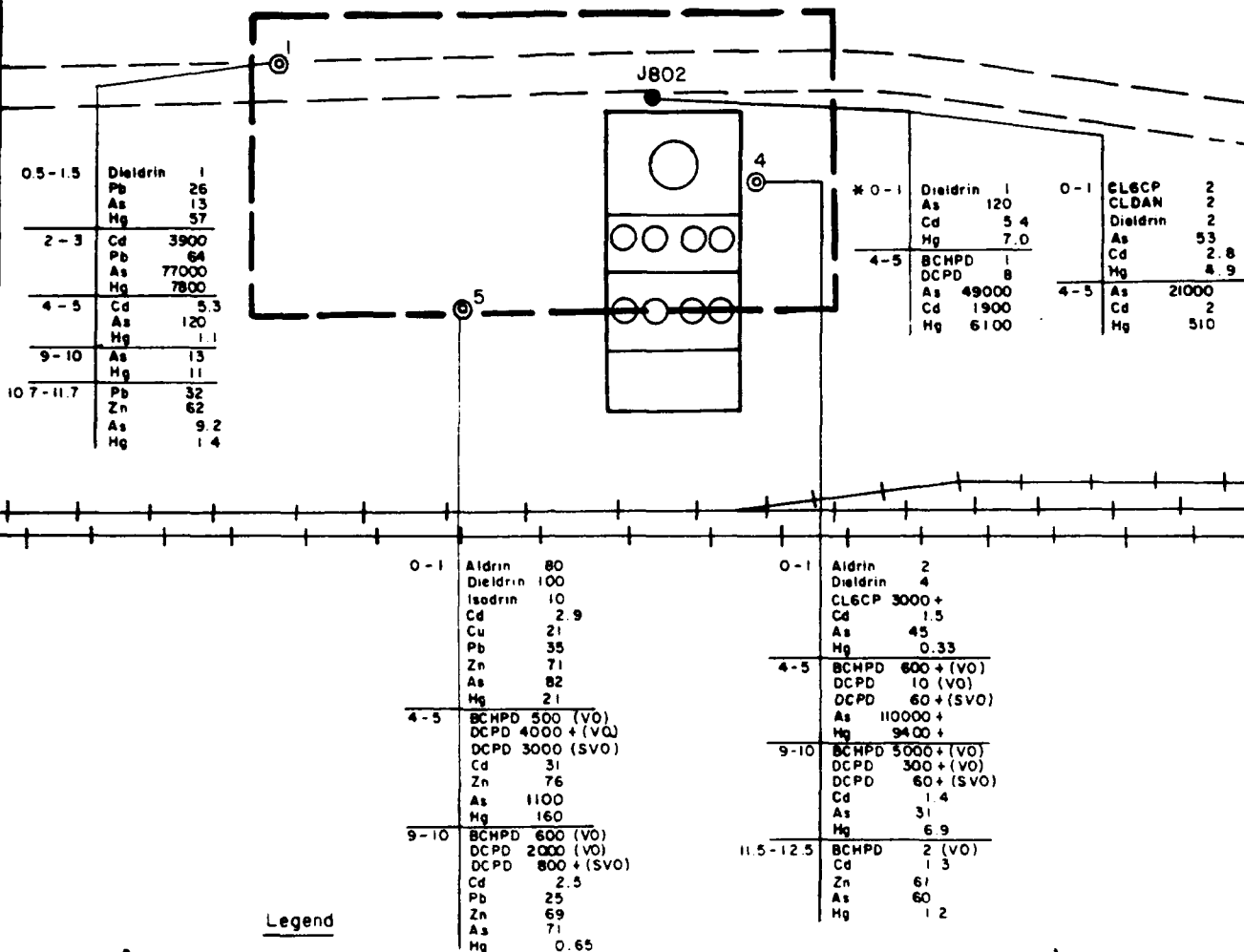
Note: Direct exposure pathways for soils include soil ingestion, suspended particulate inhalation, and dermal contact.
Indirect exposure pathways include open and enclosed space vapor inhalation.

The results of the soil exposure summary indicate that exposure to contamination from the direct and indirect pathways both contribute to the exceedance of the cumulative PPLVs. It should be noted for dicyclopentadiene, the cumulative EI exceeds 0.1 for a regulated visitor and a casual visitor but the direct and indirect EIs do not exceed 0.1. Site SPSA-1e is designated as a Priority 1 site, based on the most sensitive exposed population PPLV (i.e., the industrial worker).

The following groundwater contaminants result in an unacceptable exposure due to vapor inhalation as indicated by a VEI value greater than 1:

- Benzene (enclosed)
- Carbon tetrachloride (enclosed)
- Chlorobenzene (enclosed)
- Chloroform (enclosed)
- Dibromochloropropane (enclosed)
- 1,1-Dichloroethylene (enclosed)
- Methylene chloride (enclosed)
- Tetrachloroethylene (enclosed)
- 1,1,2-Trichloroethane (enclosed)
- Trichloroethylene (enclosed)

DECEMBER SEVENTH AVENUE



Legend

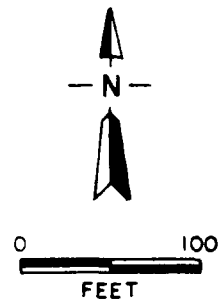
- ⊙⁸ Phase I boring
- ⁹ Phase II boring
- Site Boundary

Sample Interval (feet) → 0-1 | Aldrin 0.001 | ← Level (ug/g)
4-5

*** Results of Redrilling**

- | | |
|-----------------------------------|-----------------------------|
| BCHPD - Bicycloheximide | Pb - Lead |
| CLDAN - Chlorides | Hg - Mercury |
| DCPD - Dicycloheximide | Zn - Zinc |
| CL6CP - Hexachlorocyclopentadiene | VO - Volatile organics |
| As - Arsenic | SVO - Semivolatile organics |
| Cd - Cadmium | |
| Cu - Copper | |

+ Instrument reading value is greater than the upper limit of the Certified Reporting Limit



Prepared for:
Program Manager's Office for
Rocky Mountain Arsenal Cleanup
Aberdeen Proving Ground, Maryland

FIGURE SPSA-1e-1
Phase I and Phase II Analytes Detected
Within or Above Indicator Levels

Rocky Mountain Arsenal
Prepared by: Ebasco Services Incorporated

TABLE SPSA-1e-1
SOIL CONTAMINANT CONCENTRATIONS
FOR SITE SPSA-1e

Contaminant	Horizon 1			Horizon 2		
	Max. (ug/g)	Depth (ft)	Boring Number	Max. (ug/g)	Depth (ft)	Boring Number
Aldrin	80	0-1	5	80	0-1	5
Bicycloheptadiene	5000+ ^{1/}	9-10	4	5000+	9-10	4
Chlordane	2	0-1	J802	2	0-1	J802
Dieldrin	100	0-1	5	100	0-1	5
Dicyclopentadiene	4000+	4-5	5	4000+	4-5	5
Hexachlorocyclopentadiene	3000+	0-1	4	3000+	0-1	4
Isodrin	10	0-1	5	10	0-1	5
Arsenic	110000+	4-5	4	--	--	--
Cadmium	3900	2-3	1	--	--	--
Lead	64	2-3	1	--	--	--
Mercury	9400+	4-5	4	--	--	--

1/ + Value is greater than upper Certified Reporting Limit

SPSA
Max.
ug/g
ft

South Plants Study Area
Maximum
microgram per gram
foot/feet

TABLE SPSA-1e-2
GROUNDWATER CONTAMINANT CONCENTRATIONS (UG/L)
FOR SITE SPSA-1e

AVERAGE SITE DEPTH TO GROUNDWATER: 18 Feet

CHEMICAL	CONCENTRATION MAXIMUM	LOCATION (WELL NUMBER)	SAMPLE DATE
1,1,1-TRICHLOROETHANE	2200	36001	01/5/89
1,1,2-TRICHLOROETHANE	150	36181	05/10/88
1,1-DICHLOROETHYLENE	21	01525	12/16/88
1,1-DICHLOROETHANE	7.3	01525	12/16/88
1,2-DICHLOROETHYLENE	990	01524	01/10/89
M-XYLENE	510	36001	02/11/88
ALDRIN	6.3	36001	02/11/88
ATRAZINE	GT 180	36001	02/11/88
BICYCLOHEPTADIENE	390	36001	01/5/89
BENZOTHIAZOLE	820	01525	12/16/88
BENZENE	97000	01525	02/19/88
CARBON TETRACHLORIDE	540	36181	01/5/89
METHYLENE CHLORIDE	8400	01525	12/16/88
CHLOROFORM	1200000	01525	12/16/88
HEXACHLOROCYCLOPENTADIENE	6.0	01525	12/16/88
CHLOROBENZENE	70000	36181	05/10/88
CHLORDANE	3.6	01525	12/16/88

EACH VALUE PRESENTED IS THE MAXIMUM CONCENTRATION FOR THE LISTED ANALYTE FOR THE PERIOD March 17, 1987 TO February 28, 1989.
DATA SOURCE: DP ASSOCIATES, RMA Database, July 19, 1990

TABLE SPSA-1e-2
GROUNDWATER CONTAMINANT CONCENTRATIONS (UG/L)
FOR SITE SPSA-1e

AVERAGE SITE DEPTH TO GROUNDWATER: 18 Feet

CHEMICAL	CONCENTRATION MAXIMUM	LOCATION (WELL NUMBER)	SAMPLE DATE
CHLOROPHENYLMETHYL SULFIDE	1700	01525	02/19/88
CHLOROPHENYLMETHYL SULFOXIDE	440	01525	12/16/88
CHLOROPHENYLMETHYL SULFONE	7700	01525	12/16/88
DIBROMOCHLOROPROPANE	330	01524	01/10/89
DICYCLOPENTADIENE	550	01525	02/19/88
DIISOPROPYLMETHYL PHOSPHONATE	460	01525	12/16/88
DITHIANE	94	01525	12/16/88
DIELDRIN	1.2	36001	02/11/88
DIMETHYL DISULFIDE	5300	01525	02/19/88
DIMETHYLMETHYL PHOSPHONATE	870	01525	02/19/88
ENDRIN	14	36001	01/5/89
ETHYLBENZENE	640	36001	02/11/88
ISODRIN	0.25	01524	01/10/89
TOLUENE	7600	01525	02/19/88
METHYLISSOBUTYL KETONE	110000	01525	12/16/88
MALATHION	2.8	36001	01/5/89
1,4-OXATHIANE	16	01525	12/16/88

EACH VALUE PRESENTED IS THE MAXIMUM CONCENTRATION FOR THE LISTED ANALYTE FOR THE PERIOD March 17, 1987 TO February 28, 1989.
DATA SOURCE: DP ASSOCIATES, RMA Database, July 19, 1990

TABLE SPSA-1e-2
GROUNDWATER CONTAMINANT CONCENTRATIONS (UG/L)
FOR SITE SPSA-1e

AVERAGE SITE DEPTH TO GROUNDWATER: 18 Feet

CHEMICAL	CONCENTRATION MAXIMUM	LOCATION (WELL NUMBER)	SAMPLE DATE
PPDDE	0.86	01524	01/10/89
PPDDT	1.5	01524	01/10/89
PARATHION	24	01525	12/16/88
SUPONA	44	01524	01/10/89
TETRACHLOROETHYLENE	1100	01524	02/17/88
TRICHLOROETHYLENE	7600	36181	05/10/88
O, P-XYLENE	1100	36181	05/10/88

EACH VALUE PRESENTED IS THE MAXIMUM CONCENTRATION FOR THE LISTED ANALYTE
FOR THE PERIOD March 17, 1987 TO February 28, 1989.
DATA SOURCE: DP ASSOCIATES, RMA Database, July 19, 1990

SPSA-1e-3
EXPOSURE EVALUATIONS FOR REGULATED VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VE1 OPN
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	E1	E1	E1	
ALDRIN	1.5E+00	3.4E+06	1.5E+00	5.3E+01*	2.4E-05	5.3E+01*	4.4E-07
ATRAZINE	4.1E+04	0.0E+00	4.1E+04	0.0E+00	0.0E+00	0.0E+00	5.2E-14
BENZENE	8.6E+02	0.0E+00	8.6E+02	0.0E+00	0.0E+00	0.0E+00	8.2E-03
BENZOTHAZOLE	3.9E+04	0.0E+00	3.9E+04	0.0E+00	0.0E+00	0.0E+00	2.9E-08
BICYCLOHEPTADIENE	3.2E+05	1.0E+06	3.1E+05	1.6E-02	1.7E-04a	1.6E-02	0.0E+00
CARBON TETRACHLORIDE	2.0E+02	0.0E+00	2.0E+02	0.0E+00	0.0E+00	0.0E+00	7.9E-04
CHLORDANE	2.0E+01	3.6E+08	2.0E+01	1.0E-01*	5.5E-09	1.0E-01*	1.1E-08
CHLOROBENZENE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	5.1E-05
CHLOROFORM	4.0E+03	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	1.5E-02
CHLOROPHENYLMETHYL SULFIDE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	5.0E-08
CHLOROPHENYLMETHYL SULFONE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	2.7E-09
CHLOROPHENYLMETHYL SULFOXIDE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	3.0E-10
PPDE	7.4E+01	0.0E+00	7.4E+01	0.0E+00	0.0E+00	0.0E+00	5.6E-09
PPDT	7.4E+01	0.0E+00	7.4E+01	0.0E+00	0.0E+00	0.0E+00	7.0E-08
DIBROMOCHLOROPROPANE	1.8E+01	0.0E+00	1.8E+01	0.0E+00	0.0E+00	0.0E+00	5.8E-05
1,1-DICHLOROETHANE	2.8E+02	0.0E+00	2.8E+02	0.0E+00	0.0E+00	0.0E+00	1.7E-10
1,1-DICHLOROETHYLENE	4.3E+01	0.0E+00	4.3E+01	0.0E+00	0.0E+00	0.0E+00	4.0E-04
1,2-DICHLOROETHYLENE	1.7E+05	0.0E+00	1.7E+05	0.0E+00	0.0E+00	0.0E+00	0.0E+00
DICYCLOPENTADIENE	5.4E+04	1.0E+06	2.8E+04	7.4E-02	6.8E-02a	1.4E-01*	0.0E+00
DIELDRIN	1.6E+00	1.0E+06	1.6E+00	6.4E+01*	6.5E-05a	6.4E+01*	0.0E+00
DIISOPROPYLMETHYL PHOSPHONATE	6.6E+05	0.0E+00	6.6E+05	0.0E+00	0.0E+00	0.0E+00	8.9E-10
DIMETHYLDISULFIDE	6.7E+04	0.0E+00	6.7E+04	0.0E+00	0.0E+00	0.0E+00	4.2E-06
DIMETHYLMETHYL PHOSPHONATE	1.5E+05	0.0E+00	1.5E+05	0.0E+00	0.0E+00	0.0E+00	0.0E+00
DITHIANE	8.3E+04	0.0E+00	8.3E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENDRIN	2.5E+03	0.0E+00	2.5E+03	0.0E+00	0.0E+00	0.0E+00	6.6E-11
ETHYLBENZENE	8.3E+05	0.0E+00	8.3E+05	0.0E+00	0.0E+00	0.0E+00	3.8E-08
HEXACHLOROCYCLOPENTADIENE	1.7E+04	1.0E+06	1.3E+04	1.8E-01*	4.9E-02a	2.3E-01*	0.0E+00
ISODRIN	5.8E+02	2.4E+08	5.8E+02	1.7E-02	4.1E-08	1.7E-02	7.1E-10
MALATHION	1.7E+05	0.0E+00	1.7E+05	0.0E+00	0.0E+00	0.0E+00	1.1E-14
METHYLISOBUTYL KETONE	4.1E+05	0.0E+00	4.1E+05	0.0E+00	0.0E+00	0.0E+00	6.1E-07
METHYLENE CHLORIDE	3.3E+03	0.0E+00	3.3E+03	0.0E+00	0.0E+00	0.0E+00	1.4E-04
1,4-OXATHIANE	2.5E+05	0.0E+00	2.5E+05	0.0E+00	0.0E+00	0.0E+00	0.0E+00
PARATHION	5.0E+04	0.0E+00	5.0E+04	0.0E+00	0.0E+00	0.0E+00	2.2E-12
SUPONA	1.2E+03	0.0E+00	1.2E+03	0.0E+00	0.0E+00	0.0E+00	1.4E-13
TETRACHLOROETHYLENE	5.1E+02	0.0E+00	5.1E+02	0.0E+00	0.0E+00	0.0E+00	4.2E-05
TOLUENE	2.5E+06	0.0E+00	2.5E+06	0.0E+00	0.0E+00	0.0E+00	9.8E-08
1,1,1-TRICHLOROETHANE	7.5E+05	0.0E+00	7.5E+05	0.0E+00	0.0E+00	0.0E+00	1.1E-07
1,1,2-TRICHLOROETHANE	4.3E+02	0.0E+00	4.3E+02	0.0E+00	0.0E+00	0.0E+00	4.9E-06
TRICHLOROETHYLENE	2.3E+03	0.0E+00	2.3E+03	0.0E+00	0.0E+00	0.0E+00	5.6E-04
M-XYLENE	1.4E+07	0.0E+00	1.4E+07	0.0E+00	0.0E+00	0.0E+00	4.1E-08
O,P-XYLENE	1.4E+07	0.0E+00	1.4E+07	0.0E+00	0.0E+00	0.0E+00	8.9E-08
ARSENIC	2.2E+01	0.0E+00	2.2E+01	5.1E+03*	0.0E+00	5.1E+03*	0.0E+00
CADMIUM	4.5E+02	0.0E+00	4.5E+02	8.6E+00*	0.0E+00	8.6E+00*	0.0E+00
LEAD	1.5E+04	0.0E+00	1.5E+04	4.1E-03	0.0E+00	4.1E-03	0.0E+00
MERCURY	3.3E+03	0.0E+00	3.3E+03	2.8E+00*	0.0E+00	2.8E+00*	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPPLV for this contaminant is considered to be equal to pure compound. The SPPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-1e-4
EXPOSURE EVALUATIONS FOR CASUAL VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI
	PPLV	PPLV	PPLV	EI	EI	EI	OPN
ALDRIN	1.5E+00	3.4E+06	1.5E+00	5.3E+01*	2.4E-05	5.3E+01*	4.4E-07
ATRAZINE	4.1E+04	0.0E+00	4.1E+04	0.0E+00	0.0E+00	0.0E+00	5.2E-14
BENZENE	8.6E+02	0.0E+00	8.6E+02	0.0E+00	0.0E+00	0.0E+00	8.2E-03
BENZOTHAZOLE	3.9E+04	0.0E+00	3.9E+04	0.0E+00	0.0E+00	0.0E+00	2.9E-08
BICYCLOHEPTADIENE	3.2E+05	1.0E+06	3.1E+05	1.6E-02	1.7E-04a	1.6E-02	0.0E+00
CARBON TETRACHLORIDE	2.0E+02	0.0E+00	2.0E+02	0.0E+00	0.0E+00	0.0E+00	7.9E-04
CHLORDANE	2.0E+01	3.6E+08	2.0E+01	1.0E-01*	5.5E-09	1.0E-01*	1.1E-08
CHLOROBENZENE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	5.1E-05
CHLOROFORM	4.0E+03	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	1.5E-02
CHLOROPHENYLMETHYL SULFIDE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	5.0E-08
CHLOROPHENYLMETHYL SULFONE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	2.7E-09
CHLOROPHENYLMETHYL SULFOXIDE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	3.0E-10
PPDDE	7.4E+01	0.0E+00	7.4E+01	0.0E+00	0.0E+00	0.0E+00	5.6E-09
PPDDT	7.4E+01	0.0E+00	7.4E+01	0.0E+00	0.0E+00	0.0E+00	7.0E-08
DIBROMOCHLOROPROPANE	1.8E+01	0.0E+00	1.8E+01	0.0E+00	0.0E+00	0.0E+00	5.8E-05
1,1-DICHLOROETHANE	2.8E+02	0.0E+00	2.8E+02	0.0E+00	0.0E+00	0.0E+00	1.7E-10
1,1-DICHLOROETHYLENE	4.3E+01	0.0E+00	4.3E+01	0.0E+00	0.0E+00	0.0E+00	4.0E-04
1,2-DICHLOROETHYLENE	1.7E+05	0.0E+00	1.7E+05	0.0E+00	0.0E+00	0.0E+00	0.0E+00
DICYCLOPENTADIENE	5.4E+04	1.0E+06	2.8E+04	7.4E-02	6.8E-02a	1.4E-01*	0.0E+00
DIELDRIN	1.6E+00	1.0E+06	1.6E+00	6.4E+01*	6.5E-05a	6.4E+01*	0.0E+00
DIISOPROPYLMETHYL PHOSPHONATE	6.6E+05	0.0E+00	6.6E+05	0.0E+00	0.0E+00	0.0E+00	8.9E-10
DIMETHYLDISULFIDE	6.7E+04	0.0E+00	6.7E+04	0.0E+00	0.0E+00	0.0E+00	4.2E-06
DIMETHYLMETHYL PHOSPHONATE	1.5E+05	0.0E+00	1.5E+05	0.0E+00	0.0E+00	0.0E+00	0.0E+00
DITHIANE	8.3E+04	0.0E+00	8.3E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENDRIN	2.5E+03	0.0E+00	2.5E+03	0.0E+00	0.0E+00	0.0E+00	6.6E-11
ETHYLBENZENE	8.3E+05	0.0E+00	8.3E+05	0.0E+00	0.0E+00	0.0E+00	3.8E-08
HEXACHLOROCYCLOPENTADIENE	1.7E+04	1.0E+06	1.3E+04	1.8E-01*	4.9E-02a	2.3E-01*	0.0E+00
ISODRIN	5.8E+02	2.4E+08	5.8E+02	1.7E-02	4.1E-08	1.7E-02	7.1E-10
MALATHION	1.7E+05	0.0E+00	1.7E+05	0.0E+00	0.0E+00	0.0E+00	1.1E-14
METHYLISOBUTYL KETONE	4.1E+05	0.0E+00	4.1E+05	0.0E+00	0.0E+00	0.0E+00	6.1E-07
METHYLENE CHLORIDE	3.3E+03	0.0E+00	3.3E+03	0.0E+00	0.0E+00	0.0E+00	1.4E-04
1,4-OXATHIANE	2.5E+05	0.0E+00	2.5E+05	0.0E+00	0.0E+00	0.0E+00	0.0E+00
PARATHION	5.0E+04	0.0E+00	5.0E+04	0.0E+00	0.0E+00	0.0E+00	2.2E-12
SUPONA	1.2E+03	0.0E+00	1.2E+03	0.0E+00	0.0E+00	0.0E+00	1.4E-13
TETRACHLOROETHYLENE	5.1E+02	0.0E+00	5.1E+02	0.0E+00	0.0E+00	0.0E+00	4.2E-05
TOLUENE	2.5E+06	0.0E+00	2.5E+06	0.0E+00	0.0E+00	0.0E+00	9.8E-08
1,1,1-TRICHLOROETHANE	7.5E+05	0.0E+00	7.5E+05	0.0E+00	0.0E+00	0.0E+00	1.1E-07
1,1,2-TRICHLOROETHANE	4.3E+02	0.0E+00	4.3E+02	0.0E+00	0.0E+00	0.0E+00	4.9E-06
TRICHLOROETHYLENE	2.3E+03	0.0E+00	2.3E+03	0.0E+00	0.0E+00	0.0E+00	5.6E-04
M-XYLENE	1.4E+07	0.0E+00	1.4E+07	0.0E+00	0.0E+00	0.0E+00	4.1E-08
O,P-XYLENE	1.4E+07	0.0E+00	1.4E+07	0.0E+00	0.0E+00	0.0E+00	8.9E-08
ARSENIC	2.2E+01	0.0E+00	2.2E+01	5.1E+03*	0.0E+00	5.1E+03*	0.0E+00
CADMIUM	4.5E+02	0.0E+00	4.5E+02	8.6E+00*	0.0E+00	8.6E+00*	0.0E+00
LEAD	1.5E+04	0.0E+00	1.5E+04	4.1E-03	0.0E+00	4.1E-03	0.0E+00
MERCURY	3.3E+03	0.0E+00	3.3E+03	2.8E+00*	0.0E+00	2.8E+00*	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPLV for this contaminant is considered to be equal to pure compound. The SPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01
If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-1e-5
EXPOSURE EVALUATIONS FOR RECREATIONAL VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	OPN
ALDRIN	2.1E-01	2.2E+05	2.1E-01	3.9E+02*	3.6E-04	3.9E+02*	6.6E-06
ATRAZINE	1.8E+04	0.0E+00	1.8E+04	0.0E+00	0.0E+00	0.0E+00	3.3E-13
BENZENE	1.2E+02	0.0E+00	1.2E+02	0.0E+00	0.0E+00	0.0E+00	1.2E-01
BENZOTHIAZOLE	1.7E+04	0.0E+00	1.7E+04	0.0E+00	0.0E+00	0.0E+00	1.0E-07
BICYCLOHEPTADIENE	1.4E+05	1.0E+06	1.3E+05	3.7E-02	4.8E-04a	3.7E-02	0.9E+00
CARBON TETRACHLORIDE	2.7E+01	0.0E+00	2.7E+01	0.0E+00	0.0E+00	0.0E+00	1.2E-02
CHLORDANE	2.7E+00	2.4E+07	2.7E+00	7.4E-01*	8.3E-08	7.4E-01*	1.7E-07
CHLOROBENZENE	6.8E+04	0.0E+00	6.8E+04	0.0E+00	0.0E+00	0.0E+00	3.3E-04
CHLOROFORM	5.6E+02	0.0E+00	5.6E+02	0.0E+00	0.0E+00	0.0E+00	2.3E-01
CHLOROPHENYLMETHYL SULFIDE	7.0E+04	0.0E+00	7.0E+04	0.0E+00	0.0E+00	0.0E+00	3.2E-07
CHLOROPHENYLMETHYL SULFONE	7.0E+04	0.0E+00	7.0E+04	0.0E+00	0.0E+00	0.0E+00	1.8E-08
CHLOROPHENYLMETHYL SULFOXIDE	7.0E+04	0.0E+00	7.0E+04	0.0E+00	0.0E+00	0.0E+00	1.9E-09
PPDE	1.0E+01	0.0E+00	1.0E+01	0.0E+00	0.0E+00	0.0E+00	8.4E-08
PPDT	1.0E+01	0.0E+00	1.0E+01	0.0E+00	0.0E+00	0.0E+00	1.1E-06
DIBROMOCHLOROPROPANE	2.5E+00	0.0E+00	2.5E+00	0.0E+00	0.0E+00	0.0E+00	8.8E-04
1,1-DICHLOROETHANE	3.9E+01	0.0E+00	3.9E+01	0.0E+00	0.0E+00	0.0E+00	2.5E-09
1,1-DICHLOROETHYLENE	5.9E+00	0.0E+00	5.9E+00	0.0E+00	0.0E+00	0.0E+00	6.1E-03
1,2-DICHLOROETHYLENE	7.0E+04	0.0E+00	7.0E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
DICYCLOPENTADIENE	1.8E+04	2.1E+04	9.8E+03	2.2E-01*	1.9E-01*	4.1E-01*	0.0E+00
DIELDRIN	2.2E-01	1.0E+06	2.2E-01	4.6E+02*	9.8E-04a	4.6E+02*	0.0E+00
DIISOPROPYLMETHYL PHOSPHONATE	2.8E+05	0.0E+00	2.8E+05	0.0E+00	0.0E+00	0.0E+00	5.8E-09
DIMETHYLDISULFIDE	2.9E+04	0.0E+00	2.9E+04	0.0E+00	0.0E+00	0.0E+00	2.7E-05
DIMETHYLMETHYL PHOSPHONATE	6.3E+04	0.0E+00	6.3E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
DITHIANE	3.5E+04	0.0E+00	3.5E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENDRIN	1.1E+03	0.0E+00	1.1E+03	0.0E+00	0.0E+00	0.0E+00	4.2E-10
ETHYLBENZENE	3.5E+05	0.0E+00	3.5E+05	0.0E+00	0.0E+00	0.0E+00	2.4E-07
HEXACHLOROCYCLOPENTADIENE	5.7E+03	2.2E+04	4.5E+03	5.3E-01*	1.4E-01*	6.7E-01*	0.0E+00
ISORIN	2.5E+02	3.8E+07	2.5E+02	4.1E-02	2.7E-07	4.1E-02	4.6E-09
MALATHION	7.0E+04	0.0E+00	7.0E+04	0.0E+00	0.0E+00	0.0E+00	7.1E-14
METHYLISOBUTYL KETONE	1.7E+05	0.0E+00	1.7E+05	0.0E+00	0.0E+00	0.0E+00	3.9E-06
METHYLENE CHLORIDE	4.5E+02	0.0E+00	4.5E+02	0.0E+00	0.0E+00	0.0E+00	2.2E-03
1,4-OXATHIANE	1.1E+05	0.0E+00	1.1E+05	0.0E+00	0.0E+00	0.0E+00	0.0E+00
PARATHION	2.1E+04	0.0E+00	2.1E+04	0.0E+00	0.0E+00	0.0E+00	1.4E-11
SUPONA	5.3E+02	0.0E+00	5.3E+02	0.0E+00	0.0E+00	0.0E+00	8.7E-13
TETRACHLOROETHYLENE	7.1E+01	0.0E+00	7.1E+01	0.0E+00	0.0E+00	0.0E+00	6.3E-04
TOLUENE	1.1E+06	0.0E+00	1.1E+06	0.0E+00	0.0E+00	0.0E+00	6.4E-07
1,1,1-TRICHLOROETHANE	3.2E+05	0.0E+00	3.2E+05	0.0E+00	0.0E+00	0.0E+00	7.3E-07
1,1,2-TRICHLOROETHANE	6.0E+01	0.0E+00	6.0E+01	0.0E+00	0.0E+00	0.0E+00	7.4E-05
TRICHLOROETHYLENE	3.2E+02	0.0E+00	3.2E+02	0.0E+00	0.0E+00	0.0E+00	8.5E-03
M-XYLENE	5.8E+06	0.0E+00	5.8E+06	0.0E+00	0.0E+00	0.0E+00	2.7E-07
O,P-XYLENE	5.8E+06	0.0E+00	5.8E+06	0.0E+00	0.0E+00	0.0E+00	5.7E-07
ARSENIC	3.9E+00	0.0E+00	3.9E+00	2.8E+04*	0.0E+00	2.8E+04*	0.0E+00
CADMIUM	5.8E+01	0.0E+00	5.8E+01	6.8E+01*	0.0E+00	6.8E+01*	0.0E+00
LEAD	9.2E+03	0.0E+00	9.2E+03	6.9E-03	0.0E+00	6.9E-03	0.0E+00
MERCURY	2.0E+03	0.0E+00	2.0E+03	4.8E+00*	0.0E+00	4.8E+00*	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPPLV for this contaminant is considered to be equal to pure compound. The SPPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01
If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-1e-6
EXPOSURE EVALUATIONS FOR COMMERCIAL WORKERS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI ENC
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	
ALDRIN	1.9E+00	4.0E-01	3.3E-01	4.2E+01*	2.0E+02*	2.4E+02*	3.2E-02
ATRAZINE	2.3E+04	0.0E+00	2.3E+04	0.0E+00	0.0E+00	0.0E+00	1.1E-08
BENZENE	1.1E+03	0.0E+00	1.1E+03	0.0E+00	0.0E+00	0.0E+00	5.9E+02
BENZOTHAZOLE	2.2E+04	0.0E+00	2.2E+04	0.0E+00	0.0E+00	0.0E+00	6.4E-03
BICYCLOHEPTADIENE	1.8E+05	2.1E+02	2.1E+02	2.8E-02	2.4E+01*	2.4E+01*	0.0E+00
CARBON TETRACHLORIDE	2.5E+02	0.0E+00	2.5E+02	0.0E+00	0.0E+00	0.0E+00	5.7E+01
CHLORDANE	2.5E+01	1.4E+04	2.5E+01	8.1E-02	1.5E-04	8.1E-02	8.2E-04
CHLOROBENZENE	8.8E+04	0.0E+00	8.8E+04	0.0E+00	0.0E+00	0.0E+00	1.1E+01
CHLOROFORM	5.1E+03	0.0E+00	5.1E+03	0.0E+00	0.0E+00	0.0E+00	1.1E+03
CHLOROPHENYLMETHYL SULFIDE	9.1E+04	0.0E+00	9.1E+04	0.0E+00	0.0E+00	0.0E+00	1.1E-02
CHLOROPHENYLMETHYL SULFONE	9.1E+04	0.0E+00	9.1E+04	0.0E+00	0.0E+00	0.0E+00	5.9E-04
CHLOROPHENYLMETHYL SULFOXIDE	9.1E+04	0.0E+00	9.1E+04	0.0E+00	0.0E+00	0.0E+00	6.4E-05
PPDDE	9.3E+01	0.0E+00	9.3E+01	0.0E+00	0.0E+00	0.0E+00	4.0E-04
PPDDT	9.3E+01	0.0E+00	9.3E+01	0.0E+00	0.0E+00	0.0E+00	5.1E-03
DIBROMOCHLOROPROPANE	2.3E+01	0.0E+00	2.3E+01	0.0E+00	0.0E+00	0.0E+00	4.2E+00
1,1-DICHLOROETHANE	3.6E+02	0.0E+00	3.6E+02	0.0E+00	0.0E+00	0.0E+00	1.2E-05
1,1-DICHLOROETHYLENE	5.4E+01	0.0E+00	5.4E+01	0.0E+00	0.0E+00	0.0E+00	2.9E+01
1,2-DICHLOROETHYLENE	9.2E+04	0.0E+00	9.2E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
DICYCLOPENTADIENE	1.7E+04	5.3E-01	5.3E-01	2.3E-01*	7.6E+03*	7.6E+03*	0.0E+00
DIELDRIN	2.0E+00	5.8E+01	1.9E+00	5.0E+01*	1.7E+00*	5.2E+01*	0.0E+00
DIISOPROPYLMETHYL PHOSPHONATE	3.7E+05	0.0E+00	3.7E+05	0.0E+00	0.0E+00	0.0E+00	1.9E-04
DIMETHYLDISULFIDE	3.7E+04	0.0E+00	3.7E+04	0.0E+00	0.0E+00	0.0E+00	9.0E-01
DIMETHYLMETHYL PHOSPHONATE	8.2E+04	0.0E+00	8.2E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
DITHIANE	4.6E+04	0.0E+00	4.6E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENDRIN	1.4E+03	0.0E+00	1.4E+03	0.0E+00	0.0E+00	0.0E+00	1.4E-05
ETHYLBENZENE	4.6E+05	0.0E+00	4.6E+05	0.0E+00	0.0E+00	0.0E+00	8.2E-03
HEXACHLOROCYCLOPENTADIENE	5.5E+03	1.9E+01	1.9E+01	5.5E-01*	1.6E+02*	1.6E+02*	0.0E+00
ISODRIN	3.2E+02	6.7E+01	5.5E+01	3.1E-02	1.5E-01*	1.8E-01*	1.5E-04
MALATHION	9.2E+04	0.0E+00	9.2E+04	0.0E+00	0.0E+00	0.0E+00	2.4E-09
METHYLISOBUTYL KETONE	2.2E+05	0.0E+00	2.2E+05	0.0E+00	0.0E+00	0.0E+00	1.3E-01
METHYLENE CHLORIDE	4.1E+03	0.0E+00	4.1E+03	0.0E+00	0.0E+00	0.0E+00	1.0E+01
1,4-OXATHIANE	1.4E+05	0.0E+00	1.4E+05	0.0E+00	0.0E+00	0.0E+00	0.0E+00
PARATHION	2.7E+04	0.0E+00	2.7E+04	0.0E+00	0.0E+00	0.0E+00	4.7E-07
SUPONA	6.9E+02	0.0E+00	6.9E+02	0.0E+00	0.0E+00	0.0E+00	2.9E-08
TETRACHLOROETHYLENE	6.5E+02	0.0E+00	6.5E+02	0.0E+00	0.0E+00	0.0E+00	3.0E+00
TOLUENE	1.4E+06	0.0E+00	1.4E+06	0.0E+00	0.0E+00	0.0E+00	2.1E-02
1,1,1-TRICHLOROETHANE	4.2E+05	0.0E+00	4.2E+05	0.0E+00	0.0E+00	0.0E+00	2.4E-02
1,1,2-TRICHLOROETHANE	5.5E+02	0.0E+00	5.5E+02	0.0E+00	0.0E+00	0.0E+00	3.5E-01
TRICHLOROETHYLENE	2.9E+03	0.0E+00	2.9E+03	0.0E+00	0.0E+00	0.0E+00	4.1E+01
M-XYLENE	7.0E+06	0.0E+00	7.0E+06	0.0E+00	0.0E+00	0.0E+00	8.9E-03
O,P-XYLENE	7.0E+06	0.0E+00	7.0E+06	0.0E+00	0.0E+00	0.0E+00	1.9E-02
ARSENIC	2.0E+01	0.0E+00	2.0E+01	5.5E+03*	0.0E+00	5.5E+03*	0.0E+00
CADMIUM	3.6E+02	0.0E+00	3.6E+02	1.1E+01*	0.0E+00	1.1E+01*	0.0E+00
LEAD	6.5E+03	0.0E+00	6.5E+03	9.8E-03	0.0E+00	9.8E-03	0.0E+00
MERCURY	1.4E+03	0.0E+00	1.4E+03	6.7E+00*	0.0E+00	6.7E+00*	0.0E+00

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-1e-7
EXPOSURE EVALUATIONS FOR INDUSTRIAL WORKERS

CONTAMINANT	DIRECT	INDIRECT		CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI	
	PPLV (mg/kg)	OSVI (mg/kg)	ESVI (mg/kg)	PPLV (mg/kg)	EI	EI	EI	OPN	ENC
ALDRIN	1.2E-01	4.5E+05	4.0E-01	9.0E-02	6.9E+02*	2.0E+02*	8.9E+02*	3.3E-06	9.5E-02
ATRAZINE	4.2E+03	0.0E+00	0.0E+00	4.2E+03	0.0E+00	0.0E+00	0.0E+00	3.9E-13	1.1E-08
BENZENE	6.7E+01	0.0E+00	0.0E+00	6.7E+01	0.0E+00	0.0E+00	0.0E+00	6.2E-02	1.8E+03
BENZOTHAZOLE	4.0E+03	0.0E+00	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	2.2E-07	6.4E-03
BICYCLOHEPTADIENE	3.3E+04	3.9E+06	6.2E+02	6.1E+02	1.5E-01*	8.1E+00*	8.2E+00*	0.0E+00	0.0E+00
CARBON TETRACHLORIDE	1.5E+01	0.0E+00	0.0E+00	1.5E+01	0.0E+00	0.0E+00	0.0E+00	6.0E-03	1.7E+02
CHLORDANE	1.5E+00	4.8E+07	5.2E+00	1.2E+00	1.3E+00*	3.9E-01*	1.7E+00*	8.6E-08	2.5E-03
CHLOROBENZENE	1.5E+04	0.0E+00	0.0E+00	1.5E+04	0.0E+00	0.0E+00	0.0E+00	3.8E-04	1.1E+01
CHLOROFORM	3.1E+02	0.0E+00	0.0E+00	3.1E+02	0.0E+00	0.0E+00	0.0E+00	1.1E-01	3.3E+03
CHLOROPHENYLMETHYL SULFIDE	1.7E+04	0.0E+00	0.0E+00	1.7E+04	0.0E+00	0.0E+00	0.0E+00	3.8E-07	1.1E-02
CHLOROPHENYLMETHYL SULFONE	1.7E+04	0.0E+00	0.0E+00	1.7E+04	0.0E+00	0.0E+00	0.0E+00	2.0E-08	5.9E-04
CHLOROPHENYLMETHYL SULFOXIDE	1.7E+04	0.0E+00	0.0E+00	1.7E+04	0.0E+00	0.0E+00	0.0E+00	2.2E-09	6.4E-05
PPDDE	5.7E+00	0.0E+00	0.0E+00	5.7E+00	0.0E+00	0.0E+00	0.0E+00	4.2E-08	1.2E-03
PPDDT	5.7E+00	0.0E+00	0.0E+00	5.7E+00	0.0E+00	0.0E+00	0.0E+00	5.3E-07	1.5E-02
DIBROMOCHLOROPROPANE	1.4E+00	0.0E+00	0.0E+00	1.4E+00	0.0E+00	0.0E+00	0.0E+00	4.4E-04	1.3E+01
1,1-DICHLOROETHANE	2.3E+01	0.0E+00	0.0E+00	2.3E+01	0.0E+00	0.0E+00	0.0E+00	1.3E-09	3.7E-05
1,1-DICHLOROETHYLENE	3.2E+00	0.0E+00	0.0E+00	3.2E+00	0.0E+00	0.0E+00	0.0E+00	3.0E-03	8.7E+01
1,2-DICHLOROETHYLENE	1.7E+04	0.0E+00	0.0E+00	1.7E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
DICYCLOPENTADIENE	1.2E+03	7.8E+03	1.6E+00	1.6E+00	3.4E+00*	2.5E+03*	2.5E+03*	0.0E+00	0.0E+00
DIELDRIN	1.2E-01	2.0E+05	1.9E+01	1.2E-01	8.2E+02*	5.2E+00*	8.2E+02*	0.0E+00	0.0E+00
DIISOPROPYLMETHYL PHOSPHONATE	6.8E+04	0.0E+00	0.0E+00	6.8E+04	0.0E+00	0.0E+00	0.0E+00	6.7E-09	1.9E-04
γ-DIALLYLDISULFIDE	6.9E+03	0.0E+00	0.0E+00	6.9E+03	0.0E+00	0.0E+00	0.0E+00	3.1E-05	9.0E-01
D, THYMETHYL PHOSPHONATE	1.5E+04	0.0E+00	0.0E+00	1.5E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
DITHIANE	8.5E+03	0.0E+00	0.0E+00	8.5E+03	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENDRIN	2.5E+02	0.0E+00	0.0E+00	2.5E+02	0.0E+00	0.0E+00	0.0E+00	4.9E-10	1.4E-05
ETHYLBENZENE	8.5E+04	0.0E+00	0.0E+00	8.5E+04	0.0E+00	0.0E+00	0.0E+00	2.8E-07	8.2E-03
HEXACHLOROCYCLOPENTADIENE	3.8E+02	8.2E+03	5.8E+01	5.0E+01	7.8E+00*	5.3E+01*	6.0E+01*	0.0E+00	0.0E+00
ISODRIN	5.9E+01	3.2E+07	2.0E+02	4.6E+01	1.7E-01*	5.0E-02	2.2E-01*	5.3E-09	1.5E-04
MALATHION	1.7E+04	0.0E+00	0.0E+00	1.7E+04	0.0E+00	0.0E+00	0.0E+00	8.2E-14	2.4E-09
METHYL ISOBUTYL KETONE	4.0E+04	0.0E+00	0.0E+00	4.0E+04	0.0E+00	0.0E+00	0.0E+00	4.6E-06	1.3E-01
METHYLENE CHLORIDE	2.5E+02	0.0E+00	0.0E+00	2.5E+02	0.0E+00	0.0E+00	0.0E+00	1.1E-03	3.1E+01
1,4-OXATHIANE	2.5E+04	0.0E+00	0.0E+00	2.5E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
PARATHION	5.1E+03	0.0E+00	0.0E+00	5.1E+03	0.0E+00	0.0E+00	0.0E+00	1.6E-11	4.7E-07
SUPONA	1.3E+02	0.0E+00	0.0E+00	1.3E+02	0.0E+00	0.0E+00	0.0E+00	1.0E-12	2.9E-08
TETRACHLOROETHYLENE	4.1E+01	0.0E+00	0.0E+00	4.1E+01	0.0E+00	0.0E+00	0.0E+00	3.1E-04	9.1E+00
TOLUENE	2.6E+05	0.0E+00	0.0E+00	2.6E+05	0.0E+00	0.0E+00	0.0E+00	7.4E-07	2.1E-02
1,1,1-TRICHLOROETHANE	7.8E+04	0.0E+00	0.0E+00	7.8E+04	0.0E+00	0.0E+00	0.0E+00	8.5E-07	2.4E-02
1,1,2-TRICHLOROETHANE	3.4E+01	0.0E+00	0.0E+00	3.4E+01	0.0E+00	0.0E+00	0.0E+00	3.7E-05	1.1E+00
TRICHLOROETHYLENE	1.8E+02	0.0E+00	0.0E+00	1.8E+02	0.0E+00	0.0E+00	0.0E+00	4.2E-03	1.2E+02
M-XYLENE	8.8E+05	0.0E+00	0.0E+00	8.8E+05	0.0E+00	0.0E+00	0.0E+00	3.1E-07	8.9E-03
O,P-XYLENE	8.8E+05	0.0E+00	0.0E+00	8.8E+05	0.0E+00	0.0E+00	0.0E+00	6.7E-07	1.9E-02
ARSENIC	1.6E+00	0.0E+00	0.0E+00	1.6E+00	6.8E+04*	0.0E+00	6.8E+04*	0.0E+00	0.0E+00
CADMIUM	7.6E+00	0.0E+00	0.0E+00	7.6E+00	5.1E+02*	0.0E+00	5.1E+02*	0.0E+00	0.0E+00
LEAD	2.2E+03	0.0E+00	0.0E+00	2.2E+03	2.9E-02	0.0E+00	2.9E-02	0.0E+00	0.0E+00
MERCURY	4.6E+02	0.0E+00	0.0E+00	4.6E+02	2.0E+01*	0.0E+00	2.0E+01*	0.0E+00	0.0E+00

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

**2.6 SITE SPSA-1f: BURIED BARRELS CONTAINING
HEXACHLOROCYCLOPENTADIENE (formerly Site 1-13/2-18: South Plants
Manufacturing Complex/Shell Chemical Company Spill Sites; EBASCO, 1988y/
RIC 88286R07)**

2.6.1 Site-Specific Considerations

Figure SPSA-1f-1 and Tables SPSA-1f-1 and SPSA-1f-2 depict the target contaminants for Site SPSA-1f. Boring T201 was included in this exposure assessment, consistent with the South Plants SAR. The historical search conducted under the contaminant assessment revealed that buried barrels containing residue from the production of hexachlorocyclopentadiene were located in Site SPSA-1f (EBASCO, 1988y/RIC 88286R07). Some of these chemicals were detected in the soil during the Phase I and Phase II investigations (EBASCO, 1988y/RIC 88286R07). According to site history, no other chemicals from the RMA contaminant list were suspected to be present in Site SPSA-1d (EBASCO, 1988y/RIC 88286R07).

2.6.2 Spatial Distribution of Measured Contaminant Concentrations

The locations and concentrations of the target contaminants that were detected in Site SPSA-1f are shown in Figure SPSA-1f-1. Hexachlorobenzene, occurring in Boring T201 (0-1 ft) was not included in this figure since it was not considered a target contaminant during Phase I and Phase II investigations. Although not shown in this figure, this nontarget compound was included in the South Plants SAR and in this exposure assessment because it passed through the screening process performed in the RMA Chemical Index (EBASCO, 1988c/RIC 88357R01).

Table SPSA-1f-1 summarizes the maximum concentrations of contaminants measured in soil above indicator levels for the ICP metals, arsenic, and mercury and CRLs for organic contaminants from the Phase I and Phase II investigations. The boring number and depth where the maximum value was observed are shown. No data were included for ICP metals, arsenic, and mercury in Horizon 2 because direct soil exposure below 10 ft is assumed to be negligible (see Volume VI-A). Table SPSA-1f-2 summarizes the maximum concentrations detected in groundwater together with the well number, location, sampling interval, and depth to groundwater.

2.6.3 Site Exposure Summary

Tables SPSA-1f-3 through SPSA-1f-7 present Draft PPLVs, EIs, and VEIs for each site contaminant. Since the depth to groundwater below Site SPSA-1f is greater than 10 ft, the enclosed space vapor inhalation SPPPLV is included in the calculation of the cumulative quantity. The COCs are summarized below for each exposed population and with the critical exposure pathway identified.

Contaminants of Concern	Regulated Visitor	Casual Visitor	Recreational Visitor	Commercial Worker	Industrial Worker
Aldrin	Direct	Direct	Direct	Direct	Direct
Dieldrin	Direct	Direct	Direct	Dir/Ind	Dir/Ind
Hexachlorocyclopentadiene	--	--	--	Indirect	Indirect

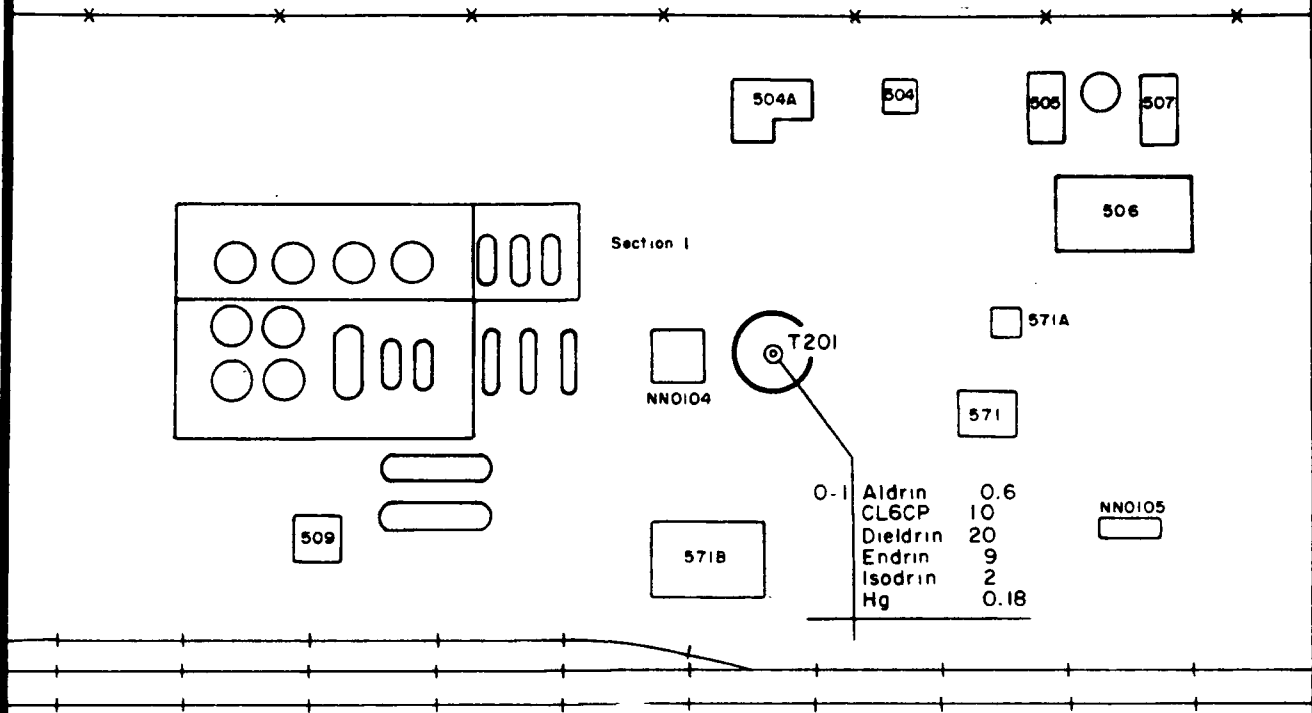
Note: Direct exposure pathways for soils include soil ingestion, suspended particulate inhalation and dermal contact.
Indirect exposure pathways include open and enclosed space vapor inhalation.

The results of the soil exposure summary indicate that exposure to contamination from the direct pathways and indirect pathways are the primary contributors to the exceedance of the cumulative PPLVs. Site SPSA-1f is designated as a Priority 1 site, based on the most sensitive exposed population PPLV (i.e., the industrial worker).

The following groundwater contaminants result in an unacceptable exposure due to vapor inhalation as indicated by a VEI value greater than 1:

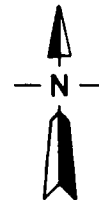
- Aldrin (enclosed)
- Benzene (enclosed)
- Carbon tetrachloride (enclosed)
- Chloroform (enclosed)
- Dibromochloropropane (enclosed)
- 1,1-Dichloroethylene (enclosed)

- Dicyclopentadiene (enclosed)
- Dimethyldisulfide (enclosed)
- Hexachlorocyclopentadiene (enclosed)
- Methylisobutyl ketone (enclosed)
- Methylene chloride (enclosed)
- Tetrachloroethylene (enclosed)
- Trichloroethylene (enclosed)



Legend

- T201 ⊙ Phase I Boring
- Site Boundary
- Sample Interval (ft.) — 0-1 | Hg — 0-18 — Analyte Level (ug/g)
- CL6CP - Hexachlorocyclopentadiene
- Hg - Mercury



Prepared for:
 Program Manager's Office for
 Rocky Mountain Arsenal Cleanup
 Aberdeen Proving Ground, Maryland

FIGURE SPSA-If-1
 Phase I and Phase II Analytes Detected
 Within or Above Indicator Levels

Rocky Mountain Arsenal
 Prepared by: Ebasco Services Incorporated

TABLE SPSA-1f-1
SOIL CONTAMINANT CONCENTRATIONS
FOR SITE SPSA-1f

Contaminant	Horizon 1			Horizon 2		
	Max. (ug/g)	Depth (ft)	Boring Number	Max. (ug/g)	Depth (ft)	Boring Number
Aldrin	0.6	0-1	T201	0.6	0-1	T201
Dieldrin	20	0-1	T201	20	0-1	T201
Endrin	9	0-1	T201	9	0-1	T201
Hexachlorobenzene ^{1/}	10	0-1	T201	10	0-1	T201
Hexachlorocyclopentadiene	10	0-1	T201	10	0-1	T201
Isodrin	2	0-1	T201	2	0-1	T201
Mercury	0.18	0-1	T201	--	--	--

1/ Nontarget contaminant. Refer to the exposure assessment nontarget screen in Appendix A.

SPSA
Max.
ug/g
ft

South Plants Study Area
Maximum
microgram per gram
foot/feet

TABLE SPSA-1f-2

GROUNDWATER CONTAMINANT CONCENTRATIONS (UG/L)
FOR SITE SPSA-1f

AVERAGE SITE DEPTH TO GROUNDWATER: 12 Feet

CHEMICAL	CONCENTRATION MAXIMUM	LOCATION (WELL NUMBER)	SAMPLE DATE
1,1,1-TRICHLOROETHANE	130	01525	02/19/88
1,1-DICHLOROETHYLENE	21	01525	12/16/88
1,1-DICHLOROETHANE	7.3	01525	12/16/88
1,2-DICHLOROETHYLENE	48	01525	02/19/88
M-XYLENE	230	01525	02/19/88
ALDRIN	GT 52	01513	05/6/88
ATRAZINE	99	01525	12/16/88
BENZOTHIAZOLE	820	01525	12/16/88
BENZENE	97000	01525	02/19/88
CARBON TETRACHLORIDE	10	01020	01/5/89
METHYLENE CHLORIDE	8400	01525	12/16/88
CHLOROFORM	1200000	01525	12/16/88
HEXACHLOROCYCLOPENTADIENE	6.0	01525	12/16/88
CHLOROBENZENE	200	01525	02/19/88
CHLORDANE	3.6	01525	12/16/88
CHLOROPHENYLMETHYL SULFIDE	1700	01525	02/19/88
CHLOROPHENYLMETHYL SULFOXIDE	440	01525	12/16/88

EACH VALUE PRESENTED IS THE MAXIMUM CONCENTRATION FOR THE LISTED ANALYTE
FOR THE PERIOD March 17, 1987 TO February 28, 1989.
DATA SOURCE: DP ASSOCIATES, RMA Database, July 19, 1990

TABLE SPSA-1f-2
GROUNDWATER CONTAMINANT CONCENTRATIONS (UG/L)
FOR SITE SPSA-1f
AVERAGE SITE DEPTH TO GROUNDWATER: 12 Feet

CHEMICAL	CONCENTRATION MAXIMUM	LOCATION (WELL NUMBER)	SAMPLE DATE
CHLOROPHENYLMETHYL SULFONE	7700	01525	12/16/88
DIBROMOCHLOROPROPANE	30	01525	12/16/88
DICYCLOPENTADIENE	550	01525	02/19/88
DIISOPROPYLMETHYL PHOSPHONATE	460	01525	12/16/88
DITHIANE	140	01020	01/5/89
DIELDRIN	80	01513	05/6/88
DIMETHYL DISULFIDE	5300	01525	02/19/88
DIMETHYLMETHYL PHOSPHONATE	870	01525	02/19/88
ENDRIN	GT 20	01513	05/6/88
ETHYLBENZENE	150	01525	02/19/88
TOLUENE	7600	01525	02/19/88
METHYLISOBUTYL KETONE	110000	01525	12/16/88
MALATHION	0.59	01020	01/5/89
1,4-OXATHIANE	16	01525	12/16/88
PARATHION	24	01525	12/16/88
SUPONA	1.8	01020	01/5/89
TETRACHLOROETHYLENE	200	01525	02/19/88

EACH VALUE PRESENTED IS THE MAXIMUM CONCENTRATION FOR THE LISTED ANALYTE
FOR THE PERIOD March 17, 1987 TO February 28, 1989.
DATA SOURCE: DP ASSOCIATES, RMA Database, July 19, 1990

TABLE SPSA-1f-2
GROUNDWATER CONTAMINANT CONCENTRATIONS (UG/L)
FOR SITE SPSA-1f
AVERAGE SITE DEPTH TO GROUNDWATER: 12 Feet

CHEMICAL	CONCENTRATION MAXIMUM	LOCATION (WELL NUMBER)	SAMPLE DATE
TRICHLOROETHYLENE	280	01020	01/5/89
O,P-XYLENE	200	01525	02/19/88

EACH VALUE PRESENTED IS THE MAXIMUM CONCENTRATION FOR THE LISTED ANALYTE FOR THE PERIOD March 17, 1987 TO February 28, 1989.
DATA SOURCE: DP ASSOCIATES, RMA Database, July 19, 1990

SPSA-1f-3
EXPOSURE EVALUATIONS FOR REGULATED VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI OPN
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	
ALDRIN	1.5E+00	3.1E+06	1.5E+00	4.0E-01*	1.9E-07	4.0E-01*	5.8E-06
ATRAZINE	4.1E+04	0.0E+00	4.1E+04	0.0E+00	0.0E+00	0.0E+00	4.6E-14
BENZENE	8.6E+02	0.0E+00	8.6E+02	0.0E+00	0.0E+00	0.0E+00	1.3E-02
BENZOTHIAZOLE	3.9E+04	0.0E+00	3.9E+04	0.0E+00	0.0E+00	0.0E+00	4.7E-08
CARBON TETRACHLORIDE	2.0E+02	0.0E+00	2.0E+02	0.0E+00	0.0E+00	0.0E+00	2.4E-05
CHLORDANE	2.0E+01	0.0E+00	2.0E+01	0.0E+00	0.0E+00	0.0E+00	1.8E-08
CHLOROBENZENE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	2.3E-07
CHLOROFORM	4.0E+03	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	2.4E-02
CHLOROPHENYLMETHYL SULFIDE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	8.0E-08
CHLOROPHENYLMETHYL SULFONE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	4.4E-09
CHLOROPHENYLMETHYL SULFOXIDE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	4.8E-10
DIBROMOCHLOROPROPANE	1.8E+01	0.0E+00	1.8E+01	0.0E+00	0.0E+00	0.0E+00	8.5E-06
1,1-DICHLOROETHANE	2.8E+02	0.0E+00	2.8E+02	0.0E+00	0.0E+00	0.0E+00	2.7E-10
1,1-DICHLOROETHYLENE	4.3E+01	0.0E+00	4.3E+01	0.0E+00	0.0E+00	0.0E+00	6.5E-04
1,2-DICHLOROETHYLENE	1.7E+05	0.0E+00	1.7E+05	0.0E+00	0.0E+00	0.0E+00	0.0E+00
DICYCLOPENTADIENE	5.4E+04	0.0E+00	5.4E+04	0.0E+00	0.0E+00	0.0E+00	2.3E-04
DIELDRIN	1.6E+00	1.0E+06	1.6E+00	1.3E+01*	2.0E-05a	1.3E+01*	0.0E+00
DIISOPROPYLMETHYL PHOSPHONATE	6.6E+05	0.0E+00	6.6E+05	0.0E+00	0.0E+00	0.0E+00	1.4E-09
DIMETHYLDISULFIDE	6.7E+04	0.0E+00	6.7E+04	0.0E+00	0.0E+00	0.0E+00	6.7E-06
DIMETHYMETHYL PHOSPHONATE	1.5E+05	0.0E+00	1.5E+05	0.0E+00	0.0E+00	0.0E+00	0.0E+00
DITHIANE	8.3E+04	0.0E+00	8.3E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENDRIN	2.5E+03	1.0E+06	2.5E+03	3.6E-03	7.8E-09a	3.6E-03	0.0E+00
ETHYLBENZENE	8.3E+05	0.0E+00	8.3E+05	0.0E+00	0.0E+00	0.0E+00	1.4E-08
HEXACHLOROCYCLOPENTADIENE	1.7E+04	1.2E+06	1.6E+04	6.0E-04	8.2E-06	6.1E-04	7.0E-06
ISODRIN	5.8E+02	2.3E+08	5.8E+02	3.5E-03	8.8E-09	3.5E-03	0.0E+00
MALATHION	1.7E+05	0.0E+00	1.7E+05	0.0E+00	0.0E+00	0.0E+00	3.7E-15
METHYLISOBUTYL KETONE	4.1E+05	0.0E+00	4.1E+05	0.0E+00	0.0E+00	0.0E+00	9.8E-07
METHYLENE CHLORIDE	3.3E+03	0.0E+00	3.3E+03	0.0E+00	0.0E+00	0.0E+00	2.3E-04
1,4-OXATHIANE	2.5E+05	0.0E+00	2.5E+05	0.0E+00	0.0E+00	0.0E+00	0.0E+00
PARATHION	5.0E+04	0.0E+00	5.0E+04	0.0E+00	0.0E+00	0.0E+00	3.5E-12
SUPONA	1.2E+03	0.0E+00	1.2E+03	0.0E+00	0.0E+00	0.0E+00	8.7E-15
TETRACHLOROETHYLENE	5.1E+02	0.0E+00	5.1E+02	0.0E+00	0.0E+00	0.0E+00	1.2E-05
TOLUENE	2.5E+06	0.0E+00	2.5E+06	0.0E+00	0.0E+00	0.0E+00	1.6E-07
1,1,1-TRICHLOROETHANE	7.5E+05	0.0E+00	7.5E+05	0.0E+00	0.0E+00	0.0E+00	1.1E-08
TRICHLOROETHYLENE	2.3E+03	0.0E+00	2.3E+03	0.0E+00	0.0E+00	0.0E+00	3.3E-05
M-XYLENE	1.4E+07	0.0E+00	1.4E+07	0.0E+00	0.0E+00	0.0E+00	2.9E-08
O,P-XYLENE	1.4E+07	0.0E+00	1.4E+07	0.0E+00	0.0E+00	0.0E+00	2.6E-08
MERCURY	3.3E+03	0.0E+00	3.3E+03	5.4E-05	0.0E+00	5.4E-05	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPPLV for this contaminant is considered to be equal to pure compound. The SPPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-1f-4
EXPOSURE EVALUATIONS FOR CASUAL VISITORS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI OPN
ALDRIN	1.5E+00	3.1E+06	1.5E+00	4.0E-01*	1.9E-07	4.0E-01*	5.8E-06
ATRAZINE	4.1E+04	0.0E+00	4.1E+04	0.0E+00	0.0E+00	0.0E+00	4.6E-14
BENZENE	8.6E+02	0.0E+00	8.6E+02	0.0E+00	0.0E+00	0.0E+00	1.3E-02
BENZOTHAZOLE	3.9E+04	0.0E+00	3.9E+04	0.0E+00	0.0E+00	0.0E+00	4.7E-08
CARBON TETRACHLORIDE	2.0E+02	0.0E+00	2.0E+02	0.0E+00	0.0E+00	0.0E+00	2.4E-05
CHLORDANE	2.0E+01	0.0E+00	2.0E+01	0.0E+00	0.0E+00	0.0E+00	1.8E-08
CHLOROBENZENE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	2.3E-07
CHLOROFORM	4.0E+03	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	2.4E-02
CHLOROPHENYLMETHYL SULFIDE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	8.0E-08
CHLOROPHENYLMETHYL SULFONE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	4.4E-09
CHLOROPHENYLMETHYL SULFOXIDE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	4.8E-10
DIBROMOCHLOROPROPANE	1.8E+01	0.0E+00	1.8E+01	0.0E+00	0.0E+00	0.0E+00	8.5E-06
1,1-DICHLOROETHANE	2.8E+02	0.0E+00	2.8E+02	0.0E+00	0.0E+00	0.0E+00	2.7E-10
1,1-DICHLOROETHYLENE	4.3E+01	0.0E+00	4.3E+01	0.0E+00	0.0E+00	0.0E+00	6.5E-04
1,2-DICHLOROETHYLENE	1.7E+05	0.0E+00	1.7E+05	0.0E+00	0.0E+00	0.0E+00	0.0E+00
DICYCLOPENTADIENE	5.4E+04	0.0E+00	5.4E+04	0.0E+00	0.0E+00	0.0E+00	2.3E-04
DIELDRIN	1.6E+00	1.0E+06	1.6E+00	1.3E+01*	2.0E-05a	1.3E+01*	0.0E+00
DIISOPROPYLMETHYL PHOSPHONATE	6.6E+05	0.0E+00	6.6E+05	0.0E+00	0.0E+00	0.0E+00	1.4E-09
DIMETHYLDISULFIDE	6.7E+04	0.0E+00	6.7E+04	0.0E+00	0.0E+00	0.0E+00	6.7E-06
DIMETHYLMETHYL PHOSPHONATE	1.5E+05	0.0E+00	1.5E+05	0.0E+00	0.0E+00	0.0E+00	0.0E+00
DITHIANE	8.3E+04	0.0E+00	8.3E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENDRIN	2.5E+03	1.0E+06	2.5E+03	3.6E-03	7.8E-09a	3.6E-03	0.0E+00
ETHYLBENZENE	8.3E+05	0.0E+00	8.3E+05	0.0E+00	0.0E+00	0.0E+00	1.4E-08
HEXACHLOROCYCLOPENTADIENE	1.7E+04	1.2E+06	1.6E+04	6.0E-04	8.2E-06	6.1E-04	7.0E-06
ISODRIN	5.8E+02	2.3E+08	5.8E+02	3.5E-03	8.8E-09	3.5E-03	0.0E+00
MALATHION	1.7E+05	0.0E+00	1.7E+05	0.0E+00	0.0E+00	0.0E+00	3.7E-15
METHYLISOBUTYL KETONE	4.1E+05	0.0E+00	4.1E+05	0.0E+00	0.0E+00	0.0E+00	9.8E-07
METHYLENE CHLORIDE	3.3E+03	0.0E+00	3.3E+03	0.0E+00	0.0E+00	0.0E+00	2.3E-04
1,4-OXATHIANE	2.5E+05	0.0E+00	2.5E+05	0.0E+00	0.0E+00	0.0E+00	0.0E+00
PARATHION	5.0E+04	0.0E+00	5.0E+04	0.0E+00	0.0E+00	0.0E+00	3.5E-12
SUPONA	1.2E+03	0.0E+00	1.2E+03	0.0E+00	0.0E+00	0.0E+00	8.7E-15
TETRACHLOROETHYLENE	5.1E+02	0.0E+00	5.1E+02	0.0E+00	0.0E+00	0.0E+00	1.2E-05
TOLUENE	2.5E+06	0.0E+00	2.5E+06	0.0E+00	0.0E+00	0.0E+00	1.6E-07
1,1,1-TRICHLOROETHANE	7.5E+05	0.0E+00	7.5E+05	0.0E+00	0.0E+00	0.0E+00	1.1E-08
TRICHLOROETHYLENE	2.3E+03	0.0E+00	2.3E+03	0.0E+00	0.0E+00	0.0E+00	3.3E-05
M-XYLENE	1.4E+07	0.0E+00	1.4E+07	0.0E+00	0.0E+00	0.0E+00	2.9E-08
O,P-XYLENE	1.4E+07	0.0E+00	1.4E+07	0.0E+00	0.0E+00	0.0E+00	2.6E-08
MERCURY	3.3E+03	0.0E+00	3.3E+03	5.4E-05	0.0E+00	5.4E-05	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPPLV for this contaminant is considered to be equal to pure compound. The SPPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-1f-5
EXPOSURE EVALUATIONS FOR RECREATIONAL VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	OPN
ALDRIN	2.1E-01	2.1E+05	2.1E-01	2.9E+00*	2.9E-06	2.9E+00*	8.8E-05
ATRAZINE	1.8E+04	0.0E+00	1.8E+04	0.0E+00	0.0E+00	0.0E+00	3.0E-13
BENZENE	1.2E+02	0.0E+00	1.2E+02	0.0E+00	0.0E+00	0.0E+00	2.0E-01
BENZOTHAZOLE	1.7E+04	0.0E+00	1.7E+04	0.0E+00	0.0E+00	0.0E+00	3.1E-07
CARBON TETRACHLORIDE	2.7E+01	0.0E+00	2.7E+01	0.0E+00	0.0E+00	0.0E+00	3.7E-04
CHLORDANE	2.7E+00	0.0E+00	2.7E+00	0.0E+00	0.0E+00	0.0E+00	2.8E-07
CHLOROBENZENE	6.8E+04	0.0E+00	6.8E+04	0.0E+00	0.0E+00	0.0E+00	1.5E-06
CHLOROFORM	5.6E+02	0.0E+00	5.6E+02	0.0E+00	0.0E+00	0.0E+00	3.7E-01
CHLOROPHENYLMETHYL SULFIDE	7.0E+04	0.0E+00	7.0E+04	0.0E+00	0.0E+00	0.0E+00	5.2E-07
CHLOROPHENYLMETHYL SULFONE	7.0E+04	0.0E+00	7.0E+04	0.0E+00	0.0E+00	0.0E+00	2.8E-08
CHLOROPHENYLMETHYL SULFOXIDE	7.0E+04	0.0E+00	7.0E+04	0.0E+00	0.0E+00	0.0E+00	3.1E-09
DIBROMOCHLOROPROPANE	2.5E+00	0.0E+00	2.5E+00	0.0E+00	0.0E+00	0.0E+00	1.3E-04
1,1-DICHLOROETHANE	3.9E+01	0.0E+00	3.9E+01	0.0E+00	0.0E+00	0.0E+00	4.1E-09
1,1-DICHLOROETHYLENE	5.9E+00	0.0E+00	5.9E+00	0.0E+00	0.0E+00	0.0E+00	9.8E-03
1,2-DICHLOROETHYLENE	7.0E+04	0.0E+00	7.0E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
DICYCLOPENTADIENE	1.8E+04	0.0E+00	1.8E+04	0.0E+00	0.0E+00	0.0E+00	1.5E-03
DIELDRIN	2.2E-01	1.0E+06	2.2E-01	9.2E+01*	3.1E-04a	9.2E+01*	0.0E+00
DIISOPROPYLMETHYL PHOSPHONATE	2.8E+05	0.0E+00	2.8E+05	0.0E+00	0.0E+00	0.0E+00	9.3E-09
DIMETHYLDISULFIDE	2.9E+04	0.0E+00	2.9E+04	0.0E+00	0.0E+00	0.0E+00	4.3E-05
DIMETHYLMETHYL PHOSPHONATE	6.3E+04	0.0E+00	6.3E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
DITHIANE	3.5E+04	0.0E+00	3.5E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENDRIN	1.1E+03	1.0E+06	1.1E+03	8.5E-03	5.0E-08a	8.5E-03	0.0E+00
ETHYLBENZENE	3.5E+05	0.0E+00	3.5E+05	0.0E+00	0.0E+00	0.0E+00	9.3E-08
HEXACHLOROCYCLOPENTADIENE	5.7E+03	4.1E+03	2.4E+03	1.8E-03	2.4E-03	4.2E-03	4.5E-05
ISODRIN	2.5E+02	3.5E+07	2.5E+02	8.1E-03	5.7E-08	8.1E-03	0.0E+00
MALATHION	7.0E+04	0.0E+00	7.0E+04	0.0E+00	0.0E+00	0.0E+00	2.4E-14
METHYLISOBUTYL KETONE	1.7E+05	0.0E+00	1.7E+05	0.0E+00	0.0E+00	0.0E+00	6.3E-06
METHYLENE CHLORIDE	4.5E+02	0.0E+00	4.5E+02	0.0E+00	0.0E+00	0.0E+00	3.5E-03
1,4-OXATHIANE	1.1E+05	0.0E+00	1.1E+05	0.0E+00	0.0E+00	0.0E+00	0.0E+00
PARATHION	2.1E+04	0.0E+00	2.1E+04	0.0E+00	0.0E+00	0.0E+00	2.3E-11
SUPONA	5.3E+02	0.0E+00	5.3E+02	0.0E+00	0.0E+00	0.0E+00	5.6E-14
TETRACHLOROETHYLENE	7.1E+01	0.0E+00	7.1E+01	0.0E+00	0.0E+00	0.0E+00	1.8E-04
TOLUENE	1.1E+06	0.0E+00	1.1E+06	0.0E+00	0.0E+00	0.0E+00	1.0E-06
1,1,1-TRICHLOROETHANE	3.2E+05	0.0E+00	3.2E+05	0.0E+00	0.0E+00	0.0E+00	7.0E-08
TRICHLOROETHYLENE	3.2E+02	0.0E+00	3.2E+02	0.0E+00	0.0E+00	0.0E+00	5.0E-04
M-XYLENE	5.8E+06	0.0E+00	5.8E+06	0.0E+00	0.0E+00	0.0E+00	1.9E-07
O,P-XYLENE	5.8E+06	0.0E+00	5.8E+06	0.0E+00	0.0E+00	0.0E+00	1.7E-07
MERCURY	2.0E+03	0.0E+00	2.0E+03	9.1E-05	0.0E+00	9.1E-05	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPLV for this contaminant is considered to be equal to pure compound. The SPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-1f-6
EXPOSURE EVALUATIONS FOR COMMERCIAL WORKERS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI ENC
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	
ALDRIN	1.9E+00	1.3E+02	1.9E+00	3.2E-01*	4.8E-03	3.2E-01*	2.7E+00
ATRAZINE	2.3E+04	0.0E+00	2.3E+04	0.0E+00	0.0E+00	0.0E+00	6.3E-08
BENZENE	1.1E+03	0.0E+00	1.1E+03	0.0E+00	0.0E+00	0.0E+00	6.1E+03
BENZOTHAZOLE	2.2E+04	0.0E+00	2.2E+04	0.0E+00	0.0E+00	0.0E+00	6.5E-02
CARBON TETRACHLORIDE	2.5E+02	0.0E+00	2.5E+02	0.0E+00	0.0E+00	0.0E+00	1.1E+01
CHLORDANE	2.5E+01	0.0E+00	2.5E+01	0.0E+00	0.0E+00	0.0E+00	8.4E-03
CHLOROBENZENE	8.8E+04	0.0E+00	8.8E+04	0.0E+00	0.0E+00	0.0E+00	3.2E-01
CHLOROFORM	5.1E+03	0.0E+00	5.1E+03	0.0E+00	0.0E+00	0.0E+00	1.1E+04
CHLOROPHENYLMETHYL SULFIDE	9.1E+04	0.0E+00	9.1E+04	0.0E+00	0.0E+00	0.0E+00	1.1E-01
CHLOROPHENYLMETHYL SULFONE	9.1E+04	0.0E+00	9.1E+04	0.0E+00	0.0E+00	0.0E+00	6.0E-03
CHLOROPHENYLMETHYL SULFOXIDE	9.1E+04	0.0E+00	9.1E+04	0.0E+00	0.0E+00	0.0E+00	6.6E-04
DIBROMOCHLOROPROPANE	2.3E+01	0.0E+00	2.3E+01	0.0E+00	0.0E+00	0.0E+00	3.9E+00
1,1-DICHLOROETHANE	3.6E+02	0.0E+00	3.6E+02	0.0E+00	0.0E+00	0.0E+00	1.2E-04
1,1-DICHLOROETHYLENE	5.4E+01	0.0E+00	5.4E+01	0.0E+00	0.0E+00	0.0E+00	3.0E+02
1,2-DICHLOROETHYLENE	9.2E+04	0.0E+00	9.2E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
DICYCLOPENTADIENE	1.7E+04	0.0E+00	1.7E+04	0.0E+00	0.0E+00	0.0E+00	3.2E+02
DIELDRIN	2.0E+00	5.8E+01	1.9E+00	1.0E+01*	3.5E-01*	1.0E+01*	0.0E+00
DIISOPROPYLMETHYL PHOSPHONATE	3.7E+05	0.0E+00	3.7E+05	0.0E+00	0.0E+00	0.0E+00	2.0E-03
DIMETHYLDISULFIDE	3.7E+04	0.0E+00	3.7E+04	0.0E+00	0.0E+00	0.0E+00	9.2E+00
DIMETHYLMETHYL PHOSPHONATE	8.2E+04	0.0E+00	8.2E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
DITHIANE	4.6E+04	0.0E+00	4.6E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENDRIN	1.4E+03	1.0E+06	1.5E+03	6.5E-03	5.8E-04a	7.1E-03	0.0E+00
ETHYLBENZENE	4.6E+05	0.0E+00	4.6E+05	0.0E+00	0.0E+00	0.0E+00	2.0E-02
HEXACHLOROCYCLOPENTADIENE	5.5E+03	1.6E+01	1.6E+01	1.8E-03	6.2E-01*	6.2E-01*	9.7E+00
ISODRIN	3.2E+02	3.0E+03	2.9E+02	6.2E-03	6.6E-04	6.9E-03	0.0E+00
MALATHION	9.2E+04	0.0E+00	9.2E+04	0.0E+00	0.0E+00	0.0E+00	5.1E-09
METHYLISOBUTYL KETONE	2.2E+05	0.0E+00	2.2E+05	0.0E+00	0.0E+00	0.0E+00	1.4E+00
METHYLENE CHLORIDE	4.1E+03	0.0E+00	4.1E+03	0.0E+00	0.0E+00	0.0E+00	1.1E+02
1,4-OXATHIANE	1.4E+05	0.0E+00	1.4E+05	0.0E+00	0.0E+00	0.0E+00	0.0E+00
PARATHION	2.7E+04	0.0E+00	2.7E+04	0.0E+00	0.0E+00	0.0E+00	4.8E-06
SUPONA	6.9E+02	0.0E+00	6.9E+02	0.0E+00	0.0E+00	0.0E+00	1.2E-08
TETRACHLOROETHYLENE	6.5E+02	0.0E+00	6.5E+02	0.0E+00	0.0E+00	0.0E+00	5.6E+00
TOLUENE	1.4E+06	0.0E+00	1.4E+06	0.0E+00	0.0E+00	0.0E+00	2.2E-01
1,1,1-TRICHLOROETHANE	4.2E+05	0.0E+00	4.2E+05	0.0E+00	0.0E+00	0.0E+00	1.5E-02
TRICHLOROETHYLENE	2.9E+03	0.0E+00	2.9E+03	0.0E+00	0.0E+00	0.0E+00	1.5E+01
M-XYLENE	7.0E+06	0.0E+00	7.0E+06	0.0E+00	0.0E+00	0.0E+00	4.1E-02
O,P-XYLENE	7.0E+06	0.0E+00	7.0E+06	0.0E+00	0.0E+00	0.0E+00	3.6E-02
MERCURY	1.4E+03	0.0E+00	1.4E+03	1.3E-04	0.0E+00	1.3E-04	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPPLV for this contaminant is considered to be equal to pure compound. The SPPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-1f-7
EXPOSURE EVALUATIONS FOR INDUSTRIAL WORKERS

CONTAMINANT	DIRECT	INDIRECT		CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI	
	PPLV (mg/kg)	OSVI (mg/kg)	ESVI (mg/kg)	PPLV (mg/kg)	EI	EI	EI	OPN	ENC
ALDRIN	1.2E-01	4.2E+05	4.2E+01	1.2E-01	5.2E+00*	1.4E-02	5.2E+00*	4.4E-05	8.0E+00
ATRAZINE	4.2E+03	0.0E+00	0.0E+00	4.2E+03	0.0E+00	0.0E+00	0.0E+00	3.4E-13	6.3E-08
BENZENE	6.7E+01	0.0E+00	0.0E+00	6.7E+01	0.0E+00	0.0E+00	0.0E+00	9.9E-02	1.8E+04
BENZOTHAZOLE	4.0E+03	0.0E+00	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	3.5E-07	6.5E-02
CARBON TETRACHLORIDE	1.5E+01	0.0E+00	0.0E+00	1.5E+01	0.0E+00	0.0E+00	0.0E+00	1.8E-04	3.4E+01
CHLORDANE	1.5E+00	0.0E+00	0.0E+00	1.5E+00	0.0E+00	0.0E+00	0.0E+00	1.4E-07	2.5E-02
CHLOROBENZENE	1.5E+04	0.0E+00	0.0E+00	1.5E+04	0.0E+00	0.0E+00	0.0E+00	1.8E-06	3.2E-01
CHLOROFORM	3.1E+02	0.0E+00	0.0E+00	3.1E+02	0.0E+00	0.0E+00	0.0E+00	1.8E-01	3.4E+04
CHLOROPHENYLMETHYL SULFIDE	1.7E+04	0.0E+00	0.0E+00	1.7E+04	0.0E+00	0.0E+00	0.0E+00	6.0E-07	1.1E-01
CHLOROPHENYLMETHYL SULFONE	1.7E+04	0.0E+00	0.0E+00	1.7E+04	0.0E+00	0.0E+00	0.0E+00	3.3E-08	6.0E-03
CHLOROPHENYLMETHYL SULFOXIDE	1.7E+04	0.0E+00	0.0E+00	1.7E+04	0.0E+00	0.0E+00	0.0E+00	3.6E-09	6.6E-04
DIBROMOCHLOROPROPANE	1.4E+00	0.0E+00	0.0E+00	1.4E+00	0.0E+00	0.0E+00	0.0E+00	6.3E-05	1.2E+01
1,1-DICHLOROETHANE	2.3E+01	0.0E+00	0.0E+00	2.3E+01	0.0E+00	0.0E+00	0.0E+00	2.0E-09	3.7E-04
1,1-DICHLOROETHYLENE	3.2E+00	0.0E+00	0.0E+00	3.2E+00	0.0E+00	0.0E+00	0.0E+00	4.9E-03	8.9E+02
1,2-DICHLOROETHYLENE	1.7E+04	0.0E+00	0.0E+00	1.7E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
DICYCLOPENTADIENE	1.2E+03	0.0E+00	0.0E+00	1.2E+03	0.0E+00	0.0E+00	0.0E+00	1.7E-03	3.2E+02
DIELDRIN	1.2E-01	1.3E+05	1.9E+01	1.2E-01	1.6E+02*	1.0E+00*	1.6E+02*	0.0E+00	0.0E+00
DIISOPROPYLMETHYL PHOSPHONATE	6.8E+04	0.0E+00	0.0E+00	6.8E+04	0.0E+00	0.0E+00	0.0E+00	1.1E-08	2.0E-03
DIMETHYLDISULFIDE	6.9E+03	0.0E+00	0.0E+00	6.9E+03	0.0E+00	0.0E+00	0.0E+00	5.0E-05	9.2E+00
DIMETHYLMETHYL PHOSPHONATE	1.5E+04	0.0E+00	0.0E+00	1.5E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ETHANETHIOLAN	8.5E+03	0.0E+00	0.0E+00	8.5E+03	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ETHANETHIOLAN IN	2.5E+02	1.0E+06	1.0E+06	2.5E+02	3.5E-02	5.8E-04a	3.6E-02	0.0E+00	0.0E+00
ETHYLBENZENE	8.5E+04	0.0E+00	0.0E+00	8.5E+04	0.0E+00	0.0E+00	0.0E+00	1.1E-07	2.0E-02
HEXACHLOROCYCLOPENTADIENE	3.8E+02	1.6E+05	3.2E-01	3.2E-01	2.6E-02	3.1E+01*	3.1E+01*	5.3E-05	9.7E+00
ISODRIN	5.9E+01	3.0E+07	3.0E+03	5.8E+01	3.4E-02	6.6E-04	3.4E-02	0.0E+00	0.0E+00
MALATHION	1.7E+04	0.0E+00	0.0E+00	1.7E+04	0.0E+00	0.0E+00	0.0E+00	2.8E-14	5.1E-09
METHYL ISOBUTYL KETONE	4.0E+04	0.0E+00	0.0E+00	4.0E+04	0.0E+00	0.0E+00	0.0E+00	7.3E-06	1.4E+00
METHYLENE CHLORIDE	2.5E+02	0.0E+00	0.0E+00	2.5E+02	0.0E+00	0.0E+00	0.0E+00	1.7E-03	3.2E+02
1,4-OXATHIANE	2.5E+04	0.0E+00	0.0E+00	2.5E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
PARATHION	5.1E+03	0.0E+00	0.0E+00	5.1E+03	0.0E+00	0.0E+00	0.0E+00	2.6E-11	4.8E-06
SUPONA	1.3E+02	0.0E+00	0.0E+00	1.3E+02	0.0E+00	0.0E+00	0.0E+00	6.6E-14	1.2E-08
TETRACHLOROETHYLENE	4.1E+01	0.0E+00	0.0E+00	4.1E+01	0.0E+00	0.0E+00	0.0E+00	9.2E-05	1.7E+01
TOLUENE	2.6E+05	0.0E+00	0.0E+00	2.6E+05	0.0E+00	0.0E+00	0.0E+00	1.2E-06	2.2E-01
1,1,1-TRICHLOROETHANE	7.8E+04	0.0E+00	0.0E+00	7.8E+04	0.0E+00	0.0E+00	0.0E+00	8.1E-08	1.5E-02
TRICHLOROETHYLENE	1.8E+02	0.0E+00	0.0E+00	1.8E+02	0.0E+00	0.0E+00	0.0E+00	2.5E-04	4.6E+01
M-XYLENE	8.8E+05	0.0E+00	0.0E+00	8.8E+05	0.0E+00	0.0E+00	0.0E+00	2.2E-07	4.1E-02
O,P-XYLENE	8.8E+05	0.0E+00	0.0E+00	8.8E+05	0.0E+00	0.0E+00	0.0E+00	1.9E-07	3.6E-02
MERCURY	4.6E+02	0.0E+00	0.0E+00	4.6E+02	3.9E-04	0.0E+00	3.9E-04	0.0E+00	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPLV for this contaminant is considered to be equal to pure compound. The SPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

if the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

2.7 SITE SPSA-1g: BALANCE OF SPSA-1 (formerly Site 1-13/2-18: South Plants Manufacturing Complex/Shell Chemical Company Spill Sites; EBASCO, 1988y/RIC 88286R07; Army Spill Sites/South Plants Manufacturing Complex; EBASCO, 1988aa/RIC 88286R10; South Plants Regional Study Area/South Plants Manufacturing Complex; EBASCO, 1988z/RIC 88306R01; Section 1-Uncontaminated Area; EBASCO, 1987o/RIC 87127R06; Section 1-Nonsource Area; EBASCO, 1988x/RIC 87127R06A; Site 1-5: Lime Pits; EBASCO, 1987a/RIC 87006R15 and EBASCO, 1988d/RIC 87006R15A; Site 1-3: Mounded Material; EBASCO, 1988b/RIC 88046R04A)

2.7.1 Site-Specific Considerations

Figure SPSA-1g-1 and Tables SPSA-1g-1 and SPSA-1g-2 depict the target contaminants for Site SPSA-1g. Borings D201, S101, U101, and U201 from the Shell Spill sites; 1 (SPRS), 32 (SPRS), 33 (SPRS), 39 (SPRS), 42 (SPRS) through 46 (SPRS), and 49 (SPRS) from the South Plants Regional Study; 1 (SPRS), 36, 37, and 50 from the Army Spill sites; 13 from Section 1-Uncontaminated Area; and 9 from Site 1-5 were included in this exposure assessment, consistent with the South Plants SAR. The historical search conducted under the contaminant assessment revealed that numerous spills and leaks of various chemicals were suspected to have occurred at Site SPSA-1g (EBASCO, 1988y/RIC 88286R07). Some of these chemicals were detected in the soil during the Phase I and Phase II investigations (EBASCO, 1988y/RIC 88286R07; EBASCO, 1988aa/RIC 88286R10; EBASCO, 1988z/RIC 88306R01; EBASCO, 1987o/RIC 87127R06; EBASCO, 1988m/RIC 87127R06A; EBASCO, 1987a/RIC 87006R15; and EBASCO, 1988d/RIC 87006R15A).

2.7.2 Spatial Distribution of Measured Contaminant Concentrations

The locations and concentrations of the target contaminants that were detected in Site SPSA-1g are shown in Figure SPSA-1g-1. The following contaminants were not included in this figure, since they were not considered target contaminants during Phase I and Phase II investigations: Fluoranthene, occurring in Boring 42 (SPRS) (0-1 ft) and 32 (SPRS) (0-1 ft); pyrene, occurring in Borings 42 (SPRS) (0-1 ft) and 32 (SPRS) (0-1 ft); 4-hydroxy-4-methyl-2-pentanone, occurring in Boring U201 (4-5 and 9-10 ft); and 1,1,2,2-tetrachloroethane, occurring in Boring S101 (4-5 ft). Although not shown in this figure, these nontarget compounds were included in the South Plants SAR and in this exposure assessment because they passed through the screening process performed in the RMA Chemical Index (EBASCO, 1988c/RIC 88357R01).

Table SPSA-1g-1 summarizes the maximum concentrations of contaminants measured in soil above indicator levels for the ICP metals, arsenic, and mercury and CRLs for organic contaminants from the Phase I and Phase II investigations. The boring number and depth where the maximum value was observed are shown. No data were included for ICP metals, arsenic, and mercury in Horizon 2 because direct soil exposure below 10 ft is assumed to be negligible (see Volume VI-A). Table SPSA-1g-2 summarizes the maximum concentrations detected in groundwater together with the well number, location, sampling interval, and depth to groundwater.

2.7.3 Site Exposure Summary

Tables SPSA-1g-3 through SPSA-1g-7 present Draft PPLVs, EIs, and VEIs for each site contaminant. Since the depth to groundwater below Site SPSA-1g is greater than 10 ft, the enclosed space vapor inhalation SPPPLV is included in the calculation of the cumulative quantity. The COCs are summarized below for each exposed population and with the critical exposure pathway identified.

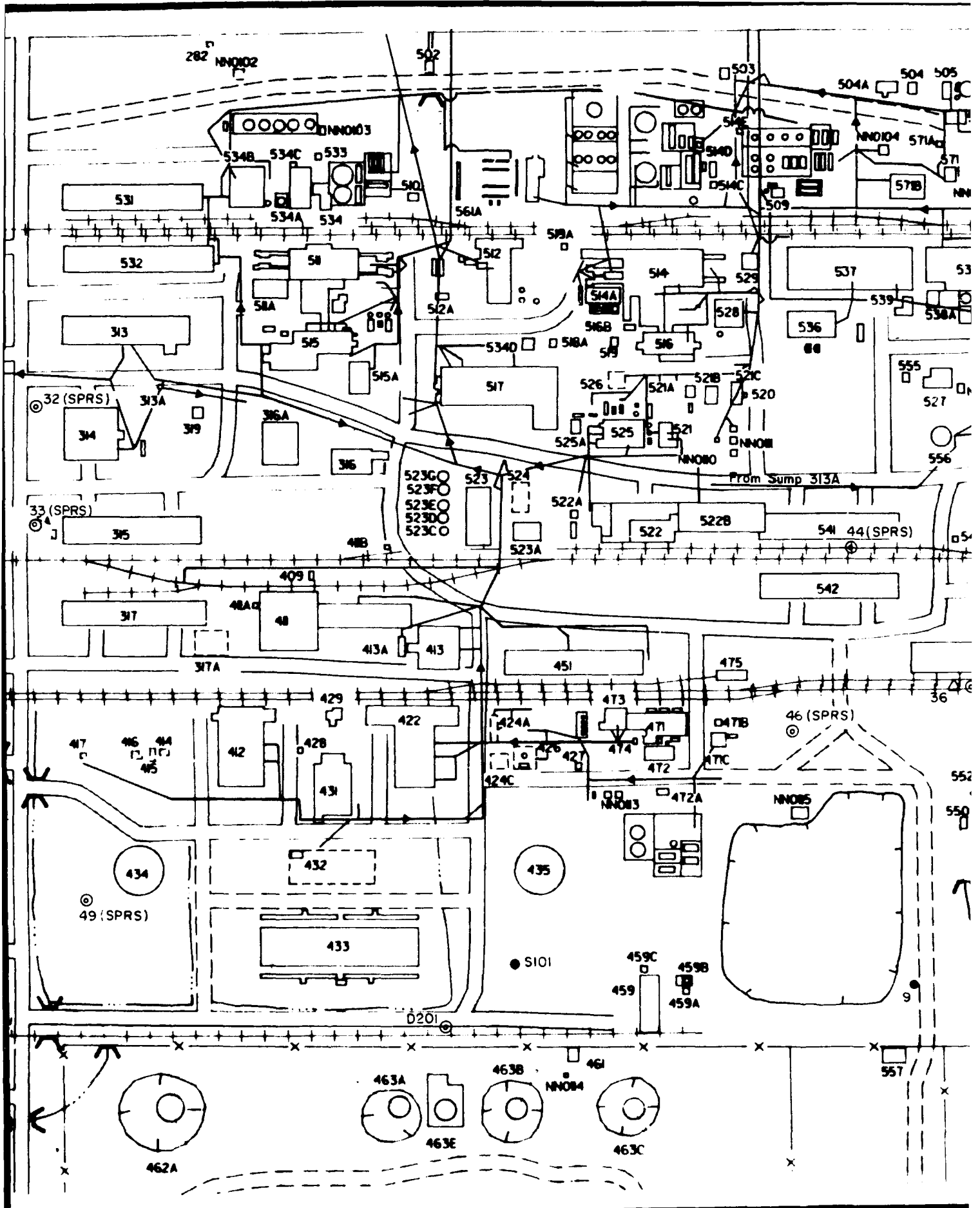
Contaminants of Concern	Regulated Visitor	Casual Visitor	Recreational Visitor	Commercial Worker	Industrial Worker
Aldrin	Direct	Direct	Direct	Direct	Direct
Dieldrin	Direct	Direct	Direct	Dir/Ind	Dir/Ind
Arsenic	Direct	Direct	Direct	Direct	Direct
Chromium	Direct	Direct	Direct	Direct	Direct
Cadmium	--	--	Direct	--	Direct
Lead	--	--	Direct	Direct	Direct
Benzene	--	--	--	Indirect	Dir/Ind
Chloroform	--	--	--	Indirect	Indirect
Methylisobutyl ketone	--	--	--	Indirect	--
1,1,2,2-Tetrachloroethane	--	--	--	Indirect	Indirect
Methylene chloride	--	--	--	Indirect	Indirect

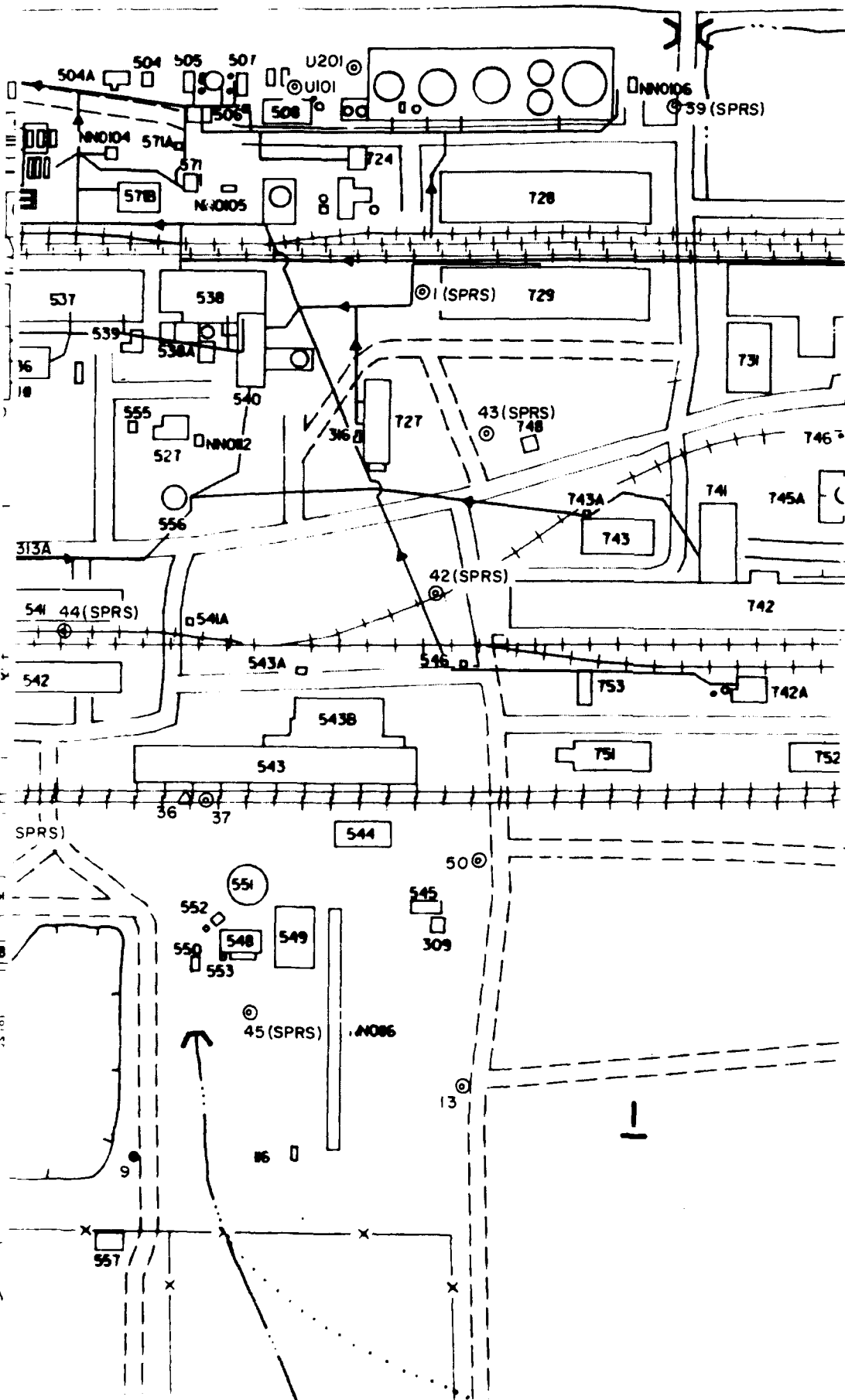
Note: Direct exposure pathways for soils include soil ingestion, suspended particulate inhalation, and dermal contact.
Indirect exposure pathways include open and enclosed space vapor inhalation.

The results of the soil exposure summary indicate that exposure to contamination from the direct and indirect pathways both contribute to the exceedance of the cumulative PPLVs. Site SPSA-1g is designated as a Priority 1 site, based on the most sensitive exposed population PPLV (i.e., the industrial worker).

The following groundwater contaminants result in an unacceptable exposure due to vapor inhalation as indicated by a VEI value greater than 1:

- Benzene (enclosed)
- Carbon tetrachloride (open, enclosed)
- Chloroform (enclosed)
- Dibromochloropropane (enclosed)
- 1,1-Dichloroethylene (enclosed)
- Hexachlorocyclopentadiene (enclosed)
- Methylene chloride (enclosed)
- Tetrachloroethylene (enclosed)
- 1,1,2-Trichloroethane (enclosed)
- Trichloroethylene (enclosed)





U)

D201

0.3-1.3	Bedrock	As	4.1
4-5		Cu	38
		Zn	97

5101

0-1	Cu	23
4-5	Cu	27
9-10	Benzene	8
	Cd	1.2
	Cu	25

U101

0-1	Dieldrin	1
	Hg	.22
4-5	Hg	71
9-10	CHCL3	1
	Hg	.12

U201

0-1	BHL	
4-5	CH2CL2	1
	MIBK	10
9-10	MIBK	30

1 (SPRS)

0-1	Cu	23
	Hg	0.41
4-5	Aldrin	0.3
	Dieldrin	2
9-10	BHL	

9

2-3	BHL	
4-5	BHL	
7-8	BHL	
9-10	As	1.2
14-15	BHL	
19-20	BHL	

Bedrock →

13

0-1	BHL	
2-3	BHL	
4-5	BHL	

32 (SPRS)

0-1	Dieldrin	20
	Endrin	2
	Cu	27
	Pb	52
	Zn	95
4-5	Cu	23
	Zn	64

33 (SPRS)

0-1	Dieldrin	1
	Cu	30
	Pb	30
	Zn	94
	Hg	6.0
4-5	Cu	29
	Zn	80
	Hg	0.070

3h

Surface	Cr	4.3
	Cr	260
	Cu	440
	Pb	1100
	Zn	160
	As	50

37

0-1	Cr	4.1
	Cr	3500
	Cu	240
	Pb	580
	Zn	170
	As	11
	Hg	0.31
2.6-3.6	As	3.3
	Hg	0.062
4-5	BHL	
9-10	BHL	
14-15	BHL	
16.5-17.5	Cu	28
	Zn	79

39 (SPRS)

0-1	BHL	
4-5	Hg	2.6
9-10	BHL	
14-15	BHL	

42 (SPRS)

0-1	Dieldrin	6
	Cd	13
	Cr	29
	Cu	75
	Pb	94
	Zn	210
	As	9.9
	Hg	0.31
4-5	As	5.8

43 (SPRS)

0-1	Aldrin	0.3
	Dieldrin	2
	Zn	91
	As	4.1
	Hg	0.15
4-5	As	3.6

44 (SPRS)

0-1	BHL	
4-5	Cr	30
	Cu	50
	Pb	33
	Zn	79
	As	9.6
	Hg	0.11

45 (SPRS)

0-1	Dieldrin	4
	Isodrin	4
	Cr	25
	Cu	320
	Pb	76
	Zn	150
	Hg	3.2

46 (SPRS)

0-1	Dieldrin	0.4
	As	6.0
4-5	BHL	

49 (SPRS)

0-1	BHL	
3.8-4.8	Cu	80
	Zn	100

50

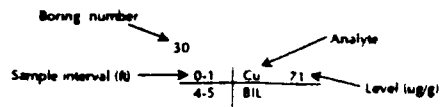
0-1	Dieldrin	1
	As	3.4
4-5	BHL	
9-10	BHL	
14-15	Cu	92
18-19	Benzene	0.9
	PCMPF	1
	CHCL3	2
	TCLF	0.4

Pr

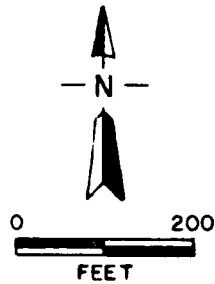
FI
PH
DI
IN
RO
PR

Legend

- 37 ⊙ Phase I Borings
- 9 ● Phase II Borings
- 36 △ Grab Sample



- BQFO - Bicyclohexadiene
- CHCL3 - Chloroform
- CH2CL2 - Methylene chloride
- MIBK - Methyl isobutyl ketone
- TCEEE - Tetrachloroethylene
- As - Arsenic
- Cd - Cadmium
- Cr - Chromium
- Cu - Copper
- Pb - Lead
- Hg - Mercury
- Zn - Zinc
- BIL - Below indicator level
- SPRS - Indicates South Plains Regional Study



Prepared for:

Program Manager's Office for
Rocky Mountain Arsenal Cleanup
Aberdeen Proving Ground, Maryland

FIGURE SPSA-1g-1
Phase I and Phase II Analytes
Detected Within or Above
Indicator Levels

Rocky Mountain Arsenal
Prepared by Ebasco Services Incorporated

TABLE SPSA-1g-1
SOIL CONTAMINANT CONCENTRATIONS
FOR SITE SPSA-1g

Contaminant	Horizon 1			Horizon 2		
	Max. (ug/g)	Depth (ft)	Boring Number	Max. (ug/g)	Depth (ft)	Boring Number
Aldrin	0.3	4-5	1(SPRS) ^{1/}	0.3	4-5	1(SPRS)
Benzene	8	0-1	43(SPRS)	8	0-1	43(SPRS)
Bicycloheptadiene	--	9-10	S101	1	9-10	S101
Chloroform	1	--	--	1	18-19	50
Dieldrin	20	9-10	U101	2	18-19	50
Endrin	2	0-1	32(SPRS)	20	0-1	32(SPRS)
Fluoroanthene ^{2/}	1.0	0-1	32(SPRS)	2	0-1	32(SPRS)
4-Hydroxy-4-methyl-2-pentanone ^{2/}	1.0	0-1	32(SPRS)	1.0	0-1	32
Isodrin	4	9-10	U201	1.0	9-10	U201
Methylene chloride	1	0-1	45(SPRS)	4	0-1	45(SPRS)
Methylisobutyl ketone	30	4-5	U201	1	4-5	U201
Pyrene ^{2/}	8.0	9-10	U201	30	9-10	U201
1,1,2,2-Tetrachloroethane ^{2/}	0.5	0-1	42(SPRS)	8.0	0-1	42
Tetrachloroethylene	--	4-5	S101	0.5	4-5	S101
Arsenic	50	--	--	0.4	18-19	50
Cadmium	13	surface	36	--	--	--
Chromium	3500	0-1	42(SPRS)	--	--	--
Copper	460	0-1	37	--	--	--
Lead	1100	surface	36	--	--	--
Mercury	6.0	surface	36(ARMSS) ^{3/}	--	--	--
Zinc	210	0-1	33(SPRS)	--	--	--
		0-1	42(SPRS)	--	--	--

TABLE SPSA-1g-1 (Continued)
SOIL CONTAMINANT CONCENTRATIONS
FOR SITE SPSA-1g

- 1/ SPRS South Plants Regional Study
2/ Nontarget contaminant. Refer to the exposure assessment nontarget screen in Appendix A.
3/ ARMSS Army spill sites

SPSA South Plants Study Area
Max. Maximum
ug/g microgram per gram
ft foot/feet

TABLE SPSA-1g-2

GROUNDWATER CONTAMINANT CONCENTRATIONS (UG/L)
FOR SITE SPSA-1g

AVERAGE SITE DEPTH TO GROUNDWATER: 16 Feet

CHEMICAL	CONCENTRATION MAXIMUM	LOCATION (WELL NUMBER)	SAMPLE DATE
1,1,1-TRICHLOROETHANE	28	01511	12/22/87
1,1,2-TRICHLOROETHANE	130	01061	01/3/89
1,1-DICHLOROETHYLENE	39	01061	01/3/89
1,1-DICHLOROETHANE	8.3	01061	01/3/89
1,2-DICHLOROETHYLENE	3.7	01012	01/29/88
M-XYLENE	2.1	01061	01/3/89
ALDRIN	0.73	01511	01/10/89
BICYCLOHEPTADIENE	2200	01527	04/18/88
BENZENE	3300	01061	01/3/89
CARBON TETRACHLORIDE	1500	01061	01/3/89
METHYLENE CHLORIDE	GT 200	01061	01/3/89
CHLOROFORM	45000	01061	01/3/89
HEXACHLOROCYCLOPENTADIENE	460	01061	01/3/89
CHLOROBENZENE	640	01061	01/3/89
CHLORDANE	11	01061	01/3/89
CHLOROPHENYLMETHYL SULFOXIDE	52	01020	01/5/89
CHLOROPHENYLMETHYL SULFONE	25	01020	01/5/89

EACH VALUE PRESENTED IS THE MAXIMUM CONCENTRATION FOR THE LISTED ANALYTE
FOR THE PERIOD March 17, 1987 TO February 28, 1989.

DATA SOURCE: DP ASSOCIATES, RMA Database, July 19, 1990

TABLE SPSA-1g-2
GROUNDWATER CONTAMINANT CONCENTRATIONS (UG/L)
FOR SITE SPSA-1g
AVERAGE SITE DEPTH TO GROUNDWATER: 16 Feet

CHEMICAL	CONCENTRATION MAXIMUM	LOCATION (WELL NUMBER)	SAMPLE DATE
DIBROMOCHLOROPROPANE	2300	01061	01/3/89
DIISOPROPYLMETHYL PHOSPHONATE	94	01020	01/5/89
DITHIANE	140	01020	01/5/89
DIELDRIN	15	01007	01/26/89
DIMETHYLMETHYL PHOSPHONATE	6.0	01061	01/3/89
ENDRIN	9.4	01007	01/26/89
ETHYLBENZENE	6.5	01061	01/3/89
ISODRIN	0.29	01061	01/3/89
TOLUENE	300	01511	01/10/89
MALATHION	0.59	01020	01/5/89
1,4-OXATHIANE	6.1	01061	01/3/89
PPDDE	0.074	01061	01/3/89
PPDDT	0.42	01510	12/16/88
SUPONA	2.1	01061	01/3/89
TETRACHLOROETHYLENE	1300	01501	03/21/88
TRICHLOROETHYLENE	710	01061	01/3/89
O,P-XYLENE	17	01061	01/3/89

EACH VALUE PRESENTED IS THE MAXIMUM CONCENTRATION FOR THE LISTED ANALYTE FOR THE PERIOD March 17, 1987 TO February 28, 1989.
DATA SOURCE: DP ASSOCIATES, RMA Database, July 19, 1990

EXPOSURE EVALUATIONS FOR REGULATED VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	OPN
ALDRIN	1.5E+00	4.9E+04	1.5E+00	2.0E-01*	6.2E-06	2.0E-01*	3.9E-06
BENZENE	8.6E+02	2.6E+03	6.5E+02	9.3E-03	3.0E-03	1.2E-02	2.2E-02
BICYCLOHEPTADIENE	3.2E+05	4.0E+05	1.8E+05	0.0E+00	2.5E-06	2.5E-06	1.2E-04
CARBON TETRACHLORIDE	2.0E+02	0.0E+00	2.0E+02	0.0E+00	0.0E+00	0.0E+00	1.7E-01
CHLORDANE	2.0E+01	0.0E+00	2.0E+01	0.0E+00	0.0E+00	0.0E+00	2.7E-06
CHLOROBENZENE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	3.6E-05
CHLOROFORM	4.0E+03	2.3E+03	1.5E+03	2.5E-04	8.6E-04	1.1E-03	4.4E-02
CHLOROPHENYLMETHYL SULFONE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	6.7E-10
CHLOROPHENYLMETHYL SULFOXIDE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	2.7E-09
PPODE	7.4E+01	0.0E+00	7.4E+01	0.0E+00	0.0E+00	0.0E+00	3.7E-08
PPDDT	7.4E+01	0.0E+00	7.4E+01	0.0E+00	0.0E+00	0.0E+00	1.5E-06
DIBROMOCHLOROPROPANE	1.8E+01	0.0E+00	1.8E+01	0.0E+00	0.0E+00	0.0E+00	3.1E-02
1,1-DICHLOROETHANE	2.8E+02	0.0E+00	2.8E+02	0.0E+00	0.0E+00	0.0E+00	1.5E-08
1,1-DICHLOROETHYLENE	4.3E+01	0.0E+00	4.3E+01	0.0E+00	0.0E+00	0.0E+00	5.8E-02
1,2-DICHLOROETHYLENE	1.7E+05	0.0E+00	1.7E+05	0.0E+00	0.0E+00	0.0E+00	0.0E+00
DIELDRIN	1.6E+00	1.0E+06	1.6E+00	1.3E+01*	9.0E-04a	1.3E+01*	0.0E+00
DIISOPROPYLMETHYL PHOSPHONATE	6.6E+05	0.0E+00	6.6E+05	0.0E+00	0.0E+00	0.0E+00	1.4E-08
DIMETHYLMETHYL PHOSPHONATE	1.5E+05	0.0E+00	1.5E+05	0.0E+00	0.0E+00	0.0E+00	0.0E+00
DITHIANE	8.3E+04	0.0E+00	8.3E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENDRIN	2.5E+03	1.0E+06	2.5E+03	8.1E-04	1.1E-07a	8.1E-04	0.0E+00
ETHYLBENZENE	8.3E+05	0.0E+00	8.3E+05	0.0E+00	0.0E+00	0.0E+00	3.0E-08
HEXACHLOROCYCLOPENTADIENE	1.7E+04	0.0E+00	1.7E+04	0.0E+00	0.0E+00	0.0E+00	2.6E-02
ISODRIN	5.8E+02	3.5E+06	5.8E+02	6.9E-03	1.1E-06	6.9E-03	6.4E-08
MALATHION	1.7E+05	0.0E+00	1.7E+05	0.0E+00	0.0E+00	0.0E+00	1.8E-13
METHYLISOBUTYL KETONE	4.1E+05	2.7E+05	1.6E+05	7.3E-05	1.1E-04	1.8E-04	0.0E+00
METHYLENE CHLORIDE	3.3E+03	3.6E+03	1.7E+03	3.1E-04	2.8E-04	5.8E-04	2.6E-04
1,4-OXATHIANE	2.5E+05	0.0E+00	2.5E+05	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SUPONA	1.2E+03	0.0E+00	1.2E+03	0.0E+00	0.0E+00	0.0E+00	4.8E-13
1,1,2,2-TETRACHLOROETHANE	1.3E+02	3.3E+02	9.2E+01	3.9E-03	1.5E-03	5.4E-03	0.0E+00
TETRACHLOROETHYLENE	5.1E+02	2.6E+04	5.0E+02	0.0E+00	1.5E-05	1.5E-05	3.7E-03
TOLUENE	2.5E+06	0.0E+00	2.5E+06	0.0E+00	0.0E+00	0.0E+00	3.0E-07
1,1,1-TRICHLOROETHANE	7.5E+05	0.0E+00	7.5E+05	0.0E+00	0.0E+00	0.0E+00	1.1E-07
1,1,2-TRICHLOROETHANE	4.3E+02	0.0E+00	4.3E+02	0.0E+00	0.0E+00	0.0E+00	3.3E-04
TRICHLOROETHYLENE	2.3E+03	0.0E+00	2.3E+03	0.0E+00	0.0E+00	0.0E+00	4.1E-03
M-XYLENE	1.4E+07	0.0E+00	1.4E+07	0.0E+00	0.0E+00	0.0E+00	1.3E-08
O,P-XYLENE	1.4E+07	0.0E+00	1.4E+07	0.0E+00	0.0E+00	0.0E+00	1.1E-07
ARSENIC	2.2E+01	0.0E+00	2.2E+01	2.3E+00*	0.0E+00	2.3E+00*	0.0E+00
CADMIUM	4.5E+02	0.0E+00	4.5E+02	2.9E-02	0.0E+00	2.9E-02	0.0E+00
CHROMIUM	6.9E+01	0.0E+00	6.9E+01	5.0E+01*	0.0E+00	5.0E+01*	0.0E+00
COPPER	4.2E+05	0.0E+00	4.2E+05	1.1E-03	0.0E+00	1.1E-03	0.0E+00
LEAD	1.5E+04	0.0E+00	1.5E+04	7.1E-02	0.0E+00	7.1E-02	0.0E+00
MERCURY	3.3E+03	0.0E+00	3.3E+03	1.8E-03	0.0E+00	1.8E-03	0.0E+00
ZINC	2.0E+06	0.0E+00	2.0E+06	1.1E-04	0.0E+00	1.1E-04	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPLV for this contaminant is considered to be equal to pure compound. The SPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

EXPOSURE EVALUATIONS FOR CASUAL VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI OPN
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI EI	EI EI	EI EI	
ALDRIN	1.5E+00	4.9E+04	1.5E+00	2.0E-01*	6.2E-06	2.0E-01*	3.9E-06
BENZENE	8.6E+02	2.6E+03	6.5E+02	9.3E-03	3.0E-03	1.2E-02	2.2E-02
BICYCLOHEPTADIENE	3.2E+05	4.0E+05	1.8E+05	0.0E+00	2.5E-06	2.5E-06	1.2E-04
CARBON TETRACHLORIDE	2.0E+02	0.0E+00	2.0E+02	0.0E+00	0.0E+00	0.0E+00	1.7E-01
CHLORDANE	2.0E+01	0.0E+00	2.0E+01	0.0E+00	0.0E+00	0.0E+00	2.7E-06
CHLOROBENZENE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	3.6E-05
CHLOROFORM	4.0E+03	2.3E+03	1.5E+03	2.5E-04	8.6E-04	1.1E-03	4.4E-02
CHLOROPHENYLMETHYL SULFONE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	6.7E-10
CHLOROPHENYLMETHYL SULFOXIDE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	2.7E-09
PPDE	7.4E+01	0.0E+00	7.4E+01	0.0E+00	0.0E+00	0.0E+00	3.7E-08
PPDT	7.4E+01	0.0E+00	7.4E+01	0.0E+00	0.0E+00	0.0E+00	1.5E-06
DIBROMOCHLOROPROPANE	1.8E+01	0.0E+00	1.8E+01	0.0E+00	0.0E+00	0.0E+00	3.1E-02
1,1-DICHLOROETHANE	2.8E+02	0.0E+00	2.8E+02	0.0E+00	0.0E+00	0.0E+00	1.5E-08
1,1-DICHLOROETHYLENE	4.3E+01	0.0E+00	4.3E+01	0.0E+00	0.0E+00	0.0E+00	5.8E-02
1,2-DICHLOROETHYLENE	1.7E+05	0.0E+00	1.7E+05	0.0E+00	0.0E+00	0.0E+00	0.0E+00
DIELDRIN	1.6E+00	1.0E+06	1.6E+00	1.3E+01*	9.0E-04a	1.3E+01*	0.0E+00
DIISOPROPYLMETHYL PHOSPHONATE	6.6E+05	0.0E+00	6.6E+05	0.0E+00	0.0E+00	0.0E+00	1.4E-08
DIMETHYLMETHYL PHOSPHONATE	1.5E+05	0.0E+00	1.5E+05	0.0E+00	0.0E+00	0.0E+00	0.0E+00
DITHIANE	8.3E+04	0.0E+00	8.3E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENDRIN	2.5E+03	1.0E+06	2.5E+03	8.1E-04	1.1E-07a	8.1E-04	0.0E+00
ETHYLBENZENE	8.3E+05	0.0E+00	8.3E+05	0.0E+00	0.0E+00	0.0E+00	3.0E-08
HEXACHLOROCYCLOPENTADIENE	1.7E+04	0.0E+00	1.7E+04	0.0E+00	0.0E+00	0.0E+00	2.6E-02
ISODRIN	5.8E+02	3.5E+06	5.8E+02	6.9E-03	1.1E-06	6.9E-03	6.4E-08
MALATHION	1.7E+05	0.0E+00	1.7E+05	0.0E+00	0.0E+00	0.0E+00	1.8E-13
METHYLISOBUTYL KETONE	4.1E+05	2.7E+05	1.6E+05	7.3E-05	1.1E-04	1.8E-04	0.0E+00
METHYLENE CHLORIDE	3.3E+03	3.6E+03	1.7E+03	3.1E-04	2.8E-04	5.8E-04	2.6E-04
1,4-OXATHIANE	2.5E+05	0.0E+00	2.5E+05	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SUPONA	1.2E+03	0.0E+00	1.2E+03	0.0E+00	0.0E+00	0.0E+00	4.8E-13
1,1,2,2-TETRACHLOROETHANE	1.3E+02	3.3E+02	9.2E+01	3.9E-03	1.5E-03	5.4E-03	0.0E+00
TETRACHLOROETHYLENE	5.1E+02	2.6E+04	5.0E+02	0.0E+00	1.5E-05	1.5E-05	3.7E-03
TOLUENE	2.5E+06	0.0E+00	2.5E+06	0.0E+00	0.0E+00	0.0E+00	3.0E-07
1,1,1-TRICHLOROETHANE	7.5E+05	0.0E+00	7.5E+05	0.0E+00	0.0E+00	0.0E+00	1.1E-07
1,1,2-TRICHLOROETHANE	4.3E+02	0.0E+00	4.3E+02	0.0E+00	0.0E+00	0.0E+00	3.3E-04
TRICHLOROETHYLENE	2.3E+03	0.0E+00	2.3E+03	0.0E+00	0.0E+00	0.0E+00	4.1E-03
M-XYLENE	1.4E+07	0.0E+00	1.4E+07	0.0E+00	0.0E+00	0.0E+00	1.3E-08
O,P-XYLENE	1.4E+07	0.0E+00	1.4E+07	0.0E+00	0.0E+00	0.0E+00	1.1E-07
ARSENIC	2.2E+01	0.0E+00	2.2E+01	2.3E+00*	0.0E+00	2.3E+00*	0.0E+00
CADMIUM	4.5E+02	0.0E+00	4.5E+02	2.9E-02	0.0E+00	2.9E-02	0.0E+00
CHROMIUM	6.9E+01	0.0E+00	6.9E+01	5.0E+01*	0.0E+00	5.0E+01*	0.0E+00
COPPER	4.2E+05	0.0E+00	4.2E+05	1.1E-03	0.0E+00	1.1E-03	0.0E+00
LEAD	1.5E+04	0.0E+00	1.5E+04	7.1E-02	0.0E+00	7.1E-02	0.0E+00
MERCURY	3.3E+03	0.0E+00	3.3E+03	1.8E-03	0.0E+00	1.8E-03	0.0E+00
ZINC	2.0E+06	0.0E+00	2.0E+06	1.1E-04	0.0E+00	1.1E-04	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPPLV for this contaminant is considered to be equal to pure compound. The SPPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-1g-5
EXPOSURE EVALUATIONS FOR RECREATIONAL VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI OPN
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	
ALDRIN	2.1E-01	3.2E+03	2.1E-01	1.4E+00*	9.3E-05	1.4E+00*	5.9E-05
BENZENE	1.2E+02	4.1E+02	9.3E+01	6.7E-02	2.0E-02	8.6E-02	3.3E-01
BICYCLOHEPTADIENE	1.4E+05	1.4E+05	7.0E+04	0.0E+00	7.0E-06	7.0E-06	7.6E-04
CARBON TETRACHLORIDE	2.7E+01	0.0E+00	2.7E+01	0.0E+00	0.0E+00	0.0E+00	2.6E+00
CHLORDANE	2.7E+00	0.0E+00	2.7E+00	0.0E+00	0.0E+00	0.0E+00	4.1E-05
CHLOROBENZENE	6.8E+04	0.0E+00	6.8E+04	0.0E+00	0.0E+00	0.0E+00	2.3E-04
CHLOROFORM	5.6E+02	3.6E+02	2.2E+02	1.8E-03	5.5E-03	7.3E-03	6.7E-01
CHLOROPHENYLMETHYL SULFONE	7.0E+04	0.0E+00	7.0E+04	0.0E+00	0.0E+00	0.0E+00	4.3E-09
CHLOROPHENYLMETHYL SULFOXIDE	7.0E+04	0.0E+00	7.0E+04	0.0E+00	0.0E+00	0.0E+00	1.8E-08
PPDDE	1.0E+01	0.0E+00	1.0E+01	0.0E+00	0.0E+00	0.0E+00	5.6E-07
PPDDT	1.0E+01	0.0E+00	1.0E+01	0.0E+00	0.0E+00	0.0E+00	2.3E-05
DIBROMOCHLOROPROPANE	2.5E+00	0.0E+00	2.5E+00	0.0E+00	0.0E+00	0.0E+00	4.7E-01
1,1-DICHLOROETHANE	3.9E+01	0.0E+00	3.9E+01	0.0E+00	0.0E+00	0.0E+00	2.2E-07
1,1-DICHLOROETHYLENE	5.9E+00	0.0E+00	5.9E+00	0.0E+00	0.0E+00	0.0E+00	8.7E-01
1,2-DICHLOROETHYLENE	7.0E+04	0.0E+00	7.0E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
DIELDRIN	2.2E-01	1.0E+06	2.2E-01	9.2E+01*	1.4E-02a	9.2E+01*	0.0E+00
DIISOPROPYLMETHYL PHOSPHONATE	2.8E+05	0.0E+00	2.8E+05	0.0E+00	0.0E+00	0.0E+00	9.2E-08
DIMETHYLMETHYL PHOSPHONATE	6.3E+04	0.0E+00	6.3E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
DITHIANE	3.5E+04	0.0E+00	3.5E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENDRIN	1.1E+03	1.0E+06	1.1E+03	1.9E-03	7.2E-07a	1.9E-03	0.0E+00
ETHYLBENZENE	3.5E+05	0.0E+00	3.5E+05	0.0E+00	0.0E+00	0.0E+00	1.9E-07
HEXACHLOROCYCLOPENTADIENE	5.7E+03	0.0E+00	5.7E+03	0.0E+00	0.0E+00	0.0E+00	1.7E-01
ISODRIN	2.5E+02	5.4E+05	2.5E+02	1.6E-02	7.3E-06	1.6E-02	4.1E-07
MALATHION	7.0E+04	0.0E+00	7.0E+04	0.0E+00	0.0E+00	0.0E+00	1.1E-12
METHYLISOBUTYL KETONE	1.7E+05	9.9E+04	6.3E+04	1.7E-04	3.0E-04	4.8E-04	0.0E+00
METHYLENE CHLORIDE	4.5E+02	5.6E+02	2.5E+02	2.2E-03	1.8E-03	4.0E-03	4.0E-03
1,4-OXATHIANE	1.1E+05	0.0E+00	1.1E+05	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SUPONA	5.3E+02	0.0E+00	5.3E+02	0.0E+00	0.0E+00	0.0E+00	3.1E-12
1,1,2,2-TETRACHLOROETHANE	1.8E+01	2.9E+01	1.1E+01	2.8E-02	1.7E-02	4.6E-02	0.0E+00
TETRACHLOROETHYLENE	7.1E+01	4.0E+03	7.0E+01	0.0E+00	1.0E-04	1.0E-04	5.6E-02
TOLUENE	1.1E+06	0.0E+00	1.1E+06	0.0E+00	0.0E+00	0.0E+00	1.9E-06
1,1,1-TRICHLOROETHANE	3.2E+05	0.0E+00	3.2E+05	0.0E+00	0.0E+00	0.0E+00	7.1E-07
1,1,2-TRICHLOROETHANE	6.0E+01	0.0E+00	6.0E+01	0.0E+00	0.0E+00	0.0E+00	5.0E-03
TRICHLOROETHYLENE	3.2E+02	0.0E+00	3.2E+02	0.0E+00	0.0E+00	0.0E+00	6.2E-02
M-XYLENE	5.8E+06	0.0E+00	5.8E+06	0.0E+00	0.0E+00	0.0E+00	8.3E-08
O,P-XYLENE	5.8E+06	0.0E+00	5.8E+06	0.0E+00	0.0E+00	0.0E+00	7.0E-07
ARSENIC	3.9E+00	0.0E+00	3.9E+00	1.3E+01*	0.0E+00	1.3E+01*	0.0E+00
CADMIUM	5.8E+01	0.0E+00	5.8E+01	2.3E-01*	0.0E+00	2.3E-01*	0.0E+00
CHROMIUM	8.8E+00	0.0E+00	8.8E+00	4.0E+02*	0.0E+00	4.0E+02*	0.0E+00
COPPER	2.5E+05	0.0E+00	2.5E+05	1.9E-03	0.0E+00	1.9E-03	0.0E+00
LEAD	9.2E+03	0.0E+00	9.2E+03	1.2E-01*	0.0E+00	1.2E-01*	0.0E+00
MERCURY	2.0E+03	0.0E+00	2.0E+03	3.0E-03	0.0E+00	3.0E-03	0.0E+00
ZINC	1.1E+06	0.0E+00	1.1E+06	2.0E-04	0.0E+00	2.0E-04	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPPLV for this contaminant is considered to be equal to pure compound. The SPPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

EXPOSURE EVALUATIONS FOR COMMERCIAL WORKERS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI ENC
	PPLV	PPLV	PPLV	EI	EI	EI	
	(mg/kg)	(mg/kg)	(mg/kg)				
ALDRIN	1.9E+00	1.3E+02	1.9E+00	1.6E-01*	2.4E-03	1.6E-01*	5.2E-03
BENZENE	1.1E+03	2.3E+00	2.3E+00	7.3E-03	3.5E+00*	3.5E+00*	2.9E+01
BICYCLOHEPTADIENE	1.8E+05	1.9E+02	1.9E+02	0.0E+00	5.4E-03	5.4E-03	4.7E-01
CARBON TETRACHLORIDE	2.5E+02	0.0E+00	2.5E+02	0.0E+00	0.0E+00	0.0E+00	2.3E+02
CHLORDANE	2.5E+01	0.0E+00	2.5E+01	0.0E+00	0.0E+00	0.0E+00	3.6E-03
CHLOROBENZENE	8.8E+04	0.0E+00	8.8E+04	0.0E+00	0.0E+00	0.0E+00	1.4E-01
CHLOROFORM	5.1E+03	2.0E+00	2.0E+00	2.0E-04	9.9E-01*	9.9E-01*	5.9E+01
CHLOROPHENYLMETHYL SULFONE	9.1E+04	0.0E+00	9.1E+04	0.0E+00	0.0E+00	0.0E+00	2.7E-06
CHLOROPHENYLMETHYL SULFOXIDE	9.1E+04	0.0E+00	9.1E+04	0.0E+00	0.0E+00	0.0E+00	1.1E-05
PPDE	9.3E+01	0.0E+00	9.3E+01	0.0E+00	0.0E+00	0.0E+00	5.0E-05
PPDT	9.3E+01	0.0E+00	9.3E+01	0.0E+00	0.0E+00	0.0E+00	2.0E-03
DIBROMOCHLOROPROPANE	2.3E+01	0.0E+00	2.3E+01	0.0E+00	0.0E+00	0.0E+00	4.2E+01
1,1-DICHLOROETHANE	3.6E+02	0.0E+00	3.6E+02	0.0E+00	0.0E+00	0.0E+00	2.0E-05
1,1-DICHLOROETHYLENE	5.4E+01	0.0E+00	5.4E+01	0.0E+00	0.0E+00	0.0E+00	7.7E+01
1,2-DICHLOROETHYLENE	9.2E+04	0.0E+00	9.2E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
DIELDRIN	2.0E+00	5.8E+01	1.9E+00	1.0E+01*	3.5E-01*	1.0E+01*	0.0E+00
DIISOPROPYLMETHYL PHOSPHONATE	3.7E+05	0.0E+00	3.7E+05	0.0E+00	0.0E+00	0.0E+00	5.7E-05
DIMETHYLMETHYL PHOSPHONATE	8.2E+04	0.0E+00	8.2E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
DITHIANE	4.6E+04	0.0E+00	4.6E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENDRIN	1.4E+03	1.0E+06	2.4E+02	1.5E-03	7.0E-03 ^a	8.4E-03	0.0E+00
ETHYLBENZENE	4.6E+05	0.0E+00	4.6E+05	0.0E+00	0.0E+00	0.0E+00	1.2E-04
HEXACHLOROCYCLOPENTADIENE	5.5E+03	0.0E+00	5.5E+03	0.0E+00	0.0E+00	0.0E+00	1.0E+02
ISODRIN	3.2E+02	6.7E+01	5.5E+01	1.2E-02	6.0E-02	7.2E-02	2.5E-04
MALATHION	9.2E+04	0.0E+00	9.2E+04	0.0E+00	0.0E+00	0.0E+00	7.1E-10
METHYLISOBUTYL KETONE	2.2E+05	1.6E+02	1.6E+02	1.3E-04	1.9E-01*	1.9E-01*	0.0E+00
METHYLENE CHLORIDE	4.1E+03	3.1E+00	3.1E+00	2.4E-04	3.2E-01*	3.2E-01*	3.5E-01
1,4-OXATHIANE	1.4E+05	0.0E+00	1.4E+05	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SUPONA	6.9E+02	0.0E+00	6.9E+02	0.0E+00	0.0E+00	0.0E+00	1.9E-09
1,1,2,2-TETRACHLOROETHANE	1.6E+02	3.7E+00	3.6E+00	3.1E-03	1.3E-01*	1.4E-01*	0.0E+00
TETRACHLOROETHYLENE	6.5E+02	2.2E+01	2.2E+01	0.0E+00	1.8E-02	1.8E-02	4.9E+00
TOLUENE	1.4E+06	0.0E+00	1.4E+06	0.0E+00	0.0E+00	0.0E+00	1.2E-03
1,1,1-TRICHLOROETHANE	4.2E+05	0.0E+00	4.2E+05	0.0E+00	0.0E+00	0.0E+00	4.4E-04
1,1,2-TRICHLOROETHANE	5.5E+02	0.0E+00	5.5E+02	0.0E+00	0.0E+00	0.0E+00	4.4E-01
TRICHLOROETHYLENE	2.9E+03	0.0E+00	2.9E+03	0.0E+00	0.0E+00	0.0E+00	5.4E+00
M-XYLENE	7.0E+06	0.0E+00	7.0E+06	0.0E+00	0.0E+00	0.0E+00	5.1E-05
O,P-XYLENE	7.0E+06	0.0E+00	7.0E+06	0.0E+00	0.0E+00	0.0E+00	4.3E-04
ARSENIC	2.0E+01	0.0E+00	2.0E+01	2.5E+00*	0.0E+00	2.5E+00*	0.0E+00
CADMIUM	3.6E+02	0.0E+00	3.6E+02	3.6E-02	0.0E+00	3.6E-02	0.0E+00
CHROMIUM	5.5E+01	0.0E+00	5.5E+01	6.4E+01*	0.0E+00	6.4E+01*	0.0E+00
COPPER	1.8E+05	0.0E+00	1.8E+05	2.6E-03	0.0E+00	2.6E-03	0.0E+00
LEAD	6.5E+03	0.0E+00	6.5E+03	1.7E-01*	0.0E+00	1.7E-01*	0.0E+00
MERCURY	1.4E+03	0.0E+00	1.4E+03	4.3E-03	0.0E+00	4.3E-03	0.0E+00
ZINC	7.8E+05	0.0E+00	7.8E+05	2.7E-04	0.0E+00	2.7E-04	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPPLV for this contaminant is considered to be equal to pure compound. The SPPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-1g-7
EXPOSURE EVALUATIONS FOR INDUSTRIAL WORKERS

CONTAMINANT	DIRECT	INDIRECT		CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI	
	PPLV	OSVI	ESVI	PPLV	EI	EI	EI	OPN	ENC
	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)					
ALDRIN	1.2E-01	6.5E+03	4.2E+01	1.2E-01	2.6E+00*	7.2E-03	2.6E+00*	3.0E-05	1.6E-02
BENZENE	6.7E+01	3.5E+02	2.3E+00	2.2E+00	1.2E-01*	3.5E+00*	3.6E+00*	1.6E-01	8.7E+01
BICYCLOHEPTADIENE	3.3E+04	5.3E+04	5.6E+02	5.4E+02	0.0E+00	1.8E-03	1.8E-03	8.8E-04	4.7E-01
CARBON TETRACHLORIDE	1.5E+01	0.0E+00	0.0E+00	1.5E+01	0.0E+00	0.0E+00	0.0E+00	1.3E+00	6.8E+02
CHLORDANE	1.5E+00	0.0E+00	0.0E+00	1.5E+00	0.0E+00	0.0E+00	0.0E+00	2.0E-05	1.1E-02
CHLOROBENZENE	1.5E+04	0.0E+00	0.0E+00	1.5E+04	0.0E+00	0.0E+00	0.0E+00	2.7E-04	1.4E-01
CHLOROFORM	3.1E+02	3.1E+02	2.0E+00	2.0E+00	3.2E-03	1.0E+00*	1.0E+00*	3.3E-01	1.8E+02
CHLOROPHENYLMETHYL SULFONE	1.7E+04	0.0E+00	0.0E+00	1.7E+04	0.0E+00	0.0E+00	0.0E+00	5.0E-09	2.7E-06
CHLOROPHENYLMETHYL SULFOXIDE	1.7E+04	0.0E+00	0.0E+00	1.7E+04	0.0E+00	0.0E+00	0.0E+00	2.0E-08	1.1E-05
PPDDE	5.7E+00	0.0E+00	0.0E+00	5.7E+00	0.0E+00	0.0E+00	0.0E+00	2.8E-07	1.5E-04
PPDDT	5.7E+00	0.0E+00	0.0E+00	5.7E+00	0.0E+00	0.0E+00	0.0E+00	1.1E-05	6.1E-03
DIBROMOCHLOROPROPANE	1.4E+00	0.0E+00	0.0E+00	1.4E+00	0.0E+00	0.0E+00	0.0E+00	2.4E-01	1.2E+02
1,1-DICHLOROETHANE	2.3E+01	0.0E+00	0.0E+00	2.3E+01	0.0E+00	0.0E+00	0.0E+00	1.1E-07	5.9E-05
1,1-DICHLOROETHYLENE	3.2E+00	0.0E+00	0.0E+00	3.2E+00	0.0E+00	0.0E+00	0.0E+00	4.3E-01	2.3E+02
1,2-DICHLOROETHYLENE	1.7E+04	0.0E+00	0.0E+00	1.7E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
DIELDRIN	1.2E-01	3.0E+03	1.9E+01	1.2E-01	1.6E+02*	1.0E+00*	1.6E+02*	0.0E+00	0.0E+00
DIISOPROPYLMETHYL PHOSPHONATE	6.8E+04	0.0E+00	0.0E+00	6.8E+04	0.0E+00	0.0E+00	0.0E+00	1.1E-07	5.7E-05
DIMETHYLMETHYL PHOSPHONATE	1.5E+04	0.0E+00	0.0E+00	1.5E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
DITHIANE	8.5E+03	0.0E+00	0.0E+00	8.5E+03	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENDRIN	2.5E+02	1.0E+06	1.0E+06	2.0E+02	7.9E-03	2.3E-03a	1.0E-02	0.0E+00	0.0E+00
ETHYLBENZENE	8.5E+04	0.0E+00	0.0E+00	8.5E+04	0.0E+00	0.0E+00	0.0E+00	2.2E-07	1.2E-04
CHLOROCYCLOPENTADIENE	3.8E+02	0.0E+00	0.0E+00	3.8E+02	0.0E+00	0.0E+00	0.0E+00	2.0E-01	1.0E+02
ISODRIN	5.9E+01	4.7E+05	2.0E+02	4.6E+01	6.8E-02	2.0E-02	8.7E-02	4.8E-07	2.5E-04
MALATHION	1.7E+04	0.0E+00	0.0E+00	1.7E+04	0.0E+00	0.0E+00	0.0E+00	1.3E-12	7.1E-10
METHYL ISOBUTYL KETONE	4.0E+04	3.6E+04	4.8E+02	4.7E+02	7.5E-04	6.3E-02	6.4E-02	0.0E+00	0.0E+00
METHYLENE CHLORIDE	2.5E+02	4.8E+02	3.1E+00	3.1E+00	4.0E-03	3.2E-01*	3.3E-01*	2.0E-03	1.1E+00
1,4-OXATHIANE	2.5E+04	0.0E+00	0.0E+00	2.5E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SUPONA	1.3E+02	0.0E+00	0.0E+00	1.3E+02	0.0E+00	0.0E+00	0.0E+00	3.6E-12	1.9E-09
1,1,2,2-TETRACHLOROETHANE	9.9E+00	4.5E+01	3.7E+00	2.6E+00	5.1E-02	1.5E-01*	2.0E-01*	0.0E+00	0.0E+00
TETRACHLOROETHYLENE	4.1E+01	3.5E+03	2.2E+01	1.4E+01	0.0E+00	1.8E-02	1.8E-02	2.8E-02	1.5E+01
TOLUENE	2.6E+05	0.0E+00	0.0E+00	2.6E+05	0.0E+00	0.0E+00	0.0E+00	2.3E-06	1.2E-03
1,1,1-TRICHLOROETHANE	7.8E+04	0.0E+00	0.0E+00	7.8E+04	0.0E+00	0.0E+00	0.0E+00	8.2E-07	4.4E-04
1,1,2-TRICHLOROETHANE	3.4E+01	0.0E+00	0.0E+00	3.4E+01	0.0E+00	0.0E+00	0.0E+00	2.5E-03	1.3E+00
TRICHLOROETHYLENE	1.8E+02	0.0E+00	0.0E+00	1.8E+02	0.0E+00	0.0E+00	0.0E+00	3.1E-02	1.6E+01
M-XYLENE	8.8E+05	0.0E+00	0.0E+00	8.8E+05	0.0E+00	0.0E+00	0.0E+00	9.6E-08	5.1E-05
O,P-XYLENE	8.8E+05	0.0E+00	0.0E+00	8.8E+05	0.0E+00	0.0E+00	0.0E+00	8.1E-07	4.3E-04
ARSENIC	1.6E+00	0.0E+00	0.0E+00	1.6E+00	3.1E+01*	0.0E+00	3.1E+01*	0.0E+00	0.0E+00
CADMIUM	7.6E+00	0.0E+00	0.0E+00	7.6E+00	1.7E+00*	0.0E+00	1.7E+00*	0.0E+00	0.0E+00
CHROMIUM	1.1E+00	0.0E+00	0.0E+00	1.1E+00	3.1E+03*	0.0E+00	3.1E+03*	0.0E+00	0.0E+00
COPPER	5.7E+04	0.0E+00	0.0E+00	5.7E+04	8.1E-03	0.0E+00	8.1E-03	0.0E+00	0.0E+00
LEAD	2.2E+03	0.0E+00	0.0E+00	2.2E+03	5.0E-01*	0.0E+00	5.0E-01*	0.0E+00	0.0E+00
MERCURY	4.6E+02	0.0E+00	0.0E+00	4.6E+02	1.3E-02	0.0E+00	1.3E-02	0.0E+00	0.0E+00
ZINC	1.4E+05	0.0E+00	0.0E+00	1.4E+05	1.5E-03	0.0E+00	1.5E-03	0.0E+00	0.0E+00

This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPPLV for this contaminant is considered to be equal to pure compound. The SPPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

2.8 SITE SPSA-2a: SOUTH TANK FARM AREA (formerly Site 1-10: South Tank Farm; EBASCO, 1987c/RIC 87127R01 and EBASCO, 1988f/RIC 87127R01A)

2.8.1 Site-Specific Considerations

Figure SPSA-2a-1 and Tables SPSA-2a-1 and SPSA-2a-2 depict the target contaminants for Site SPSA-2a. Borings 1 through 29, 29B, 30 through 35 and 35B, were included in this exposure assessment, consistent with the South Plants SAR. The historical search conducted under the contamination assessment revealed that bicycloheptadiene, and dibromochloropropane were stored and spilled in Site SPSA-2a (EBASCO, 1987c/RIC 87127R01). These chemicals were not detected in soil during the Phase I and Phase II investigations. According to site history, no other chemicals from the RMA target contaminant list were suspected to be present in Site SPSA-2a (EBASCO, 1987c/RIC 87127R01).

2.8.2 Spatial Distribution of Measured Contaminant Concentrations

The locations and concentrations of the target contaminants that were detected in Site SPSA-2a are shown in Figure SPSA-2a-1. 1,1,2,2-Tetrachloroethane, occurring in Boring 12 (0-1 ft) was not included in this figure since it was not considered a target contaminant during Phase I and Phase II investigations. Although not shown in this figure, this chemical was included in the South Plants SAR and in this exposure assessment because it passed through the screening process performed in the RMA Chemical Index (EBASCO, 1988c/RIC 88357R01).

Table SPSA-2a-1 summarizes the maximum concentrations of contaminants measured in soil above indicator levels for the ICP metals, arsenic, and mercury and CRLs for organic contaminants from the Phase I and Phase II investigations. The boring number and depth where the maximum value was observed are shown. No data were included for ICP metals, arsenic, and mercury for Horizon 2 because direct soil exposure below 10 ft is assumed to be negligible (see Volume VI-A). Table SPSA-2a-2 summarizes the maximum concentrations detected in groundwater together with the well number, location, sampling interval, and depth to groundwater.

2.8.3 Site Exposure Summary

Tables SPSA-2a-3 through SPSA-2a-7 present Draft PPLVs and EIs for each site contaminant. The COCs are summarized below for each exposed population and with the critical exposure pathway identified. The depth to groundwater below Site SPSA-2a is less than 10 ft, therefore, the enclosed space vapor inhalation exposure pathway is not included in the calculation of the cumulative quantities.

Contaminants of Concern	Regulated Visitor	Casual Visitor	Recreational Visitor	Commercial Worker	Industrial Worker
Aldrin	Direct	Direct	Direct	--	Direct
Dieldrin	Direct	Direct	Direct	Direct	Direct
Dicyclopentadiene	--	--	Indirect	--	Dir/Ind
Methylene chloride	--	--	Dir/Ind	--	Dir/Ind
Benzene	--	--	--	--	Direct
Chlordane	--	--	--	--	Direct
1,1,2,2-Tetrachloroethane	--	--	--	--	Direct

Note: Direct exposure pathways for soils include soil ingestion, suspended particulate inhalation, and dermal contact.

Indirect exposure pathways include open and enclosed space vapor inhalation.

The results of the soil exposure summary indicate that exposure to contamination from the direct and indirect pathways both contribute to the exceedance of the cumulative PPLVs. Site SPSA-2a is designated as a Priority 1 site, based on the most sensitive exposed population PPLV (i.e., the industrial worker).

The following groundwater contaminant results in an unacceptable exposure due to vapor inhalation as indicated by a VEI value greater than 1:

- Benzene (open)

2-3	BIL
4-5	111TCE 0.36 CH ₂ CL ₂ 4.0
9-10	BIL

0-1	PPDE .048
	PPDT .10
	Aldrin .065
	CLDAN .20
	Dieldrin .96
	Endrin .061
	Isodrin .0078

0-1	Aldrin .0064 Dieldrin .099
2-3	BIL
4-5	BIL
7-8	BIL

0-1	PPDE PPDT Aldrin CL ₄ CP Dieldrin Endrin Isodrin
2-3	BIL
4-5	BIL
9-10	BIL

2-3	111TCE 6.5 CH ₂ CL ₂ 52
4-5	BIL
7-8	BIL

0-1	Dieldrin 20
4-5	DCPD 200

2-3	BIL
4-5	BIL
9-10	BIL

0-1	BIL
4-5	Zn 31
5-5.1	DCPD 1 Zn 88

0.6-1.5	
3.8-4.8	
6.6-7.4	

0-1	PPDE .041
	PPDT .28
	Aldrin .16
	CLDAN .23
	Dieldrin 1.7
	Endrin .28
	Isodrin .020

2-3	BIL
4-5	111TCE .17
7-8	BIL

0-1	Dieldrin 2
4-5	CH ₂ CL ₂ 90

0-1	Dieldrin 5
4-5	BIL

0-1	BIL
4-5	BIL

0-1	Dieldrin 7
4-5	BIL

2-3	BIL
4-5	BIL
7-8	Hg .091

0-1	Zn 64
4-5	CH ₂ CL ₂ 10
5.3-6.2	Zn 63
9-10	Benzene 7 Zn 36

2-3	BIL
4-5	BIL
7-8	BIL

0-1	BIL
4.5-5.0	BIL

0-1	BIL
4-5	CH ₂ CL ₂ 2 Hg 0.2

2-3	BIL
4-5	BIL
7-8	BIL

0-1	DCPD 0.6
4-5	DCPD 30 (VO) DCPD 300 (SVO)

0-1	BIL
4-5	DCPD 100 (VO) DCPD 100 (SVO)

0-1	BIL
3.6-3.8	DCPD 4
4-5	DCPD 4

LEGEND

⊙ Phase I boring

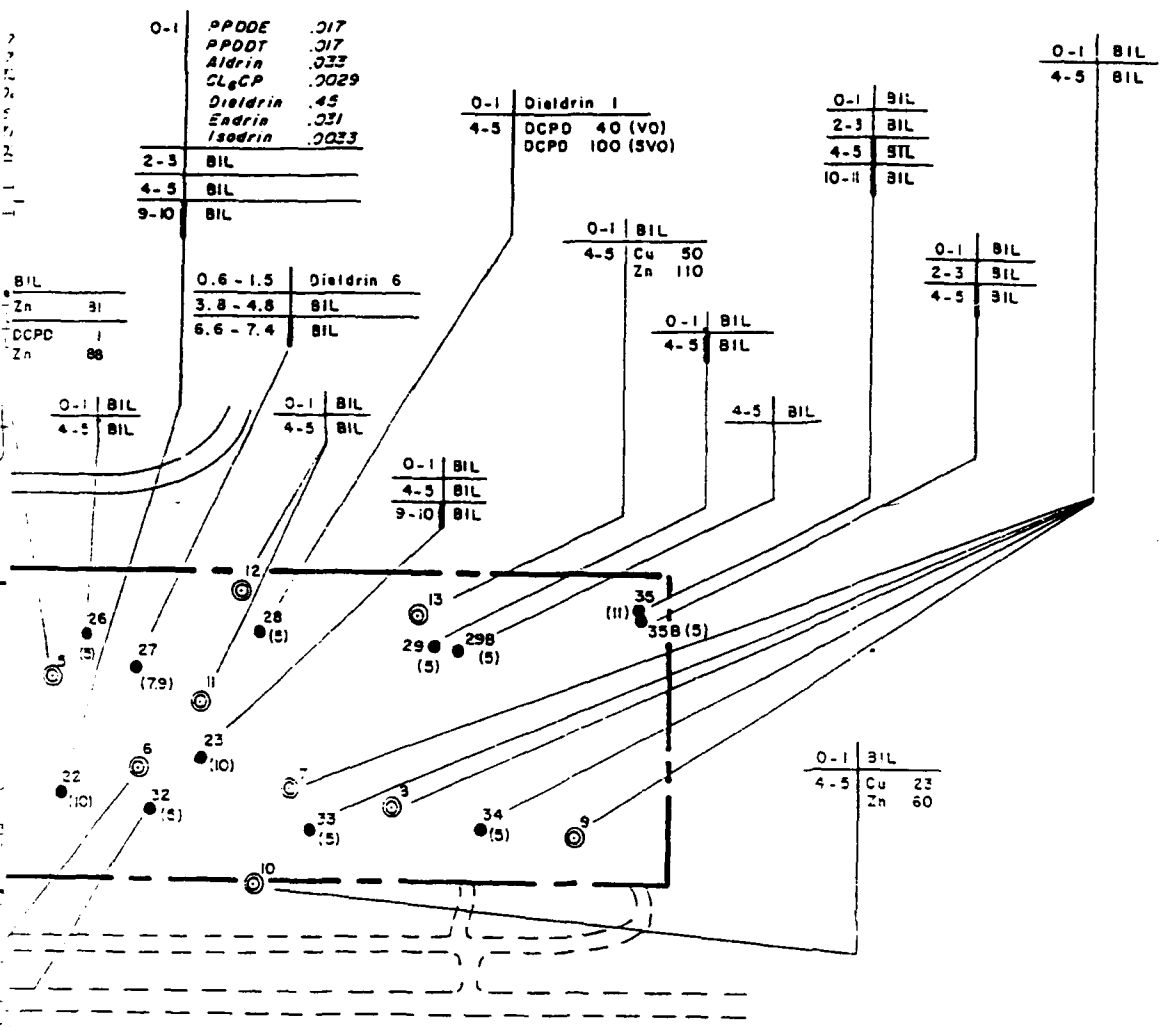
⊙¹⁸ Phase I boring and total depth drilled (ft)

Analyte
Sample interval → 0-1 Dieldrin 6
4-5 111TCE .17
Level (ug/g)

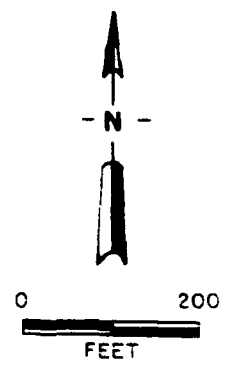
Bedrock Sample ← Phase II analytes detected by different method - see text

--- Site Boundary

- CLDAN - Chlorides
- PPDE - 2,3-bis(para-chlorophenyl)-1,1-dichloroethane
- PPDT - 2,3-bis(para-chlorophenyl)-1,1,1-trichloroethane
- DCPD - Dicycloheximide
- CL₄CP - Hexachlorocyclopentadiene
- CH₂CL₂ - Methylene chloride
- 111TCE - 1,1,1-Trichloroethane
- Cu - Copper
- Hg - Mercury
- Zn - Zinc
- BIL - Below indicator level
- VO - Volatile organics
- SVO - Semi-volatile organics



0 (VO)
0 (SVO)



Prepared for: Program Manager's Office for Rocky Mountain Arsenal Cleanup Aberdeen Proving Ground, Maryland	FIGURE SPSA-2a-1 Phase I and Phase II Analytes Detected Within or Above Indicator Levels Rocky Mountain Arsenal Prepared by: Ebasco Services Incorporated
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TABLE: SPSA-2a-1
SOIL CONTAMINANT CONCENTRATIONS
FOR SITE SPSA-2a

Contaminant	Horizon 1			Horizon 2		
	Max. (ug/g)	Depth (ft)	Boring Number	Max. (ug/g)	Depth (ft)	Boring Number
Aldrin	0.16	0-1	16	0.16	0-1	16
Benzene	7	9-10	2	7	9-10	2
Chlordane	0.23	0-1	16	0.23	0-1	16
PPDDE ^{1/}	0.048	0-1	15	0.048	0-1	15
PPDDT ^{2/}	0.28	0-1	16	0.28	0-1	16
Dicyclopentadiene	300	4-5	31	300	4-5	31
Dieldrin	20	0-1	4	20	0-1	4
Endrin	0.28	0-1	16	0.28	0-1	16
Hexachlorocyclopentadiene	0.0029	0-1	22	0.0029	0-1	22
Isodrin	0.020	0-1	16	0.020	0-1	16
Methylene chloride	90	4-5	3	90	4-5	3
1,1,2,2-Tetrachloroethane ^{3/}	1.4	0-1	12	1.4	0-1	12
1,1,1-Trichloroethane	6.5	2-3	15	6.5	2-3	15
Copper	50	4-5	13	--	--	--
Mercury	0.2	4-5	1	--	--	--
Zinc	110	4-5	13	--	--	--

1/ PPDDE 2,2-bis(Para-chlorophenyl)-1,1-dichloroethane

2/ PPDDT 2,2-bis(Para-chlorophenyl)-1,1,1-trichloroethane

3/ Nontarget contaminant. Refer to the exposure assessment nontarget screen in Appendix A.

SPSA South Plants Study Area
Max. Maximum
ug/g microgram per gram
ft foot/feet

TABLE SPSA-2a-2

GROUNDWATER CONTAMINANT CONCENTRATIONS (UG/L)
FOR SITE SPSA-2a

AVERAGE SITE DEPTH TO GROUNDWATER: 5 Feet

CHEMICAL	CONCENTRATION MAXIMUM	LOCATION (WELL NUMBER)	SAMPLE DATE
ATRAZINE	220	01529	02/18/88
BENZENE	1000000	01534	02/23/88
CHLOROPHENYLMETHYL SULFONE	20	01564	04/28/88
DICYCLOPENTADIENE	230	01564	04/28/88

EACH VALUE PRESENTED IS THE MAXIMUM CONCENTRATION FOR THE LISTED ANALYTE
FOR THE PERIOD March 17, 1987 TO February 28, 1989.
DATA SOURCE: DP ASSOCIATES, RMA Database, July 19, 1990

SPSA-2a-3
EXPOSURE EVALUATIONS FOR REGULATED VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI OPN
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	
ALDRIN	1.5E+00	7.1E+04	1.5E+00	1.1E-01*	2.2E-06	1.1E-01*	0.0E+00
ATRAZINE	4.1E+04	0.0E+00	4.1E+04	0.0E+00	0.0E+00	0.0E+00	1.1E-11
BENZENE	8.6E+02	9.7E+03	7.9E+02	8.1E-03	7.2E-04	8.8E-03	1.4E+01
CHLORDANE	2.0E+01	7.7E+06	2.0E+01	1.2E-02	3.0E-08	1.2E-02	0.0E+00
CHLOROPHENYLMETHYL SULFONE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	1.2E-09
PPDDE	7.4E+01	4.3E+06	7.4E+01	6.5E-04	1.1E-08	6.5E-04	0.0E+00
PPDDT	7.4E+01	9.1E+06	7.4E+01	3.8E-03	3.1E-08	3.8E-03	0.0E+00
DICYCLOPENTADIENE	5.4E+04	1.0E+06	3.9E+03	5.5E-03	7.2E-02 ^a	7.7E-02	0.0E+00
DIELDRIN	1.6E+00	1.0E+06	1.6E+00	1.3E+01*	6.1E-04 ^a	1.3E+01*	0.0E+00
ENDRIN	2.5E+03	2.6E+07	2.5E+03	1.1E-04	1.1E-08	1.1E-04	0.0E+00
HEXACHLOROCYCLOPENTADIENE	1.7E+04	2.2E+03	1.9E+03	1.8E-07	1.3E-06	1.5E-06	0.0E+00
ISODRIN	5.8E+02	5.2E+06	5.8E+02	3.5E-05	3.9E-09	3.5E-05	0.0E+00
METHYLENE CHLORIDE	3.3E+03	4.5E+03	1.9E+03	2.7E-02	2.0E-02	4.7E-02	0.0E+00
1,1,2,2-TETRACHLOROETHANE	1.3E+02	1.3E+03	1.2E+02	1.1E-02	1.1E-03	1.2E-02	0.0E+00
1,1,1-TRICHLOROETHANE	7.5E+05	8.2E+06	6.8E+05	8.7E-06	7.9E-07	9.5E-06	0.0E+00
COPPER	4.2E+05	0.0E+00	4.2E+05	1.2E-04	0.0E+00	1.2E-04	0.0E+00
MERCURY	3.3E+03	0.0E+00	3.3E+03	6.0E-05	0.0E+00	6.0E-05	0.0E+00
ZINC	2.0E+06	0.0E+00	2.0E+06	5.5E-05	0.0E+00	5.5E-05	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPPLV for this contaminant is considered to be equal to pure compound. The SPPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-2a-4
EXPOSURE EVALUATIONS FOR CASUAL VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI OPN
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	
ALDRIN	1.5E+00	7.1E+04	1.5E+00	1.1E-01*	2.2E-06	1.1E-01*	0.0E+00
ATRAZINE	4.1E+04	0.0E+00	4.1E+04	0.0E+00	0.0E+00	0.0E+00	1.1E-11
BENZENE	8.6E+02	9.7E+03	7.9E+02	8.1E-03	7.2E-04	8.8E-03	1.4E+01
CHLORDANE	2.0E+01	7.7E+06	2.0E+01	1.2E-02	3.0E-08	1.2E-02	0.0E+00
CHLOROPHENYLMETHYL SULFONE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	1.2E-09
PPDDE	7.4E+01	4.3E+06	7.4E+01	6.5E-04	1.1E-08	6.5E-04	0.0E+00
PPDDT	7.4E+01	9.1E+06	7.4E+01	3.8E-03	3.1E-08	3.8E-03	0.0E+00
DICYCLOPENTADIENE	5.4E+04	1.0E+06	3.9E+03	5.5E-03	7.2E-02 ^a	7.7E-02	0.0E+00
DIELDRIN	1.6E+00	1.0E+06	1.6E+00	1.3E+01*	6.1E-04 ^a	1.3E+01*	0.0E+00
ENDRIN	2.5E+03	2.6E+07	2.5E+03	1.1E-04	1.1E-08	1.1E-04	0.0E+00
HEXACHLOROCYCLOPENTADIENE	1.7E+04	2.2E+03	1.9E+03	1.8E-07	1.3E-06	1.5E-06	0.0E+00
ISODRIN	5.8E+02	5.2E+06	5.8E+02	3.5E-05	3.9E-09	3.5E-05	0.0E+00
METHYLENE CHLORIDE	3.3E+03	4.5E+03	1.9E+03	2.7E-02	2.0E-02	4.7E-02	0.0E+00
1,1,2,2-TETRACHLOROETHANE	1.3E+02	1.3E+03	1.2E+02	1.1E-02	1.1E-03	1.2E-02	0.0E+00
1,1,1-TRICHLOROETHANE	7.5E+05	8.2E+06	6.8E+05	8.7E-06	7.9E-07	9.5E-06	0.0E+00
COPPER	4.2E+05	0.0E+00	4.2E+05	1.2E-04	0.0E+00	1.2E-04	0.0E+00
MERCURY	3.3E+03	0.0E+00	3.3E+03	6.0E-05	0.0E+00	6.0E-05	0.0E+00
ZINC	2.0E+06	0.0E+00	2.0E+06	5.5E-05	0.0E+00	5.5E-05	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPLV for this contaminant is considered to be equal to pure compound. The SPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-2a-5
EXPOSURE EVALUATIONS FOR RECREATIONAL VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI OPN
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	
ALDRIN	2.1E-01	4.7E+03	2.1E-01	7.7E-01*	3.4E-05	7.7E-01*	0.0E+00
ATRAZINE	1.8E+04	0.0E+00	1.8E+04	0.0E+00	0.0E+00	0.0E+00	7.0E-11
BENZENE	1.2E+02	1.5E+03	1.1E+02	5.9E-02	4.7E-03	6.3E-02	2.2E+02
CHLORDANE	2.7E+00	5.1E+05	2.7E+00	8.5E-02	4.5E-07	8.5E-02	0.0E+00
CHLOROPHENYLMETHYL SULFONE	7.0E+04	0.0E+00	7.0E+04	0.0E+00	0.0E+00	0.0E+00	7.7E-09
PPDDE	1.0E+01	2.9E+05	1.0E+01	4.7E-03	1.7E-07	4.7E-03	0.0E+00
PPDDT	1.0E+01	6.0E+05	1.0E+01	2.7E-02	4.6E-07	2.7E-02	0.0E+00
DICYCLOPENTADIENE	1.8E+04	1.5E+03	1.4E+03	1.6E-02	2.0E-01*	2.2E-01*	0.0E+00
DIELDRIN	2.2E-01	1.0E+06	2.2E-01	9.2E+01*	9.3E-03a	9.2E+01*	0.0E+00
ENDRIN	1.1E+03	4.1E+06	1.1E+03	2.7E-04	6.9E-08	2.7E-04	0.0E+00
HEXACHLOROCYCLOPENTADIENE	5.7E+03	7.8E+02	6.9E+02	5.1E-07	3.7E-06	4.2E-06	0.0E+00
ISODRIN	2.5E+02	8.0E+05	2.5E+02	8.1E-05	2.5E-08	8.1E-05	0.0E+00
METHYLENE CHLORIDE	4.5E+02	7.0E+02	2.8E+02	2.0E-01*	1.3E-01*	3.3E-01*	0.0E+00
1,1,2,2-TETRACHLOROETHANE	1.8E+01	2.0E+02	1.6E+01	8.0E-02	7.2E-03	8.7E-02	0.0E+00
1,1,1-TRICHLOROETHANE	3.2E+05	3.0E+06	2.9E+05	2.0E-05	2.2E-06	2.3E-05	0.0E+00
COPPER	2.5E+05	0.0E+00	2.5E+05	2.0E-04	0.0E+00	2.0E-04	0.0E+00
MERCURY	2.0E+03	0.0E+00	2.0E+03	1.0E-04	0.0E+00	1.0E-04	0.0E+00
ZINC	1.1E+06	0.0E+00	1.1E+06	1.0E-04	0.0E+00	1.0E-04	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPPLV for this contaminant is considered to be equal to pure compound. The SPPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-2a-6
EXPOSURE EVALUATIONS FOR COMMERCIAL WORKERS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI ENC
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	
ALDRIN	1.9E+00	0.0E+00	1.9E+00	8.5E-02	0.0E+00	8.5E-02	NA
ATRAZINE	2.3E+04	0.0E+00	2.3E+04	0.0E+00	0.0E+00	0.0E+00	NA
BENZENE	1.1E+03	0.0E+00	1.1E+03	6.4E-03	0.0E+00	6.4E-03	NA
CHLORDANE	2.5E+01	0.0E+00	2.5E+01	9.3E-03	0.0E+00	9.3E-03	NA
CHLOROPHENYLMETHYL SULFONE	9.1E+04	0.0E+00	9.1E+04	0.0E+00	0.0E+00	0.0E+00	NA
PPDDE	9.3E+01	0.0E+00	9.3E+01	5.2E-04	0.0E+00	5.2E-04	NA
PPDDT	9.3E+01	0.0E+00	9.3E+01	3.0E-03	0.0E+00	3.0E-03	NA
DICYCLOPENTADIENE	1.7E+04	0.0E+00	1.7E+04	1.7E-02	0.0E+00	1.7E-02	NA
DIELDRIN	2.0E+00	0.0E+00	2.0E+00	1.0E+01*	0.0E+00	1.0E+01*	NA
ENDRIN	1.4E+03	0.0E+00	1.4E+03	2.0E-04	0.0E+00	2.0E-04	NA
HEXACHLOROCYCLOPENTADIENE	5.5E+03	0.0E+00	5.5E+03	5.3E-07	0.0E+00	5.3E-07	NA
ISODRIN	3.2E+02	0.0E+00	3.2E+02	6.2E-05	0.0E+00	6.2E-05	NA
METHYLENE CHLORIDE	4.1E+03	0.0E+00	4.1E+03	2.2E-02	0.0E+00	2.2E-02	NA
1,1,2,2-TETRACHLOROETHANE	1.6E+02	0.0E+00	1.6E+02	8.7E-03	0.0E+00	8.7E-03	NA
1,1,1-TRICHLOROETHANE	4.2E+05	0.0E+00	4.2E+05	1.6E-05	0.0E+00	1.6E-05	NA
COPPER	1.8E+05	0.0E+00	1.8E+05	2.8E-04	0.0E+00	2.8E-04	NA
MERCURY	1.4E+03	0.0E+00	1.4E+03	1.4E-04	0.0E+00	1.4E-04	NA
ZINC	7.8E+05	0.0E+00	7.8E+05	1.4E-04	0.0E+00	1.4E-04	NA

*: EI is equal to or exceeds 1.0E-01

SPSA-2a-7
EXPOSURE EVALUATIONS FOR INDUSTRIAL WORKERS

CONTAMINANT	DIRECT	INDIRECT		CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI	
	PPLV (mg/kg)	OSVI (mg/kg)	ESVI (mg/kg)	PPLV (mg/kg)	EI	EI -	EI	OPN	ENC
ALDRIN	1.2E-01	9.5E+03	0.0E+00	1.2E-01	1.4E+00*	1.7E-05	1.4E+00*	0.0E+00	NA
ATRAZINE	4.2E+03	0.0E+00	0.0E+00	4.2E+03	0.0E+00	0.0E+00	0.0E+00	8.2E-11	NA
BENZENE	6.7E+01	1.3E+03	0.0E+00	6.4E+01	1.0E-01*	5.4E-03	1.1E-01*	1.1E+02	NA
CHLORDANE	1.5E+00	1.0E+06	0.0E+00	1.5E+00	1.5E-01*	2.2E-07	1.5E-01*	0.0E+00	NA
CHLOROPHENYLMETHYL SULFONE	1.7E+04	0.0E+00	0.0E+00	1.7E+04	0.0E+00	0.0E+00	0.0E+00	9.0E-09	NA
PPDE	5.7E+00	5.7E+05	0.0E+00	5.7E+00	8.4E-03	8.4E-08	8.4E-03	0.0E+00	NA
PPDDT	5.7E+00	1.2E+06	0.0E+00	5.7E+00	4.9E-02	2.3E-07	4.9E-02	0.0E+00	NA
DICYCLOPENTADIENE	1.2E+03	5.6E+02	0.0E+00	3.8E+02	2.6E-01*	5.4E-01*	7.9E-01*	0.0E+00	NA
DIELDRIN	1.2E-01	1.0E+06	1.0E+06	1.2E-01	1.6E+02*	4.6E-03a	1.6E+02*	0.0E+00	NA
ENDRIN	2.5E+02	3.5E+06	0.0E+00	2.5E+02	1.1E-03	8.0E-08	1.1E-03	0.0E+00	NA
HEXACHLOROCYCLOPENTADIENE	3.8E+02	2.9E+02	0.0E+00	1.6E+02	7.6E-06	1.0E-05	1.8E-05	0.0E+00	NA
ISODRIN	5.9E+01	6.9E+05	0.0E+00	5.9E+01	3.4E-04	2.9E-08	3.4E-04	0.0E+00	NA
METHYLENE CHLORIDE	2.5E+02	6.0E+02	0.0E+00	1.8E+02	3.6E-01*	1.5E-01*	5.1E-01*	0.0E+00	NA
1,1,2,2-TETRACHLOROETHANE	9.9E+00	1.7E+02	0.0E+00	9.3E+00	1.4E-01*	8.3E-03	1.5E-01*	0.0E+00	NA
1,1,1-TRICHLOROETHANE	7.8E+04	1.1E+06	0.0E+00	7.3E+04	8.3E-05	6.0E-06	8.9E-05	0.0E+00	NA
COPPER	5.7E+04	0.0E+00	0.0E+00	5.7E+04	8.8E-04	0.0E+00	8.8E-04	0.0E+00	NA
MERCURY	4.6E+02	0.0E+00	0.0E+00	4.6E+02	4.3E-04	0.0E+00	4.3E-04	0.0E+00	NA
ZINC	1.4E+05	0.0E+00	0.0E+00	1.4E+05	7.9E-04	0.0E+00	7.9E-04	0.0E+00	NA

This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPPLV for this contaminant is considered to be equal to pure compound. The SPPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

2.9 SITE SPSA-2b: OPEN STORAGE AREA (formerly Site 1-9: Open Storage Area; EBASCO, 1987d/RIC 87127R07 and EBASCO, 1988g/RIC 87127R07A)

2.9.1 Site-Specific Considerations

Figure SPSA-2b-1 and Tables SPSA-2b-1 and SPSA-2b-2 depict the target contaminants for Site SPSA-2b. Borings V101, V102, V201, V202, V301, V401, and V501 from the Shell Spill sites; and 1 through 4, and 11 through 27 from Site 1-9 were included in this exposure assessment, consistent with the South Plants SAR. The historical search conducted under the contamination assessment revealed that spills and leaks of bicycloheptadiene occurred in Site SPSA-2b; however, this chemical was not detected in soil during the Phase I and Phase II investigations. According to site history, no other chemicals from the RMA target contaminant list were suspected to be present in Site SPSA-2b (EBASCO, 1987d/RIC 87127R07).

2.9.2 Spatial Distribution of Measured Contaminant Concentrations

The locations and concentrations of the target contaminants that were detected in Site SPSA-2b are shown in Figure SPSA-2b-1. The following contaminants were not included in this figure since they were not considered target contaminants during Phase I and Phase II investigations: 1,1,2,2-Tetrachloroethane, occurring in Borings 15 and 20 (0-1 ft), and 1-methyl-1,3-cyclopentadiene, occurring in Boring V201 (4-5 and 9-10 ft). Although not shown in this figure, these chemicals were included in the South Plants SAR and in this exposure assessment because they passed through the screening process performed in the RMA Chemical Index (EBASCO, 1988c/RIC 88357R01).

Table SPSA-2b-1 summarizes the maximum concentrations of contaminants measured in soil above indicator levels for the ICP metals, arsenic, and mercury and CRLs for organic contaminants from the Phase I and Phase II investigations. The boring number and depth where the maximum value was observed are shown. No data were included for ICP metals, arsenic, and mercury for Horizon 2 because direct soil exposure below 10 ft is assumed to be negligible (see Volume VI-A). Table SPSA-2b-2 summarizes the maximum concentrations detected in groundwater together with the well number, location, sampling interval, and depth to groundwater.

2.9.3 Site Exposure Summary

Tables SPSA-2b-3 through SPSA-2b-7 present Draft PPLVs, EIs, and VEIs for each site contaminant. Since the depth to groundwater below Site SPSA-2b is at 10 ft, the enclosed space vapor inhalation SPPPLV is included in the calculation of the cumulative quantity. The COCs are summarized below for each exposed population and with the critical exposure pathway identified.

Contaminants of Concern	Regulated Visitor	Casual Visitor	Recreational Visitor	Commercial Worker	Industrial Worker
Aldrin	Direct	Direct	Direct	Dir/Ind	Dir/Ind
Benzene	Indirect	Indirect	Indirect	Indirect	Indirect
Dicyclopentadiene	Indirect	Indirect	Indirect	Indirect	Dir/Ind
Dieldrin	Direct	Direct	Direct	Direct	Dir/Ind
Methylene chloride	--	--	Indirect	Indirect	Indirect
1,1,2,2-Tetrachloroethane	--	--	Direct	Cumulative	Dir/Ind

Note: Direct exposure pathways for soils include soil ingestion, suspended particulate inhalation, and dermal contact.
Indirect exposure pathways include open and enclosed space vapor inhalation.

The results of the soil exposure summary indicate that exposure to contamination from the direct and indirect pathways both contribute to the exceedance of the cumulative PPLVs. It should be noted for 1,1,2,2-tetrachloroethane, the cumulative EI exceeds 0.1 for a commercial worker but the direct and indirect EIs do not exceed 0.1. Site SPSA-2b is designated as a Priority 1 site, based on the most sensitive exposed population PPLV (i.e., the industrial worker).

The following groundwater contaminant results in an unacceptable exposure due to vapor inhalation as indicated by a VEI value greater than 1:

- Benzene (open, enclosed)

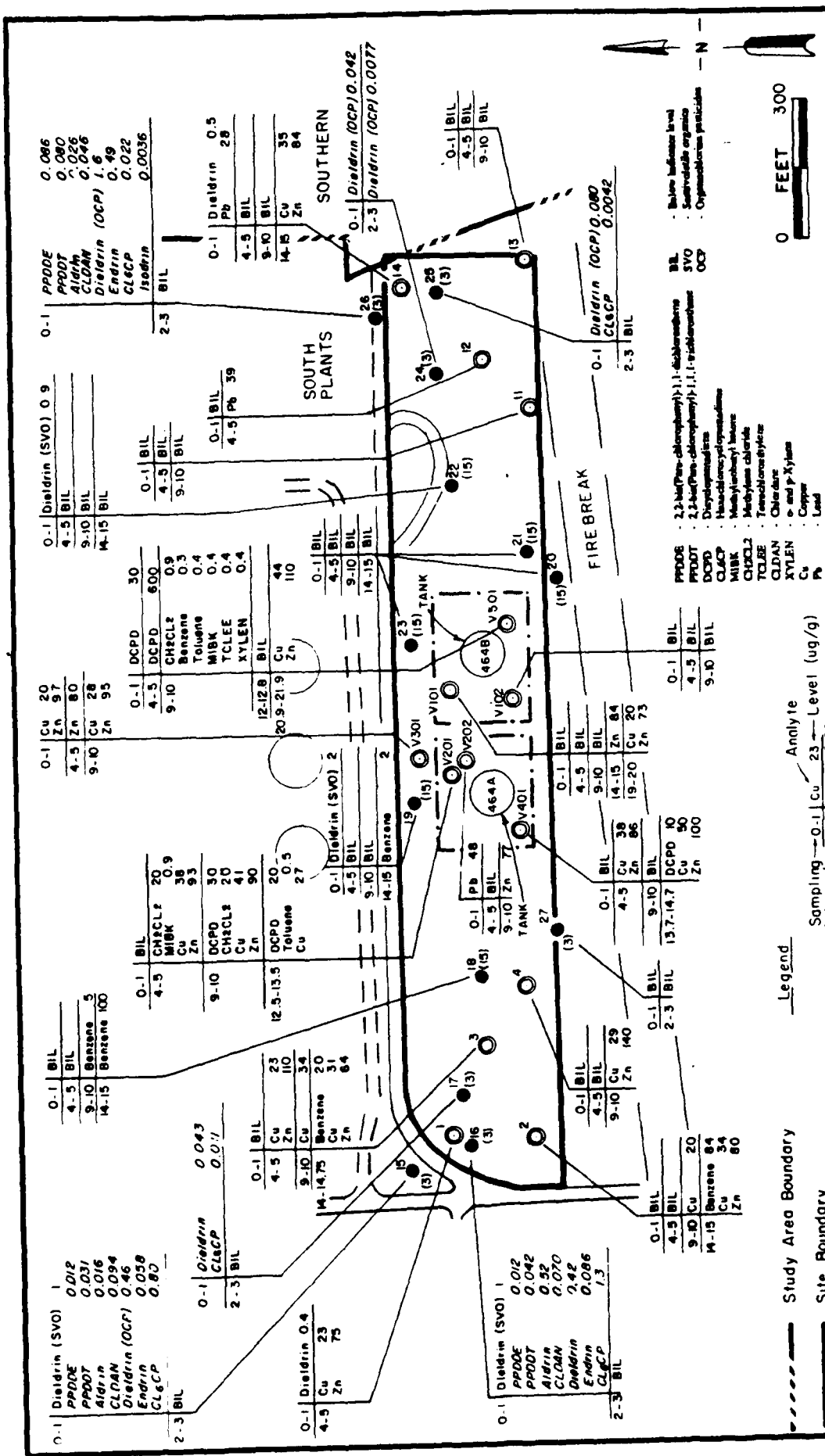


FIGURE SP5A-2b-1
Phase I and Phase II
Analytes Detected Within or
Above Indicator Levels
 Rocky Mountain Arsenal
 Prepared by: Ebasco Services Incorporated

Prepared for:
 Program Manager's Office for
 Rocky Mountain Arsenal Cleanup
 Aberdeen Proving Ground, Maryland

Prepared by:
 Analytes detected by
 different method in
 Phase II - see text

Sampling Interval (ft) → Analyte Level (ug/g)
 0-1 Cu 20
 4-5 Zn 80
 9-10 Cu 28
 Zn 55

0-1 BIL
 4-5 BIL
 9-10 Benzene 5
 Benzene 100

0-1 Dieltrin (SVO) 1
 PPDE 0.012
 PPDDE 0.031
 Aldrin 0.016
 CLDNM 0.094
 Dieltrin (OCF) 0.46
 Endrin 0.058
 CLGCP 0.80

0-1 Dieltrin (SVO) 0.9
 4-5 BIL
 9-10 BIL
 14-15 BIL

0-1 Dieltrin (SVO) 2
 4-5 BIL
 9-10 BIL
 14-15 Benzene 2

0-1 DCPD 30
 4-5 DCPD 600
 9-10 ChCCL2 0.9
 Benzene 0.3
 Toluene 0.4
 MIBK 0.4
 TCLEE 0.4
 XYLEN 0.4

0-1 BIL
 4-5 BIL
 9-10 BIL
 14-15 BIL

0-1 Dieltrin (OCF) 0.042
 2-3 Dieltrin (OCF) 0.0077

0-1 Dieltrin (OCF) 0.080
 2-3 CLGCP 0.0042
 BIL

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 4-5 BIL
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TABLE SPSA-2b-1
SOIL CONTAMINANT CONCENTRATIONS
FOR SITE SPSA-2b

Contaminant	Horizon 1				Horizon 2			
	Max. (ug/g)	Depth (ft)	Boring Number		Max. (ug/g)	Depth (ft)	Boring Number	
Aldrin	0.52	0-1	16		0.52	0-1	16	
Benzene	5	9-10	18		100	14-15	18	
Chlordane	0.094	0-1	15		0.094	0-1	15	
PPDDE ^{1/}	0.086	0-1	26		0.086	0-1	26	
PPDDT ^{2/}	0.080	0-1	26		0.080	0-1	26	
Dicyclopentadiene	600	4-5	V501		600	4-5	V501	
Dieldrin	2	0-1	19		2	0-1	19	
Endrin	0.49	0-1	26		0.49	0-1	26	
Hexachlorocyclopentadiene	1.3	0-1	16		1.3	0-1	16	
Isodrin	0.0036	0-1	26		0.0036	0-1	26	
1-Methyl-1,3-cyclopentadiene ^{3/}	3.3	9-10	V201		3.3	9-10	V201	
Methylisobutyl ketone	0.9	4-5	V201		0.9	4-5	V201	
Methylene chloride	20	4-5	V201		20	4-5	V201	
		9-10	V201			9-10	V201	
1,1,2,2-Tetrachloroethane ^{3/}	3.0	0-1	15		3.0	0-1	15	
Tetrachloroethylene	0.4	9-10	V501		0.4	9-10	V501	
Toluene	0.4	9-10	V501		0.5	12.5-13.5	V201	
o,p-Xylene	0.4	9-10	V501		0.4	9-10	V501	
Copper	41	9-10	V201		--	--	--	
Lead	48	0-1	V202		--	--	--	
Zinc	140	9-10	4		--	--	--	

TABLE SPSA-2b-1 (Continued)
SOIL CONTAMINANT CONCENTRATIONS
FOR SITE SPSA-2b

1/	PPDDE	2,2-bis(Para-chlorophenyl)-1,1-dichloroethene	
2/	PPDDT	2,2-bis(Para-chlorophenyl)-1,1,1-trichloroethane	
3/		Nontarget contaminant. Refer to the exposure assessment nontarget screen in Appendix A.	
	SPSA	South Plants Study Area	
	Max.	Maximum	
	ug/g	microgram per gram	
	ft	foot/feet	

TABLE SPSA-2b-2

GROUNDWATER CONTAMINANT CONCENTRATIONS (UG/L)
FOR SITE SPSA-2b

AVERAGE SITE DEPTH TO GROUNDWATER: 10 Feet

CHEMICAL	CONCENTRATION MAXIMUM	LOCATION (WELL NUMBER)	SAMPLE DATE
BENZENE	1100000	01555	02/29/88
DICYCLOPENTADIENE	110	01555	02/29/88

EACH VALUE PRESENTED IS THE MAXIMUM CONCENTRATION FOR THE LISTED ANALYTE
FOR THE PERIOD March 17, 1987 TO February 28, 1989.
DATA SOURCE: DP ASSOCIATES, RMA Database, July 19, 1990

SPSA-2b-3
EXPOSURE EVALUATIONS FOR REGULATED VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI OPN
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	
ALDRIN	1.5E+00	3.8E+04	1.5E+00	3.5E-01*	1.4E-05	3.5E-01*	0.0E+00
BENZENE	8.6E+02	6.1E+02	3.6E+02	5.8E-03	1.6E-01*	1.7E-01*	1.5E+01
CHLORDANE	2.0E+01	4.1E+06	2.0E+01	4.8E-03	2.3E-08	4.8E-03	0.0E+00
PPDE	7.4E+01	2.3E+06	7.4E+01	1.2E-03	3.8E-08	1.2E-03	0.0E+00
PPDDT	7.4E+01	4.8E+06	7.4E+01	1.1E-03	1.7E-08	1.1E-03	0.0E+00
DICYCLOPENTADIENE	5.4E+04	2.9E+02	2.9E+02	1.1E-02	2.1E+00*	2.1E+00*	0.0E+00
DIELDRIN	1.6E+00	1.7E+04	1.6E+00	1.3E+00*	1.2E-04	1.3E+00*	0.0E+00
ENDRIN	2.5E+03	1.4E+07	2.5E+03	2.0E-04	3.5E-08	2.0E-04	0.0E+00
HEXACHLOROCYCLOPENTADIENE	1.7E+04	1.2E+03	1.1E+03	7.8E-05	1.1E-03	1.2E-03	0.0E+00
ISODRIN	5.8E+02	2.7E+06	5.8E+02	6.2E-06	1.3E-09	6.2E-06	0.0E+00
METHYLISOBUTYL KETONE	4.1E+05	1.5E+05	1.1E+05	2.2E-06	5.9E-06	8.1E-06	0.0E+00
METHYLENE CHLORIDE	3.3E+03	1.3E+03	9.2E+02	6.1E-03	1.6E-02	2.2E-02	0.0E+00
1,1,2,2-TETRACHLOROETHANE	1.3E+02	6.7E+02	1.1E+02	2.4E-02	4.5E-03	2.8E-02	0.0E+00
TETRACHLOROETHYLENE	5.1E+02	1.4E+04	4.9E+02	7.8E-04	2.9E-05	8.1E-04	0.0E+00
TOLUENE	2.5E+06	7.4E+06	1.9E+06	1.6E-07	6.7E-08	2.3E-07	0.0E+00
O,P-XYLENE	1.4E+07	1.7E+06	1.5E+06	2.8E-08	2.3E-07	2.6E-07	0.0E+00
COPPER	4.2E+05	0.0E+00	4.2E+05	9.8E-05	0.0E+00	9.8E-05	0.0E+00
LEAD	1.5E+04	0.0E+00	1.5E+04	3.1E-03	0.0E+00	3.1E-03	0.0E+00
ZINC	2.0E+06	0.0E+00	2.0E+06	7.1E-05	0.0E+00	7.1E-05	0.0E+00

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-2b-4
EXPOSURE EVALUATIONS FOR CASUAL VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI OPN
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	
ALDRIN	1.5E+00	3.8E+04	1.5E+00	3.5E-01*	1.4E-05	3.5E-01*	0.0E+00
BENZENE	8.6E+02	6.1E+02	3.6E+02	5.8E-03	1.6E-01*	1.7E-01*	1.5E+01
CHLORDANE	2.0E+01	4.1E+06	2.0E+01	4.8E-03	2.3E-08	4.8E-03	0.0E+00
PPDDE	7.4E+01	2.3E+06	7.4E+01	1.2E-03	3.8E-08	1.2E-03	0.0E+00
PPDDT	7.4E+01	4.8E+06	7.4E+01	1.1E-03	1.7E-08	1.1E-03	0.0E+00
DICYCLOPENTADIENE	5.4E+04	2.9E+02	2.9E+02	1.1E-02	2.1E+00*	2.1E+00*	0.0E+00
DIELDRIN	1.6E+00	1.7E+04	1.6E+00	1.3E+00*	1.2E-04	1.3E+00*	0.0E+00
ENDRIN	2.5E+03	1.4E+07	2.5E+03	2.0E-04	3.5E-08	2.0E-04	0.0E+00
HEXACHLOROCYCLOPENTADIENE	1.7E+04	1.2E+03	1.1E+03	7.8E-05	1.1E-03	1.2E-03	0.0E+00
ISODRIN	5.8E+02	2.7E+06	5.8E+02	6.2E-06	1.3E-09	6.2E-06	0.0E+00
METHYLISOBUTYL KETONE	4.1E+05	1.5E+05	1.1E+05	2.2E-06	5.9E-06	8.1E-06	0.0E+00
METHYLENE CHLORIDE	3.3E+03	1.3E+03	9.2E+02	6.1E-03	1.6E-02	2.2E-02	0.0E+00
1,1,2,2-TETRACHLOROETHANE	1.3E+02	6.7E+02	1.1E+02	2.4E-02	4.5E-03	2.8E-02	0.0E+00
TETRACHLOROETHYLENE	5.1E+02	1.4E+04	4.9E+02	7.8E-04	2.9E-05	8.1E-04	0.0E+00
TOLUENE	2.5E+06	7.4E+06	1.9E+06	1.6E-07	6.7E-08	2.3E-07	0.0E+00
O,P-XYLENE	1.4E+07	1.7E+06	1.5E+06	2.8E-08	2.3E-07	2.6E-07	0.0E+00
COPPER	4.2E+05	0.0E+00	4.2E+05	9.8E-05	0.0E+00	9.8E-05	0.0E+00
LEAD	1.5E+04	0.0E+00	1.5E+04	3.1E-03	0.0E+00	3.1E-03	0.0E+00
ZINC	2.0E+06	0.0E+00	2.0E+06	7.1E-05	0.0E+00	7.1E-05	0.0E+00

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-2b-5
EXPOSURE EVALUATIONS FOR RECREATIONAL VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	OPN
ALDRIN	2.1E-01	2.5E+03	2.1E-01	2.5E+00*	2.1E-04	2.5E+00*	0.0E+00
BENZENE	1.2E+02	9.4E+01	5.3E+01	4.2E-02	1.1E+00*	1.1E+00*	2.3E+02
CHLORDANE	2.7E+00	2.7E+05	2.7E+00	3.5E-02	3.5E-07	3.5E-02	0.0E+00
PPDDE	1.0E+01	1.5E+05	1.0E+01	8.4E-03	5.7E-07	8.4E-03	0.0E+00
PPDOT	1.0E+01	3.2E+05	1.0E+01	7.8E-03	2.5E-07	7.8E-03	0.0E+00
DICYCLOPENTADIENE	1.8E+04	1.0E+02	1.0E+02	3.3E-02	5.7E+00*	5.8E+00*	0.0E+00
DIELDRIN	2.2E-01	1.2E+03	2.2E-01	9.2E+00*	1.7E-03	9.2E+00*	0.0E+00
ENDRIN	1.1E+03	2.2E+06	1.1E+03	4.6E-04	2.3E-07	4.6E-04	0.0E+00
HEXACHLOROCYCLOPENTADIENE	5.7E+03	4.2E+02	3.9E+02	2.3E-04	3.1E-03	3.3E-03	0.0E+00
ISODRIN	2.5E+02	4.3E+05	2.5E+02	1.5E-05	8.5E-09	1.5E-05	0.0E+00
METHYLISOBUTYL KETONE	1.7E+05	5.5E+04	4.2E+04	5.2E-06	1.6E-05	2.1E-05	0.0E+00
METHYLENE CHLORIDE	4.5E+02	2.0E+02	1.4E+02	4.4E-02	1.0E-01*	1.5E-01*	0.0E+00
1,1,2,2-TETRACHLOROETHANE	1.8E+01	1.0E+02	1.5E+01	1.7E-01*	2.9E-02	2.0E-01*	0.0E+00
TETRACHLOROETHYLENE	7.1E+01	2.2E+03	6.9E+01	5.6E-03	1.8E-04	5.8E-03	0.0E+00
TOLUENE	1.1E+06	2.7E+06	7.6E+05	3.8E-07	1.9E-07	5.6E-07	0.0E+00
O,P-XYLENE	5.8E+06	6.2E+05	5.6E+05	6.9E-08	6.4E-07	7.1E-07	0.0E+00
COPPER	2.5E+05	0.0E+00	2.5E+05	1.7E-04	0.0E+00	1.7E-04	0.0E+00
LEAD	9.2E+03	0.0E+00	9.2E+03	5.2E-03	0.0E+00	5.2E-03	0.0E+00
ZINC	1.1E+06	0.0E+00	1.1E+06	1.3E-04	0.0E+00	1.3E-04	0.0E+00

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-2b-6
EXPOSURE EVALUATIONS FOR COMMERCIAL WORKERS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI ENC
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	
ALDRIN	1.9E+00	4.0E-01	3.3E-01	2.7E-01*	1.3E+00*	1.6E+00*	0.0E+00
BENZENE	1.1E+03	6.7E-01	6.7E-01	4.6E-03	1.5E+02*	1.5E+02*	1.4E+06
CHLORDANE	2.5E+01	1.4E+04	2.5E+01	3.8E-03	6.9E-06	3.8E-03	0.0E+00
PPDE	9.3E+01	1.9E+01	1.6E+01	9.2E-04	4.4E-03	5.3E-03	0.0E+00
PPDT	9.3E+01	1.9E+01	1.6E+01	8.6E-04	4.1E-03	5.0E-03	0.0E+00
DICYCLOPENTADIENE	1.7E+04	1.7E-01	1.7E-01	3.5E-02	3.5E+03*	3.5E+03*	0.0E+00
DIELDRIN	2.0E+00	5.8E+01	1.9E+00	1.0E+00*	3.5E-02	1.0E+00*	0.0E+00
ENDRIN	1.4E+03	2.9E+02	2.4E+02	3.6E-04	1.7E-03	2.1E-03	0.0E+00
HEXACHLOROCYCLOPENTADIENE	5.5E+03	1.9E+01	1.9E+01	2.4E-04	6.8E-02	6.8E-02	0.0E+00
ISODRIN	3.2E+02	6.7E+01	5.5E+01	1.1E-05	5.4E-05	6.5E-05	0.0E+00
METHYLISOBUTYL KETONE	2.2E+05	1.4E+02	1.4E+02	4.0E-06	6.5E-03	6.5E-03	0.0E+00
METHYLENE CHLORIDE	4.1E+03	3.4E+00	3.4E+00	4.9E-03	5.8E+00*	5.8E+00*	0.0E+00
1,1,2,2-TETRACHLOROETHANE	1.6E+02	3.4E+01	2.8E+01	1.9E-02	8.9E-02	1.1E-01*	0.0E+00
TETRACHLOROETHYLENE	6.5E+02	1.5E+01	1.5E+01	6.2E-04	2.6E-02	2.6E-02	0.0E+00
TOLUENE	1.4E+06	2.7E+03	2.7E+03	2.9E-07	1.8E-04	1.8E-04	0.0E+00
O,P-XYLENE	7.0E+06	6.3E+02	6.3E+02	5.7E-08	6.3E-04	6.3E-04	0.0E+00
COPPER	1.8E+05	0.0E+00	1.8E+05	2.3E-04	0.0E+00	2.3E-04	0.0E+00
LEAD	6.5E+03	0.0E+00	6.5E+03	7.4E-03	0.0E+00	7.4E-03	0.0E+00
ZINC	7.8E+05	0.0E+00	7.8E+05	1.8E-04	0.0E+00	1.8E-04	0.0E+00

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-2b-7
EXPOSURE EVALUATIONS FOR INDUSTRIAL WORKERS

CONTAMINANT	DIRECT	INDIRECT		CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI	
	PPLV (mg/kg)	OSVI (mg/kg)	ESVI (mg/kg)	PPLV (mg/kg)	EI	EI	EI	OPN	ENC
ALDRIN	1.2E-01	5.1E+03	4.0E-01	9.0E-02	4.5E+00*	1.3E+00*	5.8E+00*	0.0E+00	0.0E+00
BENZENE	6.7E+01	8.1E+01	6.7E-01	6.6E-01	7.5E-02	1.5E+02*	1.5E+02*	1.1E+02	4.1E+06
CHLORDANE	1.5E+00	5.5E+05	5.2E+00	1.2E+00	6.2E-02	1.8E-02	8.0E-02	0.0E+00	0.0E+00
PPDDE	5.7E+00	3.1E+05	1.9E+01	4.4E+00	1.5E-02	4.4E-03	1.9E-02	0.0E+00	0.0E+00
PPDDT	5.7E+00	6.5E+05	1.9E+01	4.4E+00	1.4E-02	4.1E-03	1.8E-02	0.0E+00	0.0E+00
DICYCLOPENTADIENE	1.2E+03	3.9E+01	5.1E-01	5.0E-01	5.1E-01*	1.2E+03*	1.2E+03*	0.0E+00	0.0E+00
DIELDRIN	1.2E-01	2.3E+03	1.9E+01	1.2E-01	1.6E+01*	1.1E-01*	1.6E+01*	0.0E+00	0.0E+00
ENDRIN	2.5E+02	1.9E+06	8.6E+02	2.0E+02	1.9E-03	5.7E-04	2.5E-03	0.0E+00	0.0E+00
HEXACHLOROCYCLOPENTADIENE	3.8E+02	1.5E+02	5.8E+01	3.8E+01	3.4E-03	3.1E-02	3.4E-02	0.0E+00	0.0E+00
ISODRIN	5.9E+01	3.7E+05	2.0E+02	4.6E+01	6.1E-05	1.8E-05	7.9E-05	0.0E+00	0.0E+00
METHYL ISOBUTYL KETONE	4.0E+04	2.0E+04	4.1E+02	4.0E+02	2.3E-05	2.2E-03	2.2E-03	0.0E+00	0.0E+00
METHYLENE CHLORIDE	2.5E+02	1.7E+02	3.4E+00	3.3E+00	8.1E-02	6.0E+00*	6.0E+00*	0.0E+00	0.0E+00
1,1,2,2-TETRACHLOROETHANE	9.9E+00	9.0E+01	3.4E+01	7.0E+00	3.0E-01*	1.2E-01*	4.3E-01*	0.0E+00	0.0E+00
TETRACHLOROETHYLENE	4.1E+01	1.9E+03	1.5E+01	1.1E+01	9.7E-03	2.6E-02	3.6E-02	0.0E+00	0.0E+00
TOLUENE	2.6E+05	9.9E+05	8.2E+03	7.9E+03	1.5E-06	6.2E-05	6.3E-05	0.0E+00	0.0E+00
O,P-XYLENE	8.8E+05	2.3E+05	1.9E+03	1.9E+03	4.5E-07	2.1E-04	2.1E-04	0.0E+00	0.0E+00
COPPER	5.7E+04	0.0E+00	0.0E+00	5.7E+04	7.2E-04	0.0E+00	7.2E-04	0.0E+00	0.0E+00
LEAD	2.2E+03	0.0E+00	0.0E+00	2.2E+03	2.2E-02	0.0E+00	2.2E-02	0.0E+00	0.0E+00
ZINC	1.4E+05	0.0E+00	0.0E+00	1.4E+05	1.0E-03	0.0E+00	1.0E-03	0.0E+00	0.0E+00

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

2.10 SITE SPSA-2c: SALVAGE YARD (formerly Site 1-8: Salvage Yard; EBASCO, 1987e/RIC 87127R05 and EBASCO, 1988h/RIC 87127R05A)

2.10.1 Site-Specific Considerations

Figure SPSA-2c-1 and Tables SPSA-2c-1 and SPSA-2c-2 depict the target contaminants for Site SPSA-2c. Borings 1 through 14, 16 through 19, 21 through 23, and 25 were included in this exposure assessment, consistent with the South Plants SAR. A cleaning facility, as well as equipment from mustard facilities, were reportedly present in this site. Therefore, chemicals in the RMA target contaminant list were suspected to be present in Site SPSA-2c (EBASCO, 1987e/RIC 87127R05).

2.10.2 Spatial Distribution of Measured Contaminant Concentrations

The locations and concentrations of the target contaminants that were detected in Site SPSA-2c are shown in Figure SPSA-2c-1. Table SPSA-2c-1 summarizes the maximum concentrations of contaminants measured in soil above indicator levels for the ICP metals, arsenic, and mercury and CRLs for organic contaminants from the Phase I and Phase II investigations. The boring number and depth where the maximum value was observed are shown. No data were included for ICP metals, arsenic, and mercury in Horizon 2 because direct soil exposure below 10 ft is assumed to be negligible (see Volume VI-A). Table SPSA-2c-2 summarizes the maximum concentrations detected in groundwater together with the well number, location, sampling interval, and depth to groundwater.

2.10.3 Site Exposure Summary

Tables SPSA-2c-3 through SPSA-2c-7 present Draft PPLVs, EIs, and VEIs for each site contaminant. Since the depth to groundwater below Site SPSA-2c is greater than 10 ft, the enclosed space vapor inhalation SPPPLV is included in the calculation of the cumulative quantity. The COCs are summarized below for each exposed population and with the critical exposure pathway identified.

Contaminants of Concern	Regulated Visitor	Casual Visitor	Recreational Visitor	Commercial Worker	Industrial Worker
Aldrin	Direct	Direct	Direct	Dir/Ind	Dir/Ind
Dieldrin	Direct	Direct	Direct	Direct	Dir/Ind
Chlordane	--	--	Direct	--	Dir/Ind
Methylene chloride	--	--	--	Indirect	Indirect

Note: Direct exposure pathways for soils include soil ingestion, suspended particulate inhalation, and dermal contact.

Indirect exposure pathways include open and enclosed space vapor inhalation.

The results of the soil exposure summary indicate that exposure to contamination from the direct and indirect pathways both contribute to the exceedance of the cumulative PPLVs. Site SPSA-2c is designated as a Priority 1 site, based on the most sensitive exposed population PPLV (i.e., the industrial worker).

The following groundwater contaminants result in an unacceptable exposure due to vapor inhalation as indicated by a VEI value greater than 1:

- Benzene (enclosed)
- Carbon tetrachloride (enclosed)

0.5-1.5	Aldrin	2
	Dieldrin	4
	Hg	0.092
4-5	MIBK	1
9-10	CH ₂ CL ₂	10
	Cu	37
	Zn	97
13-14	Cu	37
	Zn	79

0-1	Dieldrin	0.022
	Endrin	0.026
2-3	BIL	
4-5	BIL	
7-8	BIL	
9-10	1,1,1 TCE	1.8
	CH ₂ CL ₂	11
11-12	BIL	

0-1	Cu	24
	Pb	24
	Hg	7
	Zn	89
4-5	BIL	
9-10	BIL	
14-15	Cr	57
	Cu	29
	Zn	71
17-18	BIL	
17-20	Cu	38
	Zn	69

0-1	Dieldrin	0.022
2-3	BIL	
4-5	BIL	
7-8	BIL	
9-10	BIL	
11-12	1,1,1 TCE	0.59

0-1	PPDE	0.0078
	PPDT	0.012
	Aldrin	0.026
	Chlordane	0.030
	Dieldrin	0.49
	Endrin	0.031
	Isodrin	0.0046
	Zn	290
2-3	BIL	
4-5	BIL	
7-8	BIL	
9-10	Zn	81

0-1	Dieldrin	0.039
	Endrin	0.13
	Isodrin	0.0019
2-3	Dieldrin	0.023
	Endrin	0.039
11-12	BIL	
13-14	BIL	
17-18	BIL	
19-20	BIL	

2-3	BIL	
4-5	BIL	
7-8	BIL	
9-10	Zn	81

Possible Lagoon (1966)

0-1	Dieldrin	0.6
4-5	BIL	
9-10	BIL	
14-15	Dieldrin	0.2
	Cu	37
	Pb	27
	Zn	97

0-1	BIL	
4-5	BIL	

2-3	BIL	
4-5	BIL	
7-8	BIL	

0-1	BIL	
4-5	BIL	

Section 1

0-1	PPDE	0.19
	PPDT	0.50
	Aldrin	0.12
	Chlordane	0.90
	Dieldrin	2.7
	Endrin	1.7
	Isodrin	2.2
2-3	Dieldrin	0.018
11-12	BIL	
14-15	BIL	
17-18	BIL	
19-20	BIL	

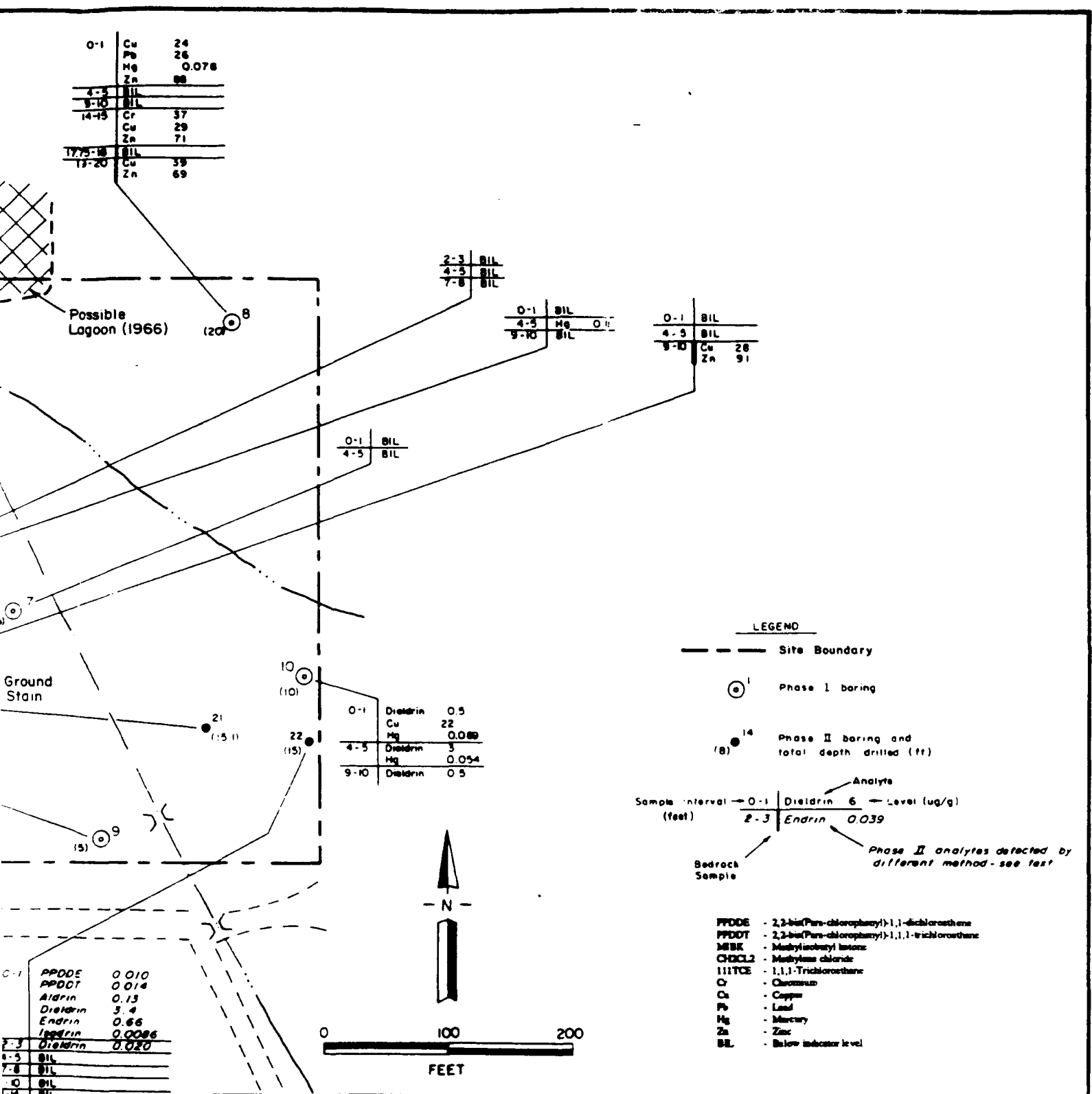
0-1	Aldrin	0.0026
	Dieldrin	0.89
	Endrin	0.0082
	Isodrin	0.0022
2-3	Dieldrin	0.041
4-5	BIL	
7-8	BIL	
9-10	BIL	
14-15	BIL	

0-1	BIL	
4-5	BIL	

Ground Stain

0-1	PPDE	0.033
	PPDT	0.033
	Chlordane	0.050
	Dieldrin	0.53
	Endrin	0.053
	Isodrin	0.0016
2-3	BIL	
11-12-13	BIL	
13-14-15	BIL	
17-18	BIL	
19-20	BIL	

0-1	PPDE	0.010
	PPDT	0.014
	Aldrin	0.13
	Dieldrin	3.4
	Endrin	0.66
	Isodrin	0.0086
2-3	Dieldrin	0.020
4-5	BIL	
7-8	BIL	
9-10	BIL	
13-14	BIL	
14-15	BIL	



0-1	Cu	24
	Pb	26
	Hg	0.078
	Zn	88
4-5	BIL	
9-10	BIL	
14-15	Cr	37
	Cu	29
	Zn	71
17-18	BIL	
19-20	Cu	39
	Zn	69

2-3	BIL
4-5	BIL
7-8	BIL

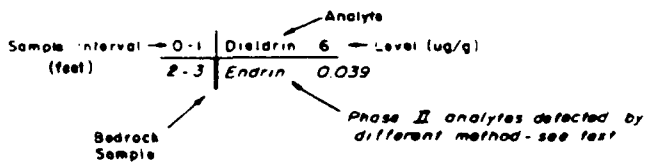
0-1	BIL	
4-5	Hg	0.11
9-10	BIL	

0-1	BIL	
4-5	BIL	
9-10	Cu	28
	Zn	91

0-1	BIL
4-5	BIL

0-1	Dieldrin	0.5
	Cu	22
	Hg	0.088
4-5	Dieldrin	3
	Hg	0.054
9-10	Dieldrin	0.5

LEGEND
 --- Site Boundary
 ⊙¹ Phase I boring
 ⊙¹⁴ Phase II boring and total depth drilled (ft)



- PFDE - 2,2-bis(Para-chlorophenyl)-1,1-dichloroethane
- PFDT - 2,2-bis(Para-chlorophenyl)-1,1,1-trichloroethane
- MIBK - Methylisobutyl ketone
- CH2CL2 - Methylene chloride
- 1,1,1TCE - 1,1,1-Trichloroethane
- Cr - Chromium
- Cu - Copper
- Pb - Lead
- Hg - Mercury
- Zn - Zinc
- BL - Below indicator level

0-1	PFDE	0.010
	PFDT	0.014
	Aldrin	0.13
	Dieldrin	3.4
	Endrin	0.66
	Isoendrin	0.0086
2-3	Dieldrin	0.020
4-5	BIL	
7-8	BIL	
10	BIL	
14	BIL	
15	BIL	

<p>Prepared for :</p> <p>Program Manager's Office for Rocky Mountain Arsenal Cleanup Aberdeen Proving Ground, Maryland</p> <p>Drafted 5/18/88</p>	<p>FIGURE SPSA-2c-1</p> <p>Phase I and Phase II Analytes Detected Within or Above Indicator Levels</p> <p>Rocky Mountain Arsenal</p> <p>Prepared by: Ebasco Services Incorporated</p>
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TABLE SPSA-2c-1
SOIL CONTAMINANT CONCENTRATIONS
FOR SITE SPSA-2c

Contaminant	Horizon 1			Horizon 2		
	Max. (ug/g)	Depth (ft)	Boring Number	Max. (ug/g)	Depth (ft)	Boring Number
Aldrin	2.0	0.5-1.5	11	2.0	0.5-1.5	11
Chlordane	0.90	0-1	18	0.90	0-1	18
PPDDE ^{1/}	0.19	0-1	18	0.19	0-1	18
PPDDT ^{2/}	0.50	0-1	18	0.50	0-1	18
Dieldrin	4.0	0.5-1.5	11	4.0	0.5-1.5	11
Endrin	1.7	0-1	18	1.7	0-1	18
Isodrin	2.2	0-1	18	2.2	0-1	18
Methylisobutyl ketone	1	4-5	11	1	4-5	11
Methylene chloride	11	9-10	12	11	9-10	12
1,1,1-Trichloroethane	1.8	9-10	12	1.8	9-10	12
Copper	37	9-10	11	--	--	--
Mercury	0.11	4-5	6	--	--	--
Zinc	290	0-1	16	--	--	--

1/ PPDDE 2,2-bis(Para-chlorophenyl)-1,1-dichloroethene
2/ PPDDT 2,2-bis(Para-chlorophenyl)-1,1,1-trichloroethane

SPSA South Plants Study Area
Max. Maximum
ug/g microgram per gram
ft foot/feet

TABLE SPSA-2c-2

GROUNDWATER CONTAMINANT CONCENTRATIONS (UG/L)
FOR SITE SPSA-2c

AVERAGE SITE DEPTH TO GROUNDWATER: 20 Feet

CHEMICAL	CONCENTRATION MAXIMUM	LOCATION (WELL NUMBER)	SAMPLE DATE
BENZENE	3800	01018	02/5/88
CARBON TETRACHLORIDE	820	01018	02/5/88
CHLOROFORM	2.9	01018	02/5/88
DIBROMOCHLOROPROPANE	6.5	01018	02/5/88
PPDDE	0.32	01018	02/5/88

EACH VALUE PRESENTED IS THE MAXIMUM CONCENTRATION FOR THE LISTED ANALYTE
FOR THE PERIOD March 17, 1987 TO February 28, 1989.
DATA SOURCE: DP ASSOCIATES, RMA Database, July 19, 1990

SPSA-2c-3
EXPOSURE EVALUATIONS FOR REGULATED VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI OPN
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	
ALDRIN	1.5E+00	6.6E+04	1.5E+00	1.3E+00*	3.0E-05	1.3E+00*	0.0E+00
BENZENE	8.6E+02	0.0E+00	8.6E+02	0.0E+00	0.0E+00	0.0E+00	1.5E-02
CARBON TETRACHLORIDE	2.0E+02	0.0E+00	2.0E+02	0.0E+00	0.0E+00	0.0E+00	5.5E-02
CHLORDANE	2.0E+01	7.2E+06	2.0E+01	4.6E-02	1.3E-07	4.6E-02	0.0E+00
CHLOROFORM	4.0E+03	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	1.7E-06
PPDDE	7.4E+01	4.0E+06	7.4E+01	2.6E-03	4.7E-08	2.6E-03	9.3E-08
PPDDT	7.4E+01	8.5E+06	7.4E+01	6.8E-03	5.9E-08	6.8E-03	0.0E+00
DIBROMOCHLOROPROPANE	1.8E+01	0.0E+00	1.8E+01	0.0E+00	0.0E+00	0.0E+00	5.2E-05
DIELDRIN	1.6E+00	3.0E+04	1.6E+00	2.5E+00*	1.3E-04	2.5E+00*	0.0E+00
ENDRIN	2.5E+03	1.0E+06	2.5E+03	6.9E-04	6.9E-08a	6.9E-04	0.0E+00
ISODRIN	5.8E+02	4.8E+06	5.8E+02	3.8E-03	4.6E-07	3.8E-03	0.0E+00
METHYLISOBUTYL KETONE	4.1E+05	7.2E+05	2.6E+05	2.4E-06	1.4E-06	3.8E-06	0.0E+00
METHYLENE CHLORIDE	3.3E+03	6.9E+03	2.2E+03	3.4E-03	1.6E-03	5.0E-03	0.0E+00
1,1,1-TRICHLOROETHANE	7.5E+05	8.0E+06	6.8E+05	2.4E-06	2.2E-07	2.6E-06	0.0E+00
COPPER	4.2E+05	0.0E+00	4.2E+05	8.9E-05	0.0E+00	8.9E-05	0.0E+00
MERCURY	3.3E+03	0.0E+00	3.3E+03	3.3E-05	0.0E+00	3.3E-05	0.0E+00
ZINC	2.0E+06	0.0E+00	2.0E+06	1.5E-04	0.0E+00	1.5E-04	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPPLV for this contaminant is considered to be equal to pure compound. The SPPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-2c-4
EXPOSURE EVALUATIONS FOR CASUAL VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI OPN
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	
ALDRIN	1.5E+00	6.6E+04	1.5E+00	1.3E+00*	3.0E-05	1.3E+00*	0.0E+00
BENZENE	8.6E+02	0.0E+00	8.6E+02	0.0E+00	0.0E+00	0.0E+00	1.5E-02
CARBON TETRACHLORIDE	2.0E+02	0.0E+00	2.0E+02	0.0E+00	0.0E+00	0.0E+00	5.5E-02
CHLORDANE	2.0E+01	7.2E+06	2.0E+01	4.6E-02	1.3E-07	4.6E-02	0.0E+00
CHLOROFORM	4.0E+03	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	1.7E-06
PPDDE	7.4E+01	4.0E+06	7.4E+01	2.6E-03	4.7E-08	2.6E-03	9.3E-08
PPDDT	7.4E+01	8.5E+06	7.4E+01	6.8E-03	5.9E-08	6.8E-03	0.0E+00
DIBROMOCHLOROPROPANE	1.8E+01	0.0E+00	1.8E+01	0.0E+00	0.0E+00	0.0E+00	5.2E-05
DIELDRIN	1.6E+00	3.0E+04	1.6E+00	2.5E+00*	1.3E-04	2.5E+00*	0.0E+00
ENDRIN	2.5E+03	1.0E+06	2.5E+03	6.9E-04	6.9E-08 ^a	6.9E-04	0.0E+00
ISODRIN	5.8E+02	4.8E+06	5.8E+02	3.8E-03	4.6E-07	3.8E-03	0.0E+00
METHYLISOBUTYL KETONE	4.1E+05	7.2E+05	2.6E+05	2.4E-06	1.4E-06	3.8E-06	0.0E+00
METHYLENE CHLORIDE	3.3E+03	6.9E+03	2.2E+03	3.4E-03	1.6E-03	5.0E-03	0.0E+00
1,1,1-TRICHLOROETHANE	7.5E+05	8.0E+06	6.8E+05	2.4E-06	2.2E-07	2.6E-06	0.0E+00
COPPER	4.2E+05	0.0E+00	4.2E+05	8.9E-05	0.0E+00	8.9E-05	0.0E+00
MERCURY	3.3E+03	0.0E+00	3.3E+03	3.3E-05	0.0E+00	3.3E-05	0.0E+00
ZINC	2.0E+06	0.0E+00	2.0E+06	1.5E-04	0.0E+00	1.5E-04	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPLV for this contaminant is considered to be equal to pure compound. The SPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-2c-5
EXPOSURE EVALUATIONS FOR RECREATIONAL VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI OPN
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI EI	EI EI	EI EI	
ALDRIN	2.1E-01	4.4E+03	2.1E-01	9.6E+00*	4.5E-04	9.6E+00*	0.0E+00
BENZENE	1.2E+02	0.0E+00	1.2E+02	0.0E+00	0.0E+00	0.0E+00	2.2E-01
CARBON TETRACHLORIDE	2.7E+01	0.0E+00	2.7E+01	0.0E+00	0.0E+00	0.0E+00	8.3E-01
CHLORDANE	2.7E+00	4.8E+05	2.7E+00	3.3E-01*	1.9E-06	3.3E-01*	0.0E+00
CHLOROFORM	5.6E+02	0.0E+00	5.6E+02	0.0E+00	0.0E+00	0.0E+00	2.5E-05
PPDDE	1.0E+01	2.7E+05	1.0E+01	1.9E-02	7.1E-07	1.9E-02	1.4E-06
PPDDT	1.0E+01	5.6E+05	1.0E+01	4.9E-02	8.9E-07	4.9E-02	0.0E+00
DIBROMOCHLOROPROPANE	2.5E+00	0.0E+00	2.5E+00	0.0E+00	0.0E+00	0.0E+00	7.8E-04
DIELDRIN	2.2E-01	2.0E+03	2.2E-01	1.8E+01*	2.0E-03	1.8E+01*	0.0E+00
ENDRIN	1.1E+03	1.0E+06	1.1E+03	1.6E-03	4.5E-07 ^a	1.6E-03	0.0E+00
ISODRIN	2.5E+02	7.4E+05	2.5E+02	8.9E-03	3.0E-06	8.9E-03	0.0E+00
METHYLISOBUTYL KETONE	1.7E+05	2.6E+05	1.0E+05	5.8E-06	3.8E-06	9.6E-06	0.0E+00
METHYLENE CHLORIDE	4.5E+02	1.1E+03	3.2E+02	2.4E-02	1.0E-02	3.5E-02	0.0E+00
1,1,1-TRICHLOROETHANE	3.2E+05	2.9E+06	2.9E+05	5.6E-06	6.2E-07	6.3E-06	0.0E+00
COPPER	2.5E+05	0.0E+00	2.5E+05	1.5E-04	0.0E+00	1.5E-04	0.0E+00
MERCURY	2.0E+03	0.0E+00	2.0E+03	5.6E-05	0.0E+00	5.6E-05	0.0E+00
ZINC	1.1E+06	0.0E+00	1.1E+06	2.8E-04	0.0E+00	2.8E-04	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPLV for this contaminant is considered to be equal to pure compound. The SPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-2c-6
EXPOSURE EVALUATIONS FOR COMMERCIAL WORKERS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI ENC
ALDRIN	1.9E+00	4.0E-01	3.3E-01	1.1E+00*	5.1E+00*	6.1E+00*	0.0E+00
BENZENE	1.1E+03	0.0E+00	1.1E+03	0.0E+00	0.0E+00	0.0E+00	1.8E+01
CARBON TETRACHLORIDE	2.5E+02	0.0E+00	2.5E+02	0.0E+00	0.0E+00	0.0E+00	6.7E+01
CHLORDANE	2.5E+01	1.4E+04	2.5E+01	3.6E-02	6.6E-05	3.7E-02	0.0E+00
CHLOROFORM	5.1E+03	0.0E+00	5.1E+03	0.0E+00	0.0E+00	0.0E+00	2.0E-03
PPDDE	9.3E+01	1.9E+01	1.6E+01	2.0E-03	9.8E-03	1.2E-02	1.1E-04
PPDDT	9.3E+01	1.6E+04	9.2E+01	5.4E-03	3.1E-05	5.4E-03	0.0E+00
DIBROMOCHLOROPROPANE	2.3E+01	0.0E+00	2.3E+01	0.0E+00	0.0E+00	0.0E+00	6.3E-02
DIELDRIN	2.0E+00	5.8E+01	1.9E+00	2.0E+00*	7.0E-02	2.1E+00*	0.0E+00
ENDRIN	1.4E+03	1.0E+06	2.4E+02	1.2E-03	5.9E-03a	7.1E-03	0.0E+00
ISODRIN	3.2E+02	6.7E+01	5.5E+01	6.9E-03	3.3E-02	4.0E-02	0.0E+00
METHYLISOBUTYL KETONE	2.2E+05	2.1E+03	2.1E+03	4.5E-06	4.7E-04	4.7E-04	0.0E+00
METHYLENE CHLORIDE	4.1E+03	4.3E+00	4.3E+00	2.7E-03	2.5E+00*	2.5E+00*	0.0E+00
1,1,1-TRICHLOROETHANE	4.2E+05	1.7E+03	1.7E+03	4.3E-06	1.1E-03	1.1E-03	0.0E+00
COPPER	1.8E+05	0.0E+00	1.8E+05	2.1E-04	0.0E+00	2.1E-04	0.0E+00
MERCURY	1.4E+03	0.0E+00	1.4E+03	7.9E-05	0.0E+00	7.9E-05	0.0E+00
ZINC	7.8E+05	0.0E+00	7.8E+05	3.7E-04	0.0E+00	3.7E-04	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPPLV for this contaminant is considered to be equal to pure compound. The SPPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

SPSA-2c-7
EXPOSURE EVALUATIONS FOR INDUSTRIAL WORKERS

CONTAMINANT	DIRECT	INDIRECT		CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI	
	PPLV (mg/kg)	OSVI (mg/kg)	ESVI (mg/kg)	PPLV (mg/kg)	EI	EI	EI	OPN	ENC
ALDRIN	1.2E-01	8.9E+03	4.0E-01	9.0E-02	1.7E+01*	5.1E+00*	2.2E+01*	0.0E+00	0.0E+00
BENZENE	6.7E+01	0.0E+00	0.0E+00	6.7E+01	0.0E+00	0.0E+00	0.0E+00	1.1E-01	5.4E+01
CARBON TETRACHLORIDE	1.5E+01	0.0E+00	0.0E+00	1.5E+01	0.0E+00	0.0E+00	0.0E+00	4.1E-01	2.0E+02
CHLORDANE	1.5E+00	9.6E+05	5.2E+00	1.2E+00	5.9E-01*	1.7E-01*	7.7E-01*	0.0E+00	0.0E+00
CHLOROFORM	3.1E+02	0.0E+00	0.0E+00	3.1E+02	0.0E+00	0.0E+00	0.0E+00	1.3E-05	6.1E-03
PPDDE	5.7E+00	5.4E+05	1.9E+01	4.4E+00	3.3E-02	9.8E-03	4.3E-02	7.0E-07	3.4E-04
PPDDT	5.7E+00	1.1E+06	5.4E+03	5.7E+00	8.7E-02	9.4E-05	8.7E-02	0.0E+00	0.0E+00
DIBROMOCHLOROPROPANE	1.4E+00	0.0E+00	0.0E+00	1.4E+00	0.0E+00	0.0E+00	0.0E+00	3.9E-04	1.9E-01
DIELDRIN	1.2E-01	4.0E+03	1.9E+01	1.2E-01	3.3E+01*	2.1E-01*	3.3E+01*	0.0E+00	0.0E+00
ENDRIN	2.5E+02	1.0E+06	1.0E+06	2.0E+02	6.7E-03	2.0E-03a	8.7E-03	0.0E+00	0.0E+00
ISODRIN	5.9E+01	6.4E+05	2.0E+02	4.6E+01	3.7E-02	1.1E-02	4.8E-02	0.0E+00	0.0E+00
METHYL ISOBUTYL KETONE	4.0E+04	9.6E+04	6.4E+03	5.2E+03	2.5E-05	1.7E-04	1.9E-04	0.0E+00	0.0E+00
METHYLENE CHLORIDE	2.5E+02	9.1E+02	4.3E+00	4.2E+00	4.4E-02	2.6E+00*	2.6E+00*	0.0E+00	0.0E+00
1,1,1-TRICHLOROETHANE	7.8E+04	1.1E+06	5.1E+03	4.7E+03	2.3E-05	3.6E-04	3.8E-04	0.0E+00	0.0E+00
COPPER	5.7E+04	0.0E+00	0.0E+00	5.7E+04	6.5E-04	0.0E+00	6.5E-04	0.0E+00	0.0E+00
MERCURY	4.6E+02	0.0E+00	0.0E+00	4.6E+02	2.4E-04	0.0E+00	2.4E-04	0.0E+00	0.0E+00
ZINC	1.4E+05	0.0E+00	0.0E+00	1.4E+05	2.1E-03	0.0E+00	2.1E-03	0.0E+00	0.0E+00

This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPPLV for this contaminant is considered to be equal to pure compound. The SPPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

2.11 SITE SPSA-2d: DRAINAGE DITCHES (formerly Site 1-1: Drainage Ditches EBASCO, 1987b/RIC 87196R01 and EBASCO, 1988e/RIC 87196R01A; Site 1-8: Salvage Yard; EBASCO, 1987e/RIC 87127R05 and EBASCO, 1988h/RIC 87127R05A, and the Process Water System; EBASCO, 1988w/RIC 88256R04)

2.11.1 Site-Specific Considerations

Figure SPSA-2d-1 and Tables SPSA-2d-1 and SPSA-2d-2 depict the target contaminants for Site SPSA-2d. Borings 6 and 11 from Site 1-1; Borings 15, 20, and 24 from Site 1-8; and Boring 2 from the Process Water System were included in this exposure assessment, consistent with the South Plants SAR. The historical search conducted under the contaminant assessment revealed that these drainage ditches were used in conjunction with the Processing Area; therefore, any materials used in the Processing Area were suspected to be present in Site SPSA-2d (EBASCO, 1987b/RIC 87196R01, EBASCO, 1987e/RIC 87127R05, and EBASCO, 1988w/RIC 88256R04). Some of these chemicals were detected in the soil during the Phase I and Phase II investigations (EBASCO, 1987b/RIC 87196R01; EBASCO, 1988e/RIC 87196R01A; EBASCO, 1987e/RIC 87127R05; EBASCO, 1988h/RIC 87127R05A; EBASCO, 1988w/RIC 88256R04).

2.11.2 Spatial Distribution of Measured Contaminant Concentrations

The locations and concentrations of the target contaminants that were detected in Site SPSA-2d are shown in Figure SPSA-2d-1. Table SPSA-2d-1 summarizes the maximum concentrations of contaminants measured in soil above indicator levels for the ICP metals, arsenic, and mercury and CRLs for organic contaminants from the Phase I and Phase II investigations. The boring number and depth where the maximum value was observed are shown. No data were included for ICP metals, arsenic, and mercury in Horizon 2 because direct soil exposure below 10 ft is assumed to be negligible (see Volume VI-A). Table SPSA-2d-2 summarizes the maximum concentrations detected in groundwater together with the well number, location, sampling interval, and depth to groundwater.

2.11.3 Site Exposure Summary

Tables SPSA-2d-3 through SPSA-2d-7 present Draft PPLVs, EIs, and VEIs for each site contaminant. Since the depth to groundwater below Site SPSA-2d is greater than 10 ft, the enclosed space vapor inhalation SPPPLV is included in the calculation of the cumulative

quantity. The COCs are summarized below for each exposed population and with the critical exposure pathway identified.

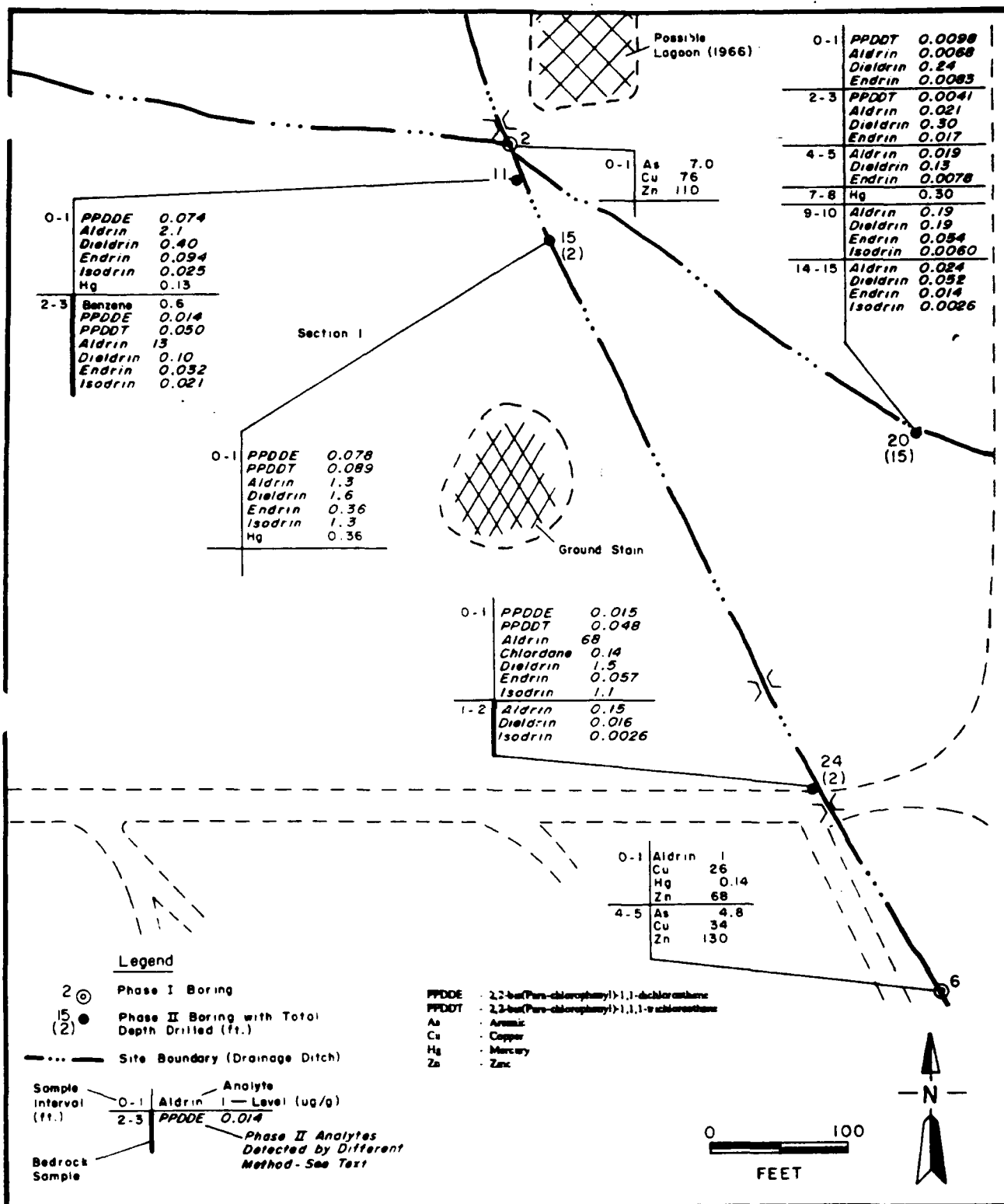
Contaminants of Concern	Regulated Visitor	Casual Visitor	Recreational Visitor	Commercial Worker	Industrial Worker
Aldrin	Direct	Direct	Direct	Dir/Ind	Dir/Ind
Dieldrin	Direct	Direct	Direct	Direct	Direct
Chlordane	--	--	--	--	Cumulative

Note: Direct exposure pathways for soils include soil ingestion, suspended particulate inhalation, and dermal contact.
 Indirect exposure pathways include open and enclosed space vapor inhalation.

The results of the soil exposure summary indicate that exposure to contamination from the direct and indirect pathways both contribute to the exceedance of the cumulative PPLVs. It should be noted for chloroform, the cumulative EI exceeds 0.1 for an industrial worker but the direct and indirect EIs do not exceed 0.1. Site SPSA-2d is designated as a Priority 1 site, based on the most sensitive exposed population PPLV (i.e., the industrial worker).

The following groundwater contaminants result in an unacceptable exposure due to vapor inhalation as indicated by a VEI value greater than 1:

- Benzene (enclosed)
- Carbon tetrachloride (enclosed)



Prepared for:

Program Manager's Office for
Rocky Mountain Arsenal Cleanup
Aberdeen Proving Ground, Maryland

FIGURE SPSA-2d-1

Phase I and Phase II Analytes Detected
Within or Above Indicator Levels

Rocky Mountain Arsenal
Prepared by Ebasco Services Incorporated

TABLE SPSA-2d-1
SOIL CONTAMINANT CONCENTRATIONS
FOR SITE SPSA-2d

Contaminant	Horizon 1			Horizon 2		
	Max. (ug/g)	Depth (ft)	Boring Number	Max. (ug/g)	Depth (ft)	Boring Number
Aldrin	68	0-1	24	68	0-1	24
Chlordane	0.14	0-1	24	0.14	0-1	24
Benzene	0.6	2-3	11	0.6	2-3	11
Dieldrin	1.6	0-1	15	1.6	0-1	15
PPDDE ^{1/}	0.078	0-1	15	0.078	0-1	15
PPDDT ^{2/}	0.089	0-1	15	0.089	0-1	15
Endrin	0.36	0-1	15	0.36	0-1	15
Isodrin	1.3	0-1	15	1.3	0-1	15
Copper	76	0-1	2	--	--	--
Mercury	0.36	0-1	15	--	--	--
Zinc	130	4-5	6	--	--	--

1/ PPDDE 2,2-bis(Para-chlorophenyl)-1,1-dichloroethene
2/ PPDDT 2,2-bis(Para-chlorophenyl)-1,1,1-trichloroethane

SPSA South Plants Study Area
Max. Maximum
ug/g microgram per gram
ft foot/feet

TABLE SPSA-2d-2
GROUNDWATER CONTAMINANT CONCENTRATIONS (UG/L)
FOR SITE SPSA-2d
AVERAGE SITE DEPTH TO GROUNDWATER: 20 Feet

CHEMICAL	CONCENTRATION MAXIMUM	LOCATION (WELL NUMBER)	SAMPLE DATE
BENZENE	3800	01018	02/5/88
CARBON TETRACHLORIDE	820	01018	02/5/88
CHLOROFORM	2.9	01018	02/5/88
DIBROMOCHLOROPROPANE	6.5	01018	02/5/88
PPDDE	0.32	01018	02/5/88

EACH VALUE PRESENTED IS THE MAXIMUM CONCENTRATION FOR THE LISTED ANALYTE FOR THE PERIOD March 17, 1987 TO February 28, 1989.
DATA SOURCE: DP ASSOCIATES, RMA Database, July 19, 1990

SPSA-2d-3
EXPOSURE EVALUATIONS FOR REGULATED VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI
	PPLV	PPLV	PPLV	EI	EI	EI	OPN
	(mg/kg)	(mg/kg)	(mg/kg)				
ALDRIN	1.5E+00	7.6E+05	1.5E+00	4.5E+01*	9.0E-05	4.5E+01*	0.0E+00
BENZENE	8.6E+02	3.8E+04	8.4E+02	7.0E-04	1.6E-05	7.1E-04	1.3E-03
CARBON TETRACHLORIDE	2.0E+02	0.0E+00	2.0E+02	0.0E+00	0.0E+00	0.0E+00	4.8E-03
CHLORDANE	2.0E+01	8.2E+07	2.0E+01	7.2E-03	1.7E-09	7.2E-03	0.0E+00
CHLOROFORM	4.0E+03	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	1.5E-07
PPDE	7.4E+01	4.6E+07	7.4E+01	1.1E-03	1.7E-09	1.1E-03	8.2E-09
PPDT	7.4E+01	9.7E+07	7.4E+01	1.2E-03	9.2E-10	1.2E-03	0.0E+00
DIBROMOCHLOROPROPANE	1.8E+01	0.0E+00	1.8E+01	0.0E+00	0.0E+00	0.0E+00	4.5E-06
DIELDRIN	1.6E+00	3.5E+05	1.6E+00	1.0E+00*	4.6E-06	1.0E+00*	0.0E+00
ENDRIN	2.5E+03	2.8E+08	2.5E+03	1.5E-04	1.3E-09	1.5E-04	0.0E+00
ISODRIN	5.8E+02	5.5E+07	5.8E+02	2.2E-03	2.4E-08	2.2E-03	0.0E+00
COPPER	4.2E+05	0.0E+00	4.2E+05	1.8E-04	0.0E+00	1.8E-04	0.0E+00
MERCURY	3.3E+03	0.0E+00	3.3E+03	1.1E-04	0.0E+00	1.1E-04	0.0E+00
ZINC	2.0E+06	0.0E+00	2.0E+06	6.6E-05	0.0E+00	6.6E-05	0.0E+00

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-2d-4
EXPOSURE EVALUATIONS FOR CASUAL VISITORS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI OPM
ALDRIN	1.5E+00	7.6E+05	1.5E+00	4.5E+01*	9.0E-05	4.5E+01*	0.0E+00
BENZENE	8.6E+02	3.8E+04	8.4E+02	7.0E-04	1.6E-05	7.1E-04	1.3E-03
CARBON TETRACHLORIDE	2.0E+02	0.0E+00	2.0E+02	0.0E+00	0.0E+00	0.0E+00	4.8E-03
CHLORDANE	2.0E+01	8.2E+07	2.0E+01	7.2E-03	1.7E-09	7.2E-03	0.0E+00
CHLOROFORM	4.0E+03	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	1.5E-07
PPODE	7.4E+01	4.6E+07	7.4E+01	1.1E-03	1.7E-09	1.1E-03	8.2E-09
PPDDT	7.4E+01	9.7E+07	7.4E+01	1.2E-03	9.2E-10	1.2E-03	0.0E+00
DIBROMOCHLOROPROPANE	1.8E+01	0.0E+00	1.8E+01	0.0E+00	0.0E+00	0.0E+00	4.5E-06
DIELDRIN	1.6E+00	3.5E+05	1.6E+00	1.0E+00*	4.6E-06	1.0E+00*	0.0E+00
ENDRIN	2.5E+03	2.8E+08	2.5E+03	1.5E-04	1.3E-09	1.5E-04	0.0E+00
ISODRIN	5.8E+02	5.5E+07	5.8E+02	2.2E-03	2.4E-08	2.2E-03	0.0E+00
COPPER	4.2E+05	0.0E+00	4.2E+05	1.8E-04	0.0E+00	1.8E-04	0.0E+00
MERCURY	3.3E+03	0.0E+00	3.3E+03	1.1E-04	0.0E+00	1.1E-04	0.0E+00
ZINC	2.0E+06	0.0E+00	2.0E+06	6.6E-05	0.0E+00	6.6E-05	0.0E+00

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-2d-5
EXPOSURE EVALUATIONS FOR RECREATIONAL VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI OPN
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	
ALDRIN	2.1E-01	5.0E+04	2.1E-01	3.3E+02*	1.4E-03	3.3E+02*	0.0E+00
BENZENE	1.2E+02	5.8E+03	1.2E+02	5.0E-03	1.0E-04	5.1E-03	1.9E-02
CARBON TETRACHLORIDE	2.7E+01	0.0E+00	2.7E+01	0.0E+00	0.0E+00	0.0E+00	7.2E-02
CHLORDANE	2.7E+00	5.4E+06	2.7E+00	5.2E-02	2.6E-08	5.2E-02	0.0E+00
CHLOROFORM	5.6E+02	0.0E+00	5.6E+02	0.0E+00	0.0E+00	0.0E+00	2.2E-06
PPDDE	1.0E+01	3.0E+06	1.0E+01	7.6E-03	2.6E-08	7.6E-03	1.2E-07
PPDDT	1.0E+01	6.4E+06	1.0E+01	8.7E-03	1.4E-08	8.7E-03	0.0E+00
DIBROMOCHLOROPROPANE	2.5E+00	0.0E+00	2.5E+00	0.0E+00	0.0E+00	0.0E+00	6.8E-05
DJELDRIN	2.2E-01	2.3E+04	2.2E-01	7.3E+00*	7.0E-05	7.3E+00*	0.0E+00
ENDRIN	1.1E+03	4.3E+07	1.1E+03	3.4E-04	8.3E-09	3.4E-04	0.0E+00
ISODRIN	2.5E+02	8.5E+06	2.5E+02	5.3E-03	1.5E-07	5.3E-03	0.0E+00
COPPER	2.5E+05	0.0E+00	2.5E+05	3.1E-04	0.0E+00	3.1E-04	0.0E+00
MERCURY	2.0E+03	0.0E+00	2.0E+03	1.8E-04	0.0E+00	1.8E-04	0.0E+00
ZINC	1.1E+06	0.0E+00	1.1E+06	1.2E-04	0.0E+00	1.2E-04	0.0E+00

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-2d-6
EXPOSURE EVALUATIONS FOR COMMERCIAL WORKERS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI ENC
ALDRIN	1.9E+00	1.3E+02	1.9E+00	3.6E+01*	5.4E-01*	3.6E+01*	0.0E+00
BENZENE	1.1E+03	2.3E+02	1.9E+02	5.5E-04	2.6E-03	3.2E-03	1.8E+01
CARBON TETRACHLORIDE	2.5E+02	0.0E+00	2.5E+02	0.0E+00	0.0E+00	0.0E+00	6.7E+01
CHLORDANE	2.5E+01	1.4E+04	2.5E+01	5.7E-03	1.0E-05	5.7E-03	0.0E+00
CHLOROFORM	5.1E+03	0.0E+00	5.1E+03	0.0E+00	0.0E+00	0.0E+00	2.0E-03
PPDE	9.3E+01	1.9E+01	1.6E+01	8.4E-04	4.0E-03	4.8E-03	1.1E-04
PPDT	9.3E+01	1.9E+01	1.6E+01	9.6E-04	4.6E-03	5.5E-03	0.0E+00
DIBROMOCHLOROPROPANE	2.3E+01	0.0E+00	2.3E+01	0.0E+00	0.0E+00	0.0E+00	6.3E-02
DIELDRIN	2.0E+00	5.8E+01	1.9E+00	8.0E-01*	2.8E-02	8.3E-01*	0.0E+00
ENDRIN	1.4E+03	1.6E+04	1.3E+03	2.6E-04	2.3E-05	2.9E-04	0.0E+00
ISODRIN	3.2E+02	3.0E+03	2.9E+02	4.1E-03	4.3E-04	4.5E-03	0.0E+00
COPPER	1.8E+05	0.0E+00	1.8E+05	4.3E-04	0.0E+00	4.3E-04	0.0E+00
MERCURY	1.4E+03	0.0E+00	1.4E+03	2.6E-04	0.0E+00	2.6E-04	0.0E+00
ZINC	7.8E+05	0.0E+00	7.8E+05	1.7E-04	0.0E+00	1.7E-04	0.0E+00

*: EI is equal to or exceeds 1.0E-01

SPSA-2d-7
EXPOSURE EVALUATIONS FOR INDUSTRIAL WORKERS

CONTAMINANT	DIRECT	INDIRECT		CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI	
	PPLV (mg/kg)	OSVI (mg/kg)	ESVI (mg/kg)	PPLV (mg/kg)	EI	EI	EI	OPN	ENC
ALDRIN	1.2E-01	1.0E+05	4.2E+01	1.2E-01	5.8E+02*	1.6E+00*	5.9E+02*	0.0E+00	0.0E+00
BENZENE	6.7E+01	5.0E+03	2.3E+02	5.1E+01	8.9E-03	2.7E-03	1.2E-02	9.6E-03	5.4E+01
CARBON TETRACHLORIDE	1.5E+01	0.0E+00	0.0E+00	1.5E+01	0.0E+00	0.0E+00	0.0E+00	3.6E-02	2.0E+02
CHLORDANE	1.5E+00	1.1E+07	5.2E+00	1.2E+00	9.2E-02	2.7E-02	1.2E-01*	0.0E+00	0.0E+00
CHLOROFORM	3.1E+02	0.0E+00	0.0E+00	3.1E+02	0.0E+00	0.0E+00	0.0E+00	1.1E-06	6.1E-03
PPDDE	5.7E+00	6.1E+06	1.9E+01	4.4E+00	1.4E-02	4.0E-03	1.8E-02	6.1E-08	3.4E-04
PPDDT	5.7E+00	1.3E+07	1.9E+01	4.4E+00	1.6E-02	4.6E-03	2.0E-02	0.0E+00	0.0E+00
DIBROMOCHLOROPROPANE	1.4E+00	0.0E+00	0.0E+00	1.4E+00	0.0E+00	0.0E+00	0.0E+00	3.4E-05	1.9E-01
DIELDRIN	1.2E-01	4.6E+04	1.9E+01	1.2E-01	1.3E+01*	8.3E-02	1.3E+01*	0.0E+00	0.0E+00
ENDRIN	2.5E+02	3.7E+07	1.6E+04	2.5E+02	1.4E-03	2.3E-05	1.4E-03	0.0E+00	0.0E+00
ISODRIN	5.9E+01	7.3E+06	3.0E+03	5.8E+01	2.2E-02	4.3E-04	2.2E-02	0.0E+00	0.0E+00
COPPER	5.7E+04	0.0E+00	0.0E+00	5.7E+04	1.3E-03	0.0E+00	1.3E-03	0.0E+00	0.0E+00
MERCURY	4.6E+02	0.0E+00	0.0E+00	4.6E+02	7.8E-04	0.0E+00	7.8E-04	0.0E+00	0.0E+00
ZINC	1.4E+05	0.0E+00	0.0E+00	1.4E+05	9.3E-04	0.0E+00	9.3E-04	0.0E+00	0.0E+00

*: EI is equal to or exceeds 1.0E-01

†: the PPLV value indicated is greater than 1.0E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

2.12 SITE SPSA-2e: BALANCE OF SPSA-2 (formerly Section 1-Uncontaminated Area; EBASCO, 1987o/RIC 87127R06; Section 1-Nonsurce Area; EBASCO, 1988x/RIC 87127R06A; 1-13/2-18: South Plants Manufacturing Complex/Shell Chemical Company Spill Sites; EBASCO, 1988y/RIC 88286R07)

2.12.1 Site-Specific Considerations

Figure SPSA-2e-1 and Tables SPSA-2e-1 and SPSA-2e-2 depict the target contaminants for Site SPSA-2e. Borings 26 through 29 and 71 through 73 from Section 1-Uncontaminated Area and D101-D104 from Site 1-13/2-18 included in this exposure assessment, consistent with the South Plants SAR. The historical search conducted under the contaminant assessment revealed that numerous spills and leaks of various chemicals were suspected to have occurred at Site SPSA-2e (EBASCO, 1988y/RIC 88286R07). Some of these chemicals were detected in the soil during the Phase I and Phase II investigations (EBASCO, 1987o/RIC 87127R06; EBASCO, 1988x/RIC 87127R06A; and EBASCO, 1988y/RIC 88286R07).

2.12.2 Spatial Distribution of Measured Contaminant Concentrations

The locations and concentrations of the target contaminants that were detected in Site SPSA-2e are shown in Figure SPSA-2e-1. 1-Methyl-1,3-cyclopentanone, occurring in Boring D102 (9-10 ft) and D103 (9-10 ft) was not included in the figure, since it was not considered a target contaminant during the Phase I and Phase II investigations. Although not shown in this figure, 1-methyl-1,3-cyclopentanone was included in the South Plants SAR and in this exposure assessment because it passed through the screening process performed in the RMA Chemical Index (EBASCO, 1988c/RIC 88357R01).

Table SPSA-2e-1 summarizes the maximum concentrations of contaminants measured in soil above indicator levels for the ICP metals, arsenic, and mercury and CRLs for organic contaminants from the Phase I and Phase II investigations. The boring number and depth where the maximum value was observed are shown. No data were included for ICP metals, arsenic, and mercury in Horizon 2 because direct soil exposure below 10 ft is assumed to be negligible (see Volume VI-A). Table SPSA-2e-2 summarizes the maximum concentrations detected in groundwater together with the well number, location, sampling interval, and depth to groundwater.

2.12.3 Site Exposure Summary

Tables SPSA-2e-3 through SPSA-2e-7 present Draft PPLVs, EIs, and VEIs for each site contaminant. Since the depth to groundwater below Site SPSA-2e is greater than 10 ft, the enclosed space vapor inhalation SPPPLV is included in the calculation of the cumulative quantity. The COCs are summarized below for each exposed population and with the critical exposure pathway identified.

Contaminants of Concern	Regulated Visitor	Casual Visitor	Recreational Visitor	Commercial Worker	Industrial Worker
Dibromochloropropane	Direct	Direct	Dir/Ind	Indirect	Dir/Ind
Dicyclopentadiene	Indirect	Indirect	Indirect	Indirect	Dir/Ind
Dieldrin	Direct	Direct	Direct	Direct	Dir/Ind
Chromium	Direct	Direct	Direct	Direct	Direct
Benzene	--	--	Indirect	Indirect	Dir/Ind

Note: Direct exposure pathways for soils include soil ingestion, suspended particulate inhalation, and dermal contact.
Indirect exposure pathways include open and enclosed space vapor inhalation.

The results of the soil exposure summary indicate that exposure to contamination from the direct and indirect pathways both contribute to the exceedance of the cumulative PPLVs. Site SPSA-2e is designated as a Priority 1 site, based on the most sensitive exposed population PPLV (i.e., the industrial worker).

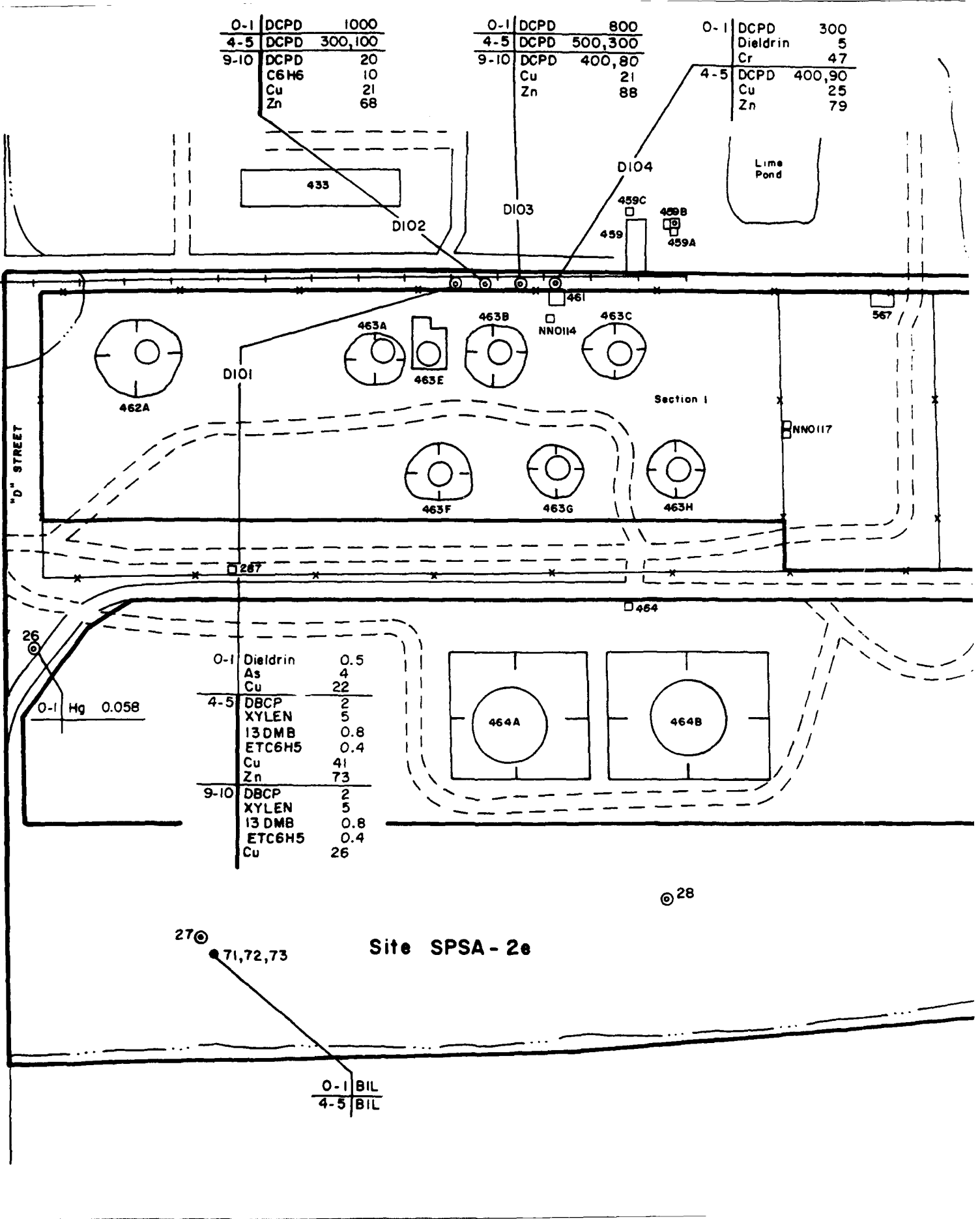
The following groundwater contaminants result in an unacceptable exposure due to vapor inhalation as indicated by a VEI value greater than 1:

- Benzene (open, enclosed)
- Bicycloheptadiene (enclosed)
- Chloroform (enclosed)

0-1	DCPD	1000
4-5	DCPD	300,100
9-10	DCPD	20
	C6H6	10
	Cu	21
	Zn	68

0-1	DCPD	800
4-5	DCPD	500,300
9-10	DCPD	400,80
	Cu	21
	Zn	88

0-1	DCPD	300
	Dieldrin	5
	Cr	47
4-5	DCPD	400,90
	Cu	25
	Zn	79



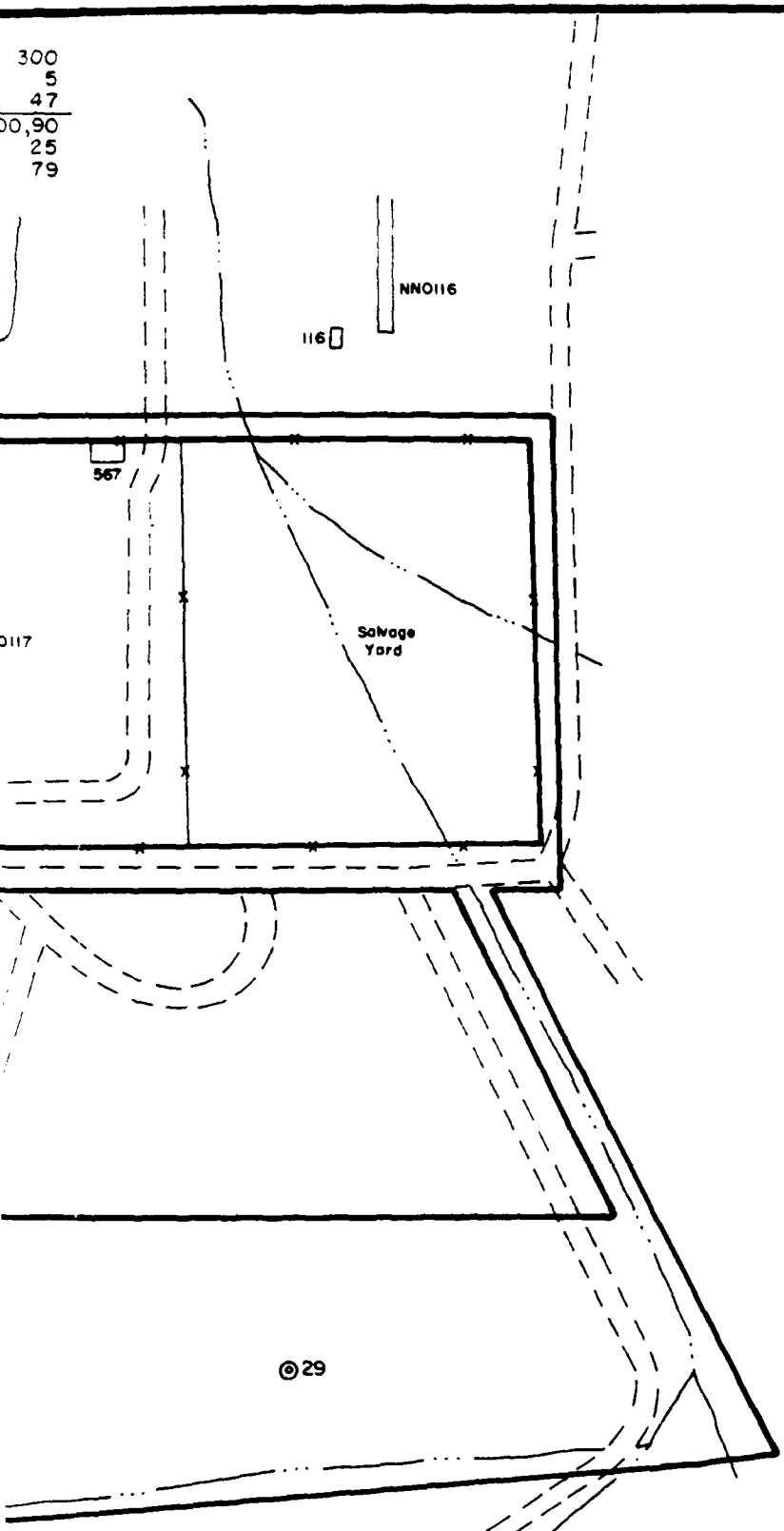
0-1	Dieldrin	0.5
	As	4
	Cu	22
4-5	DBCP	2
	XYLEN	5
	13 DMB	0.8
	ETC6H5	0.4
	Cu	41
	Zn	73
9-10	DBCP	2
	XYLEN	5
	13 DMB	0.8
	ETC6H5	0.4
	Cu	26

0-1 Hg 0.058

Site SPSA-2e

27⊙ 71,72,73

0-1 BIL
4-5 BIL



300
5
47
30,90
25
79

Legend

- 26 ⊙ Phase I Boring
 - 71 ● Phase II Boring
 - Site Boundary
- Sample Interval (ft.) 0-1 DCPD 300 Analyte Level (ug/g)
- Bedrock

Borings 27-29 - All Analytes Detected Below Indicator Levels

- CB16 - Benzene
- DBCP - Dibromochloropropane
- DCPD - Dicyclopropadiene
- ETOHIS - Ethylbenzene
- 1,2,4,5 - m-Xylene
- XYLEN - o- and p-Xylene
- As - Arsenic
- Cr - Chromium
- Cu - Copper
- Hg - Mercury
- Zn - Zinc
- BL - Below indicator level



Prepared for:
Program Manager's Office for
Rocky Mountain Arsenal Cleanup
Aberdeen Proving Ground, Maryland

FIGURE SPSA-2e-1
Phase I and Phase II Analytes
Detected Within or Above
Indicator Levels
Rocky Mountain Arsenal
Prepared by Ebasco Services Incorporated

TABLE SPSA-2e-1
SOIL CONTAMINANT CONCENTRATIONS
FOR SITE SPSA-2e

Contaminant	Horizon 1			Horizon 2		
	Max. (ug/g)	Depth (ft)	Boring Number	Max. (ug/g)	Depth (ft)	Boring Number
Benzene	10	9-10	D102	10	9-10	D102
Dibromochloropropane	2	4-5	D101	2	4-5	D101
Dicyclopentadiene	1000	9-10	D101	1000	9-10	D101
Dieldrin	5	0-1	D102	5	0-1	D102
Ethylbenzene	0.4	0-1	D104	0.4	0-1	D104
		4-5	D101		4-5	D101
		9-10	D101		9-10	D101
1-Methyl-1,3-cyclopentanone ^{1/}	3.7	9-10	D102	3.7	9-10	D102
m-Xylene	0.8	4-5	D101	0.8	4-5	D101
		9-10	D101		9-10	D101
o,p-Xylene	5	4-5	D101	5	4-5	D101
		9-10	D101		9-10	D101
Chromium	47	0-1	D104	--	--	--
Copper	41	4-5	D101	--	--	--
Zinc	88	9-10	D103	--	--	--

^{1/} Nontarget contaminant. Refer to the exposure assessment nontarget screen in Appendix A.

SPSA South Plants Study Area
Max. Maximum
ug/g microgram per gram
ft foot/feet

TABLE SPSA-2e-2

GROUNDWATER CONTAMINANT CONCENTRATIONS (UG/L)
FOR SITE SPSA-2e

AVERAGE SITE DEPTH TO GROUNDWATER: 13 Feet

CHEMICAL	CONCENTRATION MAXIMUM	LOCATION (WELL NUMBER)	SAMPLE DATE
1,1,2-TRICHLOROETHANE	18	01013	01/29/88
1,2-DICHLOROETHYLENE	4.8	01013	01/29/88
1,2-DICHLOROETHANE	9.2	01013	01/29/88
M-XYLENE	7900	01539	02/23/88
ALDRIN	0.68	01539	02/23/88
ATRAZINE	20	01014	12/13/88
BICYCLOHEPTADIENE	11000	01539	02/23/88
BENZOTHIAZOLE	310	01014	01/29/88
BENZENE	1100000	01565	03/1/88
CHLOROFORM	100	01013	01/29/88
HEXACHLOROCYCLOPENTADIENE	0.19	01014	12/13/88
CHLOROBENZENE	1100	01013	01/29/88
CHLOROPHENYLMETHYL SULFIDE	84	01013	01/29/88
CHLOROPHENYLMETHYL SULFOXIDE	140	01013	01/29/88
CHLOROPHENYLMETHYL SULFONE	670	01014	01/29/88
DICYCLOPENTADIENE	12000	01014	01/29/88
DIISOPROPYLMETHYL PHOSPHONATE	0.85	01014	12/13/88

EACH VALUE PRESENTED IS THE MAXIMUM CONCENTRATION FOR THE LISTED ANALYTE
FOR THE PERIOD March 17, 1987 TO February 28, 1989.
DATA SOURCE: DP ASSOCIATES, RMA Database, July 19, 1990

TABLE SPSA-2e-2
GROUNDWATER CONTAMINANT CONCENTRATIONS (UG/L)
FOR SITE SPSA-2e
AVERAGE SITE DEPTH TO GROUNDWATER: 13 Feet

CHEMICAL	CONCENTRATION MAXIMUM	LOCATION (WELL NUMBER)	SAMPLE DATE
DITHIANE	13	01014	01/29/88
DIELDRIN	0.096	01014	12/13/88
DIMETHYL DISULFIDE	1.8	01014	01/29/88
ENDRIN	0.14	01014	12/13/88
ETHYLBENZENE	5000	01539	02/23/88
ISODRIN	0.32	01014	12/13/88
TOLUENE	GT 10000	01539	02/23/88
METHYLISOBUTYL KETONE	23	01014	01/29/88
MALATHION	1.9	01014	12/13/88
1,4-OXATHIANE	17	01014	01/29/88
PPDDE	0.089	01014	12/13/88
TETRACHLOROETHYLENE	27	01013	01/29/88
O, P-XYLENE	5700	01539	02/23/88

EACH VALUE PRESENTED IS THE MAXIMUM CONCENTRATION FOR THE LISTED ANALYTE FOR THE PERIOD March 17, 1987 TO February 28, 1989.
DATA SOURCE: DP ASSOCIATES, RMA Database, July 19, 1990

SPSA-2e-3
EXPOSURE EVALUATIONS FOR REGULATED VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI OPH
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	
ALDRIN	1.5E+00	0.0E+00	1.5E+00	0.0E+00	0.0E+00	0.0E+00	5.9E-06
ATRAZINE	4.1E+04	0.0E+00	4.1E+04	0.0E+00	0.0E+00	0.0E+00	7.0E-13
BENZENE	8.6E+02	5.5E+02	3.4E+02	1.2E-02	1.8E-02	3.0E-02	1.2E+01
BENZOTHAZOLE	3.9E+04	0.0E+00	3.9E+04	0.0E+00	0.0E+00	0.0E+00	1.4E-06
BICYCLOHEPTADIENE	3.2E+05	0.0E+00	3.2E+05	0.0E+00	0.0E+00	0.0E+00	8.8E-04
CHLOROBENZENE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	9.9E-05
CHLOROFORM	4.0E+03	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	1.6E-04
CHLOROPHENYLMETHYL SULFIDE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	3.1E-07
CHLOROPHENYLMETHYL SULFONE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	2.9E-08
CHLOROPHENYLMETHYL SULFOXIDE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	1.2E-08
PPDDE	7.4E+01	0.0E+00	7.4E+01	0.0E+00	0.0E+00	0.0E+00	7.1E-08
DIBROMOCHLOROPROPANE	1.8E+01	3.6E+01	1.2E+01	1.1E-01*	5.6E-02	1.7E-01*	0.0E+00
1,2-DICHLOROETHANE	2.8E+02	0.0E+00	2.8E+02	0.0E+00	0.0E+00	0.0E+00	5.4E-05
1,2-DICHLOROETHYLENE	1.7E+05	0.0E+00	1.7E+05	0.0E+00	0.0E+00	0.0E+00	0.0E+00
DICYCLOPENTADIENE	5.4E+04	4.2E+02	4.1E+02	1.8E-02	2.4E+00*	2.4E+00*	0.0E+00
DIELDRIN	1.6E+00	1.0E+06	1.6E+00	3.2E+00*	2.9E-04a	3.2E+00*	0.0E+00
DIISOPROPYLMETHYL PHOSPHONATE	6.6E+05	0.0E+00	6.6E+05	0.0E+00	0.0E+00	0.0E+00	2.0E-10
DIMETHYLDISULFIDE	6.7E+04	0.0E+00	6.7E+04	0.0E+00	0.0E+00	0.0E+00	1.7E-07
DITHIANE	8.3E+04	0.0E+00	8.3E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENDRIN	2.5E+03	0.0E+00	2.5E+03	0.0E+00	0.0E+00	0.0E+00	8.2E-11
ETHYLBENZENE	8.3E+05	1.9E+06	5.8E+05	4.8E-07	2.1E-07	6.9E-07	3.6E-05
HEXACHLOROXYCLOPENTADIENE	1.7E+04	0.0E+00	1.7E+04	0.0E+00	0.0E+00	0.0E+00	1.7E-05
ISODRIN	5.8E+02	0.0E+00	5.8E+02	0.0E+00	0.0E+00	0.0E+00	1.1E-07
MALATHION	1.7E+05	0.0E+00	1.7E+05	0.0E+00	0.0E+00	0.0E+00	9.2E-13
METHYLISOBUTYL KETONE	4.1E+05	0.0E+00	4.1E+05	0.0E+00	0.0E+00	0.0E+00	1.6E-08
1,4-OXATHIANE	2.5E+05	0.0E+00	2.5E+05	0.0E+00	0.0E+00	0.0E+00	0.0E+00
TETRACHLOROETHYLENE	5.1E+02	0.0E+00	5.1E+02	0.0E+00	0.0E+00	0.0E+00	1.3E-04
TOLUENE	2.5E+06	0.0E+00	2.5E+06	0.0E+00	0.0E+00	0.0E+00	1.6E-05
1,1,2-TRICHLOROETHANE	4.3E+02	0.0E+00	4.3E+02	0.0E+00	0.0E+00	0.0E+00	7.4E-05
M-XYLENE	1.4E+07	6.0E+05	5.7E+05	5.6E-08	1.3E-06	1.4E-06	7.9E-05
O,P-XYLENE	1.4E+07	6.0E+05	5.7E+05	3.5E-07	8.4E-06	8.7E-06	5.7E-05
CHROMIUM	6.9E+01	0.0E+00	6.9E+01	6.8E-01*	0.0E+00	6.8E-01*	0.0E+00
COPPER	4.2E+05	0.0E+00	4.2E+05	9.8E-05	0.0E+00	9.8E-05	0.0E+00
ZINC	2.0E+06	0.0E+00	2.0E+06	4.4E-05	0.0E+00	4.4E-05	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPPLV for this contaminant is considered to be equal to pure compound. The SPPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-2e-4
EXPOSURE EVALUATIONS FOR CASUAL VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI OPN
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	
ALDRIN	1.5E+00	0.0E+00	1.5E+00	0.0E+00	0.0E+00	0.0E+00	5.9E-06
ATRAZINE	4.1E+04	0.0E+00	4.1E+04	0.0E+00	0.0E+00	0.0E+00	7.0E-13
BENZENE	8.6E+02	5.5E+02	3.4E+02	1.2E-02	1.8E-02	3.0E-02	1.2E+01
BENZOTHIAZOLE	3.9E+04	0.0E+00	3.9E+04	0.0E+00	0.0E+00	0.0E+00	1.4E-06
BICYCLOHEPTADIENE	3.2E+05	0.0E+00	3.2E+05	0.0E+00	0.0E+00	0.0E+00	8.8E-04
CHLOROBENZENE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	9.9E-05
CHLOROFORM	4.0E+03	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	1.6E-04
CHLOROPHENYLMETHYL SULFIDE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	3.1E-07
CHLOROPHENYLMETHYL SULFONE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	2.9E-08
CHLOROPHENYLMETHYL SULFOXIDE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	1.2E-08
PPCDE	7.4E+01	0.0E+00	7.4E+01	0.0E+00	0.0E+00	0.0E+00	7.1E-08
DIBROMOCHLOROPROPANE	1.8E+01	3.6E+01	1.2E+01	1.1E-01*	5.6E-02	1.7E-01*	0.0E+00
1,2-DICHLOROETHANE	2.8E+02	0.0E+00	2.8E+02	0.0E+00	0.0E+00	0.0E+00	5.4E-05
1,2-DICHLOROETHYLENE	1.7E+05	0.0E+00	1.7E+05	0.0E+00	0.0E+00	0.0E+00	0.0E+00
DICYCLOPENTADIENE	5.4E+04	4.2E+02	4.1E+02	1.8E-02	2.4E+00*	2.4E+00*	0.0E+00
DIELDRIN	1.6E+00	1.0E+06	1.6E+00	3.2E+00*	2.9E-04a	3.2E+00*	0.0E+00
DIISOPROPYLMETHYL PHOSPHONATE	6.6E+05	0.0E+00	6.6E+05	0.0E+00	0.0E+00	0.0E+00	2.0E-10
DIMETHYLDISULFIDE	6.7E+04	0.0E+00	6.7E+04	0.0E+00	0.0E+00	0.0E+00	1.7E-07
DITHIANE	8.3E+04	0.0E+00	8.3E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENDRIN	2.5E+03	0.0E+00	2.5E+03	0.0E+00	0.0E+00	0.0E+00	8.2E-11
ETHYLBENZENE	8.3E+05	1.9E+06	5.8E+05	4.8E-07	2.1E-07	6.9E-07	3.6E-05
HEXACHLOROCYCLOPENTADIENE	1.7E+04	0.0E+00	1.7E+04	0.0E+00	0.0E+00	0.0E+00	1.7E-05
ISODRIN	5.8E+02	0.0E+00	5.8E+02	0.0E+00	0.0E+00	0.0E+00	1.1E-07
MALATHION	1.7E+05	0.0E+00	1.7E+05	0.0E+00	0.0E+00	0.0E+00	9.2E-13
METHYLISOBUTYL KETONE	4.1E+05	0.0E+00	4.1E+05	0.0E+00	0.0E+00	0.0E+00	1.6E-08
1,4-OXATHIANE	2.5E+05	0.0E+00	2.5E+05	0.0E+00	0.0E+00	0.0E+00	0.0E+00
TETRACHLOROETHYLENE	5.1E+02	0.0E+00	5.1E+02	0.0E+00	0.0E+00	0.0E+00	1.3E-04
TOLUENE	2.5E+06	0.0E+00	2.5E+06	0.0E+00	0.0E+00	0.0E+00	1.6E-05
1,1,2-TRICHLOROETHANE	4.3E+02	0.0E+00	4.3E+02	0.0E+00	0.0E+00	0.0E+00	7.4E-05
M-XYLENE	1.4E+07	6.0E+05	5.7E+05	5.6E-08	1.3E-06	1.4E-06	7.9E-05
O,P-XYLENE	1.4E+07	6.0E+05	5.7E+05	3.5E-07	8.4E-06	8.7E-06	5.7E-05
CHROMIUM	6.9E+01	0.0E+00	6.9E+01	6.8E-01*	0.0E+00	6.8E-01*	0.0E+00
COPPER	4.2E+05	0.0E+00	4.2E+05	9.8E-05	0.0E+00	9.8E-05	0.0E+00
ZINC	2.0E+06	0.0E+00	2.0E+06	4.4E-05	0.0E+00	4.4E-05	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPLV for this contaminant is considered to be equal to pure compound. The SPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-2e-5
EXPOSURE EVALUATIONS FOR RECREATIONAL VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI OPN
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	
ALDRIN	2.1E-01	0.0E+00	2.1E-01	0.0E+00	0.0E+00	0.0E+00	8.8E-05
ATRAZINE	1.8E+04	0.0E+00	1.8E+04	0.0E+00	0.0E+00	0.0E+00	4.5E-12
BENZENE	1.2E+02	8.5E+01	5.0E+01	8.4E-02	1.2E-01*	2.0E-01*	1.8E+02
BENZOTHAZOLE	1.7E+04	0.0E+00	1.7E+04	0.0E+00	0.0E+00	0.0E+00	8.9E-06
BICYCLOHEPTADIENE	1.4E+05	0.0E+00	1.4E+05	0.0E+00	0.0E+00	0.0E+00	5.7E-03
CHLOROBENZENE	6.8E+04	0.0E+00	6.8E+04	0.0E+00	0.0E+00	0.0E+00	6.4E-04
CHLOROFORM	5.6E+02	0.0E+00	5.6E+02	0.0E+00	0.0E+00	0.0E+00	2.4E-03
CHLOROPHENYLMETHYL SULFIDE	7.0E+04	0.0E+00	7.0E+04	0.0E+00	0.0E+00	0.0E+00	2.0E-06
CHLOROPHENYLMETHYL SULFONE	7.0E+04	0.0E+00	7.0E+04	0.0E+00	0.0E+00	0.0E+00	1.9E-07
CHLOROPHENYLMETHYL SULFOXIDE	7.0E+04	0.0E+00	7.0E+04	0.0E+00	0.0E+00	0.0E+00	7.6E-08
PPDE	1.0E+01	0.0E+00	1.0E+01	0.0E+00	0.0E+00	0.0E+00	1.1E-06
DIBROMOCHLOROPROPANE	2.5E+00	1.8E+00	1.0E+00	8.0E-01*	1.1E+00*	1.9E+00*	0.0E+00
1,2-DICHLOROETHANE	3.9E+01	0.0E+00	3.9E+01	0.0E+00	0.0E+00	0.0E+00	8.1E-04
1,2-DICHLOROETHYLENE	7.0E+04	0.0E+00	7.0E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
DICYCLOPENTADIENE	1.8E+04	1.5E+02	1.5E+02	5.5E-02	6.6E+00*	6.7E+00*	0.0E+00
DIELDRIN	2.2E-01	1.0E+06	2.2E-01	2.3E+01*	4.4E-03a	2.3E+01*	0.0E+00
DIISOPROPYLMETHYL PHOSPHONATE	2.8E+05	0.0E+00	2.8E+05	0.0E+00	0.0E+00	0.0E+00	1.3E-09
DIMETHYLDISULFIDE	2.9E+04	0.0E+00	2.9E+04	0.0E+00	0.0E+00	0.0E+00	1.1E-06
DITHIANE	3.5E+04	0.0E+00	3.5E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENDRIN	1.1E+03	0.0E+00	1.1E+03	0.0E+00	0.0E+00	0.0E+00	5.3E-10
ETHYLBENZENE	3.5E+05	6.9E+05	2.3E+05	1.1E-06	5.8E-07	1.7E-06	2.3E-04
HEXACHLOROCYCLOPENTADIENE	5.7E+03	0.0E+00	5.7E+03	0.0E+00	0.0E+00	0.0E+00	1.1E-04
ISODRIN	2.5E+02	0.0E+00	2.5E+02	0.0E+00	0.0E+00	0.0E+00	7.3E-07
MALATHION	7.0E+04	0.0E+00	7.0E+04	0.0E+00	0.0E+00	0.0E+00	6.0E-12
METHYLISOBUTYL KETONE	1.7E+05	0.0E+00	1.7E+05	0.0E+00	0.0E+00	0.0E+00	1.0E-07
1,4-OXATHIANE	1.1E+05	0.0E+00	1.1E+05	0.0E+00	0.0E+00	0.0E+00	0.0E+00
TETRACHLOROETHYLENE	7.1E+01	0.0E+00	7.1E+01	0.0E+00	0.0E+00	0.0E+00	1.9E-03
TOLUENE	1.1E+06	0.0E+00	1.1E+06	0.0E+00	0.0E+00	0.0E+00	1.0E-04
1,1,2-TRICHLOROETHANE	6.0E+01	0.0E+00	6.0E+01	0.0E+00	0.0E+00	0.0E+00	1.1E-03
M-XYLENE	5.8E+06	2.2E+05	2.1E+05	1.4E-07	3.7E-06	3.8E-06	5.1E-04
O,P-XYLENE	5.8E+06	2.2E+05	2.1E+05	8.6E-07	2.3E-05	2.4E-05	3.7E-04
CHROMIUM	8.8E+00	0.0E+00	8.8E+00	5.3E+00*	0.0E+00	5.3E+00*	0.0E+00
COPPER	2.5E+05	0.0E+00	2.5E+05	1.7E-04	0.0E+00	1.7E-04	0.0E+00
ZINC	1.1E+06	0.0E+00	1.1E+06	8.4E-05	0.0E+00	8.4E-05	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPPLV for this contaminant is considered to be equal to pure compound. The SPPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-2e-6
EXPOSURE EVALUATIONS FOR COMMERCIAL WORKERS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI ENC
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	
ALDRIN	1.9E+00	0.0E+00	1.9E+00	0.0E+00	0.0E+00	0.0E+00	1.4E-02
ATRAZINE	2.3E+04	0.0E+00	2.3E+04	0.0E+00	0.0E+00	0.0E+00	4.9E-09
BENZENE	1.1E+03	1.3E+00	1.3E+00	9.2E-03	7.4E+00*	7.4E+00*	2.7E+04
BENZOTHAZOLE	2.2E+04	0.0E+00	2.2E+04	0.0E+00	0.0E+00	0.0E+00	9.7E-03
BICYCLOHEPTADIENE	1.8E+05	0.0E+00	1.8E+05	0.0E+00	0.0E+00	0.0E+00	6.2E+00
CHLOROBENZENE	8.8E+04	0.0E+00	8.8E+04	0.0E+00	0.0E+00	0.0E+00	7.0E-01
CHLOROFORM	5.1E+03	0.0E+00	5.1E+03	0.0E+00	0.0E+00	0.0E+00	3.7E-01
CHLOROPHENYLMETHYL SULFIDE	9.1E+04	0.0E+00	9.1E+04	0.0E+00	0.0E+00	0.0E+00	2.2E-03
CHLOROPHENYLMETHYL SULFONE	9.1E+04	0.0E+00	9.1E+04	0.0E+00	0.0E+00	0.0E+00	2.1E-04
CHLOROPHENYLMETHYL SULFOXIDE	9.1E+04	0.0E+00	9.1E+04	0.0E+00	0.0E+00	0.0E+00	8.2E-05
PPDE	9.3E+01	0.0E+00	9.3E+01	0.0E+00	0.0E+00	0.0E+00	1.7E-04
DIBROMOCHLOROPROPANE	2.3E+01	1.2E-01	1.2E-01	8.8E-02	1.7E+01*	1.7E+01*	0.0E+00
1,2-DICHLOROETHANE	3.5E+02	0.0E+00	3.5E+02	0.0E+00	0.0E+00	0.0E+00	1.3E-01
1,2-DICHLOROETHYLENE	9.2E+04	0.0E+00	9.2E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
DICYCLOPENTADIENE	1.7E+04	3.4E-01	3.4E-01	5.8E-02	2.9E+03*	2.9E+03*	0.0E+00
DIELDRIN	2.0E+00	1.0E+06	1.9E+00	2.5E+00*	8.7E-02a	2.6E+00*	0.0E+00
DIISOPROPYLMETHYL PHOSPHONATE	3.7E+05	0.0E+00	3.7E+05	0.0E+00	0.0E+00	0.0E+00	1.4E-06
DIMETHYLDISULFIDE	3.7E+04	0.0E+00	3.7E+04	0.0E+00	0.0E+00	0.0E+00	1.2E-03
DITHIANE	4.6E+04	0.0E+00	4.6E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENDRIN	1.4E+03	0.0E+00	1.4E+03	0.0E+00	0.0E+00	0.0E+00	5.8E-07
ETHYLBENZENE	4.6E+05	1.1E+04	1.1E+04	8.7E-07	3.8E-05	3.8E-05	2.5E-01
HEXACHLOROCYCLOPENTADIENE	5.5E+03	0.0E+00	5.5E+03	0.0E+00	0.0E+00	0.0E+00	1.2E-01
ISODRIN	3.2E+02	0.0E+00	3.2E+02	0.0E+00	0.0E+00	0.0E+00	7.9E-04
MALATHION	9.2E+04	0.0E+00	9.2E+04	0.0E+00	0.0E+00	0.0E+00	6.5E-09
METHYLISOBUTYL KETONE	2.2E+05	0.0E+00	2.2E+05	0.0E+00	0.0E+00	0.0E+00	1.1E-04
1,4-OXATHIANE	1.4E+05	0.0E+00	1.4E+05	0.0E+00	0.0E+00	0.0E+00	0.0E+00
TETRACHLOROETHYLENE	6.5E+02	0.0E+00	6.5E+02	0.0E+00	0.0E+00	0.0E+00	3.0E-01
TOLUENE	1.4E+06	0.0E+00	1.4E+06	0.0E+00	0.0E+00	0.0E+00	1.1E-01
1,1,2-TRICHLOROETHANE	5.5E+02	0.0E+00	5.5E+02	0.0E+00	0.0E+00	0.0E+00	1.7E-01
M-XYLENE	7.0E+06	4.9E+02	4.9E+02	1.1E-07	1.6E-03	1.6E-03	5.6E-01
O,P-XYLENE	7.0E+06	4.9E+02	4.9E+02	7.2E-07	1.0E-02	1.0E-02	4.0E-01
CHROMIUM	5.5E+01	0.0E+00	5.5E+01	8.5E-01*	0.0E+00	8.5E-01*	0.0E+00
COPPER	1.8E+05	0.0E+00	1.8E+05	2.3E-04	0.0E+00	2.3E-04	0.0E+00
ZINC	7.8E+05	0.0E+00	7.8E+05	1.1E-04	0.0E+00	1.1E-04	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPLV for this contaminant is considered to be equal to pure compound. The SPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-2e-7
EXPOSURE EVALUATIONS FOR INDUSTRIAL WORKERS

CONTAMINANT	DIRECT	INDIRECT		CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI	
	PPLV (mg/kg)	OSVI (mg/kg)	ESVI (mg/kg)	PPLV (mg/kg)	EI	EI	EI	OPN	ENC
ALDRIN	1.2E-01	0.0E+00	0.0E+00	1.2E-01	0.0E+00	0.0E+00	0.0E+00	4.4E-05	4.1E-02
ATRAZINE	4.2E+03	0.0E+00	0.0E+00	4.2E+03	0.0E+00	0.0E+00	0.0E+00	5.3E-12	4.9E-09
BENZENE	6.7E+01	7.4E+01	1.3E+00	1.3E+00	1.5E-01*	7.5E+00*	7.7E+00*	8.8E+01	8.2E+04
BENZOTHAZOLE	4.0E+03	0.0E+00	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	1.0E-05	9.7E-03
BICYCLOHEPTADIENE	3.3E+04	0.0E+00	0.0E+00	3.3E+04	0.0E+00	0.0E+00	0.0E+00	6.6E-03	6.2E+00
CHLOROBENZENE	1.5E+04	0.0E+00	0.0E+00	1.5E+04	0.0E+00	0.0E+00	0.0E+00	7.4E-04	7.0E-01
CHLOROFORM	3.1E+02	0.0E+00	0.0E+00	3.1E+02	0.0E+00	0.0E+00	0.0E+00	1.2E-03	1.1E+00
CHLOROPHENYLMETHYL SULFIDE	1.7E+04	0.0E+00	0.0E+00	1.7E+04	0.0E+00	0.0E+00	0.0E+00	2.3E-06	2.2E-03
CHLOROPHENYLMETHYL SULFONE	1.7E+04	0.0E+00	0.0E+00	1.7E+04	0.0E+00	0.0E+00	0.0E+00	2.2E-07	2.1E-04
CHLOROPHENYLMETHYL SULFOXIDE	1.7E+04	0.0E+00	0.0E+00	1.7E+04	0.0E+00	0.0E+00	0.0E+00	8.8E-08	8.2E-05
PPDDE	5.7E+00	0.0E+00	0.0E+00	5.7E+00	0.0E+00	0.0E+00	0.0E+00	5.4E-07	5.0E-04
DIBROMOCHLOROPROPANE	1.4E+00	4.8E+00	2.8E-02	2.7E-02	1.4E+00*	7.1E+01*	7.3E+01*	0.0E+00	0.0E+00
1,2-DICHLOROETHANE	2.2E+01	0.0E+00	0.0E+00	2.2E+01	0.0E+00	0.0E+00	0.0E+00	4.0E-04	3.8E-01
1,2-DICHLOROETHYLENE	1.7E+04	0.0E+00	0.0E+00	1.7E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
DICYCLOPENTADIENE	1.2E+03	5.6E+01	1.0E+00	1.0E+00	8.5E-01*	1.0E+03*	1.0E+03*	0.0E+00	0.0E+00
DIELDRIN	1.2E-01	2.3E+03	1.9E+01	1.2E-01	4.1E+01*	2.6E-01*	4.1E+01*	0.0E+00	0.0E+00
DIISOPROPYLMETHYL PHOSPHONATE	6.8E+04	0.0E+00	0.0E+00	6.8E+04	0.0E+00	0.0E+00	0.0E+00	1.5E-09	1.4E-06
DIMETHYLDISULFIDE	6.9E+03	0.0E+00	0.0E+00	6.9E+03	0.0E+00	0.0E+00	0.0E+00	1.3E-06	1.2E-03
DITHIANE	8.5E+03	0.0E+00	0.0E+00	8.5E+03	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENDRIN	2.5E+02	0.0E+00	0.0E+00	2.5E+02	0.0E+00	0.0E+00	0.0E+00	6.1E-10	5.8E-07
BENZENE	8.5E+04	2.6E+05	3.2E+04	2.1E+04	4.7E-06	1.4E-05	1.9E-05	2.7E-04	2.5E-01
HEXACHLOROCYCLOPENTADIENE	3.8E+02	0.0E+00	0.0E+00	3.8E+02	0.0E+00	0.0E+00	0.0E+00	1.3E-04	1.2E-01
ISODRIN	5.9E+01	0.0E+00	0.0E+00	5.9E+01	0.0E+00	0.0E+00	0.0E+00	8.4E-07	7.9E-04
MALATHION	1.7E+04	0.0E+00	0.0E+00	1.7E+04	0.0E+00	0.0E+00	0.0E+00	6.9E-12	6.5E-09
METHYL ISOBUTYL KETONE	4.0E+04	0.0E+00	0.0E+00	4.0E+04	0.0E+00	0.0E+00	0.0E+00	1.2E-07	1.1E-04
1,4-OXATHIANE	2.5E+04	0.0E+00	0.0E+00	2.5E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
TETRACHLOROETHYLENE	4.1E+01	0.0E+00	0.0E+00	4.1E+01	0.0E+00	0.0E+00	0.0E+00	9.6E-04	9.0E-01
TOLUENE	2.6E+05	0.0E+00	0.0E+00	2.6E+05	0.0E+00	0.0E+00	0.0E+00	1.2E-04	1.1E-01
1,1,2-TRICHLOROETHANE	3.4E+01	0.0E+00	0.0E+00	3.4E+01	0.0E+00	0.0E+00	0.0E+00	5.6E-04	5.2E-01
M-XYLENE	8.8E+05	8.0E+04	1.5E+03	1.4E+03	9.1E-07	5.6E-04	5.6E-04	5.9E-04	5.6E-01
O,P-XYLENE	8.8E+05	8.0E+04	1.5E+03	1.4E+03	5.7E-06	3.5E-03	3.5E-03	4.3E-04	4.0E-01
CHROMIUM	1.1E+00	0.0E+00	0.0E+00	1.1E+00	4.1E+01*	0.0E+00	4.1E+01*	0.0E+00	0.0E+00
COPPER	5.7E+04	0.0E+00	0.0E+00	5.7E+04	7.2E-04	0.0E+00	7.2E-04	0.0E+00	0.0E+00
ZINC	1.4E+05	0.0E+00	0.0E+00	1.4E+05	6.3E-04	0.0E+00	6.3E-04	0.0E+00	0.0E+00

*: EI's equal to or exceeds 1.0E-01

2.13 SITE SPSA-3a: DRAINAGE DITCHES (formerly Site 2-1: Drainage Ditches; EBASCO, 1987h/RIC 87216R06 and EBASCO, 1988m/RIC 87216R06A)

2.13.1 Site-Specific Considerations

Figure SPSA-3a-1 and Tables SPSA-3a-1 and SPSA-3a-2 depict the target contaminants for Site SPSA-3a. Borings 13 and 29 through 32 were included in this exposure assessment, consistent with the South Plants SAR. The historical search conducted under the contaminant assessment revealed that the drainage ditches were used to carry surface runoff away from the chlorine plant; therefore, any materials used in the chlorine plant were suspected to be present in Site SPSA-3a (EBASCO, 1987h/RIC 87216R06).

2.13.2 Spatial Distribution of Measured Contaminant Concentrations

The locations and concentrations of the target contaminants that were detected in Site SPSA-3a are shown in Figure SPSA-3a-1. Table SPSA-3a-1 summarizes the maximum concentrations of contaminants measured in soil above indicator levels for the ICP metals, arsenic, and mercury and CRLs for organic contaminants from the Phase I and Phase II investigations. The boring number and depth where the maximum value was observed are shown. No data were included for ICP metals, arsenic, and mercury in Horizon 2 because direct soil exposure below 10 ft is assumed to be negligible (see Volume VI-A). Table SPSA-3a-2 summarizes the maximum concentrations detected in groundwater together with the well number, location, sampling interval, and depth to groundwater.

2.13.3 Site Exposure Summary

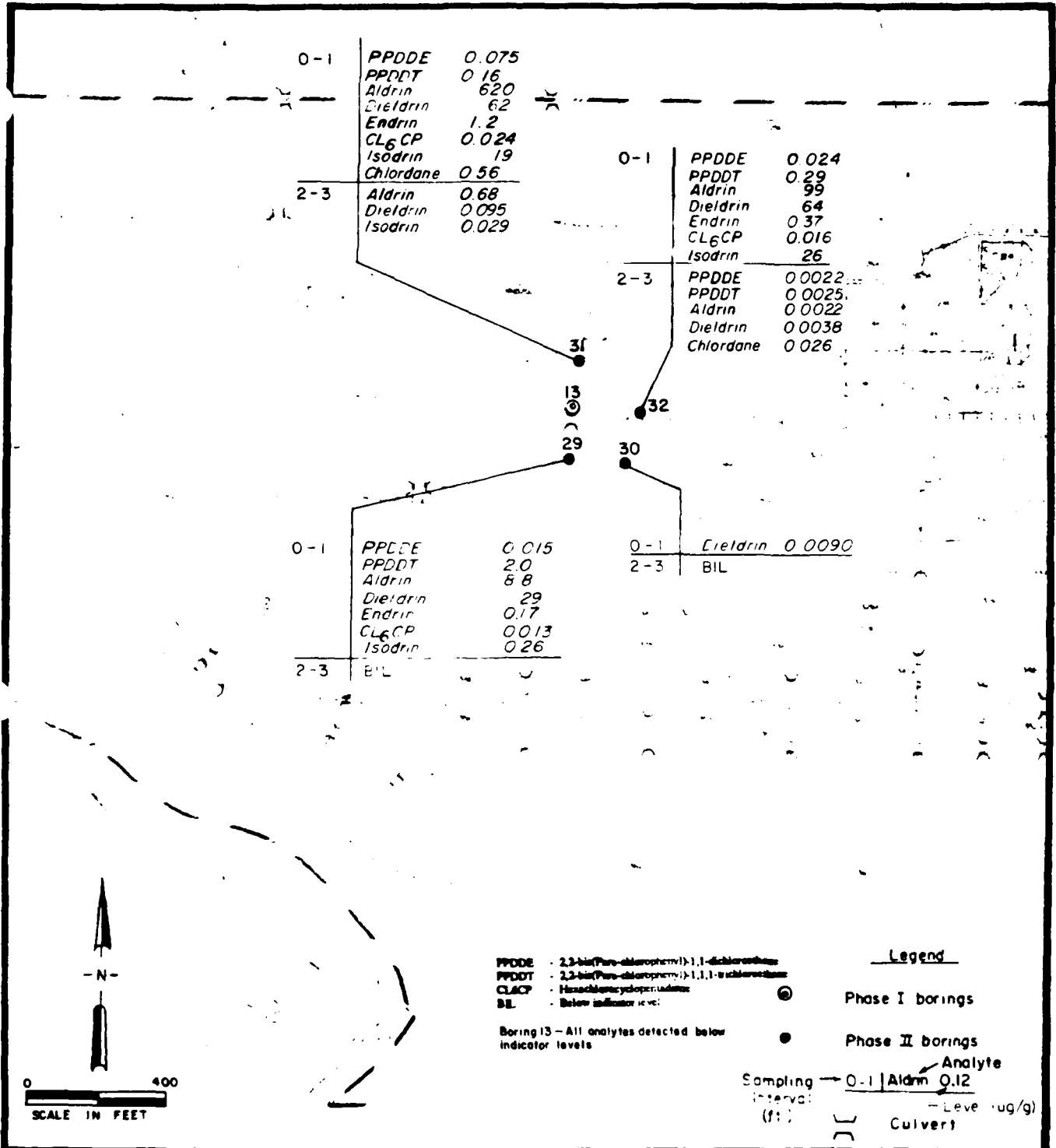
Tables SPSA-3a-3 through SPSA-3a-7 present Draft PPLVs, EIs, and VEIs for each site contaminant. Since the depth to groundwater below Site SPSA-3a is greater than 10 ft, the enclosed space vapor inhalation SPPPLV is included in the calculation of the cumulative quantity. The COCs are summarized below for each exposed population and with the critical exposure pathway identified.

Contaminants of Concern	Regulated Visitor	Casual Visitor	Recreational Visitor	Commercial Worker	Industrial Worker
Aldrin	Direct	Direct	Direct	Dir/Ind	Dir/Ind
Dieldrin	Direct	Direct	Direct	Dir/Ind	Dir/Ind
Chlordane	--	--	Direct	--	Dir/Ind
PPDDT	--	--	Direct	Indirect	Dir/Ind
Isodrin	--	--	Direct	Indirect	Dir/Ind

Note: Direct exposure pathways for soils include soil ingestion, suspended particulate inhalation, and dermal contact.
 Indirect exposure pathways include open and enclosed space vapor inhalation.

The results of the soil exposure summary indicate that exposure to contamination from the direct and indirect pathways both contribute to the exceedance of the cumulative PPLVs. Site SPSA-3a is designated as a Priority 1 site, based on the most sensitive exposed population PPLV (i.e., the industrial worker).

No groundwater contaminants result in an unacceptable exposure due to vapor inhalation as indicated by VEI values less than 1.



Prepared for:
 Program Managers Office for
 Rocky Mountain Arsenal Cleanup
 Aberdeen Proving Ground, Maryland

FIGURE SPSA-3a-1
Phase I and Phase II Analytes Detected Within or Above Indicator Levels
 Rocky Mountain Arsenal
 Prepared by: Ebasco Services Incorporated

TABLE SPSA-3a-1
SOIL CONTAMINANT CONCENTRATIONS
FOR SITE SPSA-3a

Contaminant	Horizon 1			Horizon 2		
	Max. (ug/g)	Depth (ft)	Boring Number	Max. (ug/g)	Depth (ft)	Boring Number
Aldrin	620	0-1	31	620	0-1	31
Chlordane	0.56	0-1	31	0.56	0-1	31
Dieldrin	64	0-1	32	64	0-1	32
PPDDE ^{1/}	0.075	0-1	31	0.075	0-1	31
PPDDT ^{2/}	2.0	0-1	29	2.0	0-1	29
Endrin	1.2	0-1	31	1.2	0-1	31
Hexachlorocyclopentadiene	0.024	0-1	31	0.024	0-1	31
Isodrin	26	0-1	32	26	0-1	32

1/ PPDDE 2,2-bis(Para-chlorophenyl)-1,1-dichloroethene
2/ PPDDT 2,2-bis(Para-chlorophenyl)-1,1,1-trichloroethane

SPSA South Plants Study Area
Max. Maximum
ug/g microgram per gram
ft foot/feet

TABLE SPSA-3a-2
GROUNDWATER CONTAMINANT CONCENTRATIONS (UG/L)
FOR SITE SPSA-3a

AVERAGE SITE DEPTH TO GROUNDWATER: 30 Feet

CHEMICAL	CONCENTRATION MAXIMUM	LOCATION (WELL NUMBER)	SAMPLE DATE
CARBON TETRACHLORIDE	2.6	02006	01/12/88
CHLOROFORM	24	02006	01/12/88
CHLOROPHENYLMETHYL SULFONE	6.7	02006	01/12/88
DICYCLOPENTADIENE	49	02006	01/12/88
DITHIANE	3.6	02006	01/12/88
DIELDRIN	0.052	02006	01/12/88
1,4-OXATHIANE	3.2	02006	01/12/88
TETRACHLOROETHYLENE	5.8	02006	01/12/88
TRICHLOROETHYLENE	0.87	02006	01/12/88

EACH VALUE PRESENTED IS THE MAXIMUM CONCENTRATION FOR THE LISTED ANALYTE
FOR THE PERIOD March 17, 1987 TO February 28, 1989.
DATA SOURCE: DP ASSOCIATES, RMA Database, July 19, 1990

SPSA-3a-3
EXPOSURE EVALUATIONS FOR REGULATED VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI OPN
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI EI	EI EI	EI EI	
ALDRIN	1.5E+00	1.0E+06	1.5E+00	4.1E+02*	8.8E-05a	4.1E+02*	0.0E+00
CARBON TETRACHLORIDE	2.0E+02	0.0E+00	2.0E+02	0.0E+00	0.0E+00	0.0E+00	1.1E-06
CHLORDANE	2.0E+01	7.6E+08	2.0E+01	2.9E-02	7.4E-10	2.9E-02	0.0E+00
CHLOROFORM	4.0E+03	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	8.7E-08
CHLOROPHENYLMETHYL SULFONE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	6.8E-13
PPDDE	7.4E+01	4.2E+08	7.4E+01	1.0E-03	1.8E-10	1.0E-03	0.0E+00
PPDDT	7.4E+01	8.9E+08	7.4E+01	2.7E-02	2.2E-09	2.7E-02	0.0E+00
DICYCLOPENTADIENE	5.4E+04	0.0E+00	5.4E+04	0.0E+00	0.0E+00	0.0E+00	3.7E-06
DIELDRIN	1.6E+00	1.0E+06	1.6E+00	4.1E+01*	2.0E-05a	4.1E+01*	0.0E+00
DITHIANE	8.3E+04	0.0E+00	8.3E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENDRIN	2.5E+03	1.0E+06	2.5E+03	4.8E-04	4.6E-10a	4.8E-04	0.0E+00
HEXACHLOROCYCLOPENTADIENE	1.7E+04	2.1E+05	1.5E+04	1.4E-06	1.1E-07	1.6E-06	0.0E+00
ISODRIN	5.8E+02	1.0E+06	5.8E+02	4.5E-02	5.1E-08a	4.5E-02	0.0E+00
1,4-OXATHIANE	2.5E+05	0.0E+00	2.5E+05	0.0E+00	0.0E+00	0.0E+00	0.0E+00
TETRACHLOROETHYLENE	5.1E+02	0.0E+00	5.1E+02	0.0E+00	0.0E+00	0.0E+00	6.3E-08
TRICHLOROETHYLENE	2.3E+03	0.0E+00	2.3E+03	0.0E+00	0.0E+00	0.0E+00	1.9E-08

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPPLV for this contaminant is considered to be equal to pure compound. The SPPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-3a-4

EXPOSURE EVALUATIONS FOR CASUAL VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI OPN
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	
ALDRIN	1.5E+00	1.0E+06	1.5E+00	4.1E+02*	8.8E-05a	4.1E+02*	0.0E+00
CARBON TETRACHLORIDE	2.0E+02	0.0E+00	2.0E+02	0.0E+00	0.0E+00	0.0E+00	1.1E-06
CHLORDANE	2.0E+01	7.6E+08	2.0E+01	2.9E-02	7.4E-10	2.9E-02	0.0E+00
CHLOROFORM	4.0E+03	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	8.7E-08
CHLOROPHENYLMETHYL SULFONE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	6.8E-13
PPDDE	7.4E+01	4.2E+08	7.4E+01	1.0E-03	1.8E-10	1.0E-03	0.0E+00
PPDDT	7.4E+01	8.9E+08	7.4E+01	2.7E-02	2.2E-09	2.7E-02	0.0E+00
DICYCLOPENTADIENE	5.4E+04	0.0E+00	5.4E+04	0.0E+00	0.0E+00	0.0E+00	3.7E-06
DIELDRIN	1.6E+00	1.0E+06	1.6E+00	4.1E+01*	2.0E-05a	4.1E+01*	0.0E+00
DITHIANE	8.3E+04	0.0E+00	8.3E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENDRIN	2.5E+03	1.0E+06	2.5E+03	4.8E-04	4.6E-10a	4.8E-04	0.0E+00
HEXACHLOROCYCLOPENTADIENE	1.7E+04	2.1E+05	1.5E+04	1.4E-06	1.1E-07	1.6E-06	0.0E+00
ISODRIN	5.8E+02	1.0E+06	5.8E+02	4.5E-02	5.1E-08a	4.5E-02	0.0E+00
1,4-OXATHIANE	2.5E+05	0.0E+00	2.5E+05	0.0E+00	0.0E+00	0.0E+00	0.0E+00
TETRACHLOROETHYLENE	5.1E+02	0.0E+00	5.1E+02	0.0E+00	0.0E+00	0.0E+00	6.3E-08
TRICHLOROETHYLENE	2.3E+03	0.0E+00	2.3E+03	0.0E+00	0.0E+00	0.0E+00	1.9E-08

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPPLV for this contaminant is considered to be equal to pure compound. The SPPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-3a-5
EXPOSURE EVALUATIONS FOR RECREATIONAL VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI OPN
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	
ALDRIN	2.1E-01	1.0E+06	2.1E-01	3.0E+03*	1.3E-03a	3.0E+03*	0.0E+00
CARBON TETRACHLORIDE	2.7E+01	0.0E+00	2.7E+01	0.0E+00	0.0E+00	0.0E+00	1.7E-05
CHLORDANE	2.7E+00	5.0E+07	2.7E+00	2.1E-01*	1.1E-08	2.1E-01*	0.0E+00
CHLOROFORM	5.6E+02	0.0E+00	5.6E+02	0.0E+00	0.0E+00	0.0E+00	1.3E-06
CHLOROPHENYLMETHYL SULFONE	7.0E+04	0.0E+00	7.0E+04	0.0E+00	0.0E+00	0.0E+00	4.4E-12
PPDDE	1.0E+01	2.8E+07	1.0E+01	7.3E-03	2.7E-09	7.3E-03	0.0E+00
PPDDT	1.0E+01	5.9E+07	1.0E+01	2.0E-01*	3.4E-08	2.0E-01*	0.0E+00
DICYCLOPENTADIENE	1.8E+04	0.0E+00	1.8E+04	0.0E+00	0.0E+00	0.0E+00	2.4E-05
DIELDRIN	2.2E-01	1.0E+06	2.2E-01	2.9E+02*	3.0E-04a	2.9E+02*	0.0E+00
DITHIANE	3.5E+04	0.0E+00	3.5E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENDRIN	1.1E+03	1.0E+06	1.1E+03	1.1E-03	3.0E-09a	1.1E-03	0.0E+00
HEXACHLOROCYCLOPENTADIENE	5.7E+03	7.7E+04	5.3E+03	4.2E-06	3.1E-07	4.5E-06	0.0E+00
ISODRIN	2.5E+02	1.0E+06	2.5E+02	1.1E-01*	3.3E-07a	1.1E-01*	0.0E+00
1,4-OXATHIANE	1.1E+05	0.0E+00	1.1E+05	0.0E+00	0.0E+00	0.0E+00	0.0E+00
TETRACHLOROETHYLENE	7.1E+01	0.0E+00	7.1E+01	0.0E+00	0.0E+00	0.0E+00	9.5E-07
TRICHLOROETHYLENE	3.2E+02	0.0E+00	3.2E+02	0.0E+00	0.0E+00	0.0E+00	2.8E-07

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPPLV for this contaminant is considered to be equal to pure compound. The SPPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-3a-6
EXPOSURE EVALUATIONS FOR COMMERCIAL WORKERS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI ENC
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI EI	EI EI	EI EI	
ALDRIN	1.9E+00	4.0E-01	3.3E-01	3.3E+02*	1.6E+03*	1.9E+03*	0.0E+00
CARBON TETRACHLORIDE	2.5E+02	0.0E+00	2.5E+02	0.0E+00	0.0E+00	0.0E+00	9.9E-02
CHLORDANE	2.5E+01	1.4E+04	2.5E+01	2.3E-02	4.1E-05	2.3E-02	0.0E+00
CHLOROFORM	5.1E+03	0.0E+00	5.1E+03	0.0E+00	0.0E+00	0.0E+00	7.8E-03
CHLOROPHENYLMETHYL SULFONE	9.1E+04	0.0E+00	9.1E+04	0.0E+00	0.0E+00	0.0E+00	1.8E-07
PPDDE	9.3E+01	1.9E+01	1.6E+01	8.1E-04	3.9E-03	4.7E-03	0.0E+00
PPDDT	9.3E+01	1.9E+01	1.6E+01	2.1E-02	1.0E-01*	1.2E-01*	0.0E+00
DICYCLOPENTADIENE	1.7E+04	0.0E+00	1.7E+04	0.0E+00	0.0E+00	0.0E+00	9.9E-01
DIELDRIN	2.0E+00	5.8E+01	1.9E+00	3.2E+01*	1.1E+00*	3.3E+01*	0.0E+00
DITHIANE	4.6E+04	0.0E+00	4.6E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENDRIN	1.4E+03	1.0E+06	2.4E+02	8.7E-04	4.2E-03*	5.0E-03	0.0E+00
HEXACHLOROCYCLOPENTADIENE	5.5E+03	1.9E+01	1.9E+01	4.4E-06	1.3E-03	1.3E-03	0.0E+00
ISODRIN	3.2E+02	6.7E+01	5.5E+01	8.1E-02	3.9E-01*	4.7E-01*	0.0E+00
1,4-OXATHIANE	1.4E+05	0.0E+00	1.4E+05	0.0E+00	0.0E+00	0.0E+00	0.0E+00
TETRACHLOROETHYLENE	6.5E+02	0.0E+00	6.5E+02	0.0E+00	0.0E+00	0.0E+00	5.6E-03
TRICHLOROETHYLENE	2.9E+03	0.0E+00	2.9E+03	0.0E+00	0.0E+00	0.0E+00	1.7E-03

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPLV for this contaminant is considered to be equal to pure compound. The SPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

SPSA-3a-7

EXPOSURE EVALUATIONS FOR INDUSTRIAL WORKERS

CONTAMINANT	DIRECT	INDIRECT		CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI	
	PPLV (mg/kg)	OSVI (mg/kg)	ESVI (mg/kg)	PPLV (mg/kg)	EI	EI	EI	OPN	ENC
ALDRIN	1.2E-01	9.4E+05	4.0E-01	9.0E-02	5.3E+03*	1.6E+03*	6.9E+03*	0.0E+00	0.0E+00
CARBON TETRACHLORIDE	1.5E+01	0.0E+00	0.0E+00	1.5E+01	0.0E+00	0.0E+00	0.0E+00	8.3E-06	3.0E-01
CHLORDANE	1.5E+00	1.0E+08	5.2E+00	1.2E+00	3.7E-01*	1.1E-01*	4.8E-01*	0.0E+00	0.0E+00
CHLOROFORM	3.1E+02	0.0E+00	0.0E+00	3.1E+02	0.0E+00	0.0E+00	0.0E+00	6.5E-07	2.3E-02
CHLOROPHENYLMETHYL SULFONE	1.7E+04	0.0E+00	0.0E+00	1.7E+04	0.0E+00	0.0E+00	0.0E+00	5.1E-12	1.8E-07
PPDDE	5.7E+00	5.6E+07	1.9E+01	4.4E+00	1.3E-02	3.9E-03	1.7E-02	0.0E+00	0.0E+00
PPDDT	5.7E+00	1.2E+08	1.9E+01	4.4E+00	3.5E-01*	1.0E-01*	4.5E-01*	0.0E+00	0.0E+00
DICYCLOPENTADIENE	1.2E+03	0.0E+00	0.0E+00	1.2E+03	0.0E+00	0.0E+00	0.0E+00	2.8E-05	9.9E-01
DIELDRIN	1.2E-01	4.3E+05	1.9E+01	1.2E-01	5.2E+02*	3.3E+00*	5.3E+02*	0.0E+00	0.0E+00
DITHIANE	8.5E+03	0.0E+00	0.0E+00	8.5E+03	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENDRIN	2.5E+02	1.0E+06	1.0E+06	2.0E+02	4.7E-03	1.4E-03a	6.1E-03	0.0E+00	0.0E+00
HEXACHLOROCYCLOPENTADIENE	3.8E+02	2.8E+04	5.8E+01	5.0E+01	6.3E-05	4.2E-04	4.8E-04	0.0E+00	0.0E+00
ISODRIN	5.9E+01	6.8E+07	2.0E+02	4.6E+01	4.4E-01*	1.3E-01*	5.7E-01*	0.0E+00	0.0E+00
1,4-OXATHIANE	2.5E+04	0.0E+00	0.0E+00	2.5E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
TETRACHLOROETHYLENE	4.1E+01	0.0E+00	0.0E+00	4.1E+01	0.0E+00	0.0E+00	0.0E+00	4.7E-07	1.7E-02
TRICHLOROETHYLENE	1.8E+02	0.0E+00	0.0E+00	1.8E+02	0.0E+00	0.0E+00	0.0E+00	1.4E-07	5.0E-03

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPPLV for this contaminant is considered to be equal to pure compound. The SPPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

2.14 SITE SPSA-3b: SALT STORAGE PAD (formerly Site 2-6: Salt Storage Pad; EBASCO, 1987f/RIC 87127R02 and EBASCO, 1988i/RIC 87127R02A)

2.14.1 Site-Specific Considerations

Figure SPSA-3b-1 and Tables SPSA-3b-1 and SPSA-3b-2 depict the target contaminants for Site SPSA-3b. Borings 1 through 12, 12B, and 13 through 21 were included in this exposure assessment, consistent with the South Plants SAR. The historical search conducted under the contamination assessment revealed that GB brine and mustard incineration wastes may have been stored in Site SPSA-3b (EBASCO, 1987f/RIC 87127R02); however, these chemicals and most of their degradation products were not detected in soil during the Phase I and Phase II investigations. This site was also used to store pesticide wastes, Aldrin and Dieldrin filter cakes, dirt and debris from excavated sewer lines, and waste drums, metal, wood, contaminated dirt, and concrete from Aldrin manufacturing processes. Therefore, chemicals from the RMA target contaminant list that are associated with these activities were suspected to be present in Site SPSA-3b (EBASCO, 1987f/RIC 87127R02).

2.14.2 Spatial Distribution of Measured Contaminant Concentrations

The locations and concentrations of the target contaminants that were detected in Site SPSA-3b are shown in Figure SPSA-3b-1. The following contaminants were not included in this figure, since they were not considered target contaminants during the Phase I and Phase II investigations: 2-Pentanone, occurring in Borings 3 (23.7-24.7 ft), and 1,1,2,2-Tetrachloroethane, occurring in Boring 6 (9-10 ft). Although not shown in this figure, these nontarget compounds were included in the South Plants SAR and in this exposure assessment because they passed through the screening process performed in the RMA Chemical Index (EBASCO, 1988c/RIC 88357R01).

Table SPSA-3b-1 summarizes the maximum concentrations of contaminants measured in soil above indicator levels for the ICP metals, arsenic, and mercury and CRLs for organic contaminants from the Phase I and Phase II investigations. The boring number and depth where the maximum value was observed are shown. No data were included for ICP metals, arsenic, and mercury in Horizon 2 because direct soil exposure below 10 ft is

assumed to be negligible (see Volume VI-A). Table SPSA-3b-2 summarizes the maximum concentrations detected in groundwater together with the well number, location, sampling interval, and depth to groundwater.

2.14.3 Site Exposure Summary

Tables SPSA-3b-3 through SPSA-3b-7 present Draft PPLVs, EIs, and VEIs for each site contaminant. Since the depth to groundwater below Site SPSA-3b is greater than 10 ft, the enclosed space vapor inhalation SPPPLV is included in the calculation of the cumulative quantity. The COCs are summarized below for each exposed population and with the critical exposure pathway identified.

Contaminants of Concern	Regulated Visitor	Casual Visitor	Recreational Visitor	Commercial Worker	Industrial Worker
Aldrin	Dir/Ind	Dir/Ind	Dir/Ind	Dir/Ind	Dir/Ind
Chlordane	Direct	Direct	Direct	Direct	Dir/Ind
Dieldrin	Direct	Direct	Dir/Ind	Dir/Ind	Dir/Ind
Isodrin	Direct	Direct	Direct	Dir/Ind	Dir/Ind
Arsenic	Direct	Direct	Direct	Direct	Direct
PPDDE	--	--	Direct	Indirect	Dir/Ind
PPDDT	--	--	Direct	Indirect	Dir/Ind
Hexachlorocyclopentadiene	--	--	Indirect	Indirect	Dir/Ind
Chloroform	--	--	--	Indirect	Indirect
Chlorophenylmethyl sulfide	--	--	--	Indirect	Dir/Ind
1,2-Dichloroethane	--	--	--	Indirect	Indirect
Dicyclopentadiene	--	--	--	Indirect	Dir/Ind
1,1,2,2-Tetrachloroethane	--	--	--	Indirect	Indirect

Note: Direct exposure pathways for soils include soil ingestion, suspended particulate inhalation, and dermal contact.
Indirect exposure pathways include open and enclosed space vapor inhalation.

The results of the soil exposure summary indicate that exposure to contamination from the direct and indirect pathways both contribute to the exceedance of the cumulative PPLVs. Site SPSA-3b is designated as a Priority 1 site, based on the most sensitive exposed population PPLV (i.e., the industrial worker).

No groundwater contaminants result in an unacceptable exposure due to vapor inhalation as indicated by VEI values less than 1.

0-1	Aldrin	30
	Dieldrin	100
	Pb	28
	Hg	0.12
	Zn	77
4-5	Cu	20
9-10	BIL	
14-15	Cu	21

0-1	Aldrin (SVO)	50
	Dieldrin(SVO)	50
	Isodrin (SVO)	1
	PPDDT	4.1
	Aldrin (OCP)	49
	Dieldrin (OCP)	99
	Endrin	0.24
	CL ₆ CP	0.020
	Isodrin (OCP)	1.6
2-3	PPDDE	0.0082
	PPDDT	0.12
	Aldrin	0.41
	Dieldrin	1.3
	Endrin	0.072
	Isodrin	0.24
4-5	BIL	
7-8	BIL	
9-10	BIL	

3.8-4.8	Aldrin (SVO)	5000
	CPMS	2000
	CPMSO ₂	3
	CPMSO	20
	DCPD	200
	Dieldrin (SVO)	400
	Endrin (SVO)	10
	Isodrin (SVO)	600
	PPDDE	2.0
	PPDDT	7.1
	Aldrin (OCP)	17000
	Dieldrin (OCP)	200
	Endrin (OCP)	13
	CL ₆ CP	58
	Isodrin (OCP)	900
5.8-6.8	Aldrin	3
	CPMS	1
	CPMSO	3
	Aldrin	0.21
	Isodrin	0.0039
7.8-8.8	BIL	
12.8-11.8	BIL	
15.1-14.1	BIL	

Surface	Aldrin	1
	Dieldrin	8
	As	14
	Cu	79
	Pb	38
	Hg	1.3
	Zn	170

0-1	BIL	
4-5	BIL	
9-10	BIL	
14-15	Cu	
	Zn	
19-20	Chlord	
	Cu	
	Zn	

Surface	Aldrin	30
	CPMSO ₂	3
	Dieldrin	60
	Isodrin	0.9
	As	30
	Cd	1.3
	Cu	96
	Pb	35
	Hg	2.2
	Zn	140

0-1	Dieldrin	2
	PPDDE	0.017
	PPDDT	0.37
	Aldrin	0.29
	Dieldrin	3.9
	Endrin	0.041
	Isodrin	0.011
2-3	BIL	
4-5	BIL	
7-8	BIL	
9-10	BIL	

0-1	Dieldrin	0.4
	PPDDT	0.023
	Aldrin	0.045
	Dieldrin	0.50
	Endrin	0.013
	Isodrin	0.0025
2-3	BIL	
4-5	BIL	
7-8	BIL	
9-10	BIL	

0-1	PPDDT	0.0057
	Aldrin	0.083
	Dieldrin	0.29
	Isodrin	0.0030
2-3	BIL	
4-5	BIL	
7-8	BIL	
9-10	BIL	

0-1	PPDDE	0.021
	PPDDT	0.84
	Aldrin 2000	
	Dieldrin	10
	Endrin	0.32
	CL ₆ CP	0.057
	Isodrin	2.8
2-3	Aldrin	0.88
	Dieldrin	0.066
	Isodrin	0.022
7-8	BIL	
9-10	BIL	

0-1	Atrazine	0.6
	Dieldrin	0.6
4-5	12DCLE	2
	CPMSO ₂	0.3

0-1	PPDDT	0.0052
	Aldrin	6.9
	Dieldrin	15
	Endrin	0.061
	CL ₆ CP	0.030
	Isodrin	0.018
2-3	Dieldrin	0.0098
4-5	12DCLE	0.16
7-8	12DCLE	0.23
9-10	BIL	

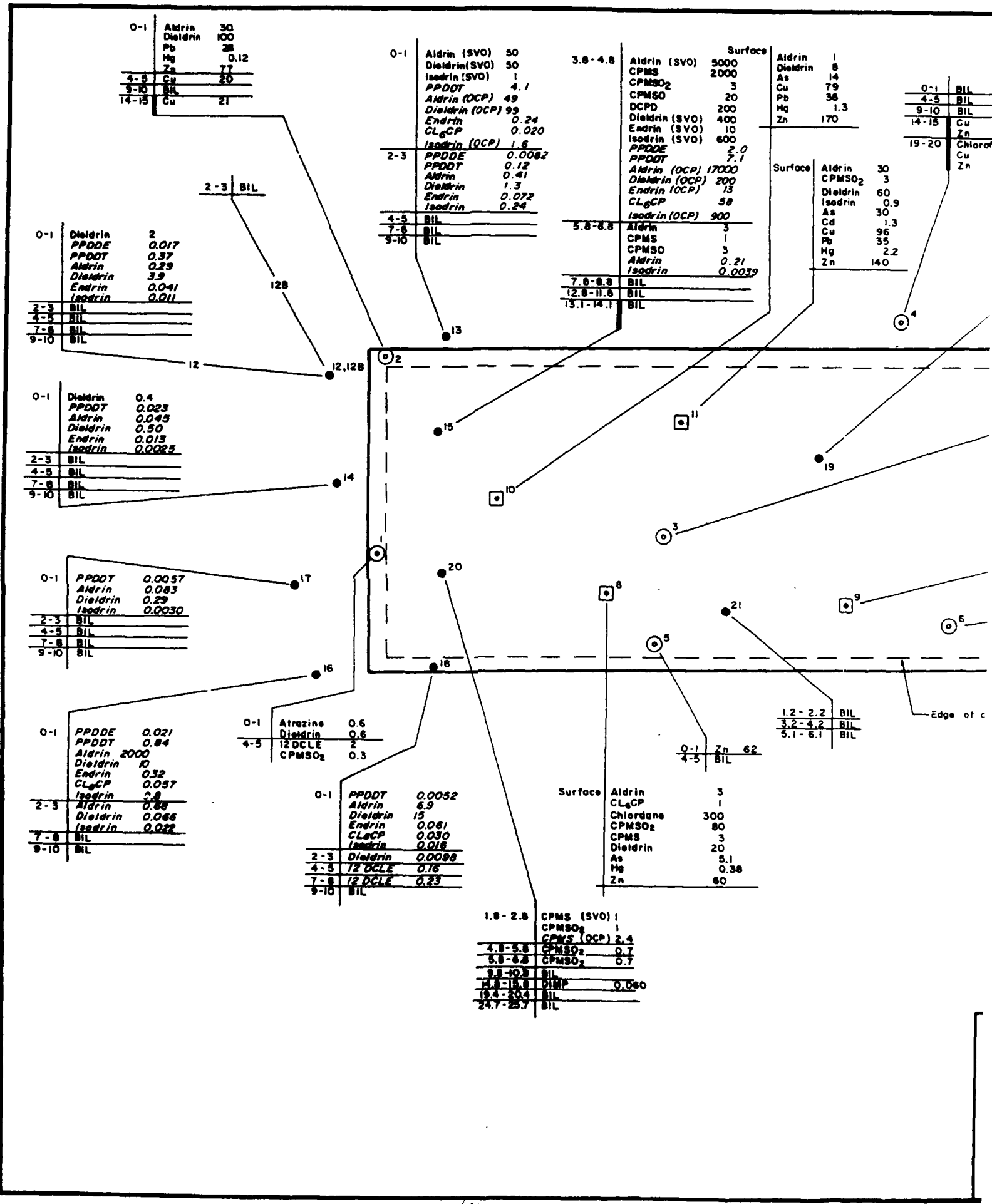
Surface	Aldrin	3
	CL ₆ CP	1
	Chlordane	300
	CPMSO ₂	80
	CPMS	3
	Dieldrin	20
	As	5.1
	Hg	0.38
	Zn	60

1.8-2.8	CPMS (SVO)	1
	CPMSO ₂	1
	CPMS (OCP)	2.4
4.8-5.8	CPMSO ₂	0.7
5.8-6.8	CPMSO ₂	0.7
9.8-10.8	BIL	
14.8-15.8	DIMP	0.060
19.4-20.4	BIL	
24.7-25.7	BIL	

1.2-2.2	BIL	
3.2-4.2	BIL	
5.1-6.1	BIL	

0-1	Zn	62
4-5	BIL	

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0-1	BIL
4-5	BIL
9-10	BIL
14-15	Cu 40
	Zn 100
19-20	Chloroform 3
	Cu 45
	Zn 110

1.3-2.3	CPMSO ₂	2
	CPMSO	0.3
3.3-4.3	CPMS (SVO)	2
	CPMSO ₂ (SVO)	3
	CPMSO (SVO)	2
	CPMS (OCP)	3.3
	CPMSO ₂ (OCP)	3.6
	CPMSO (OCP)	3.9

Aldrin	30
CPMSO ₂	3
Dieldrin	60
Isodrin	0.9
As	30
Cd	1.3
Cu	96
Pb	35
Hg	2.2
Zn	140

0-1	CPMSO ₂	0.9
	CPMSO	0.6
4-5	BIL	
9-10	BIL	
14-15	Cu	25
	Pb	29
	Zn	260
19-20	Cu	21
	Zn	91
24-25	Cu	24
	Zn	97

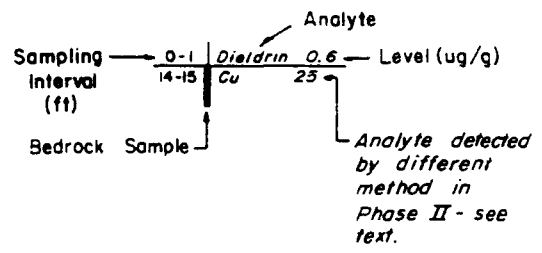
Surface	Aldrin	50
	CPMSO ₂	10
	DBCP	0.011
	Dieldrin	60
	Isodrin	3
	As	11
	Cu	240
	Pb	76
	Hg	1.5
	Zn	130

0-1	BIL
4-5	BIL
9-10	Zn 61

0-1	Zn 68
4-5	BIL
9-10	BIL
14-15	Zn 79

2.2	BIL
4.2	BIL
6.1	BIL

- ⊙ I Phase I Boring
- II Surface Grab Sample
- 16 Phase II Boring



- CPMS - Chlorophenylmethyl malic acid
- CPMSO₂ - Chlorophenylmethyl malic acid
- CPMSO - Chlorophenylmethyl malic acid
- DBCP - Dibromochloropropane
- PFDDDE - 2,2-bis(Para-chlorophenyl)-1,1-dichloroethane
- PFDDT - 2,2-bis(Para-chlorophenyl)-1,1,1-trichloroethane
- 1,2DCE - 1,2-Dichloroethane
- DCPD - Dicyclohexadiene
- CLACP - Hexachlorocyclopentadiene
- DIMP - Diisopropylamethyl phosphonate
- Cd - Cadmium
- As - Arsenic
- Cu - Copper
- Pb - Lead
- Hg - Mercury
- Zn - Zinc
- BIL - Below indicator level
- SVO - Semivolatile organics
- OCP - Organochlorine pesticides



Prepared for
 Program Manager's Office for
 Rocky Mountain Arsenal Cleanup
 Aberdeen Proving Ground, Maryland

FIGURE SPSA-3b-1
 Phase I and Phase II Analytes Detected
 Within or Above Indicator Levels
 Rocky Mountain Arsenal
 Prepared by: Ebasco Service Incorporated

TABLE SPSA-3b-1
SOIL CONTAMINANT CONCENTRATIONS
FOR SITE SPSA-3b

Contaminant	Horizon 1			Horizon 2		
	Max. (ug/g)	Depth (ft)	Boring Number	Max. (ug/g)	Depth (ft)	Boring Number
Aldrin	17000	3.8-4.8	15	17000	3.8-4.8	15
Atrazine	0.6	0-1	1	0.6	0-1	1
Chlordane	300	0-1	8	300	0-1	8
Chloroform	--	--	--	3.0	19-20	4
Chlorophenylmethyl sulfide	2000	3.8-4.8	15	2000	3.8-4.8	15
Chlorophenylmethyl sulfone	80	surface	8	80	surface	8
Chlorophenylmethyl sulfoxide	20	3.8-4.8	15	20	3.8-4.8	15
Dibromochloropropane	0.011	surface	9	0.011	surface	9
PPDDE ^v	2.0	3.8-4.8	15	2.0	3.8-4.8	15
PPDDT ^v	7.1	3.8-4.8	15	7.1	3.8-4.8	15
1,2-Dichloroethane	2	4-5	1	2	4-5	1
Dicyclopentadiene	200	3.8-4.8	15	200	3.8-4.8	15
Dieldrin	400	3.8-4.8	15	400	3.8-4.8	15
Diisopropylmethyl phosphonate	--	--	--	0.060	14.8-15.8	20
Endrin	13	3.8-4.8	15	13	3.8-4.8	15
Hexachlorocyclopentadiene	58	3.8-4.8	15	58	3.8-4.8	15
Isodrin	900	3.8-4.8	15	900	3.8-4.8	15
2-Pentanone ^v	--	--	--	1.0	23.7-24.7	3
1,1,2,2-Tetrachloroethane ^v	0.20	9-10	6	0.20	9-10	6
Arsenic	30	surface	11	--	--	--
Copper	240	surface	9	--	--	--
Lead	76	surface	9	--	--	--
Mercury	2.2	surface	11	--	--	--
Zinc	170	surface	10	--	--	--

TABLE SPSA-3b-1 (Continued)
SOIL CONTAMINANT CONCENTRATIONS
FOR SITE SPSA-3b

- 1/ PPDE 2,2-bis(Para-chlorophenyl)-1,1-dichloroethene
- 2/ PPDDT 2,2-bis(Para-chlorophenyl)-1,1,1-trichloroethane
- 3/ Nontarget contaminant. Refer to the exposure assessment nontarget screen in Appendix A.

SPSA South Plants Study Area
Max. Maximum
ug/g microgram per gram
ft foot/feet

38
3
38
3
38
38
38
38
38

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SPSA-3b-4
EXPOSURE EVALUATIONS FOR CASUAL VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI OPN
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	
ALDRIN	1.5E+00	9.6E+04	1.5E+00	1.1E+04*	1.8E-01*	1.1E+04*	0.0E+00
ATRAZINE	4.1E+04	1.6E+08	4.1E+04	1.5E-05	3.7E-09	1.5E-05	0.0E+00
CARBON TETRACHLORIDE	2.0E+02	0.0E+00	2.0E+02	0.0E+00	0.0E+00	0.0E+00	1.1E-04
CHLORDANE	2.0E+01	1.0E+06	2.0E+01	1.5E+01*	2.9E-05a	1.5E+01*	0.0E+00
CHLOROFORM	4.0E+03	1.2E+04	3.0E+03	0.0E+00	2.5E-04	2.5E-04	8.8E-05
CHLOROPHENYLMETHYL SULFIDE	1.6E+05	1.0E+06	1.6E+05	1.2E-02	3.4E-04a	1.3E-02	0.0E+00
CHLOROPHENYLMETHYL SULFONE	1.6E+05	1.0E+06	1.5E+05	4.9E-04	5.2E-05a	5.4E-04	0.0E+00
CHLOROPHENYLMETHYL SULFOXIDE	1.6E+05	9.5E+05	1.4E+05	1.2E-04	2.1E-05	1.4E-04	0.0E+00
PPDDE	7.4E+01	5.8E+06	7.4E+01	2.7E-02	3.5E-07	2.7E-02	0.0E+00
PPDDT	7.4E+01	1.0E+06	7.4E+01	9.6E-02	5.8E-07a	9.6E-02	0.0E+00
DIBROMOCHLOROPROPANE	1.8E+01	3.7E+02	1.7E+01	6.1E-04	2.9E-05	6.4E-04	0.0E+00
1,2-DICHLOROETHANE	2.8E+02	1.1E+03	2.2E+02	7.2E-03	1.8E-03	8.9E-03	0.0E+00
DICYCLOPENTADIENE	5.4E+04	1.0E+06	6.9E+03	3.7E-03	2.5E-02a	2.9E-02	0.0E+00
DIELDRIN	1.6E+00	1.0E+06	1.6E+00	2.5E+02*	9.2E-03a	2.5E+02*	0.0E+00
DIISOPROPYLMETHYL PHOSPHONATE	6.6E+05	3.7E+05	2.4E+05	0.0E+00	1.6E-07	1.6E-07	0.0E+00
DITHIANE	8.3E+04	0.0E+00	8.3E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENDRIN	2.5E+03	1.0E+06	2.5E+03	5.2E-03	3.7E-07a	5.2E-03	0.0E+00
HEXACHLOROCYCLOPENTADIENE	1.7E+04	1.0E+06	8.3E+02	3.5E-03	6.6E-02a	6.9E-02	0.0E+00
ISODRIN	5.8E+02	1.0E+06	5.8E+02	1.6E+00*	1.3E-04a	1.6E+00*	0.0E+00
1,4-OXATHIANE	2.5E+05	0.0E+00	2.5E+05	0.0E+00	0.0E+00	0.0E+00	0.0E+00
1,1,2,2-TETRACHLOROETHANE	1.3E+02	1.5E+03	1.2E+02	1.6E-03	1.3E-04	1.7E-03	0.0E+00
TETRACHLOROETHYLENE	5.1E+02	0.0E+00	5.1E+02	0.0E+00	0.0E+00	0.0E+00	6.0E-06
TRICHLOROETHYLENE	2.3E+03	0.0E+00	2.3E+03	0.0E+00	0.0E+00	0.0E+00	1.8E-06
ARSENIC	2.2E+01	0.0E+00	2.2E+01	1.4E+00*	0.0E+00	1.4E+00*	0.0E+00
COPPER	4.2E+05	0.0E+00	4.2E+05	5.7E-04	0.0E+00	5.7E-04	0.0E+00
LEAD	1.5E+04	0.0E+00	1.5E+04	4.9E-03	0.0E+00	4.9E-03	0.0E+00
MERCURY	3.3E+03	0.0E+00	3.3E+03	6.7E-04	0.0E+00	6.7E-04	0.0E+00
ZINC	2.0E+06	0.0E+00	2.0E+06	8.6E-05	0.0E+00	8.6E-05	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPPLV for this contaminant is considered to be equal to pure compound. The SPPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

2.15 SITE SPSA-3c: FORMER TANK STORAGE AREA (formerly Site 2-8: Former Tank Storage Area; EBASCO, 1988j/RIC 88166R01 and EBASCO, 1988k/RIC 88166R01A)

2.15.1 Site-Specific Considerations

Figure SPSA-3c-1 and Tables SPSA-3c-1 and SPSA-3c-2 depict the target contaminants for Site SPSA-3c. Borings 1 through 21, P101, and P102 from Site 2-8 were included in this exposure assessment, consistent with the South Plants SAR. This site was used for the storage of brine, crude caustic, and chlorine. Therefore, chemicals from the RMA target contaminant list that are associated with these activities were suspected to be present in Site SPSA-3c (EBASCO, 1988j/RIC 88166R01).

2.15.2 Spatial Distribution of Measured Contaminant Concentrations

The locations and concentrations of the target contaminants that were detected in Site SPSA-3c are shown in Figure SPSA-3c-1. Table SPSA-3c-1 summarizes the maximum concentrations of contaminants measured in soil above indicator levels for the ICP metals, arsenic, and mercury and CRLs for organic contaminants from the Phase I and Phase II investigations. The boring number and depth where the maximum value was observed are shown. No data were included for ICP metals, arsenic, and mercury in Horizon 2 because direct soil exposure below 10 ft is assumed to be negligible (see Volume VI-A).

2-Butoxyethanol, shown in Table SPSA-3c-1, is excluded from consideration in the exposure analysis for this site because it was considered a laboratory contaminant in the samples analyzed. Table SPSA-3c-2 summarizes the maximum concentrations detected in groundwater together with the well number, location, sampling interval, and depth to groundwater.

2.15.3 Site Exposure Summary

Tables SPSA-3c-3 through SPSA-3c-7 present Draft PPLVs, EIs, and VEIs for each site contaminant. Since the depth to groundwater below Site SPSA-3c is greater than 10 ft, the enclosed space vapor inhalation SPPPLV is included in the calculation of the cumulative quantity. The COCs are summarized below for each exposed population and with the critical exposure pathway identified.

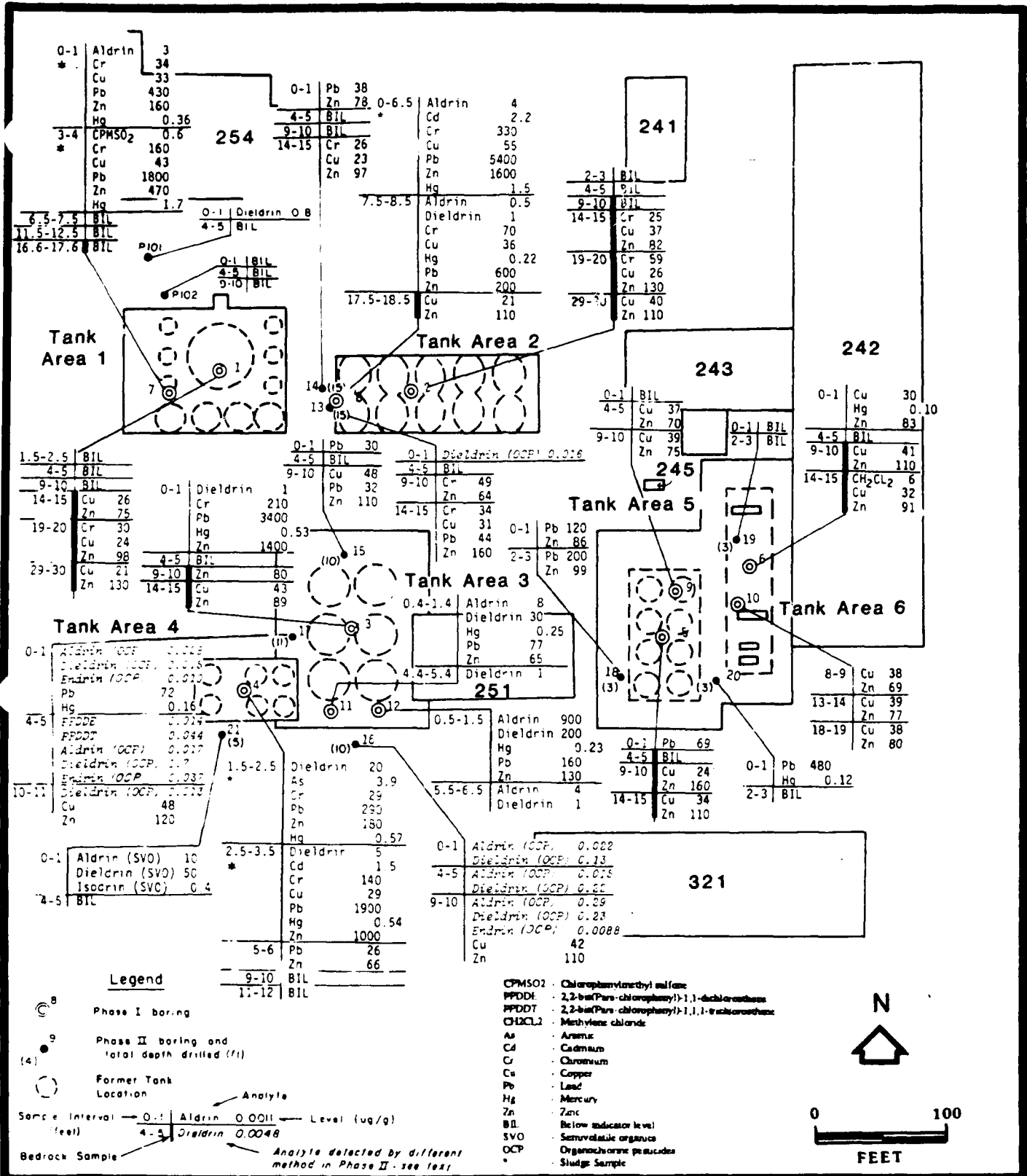
Contaminants of Concern	Regulated Visitor	Casual Visitor	Recreational Visitor	Commercial Worker	Industrial Worker
Aldrin	Direct	Direct	Direct	Dir/Ind	Dir/Ind
Dieldrin	Direct	Direct	Direct	Dir/Ind	Dir/Ind
Chromium	Direct	Direct	Direct	Direct	Direct
Lead	Direct	Direct	Direct	Direct	Direct
Methylene chloride	--	--	--	Indirect	Indirect
Cadmium	--	--	--	--	Direct

Note: Direct exposure pathways for soils include soil ingestion, suspended particulate inhalation, and dermal contact.
 Indirect exposure pathways include open and enclosed space vapor inhalation.

The results of the soil exposure summary indicate that exposure to contamination from the direct and indirect pathways both contribute to the exceedance of the cumulative PPLVs. Site SPSA-3c is designated as a Priority 1 site, based on the most sensitive exposed population PPLV (i.e., the industrial worker).

The following groundwater contaminants result in an unacceptable exposure due to vapor inhalation as indicated by a VEI value greater than 1:

- Carbon tetrachloride (enclosed)
- Dicyclopentadiene (enclosed)



Prepared for:
 Program Managers Office for
 Rocky Mountain Arsenal Cleanup
 Aberdeen Proving Ground, Maryland

FIGURE SPSA-3c-1
 Phase I and Phase II Analytes Detected
 Within or Above Indicator Levels
 Rocky Mountain Arsenal
 Prepared by Ebasco Services Incorporated

TABLE SA-3c-1
SOIL CONTAMINANT CONCENTRATIONS
FOR SITE SPSA-3c

Contaminant	Horizon 1			Horizon 2		
	Max. (ug/g)	Depth (ft)	Boring Number	Max. (ug/g)	Depth (ft)	Boring Number
Aldrin	900	0.5-1.5	12	900	0.5-1.5	12
2-Butoxyethanol ^{1/}	1.0	0-1	3	1.0	0-1	3
Chlorophenylmethyl sulfone	0.6	3-4	7	0.6	3-4	7
PPDDE ^{2/}	0.014	4-5	17	0.014	4-5	17
PPDDT ^{3/}	0.044	4-5	17	0.044	4-5	17
Dieldrin	200	0.5-1.5	12	200	0.5-1.5	12
Endrin	0.037	4-5	17	0.037	4-5	17
Isodrin	0.4	0-1	21	0.4	0-1	21
Methylene chloride	--	--	--	6	14-15	6
Cadmium	2.2	0-6.5	8	--	--	--
Chromium	330	0-6.5	8	--	--	--
Copper	55	0-6.5	8	--	--	--
Lead	5400	0-6.5	8	--	--	--
Mercury	1.7	3-4	7	--	--	--
Zinc	1600	0-6.5	8	--	--	--

1/ Suspected laboratory contaminant.
2/ PPDDE 2,2-bis(Para-chlorophenyl)-1,1-dichloroethane
3/ PPDDT 2,2-bis(Para-chlorophenyl)-1,1,1-trichloroethane

SPSA South Plants Study Area
Max. Maximum
ug/g microgram per gram
ft foot/feet

REA4/TBL0081.REA VI-G 9/12/90 9:11 am sma

LISTE

Feet
/L)
S

TABLE SPSA-3c-2

GROUNDWATER CONTAMINANT CONCENTRATIONS (UG/L)
FOR SITE SPSA-3c

AVERAGE SITE DEPTH TO GROUNDWATER: 31 Feet

CHEMICAL	CONCENTRATION MAXIMUM	LOCATION (WELL NUMBER)	SAMPLE DATE
TRICHLOROETHYLENE	3.4	02005	12/12/88

EACH VALUE PRESENTED IS THE MAXIMUM CONCENTRATION FOR THE LISTED ANALYTE
FOR THE PERIOD March 17, 1987 TO February 28, 1989.
DATA SOURCE: DP ASSOCIATES, RMA Database, July 19, 1990

SPSA-3c-3
EXPOSURE EVALUATIONS FOR REGULATED VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI OPN
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	
ALDRIN	1.5E+00	1.0E+06	1.5E+00	6.0E+02*	3.6E-03a	6.0E+02*	0.0E+00
ATRAZINE	4.1E+04	0.0E+00	4.1E+04	0.0E+00	0.0E+00	0.0E+00	2.3E-14
BENZOTHIAZOLE	3.9E+04	0.0E+00	3.9E+04	0.0E+00	0.0E+00	0.0E+00	1.6E-09
CARBON TETRACHLORIDE	2.0E+02	0.0E+00	2.0E+02	0.0E+00	0.0E+00	0.0E+00	1.6E-04
CHLOROFORM	4.0E+03	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	6.5E-06
CHLOROPHENYLMETHYL SULFIDE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	1.8E-09
CHLOROPHENYLMETHYL SULFONE	1.6E+05	8.7E+06	1.6E+05	3.7E-06	6.9E-08	3.7E-06	0.0E+00
PPDE	7.4E+01	1.5E+07	7.4E+01	1.9E-04	9.2E-10	1.9E-04	0.0E+00
PPDDT	7.4E+01	3.2E+07	7.4E+01	6.0E-04	1.4E-09	6.0E-04	0.0E+00
DIBROMOCHLOROPROPANE	1.8E+01	0.0E+00	1.8E+01	0.0E+00	0.0E+00	0.0E+00	1.8E-06
DICYCLOPENTADIENE	5.4E+04	0.0E+00	5.4E+04	0.0E+00	0.0E+00	0.0E+00	7.9E-04
DIELDRIN	1.6E+00	1.0E+06	1.6E+00	1.3E+02*	1.7E-03a	1.3E+02*	0.0E+00
ISOPROPYL METHYL PHOSPHONATE	2.5E+06	0.0E+00	2.5E+06	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENDRIN	2.5E+03	9.3E+07	2.5E+03	1.5E-05	4.0E-10	1.5E-05	2.4E-12
HEXACHLOROCYCLOPENTADIENE	1.7E+04	0.0E+00	1.7E+04	0.0E+00	0.0E+00	0.0E+00	6.0E-07
ISODRIN	5.8E+02	1.8E+07	5.8E+02	6.9E-04	2.2E-08	6.9E-04	6.6E-09
MALATHION	1.7E+05	0.0E+00	1.7E+05	0.0E+00	0.0E+00	0.0E+00	2.0E-14
METHYLENE CHLORIDE	3.3E+03	4.1E+04	3.0E+03	0.0E+00	1.5E-04	1.5E-04	0.0E+00
PARATHION	5.0E+04	0.0E+00	5.0E+04	0.0E+00	0.0E+00	0.0E+00	6.9E-13
TETRACHLOROETHYLENE	5.1E+02	0.0E+00	5.1E+02	0.0E+00	0.0E+00	0.0E+00	9.6E-06
TOLUENE	2.5E+06	0.0E+00	2.5E+06	0.0E+00	0.0E+00	0.0E+00	7.0E-10
TRICHLOROETHYLENE	2.3E+03	0.0E+00	2.3E+03	0.0E+00	0.0E+00	0.0E+00	1.9E-06
CADMIUM	4.5E+02	0.0E+00	4.5E+02	4.9E-03	0.0E+00	4.9E-03	0.0E+00
CHROMIUM	6.9E+01	0.0E+00	6.9E+01	4.8E+00*	0.0E+00	4.8E+00*	0.0E+00
COPPER	4.2E+05	0.0E+00	4.2E+05	1.3E-04	0.0E+00	1.3E-04	0.0E+00
LEAD	1.5E+04	0.0E+00	1.5E+04	3.5E-01*	0.0E+00	3.5E-01*	0.0E+00
MERCURY	3.3E+03	0.0E+00	3.3E+03	5.1E-04	0.0E+00	5.1E-04	0.0E+00
ZINC	2.0E+06	0.0E+00	2.0E+06	8.1E-04	0.0E+00	8.1E-04	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPLV for this contaminant is considered to be equal to pure compound. The SPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-3c-4
EXPOSURE EVALUATIONS FOR CASUAL VISITORS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI OPN
ALDRIN	1.5E+00	1.0E+06	1.5E+00	6.0E+02*	3.6E-03a	6.0E+02*	0.0E+00
ATRAZINE	4.1E+04	0.0E+00	4.1E+04	0.0E+00	0.0E+00	0.0E+00	2.3E-14
BENZOTHAZOLE	3.9E+04	0.0E+00	3.9E+04	0.0E+00	0.0E+00	0.0E+00	1.6E-09
CARBON TETRACHLORIDE	2.0E+02	0.0E+00	2.0E+02	0.0E+00	0.0E+00	0.0E+00	1.6E-04
CHLOROFORM	4.0E+03	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	6.5E-06
CHLOROPHENYLMETHYL SULFIDE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	1.8E-09
CHLOROPHENYLMETHYL SULFONE	1.6E+05	8.7E+06	1.6E+05	3.7E-06	6.9E-08	3.7E-06	0.0E+00
PPDDE	7.4E+01	1.5E+07	7.4E+01	1.9E-04	9.2E-10	1.9E-04	0.0E+00
PPDDT	7.4E+01	3.2E+07	7.4E+01	6.0E-04	1.4E-09	6.0E-04	0.0E+00
DIBROMOCHLOROPROPANE	1.8E+01	0.0E+00	1.8E+01	0.0E+00	0.0E+00	0.0E+00	1.8E-06
DICYCLOPENTADIENE	5.4E+04	0.0E+00	5.4E+04	0.0E+00	0.0E+00	0.0E+00	7.9E-04
DIELDRIN	1.6E+00	1.0E+06	1.6E+00	1.3E+02*	1.7E-03a	1.3E+02*	0.0E+00
ISOPROPYL METHYL PHOSPHONATE	2.5E+06	0.0E+00	2.5E+06	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENDRIN	2.5E+03	9.3E+07	2.5E+03	1.5E-05	4.0E-10	1.5E-05	2.4E-12
HEXACHLOROCYCLOPENTADIENE	1.7E+04	0.0E+00	1.7E+04	0.0E+00	0.0E+00	0.0E+00	6.0E-07
ISODRIN	5.8E+02	1.8E+07	5.8E+02	6.9E-04	2.2E-08	6.9E-04	6.6E-09
MALATHION	1.7E+05	0.0E+00	1.7E+05	0.0E+00	0.0E+00	0.0E+00	2.0E-14
METHYLENE CHLORIDE	3.3E+03	4.1E+04	3.0E+03	0.0E+00	1.5E-04	1.5E-04	0.0E+00
PARATHION	5.0E+04	0.0E+00	5.0E+04	0.0E+00	0.0E+00	0.0E+00	6.9E-13
TETRACHLOROETHYLENE	5.1E+02	0.0E+00	5.1E+02	0.0E+00	0.0E+00	0.0E+00	9.6E-06
TOLUENE	2.5E+06	0.0E+00	2.5E+06	0.0E+00	0.0E+00	0.0E+00	7.0E-10
TRICHLOROETHYLENE	2.3E+03	0.0E+00	2.3E+03	0.0E+00	0.0E+00	0.0E+00	1.9E-06
CADMIUM	4.5E+02	0.0E+00	4.5E+02	4.9E-03	0.7E+00	4.9E-03	0.0E+00
CHROMIUM	6.9E+01	0.0E+00	6.9E+01	4.8E+00*	0.0E+00	4.8E+00*	0.0E+00
COPPER	4.2E+05	0.0E+00	4.2E+05	1.3E-04	0.0E+00	1.3E-04	0.0E+00
LEAD	1.5E+04	0.0E+00	1.5E+04	3.5E-01*	0.0E+00	3.5E-01*	0.0E+00
MERCURY	3.3E+03	0.0E+00	3.3E+03	5.1E-04	0.0E+00	5.1E-04	0.0E+00
ZINC	2.0E+06	0.0E+00	2.0E+06	8.1E-04	0.0E+00	8.1E-04	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPLV for this contaminant is considered to be equal to pure compound. The SPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-3c-5
EXPOSURE EVALUATIONS FOR RECREATIONAL VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI OPN
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	
ALDRIN	2.1E-01	1.0E+06	2.1E-01	4.3E+03*	5.4E-02a	4.3E+03*	0.0E+00
ATRAZINE	1.8E+04	0.0E+00	1.8E+04	0.0E+00	0.0E+00	0.0E+00	1.5E-13
BENZOTHAZOLE	1.7E+04	0.0E+00	1.7E+04	0.0E+00	0.0E+00	0.0E+00	1.0E-08
CARBON TETRACHLORIDE	2.7E+01	0.0E+00	2.7E+01	0.0E+00	0.0E+00	0.0E+00	2.5E-03
CHLOROFORM	5.6E+02	0.0E+00	5.6E+02	0.0E+00	0.0E+00	0.0E+00	9.8E-05
CHLOROPHENYLMETHYL SULFIDE	7.0E+04	0.0E+00	7.0E+04	0.0E+00	0.0E+00	0.0E+00	1.2E-08
CHLOROPHENYLMETHYL SULFONE	7.0E+04	4.3E+06	6.9E+04	8.6E-06	1.4E-07	8.8E-06	0.0E+00
PPDDE	1.0E+01	1.0E+06	1.0E+01	1.4E-03	1.4E-08	1.4E-03	0.0E+00
PPDDT	1.0E+01	2.1E+06	1.0E+01	4.3E-03	2.1E-08	4.3E-03	0.0E+00
DIBROMOCHLOROPROPANE	2.5E+00	0.0E+00	2.5E+00	0.0E+00	0.0E+00	0.0E+00	2.7E-05
DICYCLOPENTADIENE	1.8E+04	0.0E+00	1.8E+04	0.0E+00	0.0E+00	0.0E+00	5.1E-03
DIELDRIN	2.2E-01	1.0E+06	2.2E-01	9.2E+02*	2.6E-02a	9.2E+02*	0.0E+00
ISOPROPYL METHYL PHOSPHONATE	1.1E+06	0.0E+00	1.1E+06	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENDRIN	1.1E+03	1.4E+07	1.1E+03	3.5E-05	2.6E-09	3.5E-05	1.6E-11
HEXACHLOROCCYCLOPENTADIENE	5.7E+03	0.0E+00	5.7E+03	0.0E+00	0.0E+00	0.0E+00	3.9E-06
ISODRIN	2.5E+02	2.8E+06	2.5E+02	1.6E-03	1.4E-07	1.6E-03	4.3E-08
MALATHION	7.0E+04	0.0E+00	7.0E+04	0.0E+00	0.0E+00	0.0E+00	1.3E-13
METHYLENE CHLORIDE	4.5E+02	6.3E+03	4.2E+02	0.0E+00	9.5E-04	9.5E-04	0.0E+00
PARATHION	2.1E+04	0.0E+00	2.1E+04	0.0E+00	0.0E+00	0.0E+00	4.5E-12
TETRACHLOROETHYLENE	7.1E+01	0.0E+00	7.1E+01	0.0E+00	0.0E+00	0.0E+00	1.5E-04
TOLUENE	1.1E+06	0.0E+00	1.1E+06	0.0E+00	0.0E+00	0.0E+00	4.5E-09
TRICHLOROETHYLENE	3.2E+02	0.0E+00	3.2E+02	0.0E+00	0.0E+00	0.0E+00	2.9E-05
CADMIUM	5.8E+01	0.0E+00	5.8E+01	3.8E-02	0.0E+00	3.8E-02	0.0E+00
CHROMIUM	8.8E+00	0.0E+00	8.8E+00	3.7E+01*	0.0E+00	3.7E+01*	0.0E+00
COPPER	2.5E+05	0.0E+00	2.5E+05	2.2E-04	0.0E+00	2.2E-04	0.0E+00
LEAD	9.2E+03	0.0E+00	9.2E+03	5.8E-01*	0.0E+00	5.8E-01*	0.0E+00
MERCURY	2.0E+03	0.0E+00	2.0E+03	8.6E-04	0.0E+00	8.6E-04	0.0E+00
ZINC	1.1E+06	0.0E+00	1.1E+06	1.5E-03	0.0E+00	1.5E-03	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPPLV for this contaminant is considered to be equal to pure compound. The SPPPLV has therefore been set to 1.00E+06 mg/kg (See volume V1-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-3c-6
EXPOSURE EVALUATIONS FOR COMMERCIAL WORKERS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VE1 ENC
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI EI	EI EI	EI EI	
ALDRIN	1.9E+00	1.3E+02	1.9E+00	4.8E+02*	7.1E+00*	4.8E+02*	0.0E+00
ATRAZINE	2.3E+04	0.0E+00	2.3E+04	0.0E+00	0.0E+00	0.0E+00	2.2E-10
BENZOTHAZOLE	2.2E+04	0.0E+00	2.2E+04	0.0E+00	0.0E+00	0.0E+00	1.5E-05
CARBON TETRACHLORIDE	2.5E+02	0.0E+00	2.5E+02	0.0E+00	0.0E+00	0.0E+00	5.2E-01
CHLOROFORM	5.1E+03	0.0E+00	5.1E+03	0.0E+00	0.0E+00	0.0E+00	2.1E-02
CHLOROPHENYLMETHYL SULFIDE	9.1E+04	0.0E+00	9.1E+04	0.0E+00	0.0E+00	0.0E+00	1.7E-05
CHLOROPHENYLMETHYL SULFONE	9.1E+04	1.9E+04	1.6E+04	6.6E-06	3.2E-05	3.8E-05	0.0E+00
PPDE	9.3E+01	1.9E+01	1.6E+01	1.5E-04	7.2E-04	8.7E-04	0.0E+00
PPDDT	9.3E+01	1.9E+01	1.6E+01	4.7E-04	2.3E-03	2.7E-03	0.0E+00
DIBROMOCHLOROPROPANE	2.3E+01	0.0E+00	2.3E+01	0.0E+00	0.0E+00	0.0E+00	5.6E-03
DICYCLOPENTADIENE	1.7E+04	0.0E+00	1.7E+04	0.0E+00	0.0E+00	0.0E+00	7.5E+00
DIELDRIN	2.0E+00	5.8E+01	1.9E+00	1.0E+02*	3.5E+00*	1.0E+02*	0.0E+00
ISOPROPYL METHYL PHOSPHONATE	1.4E+06	0.0E+00	1.4E+06	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENDRIN	1.4E+03	1.6E+04	1.3E+03	2.7E-05	2.4E-06	2.9E-05	2.3E-08
HEXACHLOROCYCLOPENTADIENE	5.5E+03	0.0E+00	5.5E+03	0.0E+00	0.0E+00	0.0E+00	5.7E-03
ISODRIN	3.2E+02	6.7E+01	5.5E+01	1.2E-03	6.0E-03	7.2E-03	6.3E-05
MALATHION	9.2E+04	0.0E+00	9.2E+04	0.0E+00	0.0E+00	0.0E+00	1.9E-10
METHYLENE CHLORIDE	4.1E+03	6.8E+00	6.8E+00	0.0E+00	8.8E-01*	8.8E-01*	0.0E+00
PARATHION	2.7E+04	0.0E+00	2.7E+04	0.0E+00	0.0E+00	0.0E+00	6.6E-09
TETRACHLOROETHYLENE	6.5E+02	0.0E+00	6.5E+02	0.0E+00	0.0E+00	0.0E+00	3.0E-02
TOLUENE	1.4E+06	0.0E+00	1.4E+06	0.0E+00	0.0E+00	0.0E+00	6.6E-06
TRICHLOROETHYLENE	2.9E+03	0.0E+00	2.9E+03	0.0E+00	0.0E+00	0.0E+00	6.1E-03
CADMIUM	3.6E+02	0.0E+00	3.6E+02	6.1E-03	0.0E+00	6.1E-03	0.0E+00
CHROMIUM	5.5E+01	0.0E+00	5.5E+01	6.0E+00*	0.0E+00	6.0E+00*	0.0E+00
COPPER	1.8E+05	0.0E+00	1.8E+05	3.1E-04	0.0E+00	3.1E-04	0.0E+00
LEAD	6.5E+03	0.0E+00	6.5E+03	8.3E-01*	0.0E+00	8.3E-01*	0.0E+00
MERCURY	1.4E+03	0.0E+00	1.4E+03	1.2E-03	0.0E+00	1.2E-03	0.0E+00
ZINC	7.8E+05	0.0E+00	7.8E+05	2.0E-03	0.0E+00	2.0E-03	0.0E+00

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA 3c-7
EXPOSURE EVALUATIONS FOR INDUSTRIAL WORKERS

CONTAMINANT	DIRECT	INDIRECT		CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI	
	PPLV (mg/kg)	OSVI (mg/kg)	ESVI (mg/kg)	PPLV (mg/kg)	EI	EI	EI	OPN	ENC
ALDRIN	1.2E-01	3.4E+04	4.2E+01	1.2E-01	7.7E+03*	2.1E+01*	7.8E+03*	0.0E+00	0.0E+00
ATRAZINE	4.2E+03	0.0E+00	0.0E+00	4.2E+03	0.0E+00	0.0E+00	0.0E+00	1.7E-13	2.2E-10
BENZOTHAZOLE	4.0E+03	0.0E+00	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	1.2E-08	1.5E-05
CARBON TETRACHLORIDE	1.5E+01	0.0E+00	0.0E+00	1.5E+01	0.0E+00	0.0E+00	0.0E+00	1.2E-03	1.5E+00
CHLOROFORM	3.1E+02	0.0E+00	0.0E+00	3.1E+02	0.0E+00	0.0E+00	0.0E+00	4.9E-05	6.2E-02
CHLOROPHENYLMETHYL SULFIDE	1.7E+04	0.0E+00	0.0E+00	1.7E+04	0.0E+00	0.0E+00	0.0E+00	1.4E-08	1.7E-05
CHLOROPHENYLMETHYL SULFONE	1.7E+04	1.2E+06	5.7E+04	1.3E+04	3.6E-05	1.1E-05	4.7E-05	0.0E+00	0.0E+00
PPDDE	5.7E+00	2.0E+06	1.9E+01	4.4E+00	2.4E-03	7.2E-04	3.2E-03	0.0E+00	0.0E+00
PPDDT	5.7E+00	4.3E+06	1.9E+01	4.4E+00	7.7E-03	2.3E-03	1.0E-02	0.0E+00	0.0E+00
DIBROMOCHLOROPROPANE	1.4E+00	0.0E+00	0.0E+00	1.4E+00	0.0E+00	0.0E+00	0.0E+00	1.3E-05	1.7E-02
DICYCLOPENTADIENE	1.2E+03	0.0E+00	0.0E+00	1.2E+03	0.0E+00	0.0E+00	0.0E+00	5.9E-03	7.5E+00
DIELDRIN	1.2E-01	1.5E+04	1.9E+01	1.2E-01	1.6E+03*	1.0E+01*	1.6E+03*	0.0E+00	0.0E+00
ISOPROPYL METHYL PHOSPHONATE	2.5E+05	0.0E+00	0.0E+00	2.5E+05	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENDRIN	2.5E+02	1.2E+07	1.6E+04	2.5E+02	1.5E-04	2.4E-06	1.5E-04	1.8E-11	2.3E-08
HEXACHLOROCHLOROPENTADIENE	3.8E+02	0.0E+00	0.0E+00	3.8E+02	0.0E+00	0.0E+00	0.0E+00	4.5E-06	5.7E-03
ISODRIN	5.9E+01	2.4E+06	2.0E+02	4.6E+01	6.8E-03	2.0E-03	8.7E-03	5.0E-08	6.3E-05
MALATHION	1.7E+04	0.0E+00	0.0E+00	1.7E+04	0.0E+00	0.0E+00	0.0E+00	1.5E-13	1.9E-10
METHYLENE CHLORIDE	2.5E+02	5.4E+03	6.8E+00	6.6E+00	0.0E+00	8.8E-01*	8.8E-01*	0.0E+00	0.0E+00
PARATHION	5.1E+03	0.0E+00	0.0E+00	5.1E+03	0.0E+00	0.0E+00	0.0E+00	5.2E-12	6.6E-09
TFTRACHLOROETHYLENE	4.1E+01	0.0E+00	0.0E+00	4.1E+01	0.0E+00	0.0E+00	0.0E+00	7.2E-05	9.1E-02
ENE	2.6E+05	0.0E+00	0.0E+00	2.6E+05	0.0E+00	0.0E+00	0.0E+00	5.2E-09	6.6E-06
1,1-DICHLOROETHYLENE	1.8E+02	0.0E+00	0.0E+00	1.8E+02	0.0E+00	0.0E+00	0.0E+00	1.4E-05	1.8E-02
CADMIUM	7.6E+00	0.0E+00	0.0E+00	7.6E+00	2.9E-01*	0.0E+00	2.9E-01*	0.0E+00	0.0E+00
CHROMIUM	1.1E+00	0.0E+00	0.0E+00	1.1E+00	2.9E+02*	0.0E+00	2.9E+02*	0.0E+00	0.0E+00
COPPER	5.7E+04	0.0E+00	0.0E+00	5.7E+04	9.6E-04	0.0E+00	9.6E-04	0.0E+00	0.0E+00
LEAD	2.2E+03	0.0E+00	0.0E+00	2.2E+03	2.5E+00*	0.0E+00	2.5E+00*	0.0E+00	0.0E+00
MERCURY	4.6E+02	0.0E+00	0.0E+00	4.6E+02	3.7E-03	0.0E+00	3.7E-03	0.0E+00	0.0E+00
ZINC	1.4E+05	0.0E+00	0.0E+00	1.4E+05	1.1E-02	0.0E+00	1.1E-02	0.0E+00	0.0E+00

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

2.16 SITE SPSA-3d: REVETTED TANK STORAGE AREA (formerly Site 2-12: Revetted Tank Storage Area; EBASCO, 1987g/RIC 87006R20 and EBASCO, 1988l/RIC 87006R20A)

2.16.1 Site-Specific Considerations

Figure SPSA-3d-1 and Tables SPSA-3d-1 and SPSA-3d-2 depict the target contaminants for Site SPSA-3d. Borings 1 through 4, 4B, 5, 6, 6B, 7, 7B, 8, 8B, 9, 9B, C5, and C8 were included in this exposure assessment, consistent with the South Plants SAR. This site was used to store diesel fuel and fuel oil for the chlorine plant. Therefore, chemicals from the RMA target contaminant list that are associated with these activities were suspected to be present in Site SPSA-3d (EBASCO, 1987g/RIC 87006R20).

2.16.2 Spatial Distribution of Measured Contaminant Concentrations

The locations and concentrations of the target contaminants that were detected in Site SPSA-3d are shown in Figure SPSA-3d-1. Table SPSA-3d-1 summarizes the maximum concentrations of contaminants measured in soil above indicator levels for the ICP metals, arsenic, and mercury and CRLs for organic contaminants from the Phase I and Phase II investigations. The boring number and depth where the maximum value was observed are shown. No data were included for ICP metals, arsenic, and mercury in Horizon 2 because direct soil exposure below 10 ft is assumed to be negligible (see Volume VI-A). Table SPSA-3d-2 summarizes the maximum concentrations detected in groundwater together with the well number, location, sampling interval, and depth to groundwater.

2.16.3 Site Exposure Summary

Tables SPSA-3d-3 through SPSA-3d-7 present Draft PPLVs and EIs for each site contaminant. The COCs are summarized below for each exposed population and with the critical exposure pathway identified. The depth to groundwater below Site SPSA-3d is less than 10 ft, therefore, the enclosed space vapor inhalation exposure pathway is not included in the calculation of the cumulative quantities.

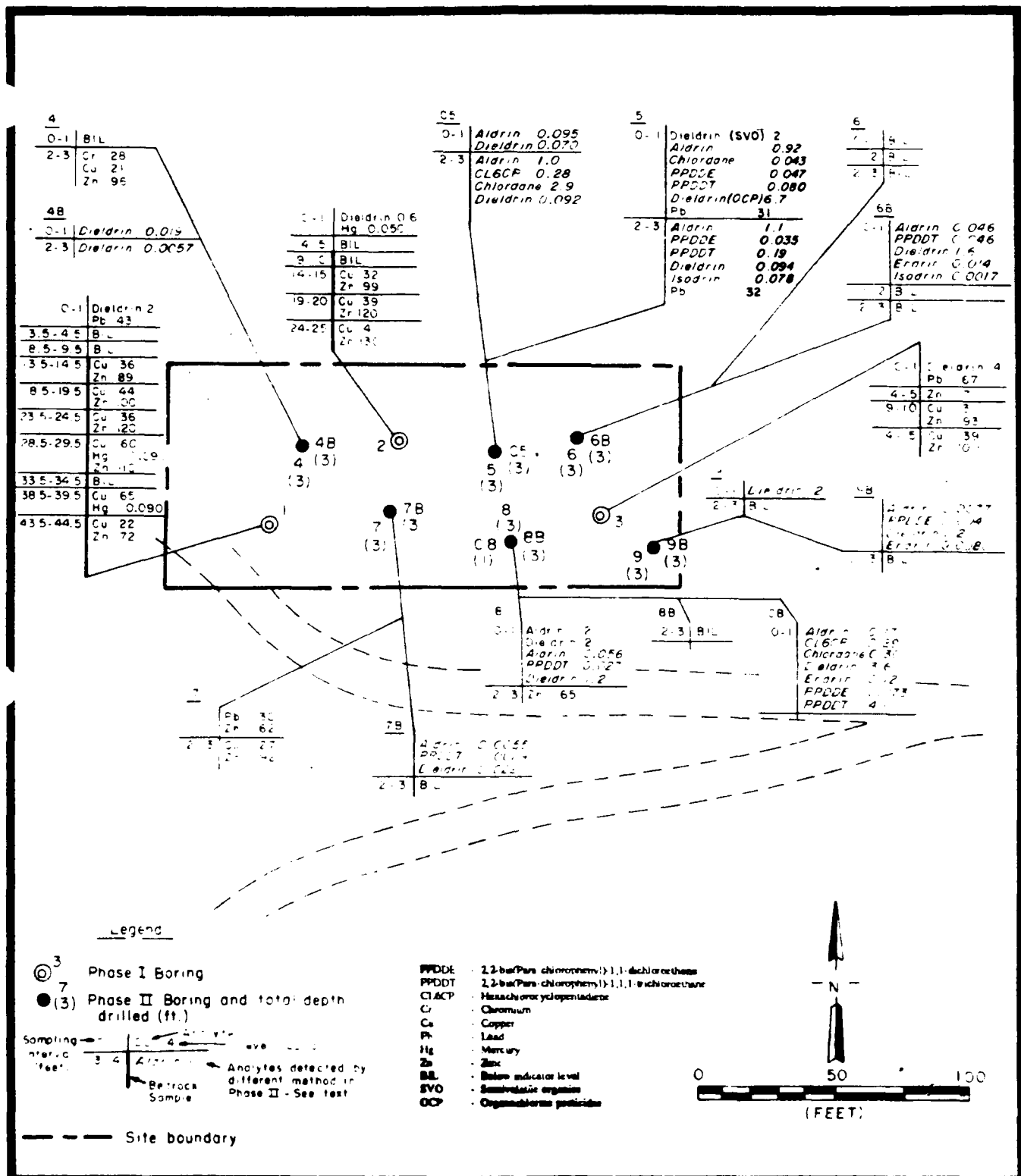
Contaminants of Concern	Regulated Visitor	Casual Visitor	Recreational Visitor	Commercial Worker	Industrial Worker
Aldrin	Direct	Direct	Direct	Dir/Ind	Dir/Ind
Chlordane	Direct	Direct	Direct	Direct	Dir/Ind
Dieldrin	Direct	Direct	Direct	Dir/Ind	Dir/Ind
PPDDT	--	--	Direct	Indirect	Dir/Ind

Note: Direct exposure pathways for soils include soil ingestion, suspended particulate inhalation, and dermal contact.
 Indirect exposure pathways include open and enclosed space vapor inhalation.

The results of the soil exposure summary indicate that exposure to contamination from the direct and indirect pathways both contribute to the exceedance of the cumulative PPLVs. Site SPSA-3d is designated as a Priority 1 site, based on the most sensitive exposed population PPLV (i.e., the industrial worker).

The following groundwater contaminants result in an unacceptable exposure due to vapor inhalation as indicated by a VEI value greater than 1:

- Chloroform (enclosed)
- Dicyclopentadiene (enclosed)



Prepared for:

Program Manager's Office for
 Rocky Mountain Arsenal Cleanup
 Aberdeen Proving Ground, Maryland

FIGURE SPSA-3d-1

Phase I and Phase II Analytes Detected
 Within or Above Indicator Levels

Rocky Mountain Arsenal
 Prepared by Ebasco Services Incorporated

TABLE SPSA-3d-1
SOIL CONTAMINANT CONCENTRATIONS
FOR SITE SPSA-3d

Contaminant	Horizon 1			Horizon 2		
	Max. (ug/g)	Depth (ft)	Boring Number	Max. (ug/g)	Depth (ft)	Boring Number
Aldrin	2	0-1	8	2	0-1	8
Chlordane	2.9	2-3	C5	2.9	2-3	C5
PPDDE ^{1/}	0.073	0-1	C8	0.073	0-1	C8
PPDDT ^{2/}	4.0	0-1	C8	4.0	0-1	C8
Dieldrin	6.7	0-1	5	6.7	0-1	5
Endrin	0.12	0-1	C8	0.12	0-1	C8
Hexachlorocyclopentadiene	0.29	0-1	C8	0.29	0-1	C8
Isodrin	0.078	2-3	5	0.078	2-3	5
Lead	67	0-1	3	--	--	--
Zinc	96	2-3	4	--	--	--

1/ PPDDE 2,2-bis(Para-chlorophenyl)-1,1-dichloroethene
2/ PPDDT 2,2-bis(Para-chlorophenyl)-1,1,1-trichloroethane

SPSA South Plants Study Area
Max. Maximum
ug/g microgram per gram
ft foot/feet

TABLE SPSA-3d-2

GROUNDWATER CONTAMINANT CONCENTRATIONS (UG/L)
FOR SITE SPSA-3d

AVERAGE SITE DEPTH TO GROUNDWATER: 15 Feet

CHEMICAL	CONCENTRATION MAXIMUM	LOCATION (WELL NUMBER)	SAMPLE DATE
CHLOROFORM	250	02594	03/8/88
DICYCLOPENTADIENE	230	02594	03/8/88

EACH VALUE PRESENTED IS THE MAXIMUM CONCENTRATION FOR THE LISTED ANALYTE
FOR THE PERIOD March 17, 1987 TO February 28, 1989.
DATA SOURCE: DP ASSOCIATES, RMA Database, July 19, 1990

SPSA-3d-3
EXPOSURE EVALUATIONS FOR REGULATED VISITORS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI OPN
ALDRIN	1.5E+00	8.2E+05	1.5E+00	1.3E+00*	2.4E-06	1.3E+00*	0.0E+00
CHLORDANE	2.0E+01	8.9E+07	2.0E+01	1.5E-01*	3.3E-08	1.5E-01*	0.0E+00
CHLOROFORM	4.0E+03	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	1.6E-05
PPDDE	7.4E+01	5.0E+07	7.4E+01	9.9E-04	1.5E-09	9.9E-04	0.0E+00
PPDDT	7.4E+01	1.0E+08	7.4E+01	5.4E-02	3.8E-08	5.4E-02	0.0E+00
DICYCLOPENTADIENE	5.4E+04	0.0E+00	5.4E+04	0.0E+00	0.0E+00	0.0E+00	2.9E-04
DIELDRIN	1.6E+00	1.0E+06	1.6E+00	4.3E+00*	1.8E-05 ^a	4.3E+00*	0.0E+00
ENDRIN	2.5E+03	3.0E+08	2.5E+03	4.8E-05	4.0E-10	4.8E-05	0.0E+00
HEXACHLOROCYCLOPENTADIENE	1.7E+04	1.1E+04	6.7E+03	1.8E-05	2.6E-05	4.3E-05	0.0E+00
ISODRIN	5.8E+02	5.9E+07	5.8E+02	1.3E-04	1.3E-09	1.3E-04	0.0E+00
LEAD	1.5E+04	0.0E+00	1.5E+04	4.3E-03	0.0E+00	4.3E-03	0.0E+00
ZINC	2.0E+06	0.0E+00	2.0E+06	4.8E-05	0.0E+00	4.8E-05	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPLV for this contaminant is considered to be equal to pure compound. The SPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-3d-4
EXPOSURE EVALUATIONS FOR CASUAL VISITORS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI OPM
ALDRIN	1.5E+00	8.2E+05	1.5E+00	1.3E+00*	2.4E-06	1.3E+00*	0.0E+00
CHLORDANE	2.0E+01	8.9E+07	2.0E+01	1.5E-01*	3.3E-08	1.5E-01*	0.0E+00
CHLOROFORM	4.0E+03	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	1.6E-05
PPDDE	7.4E+01	5.0E+07	7.4E+01	9.9E-04	1.5E-09	9.9E-04	0.0E+00
PPDDT	7.4E+01	1.0E+08	7.4E+01	5.4E-02	3.8E-08	5.4E-02	0.0E+00
DICYCLOPENTADIENE	5.4E+04	0.0E+00	5.4E+04	0.0E+00	0.0E+00	0.0E+00	2.9E-04
DIELDRIN	1.6E+00	1.0E+06	1.6E+00	4.3E+00*	1.8E-05 ^a	4.3E+00*	0.0E+00
ENDRIN	2.5E+03	3.0E+08	2.5E+03	4.8E-05	4.0E-10	4.8E-05	0.0E+00
HEXACHLOROCYCLOPENTADIENE	1.7E+04	1.1E+04	6.7E+03	1.8E-05	2.6E-05	4.3E-05	0.0E+00
ISODRIN	5.8E+02	5.9E+07	5.8E+02	1.3E-04	1.3E-09	1.3E-04	0.0E+00
LEAD	1.5E+04	0.0E+00	1.5E+04	4.3E-03	0.0E+00	4.3E-03	0.0E+00
ZINC	2.0E+06	0.0E+00	2.0E+06	4.8E-05	0.0E+00	4.8E-05	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPPLV for this contaminant is considered to be equal to pure compound. The SPPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-3d-5

EXPOSURE EVALUATIONS FOR RECREATIONAL VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI EI	EI EI	EI EI	OPN
ALDRIN	2.1E-01	5.4E+04	2.1E-01	9.6E+00*	3.7E-05	9.6E+00*	0.0E+00
CHLORDANE	2.7E+00	5.9E+06	2.7E+00	1.1E+00*	4.9E-07	1.1E+00*	0.0E+00
CHLOROFORM	5.6E+02	0.0E+00	5.6E+02	0.0E+00	0.0E+00	0.0E+00	2.4E-04
PPDDE	1.0E+01	3.3E+06	1.0E+01	7.2E-03	2.2E-08	7.2E-03	0.0E+00
PPDDT	1.0E+01	6.9E+06	1.0E+01	3.9E-01*	5.8E-07	3.9E-01*	0.0E+00
DICYCLOPENTADIENE	1.8E+04	0.0E+00	1.8E+04	0.0E+00	0.0E+00	0.0E+00	1.9E-03
DIELDRIN	2.2E-01	1.0E+06	2.2E-01	3.1E+01*	2.7E-04 ^a	3.1E+01*	0.0E+00
ENDRIN	1.1E+03	4.7E+07	1.1E+03	1.1E-04	2.6E-09	1.1E-04	0.0E+00
HEXACHLOROCYCLOPENTADIENE	5.7E+03	4.1E+03	2.4E+03	5.1E-05	7.1E-05	1.2E-04	0.0E+00
ISODRIN	2.5E+02	9.2E+06	2.5E+02	3.2E-04	8.5E-09	3.2E-04	0.0E+00
LEAD	9.2E+03	0.0E+00	9.2E+03	7.3E-03	0.0E+00	7.3E-03	0.0E+00
ZINC	1.1E+06	0.0E+00	1.1E+06	9.1E-05	0.0E+00	9.1E-05	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPPLV for this contaminant is considered to be equal to pure compound. The SPPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-3d-6
EXPOSURE EVALUATIONS FOR COMMERCIAL WORKERS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI ENC
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	
ALDRIN	1.9E+00	4.0E-01	3.3E-01	1.1E+00*	5.1E+00*	6.1E+00*	0.0E+00
CHLORDANE	2.5E+01	1.4E+04	2.5E+01	1.2E-01*	2.1E-04	1.2E-01*	0.0E+00
CHLOROFORM	5.1E+03	0.0E+00	5.1E+03	0.0E+00	0.0E+00	0.0E+00	4.2E-01
PPDDE	9.3E+01	1.9E+01	1.6E+01	7.8E-04	3.8E-03	4.5E-03	0.0E+00
PPDDT	9.3E+01	1.9E+01	1.6E+01	4.3E-02	2.1E-01*	2.5E-01*	0.0E+00
DICYCLOPENTADIENE	1.7E+04	0.0E+00	1.7E+04	0.0E+00	0.0E+00	0.0E+00	2.3E+01
DIELDRIN	2.0E+00	5.8E+01	1.9E+00	3.4E+00*	1.2E-01*	3.5E+00*	0.0E+00
ENDRIN	1.4E+03	2.9E+02	2.4E+02	8.7E-05	4.2E-04	5.0E-04	0.0E+00
HEXACHLOROCYCLOPENTADIENE	5.5E+03	1.9E+01	1.9E+01	5.3E-05	1.5E-02	1.5E-02	0.0E+00
ISODRIN	3.2E+02	6.7E+01	5.5E+01	2.4E-04	1.2E-03	1.4E-03	0.0E+00
LEAD	6.5E+03	0.0E+00	6.5E+03	1.0E-02	0.0E+00	1.0E-02	0.0E+00
ZINC	7.8E+05	0.0E+00	7.8E+05	1.2E-04	0.0E+00	1.2E-04	0.0E+00

*: EI is equal to or exceeds 1.0E-01

SPSA-3d-7
EXPOSURE EVALUATIONS FOR INDUSTRIAL WORKERS

CONTAMINANT	DIRECT	INDIRECT		CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI	
	PPLV (mg/kg)	OSVI (mg/kg)	ESVI (mg/kg)	PPLV (mg/kg)	EI	EI	EI	OPN	ENC
ALDRIN	1.2E-01	1.1E+05	4.0E-01	9.0E-02	1.7E+01*	5.1E+00*	2.2E+01*	0.0E+00	0.0E+00
CHLORDANE	1.5E+00	1.2E+07	5.2E+00	1.2E+00	1.9E+00*	5.6E-01*	2.5E+00*	0.0E+00	0.0E+00
CHLOROFORM	3.1E+02	0.0E+00	0.0E+00	3.1E+02	0.0E+00	0.0E+00	0.0E+00	1.2E-04	1.3E+00
PPDDE	5.7E+00	6.6E+06	1.9E+01	4.4E+00	1.3E-02	3.8E-03	1.7E-02	0.0E+00	0.0E+00
PPDDT	5.7E+00	1.4E+07	1.9E+01	4.4E+00	7.0E-01*	2.1E-01*	9.0E-01*	0.0E+00	0.0E+00
DICYCLOPENTADIENE	1.2E+03	0.0E+00	0.0E+00	1.2E+03	0.0E+00	0.0E+00	0.0E+00	2.2E-03	2.3E+01
DIELDRIN	1.2E-01	5.0E+04	1.9E+01	1.2E-01	5.5E+01*	3.5E-01*	5.5E+01*	0.0E+00	0.0E+00
ENDRIN	2.5E+02	4.0E+07	8.6E+02	2.0E+02	4.7E-04	1.4E-04	6.1E-04	0.0E+00	0.0E+00
HEXACHLOROCYCLOPENTADIENE	3.8E+02	1.5E+03	5.8E+01	4.8E+01	7.6E-04	5.2E-03	6.0E-03	0.0E+00	0.0E+00
ISODRIN	5.9E+01	7.9E+06	2.0E+02	4.6E+01	1.3E-03	3.9E-04	1.7E-03	0.0E+00	0.0E+00
LEAD	2.2E+03	0.0E+00	0.0E+00	2.2E+03	3.1E-02	0.0E+00	3.1E-02	0.0E+00	0.0E+00
ZINC	1.4E+05	0.0E+00	0.0E+00	1.4E+05	6.9E-04	0.0E+00	6.9E-04	0.0E+00	0.0E+00

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

2.17 SITE SPSA-3e: BALANCE OF SPSA-3 (formerly Site 1-13/2-18: South Plants Manufacturing Complex/Shell Chemical Company Spill Sites; EBASCO, 1988y/RIC 88286R07; South Plants Regional Study Area/South Plants Manufacturing Complex; EBASCO, 1988z/RIC 88306R01)

2.17.1 Site-Specific Considerations

Figure SPSA-3e-1 and Tables SPSA-3e-1 and SPSA-3e-2 depict the target contaminants for Site SPSA-3e. Borings X101 and X102 from Site 2-18, and 22 through 29 from the South Plants Regional Study Area were included in this exposure assessment, consistent with the South Plants SAR. The historical search conducted under the contaminant assessment revealed that numerous spills and leaks of various chemicals were suspected to have occurred at Site SPSA-3e (EBASCO, 1988u/RIC 88286R07). Some of these chemicals were detected in the soil during the Phase I and Phase II investigations (EBASCO, 1988y/RIC 88286R07 and EBASCO, 1988z/RIC 88306R01).

2.17.2 Spatial Distribution of Measured Contaminant Concentrations

The locations and concentrations of the target contaminants that were detected in Site SPSA-3e are shown in Figure SPSA-3e-1. The following contaminants were not included in the figure since it was not considered a target contaminant during the Phase I and Phase II investigations: Methyl naphthalene, occurring in Boring 24 (0-1); fluoroanthene or pyrene, occurring in Boring X101 (0-1 ft). Although not shown in this figure, these nontarget compounds were included in the South Plants SAR and in this exposure assessment because they passed through the screening process performed in the RMA Chemical Index (EBASCO, 1988c/RIC 88357R01).

Table SPSA-3e-1 summarizes the maximum concentrations of contaminants measured in soil above indicator levels for the ICP metals, arsenic, and mercury and CRLs for organic contaminants from the Phase I and Phase II investigations. The boring number and depth where the maximum value was observed are shown. No data were included for ICP metals, arsenic, and mercury in Horizon 2 because direct soil exposure below 10 ft is assumed to be negligible (see Volume VI-A). Table SPSA-3e-2 summarizes the maximum concentrations detected in groundwater together with the well number, location, sampling interval, and depth to groundwater.

2.17.3 Site Exposure Summary

Tables SPSA-3e-3 through SPSA-3e-7 present Draft PPLVs, EIs, and VEIs for each site contaminant. Since the depth to groundwater below Site SPSA-3e is greater than 10 ft, the enclosed space vapor inhalation SPPPLV is included in the calculation of the cumulative quantity. The COCs are summarized below for each exposed population and with the critical exposure pathway identified.

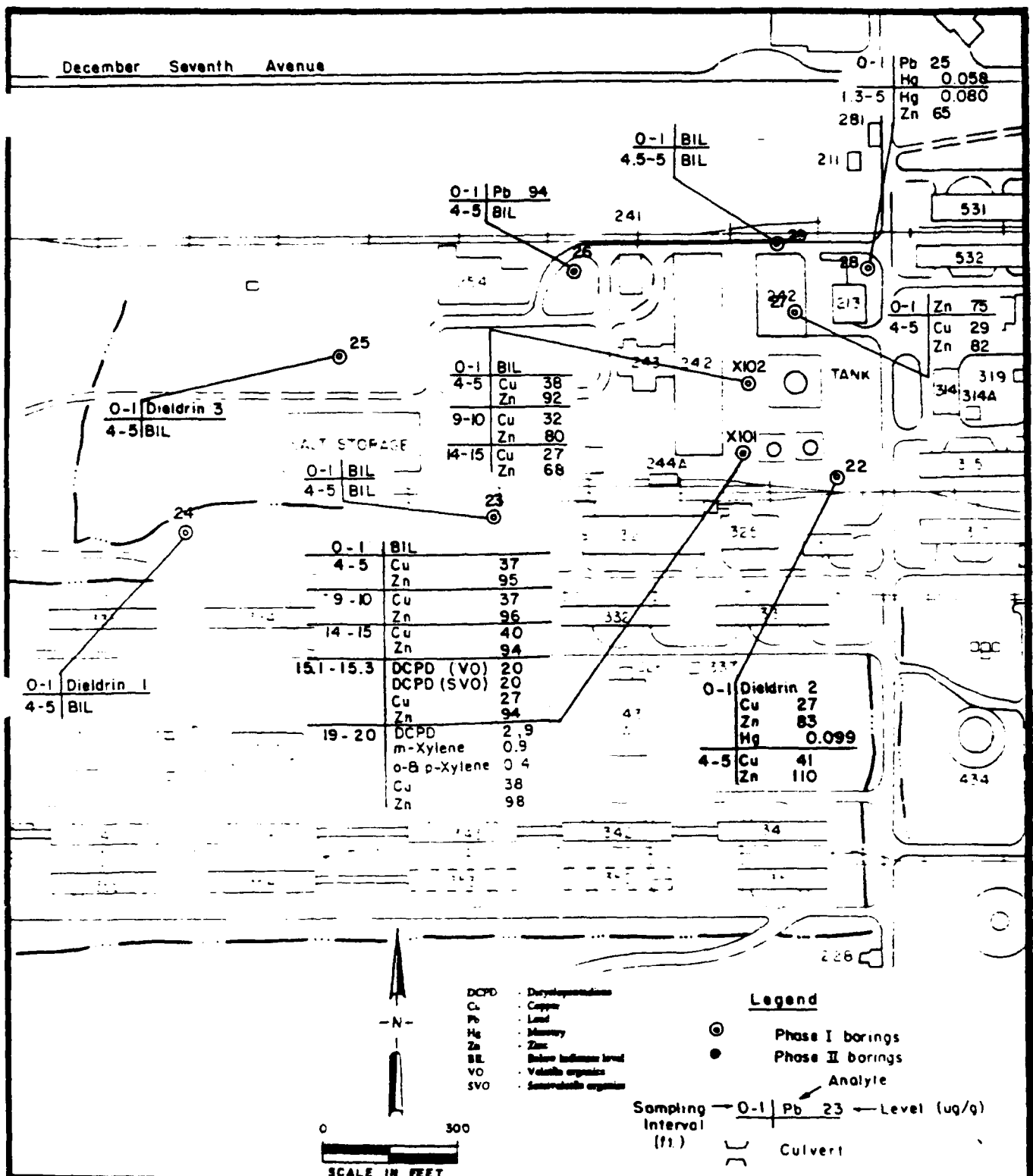
Contaminants of Concern	Regulated Visitor	Casual Visitor	Recreational Visitor	Commercial Worker	Industrial Worker
Dicyclopentadiene	Indirect	Indirect	Indirect	Indirect	Indirect
Dieldrin	Direct	Direct	Direct	Direct	Dir/Ind

Note: Direct exposure pathways for soils include soil ingestion, suspended particulate inhalation, and dermal contact.
Indirect exposure pathways include open and enclosed space vapor inhalation.

The results of the soil exposure summary indicate that exposure to contamination from the direct and indirect pathways both contribute to the exceedance of the cumulative PPLVs. Site SPSA-3e is designated as a Priority 1 site, based on the most sensitive exposed population PPLV (i.e., the industrial worker).

The following groundwater contaminants result in an unacceptable exposure due to vapor inhalation as indicated by a VEI value greater than 1:

- Benzene (enclosed)
- Carbon tetrachloride (enclosed)
- Dicyclopentadiene (enclosed)



Prepared for:
 Program Manager's Office for
 Rocky Mountain Arsenal Cleanup
 Aberdeen Proving Ground, Maryland

FIGURE SPSA-3e-1
 Phase I and Phase II Analytes Detected
 Within or Above Indicator Levels

Rocky Mountain Arsenal
 Prepared by: Ebasco Services Incorporated

TABLE SPSA-3e-1
SOIL CONTAMINANT CONCENTRATIONS
FOR SITE SPSA-3e

Contaminant	Horizon 1			Horizon 2		
	Max. (ug/g)	Depth (ft)	Boring Number	Max. (ug/g)	Depth (ft)	Boring Number
Dieldrin	3	0-1	25	3	0-1	25
Dicyclopentadiene	--	--	--	20	15.1-15.3	X101
Fluoranthene ^{1/}	3.0	0-1	24	3.0	0-1	24
Methyl naphthalene ^{1/}	0.5	0-1	24	0.5	0-1	24
Pyrene ^{1/}	3.0	0-1	24	3.0	0-1	24
m-Xylene	--	--	--	0.9	19-20	X101
o,p-Xylene	--	--	--	0.4	19-20	X101
Copper	41	4-5	22	--	--	--
Lead	94	0-1	26	--	--	--
Zinc	110	4-5	22	--	--	--

1/ Nontarget contaminant. Refer to the exposure assessment nontarget screen in Appendix A.

SPSA
Max.
ug/g
ft

South Plants Study Area
Maximum
microgram per gram
foot/foot

TABLE SPSA-3e-2

GROUNDWATER CONTAMINANT CONCENTRATIONS (UG/L)
FOR SITE SPSA-3e

AVERAGE SITE DEPTH TO GROUNDWATER: 21 Feet

CHEMICAL	CONCENTRATION MAXIMUM	LOCATION (WELL NUMBER)	SAMPLE DATE
1,2-DICHLOROETHYLENE	3.4	02543	02/10/88
BENZENE	1100	02544	03/8/88
CARBON TETRACHLORIDE	39	02543	02/10/88
CHLOROFORM	250	02594	03/8/88
CHLOROPHENYLMETHYL SULFONE	6.7	02006	01/12/88
DICYCLOPENTADIENE	230	02594	03/8/88
DITHIANE	3.6	02006	01/12/88
DIELDRIN	0.052	02006	01/12/88
1,4-OXATHIANE	3.2	02006	01/12/88
TETRACHLOROETHYLENE	65	02543	02/10/88
TRICHLOROETHYLENE	11	02543	02/10/88

EACH VALUE PRESENTED IS THE MAXIMUM CONCENTRATION FOR THE LISTED ANALYTE
FOR THE PERIOD March 17, 1987 TO February 28, 1989.

DATA SOURCE: DP ASSOCIATES, RMA Database, July 19, 1990

SPSA-3e-3
EXPOSURE EVALUATIONS FOR REGULATED VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI OPN
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	
BENZENE	8.6E+02	0.0E+00	8.6E+02	0.0E+00	0.0E+00	0.0E+00	1.1E-02
CARBON TETRACHLORIDE	2.0E+02	0.0E+00	2.0E+02	0.0E+00	0.0E+00	0.0E+00	6.5E-03
CHLOROFORM	4.0E+03	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	3.6E-04
CHLOROPHENYLMETHYL SULFONE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	2.7E-10
O,P-XYLENE	1.4E+07	1.9E+06	1.7E+06	0.0E+00	2.1E-07	2.1E-07	0.0E+00
1,2-DICHLOROETHYLENE	1.7E+05	0.0E+00	1.7E+05	0.0E+00	0.0E+00	0.0E+00	0.0E+00
DICYCLOPENTADIENE	5.4E+04	1.7E+02	1.7E+02	0.0E+00	1.2E-01*	1.2E-01*	6.7E-03
DIELDRIN	1.6E+00	1.2E+04	1.6E+00	1.9E+00*	2.6E-04	1.9E+00*	1.1E+08
DITHIANE	8.3E+04	0.0E+00	8.3E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
1,4-OXATHIANE	2.5E+05	0.0E+00	2.5E+05	0.0E+00	0.0E+00	0.0E+00	0.0E+00
TETRACHLOROETHYLENE	5.1E+02	0.0E+00	5.1E+02	0.0E+00	0.0E+00	0.0E+00	2.8E-04
TRICHLOROETHYLENE	2.3E+03	0.0E+00	2.3E+03	0.0E+00	0.0E+00	0.0E+00	8.9E-05
M-XYLENE	1.4E+07	2.5E+05	2.4E+05	0.0E+00	3.7E-06	3.7E-06	0.0E+00
COPPER	4.2E+05	0.0E+00	4.2E+05	9.8E-05	0.0E+00	9.8E-05	0.0E+00
LEAD	1.5E+04	0.0E+00	1.5E+04	6.1E-03	0.0E+00	6.1E-03	0.0E+00
ZINC	2.0E+06	0.0E+00	2.0E+06	5.5E-05	0.0E+00	5.5E-05	0.0E+00

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-3e-4

EXPOSURE EVALUATIONS FOR CASUAL VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI OPN
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	
BENZENE	8.6E+02	0.0E+00	8.6E+02	0.0E+00	0.0E+00	0.0E+00	1.1E-02
CARBON TETRACHLORIDE	2.0E+02	0.0E+00	2.0E+02	0.0E+00	0.0E+00	0.0E+00	6.5E-03
CHLOROFORM	4.0E+03	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	3.6E-04
CHLOROPHENYLMETHYL SULFONE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	2.7E-10
O,P-XYLENE	1.4E+07	1.9E+06	1.7E+06	0.0E+00	2.1E-07	2.1E-07	0.0E+00
1,2-DICHLOROETHYLENE	1.7E+05	0.0E+00	1.7E+05	0.0E+00	0.0E+00	0.0E+00	0.0E+00
DICYCLOPENTADIENE	5.4E+04	1.7E+02	1.7E+02	0.0E+00	1.2E-01*	1.2E-01*	6.7E-03
DIELDRIN	1.6E+00	1.2E+04	1.6E+00	1.9E+00*	2.6E-04	1.9E+00*	1.1E-08
DITHIANE	8.3E+04	0.0E+00	8.3E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
1,4-OXATHIANE	2.5E+05	0.0E+00	2.5E+05	0.0E+00	0.0E+00	0.0E+00	0.0E+00
TETRACHLOROETHYLENE	5.1E+02	0.0E+00	5.1E+02	0.0E+00	0.0E+00	0.0E+00	2.8E-04
TRICHLOROETHYLENE	2.3E+03	0.0E+00	2.3E+03	0.0E+00	0.0E+00	0.0E+00	8.9E-05
M-XYLENE	1.4E+07	2.5E+05	2.4E+05	0.0E+00	3.7E-06	3.7E-06	0.0E+00
COPPER	4.2E+05	0.0E+00	4.2E+05	9.8E-05	0.0E+00	9.8E-05	0.0E+00
LEAD	1.5E+04	0.0E+00	1.5E+04	6.1E-03	0.0E+00	6.1E-03	0.0E+00
ZINC	2.0E+06	0.0E+00	2.0E+06	5.5E-05	0.0E+00	5.5E-05	0.0E+00

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-3e-5
EXPOSURE EVALUATIONS FOR RECREATIONAL VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI OPN
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	
BENZENE	1.2E+02	0.0E+00	1.2E+02	0.0E+00	0.0E+00	0.0E+00	1.6E-01
CARBON TETRACHLORIDE	2.7E+01	0.0E+00	2.7E+01	0.0E+00	0.0E+00	0.0E+00	9.8E-02
CHLOROFORM	5.6E+02	0.0E+00	5.6E+02	0.0E+00	0.0E+00	0.0E+00	5.5E-03
CHLOROPHENYLMETHYL SULFONE	7.0E+04	0.0E+00	7.0E+04	0.0E+00	0.0E+00	0.0E+00	1.7E-09
O,P-XYLENE	5.8E+06	6.8E+05	6.1E+05	0.0E+00	5.9E-07	5.9E-07	0.0E+00
1,2-DICHLOROETHYLENE	7.0E+04	0.0E+00	7.0E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
DICYCLOPENTADIENE	1.8E+04	6.2E+01	6.2E+01	0.0E+00	3.2E-01*	3.2E-01*	4.3E-02
DIELDRIN	2.2E-01	7.7E+02	2.2E-01	1.4E+01*	3.9E-03	1.4E+01*	1.7E-07
DITHIANE	3.5E+04	0.0E+00	3.5E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
1,4-OXATHIANE	1.1E+05	0.0E+00	1.1E+05	0.0E+00	0.0E+00	0.0E+00	0.0E+00
TETRACHLOROETHYLENE	7.1E+01	0.0E+00	7.1E+01	0.0E+00	0.0E+00	0.0E+00	4.2E-03
TRICHLOROETHYLENE	3.2E+02	0.0E+00	3.2E+02	0.0E+00	0.0E+00	0.0E+00	1.3E-03
M-XYLENE	5.8E+06	8.9E+04	8.7E+04	0.0E+00	1.0E-05	1.0E-05	0.0E+00
COPPER	2.5E+05	0.0E+00	2.5E+05	1.7E-04	0.0E+00	1.7E-04	0.0E+00
LEAD	9.2E+03	0.0E+00	9.2E+03	1.0E-02	0.0E+00	1.0E-02	0.0E+00
ZINC	1.1E+06	0.0E+00	1.1E+06	1.0E-04	0.0E+00	1.0E-04	0.0E+00

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-3e-6
EXPOSURE EVALUATIONS FOR COMMERCIAL WORKERS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI ENC
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	
BENZENE	1.1E+03	0.0E+00	1.1E+03	0.0E+00	0.0E+00	0.0E+00	4.7E+00
CARBON TETRACHLORIDE	2.5E+02	0.0E+00	2.5E+02	0.0E+00	0.0E+00	0.0E+00	2.8E+00
CHLOROFORM	5.1E+03	0.0E+00	5.1E+03	0.0E+00	0.0E+00	0.0E+00	1.6E-01
CHLOROPHENYLMETHYL SULFONE	9.1E+04	0.0E+00	9.1E+04	0.0E+00	0.0E+00	0.0E+00	3.5E-07
O,P-XYLENE	7.0E+06	1.0E+03	1.0E+03	0.0E+00	3.9E-04	3.9E-04	0.0E+00
1,2-DICHLOROETHYLENE	9.2E+04	0.0E+00	9.2E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
DICYCLOPENTADIENE	1.7E+04	1.4E-01	1.4E-01	0.0E+00	1.4E+02*	1.4E+02*	8.9E+00
DIELDRIN	2.0E+00	5.8E+01	1.9E+00	1.5E+00*	5.2E-02	1.6E+00*	5.0E-06
DITHIANE	4.6E+04	0.0E+00	4.6E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
1,4-OXATHIANE	1.4E+05	0.0E+00	1.4E+05	0.0E+00	0.0E+00	0.0E+00	0.0E+00
TETRACHLOROETHYLENE	6.5E+02	0.0E+00	6.5E+02	0.0E+00	0.0E+00	0.0E+00	1.2E-01
TRICHLOROETHYLENE	2.9E+03	0.0E+00	2.9E+03	0.0E+00	0.0E+00	0.0E+00	3.9E-02
M-XYLENE	7.0E+06	3.0E+03	3.0E+03	0.0E+00	3.0E-04	3.0E-04	0.0E+00
COPPER	1.8E+05	0.0E+00	1.8E+05	2.3E-04	0.0E+00	2.3E-04	0.0E+00
LEAD	6.5E+03	0.0E+00	6.5E+03	1.4E-02	0.0E+00	1.4E-02	0.0E+00
ZINC	7.8E+05	0.0E+00	7.8E+05	1.4E-04	0.0E+00	1.4E-04	0.0E+00

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-3e-7
EXPOSURE EVALUATIONS FOR INDUSTRIAL WORKERS

CONTAMINANT	DIRECT	INDIRECT		CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI	
	PPLV (mg/kg)	OSVI (mg/kg)	ESVI (mg/kg)	PPLV (mg/kg)	EI	EI	EI	OPN	ENC
BENZENE	6.7E+01	0.0E+00	0.0E+00	6.7E+01	0.0E+00	0.0E+00	0.0E+00	8.0E-02	1.4E+01
CARBON TETRACHLORIDE	1.5E+01	0.0E+00	0.0E+00	1.5E+01	0.0E+00	0.0E+00	0.0E+00	4.9E-02	8.5E+00
CHLOROFORM	3.1E+02	0.0E+00	0.0E+00	3.1E+02	0.0E+00	0.0E+00	0.0E+00	2.7E-03	4.8E-01
CHLOROPHENYLMETHYL SULFONE	1.7E+04	0.0E+00	0.0E+00	1.7E+04	0.0E+00	0.0E+00	0.0E+00	2.0E-09	3.5E-07
O,P-XYLENE	8.8E+05	2.5E+05	3.1E+03	3.0E+03	0.0E+00	1.3E-04	1.3E-04	0.0E+00	0.0E+00
1,2-DICHLOROETHYLENE	1.7E+04	0.0E+00	0.0E+00	1.7E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
DICYCLOPENTADIENE	1.2E+03	2.3E+01	4.2E-01	4.1E-01	0.0E+00	4.8E+01*	4.8E+01*	5.0E-02	8.9E+00
DIELDRIN	1.2E-01	1.5E+03	1.9E+01	1.2E-01	2.5E+01*	1.6E-01*	2.5E+01*	8.5E-08	1.5E-05
DITHIANE	8.5E+03	0.0E+00	0.0E+00	8.5E+03	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
1,4-OXATHIANE	2.5E+04	0.0E+00	0.0E+00	2.5E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
TETRACHLOROETHYLENE	4.1E+01	0.0E+00	0.0E+00	4.1E+01	0.0E+00	0.0E+00	0.0E+00	2.1E-03	3.7E-01
TRICHLOROETHYLENE	1.8E+02	0.0E+00	0.0E+00	1.8E+02	0.0E+00	0.0E+00	0.0E+00	6.7E-04	1.2E-01
M-XYLENE	8.8E+05	3.3E+04	6.0E+02	5.9E+02	0.0E+00	1.5E-03	1.5E-03	0.0E+00	0.0E+00
COPPER	5.7E+04	0.0E+00	0.0E+00	5.7E+04	7.2E-04	0.0E+00	7.2E-04	0.0E+00	0.0E+00
LEAD	2.2E+03	0.0E+00	0.0E+00	2.2E+03	4.3E-02	0.0E+00	4.3E-02	0.0E+00	0.0E+00
ZINC	1.4E+05	0.0E+00	0.0E+00	1.4E+05	7.9E-04	0.0E+00	7.9E-04	0.0E+00	0.0E+00

*: EI is equal to or exceeds 1.0E-01

2.18 SITE SPSA-4a: DRAINAGE DITCHES (formerly Sites 2-1: Drainage Ditches; EBASCO, 1987h/RIC 87216R06 and EBASCO, 1988m/RIC 87216R06A; South Plants Regional Study Area/South Plants Manufacturing Complex; EBASCO, 1988z/RIC 88306R01; Process Water System; EBASCO, 1988w/RIC 88256R04)

2.18.1 Site-Specific Considerations

Figure SPSA-4a-1 and Table SPSA-4a-1 depict the target contaminants for Site SPSA-4a. Borings 6 through 8 and 33 through 42 from Site 2-1 and Boring 7 from the South Plants Regional Study Area and Boring 1 from the process water system were included in this exposure assessment, consistent with the South Plants SAR. The historical search conducted under the contaminant assessment revealed that the drainage ditches were used to carry surface runoff away from the chlorine plant; therefore, any materials used in the chlorine plant were suspected to be present in Site SPSA-4a (EBASCO, 1987h/RIC 87216R06). Some of these chemicals were not detected in the soil during the Phase I and Phase II investigations (EBASCO, 1987h/RIC 87216R06; EBASCO, 1988m/RIC 87216R06A, and EBASCO, 1988z/RIC 88306R01).

2.18.2 Spatial Distribution of Measured Contaminant Concentrations

The locations and concentrations of the target contaminants that were detected in Site SPSA-4a are shown in Figure SPSA-4a-1. Table SPSA-4a-1 summarizes the maximum concentrations of contaminants measured in soil above indicator levels for the ICP metals, arsenic, and mercury and CRLs for organic contaminants from the Phase I and Phase II investigations. The boring number and depth where the maximum value was observed are shown. No data were included for ICP metals, arsenic, and mercury in Horizon 2 because direct soil exposure below 10 ft is assumed to be negligible (see Volume VI-A). Table SPSA-4a-2 summarizes the maximum concentrations detected in groundwater together with the well number, location, sampling interval, and depth to groundwater.

2.18.3 Site Exposure Summary

Tables SPSA-4a-3 through SPSA-4a-7 present Draft PPLVs, EIs, and VEIs for each site contaminant. Since the depth to groundwater below Site SPSA-4a is greater than 10 ft, the

enclosed space vapor inhalation SPPPLV is included in the calculation of the cumulative quantity. The COCs are summarized below for each exposed population and with the critical exposure pathway identified.

Contaminants of Concern	Regulated Visitor	Casual Visitor	Recreational Visitor	Commercial Worker	Industrial Worker
Aldrin	Direct	Direct	Direct	Dir/Ind	Dir/Ind
Chlordane	Direct	Direct	Direct	Direct	Direct
Dieldrin	Direct	Direct	Direct	Dir/Ind	Dir/Ind
Chromium	Direct	Direct	Direct	Direct	Direct
PPDDE	--	--	Direct	Indirect	Dir/Ind
PPDDT	--	--	Direct	--	Direct
Methylene chloride	--	--	Direct	Indirect	Dir/Ind
Isodrin	--	--	Direct	Dir/Ind	Dir/Ind
Lead	--	--	--	Direct	Direct

Note: Direct exposure pathways for soils include soil ingestion, suspended particulate inhalation, and dermal contact.

Indirect exposure pathways include open and enclosed space vapor inhalation.

The results of the soil exposure summary indicate that exposure to contamination from the direct and indirect pathways both contribute to the exceedance of the cumulative PPLVs. Site SPSA-4a is designated as a Priority 1 site, based on the most sensitive exposed population PPLV (i.e., the industrial worker).

No groundwater contaminants result in an unacceptable exposure due to vapor inhalation as indicated by VEI values less than 1.

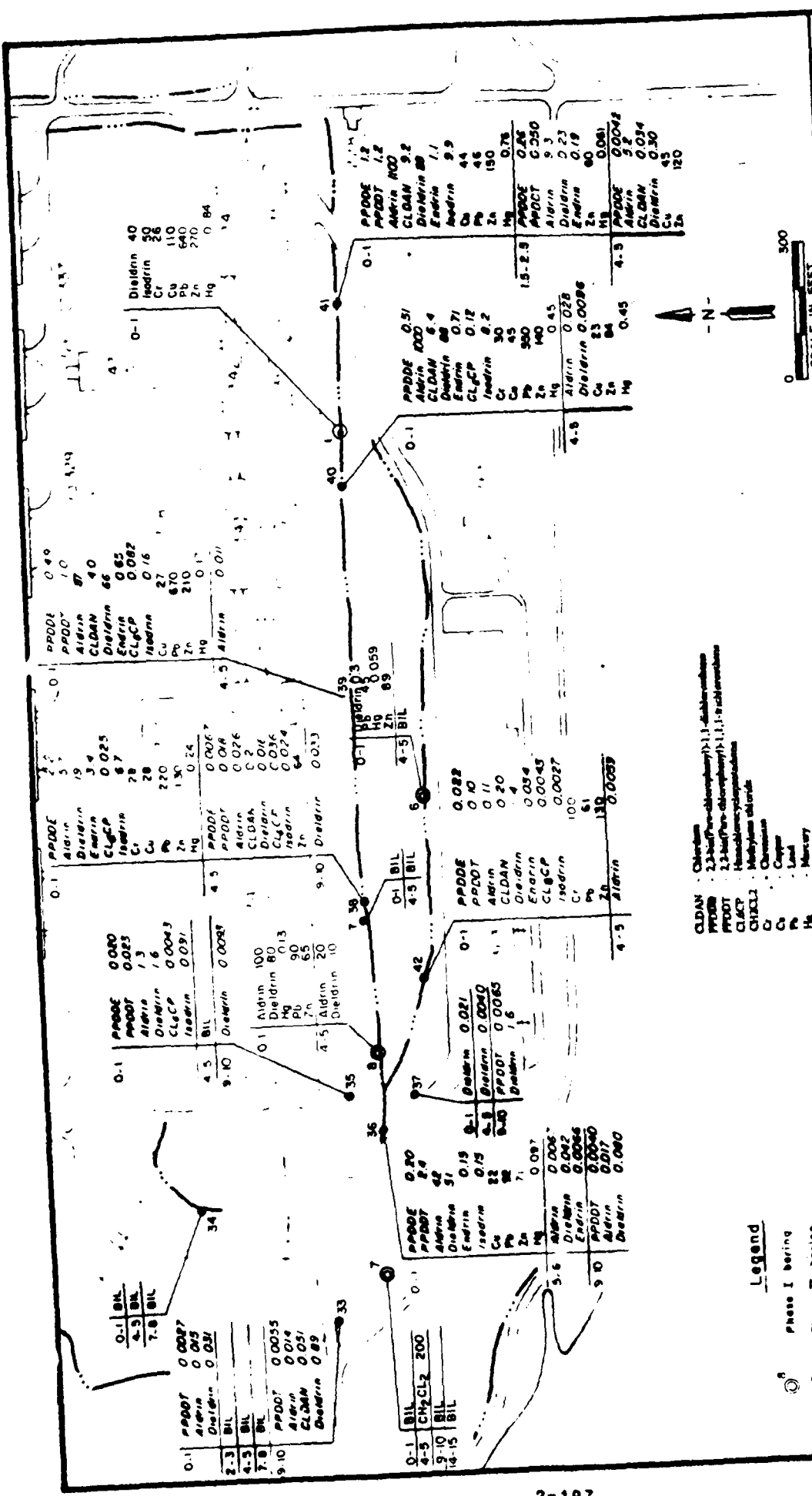


FIGURE SPSA-4a-1
 Phase I and Phase II Analytes Detected
 Within or Above Indicator Levels
 Rocky Mountain Arsenal
 Prepared by: Ebasco Services Incorporated

Prepared for:
 Program Manager's Office for
 Rocky Mountain Arsenal Cleanup
 Aberdeen Proving Ground, Maryland

TABLE SPSA-4a-1
SOIL CONTAMINANT CONCENTRATIONS
FOR SITE SPSA-4a

Contaminant	Horizon 1			Horizon 2		
	Max. (ug/g)	Depth (ft)	Boring Number	Max. (ug/g)	Depth (ft)	Boring Number
Aldrin	1100	0-1	41	1100	0-1	41
Chlordane	9.2	0-1	41	9.2	0-1	41
Dieldrin	88	0-1	41	88	0-1	41
PPDDE ^{1/}	2.2	0-1	40	2.2	0-1	40
PPDDT ^{2/}	2.4	0-1	38	2.4	0-1	38
Endrin	3.4	0-1	36	3.4	0-1	36
Hexachlorocyclopentadiene	0.12	0-1	38	0.12	0-1	38
Isodrin	50	0-1	40	50	0-1	40
Methylene chloride	200	0-1	1	200	0-1	1
Chromium	100	4-5	7	100	4-5	7
Copper	110	0-1	42	110	0-1	42
Lead	670	0-1	1	670	0-1	1
Mercury	0.84	4-5	41	0.84	4-5	41
Zinc	270	0-1	39	270	0-1	39
		0-1	1		0-1	1

1/ PPDDE 2,2-bis(Para-chlorophenyl)-1,1-dichloroethene
2/ PPDDT 2,2-bis(Para-chlorophenyl)-1,1-trichloroethane

SPSA South Plants Study Area
Max. Maximum
ug/g microgram per gram
ft foot/feet

TABLE SPSA-4a-2

GROUNDWATER CONTAMINANT CONCENTRATIONS (UG/L)
FOR SITE SPSA-4a

AVERAGE SITE DEPTH TO GROUNDWATER: 14 Feet

CHEMICAL	CONCENTRATION MAXIMUM	LOCATION (WELL NUMBER)	SAMPLE DATE
1,1-DICHLOROETHANE	7.4	02058	01/24/89
1,2-DICHLOROETHYLENE	2.2	02058	01/24/89
BENZENE	1.1	02058	01/24/89
CHLOROFORM	3.5	02546	03/9/88
CHLOROBENZENE	52	02058	01/24/89
DIBROMOCHLOROPROPANE	0.35	02058	01/24/89
DIELDRIN	0.064	02058	01/24/89
DIMETHYLMETHYL PHOSPHONATE	1.1	02058	01/24/89
ENDRIN	0.065	02058	01/24/89
TETRACHLOROETHYLENE	1.1	02058	01/24/89
TRICHLOROETHYLENE	3.7	02058	01/24/89

EACH VALUE PRESENTED IS THE MAXIMUM CONCENTRATION FOR THE LISTED ANALYTE
FOR THE PERIOD March 17, 1987 TO February 28, 1989.
DATA SOURCE: DP ASSOCIATES, RMA Database, July 19, 1990

SPSA-4a-3
EXPOSURE EVALUATIONS FOR REGULATED VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI OPM
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	
ALDRIN	1.5E+00	1.0E+06	1.5E+00	7.3E+02*	2.0E-03a	7.3E+02*	0.0E+00
BENZENE	8.6E+02	0.0E+00	8.6E+02	0.0E+00	0.0E+00	0.0E+00	7.2E-07
CHLORDANE	2.0E+01	6.0E+07	2.0E+01	4.7E-01*	1.5E-07	4.7E-01*	0.0E+00
CHLOROBENZENE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	2.9E-07
CHLOROFORM	4.0E+03	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	3.4E-07
PPDE	7.4E+01	3.4E+07	7.4E+01	3.0E-02	6.5E-08	3.0E-02	0.0E+00
PPDDT	7.4E+01	7.1E+07	7.4E+01	3.3E-02	3.4E-08	3.3E-02	0.0E+00
DIBROMOCHLOROPROPANE	1.8E+01	0.0E+00	1.8E+01	0.0E+00	0.0E+00	0.0E+00	4.7E-07
1,1-DICHLOROETHANE	2.8E+02	0.0E+00	2.8E+02	0.0E+00	0.0E+00	0.0E+00	1.3E-09
1,2-DICHLOROETHYLENE	1.7E+05	0.0E+00	1.7E+05	0.0E+00	0.0E+00	0.0E+00	0.0E+00
DIELDRIN	1.6E+00	1.0E+06	1.6E+00	5.6E+01*	3.5E-04a	5.6E+01*	0.0E+00
DIMETHYMETHYL PHOSPHONATE	1.5E+05	0.0E+00	1.5E+05	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENDRIN	2.5E+03	1.0E+06	2.5E+03	1.4E-03	1.6E-08a	1.4E-03	0.0E+00
HEXACHLOROCYCLOPENTADIENE	1.7E+04	5.1E+03	3.9E+03	7.2E-06	2.3E-05	3.1E-05	0.0E+00
ISODRIN	5.8E+02	1.0E+06	5.8E+02	8.6E-02	1.3E-06a	8.6E-02	0.0E+00
METHYLENE CHLORIDE	3.3E+03	4.2E+04	3.0E+03	6.1E-02	4.7E-03	6.6E-02	0.0E+00
TETRACHLOROETHYLENE	5.1E+02	0.0E+00	5.1E+02	0.0E+00	0.0E+00	0.0E+00	3.3E-07
TRICHLOROETHYLENE	2.3E+03	0.0E+00	2.3E+03	0.0E+00	0.0E+00	0.0E+00	2.1E-06
CHROMIUM	6.9E+01	0.0E+00	6.9E+01	1.4E+00*	0.0E+00	1.4E+00*	0.0E+00
COPPER	4.2E+05	0.0E+00	4.2E+05	2.6E-04	0.0E+00	2.6E-04	0.0E+00
LEAD	1.5E+04	0.0E+00	1.5E+04	4.3E-02	0.0E+00	4.3E-02	0.0E+00
MERCURY	3.3E+03	0.0E+00	3.3E+03	2.5E-04	0.0E+00	2.5E-04	0.0E+00
ZINC	2.0E+06	0.0E+00	2.0E+06	1.4E-04	0.0E+00	1.4E-04	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPPLV for this contaminant is considered to be equal to pure compound. The SPPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-4a-4
EXPOSURE EVALUATIONS FOR CASUAL VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI OPN
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	
ALDRIN	1.5E+00	1.0E+06	1.5E+00	7.3E+02*	2.0E-03a	7.3E+02*	0.0E+00
BENZENE	8.6E+02	0.0E+00	8.6E+02	0.0E+00	0.0E+00	0.0E+00	7.2E-07
CHLORDANE	2.0E+01	6.0E+07	2.0E+01	4.7E-01*	1.5E-07	4.7E-01*	0.0E+00
CHLOROBENZENE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	2.9E-07
CHLOROFORM	4.0E+03	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	3.4E-07
PPDDE	7.4E+01	3.4E+07	7.4E+01	3.0E-02	6.5E-08	3.0E-02	0.0E+00
PPDDT	7.4E+01	7.1E+07	7.4E+01	3.3E-02	3.4E-08	3.3E-02	0.0E+00
DIBROMOCHLOROPROPANE	1.8E+01	0.0E+00	1.8E+01	0.0E+00	0.0E+00	0.0E+00	4.7E-07
1,1-DICHLOROETHANE	2.8E+02	0.0E+00	2.8E+02	0.0E+00	0.0E+00	0.0E+00	1.3E-09
1,2-DICHLOROETHYLENE	1.7E+05	0.0E+00	1.7E+05	0.0E+00	0.0E+00	0.0E+00	0.0E+00
DIELDRIN	1.6E+00	1.0E+06	1.6E+00	5.6E+01*	3.5E-04a	5.6E+01*	0.0E+00
DIMETHYLMETHYL PHOSPHONATE	1.5E+05	0.0E+00	1.5E+05	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENDRIN	2.5E+03	1.0E+06	2.5E+03	1.4E-03	1.6E-08a	1.4E-03	0.0E+00
HEXACHLOROCYCLOPENTADIENE	1.7E+04	5.1E+03	3.9E+03	7.2E-06	2.3E-05	3.1E-05	0.0E+00
ISODRIN	5.8E+02	1.0E+06	5.8E+02	8.6E-02	1.3E-06a	8.6E-02	0.0E+00
METHYLENE CHLORIDE	3.3E+03	4.2E+04	3.0E+03	6.1E-02	4.7E-03	6.6E-02	0.0E+00
TETRACHLOROETHYLENE	5.1E+02	0.0E+00	5.1E+02	0.0E+00	0.0E+00	0.0E+00	3.3E-07
TRICHLOROETHYLENE	2.3E+03	0.0E+00	2.3E+03	0.0E+00	0.0E+00	0.0E+00	2.1E-06
CHROMIUM	6.9E+01	0.0E+00	6.9E+01	1.4E+00*	0.0E+00	1.4E+00*	0.0E+00
COPPER	4.2E+05	0.0E+00	4.2E+05	2.6E-04	0.0E+00	2.6E-04	0.0E+00
LEAD	1.5E+04	0.0E+00	1.5E+04	4.3E-02	0.0E+00	4.3E-02	0.0E+00
MERCURY	3.3E+03	0.0E+00	3.3E+03	2.5E-04	0.0E+00	2.5E-04	0.0E+00
ZINC	2.0E+06	0.0E+00	2.0E+06	1.4E-04	0.0E+00	1.4E-04	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPPLV for this contaminant is considered to be equal to pure compound. The SPPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-4a-5
EXPOSURE EVALUATIONS FOR RECREATIONAL VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI OPN
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI EI	EI EI	EI EI	
ALDRIN	2.1E-01	1.0E+06	2.1E-01	5.3E+03*	3.0E-02a	5.3E+03*	0.0E+00
BENZENE	1.2E+02	0.0E+00	1.2E+02	0.0E+00	0.0E+00	0.0E+00	1.1E-05
CHLORDANE	2.7E+00	4.0E+06	2.7E+00	3.4E+00*	2.3E-06	3.4E+00*	0.0E+00
CHLOROBENZENE	6.8E+04	0.0E+00	6.8E+04	0.0E+00	0.0E+00	0.0E+00	1.9E-06
CHLOROFORM	5.6E+02	0.0E+00	5.6E+02	0.0E+00	0.0E+00	0.0E+00	5.1E-06
PPDE	1.0E+01	2.2E+06	1.0E+01	2.2E-01*	9.8E-07	2.2E-01*	0.0E+00
PPDT	1.0E+01	4.7E+06	1.0E+01	2.4E-01*	5.1E-07	2.4E-01*	0.0E+00
DIBROMOCHLOROPROPANE	2.5E+00	0.0E+00	2.5E+00	0.0E+00	0.0E+00	0.0E+00	7.1E-06
1,1-DICHLOROETHANE	3.9E+01	0.0E+00	3.9E+01	0.0E+00	0.0E+00	0.0E+00	2.0E-08
1,2-DICHLOROETHYLENE	7.0E+04	0.0E+00	7.0E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
D'ELDRIN	2.2E-01	1.0E+06	2.2E-01	4.0E+02*	5.2E-03a	4.0E+02*	0.0E+00
DIMETHYMETHYL PHOSPHONATE	6.3E+04	0.0E+00	6.3E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENDRIN	1.1E+03	1.0E+06	1.1E+03	3.2E-03	1.1E-07a	3.2E-03	0.0E+00
HEXACHLOROCYCLOPENTADIENE	5.7E+03	1.9E+03	1.4E+03	2.1E-05	6.5E-05	8.6E-05	0.0E+00
ISODRIN	2.5E+02	1.0E+06	2.5E+02	2.0E-01*	8.3E-06a	2.0E-01*	0.0E+00
METHYLENE CHLORIDE	4.5E+02	6.6E+03	4.2E+02	4.4E-01*	3.0E-02	4.7E-01*	0.0E+00
TETRACHLOROETHYLENE	7.1E+01	0.0E+00	7.1E+01	0.0E+00	0.0E+00	0.0E+00	5.0E-06
TRICHLOROETHYLENE	3.2E+02	0.0E+00	3.2E+02	0.0E+00	0.0E+00	0.0E+00	3.2E-05
CHROMIUM	8.8E+00	0.0E+00	8.8E+00	1.1E+01*	0.0E+00	1.1E+01*	0.0E+00
COPPER	2.5E+05	0.0E+00	2.5E+05	4.4E-04	0.0E+00	4.4E-04	0.0E+00
LEAD	9.2E+03	0.0E+00	9.2E+03	7.3E-02	0.0E+00	7.3E-02	0.0E+00
MERCURY	2.0E+03	0.0E+00	2.0E+03	4.3E-04	0.0E+00	4.3E-04	0.0E+00
ZINC	1.1E+06	0.0E+00	1.1E+06	2.6E-04	0.0E+00	2.6E-04	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPPLV for this contaminant is considered to be equal to pure compound. The SPPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-4a-6
EXPOSURE EVALUATIONS FOR COMMERCIAL WORKERS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI ENC
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	
ALDRIN	1.9E+00	1.3E+02	1.9E+00	5.8E+02*	8.7E+00*	5.9E+02*	0.0E+00
BENZENE	1.1E+03	0.0E+00	1.1E+03	0.0E+00	0.0E+00	0.0E+00	1.7E-02
CHLORDANE	2.5E+01	1.4E+04	2.5E+01	3.7E-01*	6.8E-04	3.7E-01*	0.0E+00
CHLOROBENZENE	8.8E+04	0.0E+00	8.8E+04	0.0E+00	0.0E+00	0.0E+00	2.0E-02
CHLOROFORM	5.1E+03	0.0E+00	5.1E+03	0.0E+00	0.0E+00	0.0E+00	7.9E-03
PPDDE	9.3E+01	1.9E+01	1.6E+01	2.4E-02	1.1E-01*	1.4E-01*	0.0E+00
PPDDT	9.3E+01	1.6E+04	9.2E+01	2.6E-02	1.5E-04	2.6E-02	0.0E+00
DIBROMOCHLOROPROPANE	2.3E+01	0.0E+00	2.3E+01	0.0E+00	0.0E+00	0.0E+00	1.1E-02
1,1-DICHLOROETHANE	3.6E+02	0.0E+00	3.6E+02	0.0E+00	0.0E+00	0.0E+00	3.1E-05
1,2-DICHLOROETHYLENE	9.2E+04	0.0E+00	9.2E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
DIELDRIN	2.0E+00	5.8E+01	1.9E+00	4.4E+01*	1.5E+00*	4.6E+01*	0.0E+00
DIMETHYMETHYL PHOSPHONATE	8.2E+04	0.0E+00	8.2E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENDRIN	1.4E+03	1.0E+06	2.4E+02	2.5E-03	1.2E-02a	1.4E-02	0.0E+00
HEXACHLOROCYCLOPENTADIENE	5.5E+03	1.9E+01	1.9E+01	2.2E-05	6.3E-03	6.3E-03	0.0E+00
ISODRIN	3.2E+02	7.5E+00	7.3E+00	1.6E-01*	6.7E+00*	6.9E+00*	0.0E+00
METHYLENE CHLORIDE	4.1E+03	4.8E+02	4.3E+02	4.9E-02	4.2E-01*	4.7E-01*	0.0E+00
TETRACHLOROETHYLENE	6.5E+02	0.0E+00	6.5E+02	0.0E+00	0.0E+00	0.0E+00	7.8E-03
TRICHLOROETHYLENE	2.9E+03	0.0E+00	2.9E+03	0.0E+00	0.0E+00	0.0E+00	4.9E-02
CHROMIUM	5.5E+01	0.0E+00	5.5E+01	1.8E+00*	0.0E+00	1.8E+00*	0.0E+00
COPPER	1.8E+05	0.0E+00	1.8E+05	6.3E-04	0.0E+00	6.3E-04	0.0E+00
LEAD	6.5E+03	0.0E+00	6.5E+03	1.0E-01*	0.0E+00	1.0E-01*	0.0E+00
MERCURY	1.4E+03	0.0E+00	1.4E+03	6.0E-04	0.0E+00	6.0E-04	0.0E+00
ZINC	7.8E+05	0.0E+00	7.8E+05	3.5E-04	0.0E+00	3.5E-04	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPPLV for this contaminant is considered to be equal to pure compound. The SPPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

SPSA-4a-7
EXPOSURE EVALUATIONS FOR INDUSTRIAL WORKERS

CONTAMINANT	DIRECT	INDIRECT		CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI	
	PPLV (mg/kg)	OSVI (mg/kg)	ESVI (mg/kg)	PPLV (mg/kg)	EI	EI	- EI	OPN	ENC
LDRIIN	1.2E-01	7.4E+04	4.2E+01	1.2E-01	9.4E+03*	2.6E+01*	9.5E+03*	0.0E+00	0.0E+00
ENZENE	6.7E+01	0.0E+00	0.0E+00	6.7E+01	0.0E+00	0.0E+00	0.0E+00	5.4E-06	5.0E-02
HLORDANE	1.5E+00	8.0E+06	4.5E+03	1.5E+00	6.1E+00*	2.0E-03	6.1E+00*	0.0E+00	0.0E+00
HLOROBENZENE	1.5E+04	0.0E+00	0.0E+00	1.5E+04	0.0E+00	0.0E+00	0.0E+00	2.2E-06	2.0E-02
HLOROFORM	3.1E+02	0.0E+00	0.0E+00	3.1E+02	0.0E+00	0.0E+00	0.0E+00	2.5E-06	2.4E-02
PPDE	5.7E+00	4.5E+06	1.9E+01	4.4E+00	3.8E-01*	1.1E-01*	5.0E-01*	0.0E+00	0.0E+00
PPDT	5.7E+00	9.5E+06	5.4E+03	5.7E+00	4.2E-01*	4.5E-04	4.2E-01*	0.0E+00	0.0E+00
IBROMOCHLOROPROPANE	1.4E+00	0.0E+00	0.0E+00	1.4E+00	0.0E+00	0.0E+00	0.0E+00	3.5E-06	3.3E-02
1,1-DICHLOROETHANE	2.3E+01	0.0E+00	0.0E+00	2.3E+01	0.0E+00	0.0E+00	0.0E+00	1.0E-08	9.3E-05
1,2-DICHLOROETHYLENE	1.7E+04	0.0E+00	0.0E+00	1.7E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
DELDRIN	1.2E-01	3.4E+04	1.9E+01	1.2E-01	7.2E+02*	4.6E+00*	7.2E+02*	0.0E+00	0.0E+00
DIMETHYLMETHYL PHOSPHONATE	1.5E+04	0.0E+00	0.0E+00	1.5E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENDRIN	2.5E+02	1.0E+06	1.0E+06	2.0E+02	1.3E-02	3.9E-03a	1.7E-02	0.0E+00	0.0E+00
HEXACHLOROCYCLOPENTADIENE	3.8E+02	6.8E+02	5.8E+01	4.7E+01	3.1E-04	2.3E-03	2.6E-03	0.0E+00	0.0E+00
ISODRIN	5.9E+01	5.2E+06	2.2E+01	1.6E+01	8.4E-01*	2.2E+00*	3.1E+00*	0.0E+00	0.0E+00
METHYLENE CHLORIDE	2.5E+02	5.7E+03	4.8E+02	1.6E+02	8.1E-01*	4.6E-01*	1.3E+00*	0.0E+00	0.0E+00
TETRACHLOROETHYLENE	4.1E+01	0.0E+00	0.0E+00	4.1E+01	0.0E+00	0.0E+00	0.0E+00	2.5E-06	2.3E-02
TRICHLOROETHYLENE	1.8E+02	0.0E+00	0.0E+00	1.8E+02	0.0E+00	0.0E+00	0.0E+00	1.6E-05	1.5E-01
CHROMIUM	1.1E+00	0.0E+00	0.0E+00	1.1E+00	8.7E+01*	0.0E+00	8.7E+01*	0.0E+00	0.0E+00
CO	5.7E+04	0.0E+00	0.0E+00	5.7E+04	1.9E-03	0.0E+00	1.9E-03	0.0E+00	0.0E+00
LEAD	2.2E+03	0.0E+00	0.0E+00	2.2E+03	3.1E-01*	0.0E+00	3.1E-01*	0.0E+00	0.0E+00
MERCURY	4.6E+02	0.0E+00	0.0E+00	4.6E+02	1.8E-03	0.0E+00	1.8E-03	0.0E+00	0.0E+00
ZINC	1.4E+05	0.0E+00	0.0E+00	1.4E+05	1.9E-03	0.0E+00	1.9E-03	0.0E+00	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPPLV for this contaminant is considered to be equal to pure compound. The SPPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

2.19.3 Site Exposure Summary

Tables SPSA-4b-3 through SPSA-4b-7 present Draft PPLVs, EIs, and VEIs for each site contaminant. Since the depth to groundwater below Site SPSA-4b is greater than 10 ft, the enclosed space vapor inhalation SPPPLV is included in the calculation of the cumulative quantity. The COCs are summarized below for each exposed population and with the critical exposure pathway identified.

Contaminants of Concern	Regulated Visitor	Casual Visitor	Recreational Visitor	Commercial Worker	Industrial Worker
Aldrin	Direct	Direct	Direct	Dir/Ind	Dir/Ind
Dieldrin	Direct	Direct	Direct	Dir/Ind	Dir/Ind
Methylene chloride	--	--	--	Indirect	Indirect

Note: Direct exposure pathways for soils include soil ingestion, suspended particulate inhalation, and dermal contact.
Indirect exposure pathways include open and enclosed space vapor inhalation.

The results of the soil exposure summary indicate that exposure to contamination from the direct and indirect pathways both contribute to the exceedance of the cumulative PPLVs. Site SPSA-4b is designated as a Priority 1 site, based on the most sensitive exposed population PPLV (i.e., the industrial worker).

The following groundwater contaminant results in an unacceptable exposure due to vapor inhalation as indicated by a VEI value greater than 1:

- Dicyclopentadiene (enclosed)

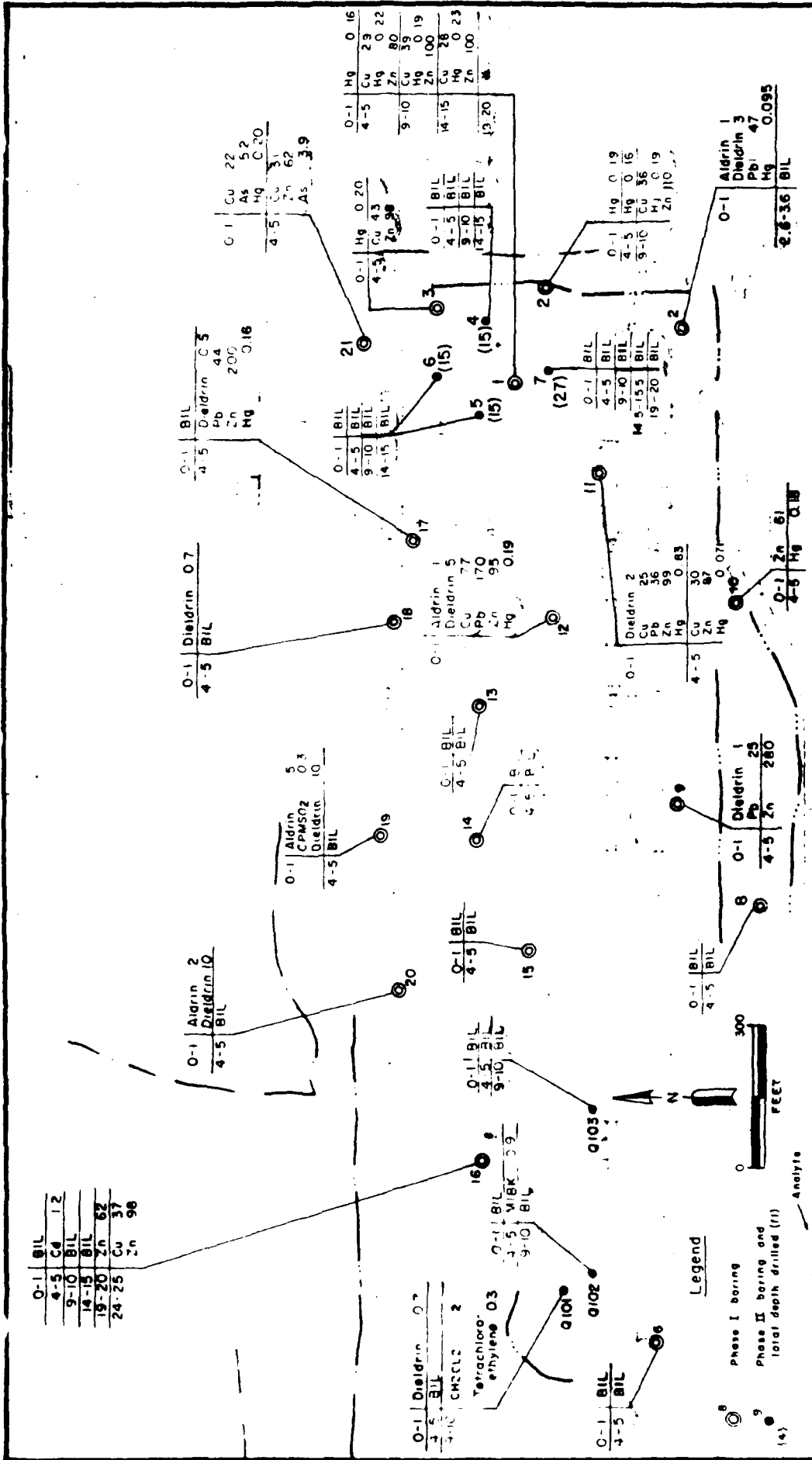


FIGURE SPSA-4b-1
 Phase I and Phase II Analytes Detected
 Within or Above Indicator Levels
 Rocky Mountain Arsenal
 Prepared by: Ebasco Services Incorporated

Prepared for:
 Program Manager's Office for
 Rocky Mountain Arsenal Cleanup
 Aberdeen Proving Ground, Maryland

TABLE SPSA-4b-1
SOIL CONTAMINANT CONCENTRATIONS
FOR SITE SPSA-4b

Contaminant	Horizon 1			Horizon 2		
	Max. (ug/g)	Depth (ft)	Boring Number	Max. (ug/g)	Depth (ft)	Boring Number
Aldrin	5	0-1	19	5	0-1	19
Chlorophenylmethyl sulfone	0.3	0-1	19	0.3	0-1	19
Dieldrin	10	0-1	19	10	0-1	19
		0-1	20		0-1	20
Methylisobutyl ketone	0.9	4-5	Q102	0.9	4-5	Q102
Methylene chloride	2	9-10	Q101	2	9-10	Q101
Tetrachloroethylene	0.3	9-10	Q101	0.3	9-10	Q101
Copper	77	0-1	12	--	--	--
Lead	170	0-1	12	--	--	--
Mercury	0.83	0-1	11	--	--	--
Zinc	280	4-5	9	--	--	--

SPSA
Max.
ug/g
ft

South Plants Study Area
Maximum
microgram per gram
foot/feet

TABLE SPSA-4b-2

GROUNDWATER CONTAMINANT CONCENTRATIONS (UG/L)
FOR SITE SPSA-4b

AVERAGE SITE DEPTH TO GROUNDWATER: 30 Feet

CHEMICAL	CONCENTRATION MAXIMUM	LOCATION (WELL NUMBER)	SAMPLE DATE
ATRAZINE	4.6	02007	12/12/88
CARBON TETRACHLORIDE	2.2	02007	01/22/88
CHLOROFORM	16	02007	01/22/88
DICYCLOPENTADIENE	55	02007	12/12/88
DIISOPROPYLMETHYL PHOSPHONATE	16	02007	12/12/88
DIELDRIN	0.061	02007	12/12/88
ENDRIN	0.048	02007	01/22/88
TETRACHLOROETHYLENE	1.3	02007	12/12/88

EACH VALUE PRESENTED IS THE MAXIMUM CONCENTRATION FOR THE LISTED ANALYTE
FOR THE PERIOD March 17, 1987 TO February 28, 1989.
DATA SOURCE: DP ASSOCIATES, RMA Database, July 19, 1990

SPSA-4b-3
EXPOSURE EVALUATIONS FOR REGULATED VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI OPN
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	
ALDRIN	1.5E+00	1.8E+04	1.5E+00	3.3E+00*	2.8E-04	3.3E+00*	0.0E+00
ATRAZINE	4.1E+04	0.0E+00	4.1E+04	0.0E+00	0.0E+00	0.0E+00	1.5E-13
CARBON TETRACHLORIDE	2.0E+02	0.0E+00	2.0E+02	0.0E+00	0.0E+00	0.0E+00	3.7E-04
CHLOROFORM	4.0E+03	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	2.3E-05
CHLOROPHENYLMETHYL SULFONE	1.6E+05	2.8E+05	1.0E+05	1.8E-06	1.1E-06	2.9E-06	0.0E+00
DICYCLOPENTADIENE	5.4E+04	0.0E+00	5.4E+04	0.0E+00	0.0E+00	0.0E+00	1.7E-03
DIELDRIN	1.6E+00	1.0E+06	1.6E+00	6.4E+00*	1.2E-03a	6.4E+00*	0.0E+00
DIISOPROPYLMETHYL PHOSPHONATE	6.6E+05	0.0E+00	6.6E+05	0.0E+00	0.0E+00	0.0E+00	3.6E-09
ENDRIN	2.5E+03	0.0E+00	2.5E+03	0.0E+00	0.0E+00	0.0E+00	2.5E-11
METHYLISOBUTYL KETONE	4.1E+05	1.8E+05	1.3E+05	2.2E-06	5.0E-06	7.2E-06	0.0E+00
METHYLENE CHLORIDE	3.3E+03	1.3E+03	9.0E+02	6.1E-04	1.6E-03	2.2E-03	0.0E+00
TETRACHLOROETHYLENE	5.1E+02	5.3E+03	4.7E+02	5.9E-04	5.7E-05	6.4E-04	5.4E-06
COPPER	4.2E+05	0.0E+00	4.2E+05	1.8E-04	0.0E+00	1.8E-04	0.0E+00
LEAD	1.5E+04	0.0E+00	1.5E+04	1.1E-02	0.0E+00	1.1E-02	0.0E+00
MERCURY	3.3E+03	0.0E+00	3.3E+03	2.5E-04	0.0E+00	2.5E-04	0.0E+00
ZINC	2.0E+06	0.0E+00	2.0E+06	1.4E-04	0.0E+00	1.4E-04	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPLV for this contaminant is considered to be equal to pure compound. The SPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-4b-4
EXPOSURE EVALUATIONS FOR CASUAL VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI EI	EI EI	EI EI	OPN
ALDRIN	1.5E+00	1.8E+04	1.5E+00	3.3E+00*	2.8E-04	3.3E+00*	0.0E+00
ATRAZINE	4.1E+04	0.0E+00	4.1E+04	0.0E+00	0.0E+00	0.0E+00	1.5E-13
CARBON TETRACHLORIDE	2.0E+02	0.0E+00	2.0E+02	0.0E+00	0.0E+00	0.0E+00	3.7E-04
CHLOROFORM	4.0E+03	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	2.3E-05
CHLOROPHENYLMETHYL SULFONE	1.6E+05	2.8E+05	1.0E+05	1.8E-06	1.1E-06	2.9E-06	0.0E+00
DICYCLOPENTADIENE	5.4E+04	0.0E+00	5.4E+04	0.0E+00	0.0E+00	0.0E+00	1.7E-03
DIELDRIN	1.6E+00	1.0E+06	1.6E+00	6.4E+00*	1.2E-03a	6.4E+00*	0.0E+00
DIISOPROPYLMETHYL PHOSPHONATE	6.6E+05	0.0E+00	6.6E+05	0.0E+00	0.0E+00	0.0E+00	3.6E-09
ENDRIN	2.5E+03	0.0E+00	2.5E+03	0.0E+00	0.0E+00	0.0E+00	2.5E-11
METHYLISOBUTYL KETONE	4.1E+05	1.8E+05	1.3E+05	2.2E-06	5.0E-06	7.2E-06	0.0E+00
METHYLENE CHLORIDE	3.3E+03	1.3E+03	9.0E+02	6.1E-04	1.6E-03	2.2E-03	0.0E+00
TETRACHLOROETHYLENE	5.1E+02	5.3E+03	4.7E+02	5.9E-04	5.7E-05	6.4E-04	5.4E-06
COPPER	4.2E+05	0.0E+00	4.2E+05	1.8E-04	0.0E+00	1.8E-04	0.0E+00
LEAD	1.5E+04	0.0E+00	1.5E+04	1.1E-02	0.0E+00	1.1E-02	0.0E+00
MERCURY	3.3E+03	0.0E+00	3.3E+03	2.5E-04	0.0E+00	2.5E-04	0.0E+00
ZINC	2.0E+06	0.0E+00	2.0E+06	1.4E-04	0.0E+00	1.4E-04	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPPLV for this contaminant is considered to be equal to pure compound. The SPPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-4b-5
EXPOSURE EVALUATIONS FOR RECREATIONAL VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI OPN
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	
ALDRIN	2.1E-01	1.2E+03	2.1E-01	2.4E+01*	4.3E-03	2.4E+01*	0.0E+00
ATRAZINE	1.8E+04	0.0E+00	1.8E+04	0.0E+00	0.0E+00	0.0E+00	9.6E-13
CARBON TETRACHLORIDE	2.7E+01	0.0E+00	2.7E+01	0.0E+00	0.0E+00	0.0E+00	5.6E-03
CHLOROFORM	5.6E+02	0.0E+00	5.6E+02	0.0E+00	0.0E+00	0.0E+00	3.4E-04
CHLOROPHENYLMETHYL SULFONE	7.0E+04	4.4E+04	2.7E+04	4.3E-06	6.9E-06	1.1E-05	0.0E+00
DICYCLOPENTADIENE	1.8E+04	0.0E+00	1.8E+04	0.0E+00	0.0E+00	0.0E+00	1.1E-02
DIELDRIN	2.2E-01	1.0E+06	2.2E-01	4.6E+01*	1.9E-02 ^a	4.6E+01*	0.0E+00
DIISOPROPYLMETHYL PHOSPHONATE	2.8E+05	0.0E+00	2.8E+05	0.0E+00	0.0E+00	0.0E+00	2.3E-08
ENDRIN	1.1E+03	0.0E+00	1.1E+03	0.0E+00	0.0E+00	0.0E+00	1.6E-10
METHYLISOBUTYL KETONE	1.7E+05	6.5E+04	4.7E+04	5.2E-06	1.4E-05	1.9E-05	0.0E+00
METHYLENE CHLORIDE	4.5E+02	1.9E+02	1.4E+02	4.4E-03	1.0E-02	1.5E-02	0.0E+00
TETRACHLOROETHYLENE	7.1E+01	8.2E+02	6.5E+01	4.2E-03	3.7E-04	4.6E-03	8.2E-05
COPPER	2.5E+05	0.0E+00	2.5E+05	3.1E-04	0.0E+00	3.1E-04	0.0E+00
LEAD	9.2E+03	0.0E+00	9.2E+03	1.8E-02	0.0E+00	1.8E-02	0.0E+00
MERCURY	2.0E+03	0.0E+00	2.0E+03	4.2E-04	0.0E+00	4.2E-04	0.0E+00
ZINC	1.1E+06	0.0E+00	1.1E+06	2.7E-04	0.0E+00	2.7E-04	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPLV for this contaminant is considered to be equal to pure compound. The SPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-4b-6
EXPOSURE EVALUATIONS FOR COMMERCIAL WORKERS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI ENC
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	
ALDRIN	1.9E+00	4.0E-01	3.3E-01	2.6E+00*	1.3E+01*	1.5E+01*	0.0E+00
ATRAZINE	2.3E+04	0.0E+00	2.3E+04	0.0E+00	0.0E+00	0.0E+00	1.0E-10
CARBON TETRACHLORIDE	2.5E+02	0.0E+00	2.5E+02	0.0E+00	0.0E+00	0.0E+00	8.4E-02
CHLOROFORM	5.1E+03	0.0E+00	5.1E+03	0.0E+00	0.0E+00	0.0E+00	5.1E-03
CHLOROPHENYLMETHYL SULFONE	9.1E+04	6.8E+02	6.7E+02	3.3E-06	4.4E-04	4.5E-04	0.0E+00
DICYCLOPENTADIENE	1.7E+04	0.0E+00	1.7E+04	0.0E+00	0.0E+00	0.0E+00	1.1E+00
DIELDRIN	2.0E+00	5.8E+01	1.9E+00	5.0E+00*	1.7E-01*	5.2E+00*	0.0E+00
DIISOPROPYLMETHYL PHOSPHONATE	3.7E+05	0.0E+00	3.7E+05	0.0E+00	0.0E+00	0.0E+00	2.4E-06
ENDRIN	1.4E+03	0.0E+00	1.4E+03	0.0E+00	0.0E+00	0.0E+00	1.7E-08
METHYLISOBUTYL KETONE	2.2E+05	2.1E+03	2.1E+03	4.0E-06	4.2E-04	4.3E-04	0.0E+00
METHYLENE CHLORIDE	4.1E+03	3.0E+00	3.0E+00	4.9E-04	6.7E-01*	6.7E-01*	0.0E+00
TETRACHLOROETHYLENE	6.5E+02	1.3E+01	1.2E+01	4.6E-04	2.4E-02	2.4E-02	1.2E-03
COPPER	1.8E+05	0.0E+00	1.8E+05	4.4E-04	0.0E+00	4.4E-04	0.0E+00
LEAD	6.5E+03	0.0E+00	6.5E+03	2.6E-02	0.0E+00	2.6E-02	0.0E+00
MERCURY	1.4E+03	0.0E+00	1.4E+03	6.0E-04	0.0E+00	6.0E-04	0.0E+00
ZINC	7.8E+05	0.0E+00	7.8E+05	3.6E-04	0.0E+00	3.6E-04	0.0E+00

*: EI is equal to or exceeds 1.0E-01

SPSA-4b-7
EXPOSURE EVALUATIONS FOR INDUSTRIAL WORKERS

CONTAMINANT	DIRECT	INDIRECT		CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI	
	PPLV (mg/kg)	OSVI (mg/kg)	ESVI (mg/kg)	PPLV (mg/kg)	EI	EI	EI	OPN	ENC
ALDRIN	1.2E-01	2.4E+03	4.0E-01	9.0E-02	4.3E+01*	1.3E+01*	5.6E+01*	0.0E+00	0.0E+00
ATRAZINE	4.2E+03	0.0E+00	0.0E+00	4.2E+03	0.0E+00	0.0E+00	0.0E+00	1.1E-12	1.0E-10
CARBON TETRACHLORIDE	1.5E+01	0.0E+00	0.0E+00	1.5E+01	0.0E+00	0.0E+00	0.0E+00	2.8E-03	2.5E-01
CHLOROFORM	3.1E+02	0.0E+00	0.0E+00	3.1E+02	0.0E+00	0.0E+00	0.0E+00	1.7E-04	1.5E-02
CHLOROPHENYLMETHYL SULFONE	1.7E+04	3.8E+04	6.8E+02	6.4E+02	1.8E-05	4.5E-04	4.7E-04	0.0E+00	0.0E+00
DICYCLOPENTADIENE	1.2E+03	0.0E+00	0.0E+00	1.2E+03	0.0E+00	0.0E+00	0.0E+00	1.2E-02	1.1E+00
DIELDRIN	1.2E-01	1.1E+03	1.9E+01	1.2E-01	8.2E+01*	5.3E-01*	8.2E+01*	0.0E+00	0.0E+00
DIISOPROPYLMETHYL PHOSPHONATE	6.8E+04	0.0E+00	0.0E+00	6.8E+04	0.0E+00	0.0E+00	0.0E+00	2.7E-08	2.4E-06
ENDRIN	2.5E+02	0.0E+00	0.0E+00	2.5E+02	0.0E+00	0.0E+00	0.0E+00	1.9E-10	1.7E-08
METHYL ISOBUTYL KETONE	4.0E+04	2.4E+04	6.4E+03	4.5E+03	2.3E-05	1.8E-04	2.0E-04	0.0E+00	0.0E+00
METHYLENE CHLORIDE	2.5E+02	1.7E+02	3.0E+00	2.9E+00	8.1E-03	6.8E-01*	6.9E-01*	0.0E+00	0.0E+00
TETRACHLOROETHYLENE	4.1E+01	7.0E+02	1.3E+01	9.5E+00	7.3E-03	2.4E-02	3.2E-02	4.1E-05	3.7E-03
COPPER	5.7E+04	0.0E+00	0.0E+00	5.7E+04	1.3E-03	0.0E+00	1.3E-03	0.0E+00	0.0E+00
LEAD	2.2E+03	0.0E+00	0.0E+00	2.2E+03	7.8E-02	0.0E+00	7.8E-02	0.0E+00	0.0E+00
MERCURY	4.6E+02	0.0E+00	0.0E+00	4.6E+02	1.8E-03	0.0E+00	1.8E-03	0.0E+00	0.0E+00
ZINC	1.4E+05	0.0E+00	0.0E+00	1.4E+05	2.0E-03	0.0E+00	2.0E-03	0.0E+00	0.0E+00

*: EI is equal to or exceeds 1.0E-01

2.20 SITE SPSA-5a: DRAINAGE DITCH (Army Spill Sites/South Plants Manufacturing Complex; EBASCO, 1988aa/RIC 88286R10)

2.20.1 Site-Specific Considerations

Figure SPSA-5a-1 and Tables SPSA-5a-1 and SPSA-5a-2 depict the target contaminants for Site SPSA-5a. Boring 42 was included in this exposure assessment, consistent with the South Plants SAR. The historical search conducted under the contaminant assessment revealed that this site was a drainage ditch used to carry surface runoff and process water from the South Plants complex (EBASCO, 1988aa/RIC 88286R10). Therefore, many of the chemicals from the RMA target contaminant list were suspected to be present in Site SPSA-5a (EBASCO, 1988aa/RIC 88286R10).

2.20.2 Spatial Distribution of Measured Contaminant Concentrations

The locations and concentrations of the target contaminants that were detected in Site SPSA-5a are shown in Figure SPSA-5a-1. The following contaminants were not included in this figure since they were not considered target contaminants during Phase I and Phase II investigations: Fluoranthene, occurring in Boring 42 (0-1 ft), and pyrene, occurring in Boring 42 (0-1 ft). Although not shown in this figure, these nontarget compounds were included in the South Plants SAR and in this exposure assessment because they passed through the screening performed in the RMA Chemical Index (EBASCO, 1988c/RIC 88357R01).

Table SPSA-5a-1 summarizes the maximum concentrations of contaminants measured in soil above indicator levels for the ICP metals, arsenic, and mercury and CRLs for organic contaminants from the Phase I and Phase II investigations. The boring number and depth where the maximum value was observed are shown. No data were included for ICP metals, arsenic, and mercury in Horizon 2 because direct soil exposure below 10 ft is assumed to be negligible (see Volume VI-A). Table SPSA-5a-2 summarizes the maximum concentrations detected in groundwater together with the well number, location, sampling interval, and depth to groundwater.

2.20.3 Site Exposure Summary

Tables SPSA-5a-3 through SPSA-5a-7 present Draft PPLVs, EIs, and VEIs for each site contaminant. Since the depth to groundwater below Site SPSA-5a is greater than 10 ft, the enclosed space vapor inhalation SPPPLV is included in the calculation of the cumulative quantity. The COCs are summarized below for each exposed population and with the critical exposure pathway identified.

Contaminants of Concern	Regulated Visitor	Casual Visitor	Recreational Visitor	Commercial Worker	Industrial Worker
Dieldrin	Direct	Direct	Direct	Direct	Dir/Ind
Cadmium	--	--	--	--	Direct

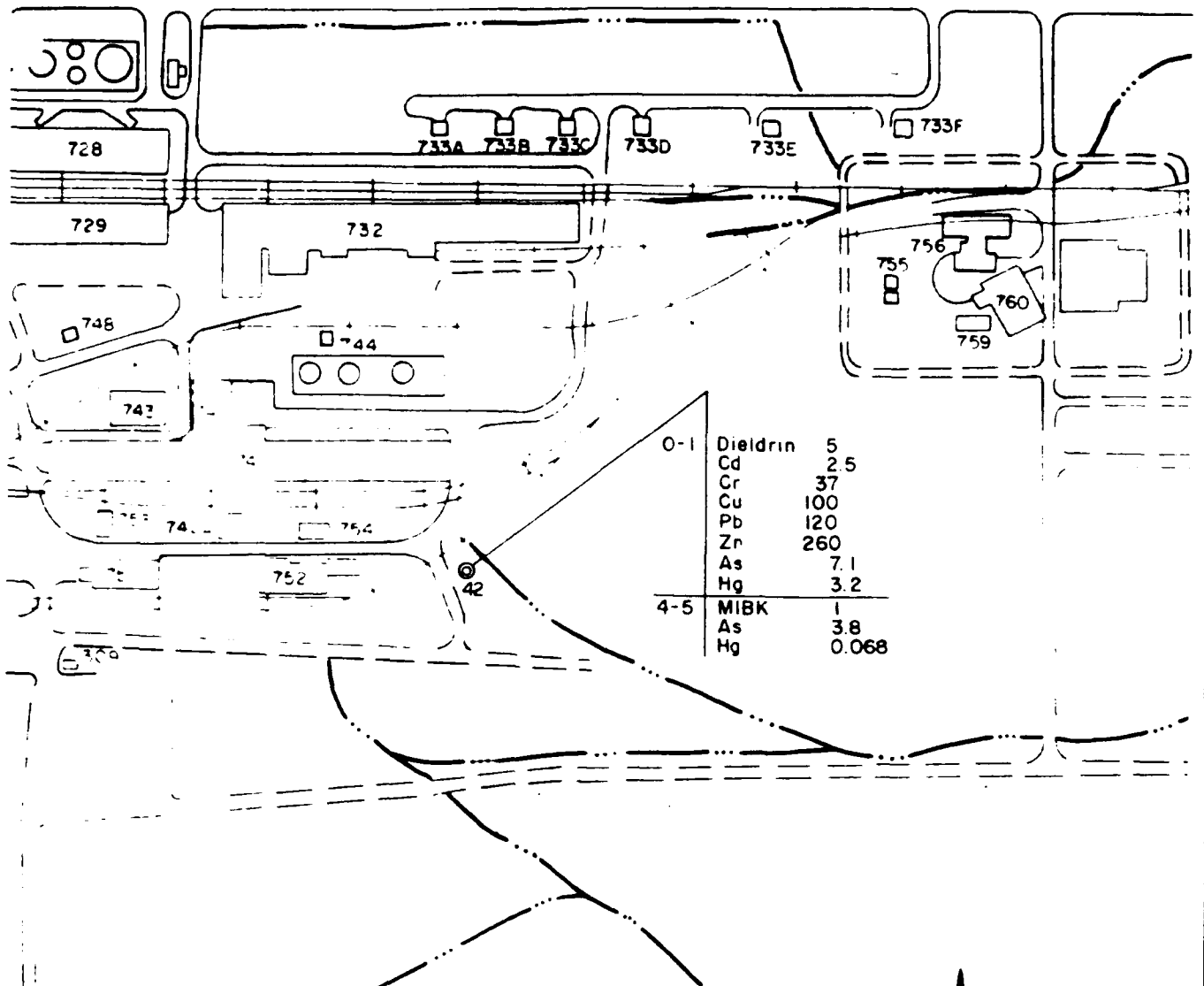
Note: Direct exposure pathways for soils include soil ingestion, suspended particulate inhalation, and dermal contact.
Indirect exposure pathways include open and enclosed space vapor inhalation.

The results of the soil exposure summary indicate that exposure to contamination from the direct and indirect pathways both contribute to the exceedance of the cumulative PPLVs. Site SPSA-5a is designated as a Priority 1 site, based on the most sensitive exposed population PPLV (i.e., the industrial worker).

The following groundwater contaminants result in an unacceptable exposure due to vapor inhalation as indicated by a VEI value greater than 1:

- Carbon tetrachloride (enclosed)
- Chloroform (enclosed)
- Trichloroethylene (enclosed)

DECEMBER 7th AVENUE



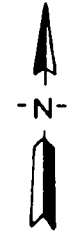
0-1	Dieldrin	5
	Cd	2.5
	Cr	37
	Cu	100
	Pb	120
	Zn	260
	As	7.1
	Hg	3.2
4-5	MIBK	1
	As	3.8
	Hg	0.068

LEGEND

51 Phase I boring and number

Sample Interval (ft) → 0-1 | Analyte Dieldrin 0.6 | Level (ug/g)

- MIBK - Methyl isobutyl ketone
- As - Arsenic
- Cd - Cadmium
- Cr - Chromium
- Cu - Copper
- Pb - Lead
- Hg - Mercury
- Zn - Zinc



Prepared for:

Program Manager's Office for
Rocky Mountain Arsenal Cleanup
Aberdeen Proving Ground, Maryland

FIGURE SPSA-5a-1

Phase I and Phase II Analytes Detected
Within or Above Indicator Levels

Rocky Mountain Arsenal
Prepared by: Ebasco Services Incorporated

TABLE SPSA-5a-1
SOIL CONTAMINANT CONCENTRATIONS
FOR SITE SPSA-5a

Contaminant	Horizon 1			Horizon 2		
	Max. (ug/g)	Depth (ft)	Boring Number	Max. (ug/g)	Depth (ft)	Boring Number
Dieldrin	5	0-1	42	5	0-1	42
Fluoranthene ^{1/}	0.7	0-1	42	0.7	0-1	42
Methylisobutyl ketone	1	4-5	42	1	4-5	42
Pyrene ^{1/}	0.2	0-1	42	0.2	0-1	42
Cadmium	2.5	0-1	42	--	--	--
Copper	100	0-1	42	--	--	--
Lead	120	0-1	42	--	--	--
Mercury	3.2	0-1	42	--	--	--
Zinc	260	0-1	42	--	--	--

1/ Nontarget contaminant. Refer to the exposure assessment nontarget screen in Appendix A.

SPSA
Max.
ug/g
ft

South Plains Study Area
Maximum
microgram per gram
foot/feet

TABLE SPSA-5a-2
GROUNDWATER CONTAMINANT CONCENTRATIONS (UG/L)
FOR SITE SPSA-5a

AVERAGE SITE DEPTH TO GROUNDWATER: 16 Feet

CHEMICAL	CONCENTRATION MAXIMUM	LOCATION (WELL NUMBER)	SAMPLE DATE
BENZENE	34	01510	12/22/87
CARBON TETRACHLORIDE	41	01510	12/16/88
CHLOROFORM	350	01510	12/16/88
HEXACHLOROCYCLOPENTADIENE	0.40	01510	12/16/88
CHLOROBENZENE	8.7	01510	12/16/88
DIBROMOCHLOROPROPANE	3.1	01510	12/22/87
DIISOPROPYLMETHYL PHOSPHONATE	0.84	01055	12/21/88
DIMETHYLMETHYL PHOSPHONATE	1.0	01055	12/21/88
ENDRIN	0.21	01510	12/16/88
PPDDT	0.42	01510	12/16/88
SUPONA	1.1	01055	12/21/88
TETRACHLOROETHYLENE	1.7	01510	12/16/88
TRICHLOROETHYLENE	84	01055	12/21/88

EACH VALUE PRESENTED IS THE MAXIMUM CONCENTRATION FOR THE LISTED ANALYTE FOR THE PERIOD March 17, 1987 TO February 28, 1989.
DATA SOURCE: DP ASSOCIATES, RMA Database, July 19, 1990

SPSA-5a-3
EXPOSURE EVALUATIONS FOR REGULATED VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI OPN
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	
BENZENE	8.6E+02	0.0E+00	8.6E+02	0.0E+00	0.0E+00	0.0E+00	5.5E-05
CARBON TETRACHLORIDE	2.0E+02	0.0E+00	2.0E+02	0.0E+00	0.0E+00	0.0E+00	1.2E-03
CHLOROBENZENE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	1.2E-07
CHLOROFORM	4.0E+03	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	8.5E-05
PPDDT	7.4E+01	0.0E+00	7.4E+01	0.0E+00	0.0E+00	0.0E+00	3.7E-07
DIBROMOCHLOROPROPANE	1.8E+01	0.0E+00	1.8E+01	0.0E+00	0.0E+00	0.0E+00	1.0E-05
DIELDRIN	1.6E+00	1.0E+06	1.6E+00	3.2E+00*	5.5E-05a	3.2E+00*	0.0E+00
DIISOPROPYLMETHYL PHOSPHONATE	6.6E+05	0.0E+00	6.6E+05	0.0E+00	0.0E+00	0.0E+00	3.1E-11
DIMETHYLMETHYL PHOSPHONATE	1.5E+05	0.0E+00	1.5E+05	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENDRIN	2.5E+03	0.0E+00	2.5E+03	0.0E+00	0.0E+00	0.0E+00	1.9E-11
HEXACHLOROCYCLOPENTADIENE	1.7E+04	0.0E+00	1.7E+04	0.0E+00	0.0E+00	0.0E+00	5.5E-06
METHYLISOBUTYL KETONE	4.1E+05	1.8E+06	3.3E+05	2.4E-06	5.5E-07	3.0E-06	0.0E+00
SUPONA	1.2E+03	0.0E+00	1.2E+03	0.0E+00	0.0E+00	0.0E+00	6.2E-14
TETRACHLOROETHYLENE	5.1E+02	0.0E+00	5.1E+02	0.0E+00	0.0E+00	0.0E+00	1.2E-06
TRICHLOROETHYLENE	2.3E+03	0.0E+00	2.3E+03	0.0E+00	0.0E+00	0.0E+00	1.2E-04
CADMIUM	4.5E+02	0.0E+00	4.5E+02	5.5E-03	0.0E+00	5.5E-03	0.0E+00
COPPER	4.2E+05	0.0E+00	4.2E+05	2.4E-04	0.0E+00	2.4E-04	0.0E+00
LEAD	1.5E+04	0.0E+00	1.5E+04	7.8E-03	0.0E+00	7.8E-03	0.0E+00
MERCURY	3.3E+03	0.0E+00	3.3E+03	9.7E-04	0.0E+00	9.7E-04	0.0E+00
ZINC	2.0E+06	0.0E+00	2.0E+06	1.3E-04	0.0E+00	1.3E-04	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPLV for this contaminant is considered to be equal to pure compound. The SPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-5a-4
EXPOSURE EVALUATIONS FOR CASUAL VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI OPN
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	
BENZENE	8.6E+02	0.0E+00	8.6E+02	0.0E+00	0.0E+00	0.0E+00	5.5E-05
CARBON TETRACHLORIDE	2.0E+02	0.0E+00	2.0E+02	0.0E+00	0.0E+00	0.0E+00	1.2E-03
CHLOROBENZENE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	1.2E-07
CHLOROFORM	4.0E+03	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	8.5E-05
PPDDT	7.4E+01	0.0E+00	7.4E+01	0.0E+00	0.0E+00	0.0E+00	3.7E-07
DIBROMOCHLOROPROPANE	1.8E+01	0.0E+00	1.8E+01	0.0E+00	0.0E+00	0.0E+00	1.0E-05
DIELDRIN	1.6E+00	1.0E+06	1.6E+00	3.2E+00*	5.5E-05a	3.2E+00*	0.0E+00
DIISOPROPYLMETHYL PHOSPHONATE	6.6E+05	0.0E+00	6.6E+05	0.0E+00	0.0E+00	0.0E+00	3.1E-11
DIMETHYMETHYL PHOSPHONATE	1.5E+05	0.0E+00	1.5E+05	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENDRIN	2.5E+03	0.0E+00	2.5E+03	0.0E+00	0.0E+00	0.0E+00	1.9E-11
HEXACHLOROCYCLOPENTADIENE	1.7E+04	0.0E+00	1.7E+04	0.0E+00	0.0E+00	0.0E+00	5.5E-06
METHYLISOBUTYL KETONE	4.1E+05	1.8E+06	3.3E+05	2.4E-06	5.5E-07	3.0E-06	0.0E+00
SUPONA	1.2E+03	0.0E+00	1.2E+03	0.0E+00	0.0E+00	0.0E+00	6.2E-14
TETRACHLOROETHYLENE	5.1E+02	0.0E+00	5.1E+02	0.0E+00	0.0E+00	0.0E+00	1.2E-06
TRICHLOROETHYLENE	2.3E+03	0.0E+00	2.3E+03	0.0E+00	0.0E+00	0.0E+00	1.2E-04
CADMIUM	4.5E+02	0.0E+00	4.5E+02	5.5E-03	0.0E+00	5.5E-03	0.0E+00
COPPER	4.2E+05	0.0E+00	4.2E+05	2.4E-04	0.0E+00	2.4E-04	0.0E+00
LEAD	1.5E+04	0.0E+00	1.5E+04	7.8E-03	0.0E+00	7.8E-03	0.0E+00
MERCURY	3.3E+03	0.0E+00	3.3E+03	9.7E-04	0.0E+00	9.7E-04	0.0E+00
ZINC	2.0E+06	0.0E+00	2.0E+06	1.3E-04	0.0E+00	1.3E-04	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPPLV for this contaminant is considered to be equal to pure compound. The SPPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-5a-5
EXPOSURE EVALUATIONS FOR RECREATIONAL VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI OPN
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	
BENZENE	1.2E+02	0.0E+00	1.2E+02	0.0E+00	0.0E+00	0.0E+00	8.3E-04
CARBON TETRACHLORIDE	2.7E+01	0.0E+00	2.7E+01	0.0E+00	0.0E+00	0.0E+00	1.7E-02
CHLOROBENZENE	6.8E+04	0.0E+00	6.8E+04	0.0E+00	0.0E+00	0.0E+00	7.8E-07
CHLOROFORM	5.6E+02	0.0E+00	5.6E+02	0.0E+00	0.0E+00	0.0E+00	1.3E-03
PPDDT	1.0E+01	0.0E+00	1.0E+01	0.0E+00	0.0E+00	0.0E+00	5.7E-06
DIBROMOCHLOROPROPANE	2.5E+00	0.0E+00	2.5E+00	0.0E+00	0.0E+00	0.0E+00	1.6E-04
DIELDRIN	2.2E-01	1.0E+06	2.2E-01	2.3E+01*	8.4E-04a	2.3E+01*	0.0E+00
DIISOPROPYLMETHYL PHOSPHONATE	2.8E+05	0.0E+00	2.8E+05	0.0E+00	0.0E+00	0.0E+00	2.0E-10
DIMETHYMETHYL PHOSPHONATE	6.3E+04	0.0E+00	6.3E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENDRIN	1.1E+03	0.0E+00	1.1E+03	0.0E+00	0.0E+00	0.0E+00	1.2E-10
HEXACHLOROCYCLOPENTADIENE	5.7E+03	0.0E+00	5.7E+03	0.0E+00	0.0E+00	0.0E+00	3.6E-05
METHYLISOBUTYL KETONE	1.7E+05	6.6E+05	1.4E+05	5.8E-06	1.5E-06	7.3E-06	0.0E+00
SUPONA	5.3E+02	0.0E+00	5.3E+02	0.0E+00	0.0E+00	0.0E+00	4.0E-13
TETRACHLOROETHYLENE	7.1E+01	0.0E+00	7.1E+01	0.0E+00	0.0E+00	0.0E+00	1.8E-05
TRICHLOROETHYLENE	3.2E+02	0.0E+00	3.2E+02	0.0E+00	0.0E+00	0.0E+00	1.8E-03
CADMIUM	5.8E+01	0.0E+00	5.8E+01	4.3E-02	0.0E+00	4.3E-02	0.0E+00
COPPER	2.5E+05	0.0E+00	2.5E+05	4.0E-04	0.0E+00	4.0E-04	0.0E+00
LEAD	9.2E+03	0.0E+00	9.2E+03	1.3E-02	0.0E+00	1.3E-02	0.0E+00
MERCURY	2.0E+03	0.0E+00	2.0E+03	1.6E-03	0.0E+00	1.6E-03	0.0E+00
ZINC	1.1E+06	0.0E+00	1.1E+06	2.5E-04	0.0E+00	2.5E-04	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPPLV for this contaminant is considered to be equal to pure compound. The SPPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-5a-6
EXPOSURE EVALUATIONS FOR COMMERCIAL WORKERS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI ENC
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	
BENZENE	1.1E+03	0.0E+00	1.1E+03	0.0E+00	0.0E+00	0.0E+00	3.0E-01
CARBON TETRACHLORIDE	2.5E+02	0.0E+00	2.5E+02	0.0E+00	0.0E+00	0.0E+00	6.2E+00
CHLOROBENZENE	8.8E+04	0.0E+00	8.8E+04	0.0E+00	0.0E+00	0.0E+00	2.0E-03
CHLOROFORM	5.1E+03	0.0E+00	5.1E+03	0.0E+00	0.0E+00	0.0E+00	4.6E-01
PPDDT	9.3E+01	0.0E+00	9.3E+01	0.0E+00	0.0E+00	0.0E+00	2.0E-03
DIBROMOCHLOROPROPANE	2.3E+01	0.0E+00	2.3E+01	0.0E+00	0.0E+00	0.0E+00	5.6E-02
DIELDRIN	2.0E+00	1.0E+06	1.9E+00	2.5E+00*	8.7E-02a	2.6E+00*	0.0E+00
DIISOPROPYLMETHYL PHOSPHONATE	3.7E+05	0.0E+00	3.7E+05	0.0E+00	0.0E+00	0.0E+00	5.1E-07
DIMETHYLMETHYL PHOSPHONATE	8.2E+04	0.0E+00	8.2E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENDRIN	1.4E+03	0.0E+00	1.4E+03	0.0E+00	0.0E+00	0.0E+00	3.1E-07
HEXACHLOROCYCLOPENTADIENE	5.5E+03	0.0E+00	5.5E+03	0.0E+00	0.0E+00	0.0E+00	8.9E-02
METHYLISOBUTYL KETONE	2.2E+05	1.9E+04	1.8E+04	4.5E-06	5.2E-05	5.7E-05	0.0E+00
SUPONA	6.9E+02	0.0E+00	6.9E+02	0.0E+00	0.0E+00	0.0E+00	1.0E-09
TETRACHLOROETHYLENE	6.5E+02	0.0E+00	6.5E+02	0.0E+00	0.0E+00	0.0E+00	6.6E-03
TRICHLOROETHYLENE	2.9E+03	0.0E+00	2.9E+03	0.0E+00	0.0E+00	0.0E+00	6.4E-01
CADMIUM	3.6E+02	0.0E+00	3.6E+02	7.0E-03	0.0E+00	7.0E-03	0.0E+00
COPPER	1.8E+05	0.0E+00	1.8E+05	5.7E-04	0.0E+00	5.7E-04	0.0E+00
LEAD	6.5E+03	0.0E+00	6.5E+03	1.8E-02	0.0E+00	1.8E-02	0.0E+00
MERCURY	1.4E+03	0.0E+00	1.4E+03	2.3E-03	0.0E+00	2.3E-03	0.0E+00
ZINC	7.8E+05	0.0E+00	7.8E+05	3.3E-04	0.0E+00	3.3E-04	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPPLV for this contaminant is considered to be equal to pure compound. The SPPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

SPSA-5a-7
EXPOSURE EVALUATIONS FOR INDUSTRIAL WORKERS

CONTAMINANT	DIRECT	INDIRECT		CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI	
	PPLV (mg/kg)	OSVI (mg/kg)	ESVI (mg/kg)	PPLV (mg/kg)	EI	EI	EI	OPN	ENC
BENZENE	6.7E+01	0.0E+00	0.0E+00	6.7E+01	0.0E+00	0.0E+00	0.0E+00	4.1E-04	8.9E-01
CARBON TETRACHLORIDE	1.5E+01	0.0E+00	0.0E+00	1.5E+01	0.0E+00	0.0E+00	0.0E+00	8.7E-03	1.9E+01
CHLOROBENZENE	1.5E+04	0.0E+00	0.0E+00	1.5E+04	0.0E+00	0.0E+00	0.0E+00	9.0E-07	2.0E-03
CHLOROFORM	3.1E+02	0.0E+00	0.0E+00	3.1E+02	0.0E+00	0.0E+00	0.0E+00	6.4E-04	1.4E+00
PPDDT	5.7E+00	0.0E+00	0.0E+00	5.7E+00	0.0E+00	0.0E+00	0.0E+00	2.8E-06	6.1E-03
DIBROMOCHLOROPROPANE	1.4E+00	0.0E+00	0.0E+00	1.4E+00	0.0E+00	0.0E+00	0.0E+00	7.8E-05	1.7E-01
DIELDRIN	1.2E-01	1.2E+04	1.9E+01	1.2E-01	4.1E+01*	2.6E-01*	4.1E+01*	0.0E+00	0.0E+00
DIISOPROPYLMETHYL PHOSPHONATE	6.8E+04	0.0E+00	0.0E+00	6.8E+04	0.0E+00	0.0E+00	0.0E+00	2.4E-10	5.1E-07
DIMETHYMETHYL PHOSPHONATE	1.5E+04	0.0E+00	0.0E+00	1.5E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENDRIN	2.5E+02	0.0E+00	0.0E+00	2.5E+02	0.0E+00	0.0E+00	0.0E+00	1.4E-10	3.1E-07
HEXACHLOROCYCLOPENTADIENE	3.8E+02	0.0E+00	0.0E+00	3.8E+02	0.0E+00	0.0E+00	0.0E+00	4.1E-05	8.9E-02
METHYL ISOBUTYL KETONE	4.0E+04	2.4E+05	5.8E+04	2.1E+04	2.5E-05	2.2E-05	4.7E-05	0.0E+00	0.0E+00
SUPONA	1.3E+02	0.0E+00	0.0E+00	1.3E+02	0.0E+00	0.0E+00	0.0E+00	4.6E-13	1.0E-09
TETRACHLOROETHYLENE	4.1E+01	0.0E+00	0.0E+00	4.1E+01	0.0E+00	0.0E+00	0.0E+00	9.1E-06	2.0E-02
TRICHLOROETHYLENE	1.8E+02	0.0E+00	0.0E+00	1.8E+02	0.0E+00	0.0E+00	0.0E+00	8.9E-04	1.9E+00
CADMIUM	7.6E+00	0.0E+00	0.0E+00	7.6E+00	3.3E-01*	0.0E+00	3.3E-01*	0.0E+00	0.0E+00
COPPER	5.7E+04	0.0E+00	0.0E+00	5.7E+04	1.8E-03	0.0E+00	1.8E-03	0.0E+00	0.0E+00
LEAD	2.2E+03	0.0E+00	0.0E+00	2.2E+03	5.5E-02	0.0E+00	5.5E-02	0.0E+00	0.0E+00
MERCURY	4.6E+02	0.0E+00	0.0E+00	4.6E+02	6.9E-03	0.0E+00	6.9E-03	0.0E+00	0.0E+00
C	1.4E+05	0.0E+00	0.0E+00	1.4E+05	1.9E-03	0.0E+00	1.9E-03	0.0E+00	0.0E+00

*: EI is equal to or exceeds 1.0E-01

2.21 SITE SPSA-5b: BALANCE OF SPSA-5 (formerly Section 1-Uncontaminated Area, EBASCO, 1987o/RIC 87127R06; Section 1-Nonsource Area, EBASCO, 1988x/RIC 87127R06A; Section 2-Uncontaminated Area, EBASCO, 1987p/RIC 87127R08; Site 1-11: Sanitary Landfill; EBASCO, 1988n/RIC 87216R01A; Army Spill Sites/South Plants Manufacturing Complex, EBASCO, 1988aa/RIC 88286R10; South Plants Regional Study Area/South Plants Manufacturing Complex, EBASCO, 1988z/RIC 88306R01)

2.21.1 Site-Specific Considerations

Figure SPSA-5b-1 and Tables SPSA-5b-1 and SPSA-5b-2 depict the target contaminants for Site SPSA-5b. Borings 1, 1a, 2, 2a, 3, 3a, 4, 4a, 5, 5a, 6, 22, 38, 39, 40, 40a, 41, 41a, 45, and 52 through 55 were included in this exposure assessment, consistent with the South Plants SAR. The historical search conducted under the contaminant assessment revealed that toluene, ethylbenzene, and dicyclopentadiene were suspected to be present in Site SPSA-5b (EBASCO, 1988aa/RIC 88286R10). According to site history, no other chemicals from the RMA target contaminant list were suspected to be present in Site SPSA-5b (EBASCO, 1987o/RIC 87127R06).

2.21.2 Spatial Distribution of Measured Contaminant Concentrations

The locations and concentrations of the target contaminants that were detected in Site SPSA-5b are shown in Figure SPSA-5b-1. The following contaminants were not included in this figure, since they were not considered target contaminants during Phase I and Phase II investigations: Fluoranthene, occurring in Boring 40 (0-1 ft), and pyrene, occurring in Boring 40 (0-1 ft). Although not shown in this figure, these nontarget compounds were included in the South Plants SAR and in this exposure assessment because they passed through the screening process performed in the RMA Chemical Index (EBASCO, 1988c/RIC 88357R01).

Table SPSA-5b-1 summarizes the maximum concentrations of contaminants measured in soil above indicator levels for the ICP metals, arsenic, and mercury and CRLs for organic contaminants from the Phase I and Phase II investigations. The boring number and depth where the maximum value was observed are shown. No data were included for ICP metals, arsenic, and mercury in Horizon 2 because direct soil exposure below 10 ft is assumed to be negligible (see Volume VI-A). Table SPSA-5b-2 summarizes the maximum

concentrations detected in groundwater together with the well number, location, sampling interval, and depth to groundwater.

2.21.3 Site Exposure Summary

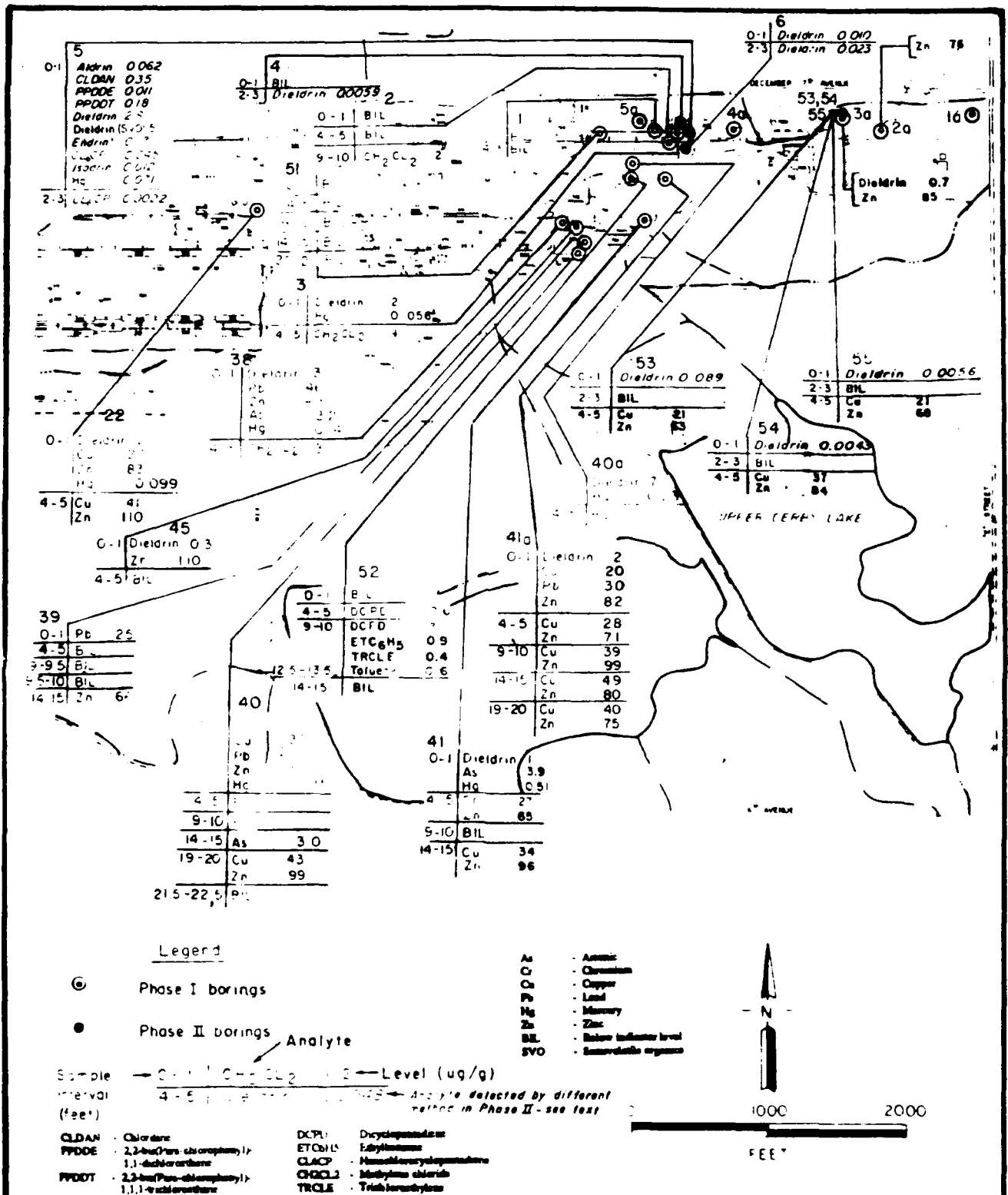
Tables SPSA-5b-3 through SPSA-5b-7 present Draft PPLVs, EIs, and VEIs for each site contaminant. Since the depth to groundwater below Site SPSA-5b is greater than 10 ft, the enclosed space vapor inhalation SPPPLV is included in the calculation of the cumulative quantity. The COCs are summarized below for each exposed population and with the critical exposure pathway identified.

Contaminants of Concern	Regulated Visitor	Casual Visitor	Recreational Visitor	Commercial Worker	Industrial Worker
Dieldrin	Direct	Direct	Direct	Dir/Ind	Dir/Ind
Chromium	Direct	Direct	Direct	Direct	Direct
Aldrin	--	--	Direct	Indirect	Dir/Ind
Chlordane	--	--	Direct	--	Direct
Dicyclopentadiene	--	--	--	Indirect	Indirect
Methylene chloride	--	--	--	Indirect	Indirect
Trichloroethylene	--	--	--	Indirect	Indirect

Note: Direct exposure pathways for soils include soil ingestion, suspended particulate inhalation, and dermal contact.
 Indirect exposure pathways include open and enclosed space vapor inhalation.

The results of the soil exposure summary indicate that exposure to contamination from the direct and indirect pathways both contribute to the exceedance of the cumulative PPLVs. Site SPSA-5b is designated as a Priority 1 site, based on the most sensitive exposed population PPLV (i.e., the industrial worker).

No groundwater contaminants result in an unacceptable exposure due to vapor inhalation as indicated by VEI values less than 1.



Prepared for

Program Manager's Office for
Rocky Mountain Arsenal Cleanup
Aberdeen Proving Ground, Maryland

FIGURE SPSA-5b-1

Phase I and Phase II Analytes Detected
Within or Above Indicator Levels

Rocky Mountain Arsenal

Prepared by Etasco Services Incorporated

TABLE SPSA-5b-1
SOIL CONTAMINANT CONCENTRATIONS
FOR SITE SPSA-5b

Contaminant	Horizon 1			Horizon 2		
	Max. (ug/g)	Depth (ft)	Boring Number	Max. (ug/g)	Depth (ft)	Boring Number
Aldrin	0.062	0-1	5	0.062	0-1	5
Chlordane	0.35	0-1	5	0.35	0-1	5
Dieldrin	7	0-1	40a	7	0-1	40a
PPDDE ^{1/}	0.011	0-1	5	0.011	0-1	5
PPDDT ^{2/}	0.18	0-1	5	0.18	0-1	5
Dicyclopentadiene	7	9-10	52	7	9-10	52
Endrin	0.17	0-1	5	0.17	0-1	5
Ethylbenzene	0.9	9-10	52	0.9	9-10	52
Fluoranthene ^{3/}	4.0	0-1	40	4.0	0-1	40
Hexachlorocyclopentadiene	0.045	0-1	5	0.045	0-1	5
Isodrin	0.012	0-1	5	0.012	0-1	5
Methylene chloride	3	4-5	38	3	4-5	38
Pyrene ^{3/}	3.0	0-1	40	3.0	0-1	40
Toluene	--	--	--	--	--	--
Trichloroethylene	0.4	9-10	52	0.4	9-10	52
Chromium	120	0-1	40	--	--	--
Copper	41	4-5	22	--	--	--
Lead	200	0-1	40	--	--	--
Mercury	0.51	0-1	41	--	--	--
Zinc	160	0-1	40	--	--	--

TABLE SPSA-5b-1 (Continued)
SOIL CONTAMINANT CONCENTRATIONS
FOR SITE SPSA-5b

- 1/ PPDE 2,2-bis(Para-chlorophenyl)-1,1-dichloroethene
- 2/ PPDDT 2,2-bis(Para-chlorophenyl)-1,1,1-trichloroethane
- 3/ Nontarget contaminant. Refer to the exposure assessment nontarget screen in Appendix A.

SPSA South Plants Study Area

Max. Maximum
ug/g microgram per gram
ft foot/feet

TABLE SPSA-5b-2

GROUNDWATER CONTAMINANT CONCENTRATIONS (UG/L)
FOR SITE SPSA-5b

AVERAGE SITE DEPTH TO GROUNDWATER: 19 Feet

CHEMICAL	CONCENTRATION MAXIMUM	LOCATION (WELL NUMBER)	SAMPLE DATE
BENZOTHAZOLE	6.9	01008	01/29/88
CARBON TETRACHLORIDE	1.9	01008	01/10/89
CHLOROFORM	5.9	01008	01/29/88
CHLOROPHENYLMETHYL SULFIDE	7.5	01008	01/29/88
CHLOROPHENYLMETHYL SULFONE	6.7	01008	01/29/88
DIISOPROPYLMETHYL PHOSPHONATE	1.4	01008	01/10/89
DIELDRIN	0.34	01008	01/29/88
ENDRIN	0.046	01008	01/29/88
TRICHLOROETHYLENE	3.1	01008	01/10/89

EACH VALUE PRESENTED IS THE MAXIMUM CONCENTRATION FOR THE LISTED ANALYTE
FOR THE PERIOD March 17, 1987 TO February 28, 1989.
DATA SOURCE: DP ASSOCIATES, RMA Database, July 19, 1990

SPSA-5b-3
EXPOSURE EVALUATIONS FOR REGULATED VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI OPN
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	
ALDRIN	1.5E+00	2.0E+04	1.5E+00	4.1E-02	3.1E-06	4.1E-02	0.0E+00
BENZOTHIAZOLE	3.9E+04	0.0E+00	3.9E+04	0.0E+00	0.0E+00	0.0E+00	3.9E-08
CARBON TETRACHLORIDE	2.0E+02	0.0E+00	2.0E+02	0.0E+00	0.0E+00	0.0E+00	4.3E-04
CHLORDANE	2.0E+01	2.2E+06	2.0E+01	1.8E-02	1.6E-07	1.8E-02	0.0E+00
CHLOROFORM	4.0E+03	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	1.2E-05
CHLOROPHENYLMETHYL SULFIDE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	3.5E-08
CHLOROPHENYLMETHYL SULFONE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	3.7E-10
PPDDE	7.4E+01	1.2E+06	7.4E+01	1.5E-04	9.0E-09	1.5E-04	0.0E+00
PPDDT	7.4E+01	2.6E+06	7.4E+01	2.4E-03	6.9E-08	2.4E-03	0.0E+00
DICYCLOPENTADIENE	5.4E+04	2.5E+02	2.5E+02	1.3E-04	2.8E-02	2.9E-02	0.0E+00
DIELDRIN	1.6E+00	1.0E+06	1.6E+00	4.4E+00*	1.1E-03a	4.5E+00*	0.0E+00
DIISOPROPYLMETHYL PHOSPHONATE	6.6E+05	0.0E+00	6.6E+05	0.0E+00	0.0E+00	0.0E+00	4.3E-10
ENDRIN	2.5E+03	7.5E+06	2.5E+03	6.9E-05	2.3E-08	6.9E-05	3.4E-11
ETHYLBENZENE	8.3E+05	8.7E+05	4.2E+05	1.1E-06	1.0E-06	2.1E-06	0.0E+00
HEXACHLOROCYCLOPENTADIENE	1.7E+04	2.6E+02	2.5E+02	2.7E-06	1.8E-04	1.8E-04	0.0E+00
ISODRIN	5.8E+02	1.5E+06	5.8E+02	2.1E-05	8.2E-09	2.1E-05	0.0E+00
METHYLENE CHLORIDE	3.3E+03	1.0E+03	7.7E+02	9.2E-04	3.0E-03	3.9E-03	0.0E+00
TOLUENE	2.5E+06	9.9E+06	2.0E+06	0.0E+00	6.1E-08	6.1E-08	0.0E+00
TRICHLOROETHYLENE	2.3E+03	1.5E+03	9.0E+02	1.7E-04	2.7E-04	4.5E-04	3.6E-05
CHROMIUM	6.9E+01	0.0E+00	6.9E+01	1.7E+00*	0.0E+00	1.7E+00*	0.0E+00
COPPER	4.2E+05	0.0E+00	4.2E+05	9.8E-05	0.0E+00	9.8E-05	0.0E+00
LEAD	1.5E+04	0.0E+00	1.5E+04	1.3E-02	0.0E+00	1.3E-02	0.0E+00
MERCURY	3.3E+03	0.0E+00	3.3E+03	1.5E-04	0.0E+00	1.5E-04	0.0E+00
ZINC	2.0E+06	0.0E+00	2.0E+06	8.1E-05	0.0E+00	8.1E-05	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPLV for this contaminant is considered to be equal to pure compound. The SPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-5b-4
EXPOSURE EVALUATIONS FOR CASUAL VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI OPN
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	
ALDRIN	1.5E+00	2.0E+04	1.5E+00	4.1E-02	3.1E-06	4.1E-02	0.0E+00
BENZOTHAZOLE	3.9E+04	0.0E+00	3.9E+04	0.0E+00	0.0E+00	0.0E+00	3.9E-08
CARBON TETRACHLORIDE	2.0E+02	0.0E+00	2.0E+02	0.0E+00	0.0E+00	0.0E+00	4.3E-04
CHLORDANE	2.0E+01	2.2E+06	2.0E+01	1.8E-02	1.6E-07	1.8E-02	0.0E+00
CHLOROFORM	4.0E+03	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	1.2E-05
CHLOROPHENYLMETHYL SULFIDE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	3.5E-08
CHLOROPHENYLMETHYL SULFONE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	3.7E-10
PPDDE	7.4E+01	1.2E+06	7.4E+01	1.5E-04	9.0E-09	1.5E-04	0.0E+00
PPDDT	7.4E+01	2.6E+06	7.4E+01	2.4E-03	6.9E-08	2.4E-03	0.0E+00
DICYCLOPENTADIENE	5.4E+04	2.5E+02	2.5E+02	1.3E-04	2.8E-02	2.9E-02	0.0E+00
DIELDRIN	1.6E+00	1.0E+06	1.6E+00	4.4E+00*	1.1E-03a	4.5E+00*	0.0E+00
DIISOPROPYLMETHYL PHOSPHONATE	6.6E+05	0.0E+00	6.6E+05	0.0E+00	0.0E+00	0.0E+00	4.3E-10
ENDRIN	2.5E+03	7.5E+06	2.5E+03	6.9E-05	2.3E-08	6.9E-05	3.4E-11
ETHYLBENZENE	8.3E+05	8.7E+05	4.2E+05	1.1E-06	1.0E-06	2.1E-06	0.0E+00
HEXACHLOROCYCLOPENTADIENE	1.7E+04	2.6E+02	2.5E+02	2.7E-06	1.8E-04	1.8E-04	0.0E+00
ISODRIN	5.8E+02	1.5E+06	5.8E+02	2.1E-05	8.2E-09	2.1E-05	0.0E+00
METHYLENE CHLORIDE	3.3E+03	1.0E+03	7.7E+02	9.2E-04	3.0E-03	3.9E-03	0.0E+00
TOLUENE	2.5E+06	9.9E+06	2.0E+06	0.0E+00	6.1E-08	6.1E-08	0.0E+00
TRICHLOROETHYLENE	2.3E+03	1.5E+03	9.0E+02	1.7E-04	2.7E-04	4.5E-04	3.6E-05
CHROMIUM	6.9E+01	0.0E+00	6.9E+01	1.7E+00*	0.0E+00	1.7E+00*	0.0E+00
COPPER	4.2E+05	0.0E+00	4.2E+05	9.8E-05	0.0E+00	9.8E-05	0.0E+00
LEAD	1.5E+04	0.0E+00	1.5E+04	1.3E-02	0.0E+00	1.3E-02	0.0E+00
MERCURY	3.3E+03	0.0E+00	3.3E+03	1.5E-04	0.0E+00	1.5E-04	0.0E+00
ZINC	2.0E+06	0.0E+00	2.0E+06	8.1E-05	0.0E+00	8.1E-05	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPPLV for this contaminant is considered to be equal to pure compound. The SPPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-5b-5
EXPOSURE EVALUATIONS FOR RECREATIONAL VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI OPM
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	
ALDRIN	2.1E-01	1.3E+03	2.1E-01	3.0E-01*	4.6E-05	3.0E-01*	0.0E+00
BENZOTHAZOLE	1.7E+04	0.0E+00	1.7E+04	0.0E+00	0.0E+00	0.0E+00	2.5E-07
CARBON TETRACHLORIDE	2.7E+01	0.0E+00	2.7E+01	0.0E+00	0.0E+00	0.0E+00	6.4E-03
CHLORDANE	2.7E+00	1.5E+05	2.7E+00	1.3E-01*	2.4E-06	1.3E-01*	0.0E+00
CHLOROFORM	5.6E+02	0.0E+00	5.6E+02	0.0E+00	0.0E+00	0.0E+00	1.8E-04
CHLOROPHENYLMETHYL SULFIDE	7.0E+04	0.0E+00	7.0E+04	0.0E+00	0.0E+00	0.0E+00	2.2E-07
CHLOROPHENYLMETHYL SULFONE	7.0E+04	0.0E+00	7.0E+04	0.0E+00	0.0E+00	0.0E+00	2.4E-09
PPDDE	1.0E+01	8.1E+04	1.0E+01	1.1E-03	1.4E-07	1.1E-03	0.0E+00
PPDDT	1.0E+01	1.7E+05	1.0E+01	1.8E-02	1.0E-06	1.8E-02	0.0E+00
DICYCLOPENTADIENE	1.8E+04	8.9E+01	8.9E+01	3.8E-04	7.9E-02	7.9E-02	0.0E+00
DIELDRIN	2.2E-01	1.0E+06	2.2E-01	3.2E+01*	1.6E-02a	3.2E+01*	0.0E+00
DIISOPROPYLMETHYL PHOSPHONATE	2.8E+05	0.0E+00	2.8E+05	0.0E+00	0.0E+00	0.0E+00	2.8E-09
ENDRIN	1.1E+03	1.2E+06	1.1E+03	1.6E-04	1.5E-07	1.6E-04	2.2E-10
ETHYLBENZENE	3.5E+05	3.1E+05	1.7E+05	2.6E-06	2.9E-06	5.4E-06	0.0E+00
HEXACHLOROCYCLOPENTADIENE	5.7E+03	9.2E+01	9.1E+01	7.9E-06	4.9E-04	5.0E-04	0.0E+00
ISODRIN	2.5E+02	2.3E+05	2.5E+02	4.9E-05	5.3E-08	4.9E-05	0.0E+00
METHYLENE CHLORIDE	4.5E+02	1.6E+02	1.2E+02	6.6E-03	1.9E-02	2.6E-02	0.0E+00
TOLUENE	1.1E+06	3.6E+06	8.2E+05	0.0E+00	1.7E-07	1.7E-07	0.0E+00
TRICHLOROETHYLENE	3.2E+02	2.3E+02	1.3E+02	1.3E-03	1.8E-03	3.0E-03	5.4E-04
CHROMIUM	8.8E+00	0.0E+00	8.8E+00	1.4E+01*	0.0E+00	1.4E+01*	0.0E+00
COPPER	2.5E+05	0.0E+00	2.5E+05	1.7E-04	0.0E+00	1.7E-04	0.0E+00
LEAD	9.2E+03	0.0E+00	9.2E+03	2.2E-02	0.0E+00	2.2E-02	0.0E+00
MERCURY	2.0E+03	0.0E+00	2.0E+03	2.6E-04	0.0E+00	2.6E-04	0.0E+00
ZINC	1.1E+06	0.0E+00	1.1E+06	1.5E-04	0.0E+00	1.5E-04	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPLV for this contaminant is considered to be equal to pure compound. The SPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-5b-6
EXPOSURE EVALUATIONS FOR COMMERCIAL WORKERS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI ENC
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	
ALDRIN	1.9E+00	4.0E-01	3.3E-01	3.3E-02	1.6E-01*	1.9E-01*	0.0E+00
BENZOTHAZOLE	2.2E+04	0.0E+00	2.2E+04	0.0E+00	0.0E+00	0.0E+00	4.7E-05
CARBON TETRACHLORIDE	2.5E+02	0.0E+00	2.5E+02	0.0E+00	0.0E+00	0.0E+00	1.7E-01
CHLORDANE	2.5E+01	1.4E+04	2.5E+01	1.4E-02	2.6E-05	1.4E-02	0.0E+00
CHLOROFORM	5.1E+03	0.0E+00	5.1E+03	0.0E+00	0.0E+00	0.0E+00	4.7E-03
CHLOROPHENYLMETHYL SULFIDE	9.1E+04	0.0E+00	9.1E+04	0.0E+00	0.0E+00	0.0E+00	4.2E-05
CHLOROPHENYLMETHYL SULFONE	9.1E+04	0.0E+00	9.1E+04	0.0E+00	0.0E+00	0.0E+00	4.5E-07
PPDDE	9.3E+01	1.9E+01	1.6E+01	1.2E-04	5.7E-04	6.8E-04	0.0E+00
PPDDT	9.3E+01	1.9E+01	1.6E+01	1.9E-03	9.3E-03	1.1E-02	0.0E+00
DICYCLOPENTADIENE	1.7E+04	4.1E-01	4.1E-01	4.1E-04	1.7E+01*	1.7E+01*	0.0E+00
DIELDRIN	2.0E+00	5.8E+01	1.9E+00	3.5E+00*	1.2E-01*	3.6E+00*	0.0E+00
DIISOPROPYLMETHYL PHOSPHONATE	3.7E+05	0.0E+00	3.7E+05	0.0E+00	0.0E+00	0.0E+00	5.1E-07
ENDRIN	1.4E+03	2.9E+02	2.4E+02	1.2E-04	5.9E-04	7.1E-04	4.1E-08
ETHYLBENZENE	4.6E+05	6.0E+02	6.0E+02	2.0E-06	1.5E-03	1.5E-03	0.0E+00
HEXACHLOROCYCLOPENTADIENE	5.5E+03	1.9E+01	1.9E+01	8.3E-06	2.3E-03	2.4E-03	0.0E+00
ISODRIN	3.2E+02	6.7E+01	5.5E+01	3.7E-05	1.8E-04	2.2E-04	0.0E+00
METHYLENE CHLORIDE	4.1E+03	3.4E+00	3.4E+00	7.3E-04	8.8E-01*	8.8E-01*	0.0E+00
TOLUENE	1.4E+06	6.8E+03	6.8E+03	0.0E+00	8.8E-05	8.8E-05	0.0E+00
TRICHLOROETHYLENE	2.9E+03	3.0E+00	3.0E+00	1.4E-04	1.3E-01*	1.3E-01*	1.4E-02
CHROMIUM	5.5E+01	0.0E+00	5.5E+01	2.2E+00*	0.0E+00	2.2E+00*	0.0E+00
COPPER	1.8E+05	0.0E+00	1.8E+05	2.3E-04	0.0E+00	2.3E-04	0.0E+00
LEAD	6.5E+03	0.0E+00	6.5E+03	3.1E-02	0.0E+00	3.1E-02	0.0E+00
MERCURY	1.4E+03	0.0E+00	1.4E+03	3.7E-04	0.0E+00	3.7E-04	0.0E+00
ZINC	7.8E+05	0.0E+00	7.8E+05	2.0E-04	0.0E+00	2.0E-04	0.0E+00

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-5b-7
EXPOSURE EVALUATIONS FOR INDUSTRIAL WORKERS

CONTAMINANT	DIRECT	INDIRECT		CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI	
	PPLV (mg/kg)	OSVI (mg/kg)	ESVI (mg/kg)	PPLV (mg/kg)	EI	EI	EI	OPN	ENC
ALDRIN	1.2E-01	2.7E+03	4.0E-01	9.0E-02	5.3E-01*	1.6E-01*	6.9E-01*	0.0E+00	0.0E+00
BENZOTHIAZOLE	4.0E+03	0.0E+00	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	2.9E-07	4.7E-05
CARBON TETRACHLORIDE	1.5E+01	0.0E+00	0.0E+00	1.5E+01	0.0E+00	0.0E+00	0.0E+00	3.2E-03	5.1E-01
CHLORDANE	1.5E+00	2.9E+05	5.2E+00	1.2E+00	2.3E-01*	6.8E-02	3.0E-01*	0.0E+00	0.0E+00
CHLOROFORM	3.1E+02	0.0E+00	0.0E+00	3.1E+02	0.0E+00	0.0E+00	0.0E+00	8.7E-05	1.4E-02
CHLOROPHENYLMETHYL SULFIDE	1.7E+04	0.0E+00	0.0E+00	1.7E+04	0.0E+00	0.0E+00	0.0E+00	2.6E-07	4.2E-05
CHLOROPHENYLMETHYL SULFONE	1.7E+04	0.0E+00	0.0E+00	1.7E+04	0.0E+00	0.0E+00	0.0E+00	2.8E-09	4.5E-07
PPDDE	5.7E+00	1.6E+05	1.9E+01	4.4E+00	1.9E-03	5.7E-04	2.5E-03	0.0E+00	0.0E+00
PPDDT	5.7E+00	3.5E+05	1.9E+01	4.4E+00	3.1E-02	9.3E-03	4.1E-02	0.0E+00	0.0E+00
DICYCLOPENTADIENE	1.2E+03	3.3E+01	1.2E+00	1.2E+00	6.0E-03	5.9E+00*	5.9E+00*	0.0E+00	0.0E+00
DIELDRIN	1.2E-01	8.5E+02	1.9E+01	1.2E-01	5.7E+01*	3.7E-01*	5.8E+01*	0.0E+00	0.0E+00
DIISOPROPYLMETHYL PHOSPHONATE	6.8E+04	0.0E+00	0.0E+00	6.8E+04	0.0E+00	0.0E+00	0.0E+00	3.2E-09	5.1E-07
ENDRIN	2.5E+02	1.0E+06	8.6E+02	2.0E+02	6.7E-04	2.0E-04	8.7E-04	2.5E-10	4.1E-08
ETHYLBENZENE	8.5E+04	1.2E+05	1.8E+03	1.7E+03	1.1E-05	5.1E-04	5.2E-04	0.0E+00	0.0E+00
HEXACHLOROCYCLOPENTADIENE	3.8E+02	3.4E+01	5.8E+01	2.0E+01	1.2E-04	2.1E-03	2.2E-03	0.0E+00	0.0E+00
ISODRIN	5.9E+01	2.0E+05	2.0E+02	4.6E+01	2.0E-04	6.0E-05	2.6E-04	0.0E+00	0.0E+00
METHYLENE CHLORIDE	2.5E+02	1.3E+02	3.4E+00	3.3E+00	1.2E-02	9.0E-01*	9.1E-01*	0.0E+00	0.0E+00
TOLUENE	2.6E+05	1.3E+06	2.0E+04	1.9E+04	0.0E+00	3.0E-05	3.0E-05	0.0E+00	0.0E+00
TRICHLOROETHYLENE	1.8E+02	2.0E+02	3.0E+00	2.9E+00	2.3E-03	1.3E-01*	1.4E-01*	2.7E-04	4.3E-02
MILM	1.1E+00	0.0E+00	0.0E+00	1.1E+00	1.0E+02*	0.0E+00	1.0E+02*	0.0E+00	0.0E+00
PER	5.7E+04	0.0E+00	0.0E+00	5.7E+04	7.2E-04	0.0E+00	7.2E-04	0.0E+00	0.0E+00
LEAD	2.2E+03	0.0E+00	0.0E+00	2.2E+03	9.1E-02	0.0E+00	9.1E-02	0.0E+00	0.0E+00
MERCURY	4.6E+02	0.0E+00	0.0E+00	4.6E+02	1.1E-03	0.0E+00	1.1E-03	0.0E+00	0.0E+00
ZINC	1.4E+05	0.0E+00	0.0E+00	1.4E+05	1.1E-03	0.0E+00	1.1E-03	0.0E+00	0.0E+00

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

2.22 SITE SPSA-6: HYDRAZINE FACILITY (formerly Site 1-7: Hydrazine Blending and Storage Facility; EBASCO, 1988o/RIC 88286R09)

2.22.1 Site-Specific Considerations

Figure SPSA-6-1 and Tables SPSA-6-1 and SPSA-6-2 depict the target contaminants for Site SPSA-6. Borings 1 through 15 were included in this exposure assessment, consistent with the South Plants SAR. The historical search conducted under the contamination assessment revealed that blending and storage of hydrazine occurred in Site SPSA-6 (EBASCO, 1988o/RIC 88286R09), but the only degradation product of hydrazine in the RMA target contaminant list, n-nitrosodimethylamine, was not detected during the Phase I investigation. According to site history, no other chemicals from the RMA target contaminant list were suspected to be present in Site SPSA-6 (EBASCO, 1988o/RIC 88286R09).

2.22.2 Spatial Distribution of Measured Contaminant Concentrations

The locations and concentrations of the target contaminants that were detected in Site SPSA-6 are shown in Figure SPSA-6-1. Table SPSA-6-1 summarizes the maximum concentrations of contaminants measured in soil above indicator levels for the ICP metals, arsenic, and mercury and CRLs for organic contaminants from the Phase I and Phase II investigations. The boring number and depth where the maximum value was observed are shown. No data were included for ICP metals, arsenic, and mercury in Horizon 2 because direct soil exposure below 10 ft is assumed to be negligible (see Volume VI-A). Table SPSA-6-2 summarizes the maximum concentrations detected in groundwater together with the well number, location, sampling interval, and depth to groundwater.

2.22.3 Site Exposure Summary

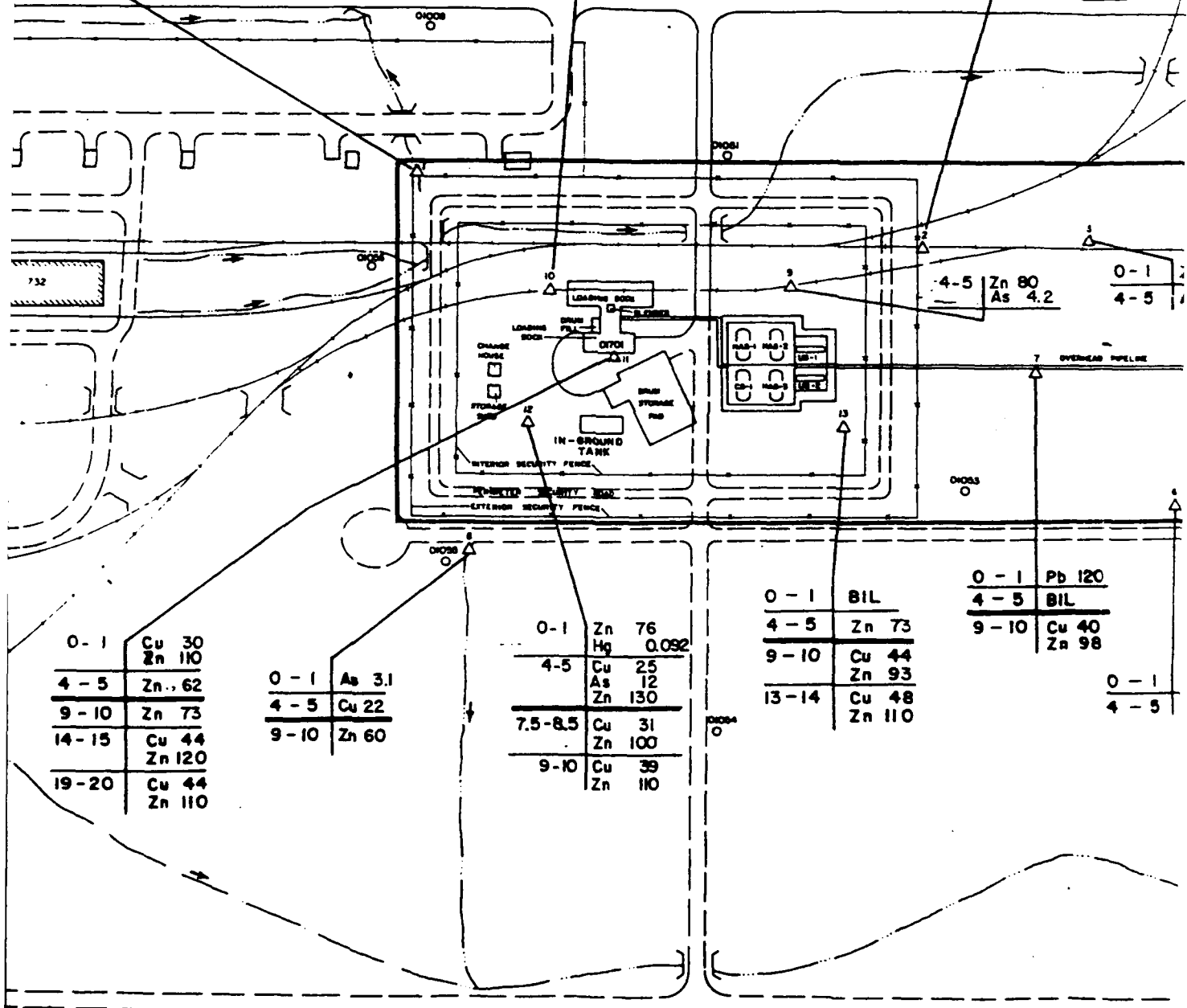
Tables SPSA-6-3 through SPSA-6-7 present Draft PPLVs, EIs, and VEIs for each site contaminant. Since the depth to groundwater below Site SPSA-6 is greater than 10 ft, the enclosed space vapor inhalation SPPPLV is included in the calculation of the cumulative quantity. The COCs are summarized below for each exposed population and with the critical exposure pathway identified.

0-1	Dieldrin	0.4
	Cd	1.7
	Cr	27
	Pb	130
	Zn	150
	Hg	0.086
4-5	BIL	
9-10	Cu	81
	Zn	92

0-1	BIL	
4-5	MIBK 1	
9-10	BIL	

0-1	BIL	
4-5	BIL	
5.1-6.1	BIL	
9.5-10	Cu	33
	Zn	89
	As	3.4
14-15	Cu	43
	Zn	110
16.5-17.5	Pb	31
	Cu	49
	Zn	100

DECEMBER SEVENTH AVENUE



4-5	Zn	80
	As	4.2

0-1	Cu	30
	Zn	110
4-5	Zn	62
9-10	Zn	73
14-15	Cu	44
	Zn	120
19-20	Cu	44
	Zn	110

0-1	As	3.1
4-5	Cu	22
9-10	Zn	60

0-1	Zn	76
	Hg	0.092
4-5	Cu	25
	As	12
	Zn	130
7.5-8.5	Cu	31
	Zn	100
9-10	Cu	39
	Zn	110

0-1	BIL	
4-5	Zn	73
9-10	Cu	44
	Zn	93
13-14	Cu	48
	Zn	110

0-1	Pb	120
4-5	BIL	
9-10	Cu	40
	Zn	98

0-1	BIL	
4-5	BIL	

01030
01031
01032
O

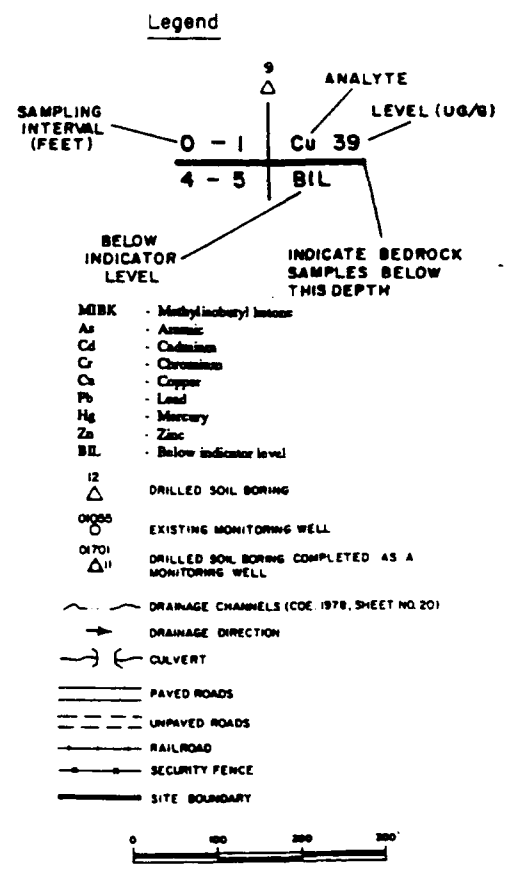
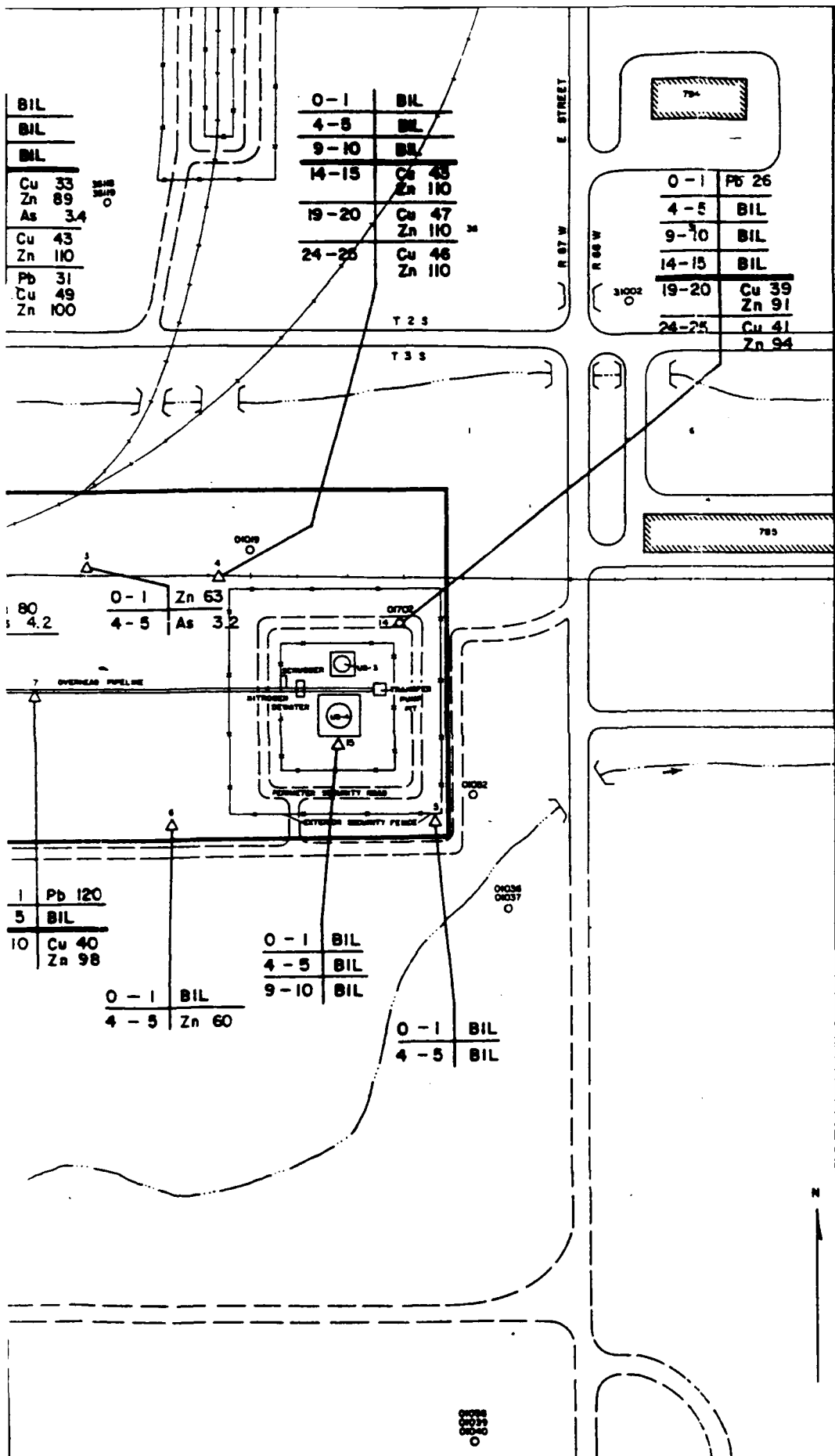


FIGURE SPSA-6-1
 Phase I and Phase II
 Analytes Detected Within or
 Above Indicator Levels

Rocky Mountain Arsenal
 Prepared by: Geraghty & Miller, Inc.
 for Ebasco Services, Inc.

Prepared For:
 Program Manager's Office for
 Rocky Mountain Arsenal Cleanup
 Aberdeen Proving Ground, Maryland

TABLE SPSA-6-1
 SOIL CONTAMINANT CONCENTRATIONS
 FOR SITE SPSA-6

Contaminant	Horizon 1			Horizon 2		
	Max. (ug/g)	Depth (ft)	Boring Number	Max. (ug/g)	Depth (ft)	Boring Number
Dieldrin	0.4	0-1	1	0.4	0-1	1
Methylisobutyl ketone	1	4-5	10	1	4-5	10
Arsenic	12	4-5	12	--	--	--
Copper	81	9-10	1	--	--	--
Lead	130	0-1	1	--	--	--
Zinc	150	0-1	1	--	--	--

SPSA Max. ug/g ft
 South Plants Study Area
 Maximum microgram per gram
 foot/feet

TABLE SPSA-6-2

GROUNDWATER CONTAMINANT CONCENTRATIONS (UG/L)
FOR SITE SPSA-6

AVERAGE SITE DEPTH TO GROUNDWATER: 19 Feet

CHEMICAL	CONCENTRATION MAXIMUM	LOCATION (WELL NUMBER)	SAMPLE DATE
BENZOTHIAZOLE	6.9	01008	01/29/88
CARBON TETRACHLORIDE	29	01055	12/21/88
CHLOROFORM	62	01055	12/21/88
CHLOROPHENYLMETHYL SULFIDE	7.5	01008	01/29/88
CHLOROPHENYLMETHYL SULFONE	6.7	01008	01/29/88
DIBROMOCHLOROPROPANE	0.73	01055	12/21/88
DIISOPROPYLMETHYL PHOSPHONATE	1.4	01008	01/10/89
DIELDRIN	0.34	01008	01/29/88
DIMETHYLMETHYL PHOSPHONATE	1.0	01055	12/21/88
ENDRIN	0.046	01008	01/29/88
SUPONA	1.1	01055	12/21/88
TRICHLOROETHYLENE	84	01055	12/21/88

EACH VALUE PRESENTED IS THE MAXIMUM CONCENTRATION FOR THE LISTED ANALYTE
FOR THE PERIOD March 17, 1987 TO February 28, 1989.
DATA SOURCE: DP ASSOCIATES, RMA Database, July 19, 1990

SPSA-6-3
EXPOSURE EVALUATIONS FOR REGULATED VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI OPN
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	
BENZOTHAZOLE	3.9E+04	0.0E+00	3.9E+04	0.0E+00	0.0E+00	0.0E+00	9.2E-09
CARBON TETRACHLORIDE	2.0E+02	0.0E+00	2.0E+02	0.0E+00	0.0E+00	0.0E+00	1.6E-03
CHLOROFORM	4.0E+03	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	2.9E-05
CHLOROPHENYLMETHYL SULFIDE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	8.2E-09
CHLOROPHENYLMETHYL SULFONE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	8.8E-11
DIBROMOCHLOROPROPANE	1.8E+01	0.0E+00	1.8E+01	0.0E+00	0.0E+00	0.0E+00	4.7E-06
DIELDRIN	1.6E+00	3.9E+04	1.6E+00	2.5E-01*	1.0E-05	2.5E-01*	2.4E-08
DIISOPROPYLMETHYL PHOSPHONATE	6.6E+05	0.0E+00	6.6E+05	0.0E+00	0.0E+00	0.0E+00	1.0E-10
DIMETHYMETHYL PHOSPHONATE	1.5E+05	0.0E+00	1.5E+05	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENDRIN	2.5E+03	0.0E+00	2.5E+03	0.0E+00	0.0E+00	0.0E+00	8.0E-12
METHYLISOBUTYL KETONE	4.1E+05	7.9E+05	2.7E+05	2.4E-06	1.3E-06	3.7E-06	0.0E+00
SUPONA	1.2E+03	0.0E+00	1.2E+03	0.0E+00	0.0E+00	0.0E+00	1.2E-13
TRICHLOROETHYLENE	2.3E+03	0.0E+00	2.3E+03	0.0E+00	0.0E+00	0.0E+00	2.3E-04
ARSENIC	2.2E+01	0.0E+00	2.2E+01	5.6E-01*	0.0E+00	5.6E-01*	0.0E+00
COPPER	4.2E+05	0.0E+00	4.2E+05	1.9E-04	0.0E+00	1.9E-04	0.0E+00
LEAD	1.5E+04	0.0E+00	1.5E+04	8.4E-03	0.0E+00	8.4E-03	0.0E+00
ZINC	2.0E+06	0.0E+00	2.0E+06	7.6E-05	0.0E+00	7.6E-05	0.0E+00

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-6-4

EXPOSURE EVALUATIONS FOR CASUAL VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI OPN
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	
BENZOTHAZOLE	3.9E+04	0.0E+00	3.9E+04	0.0E+00	0.0E+00	0.0E+00	9.2E-09
CARBON TETRACHLORIDE	2.0E+02	0.0E+00	2.0E+02	0.0E+00	0.0E+00	0.0E+00	1.6E-03
CHLOROFORM	4.0E+03	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	2.9E-05
CHLOROPHENYLMETHYL SULFIDE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	8.2E-09
CHLOROPHENYLMETHYL SULFONE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	8.8E-11
DIBROMOCHLOROPROPANE	1.8E+01	0.0E+00	1.8E+01	0.0E+00	0.0E+00	0.0E+00	4.7E-06
DIELDRIN	1.6E+00	3.9E+04	1.6E+00	2.5E-01*	1.0E-05	2.5E-01*	2.4E-08
DIISOPROPYLMETHYL PHOSPHONATE	6.6E+05	0.0E+00	6.6E+05	0.0E+00	0.0E+00	0.0E+00	1.0E-10
DIMETHYLMETHYL PHOSPHONATE	1.5E+05	0.0E+00	1.5E+05	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENDRIN	2.5E+03	0.0E+00	2.5E+03	0.0E+00	0.0E+00	0.0E+00	8.0E-12
METHYLISOBUTYL KETONE	4.1E+05	7.9E+05	2.7E+05	2.4E-06	1.3E-06	3.7E-06	0.0E+00
SUPONA	1.2E+03	0.0E+00	1.2E+03	0.0E+00	0.0E+00	0.0E+00	1.2E-13
TRICHLOROETHYLENE	2.3E+03	0.0E+00	2.3E+03	0.0E+00	0.0E+00	0.0E+00	2.3E-04
ARSENIC	2.2E+01	0.0E+00	2.2E+01	5.6E-01*	0.0E+00	5.6E-01*	0.0E+00
COPPER	4.2E+05	0.0E+00	4.2E+05	1.9E-04	0.0E+00	1.9E-04	0.0E+00
LEAD	1.5E+04	0.0E+00	1.5E+04	8.4E-03	0.0E+00	8.4E-03	0.0E+00
ZINC	2.0E+06	0.0E+00	2.0E+06	7.6E-05	0.0E+00	7.6E-05	0.0E+00

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-6-5
EXPOSURE EVALUATIONS FOR RECREATIONAL VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI OPN
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	
BENZOTHAZOLE	1.7E+04	0.0E+00	1.7E+04	0.0E+00	0.0E+00	0.0E+00	5.9E-08
CARBON TETRACHLORIDE	2.7E+01	0.0E+00	2.7E+01	0.0E+00	0.0E+00	0.0E+00	2.4E-02
CHLOROFORM	5.6E+02	0.0E+00	5.6E+02	0.0E+00	0.0E+00	0.0E+00	4.4E-04
CHLOROPHENYLMETHYL SULFIDE	7.0E+04	0.0E+00	7.0E+04	0.0E+00	0.0E+00	0.0E+00	5.3E-08
CHLOROPHENYLMETHYL SULFONE	7.0E+04	0.0E+00	7.0E+04	0.0E+00	0.0E+00	0.0E+00	5.7E-10
DIBROMOCHLOROPROPANE	2.5E+00	0.0E+00	2.5E+00	0.0E+00	0.0E+00	0.0E+00	7.2E-05
DIELDRIN	2.2E-01	2.6E+03	2.2E-01	1.8E+00*	1.5E-04	1.8E+00*	3.6E-07
DIISOPROPYLMETHYL PHOSPHONATE	2.8E+05	0.0E+00	2.8E+05	0.0E+00	0.0E+00	0.0E+00	6.6E-10
DIMETHYLMETHYL PHOSPHONATE	6.3E+04	0.0E+00	6.3E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENDRIN	1.1E+03	0.0E+00	1.1E+03	0.0E+00	0.0E+00	0.0E+00	5.2E-11
METHYLISOBUTYL KETONE	1.7E+05	2.8E+05	1.1E+05	5.8E-06	3.5E-06	9.3E-06	0.0E+00
SUPONA	5.3E+02	0.0E+00	5.3E+02	0.0E+00	0.0E+00	0.0E+00	7.7E-13
TRICHLOROETHYLENE	3.2E+02	0.0E+00	3.2E+02	0.0E+00	0.0E+00	0.0E+00	3.5E-03
ARSENIC	3.9E+00	0.0E+00	3.9E+00	3.0E+00*	0.0E+00	3.0E+00*	0.0E+00
COPPER	2.5E+05	0.0E+00	2.5E+05	3.3E-04	0.0E+00	3.3E-04	0.0E+00
LEAD	9.2E+03	0.0E+00	9.2E+03	1.4E-02	0.0E+00	1.4E-02	0.0E+00
ZINC	1.1E+06	0.0E+00	1.1E+06	1.4E-04	0.0E+00	1.4E-04	0.0E+00

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-6-6
EXPOSURE EVALUATIONS FOR COMMERCIAL WORKERS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI ENC
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	
BENZOTHAZOLE	2.2E+04	0.0E+00	2.2E+04	0.0E+00	0.0E+00	0.0E+00	4.7E-05
CARBON TETRACHLORIDE	2.5E+02	0.0E+00	2.5E+02	0.0E+00	0.0E+00	0.0E+00	2.7E+00
CHLOROFORM	5.1E+03	0.0E+00	5.1E+03	0.0E+00	0.0E+00	0.0E+00	4.9E-02
CHLOROPHENYLMETHYL SULFIDE	9.1E+04	0.0E+00	9.1E+04	0.0E+00	0.0E+00	0.0E+00	4.2E-05
CHLOROPHENYLMETHYL SULFONE	9.1E+04	0.0E+00	9.1E+04	0.0E+00	0.0E+00	0.0E+00	4.5E-07
DIBROMOCHLOROPROPANE	2.3E+01	0.0E+00	2.3E+01	0.0E+00	0.0E+00	0.0E+00	8.0E-03
DIELDRIN	2.0E+00	5.8E+01	1.9E+00	2.0E-01*	7.0E-03	2.1E-01*	4.1E-05
DIISOPROPYLMETHYL PHOSPHONATE	3.7E+05	0.0E+00	3.7E+05	0.0E+00	0.0E+00	0.0E+00	5.1E-07
DIMETHYMETHYL PHOSPHONATE	8.2E+04	0.0E+00	8.2E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENDRIN	1.4E+03	0.0E+00	1.4E+03	0.0E+00	0.0E+00	0.0E+00	4.1E-08
METHYLISOBUTYL KETONE	2.2E+05	1.9E+04	1.8E+04	4.5E-06	5.2E-05	5.7E-05	0.0E+00
SUPONA	6.9E+02	0.0E+00	6.9E+02	0.0E+00	0.0E+00	0.0E+00	6.1E-10
TRICHLOROETHYLENE	2.9E+03	0.0E+00	2.9E+03	0.0E+00	0.0E+00	0.0E+00	3.9E-01
ARSENIC	2.0E+01	0.0E+00	2.0E+01	6.0E-01*	0.0E+00	6.0E-01*	0.0E+00
COPPER	1.8E+05	0.0E+00	1.8E+05	4.6E-04	0.0E+00	4.6E-04	0.0E+00
LEAD	6.5E+03	0.0E+00	6.5E+03	2.0E-02	0.0E+00	2.0E-02	0.0E+00
ZINC	7.8E+05	0.0E+00	7.8E+05	1.9E-04	0.0E+00	1.9E-04	0.0E+00

*: EI is equal to or exceeds 1.0E-01

SPSA-6-7
EXPOSURE EVALUATIONS FOR INDUSTRIAL WORKERS

CONTAMINANT	DIRECT	INDIRECT		CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI	
	PPLV (mg/kg)	OSVI (mg/kg)	ESVI (mg/kg)	PPLV (mg/kg)	EI	EI	EI	OPN	ENC
BENZOTHAZOLE	4.0E+03	0.0E+00	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	6.9E-08	4.7E-05
CARBON TETRACHLORIDE	1.5E+01	0.0E+00	0.0E+00	1.5E+01	0.0E+00	0.0E+00	0.0E+00	1.2E-02	8.0E+00
CHLOROFORM	3.1E+02	0.0E+00	0.0E+00	3.1E+02	0.0E+00	0.0E+00	0.0E+00	2.2E-04	1.5E-01
CHLOROPHENYLMETHYL SULFIDE	1.7E+04	0.0E+00	0.0E+00	1.7E+04	0.0E+00	0.0E+00	0.0E+00	6.2E-08	4.2E-05
CHLOROPHENYLMETHYL SULFONE	1.7E+04	0.0E+00	0.0E+00	1.7E+04	0.0E+00	0.0E+00	0.0E+00	6.6E-10	4.5E-07
DIBROMOCHLOROPROPANE	1.4E+00	0.0E+00	0.0E+00	1.4E+00	0.0E+00	0.0E+00	0.0E+00	3.6E-05	2.4E-02
DIELDRIN	1.2E-01	5.2E+03	1.9E+01	1.2E-01	3.3E+00*	2.1E-02	3.3E+00*	1.8E-07	1.2E-04
DIISOPROPYLMETHYL PHOSPHONATE	6.8E+04	0.0E+00	0.0E+00	6.8E+04	0.0E+00	0.0E+00	0.0E+00	7.6E-10	5.1E-07
DIMETHYLMETHYL PHOSPHONATE	1.5E+04	0.0E+00	0.0E+00	1.5E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENDRIN	2.5E+02	0.0E+00	0.0E+00	2.5E+02	0.0E+00	0.0E+00	0.0E+00	6.0E-11	4.1E-08
METHYL ISOBUTYL KETONE	4.0E+04	1.1E+05	5.8E+04	1.9E+04	2.5E-05	2.7E-05	5.2E-05	0.0E+00	0.0E+00
SUPONA	1.3E+02	0.0E+00	0.0E+00	1.3E+02	0.0E+00	0.0E+00	0.0E+00	9.0E-13	6.1E-10
TRICHLOROETHYLENE	1.8E+02	0.0E+00	0.0E+00	1.8E+02	0.0E+00	0.0E+00	0.0E+00	1.7E-03	1.2E+00
ARSENIC	1.6E+00	0.0E+00	0.0E+00	1.6E+00	7.4E+00*	0.0E+00	7.4E+00*	0.0E+00	0.0E+00
COPPER	5.7E+04	0.0E+00	0.0E+00	5.7E+04	1.4E-03	0.0E+00	1.4E-03	0.0E+00	0.0E+00
LEAD	2.2E+03	0.0E+00	0.0E+00	2.2E+03	5.9E-02	0.0E+00	5.9E-02	0.0E+00	0.0E+00
ZINC	1.4E+05	0.0E+00	0.0E+00	1.4E+05	1.1E-03	0.0E+00	1.1E-03	0.0E+00	0.0E+00

EI is equal to or exceeds 1.0E-01

2.23 SITE SPSA-7a: DRAINAGE DITCHES (formerly Site 2-1: Drainage Ditches; EBASCO, 1987h/RIC 87216R06 and EBASCO, 1988m/RIC 87216R06A)

2.23.1 Site-Specific Considerations

Figure SPSA-7a-1 and Tables SPSA-7a-1 and SPSA-7a-2 depict the target contaminants for Site SPSA-7a. Borings 3 and 44 through 47 were included in this exposure assessment, consistent with the South Plants SAR. The historical search conducted under the contaminant assessment revealed that Aldrin, Aldrite, bicycloheptadiene, hexachlorocyclopentadiene, dicyclopentadiene, and xylene were suspected to be present in Site SPSA-7a (EBASCO, 1987h/RIC 87216R06); however, most of these chemicals were not detected in the soil during the Phase I and Phase II investigations. According to site history, no other chemicals from the RMA target contaminant list were suspected to be present in Site SPSA-7a (EBASCO, 1987h/RIC 87216R06).

2.23.2 Spatial Distribution of Measured Contaminant Concentrations

The locations and concentrations of the target contaminants that were detected in Site SPSA-7a are shown in Figure SPSA-7a-1. Table SPSA-7a-1 summarizes the maximum concentrations of contaminants measured in soil above indicator levels for the ICP metals, arsenic, and mercury and CRLs for organic contaminants from the Phase I and Phase II investigations. The boring number and depth where the maximum value was observed are shown. No data were included for ICP metals, arsenic, and mercury in Horizon 2 because direct soil exposure below 10 ft is assumed to be negligible (see Volume VI-A). Table SPSA-7a-2 summarizes the maximum concentrations detected in groundwater together with the well number, location, sampling interval, and depth to groundwater.

2.23.3 Site Exposure Summary

Tables SPSA-7a-3 through SPSA-7a-7 present Draft PPLVs, EIs, and VEIs for each site contaminant. Since the depth to groundwater below Site SPSA-7a is greater than 10 ft, the enclosed space vapor inhalation SPPPLV is included in the calculation of the cumulative quantity. The COCs are summarized below for each exposed population and with the critical exposure pathway identified.

Contaminants of Concern	Regulated Visitor	Casual Visitor	Recreational Visitor	Commercial Worker	Industrial Worker
Dieldrin	Direct	Direct	Direct	Direct	Direct

Note: Direct exposure pathways for soils include soil ingestion, suspended particulate inhalation, and dermal contact.

The results of the soil exposure summary indicate that exposure to contamination from the direct pathways are the primary contributors to the exceedance of the cumulative PPLVs. Site SPSA-7a is designated as a Priority 1 site, based on the most sensitive exposed population PPLV (i.e., the industrial worker).

No groundwater contaminants result in an unacceptable exposure due to vapor inhalation as indicated by VEI values less than 1.

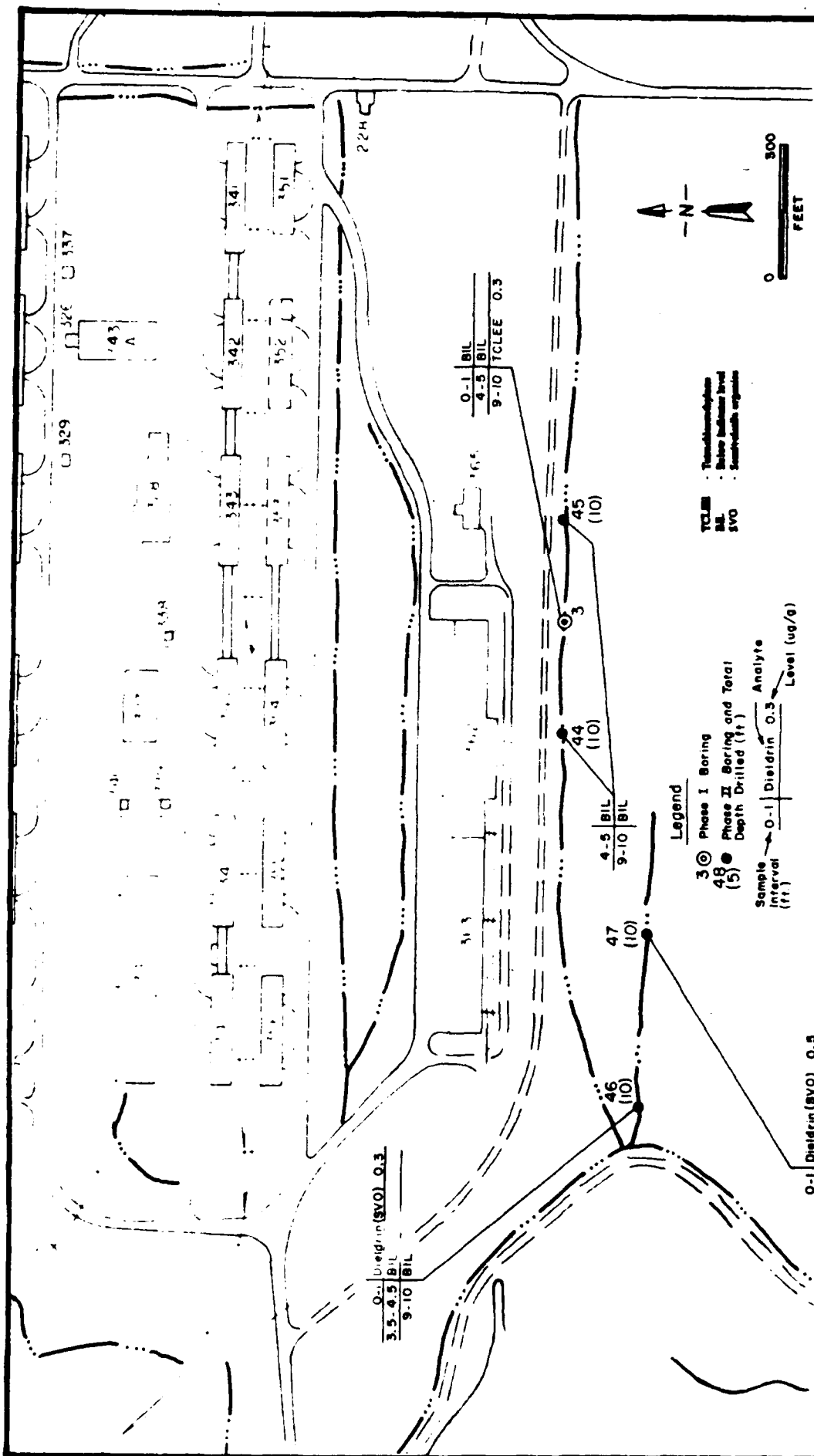


FIGURE SPSA-70a-1
Phase I and Phase II Analytes Detected
Within or Above Indicator Levels
 Rocky Mountain Arsenal
 Prepared by: Ebasco Services Incorporated

Prepared for:
 Program Manager's Office for
 Rocky Mountain Arsenal Cleanup
 Aberdeen Proving Ground, Maryland

TABLE SPSA-7a-1
SOIL CONTAMINANT CONCENTRATIONS
FOR SITE SPSA-7a

Contaminant	Horizon 1			Horizon 2		
	Max. (ug/g)	Depth (ft)	Boring Number	Max. (ug/g)	Depth (ft)	Boring Number
Dieldrin	0.5	0-1	47	0.5	0-1	47
	0.3	9-10	3	0.3	9-10	3
Tetrachloroethylene						

SPSA
Max.
ug/g
ft

South Plants Study Area
Maximum
microgram per gram
foot/feet

TABLE SPSA-7a-2
GROUNDWATER CONTAMINANT CONCENTRATIONS (UG/L)
FOR SITE SPSA-7a
AVERAGE SITE DEPTH TO GROUNDWATER: 17 Feet

CHEMICAL	CONCENTRATION MAXIMUM	LOCATION (WELL NUMBER)	SAMPLE DATE
1,1-DICHLOROETHANE	3.2	02034	12/14/88
ALDRIN	0.11	02034	12/14/88
BENZENE	13	02034	12/14/88
CHLOROFORM	9.9	02034	12/14/88
DIISOPROPYLMETHYL PHOSPHONATE	0.80	02034	12/14/88
DIELDRIN	0.18	02034	12/14/88
DIMETHYLMETHYL PHOSPHONATE	2.0	02034	12/14/88
ENDRIN	0.046	02034	12/14/88
ISODRIN	0.31	02034	12/14/88
PPDDE	0.082	02034	12/14/88
PPDDT	0.11	02034	12/14/88
TETRACHLOROETHYLENE	1.7	02034	12/14/88
TRICHLOROETHYLENE	4.1	02034	12/1/87

EACH VALUE PRESENTED IS THE MAXIMUM CONCENTRATION FOR THE LISTED ANALYTE FOR THE PERIOD March 17, 1987 TO February 28, 1989.
DATA SOURCE: DP ASSOCIATES, RMA Database, July 19, 1990

SPSA-7a-3
EXPOSURE EVALUATIONS FOR REGULATED VISITORS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI OPN
ALDRIN	1.5E+00	0.0E+00	1.5E+00	0.0E+00	0.0E+00	0.0E+00	3.9E-08
BENZENE	8.6E+02	0.0E+00	8.6E+02	0.0E+00	0.0E+00	0.0E+00	5.9E-06
CHLOROFORM	4.0E+03	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	6.5E-07
PPDDE	7.4E+01	0.0E+00	7.4E+01	0.0E+00	0.0E+00	0.0E+00	2.7E-09
PPDDT	7.4E+01	0.0E+00	7.4E+01	0.0E+00	0.0E+00	0.0E+00	2.7E-08
1,1-DICHLOROETHANE	2.8E+02	0.0E+00	2.8E+02	0.0E+00	0.0E+00	0.0E+00	3.8E-10
DIELDRIN	1.6E+00	3.2E+05	1.6E+00	3.2E-01*	1.6E-06	3.2E-01*	1.8E-09
DIISOPROPYLMETHYL PHOSPHONATE	6.6E+05	0.0E+00	6.6E+05	0.0E+00	0.0E+00	0.0E+00	7.9E-12
DIMETHYLMETHYL PHOSPHONATE	1.5E+05	0.0E+00	1.5E+05	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENDRIN	2.5E+03	0.0E+00	2.5E+03	0.0E+00	0.0E+00	0.0E+00	1.1E-12
ISODRIN	5.8E+02	0.0E+00	5.8E+02	0.0E+00	0.0E+00	0.0E+00	4.5E-09
TETRACHLOROETHYLENE	5.1E+02	3.3E+05	5.1E+02	5.9E-04	9.1E-07	5.9E-04	3.4E-07
TRICHLOROETHYLENE	2.3E+03	0.0E+00	2.3E+03	0.0E+00	0.0E+00	0.0E+00	1.6E-06

*: EI is equal to or exceeds 1.0E-01

SPSA-7a-4

EXPOSURE EVALUATIONS FOR CASUAL VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI OPN
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	
ALDRIN	1.5E+00	0.0E+00	1.5E+00	0.0E+00	0.0E+00	0.0E+00	3.9E-08
BENZENE	8.6E+02	0.0E+00	8.6E+02	0.0E+00	0.0E+00	0.0E+00	5.9E-06
CHLOROPORM	4.0E+03	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	6.5E-07
PPDE	7.4E+01	0.0E+00	7.4E+01	0.0E+00	0.0E+00	0.0E+00	2.7E-09
PPDDT	7.4E+01	0.0E+00	7.4E+01	0.0E+00	0.0E+00	0.0E+00	2.7E-08
1,1-DICHLOROETHANE	2.8E+02	0.0E+00	2.8E+02	0.0E+00	0.0E+00	0.0E+00	3.8E-10
DIELDRIN	1.6E+00	3.2E+05	1.6E+00	3.2E-01*	1.6E-06	3.2E-01*	1.8E-09
DIISOPROPYLMETHYL PHOSPHONATE	6.6E+05	0.0E+00	6.6E+05	0.0E+00	0.0E+00	0.0E+00	7.9E-12
DIMETHYMETHYL PHOSPHONATE	1.5E+05	0.0E+00	1.5E+05	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENDRIN	2.5E+03	0.0E+00	2.5E+03	0.0E+00	0.0E+00	0.0E+00	1.1E-12
ISODRIN	5.8E+02	0.0E+00	5.8E+02	0.0E+00	0.0E+00	0.0E+00	4.5E-09
TETRACHLOROETHYLENE	5.1E+02	3.3E+05	5.1E+02	5.9E-04	9.1E-07	5.9E-04	3.4E-07
TRICHLOROETHYLENE	2.3E+03	0.0E+00	2.3E+03	0.0E+00	0.0E+00	0.0E+00	1.6E-06

*: EI is equal to or exceeds 1.0E-01

SPSA-7a-5
EXPOSURE EVALUATIONS FOR RECREATIONAL VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI OPN
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	
ALDRIN	2.1E-01	0.0E+00	2.1E-01	0.0E+00	0.0E+00	0.0E+00	5.8E-07
BENZENE	1.2E+02	0.0E+00	1.2E+02	0.0E+00	0.0E+00	0.0E+00	8.8E-05
CHLOROFORM	5.6E+02	0.0E+00	5.6E+02	0.0E+00	0.0E+00	0.0E+00	9.8E-06
PPDE	1.0E+01	0.0E+00	1.0E+01	0.0E+00	0.0E+00	0.0E+00	4.1E-08
PPDT	1.0E+01	0.0E+00	1.0E+01	0.0E+00	0.0E+00	0.0E+00	4.0E-07
1,1-DICHLOROETHANE	3.9E+01	0.0E+00	3.9E+01	0.0E+00	0.0E+00	0.0E+00	5.8E-09
DIELDRIN	2.2E-01	2.1E+04	2.2E-01	2.3E+00*	2.4E-05	2.3E+00*	2.8E-08
DIISOPROPYLMETHYL PHOSPHONATE	2.8E+05	0.0E+00	2.8E+05	0.0E+00	0.0E+00	0.0E+00	5.1E-11
DIMETHYMETHYL PHOSPHONATE	6.3E+04	0.0E+00	6.3E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENDRIN	1.1E+03	0.0E+00	1.1E+03	0.0E+00	0.0E+00	0.0E+00	7.2E-12
ISODRIN	2.5E+02	0.0E+00	2.5E+02	0.0E+00	0.0E+00	0.0E+00	2.9E-08
TETRACHLOROETHYLENE	7.1E+01	5.1E+04	7.1E+01	4.2E-03	5.9E-06	4.2E-03	5.1E-06
TRICHLOROETHYLENE	3.2E+02	0.0E+00	3.2E+02	0.0E+00	0.0E+00	0.0E+00	2.4E-05

*: EI is equal to or exceeds 1.0E-01

SPSA-7a-6
EXPOSURE EVALUATIONS FOR COMMERCIAL WORKERS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI ENC
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	
ALDRIN	1.9E+00	0.0E+00	1.9E+00	0.0E+00	0.0E+00	0.0E+00	6.4E-04
BENZENE	1.1E+03	0.0E+00	1.1E+03	0.0E+00	0.0E+00	0.0E+00	9.6E-02
CHLOROFORM	5.1E+03	0.0E+00	5.1E+03	0.0E+00	0.0E+00	0.0E+00	1.1E-02
PPDE	9.3E+01	0.0E+00	9.3E+01	0.0E+00	0.0E+00	0.0E+00	4.5E-05
PPDT	9.3E+01	0.0E+00	9.3E+01	0.0E+00	0.0E+00	0.0E+00	4.4E-04
1,1-DICHLOROETHANE	3.6E+02	0.0E+00	3.6E+02	0.0E+00	0.0E+00	0.0E+00	6.3E-06
DIELDRIN	2.0E+00	5.8E+01	1.9E+00	2.5E-01*	8.7E-03	2.6E-01*	3.0E-05
DIISOPROPYLMETHYL PHOSPHONATE	3.7E+05	0.0E+00	3.7E+05	0.0E+00	0.0E+00	0.0E+00	3.9E-07
DIMETHYLMETHYL PHOSPHONATE	8.2E+04	0.0E+00	8.2E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENDRIN	1.4E+03	0.0E+00	1.4E+03	0.0E+00	0.0E+00	0.0E+00	5.5E-08
ISODRIN	3.2E+02	0.0E+00	3.2E+02	0.0E+00	0.0E+00	0.0E+00	2.2E-04
TETRACHLOROETHYLENE	6.5E+02	2.0E+01	2.0E+01	4.6E-04	1.5E-02	1.5E-02	5.6E-03
TRICHLOROETHYLENE	2.9E+03	0.0E+00	2.9E+03	0.0E+00	0.0E+00	0.0E+00	2.6E-02

*: EI is equal to or exceeds 1.0E-01

SPSA-7a-7
EXPOSURE EVALUATIONS FOR INDUSTRIAL WORKERS

CONTAMINANT	DIRECT	INDIRECT		CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI	
	PPLV (mg/kg)	OSVI (mg/kg)	ESVI (mg/kg)	PPLV (mg/kg)	EI	EI	EI	OPN	ENC
ALDRIN	1.2E-01	0.0E+00	0.0E+00	1.2E-01	0.0E+00	0.0E+00	0.0E+00	2.9E-07	1.9E-03
BENZENE	6.7E+01	0.0E+00	0.0E+00	6.7E+01	0.0E+00	0.0E+00	0.0E+00	4.4E-05	2.9E-01
CHLOROFORM	3.1E+02	0.0E+00	0.0E+00	3.1E+02	0.0E+00	0.0E+00	0.0E+00	4.9E-06	3.2E-02
PPDE	5.7E+00	0.0E+00	0.0E+00	5.7E+00	0.0E+00	0.0E+00	0.0E+00	2.1E-08	1.4E-04
PPDT	5.7E+00	0.0E+00	0.0E+00	5.7E+00	0.0E+00	0.0E+00	0.0E+00	2.0E-07	1.3E-03
1,1-DICHLOROETHANE	2.3E+01	0.0E+00	0.0E+00	2.3E+01	0.0E+00	0.0E+00	0.0E+00	2.9E-09	1.9E-05
DIELDRIN	1.2E-01	4.2E+04	1.9E+01	1.2E-01	4.1E+00*	2.6E-02	4.1E+00*	1.4E-08	9.1E-05
DIISOPROPYLMETHYL PHOSPHONATE	6.8E+04	0.0E+00	0.0E+00	6.8E+04	0.0E+00	0.0E+00	0.0E+00	6.0E-11	3.9E-07
DIMETHYLMETHYL PHOSPHONATE	1.5E+04	0.0E+00	0.0E+00	1.5E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENDRIN	2.5E+02	0.0E+00	0.0E+00	2.5E+02	0.0E+00	0.0E+00	0.0E+00	8.3E-12	5.5E-08
ISODRIN	5.9E+01	0.0E+00	0.0E+00	5.9E+01	0.0E+00	0.0E+00	0.0E+00	3.4E-08	2.2E-04
TETRACHLOROETHYLENE	4.1E+01	4.4E+04	2.0E+01	1.4E+01	7.3E-03	1.5E-02	2.2E-02	2.6E-06	1.7E-02
TRICHLOROETHYLENE	1.8E+02	0.0E+00	0.0E+00	1.8E+02	0.0E+00	0.0E+00	0.0E+00	1.2E-05	7.8E-02

*: EI is equal to or exceeds 1.0E-01

2.24 SITE SPSA-7b: LAGOON (formerly Site 2-3; EBASCO, 1987i/RIC 87006R16 and EBASCO, 1988p/RIC 87006R16A)

2.24.1 Site-Specific Considerations

Figure SPSA-7b-1 and Table SPSA-7b-1 depict the target contaminants for Site SPSA-7b. Borings 1 through 7, 9 through 11, 11B, and 12 through 19 were included in this exposure assessment, consistent with the South Plants SAR. According to site history, the Lagoon is a low spot that fills after rain storms (EBASCO, 1987i/RIC 87006R16) and it was not used as a disposal site. No chemicals from the RMA target contaminant list were suspected to be present in Site SPSA-7b.

2.24.2 Spatial Distribution of Measured Contaminant Concentrations

The locations and concentrations of the target contaminants that were detected in Site SPSA-7b are shown in Figure SPSA-7b-1. Table SPSA-7b-1 summarizes the maximum concentrations of contaminants measured in soil above indicator levels for the ICP metals, arsenic, and mercury and CRLs for organic contaminants from the Phase I and Phase II investigations. The boring number and depth where the maximum value was observed are shown. Methylene chloride, shown in Table SPSA-7b-1 is excluded from consideration in the exposure analysis for this site, because it was considered a laboratory contaminant in the samples analyzed. No data were included for ICP metals, arsenic, and mercury in Horizon 2 because direct soil exposure below 10 ft is assumed to be negligible (see Volume VI-A). Based on available groundwater data from the first quarter 1987 to the first quarter 1989, no evidence of groundwater contamination beneath this site was found (see Volume VI-A).

2.24.3 Site Exposure Summary

Tables SPSA-7b-2 through SPSA-7b-6 present Draft PPLVs and EIs for each site contaminant. The COCs are summarized below for each exposed population and with the critical exposure pathway identified.

Contaminants of Concern	Regulated Visitor	Casual Visitor	Recreational Visitor	Commercial Worker	Industrial Worker
Dieldrin	Direct	Direct	Direct	Direct	Direct
Arsenic	Direct	Direct	Direct	Direct	Direct
Aldrin	--	--	Direct	Indirect	Dir/Ind
PPDDT	--	--	Direct	Indirect	Dir/Ind

Note: Direct exposure pathways for soils include soil ingestion, suspended particulate inhalation, and dermal contact.
 Indirect exposure pathways include open and enclosed space vapor inhalation.

The results of the soil exposure summary indicate that exposure to contamination from the direct and indirect pathways both contribute to the exceedance of the cumulative PPLVs. Site SPSA-7b is designated as a Priority 1 site, based on the most sensitive exposed population PPLV (i.e., the industrial worker).

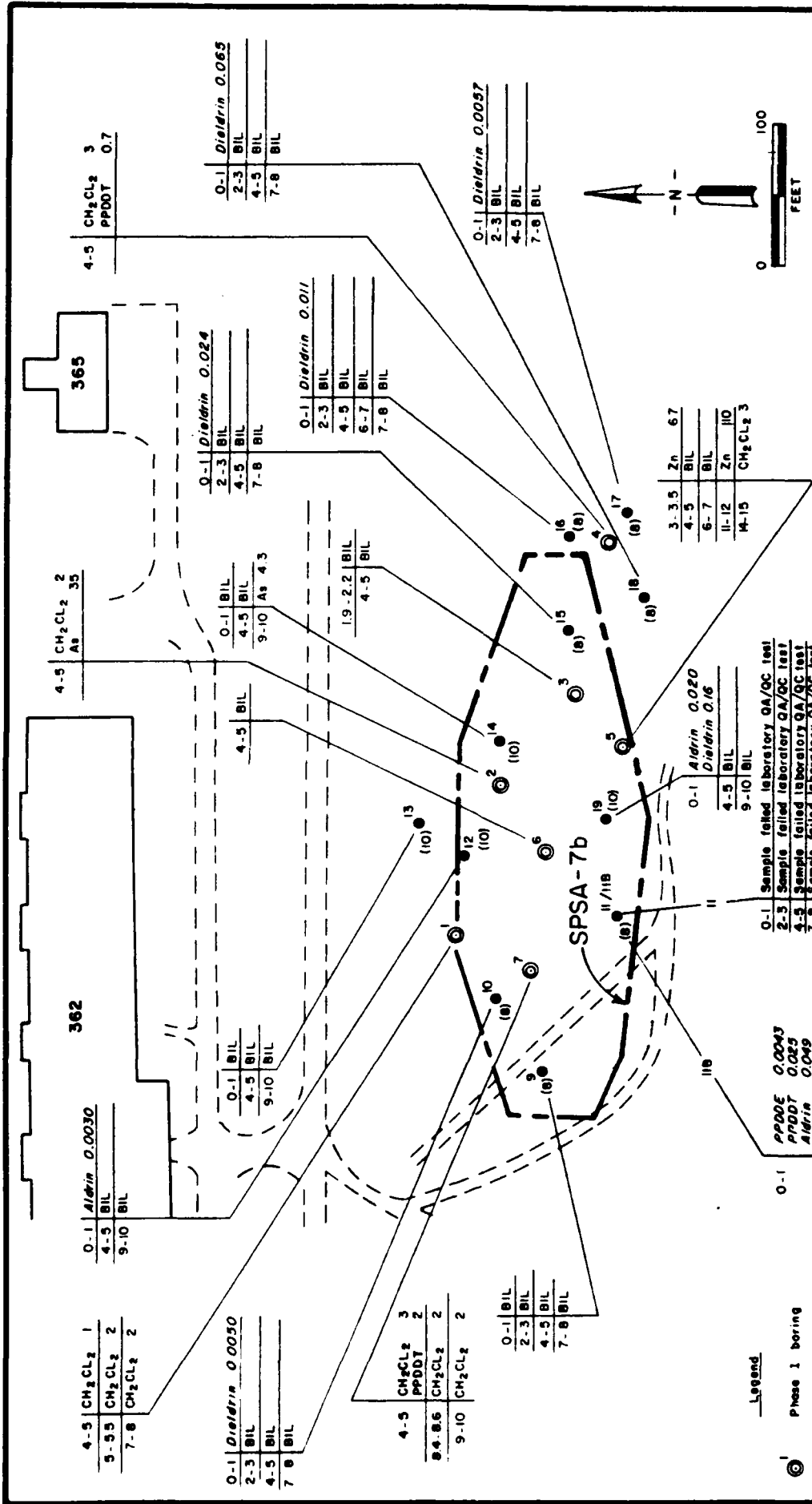


FIGURE SPSA-7b-1
Phase I and Phase II Analytes Detected Within or Above Indicator Levels
 Rocky Mountain Arsenal
 Prepared by: Ebasco Services Incorporated

Prepared for:
 Program Manager's Office for
 Rocky Mountain Arsenal Cleanup
 Aberdeen Proving Ground, Maryland

TABLE SPSA-7b-1
SOIL CONTAMINANT CONCENTRATIONS
FOR SITE SPSA-7b

Contaminant	Horizon 1			Horizon 2		
	Max. (ug/g)	Depth (ft)	Boring Number	Max. (ug/g)	Depth (ft)	Boring Number
Aldrin	0.049	0-1	11B	0.049	0-1	11B
PPDDE ^{1/}	0.0043	0-1	11B	0.0043	0-1	11B
PPDDT ^{2/}	2	4-5	7	2	4-5	7
Dieldrin	0.24	0-1	11B	0.24	0-1	11B
Methylene chloride ^{3/}	3	4-5	4	3	4-5	4
		4-5	7		4-5	7
Arsenic	--	--	--	--	14-15	5
	35	4-5	2	--	--	--

1/ PPDDE 2,2-bis(Para-chlorophenyl)-1,1-dichloroethene
2/ PPDDT 2,2-bis(Para-chlorophenyl)-1,1,1-trichloroethane
3/ Suspected laboratory contaminant.

SPSA South Plants Study Area
Max. Maximum
ug/g microgram per gram
ft foot/feet

SPSA-7b-2
EXPOSURE EVALUATIONS FOR REGULATED VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI EI	EI EI	EI EI	OPN
ALDRIN	1.5E+00	2.0E+05	1.5E+00	3.3E-02	2.5E-07	3.3E-02	0.0E+00
PPDDE	7.4E+01	1.2E+07	7.4E+01	5.8E-05	3.6E-10	5.8E-05	0.0E+00
PPDDT	7.4E+01	2.5E+07	7.4E+01	2.7E-02	7.9E-08	2.7E-02	0.0E+00
DIELDRIN	1.6E+00	6.2E+04	1.6E+00	1.5E-01*	3.8E-06	1.5E-01*	0.0E+00
ARSENIC	2.2E+01	0.0E+00	2.2E+01	1.6E+00*	0.0E+00	1.6E+00*	0.0E+00

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-7b-3
EXPOSURE EVALUATIONS FOR CASUAL VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI OPN
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	
ALDRIN	1.5E+00	2.0E+05	1.5E+00	3.3E-02	2.5E-07	3.3E-02	0.0E+00
PPDDE	7.4E+01	1.2E+07	7.4E+01	5.8E-05	3.6E-10	5.8E-05	0.0E+00
PPDDT	7.4E+01	2.5E+07	7.4E+01	2.7E-02	7.9E-08	2.7E-02	0.0E+00
DIELDRIN	1.6E+00	6.2E+04	1.6E+00	1.5E-01*	3.8E-06	1.5E-01*	0.0E+00
ARSENIC	2.2E+01	0.0E+00	2.2E+01	1.6E+00*	0.0E+00	1.6E+00*	0.0E+00

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-7b-4

EXPOSURE EVALUATIONS FOR RECREATIONAL VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI EI	EI EI	EI EI	OPM
ALDRIN	2.1E-01	1.3E+04	2.1E-01	2.4E-01*	3.7E-06	2.4E-01*	0.0E+00
PPDDE	1.0E+01	7.9E+05	1.0E+01	4.2E-04	5.4E-09	4.2E-04	0.0E+00
PPDDT	1.0E+01	1.7E+06	1.0E+01	2.0E-01*	1.2E-06	2.0E-01*	0.0E+00
DIELDRIN	2.2E-01	4.1E+03	2.2E-01	1.1E+00*	5.8E-05	1.1E+00*	0.0E+00
ARSENIC	3.9E+00	0.0E+00	3.9E+00	8.9E+00*	0.0E+00	8.9E+00*	0.0E+00

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-7b-5
EXPOSURE EVALUATIONS FOR COMMERCIAL WORKERS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI ENC
ALDRIN	1.9E+00	4.0E-01	3.3E-01	2.6E-02	1.2E-01*	1.5E-01*	0.0E+00
PPDDE	9.3E+01	1.9E+01	1.6E+01	4.6E-05	2.2E-04	2.7E-04	0.0E+00
PPDDT	9.3E+01	1.9E+01	1.6E+01	2.1E-02	1.0E-01*	1.2E-01*	0.0E+00
DIELDRIN	2.0E+00	5.8E+01	1.9E+00	1.2E-01*	4.2E-03	1.2E-01*	0.0E+00
ARSENIC	2.0E+01	0.0E+00	2.0E+01	1.8E+00*	0.0E+00	1.8E+00*	0.0E+00

*: EI is equal to or exceeds 1.0E-01

SPSA-7b-6
EXPOSURE EVALUATIONS FOR INDUSTRIAL WORKERS

CONTAMINANT	DIRECT	INDIRECT		CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI	
	PPLV (mg/kg)	OSVI (mg/kg)	ESVI (mg/kg)	PPLV (mg/kg)	EI	EI	EI	OPN	ENC
ALDRIN	1.2E-01	2.6E+04	4.0E-01	9.0E-02	4.2E-01*	1.2E-01*	5.4E-01*	0.0E+00	0.0E+00
PPDDE	5.7E+00	1.6E+06	1.9E+01	4.4E+00	7.5E-04	2.2E-04	9.7E-04	0.0E+00	0.0E+00
PPDDT	5.7E+00	3.4E+06	1.9E+01	4.4E+00	3.5E-01*	1.0E-01*	4.5E-01*	0.0E+00	0.0E+00
DIELDRIN	1.2E-01	8.3E+03	1.9E+01	1.2E-01	2.0E+00*	1.3E-02	2.0E+00*	0.0E+00	0.0E+00
ARSENIC	1.6E+00	0.0E+00	0.0E+00	1.6E+00	2.2E+01*	0.0E+00	2.2E+01*	0.0E+00	0.0E+00

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

2.25 SITE SPSA-7c: BALANCE OF SPSA-7 (formerly Site 2-4: Excavation Pit; EBASCO, 1987k/RIC 87006R17; Site 2-2: Test Site; EBASCO, 1987j/RIC 87216R02 and EBASCO, 1988q/RIC 87216R02A; Site 2-13: Former Open Storage Area; EBASCO, 1987l/RIC 87216R04 and EBASCO, 1988r/RIC 87216R04A; Sites 2-14a and 2-14b: Sanitary Landfills; EBASCO, 1987m/RIC 87216R05; Section 2-Uncontaminated Area; EBASCO, 1987p/RIC 87127R08; Site 2-14a: Sanitary Landfill; EBASCO, 1988s/RIC 87216R05A; South Plants Regional Study Area/South Plants Manufacturing Complex; EBASCO, 1988z/RIC88306R01)

2.25.1 Site-Specific Considerations

Figure SPSA-7c-1 and Tables SPSA-7c-1 and SPSA-7c-2 depict the target contaminants for Site SPSA-7c. Borings 3, 4, and 5 from South Plants Regional Study Area/South Plants Manufacturing Complex, 1a through 8a from Sites 2-14a and 2-14b, 1d through 4d from Site 2-13, 1c through 11c from Site 2-2, 1b through 4b from Site 2-4, 21, 23, and 33 from Section 2-Uncontaminated Area, were included in this exposure assessment, consistent with the South Plants SAR. The historical search conducted under the contaminant assessment identified lead and hydrocarbon fuels as potential contaminants. According to site history, no other chemicals from the RMA target contaminant list were suspected to be present in Site SPSA-7c.

2.25.2 Spatial Distribution of Measured Contaminant Concentrations

The locations and concentrations of the target contaminants that were detected in Site SPSA-7c are shown in Figure SPSA-7c-1. Table SPSA-7c-1 summarizes the maximum concentrations of contaminants measured in soil above indicator levels for the ICP metals, arsenic, and mercury and CRLs for organic contaminants from the Phase I and Phase II investigations. The boring number and depth where the maximum value was observed are shown. Methylene chloride, shown in Table SPSA-7c-1 is excluded from consideration in the exposure analysis for this site because it is considered a laboratory contaminant in the samples analyzed. No data were included for ICP metals, arsenic, and mercury in Horizon 2 because direct soil exposure below 10 ft is assumed to be negligible (see Volume VI-A). Table SPSA-7c-2 summarizes the maximum concentrations detected in groundwater together with the well number, location, sampling interval, and depth to groundwater.

2.25.3 Site Exposure Summary

Tables SPSA-7c-3 through SPSA-7c-7 present Draft PPLVs, EIs, and VEIs for each site contaminant. Since the depth to groundwater below Site SPSA-7c is greater than 10 ft, the enclosed space vapor inhalation SPPPLV is included in the calculation of the cumulative quantity. The COCs are summarized below for each exposed population and with the critical exposure pathway identified.

Contaminants of Concern	Regulated Visitor	Casual Visitor	Recreational Visitor	Commercial Worker	Industrial Worker
Dieldrin	Direct	Direct	Direct	Direct	Direct
Benzene	--	--	Dir/Ind	Indirect	Dir/Ind

Note: Direct exposure pathways for soils include soil ingestion, suspended particulate inhalation, and dermal contact.
Indirect exposure pathways include open and enclosed space vapor inhalation.

The results of the soil exposure summary indicate that exposure to contamination from the direct and indirect pathways both contribute to the exceedance of the cumulative PPLVs. Site SPSA-7c is designated as a Priority 1 site, based on the most sensitive exposed population PPLV (i.e., the industrial worker).

The following groundwater contaminant results in an unacceptable exposure due to vapor inhalation as indicated by a VEI value greater than 1:

- Dicyclopentadiene (enclosed)

TABLE SPSA-7c-1
SOIL CONTAMINANT CONCENTRATIONS
FOR SITE SPSA-7c

Contaminant	Horizon 1			Horizon 2		
	Max. (ug/g)	Depth (ft)	Boring Number	Max. (ug/g)	Depth (ft)	Boring Number
Benzene	20	9-10	4c	20	9-10	4c
	--	--	--		14-15	4c
Dieldrin	0.4	0-1	3	0.4	0-1	3
		0-1	8a		0-1	8a
Methylene chloride ^{1/}	4	4-5	1c	4	4-5	1c
		4-5	2c		4-5	2c
		9-10	2a		9-10	2a
Copper	54	6.5-7.5	6c	--	--	--
Zinc	300	0-1	1a	--	--	--

1/ Suspected laboratory contaminant.

SPSA South Plants Study Area
Max. Maximum
ug/g microgram per gram
ft foot/feet

SAMPL DATE
02/19
01/24
02/19
02/19
02/19
02/19
01/24
12/13
02/19
01/24
02/19
12/13
02/19
01/24
01/24
12/13
12/13

REA4/TBL0081.REA VI-G 9/12/90 9:11 am sma

TABLE SPSA-7c-2

GROUNDWATER CONTAMINANT CONCENTRATIONS (UG/L)
FOR SITE SPSA-7c

AVERAGE SITE DEPTH TO GROUNDWATER: 16 Feet

CHEMICAL	CONCENTRATION MAXIMUM	LOCATION (WELL NUMBER)	SAMPLE DATE
SUPONA	0.99	02023	12/13/88
TETRACHLOROETHYLENE	1.9	02023	12/13/88
TRICHLOROETHYLENE	3.7	02058	01/24/89

EACH VALUE PRESENTED IS THE MAXIMUM CONCENTRATION FOR THE LISTED ANALYTE
FOR THE PERIOD March 17, 1987 TO February 28, 1989.
DATA SOURCE: DP ASSOCIATES, RMA Database, July 19, 1990

SPSA-7c-3
EXPOSURE EVALUATIONS FOR REGULATED VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VE1 OPN
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	
ALDRIN	1.5E+00	0.0E+00	1.5E+00	0.0E+00	0.0E+00	0.0E+00	2.1E-06
BENZENE	8.6E+02	3.2E+02	2.3E+02	2.3E-02	6.3E-02	8.6E-02	9.7E-05
CHLORDANE	2.0E+01	0.0E+00	2.0E+01	0.0E+00	0.0E+00	0.0E+00	4.7E-07
CHLOROBENZENE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	4.9E-06
CHLOROFORM	4.0E+03	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	4.5E-06
CHLOROPHENYLMETHYL SULFONE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	2.9E-09
PPDDE	7.4E+01	0.0E+00	7.4E+01	0.0E+00	0.0E+00	0.0E+00	5.4E-08
DIBROMOCHLOROPROPANE	1.8E+01	0.0E+00	1.8E+01	0.0E+00	0.0E+00	0.0E+00	8.0E-06
1,1-DICHLOROETHANE	2.8E+02	0.0E+00	2.8E+02	0.0E+00	0.0E+00	0.0E+00	3.1E-08
1,2-DICHLOROETHANE	2.8E+02	0.0E+00	2.8E+02	0.0E+00	0.0E+00	0.0E+00	1.4E-05
1,2-DICHLOROETHYLENE	1.7E+05	0.0E+00	1.7E+05	0.0E+00	0.0E+00	0.0E+00	0.0E+00
DICYCLOPENTADIENE	5.4E+04	0.0E+00	5.4E+04	0.0E+00	0.0E+00	0.0E+00	1.7E-03
DIELDRIN	1.6E+00	1.3E+04	1.6E+00	2.5E-01*	3.0E-05	2.5E-01*	3.8E-08
DIISOPROPYLMETHYL PHOSPHONATE	6.6E+05	0.0E+00	6.6E+05	0.0E+00	0.0E+00	0.0E+00	1.2E-10
DIMETHYLMETHYL PHOSPHONATE	1.5E+05	0.0E+00	1.5E+05	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENDRIN	2.5E+03	0.0E+00	2.5E+03	0.0E+00	0.0E+00	0.0E+00	4.0E-11
ISODRIN	5.8E+02	0.0E+00	5.8E+02	0.0E+00	0.0E+00	0.0E+00	4.2E-08
SUPONA	1.2E+03	0.0E+00	1.2E+03	0.0E+00	0.0E+00	0.0E+00	3.9E-13
TETRACHLOROETHYLENE	5.1E+02	0.0E+00	5.1E+02	0.0E+00	0.0E+00	0.0E+00	9.4E-06
TRICHLOROETHYLENE	2.3E+03	0.0E+00	2.3E+03	0.0E+00	0.0E+00	0.0E+00	3.6E-05
COPPER	4.2E+05	0.0E+00	4.2E+05	1.3E-04	0.0E+00	1.3E-04	0.0E+00
ZINC	2.0E+06	0.0E+00	2.0E+06	1.5E-04	0.0E+00	1.5E-04	0.0E+00

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-7c-4
EXPOSURE EVALUATIONS FOR CASUAL VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI EI	EI EI	EI EI	OPN
ALDRIN	1.5E+00	0.0E+00	1.5E+00	0.0E+00	0.0E+00	0.0E+00	2.1E-06
BENZENE	8.6E+02	3.2E+02	2.3E+02	2.3E-02	6.3E-02	8.6E-02	9.7E-05
CHLORDANE	2.0E+01	0.0E+00	2.0E+01	0.0E+00	0.0E+00	0.0E+00	4.7E-07
CHLOROBENZENE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	4.9E-06
CHLOROFORM	4.0E+03	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	4.5E-06
CHLOROPHENYLMETHYL SULFONE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	2.9E-09
PPDE	7.4E+01	0.0E+00	7.4E+01	0.0E+00	0.0E+00	0.0E+00	5.4E-08
DIBROMOCHLOROPROPANE	1.8E+01	0.0E+00	1.8E+01	0.0E+00	0.0E+00	0.0E+00	8.0E-06
1,1-DICHLOROETHANE	2.8E+02	0.0E+00	2.8E+02	0.0E+00	0.0E+00	0.0E+00	3.1E-08
1,2-DICHLOROETHANE	2.8E+02	0.0E+00	2.8E+02	0.0E+00	0.0E+00	0.0E+00	1.4E-05
1,2-DICHLOROETHYLENE	1.7E+05	0.0E+00	1.7E+05	0.0E+00	0.0E+00	0.0E+00	0.0E+00
DICYCLOPENTADIENE	5.4E+04	0.0E+00	5.4E+04	0.0E+00	0.0E+00	0.0E+00	1.7E-03
DIELDRIN	1.6E+00	1.3E+04	1.6E+00	2.5E-01*	3.0E-05	2.5E-01*	3.8E-08
DIISOPROPYLMETHYL PHOSPHONATE	6.6E+05	0.0E+00	6.6E+05	0.0E+00	0.0E+00	0.0E+00	1.2E-10
DIMETHYMETHYL PHOSPHONATE	1.5E+05	0.0E+00	1.5E+05	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENDRIN	2.5E+03	0.0E+00	2.5E+03	0.0E+00	0.0E+00	0.0E+00	4.0E-11
ISODRIN	5.8E+02	0.0E+00	5.8E+02	0.0E+00	0.0E+00	0.0E+00	4.2E-08
SUPONA	1.2E+03	0.0E+00	1.2E+03	0.0E+00	0.0E+00	0.0E+00	3.9E-13
TETRACHLOROETHYLENE	5.1E+02	0.0E+00	5.1E+02	0.0E+00	0.0E+00	0.0E+00	9.4E-06
TRICHLOROETHYLENE	2.3E+03	0.0E+00	2.3E+03	0.0E+00	0.0E+00	0.0E+00	3.6E-05
COPPER	4.2E+05	0.0E+00	4.2E+05	1.3E-04	0.0E+00	1.3E-04	0.0E+00
ZINC	2.0E+06	0.0E+00	2.0E+06	1.5E-04	0.0E+00	1.5E-04	0.0E+00

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-7c-5
EXPOSURE EVALUATIONS FOR RECREATIONAL VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI OPN
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI EI	EI EI	EI EI	
ALDRIN	2.1E-01	0.0E+00	2.1E-01	0.0E+00	0.0E+00	0.0E+00	3.1E-05
BENZENE	1.2E+02	4.9E+01	3.5E+01	1.7E-01*	4.0E-01*	5.7E-01*	1.5E-03
CHLORDANE	2.7E+00	0.0E+00	2.7E+00	0.0E+00	0.0E+00	0.0E+00	7.2E-06
CHLOROBENZENE	6.8E+04	0.0E+00	6.8E+04	0.0E+00	0.0E+00	0.0E+00	3.2E-05
CHLOROFORM	5.6E+02	0.0E+00	5.6E+02	0.0E+00	0.0E+00	0.0E+00	6.8E-05
CHLOROPHENYLMETHYL SULFONE	7.0E+04	0.0E+00	7.0E+04	0.0E+00	0.0E+00	0.0E+00	1.9E-08
PPDDE	1.0E+01	0.0E+00	1.0E+01	0.0E+00	0.0E+00	0.0E+00	8.2E-07
DIBROMOCHLOROPROPANE	2.5E+00	0.0E+00	2.5E+00	0.0E+00	0.0E+00	0.0E+00	1.2E-04
1,1-DICHLOROETHANE	3.9E+01	0.0E+00	3.9E+01	0.0E+00	0.0E+00	0.0E+00	4.7E-07
1,2-DICHLOROETHANE	3.9E+01	0.0E+00	3.9E+01	0.0E+00	0.0E+00	0.0E+00	2.1E-04
1,2-DICHLOROETHYLENE	7.0E+04	0.0E+00	7.0E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
DICYCLOPENTADIENE	1.8E+04	0.0E+00	1.8E+04	0.0E+00	0.0E+00	0.0E+00	1.1E-02
DIELDRIN	2.2E-01	8.7E+02	2.2E-01	1.8E+00*	4.6E-04	1.8E+00*	5.8E-07
DIISOPROPYLMETHYL PHOSPHONATE	2.8E+05	0.0E+00	2.8E+05	0.0E+00	0.0E+00	0.0E+00	7.6E-10
DIMETHYMETHYL PHOSPHONATE	6.3E+04	0.0E+00	6.3E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENDRIN	1.1E+03	0.0E+00	1.1E+03	0.0E+00	0.0E+00	0.0E+00	2.6E-10
ISODRIN	2.5E+02	0.0E+00	2.5E+02	0.0E+00	0.0E+00	0.0E+00	2.7E-07
SUPONA	5.3E+02	0.0E+00	5.3E+02	0.0E+00	0.0E+00	0.0E+00	2.5E-12
TETRACHLOROETHYLENE	7.1E+01	0.0E+00	7.1E+01	0.0E+00	0.0E+00	0.0E+00	1.4E-04
TRICHLOROETHYLENE	3.2E+02	0.0E+00	3.2E+02	0.0E+00	0.0E+00	0.0E+00	5.4E-04
COPPER	2.5E+05	0.0E+00	2.5E+05	2.2E-04	0.0E+00	2.2E-04	0.0E+00
ZINC	1.1E+06	0.0E+00	1.1E+06	2.9E-04	0.0E+00	2.9E-04	0.0E+00

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-7c-6
EXPOSURE EVALUATIONS FOR COMMERCIAL WORKERS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VE1 ENC
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	
ALDRIN	1.9E+00	0.0E+00	1.9E+00	0.0E+00	0.0E+00	0.0E+00	1.6E-03
BENZENE	1.1E+03	4.9E-01	4.9E-01	1.8E-02	4.1E+01*	4.1E+01*	7.6E-02
CHLORDANE	2.5E+01	0.0E+00	2.5E+01	0.0E+00	0.0E+00	0.0E+00	3.7E-04
CHLOROBENZENE	8.8E+04	0.0E+00	8.8E+04	0.0E+00	0.0E+00	0.0E+00	1.2E-02
CHLOROFORM	5.1E+03	0.0E+00	5.1E+03	0.0E+00	0.0E+00	0.0E+00	3.6E-03
CHLOROPHENYLMETHYL SULFONE	9.1E+04	0.0E+00	9.1E+04	0.0E+00	0.0E+00	0.0E+00	7.0E-06
PPDDE	9.3E+01	0.0E+00	9.3E+01	0.0E+00	0.0E+00	0.0E+00	4.3E-05
DIBROMOCHLOROPROPANE	2.3E+01	0.0E+00	2.3E+01	0.0E+00	0.0E+00	0.0E+00	6.3E-03
1,1-DICHLOROETHANE	3.6E+02	0.0E+00	3.6E+02	0.0E+00	0.0E+00	0.0E+00	2.4E-05
1,2-DICHLOROETHANE	3.5E+02	0.0E+00	3.5E+02	0.0E+00	0.0E+00	0.0E+00	1.1E-02
1,2-DICHLOROETHYLENE	9.2E+04	0.0E+00	9.2E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
DICYCLOPENTADIENE	1.7E+04	0.0E+00	1.7E+04	0.0E+00	0.0E+00	0.0E+00	4.1E+00
DIELDRIN	2.0E+00	5.8E+01	1.9E+00	2.0E-01*	7.0E-03	2.1E-01*	3.0E-05
DIISOPROPYLMETHYL PHOSPHONATE	3.7E+05	0.0E+00	3.7E+05	0.0E+00	0.0E+00	0.0E+00	2.8E-07
DIMETHYLMETHYL PHOSPHONATE	8.2E+04	0.0E+00	8.2E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENDRIN	1.4E+03	0.0E+00	1.4E+03	0.0E+00	0.0E+00	0.0E+00	9.4E-08
ISODRIN	3.2E+02	0.0E+00	3.2E+02	0.0E+00	0.0E+00	0.0E+00	9.9E-05
SUPONA	6.9E+02	0.0E+00	6.9E+02	0.0E+00	0.0E+00	0.0E+00	9.3E-10
TETRACHLOROETHYLENE	6.5E+02	0.0E+00	6.5E+02	0.0E+00	0.0E+00	0.0E+00	7.4E-03
TRICHLOROETHYLENE	2.9E+03	0.0E+00	2.9E+03	0.0E+00	0.0E+00	0.0E+00	2.8E-02
COPPER	1.8E+05	0.0E+00	1.8E+05	3.1E-04	0.0E+00	3.1E-04	0.0E+00
ZINC	7.8E+05	0.0E+00	7.8E+05	3.8E-04	0.0E+00	3.8E-04	0.0E+00

*: EI is equal to or exceeds 1.0E-01

SPSA-7c-7
EXPOSURE EVALUATIONS FOR INDUSTRIAL WORKERS

CONTAMINANT	DIRECT	INDIRECT		CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI	
	PPLV (mg/kg)	OSVI (mg/kg)	ESVI (mg/kg)	PPLV (mg/kg)	EI	EI	EI	OPN	ENC
ALDRIN	1.2E-01	0.0E+00	0.0E+00	1.2E-01	0.0E+00	0.0E+00	0.0E+00	1.5E-05	4.9E-03
BENZENE	6.7E+01	4.3E+01	4.9E-01	4.8E-01	3.0E-01*	4.2E+01*	4.2E+01*	7.3E-04	2.3E-01
CHLORDANE	1.5E+00	0.0E+00	0.0E+00	1.5E+00	0.0E+00	0.0E+00	0.0E+00	3.6E-06	1.1E-03
CHLOROBENZENE	1.5E+04	0.0E+00	0.0E+00	1.5E+04	0.0E+00	0.0E+00	0.0E+00	3.7E-05	1.2E-02
CHLOROFORM	3.1E+02	0.0E+00	0.0E+00	3.1E+02	0.0E+00	0.0E+00	0.0E+00	3.4E-05	1.1E-02
CHLOROPHENYLMETHYL SULFONE	1.7E+04	0.0E+00	0.0E+00	1.7E+04	0.0E+00	0.0E+00	0.0E+00	2.2E-08	7.0E-06
PPDDE	5.7E+00	0.0E+00	0.0E+00	5.7E+00	0.0E+00	0.0E+00	0.0E+00	4.1E-07	1.3E-04
DIBROMOCHLOROPROPANE	1.4E+00	0.0E+00	0.0E+00	1.4E+00	0.0E+00	0.0E+00	0.0E+00	6.0E-05	1.9E-02
1,1-DICHLOROETHANE	2.3E+01	0.0E+00	0.0E+00	2.3E+01	0.0E+00	0.0E+00	0.0E+00	2.3E-07	7.3E-05
1,2-DICHLOROETHANE	2.2E+01	0.0E+00	0.0E+00	2.2E+01	0.0E+00	0.0E+00	0.0E+00	1.1E-04	3.3E-02
1,2-DICHLOROETHYLENE	1.7E+04	0.0E+00	0.0E+00	1.7E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
DICYCLOPENTADIENE	1.2E+03	0.0E+00	0.0E+00	1.2E+03	0.0E+00	0.0E+00	0.0E+00	1.3E-02	4.1E+00
DIELDRIN	1.2E-01	1.8E+03	1.9E+01	1.2E-01	3.3E+00*	2.1E-02	3.3E+00*	2.9E-07	9.0E-05
DIISOPROPYLMETHYL PHOSPHONATE	6.8E+04	0.0E+00	0.0E+00	6.8E+04	0.0E+00	0.0E+00	0.0E+00	8.8E-10	2.8E-07
DIMETHYLMETHYL PHOSPHONATE	1.5E+04	0.0E+00	0.0E+00	1.5E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENDRIN	2.5E+02	0.0E+00	0.0E+00	2.5E+02	0.0E+00	0.0E+00	0.0E+00	3.0E-10	9.4E-08
ISODRIN	5.9E+01	0.0E+00	0.0E+00	5.9E+01	0.0E+00	0.0E+00	0.0E+00	3.2E-07	9.9E-05
SUPONA	1.3E+02	0.0E+00	0.0E+00	1.3E+02	0.0E+00	0.0E+00	0.0E+00	3.0E-12	9.3E-10
TETRACHLOROETHYLENE	4.1E+01	0.0E+00	0.0E+00	4.1E+01	0.0E+00	0.0E+00	0.0E+00	7.1E-05	2.2E-02
TRICHLOROETHYLENE	1.8E+02	0.0E+00	0.0E+00	1.8E+02	0.0E+00	0.0E+00	0.0E+00	2.7E-04	8.4E-02
COPPER	5.7E+04	0.0E+00	0.0E+00	5.7E+04	9.5E-04	0.0E+00	9.5E-04	0.0E+00	0.0E+00
ZINC	1.4E+05	0.0E+00	0.0E+00	1.4E+05	2.2E-03	0.0E+00	2.2E-03	0.0E+00	0.0E+00

*: EI is equal to or exceeds 1.0E-01

2.26 SITE SPSA-8a: SANITARY LANDFILL (formerly Sites 2-14a and 2-14b: Sanitary Landfills; EBASCO, 1987m/RIC 87216R05; and Site 2-14: Sanitary Landfill; EBASCO, 1988s/RIC 87216R05A)

2.26.1 Site-Specific Considerations

Figure SPSA-8a-1 and Tables SPSA-8a-1 and SPSA-8a-2 depict the target contaminants for Site SPSA-8a. Borings 2, 4, and 6 through 24 were included in the exposure assessment, consistent with the South Plants SAR. The historical search conducted under the contamination assessment revealed that waste sand contaminated with Atrazine, benzene, chlorobenzene, toluene, and xylene was disposed at and later removed from Site SPSA-8a (EBASCO, 1987m/RIC 87216R05); however, these chemicals were not detected in soils during the Phase I and Phase II investigations. According to site history, no other chemicals from the RMA target contaminant list were suspected to be present in Site SPSA-8a (EBASCO, 1987m/RIC 87216R05).

2.26.2 Spatial Distribution of Measured Contaminant Concentrations

The locations and concentrations of the target contaminants that were detected in Site SPSA-8a are shown in Figure SPSA-8a-1. Table SPSA-8a-1 summarizes the maximum concentrations of contaminants measured in soil above indicator levels for the ICP metals, arsenic, and mercury and CRLs for organic contaminants from the Phase I and Phase II investigations. The boring number and depth where the maximum value was observed are shown. Methylene chloride, shown in Table SPSA-8a-1, is excluded from consideration in the exposure evaluations for this site because it is a suspected laboratory contaminant in the samples analyzed. No data were included for ICP metals, arsenic, and mercury in Horizon 2 because direct soil exposure below 10 ft is assumed to be negligible (see Volume VI-A). Table SPSA-8a-2 summarizes the maximum concentrations detected in groundwater together with the well number, location, sampling interval, and depth to groundwater.

2.26.3 Site Exposure Summary

Tables SPSA-8a-3 through SPSA-8a-7 present Draft PPLVs, EIs, and VEIs for each site contaminant. Since the depth to groundwater below Site SPSA-8a is greater than 10 ft, the enclosed space vapor inhalation SPPPLV is included in the calculation of the cumulative

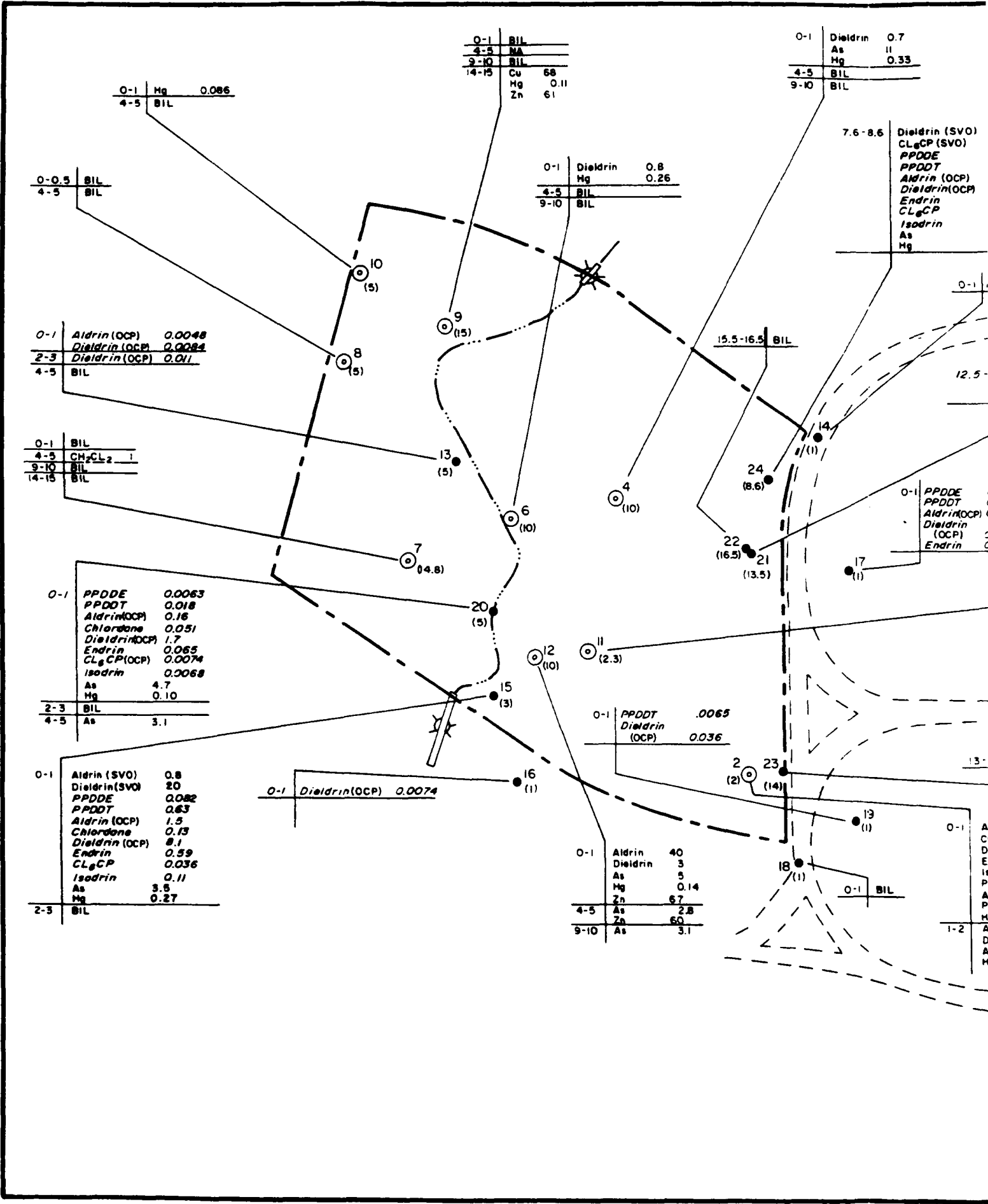
quantity. The COCs are summarized below for each exposed population and with the critical exposure pathway identified.

Contaminants of Concern	Regulated Visitor	Casual Visitor	Recreational Visitor	Commercial Worker	Industrial Worker
Aldrin	Direct	Direct	Direct	Dir/Ind	Dir/Ind
Chlordane	Direct	Direct	Direct	Direct	Dir/Ind
PPDDT	Direct	Direct	Direct	Dir/Ind	Dir/Ind
Dieldrin	Direct	Direct	Dir/Ind	Dir/Ind	Dir/Ind
Hexachlorocyclo-pentadiene	Dir/Ind	Dir/Ind	Dir/Ind	Dir/Ind	Dir/Ind
Isodrin	Direct	Direct	Direct	Dir/Ind	Dir/Ind
Arsenic	Direct	Direct	Direct	Direct	Direct

Note: Direct exposure pathways for soils include soil ingestion, suspended particulate inhalation, and dermal contact.
Indirect exposure pathways include open and enclosed space vapor inhalation.

The results of the soil exposure summary indicate that exposure to contamination from the direct and indirect pathways both contribute to the exceedance of the cumulative PPLVs. Site SPSA-8a is designated as a Priority 1 site, based on the most sensitive exposed population PPLV (i.e., the industrial worker).

No groundwater contaminants result in an unacceptable exposure due to vapor inhalation as indicated by VEI values less than 1.



0-1	Hg	0.086
4-5	BIL	

0-1	BIL	
4-5	NA	
9-10	BIL	
14-15	Cu	68
	Hg	0.11
	Zn	61

0-1	Dieldrin	0.7
	As	11
	Hg	0.33
4-5	BIL	
9-10	BIL	

7.6-8.6	Dieldrin (SVO)	
	CL ₂ CP (SVO)	
	PPDE	
	PPDT	
	Aldrin (OCP)	
	Dieldrin (OCP)	
	Endrin	
	CL ₂ CP	
	Isodrin	
	As	
	Hg	

0-1	Dieldrin	0.8
	Hg	0.26
4-5	BIL	
9-10	BIL	

0-0.5	BIL	
4-5	BIL	

0-1	Aldrin (OCP)	0.0048
	Dieldrin (OCP)	0.0084
2-3	Dieldrin (OCP)	0.011
4-5	BIL	

0-1	BIL	
4-5	CH ₂ CL ₂	1
9-10	BIL	
14-15	BIL	

0-1	PPDE	0.0063
	PPDT	0.018
	Aldrin(OCP)	0.16
	Chlordane	0.051
	Dieldrin(OCP)	1.7
	Endrin	0.065
	CL ₂ CP(OCP)	0.0074
	Isodrin	0.0068
	As	4.7
	Hg	0.10
2-3	BIL	
4-5	As	3.1

0-1	Aldrin (SVO)	0.8
	Dieldrin(SVO)	20
	PPDE	0.082
	PPDT	0.63
	Aldrin (OCP)	1.5
	Chlordane	0.13
	Dieldrin (OCP)	8.1
	Endrin	0.59
	CL ₂ CP	0.036
	Isodrin	0.11
	As	3.5
	Hg	0.27
2-3	BIL	

0-1 Dieldrin(OCP) 0.0074

0-1	PPDT	0.0065
	Dieldrin (OCP)	0.036

0-1	Aldrin	40
	Dieldrin	3
	As	5
	Hg	0.14
	Zn	67
4-5	As	2.8
	Zn	60
9-10	As	3.1

0-1	PPDE	
	PPDT	
	Aldrin(OCP)	
	Dieldrin (OCP)	
	Endrin	

0-1 Aldrin
0-1 Dieldrin
0-1 As
0-1 Hg
0-1 Zn
0-1 P
0-1 A
0-1 D
0-1 H

0-1	Dieldrin	0.7
	As	11
	Hg	0.33
4-5	BIL	
1-10	BIL	

7.6-8.6	Dieldrin (SVO)	0.4
	CL ₆ CP (SVO)	3
	PPDE	0.0073
	PPDT	0.13
	Aldrin (OCP)	0.052
	Dieldrin(OCP)	0.40
	Endrin	0.080
	CL ₆ CP	5.3
	Isodrin	0.021
	As	3.1
	Hg	0.17

0-1 Dieldrin (OCP) 0.023

12.5-13.5
PPDT 0.0036
Aldrin(OCP) 0.037
Dieldrin(OCP) 0.029

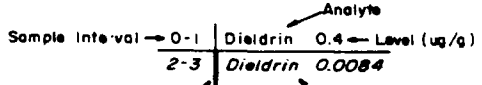
0-1	PPDE	0.0074	0-1	Dieldrin	3000
	PPDT	0.025		CL ₆ CP	3000
	Aldrin(OCP)	0.020		Isodrin	500
	Dieldrin (OCP)	0.039		PPDT	9
	Endrin	0.015		As	3
				Cu	39
				Pb	25
				Hg	0.14
				Zn	100

13-14 BIL

0-1	Aldrin	80
	Chlordane	800
	Dieldrin	80
	Endrin	20
	Isodrin	10
	PPDT	10
	As	12
	Pb	39
	Hg	1.1
1-2	Aldrin	2
	Dieldrin	4
	As	21
	Hg	0.11

LEGEND

- Site boundary
- Phase I boring
- (B) Phase II boring and total depth drilled (ft)



Bedrock Sample Phase II analytes detected by different method-see text

- CL₆CP - Hexachlorocyclopentadiene
- CH₂CL₂ - Methylene chloride
- PPDE - 2,2-bis(Pure-chlorophenyl)-1,1-dichloroethane
- PPDT - 2,2-bis(Pure-chlorophenyl)-1,1,1-trichloroethane
- As - Arsenic
- Cu - Copper
- Pb - Lead
- Hg - Mercury
- Zn - Zinc
- B.L. - Below indicator level
- SVO - Semivolatile organics
- OCP - Organochlorine pesticides
- NA - Not analyzed



Prepared for:
Program Manager's Office for
Rocky Mountain Arsenal Cleanup
Aberdeen Proving Ground, Maryland

FIGURE SPSA-8a-1
Phase I and Phase II Analytes Detected
Within or Above Indicator Levels
Rocky Mountain Arsenal
Prepared by: Ebasco Services Incorporated

TABLE SPSA-8a-1
SOIL CONTAMINANT CONCENTRATIONS
FOR SITE SPSA-8a

Contaminant	Horizon 1			Horizon 2		
	Max. (ug/g)	Depth (ft)	Boring Number	Max. (ug/g)	Depth (ft)	Boring Number
Aldrin	80	0-1	2	80	0-1	2
Chlordane	800	0-1	2	800	0-1	2
PPDDE ^{1/}	0.082	0-1	15	0.082	0-1	15
PPDDT ^{2/}	10	0-1	2	10	0-1	2
Dieldrin	3000	0-1	11	3000	0-1	11
Endrin	20	0-1	2	20	0-1	2
Hexachlorocyclopentadiene	3000	0-1	11	3000	0-1	11
Isodrin	500	0-1	11	500	0-1	11
Methylene chloride ^{3/}	1	4-5	7	1	4-5	7
Arsenic	21	1-2	2	--	--	--
Copper	39	0-1	11	--	--	--
Mercury	1.1	0-1	2	--	--	--
Zinc	100	0-1	11	--	--	--

1/ PPDDE 2,2-bis(Para-chlorophenyl)-1,1-dichloroethene
2/ PPDDT 2,2-bis(Para-chlorophenyl)-1,1,1-trichloroethane
3/ Suspected laboratory contaminant.

SPSA South Plants Study Area
Max. Maximum
ug/g microgram per gram
ft foot/feet

TABLE SPSA-8a-2
GROUNDWATER CONTAMINANT CONCENTRATIONS (UG/L)
FOR SITE SPSA-8a

AVERAGE SITE DEPTH TO GROUNDWATER: 18 Feet

CHEMICAL	CONCENTRATION MAXIMUM	LOCATION (WELL NUMBER)	SAMPLE DATE
ALDRIN	0.11	02037	12/14/88
CARBON TETRACHLORIDE	1.4	02037	12/14/88
CHLOROFORM	3.7	02037	12/14/88
CHLORDANE	2.1	02037	12/14/88
DIISOPROPYLMETHYL PHOSPHONATE	0.56	02037	12/14/88
DIELDRIN	5.3	02037	12/2/87
ISODRIN	0.24	02037	12/14/88
PPDDE	0.072	02037	12/14/88
SUPONA	1.6	02037	12/14/88

EACH VALUE PRESENTED IS THE MAXIMUM CONCENTRATION FOR THE LISTED ANALYTE FOR THE PERIOD March 17, 1987 TO February 28, 1989.
DATA SOURCE: DP ASSOCIATES, RMA Database, July 19, 1990

SPSA-8a-3
EXPOSURE EVALUATIONS FOR REGULATED VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI OPN
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	
ALDRIN	1.5E+00	8.8E+04	1.5E+00	5.3E+01*	9.1E-04	5.3E+01*	3.0E-07
CARBON TETRACHLORIDE	2.0E+02	0.0E+00	2.0E+02	0.0E+00	0.0E+00	0.0E+00	8.1E-05
CHLORDANE	2.0E+01	1.0E+06	2.0E+01	4.1E+01*	8.4E-05a	4.1E+01*	0.0E+00
CHLOROFORM	4.0E+03	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	1.8E-06
PPDDE	7.4E+01	5.3E+06	7.4E+01	1.1E-03	1.5E-08	1.1E-03	1.8E-08
PPDDT	7.4E+01	1.0E+06	7.4E+01	1.4E-01*	8.9E-07a	1.4E-01*	0.0E+00
DIELDRIN	1.6E+00	1.0E+06	1.6E+00	1.9E+03*	7.5E-02a	1.9E+03*	0.0E+00
DIISOPROPYLMETHYL PHOSPHONATE	6.6E+05	0.0E+00	6.6E+05	0.0E+00	0.0E+00	0.0E+00	4.2E-11
ENDRIN	2.5E+03	1.0E+06	2.5E+03	8.1E-03	6.2E-07a	8.1E-03	0.0E+00
HEXACHLOROCYCLOPENTADIENE	1.7E+04	4.5E+02	4.4E+02	1.8E-01*	6.7E+00*	6.9E+00*	0.0E+00
ISODRIN	5.8E+02	1.0E+06	5.8E+02	8.6E-01*	7.9E-05a	8.6E-01*	0.0E+00
SUPONA	1.2E+03	0.0E+00	1.2E+03	0.0E+00	0.0E+00	0.0E+00	1.9E-13
ARSENIC	2.2E+01	0.0E+00	2.2E+01	9.7E-01*	0.0E+00	9.7E-01*	0.0E+00
COPPER	4.2E+05	0.0E+00	4.2E+05	9.3E-05	0.0E+00	9.3E-05	0.0E+00
MERCURY	3.3E+03	0.0E+00	3.3E+03	3.3E-04	0.0E+00	3.3E-04	0.0E+00
ZINC	2.0E+06	0.0E+00	2.0E+06	5.0E-05	0.0E+00	5.0E-05	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPPLV for this contaminant is considered to be equal to pure compound. The SPPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-8a-4
EXPOSURE EVALUATIONS FOR CASUAL VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI EI	EI EI	EI EI	OPN
ALDRIN	1.5E+00	8.8E+04	1.5E+00	5.3E+01*	9.1E-04	5.3E+01*	3.0E-07
CARBON TETRACHLORIDE	2.0E+02	0.0E+00	2.0E+02	0.0E+00	0.0E+00	0.0E+00	8.1E-05
CHLORDANE	2.0E+01	1.0E+06	2.0E+01	4.1E+01*	8.4E-05a	4.1E+01*	0.0E+00
CHLOROFORM	4.0E+03	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	1.8E-06
PPDDE	7.4E+01	5.3E+06	7.4E+01	1.1E-03	1.5E-08	1.1E-03	1.8E-08
PPDDT	7.4E+01	1.0E+06	7.4E+01	1.4E-01*	8.9E-07a	1.4E-01*	0.0E+00
DIELDRIN	1.6E+00	1.0E+06	1.6E+00	1.9E+03*	7.5E-02a	1.9E+03*	0.0E+00
DIISOPROPYLMETHYL PHOSPHONATE	6.6E+05	0.0E+00	6.6E+05	0.0E+00	0.0E+00	0.0E+00	4.2E-11
ENDRIN	2.5E+03	1.0E+06	2.5E+03	8.1E-03	6.2E-07a	8.1E-03	0.0E+00
HEXACHLOROCYCLOPENTADIENE	1.7E+04	4.5E+02	4.4E+02	1.8E-01*	6.7E+00*	6.9E+00*	0.0E+00
ISODRIN	5.8E+02	1.0E+06	5.8E+02	8.6E-01*	7.9E-05a	8.6E-01*	0.0E+00
SUPONA	1.2E+03	0.0E+00	1.2E+03	0.0E+00	0.0E+00	0.0E+00	1.9E-13
ARSENIC	2.2E+01	0.0E+00	2.2E+01	9.7E-01*	0.0E+00	9.7E-01*	0.0E+00
COPPER	4.2E+05	0.0E+00	4.2E+05	9.3E-05	0.0E+00	9.3E-05	0.0E+00
MERCURY	3.3E+03	0.0E+00	3.3E+03	3.3E-04	0.0E+00	3.3E-04	0.0E+00
ZINC	2.0E+06	0.0E+00	2.0E+06	5.0E-05	0.0E+00	5.0E-05	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPPLV for this contaminant is considered to be equal to pure compound. The SPPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-8a-5

EXPOSURE EVALUATIONS FOR RECREATIONAL VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	OPN
ALDRIN	2.1E-01	5.8E+03	2.1E-01	3.9E+02*	1.4E-02	3.9E+02*	4.5E-06
CARBON TETRACHLORIDE	2.7E+01	0.0E+00	2.7E+01	0.0E+00	0.0E+00	0.0E+00	1.2E-03
CHLORDANE	2.7E+00	1.0E+06	2.7E+00	3.0E+02*	1.3E-03a	3.0E+02*	0.0E+00
CHLOROFORM	5.6E+02	0.0E+00	5.6E+02	0.0E+00	0.0E+00	0.0E+00	2.7E-05
PPDE	1.0E+01	3.5E+05	1.0E+01	8.0E-03	2.3E-07	8.0E-03	2.7E-07
PPDDT	1.0E+01	1.0E+06	1.0E+01	9.8E-01*	1.3E-05a	9.8E-01*	0.0E+00
DIELDRIN	2.2E-01	2.7E+03	2.2E-01	1.4E+04*	1.1E+00*	1.4E+04*	0.0E+00
DIISOPROPYLMETHYL PHOSPHONATE	2.8E+05	0.0E+00	2.8E+05	0.0E+00	0.0E+00	0.0E+00	2.7E-10
ENDRIN	1.1E+03	1.0E+06	1.1E+03	1.9E-02	4.0E-06a	1.9E-02	0.0E+00
HEXACHLOROCYCLOPENTADIENE	5.7E+03	1.6E+02	1.6E+02	5.3E-01*	1.9E+01*	1.9E+01*	0.0E+00
ISODRIN	2.5E+02	1.0E+06	2.5E+02	2.0E+00*	5.1E-04a	2.0E+00*	0.0E+00
SUPONA	5.3E+02	0.0E+00	5.3E+02	0.0E+00	0.0E+00	0.0E+00	1.2E-12
ARSENIC	3.9E+00	0.0E+00	3.9E+00	5.3E+00*	0.0E+00	5.3E+00*	0.0E+00
COPPER	2.5E+05	0.0E+00	2.5E+05	1.6E-04	0.0E+00	1.6E-04	0.0E+00
MERCURY	2.0E+03	0.0E+00	2.0E+03	5.6E-04	0.0E+00	5.6E-04	0.0E+00
ZINC	1.1E+06	0.0E+00	1.1E+06	9.5E-05	0.0E+00	9.5E-05	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPPLV for this contaminant is considered to be equal to pure compound. The SPPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-8a-6
EXPOSURE EVALUATIONS FOR COMMERCIAL WORKERS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI ENC
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	
ALDRIN	1.9E+00	1.3E+02	1.9E+00	4.2E+01*	6.4E-01*	4.3E+01*	5.6E-04
CARBON TETRACHLORIDE	2.5E+02	0.0E+00	2.5E+02	0.0E+00	0.0E+00	0.0E+00	1.5E-01
CHLORDANE	2.5E+01	1.0E+06	2.5E+01	3.2E+01*	5.9E-02a	3.2E+01*	0.0E+00
CHLOROFORM	5.1E+03	0.0E+00	5.1E+03	0.0E+00	0.0E+00	0.0E+00	3.4E-03
PPDDE	9.3E+01	1.9E+01	1.6E+01	8.8E-04	4.2E-03	5.1E-03	3.4E-05
PPDDT	9.3E+01	1.9E+01	1.6E+01	1.1E-01*	5.1E-01*	6.2E-01*	0.0E+00
DIELDRIN	2.0E+00	5.8E+01	1.9E+00	1.5E+03*	5.2E+01*	1.6E+03*	0.0E+00
DIISOPROPYLMETHYL PHOSPHONATE	3.7E+05	0.0E+00	3.7E+05	0.0E+00	0.0E+00	0.0E+00	2.4E-07
ENDRIN	1.4E+03	1.0E+06	1.3E+03	1.5E-02	1.3E-03a	1.6E-02	0.0E+00
HEXACHLOROCYCLOPENTADIENE	5.5E+03	2.8E-01	2.8E-01	5.5E-01*	1.1E+04*	1.1E+04*	0.0E+00
ISODRIN	3.2E+02	3.0E+03	2.9E+02	1.6E+00*	1.6E-01*	1.7E+00*	0.0E+00
SUPONA	6.9E+02	0.0E+00	6.9E+02	0.0E+00	0.0E+00	0.0E+00	1.1E-09
ARSENIC	2.0E+01	0.0E+00	2.0E+01	1.1E+00*	0.0E+00	1.1E+00*	0.0E+00
COPPER	1.8E+05	0.0E+00	1.8E+05	2.2E-04	0.0E+00	2.2E-04	0.0E+00
MERCURY	1.4E+03	0.0E+00	1.4E+03	7.9E-04	0.0E+00	7.9E-04	0.0E+00
ZINC	7.8E+05	0.0E+00	7.8E+05	1.3E-04	0.0E+00	1.3E-04	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPLV for this contaminant is considered to be equal to pure compound. The SPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

SPSA-8a-7
EXPOSURE EVALUATIONS FOR INDUSTRIAL WORKERS

CONTAMINANT	DIRECT	INDIRECT		CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI	
	PPLV (mg/kg)	OSVI (mg/kg)	ESVI (mg/kg)	PPLV (mg/kg)	EI	EI	EI	OPN	ENC
ALDRIN	1.2E-01	1.2E+04	4.2E+01	1.2E-01	6.9E+02*	1.9E+00*	6.9E+02*	2.2E-06	1.7E-03
CARBON TETRACHLORIDE	1.5E+01	0.0E+00	0.0E+00	1.5E+01	0.0E+00	0.0E+00	0.0E+00	6.1E-04	4.6E-01
CHLORDANE	1.5E+00	1.3E+06	5.2E+00	1.2E+00	5.3E+02*	1.5E+02*	6.8E+02*	0.0E+00	0.0E+00
CHLOROFORM	3.1E+02	0.0E+00	0.0E+00	3.1E+02	0.0E+00	0.0E+00	0.0E+00	1.4E-05	1.0E-02
PPDDE	5.7E+00	7.1E+05	1.9E+01	4.4E+00	1.4E-02	4.2E-03	1.9E-02	1.3E-07	1.0E-04
PPDDT	5.7E+00	1.5E+06	1.9E+01	4.4E+00	1.7E+00*	5.1E-01*	2.3E+00*	0.0E+00	0.0E+00
DIELDRIN	1.2E-01	5.3E+03	1.9E+01	1.2E-01	2.5E+04*	1.6E+02*	2.5E+04*	0.0E+00	0.0E+00
DIISOPROPYLMETHYL PHOSPHONATE	6.8E+04	0.0E+00	0.0E+00	6.8E+04	0.0E+00	0.0E+00	0.0E+00	3.1E-10	2.4E-07
ENDRIN	2.5E+02	1.0E+06	1.0E+06	2.5E+02	7.9E-02	1.3E-03*	8.0E-02	0.0E+00	0.0E+00
HEXACHLOROCYCLOPENTADIENE	3.8E+02	6.0E+01	8.3E-01	8.2E-01	7.8E+00*	3.6E+03*	3.7E+03*	0.0E+00	0.0E+00
ISODRIN	5.9E+01	8.5E+05	3.0E+03	5.8E+01	8.4E+00*	1.7E-01*	8.6E+00*	0.0E+00	0.0E+00
SUPONA	1.3E+02	0.0E+00	0.0E+00	1.3E+02	0.0E+00	0.0E+00	0.0E+00	1.4E-12	1.1E-09
ARSENIC	1.6E+00	0.0E+00	0.0E+00	1.6E+00	1.3E+01*	0.0E+00	1.3E+01*	0.0E+00	0.0E+00
COPPER	5.7E+04	0.0E+00	0.0E+00	5.7E+04	6.8E-04	0.0E+00	6.8E-04	0.0E+00	0.0E+00
MERCURY	4.6E+02	0.0E+00	0.0E+00	4.6E+02	2.4E-03	0.0E+00	2.4E-03	0.0E+00	0.0E+00
ZINC	1.4E+05	0.0E+00	0.0E+00	1.4E+05	7.2E-04	0.0E+00	7.2E-04	0.0E+00	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPPLV for this contaminant is considered to be equal to pure compound. The SPPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

2.27 SITE SPSA-8b: DRAINAGE DITCHES (formerly Site 2-1: Drainage Ditches; EBASCO, 1987h/RIC 87216R06 and EBASCO, 1988m/RIC 87216R06A; Section 1-Uncontaminated Area; EBASCO,1987o/RIC 87127R06; Section 1-Nonsource Area; UNC; EBASCO, 1988x/RIC 87127R06A)

2.27.1 Site-Specific Considerations

Figure SPSA-8b-1 and Tables SPSA-8b-1 and SPSA-8b-2 depict the target contaminants for Site SPSA-8b. Although this site was included in the overall contaminant assessment for the SPSA, only Borings 9, 11, 17, 18, and 28 were included in this exposure assessment, consistent with the South Plants SAR. The historical search conducted under the contaminant assessment revealed that this site was a drainage ditch used to carry surface runoff and process water from the South Plants complex (EBASCO, 1987h/RIC 87216R06; EBASCO, 1988m/RIC 87216R06A; EBASCO, 1987o/RIC 87127R06; EBASCO, 1988x/RIC 87127R06A). Therefore, many of the chemicals from the RMA target contaminant list were suspected to be present in Site SPSA-8b.

2.27.2 Spatial Distribution of Measured Contaminant Concentrations

The locations and concentrations of the target contaminants that were detected in Site SPSA-8b are shown in Figure SPSA-8b-1. Table SPSA-8b-1 summarizes the maximum concentrations of contaminants measured in soil above indicator levels for the ICP metals, arsenic, and mercury and CRLs limits for organic contaminants from the Phase I and Phase II investigations. The boring number and depth where the maximum value was observed are shown. No data were included for ICP metals, arsenic, and mercury in Horizon 2 because direct soil exposure below 10 ft is assumed to be negligible (see Volume VI-A). Table SPSA-8b-2 summarizes the maximum concentrations detected in groundwater together with the well number, location, sampling interval, and depth to groundwater.

2.27.3 Site Exposure Summary

Tables SPSA-8b-3 through SPSA-8b-7 present Draft PPLVs, EIs, and VEIs for each site contaminant. Since the depth to groundwater below Site SPSA-8b is greater than 10 ft, the enclosed space vapor inhalation SPPPLV is included in the calculation of the cumulative quantity. The COCs are summarized below for each exposed population and with the critical exposure pathway identified.

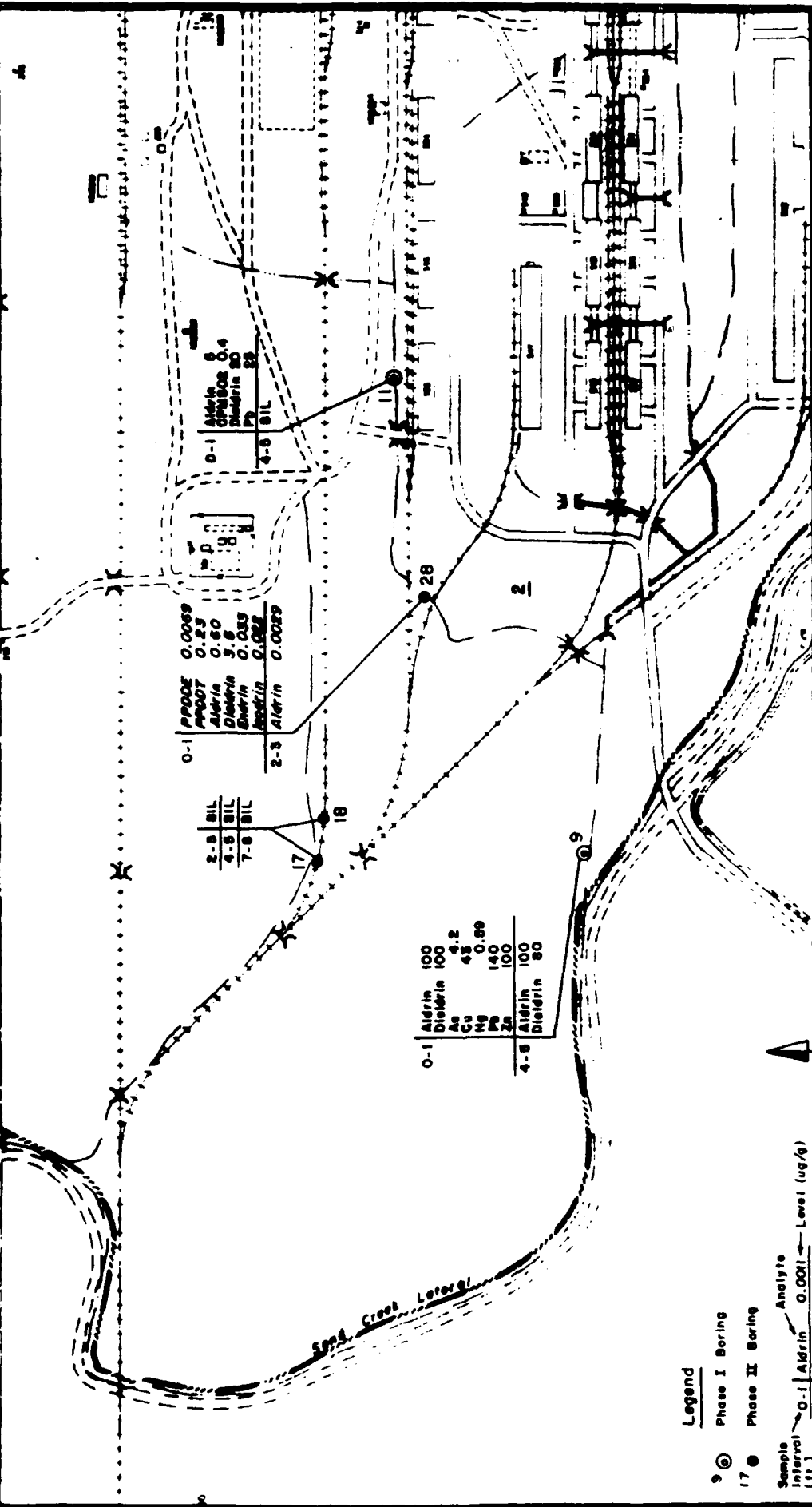
Contaminants of Concern	Regulated Visitor	Casual Visitor	Recreational Visitor	Commercial Worker	Industrial Worker
Aldrin	Direct	Direct	Direct	Dir/Ind	Dir/Ind
Dieldrin	Direct	Direct	Direct	Dir/Ind	Dir/Ind

Note: Direct exposure pathways for soils include soil ingestion, suspended particulate inhalation, and dermal contact.
 Indirect exposure pathways include open and enclosed space vapor inhalation.

The results of the soil exposure summary indicate that exposure to contamination from the direct and indirect pathways both contribute to the exceedance of the cumulative PPLVs. Site SPSA-8b is designated as a Priority 1 site, based on the most sensitive exposed population PPLV (i.e., the industrial worker).

No groundwater contaminants result in an unacceptable exposure due to vapor inhalation as indicated by VEI values less than 1.

December Streets Avenue



Legend

- 9 (C) Phase I Boring
- 17 (B) Phase II Boring

Sample Interval (ft) | Analyte Level (ug/g)

0-1	Aldrin	0.001
4-5	Dieldrin	0.0048

Analyte detected by different method in Phase II - see text

- CPH602 Chlorobenzene
- PH605 2,3,4-Trichlorobenzene
- PRODT 2,3,4-Trichlorobenzene
- As Arsenic
- Cu Copper
- Pb Lead
- Mn Manganese
- Zn Zinc
- BL Below indicator level

Prepared for:
 Program Manager's Office for
 Rocky Mountain Arsenal Cleanup
 Aberdeen Proving Ground, Maryland

FIGURE SP5A-8b-1
 Phase I and Phase II Analytes Detected
 Within or Above Indicator Levels
 Rocky Mountain Arsenal
 Prepared by: Ebasco Services Incorporated

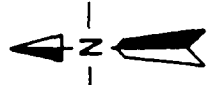


TABLE SPSA-8b-1
SOIL CONTAMINANT CONCENTRATIONS
FOR SITE SPSA-8b

Contaminant	Horizon 1			Horizon 2		
	Max. (ug/g)	Depth (ft)	Boring Number	Max. (ug/g)	Depth (ft)	Boring Number
Aldrin	100	0-1	9	100	0-1	9
Dieldrin	100	0-1	9	100	0-1	9
PPDDE ^{1/}	0.0069	0-1	28	0.0069	0-1	28
PPDDT ^{2/}	0.23	0-1	28	0.23	0-1	28
Isodrin	0.022	0-1	28	0.022	0-1	28
Chlorophenylmethyl sulfone	0.4	0-1	11	0.4	0-1	11
Endrin	0.033	0-1	28	0.033	0-1	28
Copper	43	0-1	9	--	--	--
Lead	140	0-1	9	--	--	--
Mercury	0.59	0-1	9	--	--	--
Zinc	100	0-1	9	--	--	--

1/ PPDDE 2,2-bis(Para-chlorophenyl)-1,1-dichloroethene
2/ PPDDT 2,2-bis(Para-chlorophenyl)-1,1,1-trichloroethane

SPSA South Plants Study Area
Max. Maximum
ug/g microgram per gram
ft foot/feet

TABLE SPSA-8b-2

GROUNDWATER CONTAMINANT CONCENTRATIONS (UG/L)
FOR SITE SPSA-8b

AVERAGE SITE DEPTH TO GROUNDWATER: 18 Feet

CHEMICAL	CONCENTRATION MAXIMUM	LOCATION (WELL NUMBER)	SAMPLE DATE
ALDRIN	0.11	02037	12/14/88
CARBON TETRACHLORIDE	1.4	02037	12/14/88
CHLOROFORM	3.7	02037	12/14/88
CHLORDANE	2.1	02037	12/14/88
DIISOPROPYLMETHYL PHOSPHONATE	0.56	02037	12/14/88
DIELDRIN	5.3	02037	12/2/87
ISODRIN	0.24	02037	12/14/88
PPDDE	0.072	02037	12/14/88
SUPONA	1.6	02037	12/14/88

EACH VALUE PRESENTED IS THE MAXIMUM CONCENTRATION FOR THE LISTED ANALYTE
FOR THE PERIOD March 17, 1987 TO February 28, 1989.
DATA SOURCE: DP ASSOCIATES, RMA Database, July 19, 1990

SPSA-8b-3
EXPOSURE EVALUATIONS FOR REGULATED VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI OPN
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	
ALDRIN	1.5E+00	2.2E+05	1.5E+00	6.7E+01*	4.5E-04	6.7E+01*	1.0E-07
CARBON TETRACHLORIDE	2.0E+02	0.0E+00	2.0E+02	0.0E+00	0.0E+00	0.0E+00	2.7E-05
CHLORDANE	2.0E+01	0.0E+00	2.0E+01	0.0E+00	0.0E+00	0.0E+00	8.6E-08
CHLOROFORM	4.0E+03	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	6.1E-07
CHLOROPHENYLMETHYL SULFONE	1.6E+05	4.2E+06	1.6E+05	2.4E-06	9.6E-08	2.5E-06	0.0E+00
PPDDE	7.4E+01	1.4E+07	7.4E+01	9.4E-05	4.9E-10	9.4E-05	6.0E-09
PPDDT	7.4E+01	3.1E+07	7.4E+01	3.1E-03	7.4E-09	3.1E-03	0.0E+00
DIELDRIN	1.6E+00	1.0E+06	1.6E+00	6.4E+01*	1.2E-03a	6.4E+01*	0.0E+00
DIISOPROPYLMETHYL PHOSPHONATE	6.6E+05	0.0E+00	6.6E+05	0.0E+00	0.0E+00	0.0E+00	1.4E-11
ENDRIN	2.5E+03	8.1E+07	2.5E+03	1.3E-05	4.1E-10	1.3E-05	0.0E+00
ISODRIN	5.8E+02	1.8E+07	5.8E+02	3.8E-04	1.2E-08	3.8E-04	8.6E-09
SUPONA	1.2E+03	0.0E+00	1.2E+03	0.0E+00	0.0E+00	0.0E+00	6.2E-14
COPPER	4.2E+05	0.0E+00	4.2E+05	1.0E-04	0.0E+00	1.0E-04	0.0E+00
LEAD	1.5E+04	0.0E+00	1.5E+04	9.1E-03	0.0E+00	9.1E-03	0.0E+00
MERCURY	3.3E+03	0.0E+00	3.3E+03	1.8E-04	0.0E+00	1.8E-04	0.0E+00
ZINC	2.0E+06	0.0E+00	2.0E+06	5.0E-05	0.0E+00	5.0E-05	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPPLV for this contaminant is considered to be equal to pure compound. The SPPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-8b-4

EXPOSURE EVALUATIONS FOR CASUAL VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI EI	EI EI	EI EI	OPN
ALDRIN	1.5E+00	2.2E+05	1.5E+00	6.7E+01*	4.5E-04	6.7E+01*	1.0E-07
CARBON TETRACHLORIDE	2.0E+02	0.0E+00	2.0E+02	0.0E+00	0.0E+00	0.0E+00	2.7E-05
CHLORDANE	2.0E+01	0.0E+00	2.0E+01	0.0E+00	0.0E+00	0.0E+00	8.6E-08
CHLOROFORM	4.0E+03	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	6.1E-07
CHLOROPHENYLMETHYL SULFONE	1.6E+05	4.2E+06	1.6E+05	2.4E-06	9.6E-08	2.5E-06	0.0E+00
PPDDE	7.4E+01	1.4E+07	7.4E+01	9.4E-05	4.9E-10	9.4E-05	6.0E-09
PPDDT	7.4E+01	3.1E+07	7.4E+01	3.1E-03	7.4E-09	3.1E-03	0.0E+00
DIELDRIN	1.6E+00	1.0E+06	1.6E+00	6.4E+01*	1.2E-03a	6.4E+01*	0.0E+00
DIISOPROPYLMETHYL PHOSPHONATE	6.6E+05	0.0E+00	6.6E+05	0.0E+00	0.0E+00	0.0E+00	1.4E-11
ENDRIN	2.5E+03	8.1E+07	2.5E+03	1.3E-05	4.1E-10	1.3E-05	0.0E+00
ISODRIN	5.8E+02	1.8E+07	5.8E+02	3.8E-04	1.2E-08	3.8E-04	8.6E-09
SUPONA	1.2E+03	0.0E+00	1.2E+03	0.0E+00	0.0E+00	0.0E+00	6.2E-14
COPPER	4.2E+05	0.0E+00	4.2E+05	1.0E-04	0.0E+00	1.0E-04	0.0E+00
LEAD	1.5E+04	0.0E+00	1.5E+04	9.1E-03	0.0E+00	9.1E-03	0.0E+00
MERCURY	3.3E+03	0.0E+00	3.3E+03	1.8E-04	0.0E+00	1.8E-04	0.0E+00
ZINC	2.0E+06	0.0E+00	2.0E+06	5.0E-05	0.0E+00	5.0E-05	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPPLV for this contaminant is considered to be equal to pure compound. The SPPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-8b-5
EXPOSURE EVALUATIONS FOR RECREATIONAL VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI OPN
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI EI	EI EI	EI EI	
ALDRIN	2.1E-01	1.5E+04	2.1E-01	4.8E+02*	6.8E-03	4.8E+02*	1.5E-06
CARBON TETRACHLORIDE	2.7E+01	0.0E+00	2.7E+01	0.0E+00	0.0E+00	0.0E+00	4.1E-04
CHLORDANE	2.7E+00	0.0E+00	2.7E+00	0.0E+00	0.0E+00	0.0E+00	1.3E-06
CHLOROFORM	5.6E+02	0.0E+00	5.6E+02	0.0E+00	0.0E+00	0.0E+00	9.2E-06
CHLOROPHENYLMETHYL SULFONE	7.0E+04	1.7E+06	6.7E+04	5.7E-06	2.4E-07	6.0E-06	0.0E+00
PPDDE	1.0E+01	9.4E+05	1.0E+01	6.8E-04	7.3E-09	6.8E-04	9.1E-08
PPDDT	1.0E+01	2.1E+06	1.0E+01	2.3E-02	1.1E-07	2.3E-02	0.0E+00
DIELDRIN	2.2E-01	1.0E+06	2.2E-01	4.6E+02*	1.8E-02a	4.6E+02*	0.0E+00
DIISOPROPYLMETHYL PHOSPHONATE	2.8E+05	0.0E+00	2.8E+05	0.0E+00	0.0E+00	0.0E+00	9.1E-11
ENDRIN	1.1E+03	1.3E+07	1.1E+03	3.1E-05	2.6E-09	3.1E-05	0.0E+00
ISODRIN	2.5E+02	2.8E+06	2.5E+02	8.9E-04	7.8E-08	8.9E-04	5.5E-08
SUPONA	5.3E+02	0.0E+00	5.3E+02	0.0E+00	0.0E+00	0.0E+00	4.0E-13
COPPER	2.5E+05	0.0E+00	2.5E+05	1.7E-04	0.0E+00	1.7E-04	0.0E+00
LEAD	9.2E+03	0.0E+00	9.2E+03	1.5E-02	0.0E+00	1.5E-02	0.0E+00
MERCURY	2.0E+03	0.0E+00	2.0E+03	3.0E-04	0.0E+00	3.0E-04	0.0E+00
ZINC	1.1E+06	0.0E+00	1.1E+06	9.5E-05	0.0E+00	9.5E-05	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPPLV for this contaminant is considered to be equal to pure compound. The SPPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-8b-6
EXPOSURE EVALUATIONS FOR COMMERCIAL WORKERS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI ENC
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	
ALDRIN	1.9E+00	4.0E-01	3.3E-01	5.3E+01*	2.5E+02*	3.1E+02*	5.6E-04
CARBON TETRACHLORIDE	2.5E+02	0.0E+00	2.5E+02	0.0E+00	0.0E+00	0.0E+00	1.5E-01
CHLORDANE	2.5E+01	0.0E+00	2.5E+01	0.0E+00	0.0E+00	0.0E+00	4.8E-04
CHLOROFORM	5.1E+03	0.0E+00	5.1E+03	0.0E+00	0.0E+00	0.0E+00	3.4E-03
CHLOROPHENYLMETHYL SULFONE	9.1E+04	1.9E+04	1.6E+04	4.4E-06	2.1E-05	2.5E-05	0.0E+00
PPDDE	9.3E+01	1.9E+01	1.6E+01	7.4E-05	3.5E-04	4.3E-04	3.4E-05
PPDDT	9.3E+01	1.9E+01	1.6E+01	2.5E-03	1.2E-02	1.4E-02	0.0E+00
DIELDRIN	2.0E+00	5.8E+01	1.9E+00	5.0E+01*	1.7E+00*	5.2E+01*	0.0E+00
DIISOPROPYLMETHYL PHOSPHONATE	3.7E+05	0.0E+00	3.7E+05	0.0E+00	0.0E+00	0.0E+00	2.4E-07
ENDRIN	1.4E+03	2.9E+02	2.4E+02	2.4E-05	1.1E-04	1.4E-04	0.0E+00
ISODRIN	3.2E+02	6.7E+01	5.5E+01	6.9E-04	3.3E-03	4.0E-03	1.4E-04
SUPONA	6.9E+02	0.0E+00	6.9E+02	0.0E+00	0.0E+00	0.0E+00	1.1E-09
COPPER	1.8E+05	0.0E+00	1.8E+05	2.4E-04	0.0E+00	2.4E-04	0.0E+00
LEAD	6.5E+03	0.0E+00	6.5E+03	2.1E-02	0.0E+00	2.1E-02	0.0E+00
MERCURY	1.4E+03	0.0E+00	1.4E+03	4.2E-04	0.0E+00	4.2E-04	0.0E+00
ZINC	7.8E+05	0.0E+00	7.8E+05	1.3E-04	0.0E+00	1.3E-04	0.0E+00

*: EI is equal to or exceeds 1.0E-01

SPSA-8b-7
EXPOSURE EVALUATIONS FOR INDUSTRIAL WORKERS

CONTAMINANT	DIRECT	INDIRECT		CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI	
	PPLV (mg/kg)	OSVI (mg/kg)	ESVI (mg/kg)	PPLV (mg/kg)	EI	EI	EI	OPN	ENC
ALDRIN	1.2E-01	3.0E+04	4.0E-01	9.0E-02	8.6E+02*	2.5E+02*	1.1E+03*	7.5E-07	1.7E-03
CARBON TETRACHLORIDE	1.5E+01	0.0E+00	0.0E+00	1.5E+01	0.0E+00	0.0E+00	0.0E+00	2.0E-04	4.6E-01
CHLORDANE	1.5E+00	0.0E+00	0.0E+00	1.5E+00	0.0E+00	0.0E+00	0.0E+00	6.4E-07	1.4E-03
CHLOROFORM	3.1E+02	0.0E+00	0.0E+00	3.1E+02	0.0E+00	0.0E+00	0.0E+00	4.6E-06	1.0E-02
CHLOROPHENYLMETHYL SULFONE	1.7E+04	5.6E+05	5.7E+04	1.3E+04	2.4E-05	7.7E-06	3.2E-05	0.0E+00	0.0E+00
PPDDE	5.7E+00	1.9E+06	1.9E+01	4.4E+00	1.2E-03	3.5E-04	1.6E-03	4.5E-08	1.0E-04
PPDDT	5.7E+00	4.1E+06	1.9E+01	4.4E+00	4.0E-02	1.2E-02	5.2E-02	0.0E+00	0.0E+00
DIELDRIN	1.2E-01	1.1E+04	1.9E+01	1.2E-01	8.2E+02*	5.2E+00*	8.2E+02*	0.0E+00	0.0E+00
DIISOPROPYLMETHYL PHOSPHONATE	6.8E+04	0.0E+00	0.0E+00	6.8E+04	0.0E+00	0.0E+00	0.0E+00	1.1E-10	2.4E-07
ENDRIN	2.5E+02	1.1E+07	8.6E+02	2.0E+02	1.3E-04	3.8E-05	1.7E-04	0.0E+00	0.0E+00
ISODRIN	5.9E+01	2.4E+06	2.0E+02	4.6E+01	3.7E-03	1.1E-03	4.8E-03	6.4E-08	1.4E-04
SUPONA	1.3E+02	0.0E+00	0.0E+00	1.3E+02	0.0E+00	0.0E+00	0.0E+00	4.7E-13	1.1E-09
COPPER	5.7E+04	0.0E+00	0.0E+00	5.7E+04	7.5E-04	0.0E+00	7.5E-04	0.0E+00	0.0E+00
LEAD	2.2E+03	0.0E+00	0.0E+00	2.2E+03	6.4E-02	0.0E+00	6.4E-02	0.0E+00	0.0E+00
MERCURY	4.6E+02	0.0E+00	0.0E+00	4.6E+02	1.3E-03	0.0E+00	1.3E-03	0.0E+00	0.0E+00
ZINC	1.4E+05	0.0E+00	0.0E+00	1.4E+05	7.2E-04	0.0E+00	7.2E-04	0.0E+00	0.0E+00

*: EI is equal to or exceeds 1.0E-01

the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

2.28 SITE SPSA-8c: BALANCE OF SPSA-8 (formerly Section 2-Uncontaminated Area; EBASCO, 1987p/RIC 87127R08)

2.28.1 Site-Specific Considerations

Figure SPSA-8c-1 and Tables SPSA-8c-1 and SPSA-8c-2 depict the target contaminants for Site SPSA-8c. Borings 5, 6, 6B, 8, 9, 15, 16, and 18 through 20 were included in this exposure assessment, consistent with the South Plants SAR. According to site history, no chemicals from the RMA target contaminant list were suspected to be present in Site SPSA-8c.

2.28.2 Spatial Distribution of Measured Contaminant Concentrations

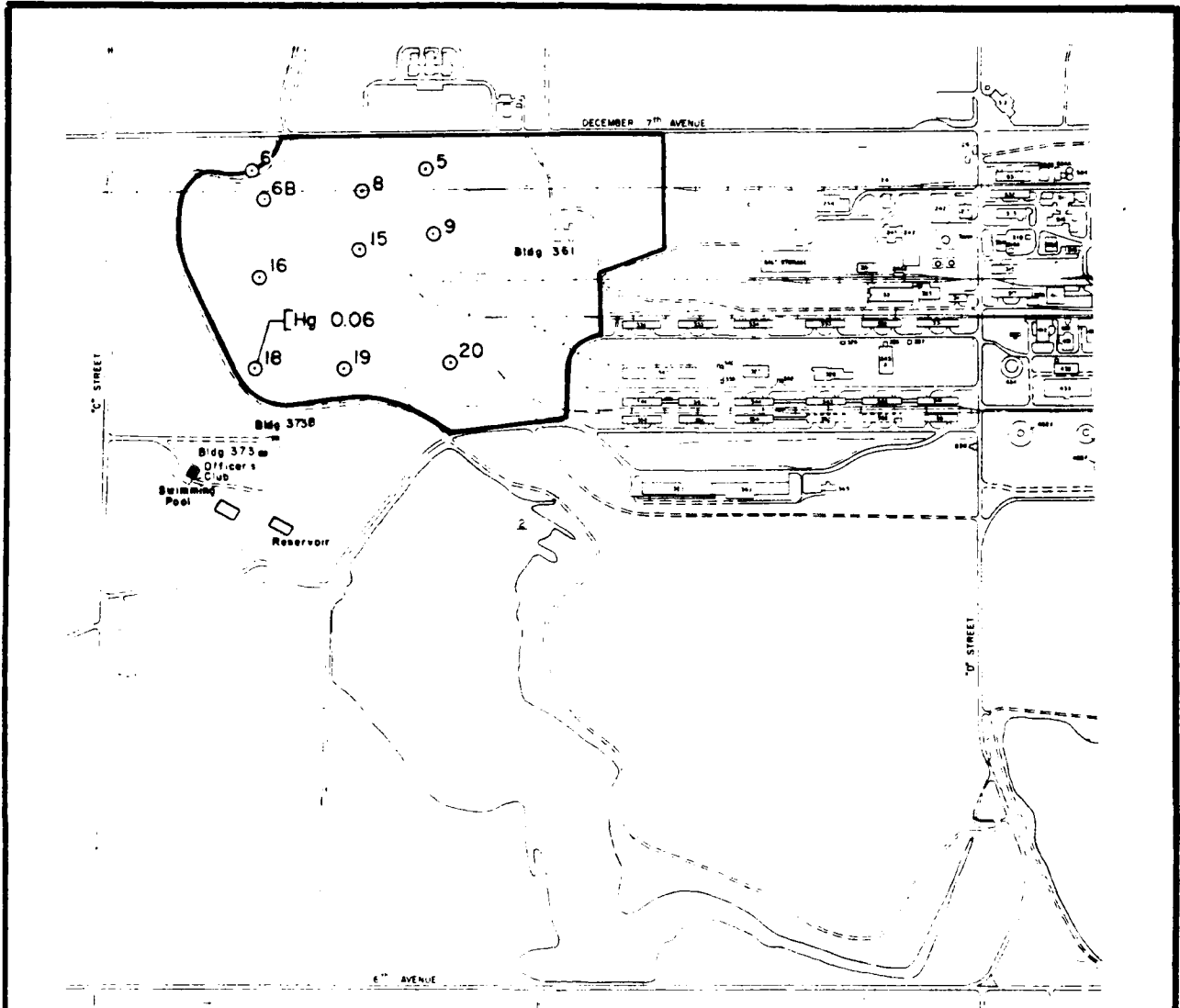
The locations and concentrations of the target contaminants that were detected in Site SPSA-8c are shown in Figure SPSA-8c-1. Table SPSA-8c-1 shows that no target contaminants were found above the reporting level. No data were included for ICP metals, arsenic, and mercury in Horizon 2 because direct soil exposure below 10 ft is assumed to be negligible (see Volume VI-A). Table SPSA-8c-2 summarizes the maximum concentrations detected in groundwater together with the well number, location, sampling interval, and depth to groundwater.

2.28.3 Site Exposure Summary




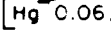
Tables SPSA-8c-3 through SPSA-8c-7 present Draft PPLVs and VEIs for each site contaminant. Since the depth to groundwater below Site SPSA-8c is greater than 10 ft, the enclosed space vapor inhalation SPPPLV is included in the calculation of the cumulative quantity.

No soil contaminants are shown on Table SPSA-8c-1, therefore, no COCs were identified for this site. Site SPSA-8c is designated as a Priority 2 site.

No groundwater contaminants result in an unacceptable exposure due to vapor inhalation as indicated by VEI values less than 1.



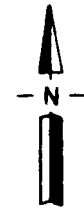
Legend

-  Phase I boring
-  Site Boundary
-  Analyte
-  Level (ug/g)

Note: All borings to 5 ft.

Hg - Mercury

Borings 5,6,6B,8,9,15,16,19,20 - All analytes detected below indicator levels.



Prepared for:

Program Manager's Office for
Rocky Mountain Arsenal Cleanup
Aberdeen Proving Ground, Maryland

FIGURE SPSA - 8c-1

Phase I and Phase II Analytes Detected
Within or Above Indicator Levels

Rocky Mountain Arsenal

Prepared by: Ebasco Services Incorporated

TABLE SPSA-8c-1
SOIL CONTAMINANT CONCENTRATIONS
FOR SITE SPSA-8c

Contaminant	Horizon 1			Horizon 2		
	Max. (ug/g)	Depth (ft)	Boring Number	Max. (ug/g)	Depth (ft)	Boring Number
None	--	--	--	--	--	--

SPSA
Max.
ug/g
ft

South Plants Study Area
Maximum
microgram per gram
foot/feet

TABLE SPSA-8c-2

GROUNDWATER CONTAMINANT CONCENTRATIONS (UG/L)
FOR SITE SPSA-8c

AVERAGE SITE DEPTH TO GROUNDWATER: 18 Feet

CHEMICAL	CONCENTRATION MAXIMUM	LOCATION (WELL NUMBER)	SAMPLE DATE
ALDRIN	0.11	02037	12/14/88
CARBON TETRACHLORIDE	1.4	02037	12/14/88
CHLOROFORM	3.7	02037	12/14/88
CHLORDANE	2.1	02037	12/14/88
DIISOPROPYLMETHYL PHOSPHONATE	0.56	02037	12/14/88
DIELDRIN	5.3	02037	12/2/87
ISODRIN	0.24	02037	12/14/88
PPDDE	0.072	02037	12/14/88
SUPONA	1.6	02037	12/14/88

EACH VALUE PRESENTED IS THE MAXIMUM CONCENTRATION FOR THE LISTED ANALYTE
FOR THE PERIOD March 17, 1987 TO February 28, 1989.
DATA SOURCE: DP ASSOCIATES, RMA Database, July 19, 1990

SPSA-8c-3
EXPOSURE EVALUATIONS FOR REGULATED VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI EI	EI EI	EI EI	OPN
ALDRIN	1.5E+00	0.0E+00	1.5E+00	0.0E+00	0.0E+00	0.0E+00	1.2E-06
CARBON TETRACHLORIDE	2.0E+02	0.0E+00	2.0E+02	0.0E+00	0.0E+00	0.0E+00	3.2E-04
CHLOROFORM	4.0E+03	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	7.3E-06
CHLORDANE	2.0E+01	0.0E+00	2.0E+01	0.0E+00	0.0E+00	0.0E+00	1.0E-06
DIISOPROPYLMETHYL PHOSPHONATE	6.6E+05	0.0E+00	6.6E+05	0.0E+00	0.0E+00	0.0E+00	1.7E-10
DIELDRIN	1.6E+00	0.0E+00	1.6E+00	0.0E+00	0.0E+00	0.0E+00	1.6E-06
ISODRIN	5.8E+02	0.0E+00	5.8E+02	0.0E+00	0.0E+00	0.0E+00	1.1E-07
PPDDE	7.4E+01	0.0E+00	7.4E+01	0.0E+00	0.0E+00	0.0E+00	7.3E-08
SUPONA	1.2E+03	0.0E+00	1.2E+03	0.0E+00	0.0E+00	0.0E+00	7.6E-13

SPSA-8c-4
EXPOSURE EVALUATIONS FOR CASUAL VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	OPN
ALDRIN	1.5E+00	0.0E+00	1.5E+00	0.0E+00	0.0E+00	0.0E+00	1.2E-06
CARBON TETRACHLORIDE	2.0E+02	0.0E+00	2.0E+02	0.0E+00	0.0E+00	0.0E+00	3.2E-04
CHLOROFORM	4.0E+03	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	7.3E-06
CHLORDANE	2.0E+01	0.0E+00	2.0E+01	0.0E+00	0.0E+00	0.0E+00	1.0E-06
DIISOPROPYLMETHYL PHOSPHONATE	6.6E+05	0.0E+00	6.6E+05	0.0E+00	0.0E+00	0.0E+00	1.7E-10
DIELDRIN	1.6E+00	0.0E+00	1.6E+00	0.0E+00	0.0E+00	0.0E+00	1.6E-06
ISODRIN	5.8E+02	0.0E+00	5.8E+02	0.0E+00	0.0E+00	0.0E+00	1.1E-07
PPDDE	7.4E+01	0.0E+00	7.4E+01	0.0E+00	0.0E+00	0.0E+00	7.3E-08
SUPONA	1.2E+03	0.0E+00	1.2E+03	0.0E+00	0.0E+00	0.0E+00	7.6E-13

SPSA-8c-5

EXPOSURE EVALUATIONS FOR RECREATIONAL VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI
	PPLV	PPLV	PPLV	EI	EI	EI	OPN
	(mg/kg)	(mg/kg)	(mg/kg)				
ALDRIN	2.1E-01	0.0E+00	2.1E-01	0.0E+00	0.0E+00	0.0E+00	1.8E-05
CARBON TETRACHLORIDE	2.7E+01	0.0E+00	2.7E+01	0.0E+00	0.0E+00	0.0E+00	4.8E-03
CHLOROFORM	5.6E+02	0.0E+00	5.6E+02	0.0E+00	0.0E+00	0.0E+00	1.1E-04
CHLORDANE	2.7E+00	0.0E+00	2.7E+00	0.0E+00	0.0E+00	0.0E+00	1.6E-05
DIISOPROPYLMETHYL PHOSPHONATE	2.8E+05	0.0E+00	2.8E+05	0.0E+00	0.0E+00	0.0E+00	1.1E-09
DIELDRIN	2.2E-01	0.0E+00	2.2E-01	0.0E+00	0.0E+00	0.0E+00	2.4E-05
ISODRIN	2.5E+02	0.0E+00	2.5E+02	0.0E+00	0.0E+00	0.0E+00	6.8E-07
PPDDE	1.0E+01	0.0E+00	1.0E+01	0.0E+00	0.0E+00	0.0E+00	1.1E-06
SUPONA	5.3E+02	0.0E+00	5.3E+02	0.0E+00	0.0E+00	0.0E+00	4.9E-12

SPSA-8c-6
EXPOSURE EVALUATIONS FOR COMMERCIAL WORKERS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	ENC
ALDRIN	1.9E+00	0.0E+00	1.9E+00	0.0E+00	0.0E+00	0.0E+00	5.5E-04
CARBON TETRACHLORIDE	2.5E+02	0.0E+00	2.5E+02	0.0E+00	0.0E+00	0.0E+00	1.5E-01
CHLOROFORM	5.1E+03	0.0E+00	5.1E+03	0.0E+00	0.0E+00	0.0E+00	3.4E-03
CHLORDANE	2.5E+01	0.0E+00	2.5E+01	0.0E+00	0.0E+00	0.0E+00	4.8E-04
DIISOPROPYLMETHYL PHOSPHONATE	3.7E+05	0.0E+00	3.7E+05	0.0E+00	0.0E+00	0.0E+00	2.4E-07
DIELDRIN	2.0E+00	0.0E+00	2.0E+00	0.0E+00	0.0E+00	0.0E+00	7.4E-04
ISODRIN	3.2E+02	0.0E+00	3.2E+02	0.0E+00	0.0E+00	0.0E+00	1.5E-04
PPDE	9.3E+01	0.0E+00	9.3E+01	0.0E+00	0.0E+00	0.0E+00	3.4E-05
SUPONA	6.9E+02	0.0E+00	6.9E+02	0.0E+00	0.0E+00	0.0E+00	1.1E-09

SPSA-8c-7
EXPOSURE EVALUATIONS FOR INDUSTRIAL WORKERS

CONTAMINANT	DIRECT	INDIRECT		CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI	
	PPLV (mg/kg)	OSVI (mg/kg)	ESVI (mg/kg)	PPLV (mg/kg)	EI	EI	EI	OPN	ENC
ALDRIN	1.2E-01	0.0E+00	0.0E+00	1.2E-01	0.0E+00	0.0E+00	0.0E+00	8.9E-06	1.7E-03
CARBON TETRACHLORIDE	1.5E+01	0.0E+00	0.0E+00	1.5E+01	0.0E+00	0.0E+00	0.0E+00	2.4E-03	4.5E-01
CHLOROFORM	3.1E+02	0.0E+00	0.0E+00	3.1E+02	0.0E+00	0.0E+00	0.0E+00	5.5E-05	1.0E-02
CHLORDANE	1.5E+00	0.0E+00	0.0E+00	1.5E+00	0.0E+00	0.0E+00	0.0E+00	7.8E-06	1.4E-03
DIISOPROPYLMETHYL PHOSPHONATE	6.8E+04	0.0E+00	0.0E+00	6.8E+04	0.0E+00	0.0E+00	0.0E+00	1.3E-09	2.4E-07
DIELDRIN	1.2E-01	0.0E+00	0.0E+00	1.2E-01	0.0E+00	0.0E+00	0.0E+00	1.2E-05	2.2E-03
ISODRIN	5.9E+01	0.0E+00	0.0E+00	5.9E+01	0.0E+00	0.0E+00	0.0E+00	7.9E-07	1.5E-04
PPDE	5.7E+00	0.0E+00	0.0E+00	5.7E+00	0.0E+00	0.0E+00	0.0E+00	5.4E-07	1.0E-04
SUPONA	1.3E+02	0.0E+00	0.0E+00	1.3E+02	0.0E+00	0.0E+00	0.0E+00	5.7E-12	1.1E-09

2.29 SITE SPSA-9a: DRAINAGE DITCH (formerly Site 1-1: Drainage Ditches; EBASCO, 1987b/RIC 87196R01 and EBASCO, 1988e/RIC 87196R01A; Process Water System; EBASCO, 1988w/RIC 88256R04)

2.29.1 Site-Specific Considerations

Figure SPSA-9a-1 and Tables SPSA-9a-1 and SPSA-9a-2 depict the target contaminants for Site SPSA-9a. Borings 9, 19, and 20 from Site 1-1 and Boring 4 from Process Water System were included in this exposure assessment, consistent with the South Plants SAR. The historical search conducted under the contaminant assessment revealed that this site was a drainage ditch used to carry surface runoff and process water from the South Plants complex (EBASCO, 1987b/RIC 87196R01). Therefore, many of the chemicals from the RMA target contaminant list were suspected to be present in Site SPSA-9a.

2.29.2 Spatial Distribution of Measured Contaminant Concentrations

The locations and concentrations of the target contaminants that were detected in Site SPSA-9a are shown in Figure SPSA-9a-1. Table SPSA-9a-1 summarizes the maximum concentrations of contaminants measured in soil above indicator levels for the ICP metals, arsenic, and mercury and CRLs for organic contaminants from the Phase I and Phase II investigations. The boring number and depth where the maximum value was observed are shown. No data were included for ICP metals, arsenic, and mercury in Horizon 2 because direct soil exposure below 10 ft is assumed to be negligible (see Volume VI-A). Table SPSA-9a-2 summarizes the maximum concentrations detected in groundwater together with the well number, location, sampling interval, and depth to groundwater.

2.29.3 Site Exposure Summary

Tables SPSA-9a-3 through SPSA-9a-7 present Draft PPLVs, EIs, and VEIs for each site contaminant. Since the depth to groundwater below Site SPSA-9a is greater than 10 ft, the enclosed space vapor inhalation SPPPLV is included in the calculation of the cumulative quantity. The COCs are summarized below for each exposed population and with the critical exposure pathway identified.

Contaminants of Concern	Regulated Visitor	Casual Visitor	Recreational Visitor	Commercial Worker	Industrial Worker
Dieldrin	Direct	Direct	Direct	Direct	Dir/Ind
Aldrin	--	--	Direct	Indirect	Dir/Ind
Chlordane	--	--	Direct	--	Dir/Ind
PPDDE	--	--	Direct	Indirect	Dir/Ind
PPDDT	--	--	Direct	--	Direct

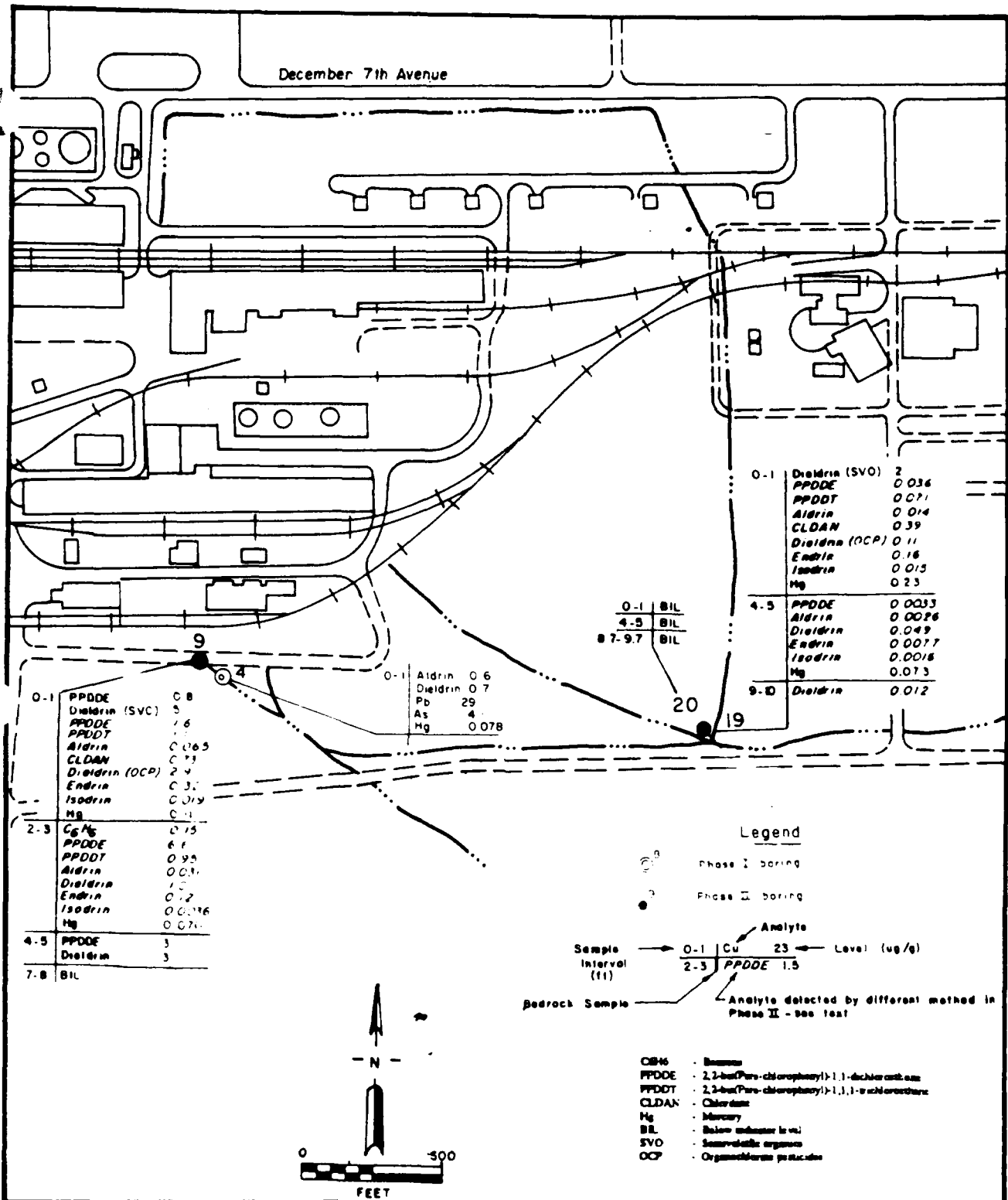
Note: Direct exposure pathways for soils include soil ingestion, suspended particulate inhalation, and dermal contact.
 Indirect exposure pathways include open and enclosed space vapor inhalation.

The results of the soil exposure summary indicate that exposure to contamination from the direct and indirect pathways both contribute to the exceedance of the cumulative PPLVs. Site SPSA-9a is designated as a Priority 1 site, based on the most sensitive exposed population PPLV (i.e., the industrial worker).

The following groundwater contaminants result in an unacceptable exposure due to vapor inhalation as indicated by a VEI value greater than 1:

- Carbon tetrachloride (enclosed)
- Trichloroethylene (enclosed)

December 7th Avenue



Prepared for:

Program Managers Office for
Rocky Mountain Arsenal Cleanup
Aberdeen Proving Ground, Maryland

FIGURE SPSA-9a-1

Phase I and Phase II Analytes Detected
Within or Above Indicator Levels

Rocky Mountain Arsenal
Prepared by Ebasco Services Incorporated

TABLE SPSA-9a-1
SOIL CONTAMINANT CONCENTRATIONS
FOR SITE SPSA-9a

Contaminant	Horizon 1			Horizon 2		
	Max. (ug/g)	Depth (ft)	Boring Number	Max. (ug/g)	Depth (ft)	Boring Number
Aldrin	0.065	0-1	9	0.065	0-1	9
Benzene	0.15	2-3	9	0.15	2-3	9
Chlordane	0.73	0-1	9	0.73	0-1	9
Dieldrin	5	0-1	9	5	0-1	9
PPDDE ^{1/}	6.6	2-3	9	6.6	2-3	9
PPDDT ^{2/}	1.1	0-1	9	1.1	0-1	9
Endrin	0.32	0-1	9	0.32	0-1	9
Isodrin	0.019	0-1	9	0.019	0-1	9
Mercury	0.23	0-1	19	--	--	--

1/ PPDE 2,2-bis(Para-chlorophenyl)-1,1-dichloroethene
2/ PPDDT 2,2-bis(Para-chlorophenyl)-1,1,1-trichloroethane

SPSA South Plants Study Area
Max. Maximum
ug/g microgram per gram
ft foot/feet

TABLE SPSA-9a-2

GROUNDWATER CONTAMINANT CONCENTRATIONS (UG/L)
FOR SITE SPSA-9a

AVERAGE SITE DEPTH TO GROUNDWATER: 20 Feet

CHEMICAL	CONCENTRATION MAXIMUM	LOCATION (WELL NUMBER)	SAMPLE DATE
CARBON TETRACHLORIDE	29	01055	12/21/88
CHLOROFORM	62	01055	12/21/88
DIBROMOCHLOROPROPANE	0.73	01055	12/21/88
DIISOPROPYLMETHYL PHOSPHONATE	0.84	01055	12/21/88
DIMETHYLMETHYL PHOSPHONATE	1.0	01055	12/21/88
SUPONA	1.1	01055	12/21/88
TRICHLOROETHYLENE	84	01055	12/21/88

EACH VALUE PRESENTED IS THE MAXIMUM CONCENTRATION FOR THE LISTED ANALYTE
FOR THE PERIOD March 17, 1987 TO February 28, 1989.
DATA SOURCE: DP ASSOCIATES, RMA Database, July 19, 1990

SPSA-9a-3
EXPOSURE EVALUATIONS FOR REGULATED VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI OPN
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI EI	EI EI	EI EI	
ALDRIN	1.5E+00	2.2E+05	1.5E+00	4.3E-02	2.9E-07	4.3E-02	0.0E+00
BENZENE	8.6E+02	2.7E+04	8.4E+02	1.7E-04	5.6E-06	1.8E-04	0.0E+00
CARBON TETRACHLORIDE	2.0E+02	0.0E+00	2.0E+02	0.0E+00	0.0E+00	0.0E+00	5.8E-04
CHLORDANE	2.0E+01	2.4E+07	2.0E+01	3.7E-02	3.1E-08	3.7E-02	0.0E+00
CHLOROFORM	4.0E+03	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	1.1E-05
PPDDE	7.4E+01	1.3E+07	7.4E+01	9.0E-02	4.9E-07	9.0E-02	0.0E+00
PPDDT	7.4E+01	2.8E+07	7.4E+01	1.5E-02	3.9E-08	1.5E-02	0.0E+00
DIBROMOCHLOROPROPANE	1.8E+01	0.0E+00	1.8E+01	0.0E+00	0.0E+00	0.0E+00	1.8E-06
DIELDRIN	1.6E+00	1.0E+06	1.6E+00	3.2E+00*	5.0E-05a	3.2E+00*	0.0E+00
DIISOPROPYLMETHYL PHOSPHONATE	6.6E+05	0.0E+00	6.6E+05	0.0E+00	0.0E+00	0.0E+00	2.2E-11
DIMETHYMETHYL PHOSPHONATE	1.5E+05	0.0E+00	1.5E+05	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENDRIN	2.5E+03	8.2E+07	2.5E+03	1.3E-04	3.9E-09	1.3E-04	0.0E+00
ISODRIN	5.8E+02	1.5E+07	5.8E+02	3.3E-05	1.2E-09	3.3E-05	0.0E+00
SUPONA	1.2E+03	0.0E+00	1.2E+03	0.0E+00	0.0E+00	0.0E+00	4.4E-14
TRICHLOROETHYLENE	2.3E+03	0.0E+00	2.3E+03	0.0E+00	0.0E+00	0.0E+00	8.5E-05
MERCURY	3.3E+03	0.0E+00	3.3E+03	7.0E-05	0.0E+00	7.0E-05	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPPLV for this contaminant is considered to be equal to pure compound. The SPPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-9a-4
EXPOSURE EVALUATIONS FOR CASUAL VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI OPN
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	
ALDRIN	1.5E+00	2.2E+05	1.5E+00	4.3E-02	2.9E-07	4.3E-02	0.0E+00
BENZENE	8.6E+02	2.7E+04	8.4E+02	1.7E-04	5.6E-06	1.8E-04	0.0E+00
CARBON TETRACHLORIDE	2.0E+02	0.0E+00	2.0E+02	0.0E+00	0.0E+00	0.0E+00	5.8E-04
CHLORDANE	2.0E+01	2.4E+07	2.0E+01	3.7E-02	3.1E-08	3.7E-02	0.0E+00
CHLOROFORM	4.0E+03	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	1.1E-05
PPODE	7.4E+01	1.3E+07	7.4E+01	9.0E-02	4.9E-07	9.0E-02	0.0E+00
PPDDT	7.4E+01	2.8E+07	7.4E+01	1.5E-02	3.9E-08	1.5E-02	0.0E+00
DIBROMOCHLOROPROPANE	1.8E+01	0.0E+00	1.8E+01	0.0E+00	0.0E+00	0.0E+00	1.8E-06
DIELDRIN	1.6E+00	1.0E+06	1.6E+00	3.2E+00*	5.0E-05a	3.2E+00*	0.0E+00
DIISOPROPYLMETHYL PHOSPHONATE	6.6E+05	0.0E+00	6.6E+05	0.0E+00	0.0E+00	0.0E+00	2.2E-11
DIMETHYLMETHYL PHOSPHONATE	1.5E+05	0.0E+00	1.5E+05	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENDRIN	2.5E+03	8.2E+07	2.5E+03	1.3E-04	3.9E-09	1.3E-04	0.0E+00
ISODRIN	5.8E+02	1.5E+07	5.8E+02	3.3E-05	1.2E-09	3.3E-05	0.0E+00
SUPONA	1.2E+03	0.0E+00	1.2E+03	0.0E+00	0.0E+00	0.0E+00	4.4E-14
TRICHLOROETHYLENE	2.3E+03	0.0E+00	2.3E+03	0.0E+00	0.0E+00	0.0E+00	8.5E-05
MERCURY	3.3E+03	0.0E+00	3.3E+03	7.0E-05	0.0E+00	7.0E-05	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPPLV for this contaminant is considered to be equal to pure compound. The SPPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-9a-5
EXPOSURE EVALUATIONS FOR RECREATIONAL VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI OPN
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI EI	EI EI	EI EI	
ALDRIN	2.1E-01	1.5E+04	2.1E-01	3.1E-01*	4.4E-06	3.1E-01*	0.0E+00
BENZENE	1.2E+02	4.1E+03	1.2E+02	1.3E-03	3.6E-05	1.3E-03	0.0E+00
CARBON TETRACHLORIDE	2.7E+01	0.0E+00	2.7E+01	0.0E+00	0.0E+00	0.0E+00	8.8E-03
CHLORDANE	2.7E+00	1.6E+06	2.7E+00	2.7E-01*	4.6E-07	2.7E-01*	0.0E+00
CHLOROFORM	5.6E+02	0.0E+00	5.6E+02	0.0E+00	0.0E+00	0.0E+00	1.6E-04
PPDDE	1.0E+01	8.8E+05	1.0E+01	6.5E-01*	7.5E-06	6.5E-01*	0.0E+00
PPDDT	1.0E+01	1.9E+06	1.0E+01	1.1E-01*	5.9E-07	1.1E-01*	0.0E+00
DIBROMOCHLOROPROPANE	2.5E+00	0.0E+00	2.5E+00	0.0E+00	0.0E+00	0.0E+00	2.6E-05
DIELDRIN	2.2E-01	1.0E+06	2.2E-01	2.3E+01*	7.5E-04a	2.3E+01*	0.0E+00
DIISOPROPYLMETHYL PHOSPHONATE	2.8E+05	0.0E+00	2.8E+05	0.0E+00	0.0E+00	0.0E+00	1.4E-10
DIMETHYMETHYL PHOSPHONATE	6.3E+04	0.0E+00	6.3E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENDRIN	1.1E+03	1.3E+07	1.1E+03	3.0E-04	2.5E-08	3.0E-04	0.0E+00
ISODRIN	2.5E+02	2.4E+06	2.5E+02	7.7E-05	7.9E-09	7.7E-05	0.0E+00
SUPONA	5.3E+02	0.0E+00	5.3E+02	0.0E+00	0.0E+00	0.0E+00	2.8E-13
TRICHLOROETHYLENE	3.2E+02	0.0E+00	3.2E+02	0.0E+00	0.0E+00	0.0E+00	1.3E-03
MERCURY	2.0E+03	0.0E+00	2.0E+03	1.2E-04	0.0E+00	1.2E-04	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPPLV for this contaminant is considered to be equal to pure compound. The SPPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-9a-6
EXPOSURE EVALUATIONS FOR COMMERCIAL WORKERS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	ENC
ALDRIN	1.9E+00	4.0E-01	3.3E-01	3.4E-02	1.6E-01*	2.0E-01*	0.0E+00
BENZENE	1.1E+03	2.3E+02	1.9E+02	1.4E-04	6.6E-04	8.0E-04	0.0E+00
CARBON TETRACHLORIDE	2.5E+02	0.0E+00	2.5E+02	0.0E+00	0.0E+00	0.0E+00	2.4E+00
CHLORDANE	2.5E+01	1.4E+04	2.5E+01	3.0E-02	5.4E-05	3.0E-02	0.0E+00
CHLOROFORM	5.1E+03	0.0E+00	5.1E+03	0.0E+00	0.0E+00	0.0E+00	4.3E-02
PPDE	9.3E+01	1.9E+01	1.6E+01	7.1E-02	3.4E-01*	4.1E-01*	0.0E+00
PPDT	9.3E+01	1.9E+01	1.6E+01	1.2E-02	5.7E-02	6.8E-02	0.0E+00
DIBROMOCHLOROPROPANE	2.3E+01	0.0E+00	2.3E+01	0.0E+00	0.0E+00	0.0E+00	7.1E-03
DIELDRIN	2.0E+00	1.0E+06	1.9E+00	2.5E+00*	8.7E-02*	2.6E+00*	0.0E+00
DIISOPROPYLMETHYL PHOSPHONATE	3.7E+05	0.0E+00	3.7E+05	0.0E+00	0.0E+00	0.0E+00	2.7E-07
DIMETHYLMETHYL PHOSPHONATE	8.2E+04	0.0E+00	8.2E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENDRIN	1.4E+03	2.9E+02	2.4E+02	2.3E-04	1.1E-03	1.3E-03	0.0E+00
ISODRIN	3.2E+02	6.7E+01	5.5E+01	5.9E-05	2.8E-04	3.4E-04	0.0E+00
SUPONA	6.9E+02	0.0E+00	6.9E+02	0.0E+00	0.0E+00	0.0E+00	5.4E-10
TRICHLOROETHYLENE	2.9E+03	0.0E+00	2.9E+03	0.0E+00	0.0E+00	0.0E+00	3.4E-01
MERCURY	1.4E+03	0.0E+00	1.4E+03	1.7E-04	0.0E+00	1.7E-04	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPLV for this contaminant is considered to be equal to pure compound. The SPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

SPSA-9a-7
EXPOSURE EVALUATIONS FOR INDUSTRIAL WORKERS

CONTAMINANT	DIRECT	INDIRECT		CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI	
	PPLV (mg/kg)	OSVI (mg/kg)	ESVI (mg/kg)	PPLV (mg/kg)	EI	EI	EI	OPN	ENC
ALDRIN	1.2E-01	2.9E+04	4.0E-01	9.0E-02	5.6E-01*	1.6E-01*	7.2E-01*	0.0E+00	0.0E+00
BENZENE	6.7E+01	3.6E+03	2.3E+02	5.1E+01	2.2E-03	7.0E-04	2.9E-03	0.0E+00	0.0E+00
CARBON TETRACHLORIDE	1.5E+01	0.0E+00	0.0E+00	1.5E+01	0.0E+00	0.0E+00	0.0E+00	4.4E-03	7.1E+00
CHLORDANE	1.5E+00	3.2E+06	5.2E+00	1.2E+00	4.8E-01*	1.4E-01*	6.2E-01*	0.0E+00	0.0E+00
CHLOROFORM	3.1E+02	0.0E+00	0.0E+00	3.1E+02	0.0E+00	0.0E+00	0.0E+00	8.0E-05	1.3E-01
PPDDE	5.7E+00	1.8E+06	1.9E+01	4.4E+00	1.2E+00*	3.4E-01*	1.5E+00*	0.0E+00	0.0E+00
PPDDT	5.7E+00	3.8E+06	1.9E+01	4.4E+00	1.9E-01*	5.7E-02	2.5E-01*	0.0E+00	0.0E+00
DIBROMOCHLOROPROPANE	1.4E+00	0.0E+00	0.0E+00	1.4E+00	0.0E+00	0.0E+00	0.0E+00	1.3E-05	2.1E-02
DIELDRIN	1.2E-01	1.3E+04	1.9E+01	1.2E-01	4.1E+01*	2.6E-01*	4.1E+01*	0.0E+00	0.0E+00
DIISOPROPYLMETHYL PHOSPHONATE	6.8E+04	0.0E+00	0.0E+00	6.8E+04	0.0E+00	0.0E+00	0.0E+00	1.7E-10	2.7E-07
DIMETHYLMETHYL PHOSPHONATE	1.5E+04	0.0E+00	0.0E+00	1.5E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENDRIN	2.5E+02	1.1E+07	8.6E+02	2.0E+02	1.3E-03	3.7E-04	1.6E-03	0.0E+00	0.0E+00
ISODRIN	5.9E+01	2.1E+06	2.0E+02	4.6E+01	3.2E-04	9.4E-05	4.2E-04	0.0E+00	0.0E+00
SUPONA	1.3E+02	0.0E+00	0.0E+00	1.3E+02	0.0E+00	0.0E+00	0.0E+00	3.3E-13	5.4E-10
TRICHLOROETHYLENE	1.8E+02	0.0E+00	0.0E+00	1.8E+02	0.0E+00	0.0E+00	0.0E+00	6.4E-04	1.0E+00
MERCURY	4.6E+02	0.0E+00	0.0E+00	4.6E+02	5.0E-04	0.0E+00	5.0E-04	0.0E+00	0.0E+00

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

2.30 SITE SPSA-9b: BALANCE OF SPSA-9 (formerly Section 1-Uncontaminated Area; EBASCO, 1987o/RIC 87127R06; Section 1-Nonsource Area; EBASCO, 1988x/RIC 87127R06A)

2.30.1 Site-Specific Considerations

Figure SPSA-9b-1 and Tables SPSA-9b-1 and SPSA-9b-2 depict the target contaminants for Site SPSA-9b. Borings 6, 12, 14, and 59 through 61 were included in this exposure assessment, consistent with the South Plants SAR. The historical search conducted under the contaminant assessment revealed that this site had been used to store decontaminated ton containers that may have previously contained mustard or lewisite (EBASCO, 1987o/RIC 87127R06); however, neither of these chemicals were detected in the soil during the Phase I and Phase II investigations. According to site history, no other chemicals from the RMA target contaminant list were suspected to be present in Site SPSA-9b (EBASCO, 1987o/RIC 87127R06).

2.30.2 Spatial Distribution of Measured Contaminant Concentrations

The locations and concentrations of the target contaminants that were detected in Site SPSA-9b are shown in Figure SPSA-9b-1. Table SPSA-9b-1 summarizes the maximum concentrations of contaminants measured in soil above indicator levels for the ICP metals, arsenic, and mercury from the Phase I and Phase II investigations. The boring number and depth where the maximum value was observed are shown. No data were included for ICP metals, arsenic, and mercury in Horizon 2 because direct soil exposure below 10 ft is assumed to be negligible (see Volume VI-A). No organic contaminants were detected at this location. Table SPSA-9b-2 summarizes the maximum concentrations detected in groundwater together with the well number, location, sampling interval, and depth to groundwater.

2.30.3 Site Exposure Summary

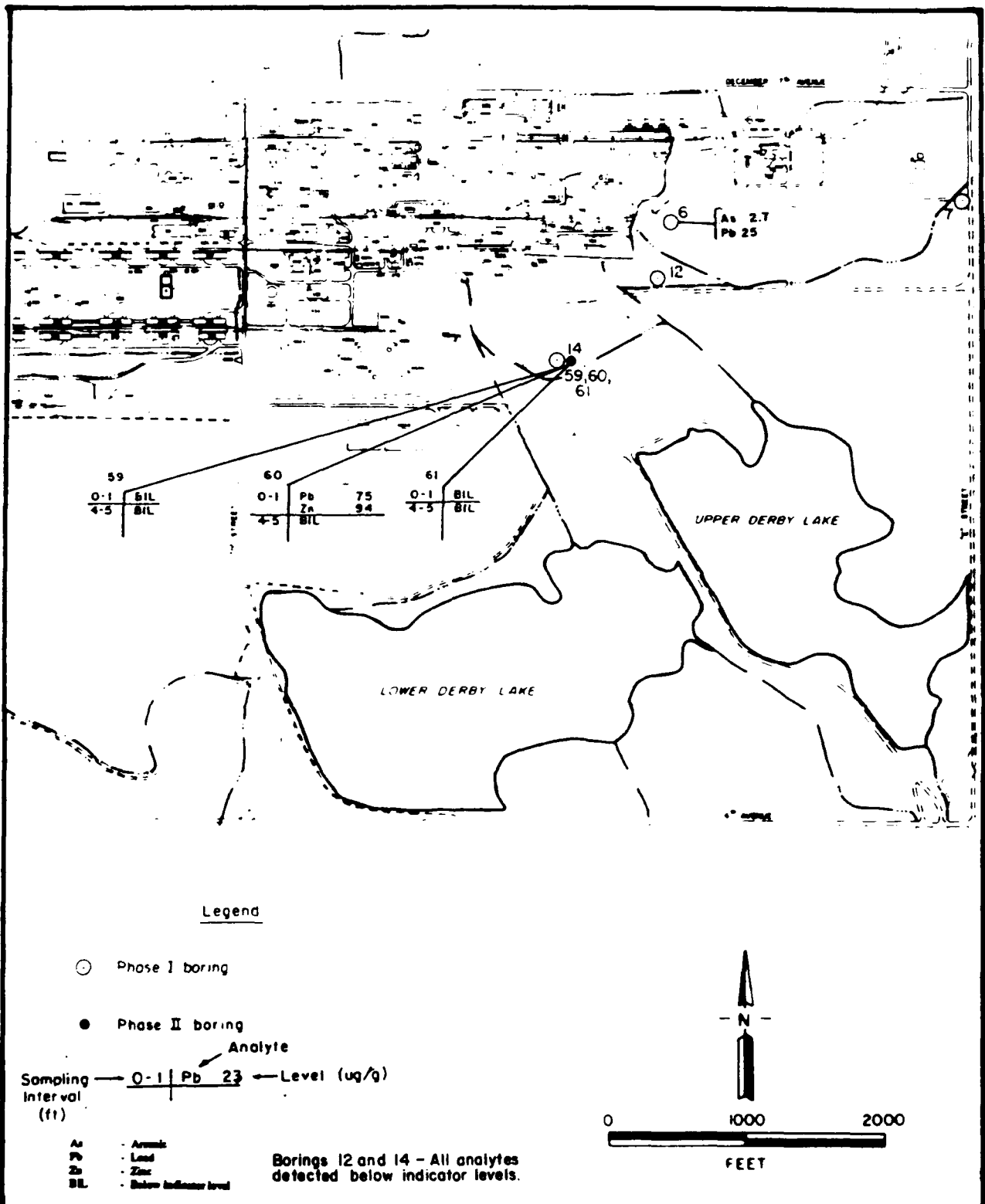
Tables SPSA-9b-3 through SPSA-9b-7 present Draft PPLVs, EIs, and VEIs for each site contaminant. Since the depth to groundwater below Site SPSA-9b is greater than 10 ft, the enclosed space vapor inhalation SPPPLV is included in the calculation of the cumulative quantity. The COCs are summarized below for each exposed population and with the critical exposure pathway identified.

Contaminants of Concern	Regulated Visitor	Casual Visitor	Recreational Visitor	Commercial Worker	Industrial Worker
None	--	--	--	--	--

The results of the soil exposure summary indicate that there are no COCs. Site SPSA-9b is designated as a Priority 2 site, based on the most sensitive exposed population PPLV (i.e., the industrial worker).

The following groundwater contaminants result in an unacceptable exposure due to vapor inhalation as indicated by a VEI value greater than 1:

- Carbon tetrachloride (enclosed)
- Trichloroethylene (enclosed)



Prepared for:

Program Manager's Office for
Rocky Mountain Arsenal Cleanup
Aberdeen Proving Ground, Maryland

FIGURE SPSA-9b-1

Phase I and Phase II Analytes Detected
Within or Above Indicator Levels
Rocky Mountain Arsenal

Prepared by: Ebasco Services Incorporated

TABLE SPSA-9b-1
 SOIL CONTAMINANT CONCENTRATIONS
 FOR SITE SPSA-9b

Contaminant	Horizon 1			Horizon 2		
	Max. (ug/g)	Depth (ft)	Boring Number	Max. (ug/g)	Depth (ft)	Boring Number
Lead	75	0-1	60	--	--	--
Zinc	94	0-1	60	--	--	--

SPSA
 Max.
 ug/g
 ft

South Plants Study Area
 Maximum
 microgram per gram
 foot/feet

TABLE SPSA-9b-2

GROUNDWATER CONTAMINANT CONCENTRATIONS (UG/L)
FOR SITE SPSA-9b

AVERAGE SITE DEPTH TO GROUNDWATER: 20 Feet

CHEMICAL	CONCENTRATION MAXIMUM	LOCATION (WELL NUMBER)	SAMPLE DATE
CARBON TETRACHLORIDE	29	01055	12/21/88
CHLOROFORM	62	01055	12/21/88
DIBROMOCHLOROPROPANE	0.73	01055	12/21/88
DIISOPROPYLMETHYL PHOSPHONATE	0.84	01055	12/21/88
DIELDRIN	0.076	01017	01/28/88
DIMETHYLMETHYL PHOSPHONATE	1.0	01055	12/21/88
ENDRIN	0.041	01017	01/28/88
ISODRIN	0.062	01017	01/28/88
PPDDE	0.059	01017	01/28/88
PPDDT	0.054	01017	01/28/88
SUPONA	1.1	01055	12/21/88
TRICHLOROETHYLENE	84	01055	12/21/88

EACH VALUE PRESENTED IS THE MAXIMUM CONCENTRATION FOR THE LISTED ANALYTE
FOR THE PERIOD March 17, 1987 TO February 28, 1989.
DATA SOURCE: DP ASSOCIATES, RMA Database, July 19, 1990

SPSA-9b-3
EXPOSURE EVALUATIONS FOR REGULATED VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI OPN
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	
CARBON TETRACHLORIDE	2.0E+02	0.0E+00	2.0E+02	0.0E+00	0.0E+00	0.0E+00	5.2E-03
CHLOROFORM	4.0E+03	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	9.6E-05
PPDE	7.4E+01	0.0E+00	7.4E+01	0.0E+00	0.0E+00	0.0E+00	4.7E-08
PPDDT	7.4E+01	0.0E+00	7.4E+01	0.0E+00	0.0E+00	0.0E+00	3.1E-07
DIBROMOCHLOROPROPANE	1.8E+01	0.0E+00	1.8E+01	0.0E+00	0.0E+00	0.0E+00	1.6E-05
DIELDRIN	1.6E+00	0.0E+00	1.6E+00	0.0E+00	0.0E+00	0.0E+00	1.8E-08
DIISOPROPYLMETHYL PHOSPHONATE	6.6E+05	0.0E+00	6.6E+05	0.0E+00	0.0E+00	0.0E+00	2.0E-10
DIMETHYMETHYL PHOSPHONATE	1.5E+05	0.0E+00	1.5E+05	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENDRIN	2.5E+03	0.0E+00	2.5E+03	0.0E+00	0.0E+00	0.0E+00	2.3E-11
ISODRIN	5.8E+02	0.0E+00	5.8E+02	0.0E+00	0.0E+00	0.0E+00	2.1E-08
SUPONA	1.2E+03	0.0E+00	1.2E+03	0.0E+00	0.0E+00	0.0E+00	3.9E-13
TRICHLOROETHYLENE	2.3E+03	0.0E+00	2.3E+03	0.0E+00	0.0E+00	0.0E+00	7.6E-04
LEAD	1.5E+04	0.0E+00	1.5E+04	4.8E-03	0.0E+00	4.8E-03	0.0E+00
ZINC	2.0E+06	0.0E+00	2.0E+06	4.7E-05	0.0E+00	4.7E-05	0.0E+00

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-9b-4
EXPOSURE EVALUATIONS FOR CASUAL VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI OPN
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	
CARBON TETRACHLORIDE	2.0E+02	0.0E+00	2.0E+02	0.0E+00	0.0E+00	0.0E+00	5.2E-03
CHLOROFORM	4.0E+03	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	9.6E-05
PPDE	7.4E+01	0.0E+00	7.4E+01	0.0E+00	0.0E+00	0.0E+00	4.7E-08
PPDT	7.4E+01	0.0E+00	7.4E+01	0.0E+00	0.0E+00	0.0E+00	3.1E-07
DIBROMOCHLOROPROPANE	1.8E+01	0.0E+00	1.8E+01	0.0E+00	0.0E+00	0.0E+00	1.6E-05
DIELDRIN	1.6E+00	0.0E+00	1.6E+00	0.0E+00	0.0E+00	0.0E+00	1.8E-08
DIISOPROPYLMETHYL PHOSPHONATE	6.6E+05	0.0E+00	6.6E+05	0.0E+00	0.0E+00	0.0E+00	2.0E-10
DIMETHYLMETHYL PHOSPHONATE	1.5E+05	0.0E+00	1.5E+05	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENDRIN	2.5E+03	0.0E+00	2.5E+03	0.0E+00	0.0E+00	0.0E+00	2.3E-11
ISODRIN	5.8E+02	0.0E+00	5.8E+02	0.0E+00	0.0E+00	0.0E+00	2.1E-08
SUPONA	1.2E+03	0.0E+00	1.2E+03	0.0E+00	0.0E+00	0.0E+00	3.9E-13
TRICHLOROETHYLENE	2.3E+03	0.0E+00	2.3E+03	0.0E+00	0.0E+00	0.0E+00	7.6E-04
LEAD	1.5E+04	0.0E+00	1.5E+04	4.8E-03	0.0E+00	4.8E-03	0.0E+00
ZINC	2.0E+06	0.0E+00	2.0E+06	4.7E-05	0.0E+00	4.7E-05	0.0E+00

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-9b-5
EXPOSURE EVALUATIONS FOR RECREATIONAL VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI OPN
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI EI	EI EI	EI EI	
CARBON TETRACHLORIDE	2.7E+01	0.0E+00	2.7E+01	0.0E+00	0.0E+00	0.0E+00	7.9E-02
CHLOROFORM	5.6E+02	0.0E+00	5.6E+02	0.0E+00	0.0E+00	0.0E+00	1.4E-03
PPDDE	1.0E+01	0.0E+00	1.0E+01	0.0E+00	0.0E+00	0.0E+00	7.0E-07
PPDDT	1.0E+01	0.0E+00	1.0E+01	0.0E+00	0.0E+00	0.0E+00	4.7E-06
DIBROMOCHLOROPROPANE	2.5E+00	0.0E+00	2.5E+00	0.0E+00	0.0E+00	0.0E+00	2.4E-04
DIELDRIN	2.2E-01	0.0E+00	2.2E-01	0.0E+00	0.0E+00	0.0E+00	2.7E-07
DIISOPROPYLMETHYL PHOSPHONATE	2.8E+05	0.0E+00	2.8E+05	0.0E+00	0.0E+00	0.0E+00	1.3E-09
DIMETHYMETHYL PHOSPHONATE	6.3E+04	0.0E+00	6.3E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENDRIN	1.1E+03	0.0E+00	1.1E+03	0.0E+00	0.0E+00	0.0E+00	1.5E-10
ISODRIN	2.5E+02	0.0E+00	2.5E+02	0.0E+00	0.0E+00	0.0E+00	1.4E-07
SUPONA	5.3E+02	0.0E+00	5.3E+02	0.0E+00	0.0E+00	0.0E+00	2.5E-12
TRICHLOROETHYLENE	3.2E+02	0.0E+00	3.2E+02	0.0E+00	0.0E+00	0.0E+00	1.1E-02
LEAD	9.2E+03	0.0E+00	9.2E+03	8.1E-03	0.0E+00	8.1E-03	0.0E+00
ZINC	1.1E+06	0.0E+00	1.1E+06	8.9E-05	0.0E+00	8.9E-05	0.0E+00

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-9b-6
EXPOSURE EVALUATIONS FOR COMMERCIAL WORKERS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI ENC
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI EI	EI EI	EI EI	
CARBON TETRACHLORIDE	2.5E+02	0.0E+00	2.5E+02	0.0E+00	0.0E+00	0.0E+00	2.4E+00
CHLOROFORM	5.1E+03	0.0E+00	5.1E+03	0.0E+00	0.0E+00	0.0E+00	4.3E-02
PPDE	9.3E+01	0.0E+00	9.3E+01	0.0E+00	0.0E+00	0.0E+00	2.1E-05
PPDT	9.3E+01	0.0E+00	9.3E+01	0.0E+00	0.0E+00	0.0E+00	1.4E-04
DIBROMOCHLOROPROPANE	2.3E+01	0.0E+00	2.3E+01	0.0E+00	0.0E+00	0.0E+00	7.1E-03
DIELDRIN	2.0E+00	0.0E+00	2.0E+00	0.0E+00	0.0E+00	0.0E+00	8.2E-06
DIISOPROPYLMETHYL PHOSPHONATE	3.7E+05	0.0E+00	3.7E+05	0.0E+00	0.0E+00	0.0E+00	2.7E-07
DIMETHYLMETHYL PHOSPHONATE	8.2E+04	0.0E+00	8.2E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENDRIN	1.4E+03	0.0E+00	1.4E+03	0.0E+00	0.0E+00	0.0E+00	3.2E-08
ISODRIN	3.2E+02	0.0E+00	3.2E+02	0.0E+00	0.0E+00	0.0E+00	2.9E-05
SUPONA	6.9E+02	0.0E+00	6.9E+02	0.0E+00	0.0E+00	0.0E+00	5.4E-10
TRICHLOROETHYLENE	2.9E+03	0.0E+00	2.9E+03	0.0E+00	0.0E+00	0.0E+00	3.4E-01
LEAD	6.5E+03	0.0E+00	6.5E+03	1.1E-02	0.0E+00	1.1E-02	0.0E+00
ZINC	7.8E+05	0.0E+00	7.8E+05	1.2E-04	0.0E+00	1.2E-04	0.0E+00

SPSA-9b-7
EXPOSURE EVALUATIONS FOR INDUSTRIAL WORKERS

CONTAMINANT	DIRECT			INDIRECT			CUMULATIVE			VEI	
	PPLV (mg/kg)	OSVI (mg/kg)	ESVI (mg/kg)	PPLV (mg/kg)	EI	EI	EI	OPM	ENC		
CARBON TETRACHLORIDE	1.5E+01	0.0E+00	0.0E+00	1.5E+01	0.0E+00	0.0E+00	0.0E+00	3.9E-02	7.1E+00		
CHLOROFORM	3.1E+02	0.0E+00	0.0E+00	3.1E+02	0.0E+00	0.0E+00	0.0E+00	7.2E-04	1.3E-01		
PPDE	5.7E+00	0.0E+00	0.0E+00	5.7E+00	0.0E+00	0.0E+00	0.0E+00	3.5E-07	6.4E-05		
PPDT	5.7E+00	0.0E+00	0.0E+00	5.7E+00	0.0E+00	0.0E+00	0.0E+00	2.3E-06	4.2E-04		
DIBROMOCHLOROPROPANE	1.4E+00	0.0E+00	0.0E+00	1.4E+00	0.0E+00	0.0E+00	0.0E+00	1.2E-04	2.1E-02		
DIELDRIN	1.2E-01	0.0E+00	0.0E+00	1.2E-01	0.0E+00	0.0E+00	0.0E+00	1.4E-07	2.5E-05		
DIISOPROPYLMETHYL PHOSPHONATE	6.8E+04	0.0E+00	0.0E+00	6.8E+04	0.0E+00	0.0E+00	0.0E+00	1.5E-09	2.7E-07		
DIMETHYLMETHYL PHOSPHONATE	1.5E+04	0.0E+00	0.0E+00	1.5E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00		
ENDRIN	2.5E+02	0.0E+00	0.0E+00	2.5E+02	0.0E+00	0.0E+00	0.0E+00	1.8E-10	3.2E-08		
ISODRIN	5.9E+01	0.0E+00	0.0E+00	5.9E+01	0.0E+00	0.0E+00	0.0E+00	1.6E-07	2.9E-05		
SUPONA	1.3E+02	0.0E+00	0.0E+00	1.3E+02	0.0E+00	0.0E+00	0.0E+00	3.0E-12	5.4E-10		
TRICHLOROETHYLENE	1.8E+02	0.0E+00	0.0E+00	1.8E+02	0.0E+00	0.0E+00	0.0E+00	5.7E-03	1.0E+00		
LEAD	2.2E+03	0.0E+00	0.0E+00	2.2E+03	3.4E-02	0.0E+00	3.4E-02	0.0E+00	0.0E+00		
ZINC	1.4E+05	0.0E+00	0.0E+00	1.4E+05	6.7E-04	0.0E+00	6.7E-04	0.0E+00	0.0E+00		

2.31 SITE SPSA-10: CHEMICAL SEWER SYSTEM (formerly Chemical Sewer-North Plants and South Plants; EBASCO, 1988t/RIC 88286R08)

2.31.1 Site-Specific Considerations

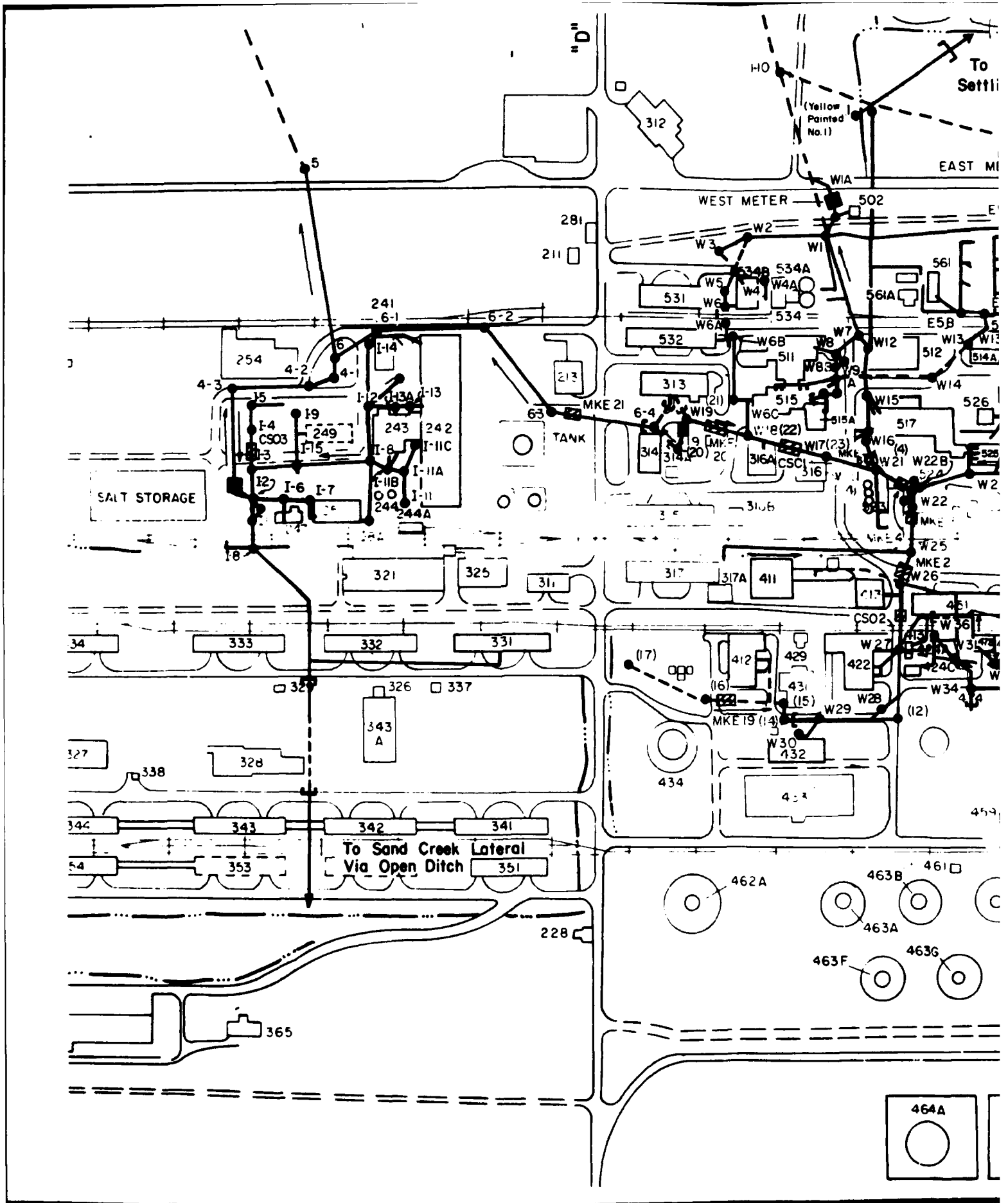
Figure SPSA-10-1 and Table SPSA-10-1 depict the target contaminants for Site SPSA-10. Borings W21, W25, W27, 4-3, 6-1; 1 through 11 from Trench CS01; 1 through 8 from Trench CS02; 1 through 8 from Trench CS03; 1 through 3 from Trench MKE2; 1 and 3 from Trench MKE3; 2 and 3 from Trench MKE4; 1 through 3 from Trench MKE6; 1 through 3 from Trench MKE7; 1 through 3 from Trench MKE19; 1 through 3 from Trench MKE20; and 1 and 2 from Trench MKE21. The historical search conducted under the contamination assessment revealed that wastes from the lewisite production area were collected and leaks of materials containing Endrin may have occurred in Site SPSA-10 (EBASCO, 1988t/RIC 88286R08). Since this site is a sewer line, many of the chemicals from the RMA target contaminant list were suspected to be present in Site SPSA-10 (EBASCO, 1988t/RIC 88286R08).

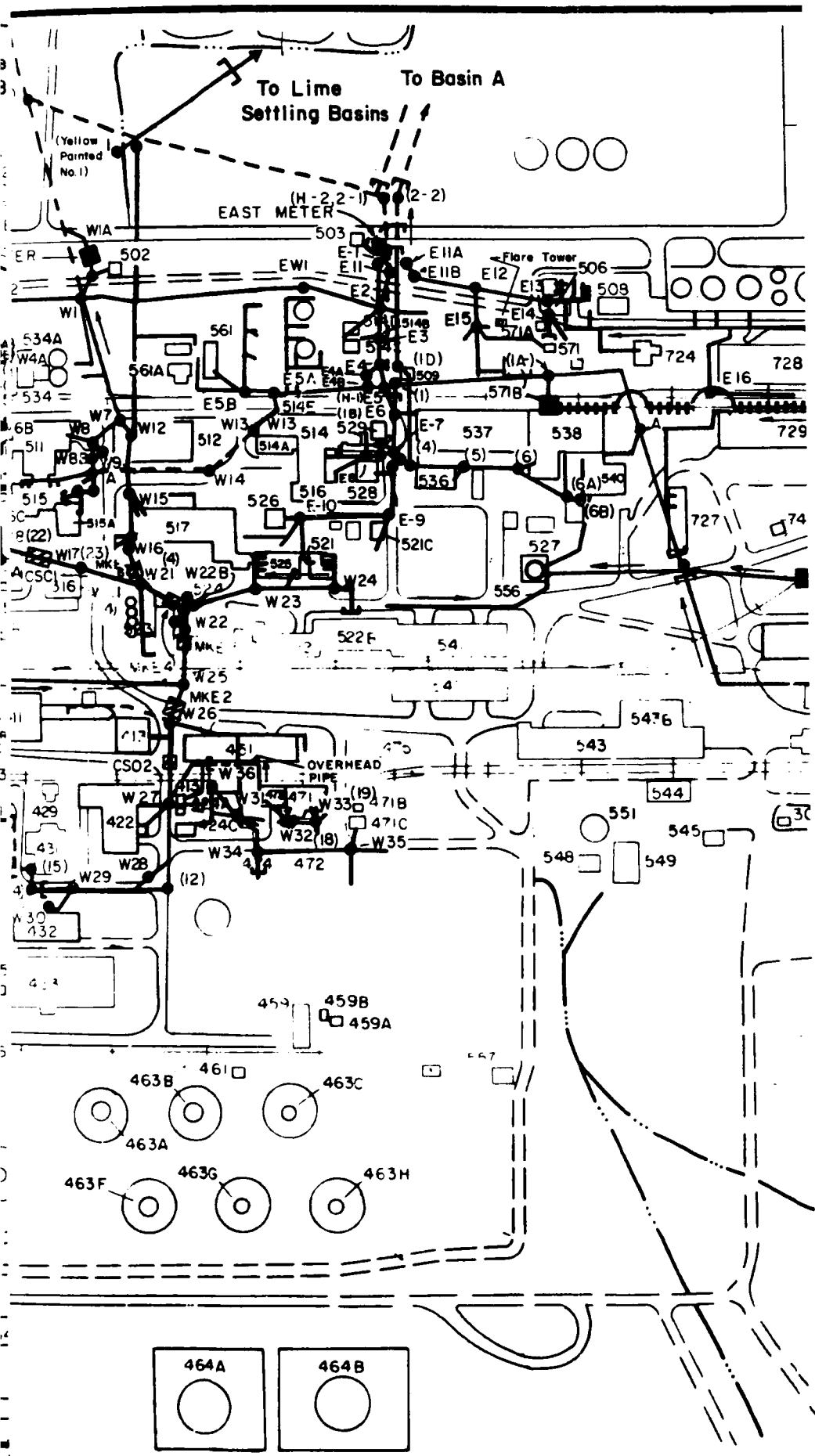
2.31.2 Spatial Distribution of Measured Contaminant Concentrations

The locations and concentrations of the target contaminants that were detected in Site SPSA-10 are shown in Figure SPSA-10-1 and SPSA-10-2. The following contaminants were not included in these figures, since they were not considered target contaminants during the Phase I investigation: Hexachlorobutadiene, occurring in Boring 31 (8.7-9.5 ft), tetrachlorobenzene and pentachlorobenzene, occurring in Boring 44 (7.6-7.9 ft). Although not shown in these figures, these nontarget compounds were included in the South Plants SAR and in this exposure assessment because they passed through the screening process performed in the RMA Chemical Index (EBASCO, 1988c/RIC 88357R01).

Table SPSA-10-1 summarizes the maximum concentrations of contaminants measured in soil above indicator levels for the ICP metals, arsenic, and mercury and CRLs for organic contaminants from the Phase I and Phase II investigations. The boring number and depth where the maximum value was observed are shown. Data were included for ICP metals, arsenic, and mercury from 0-10 ft only because direct soil exposure below 10 ft is assumed

and a casual visitor but the direct and indirect EIs do not exceed 0.1. Site SPSA-10 is designated as a Priority 1 site, based on the most sensitive exposed population PPLV (i.e., the industrial worker).

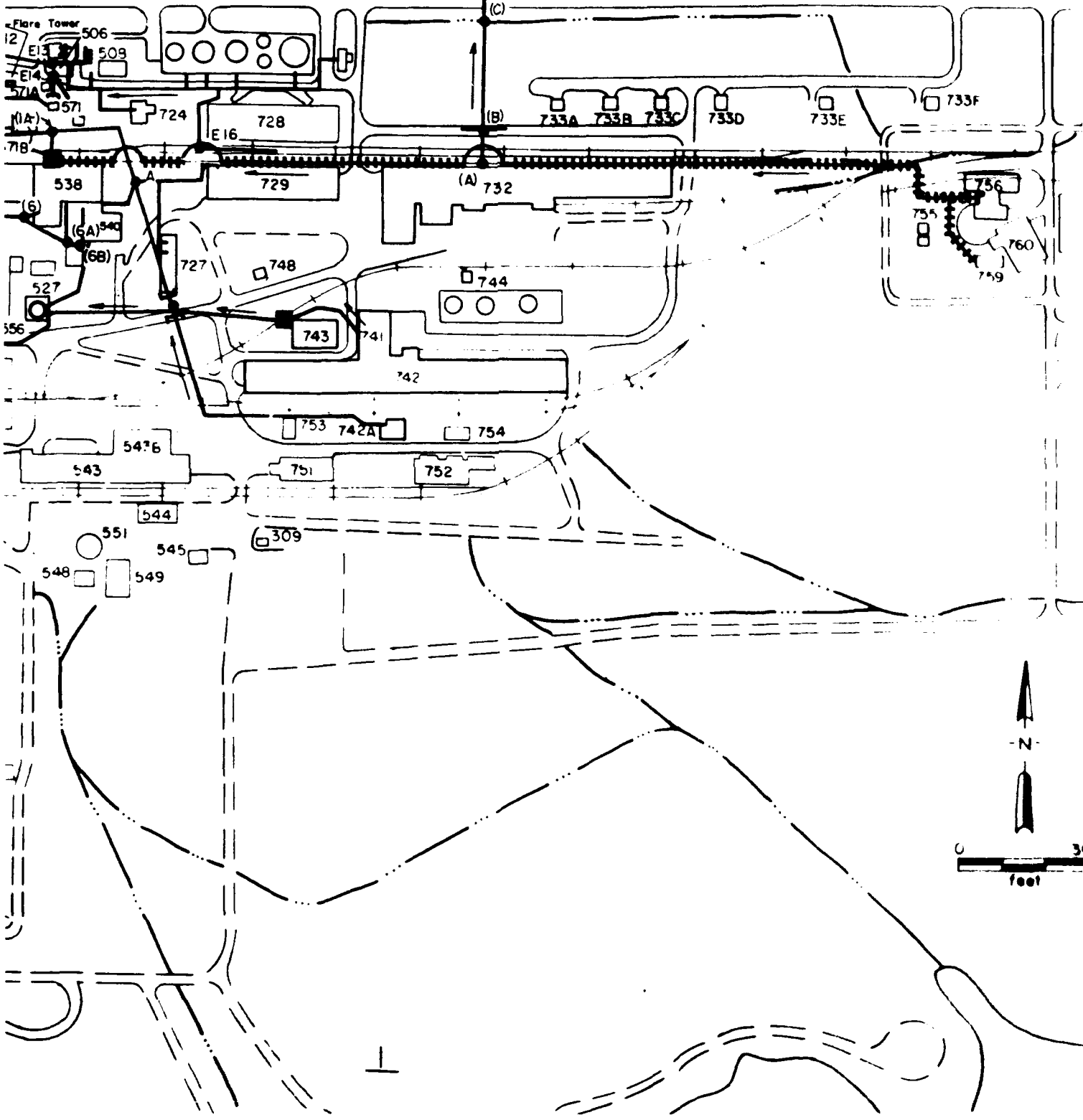


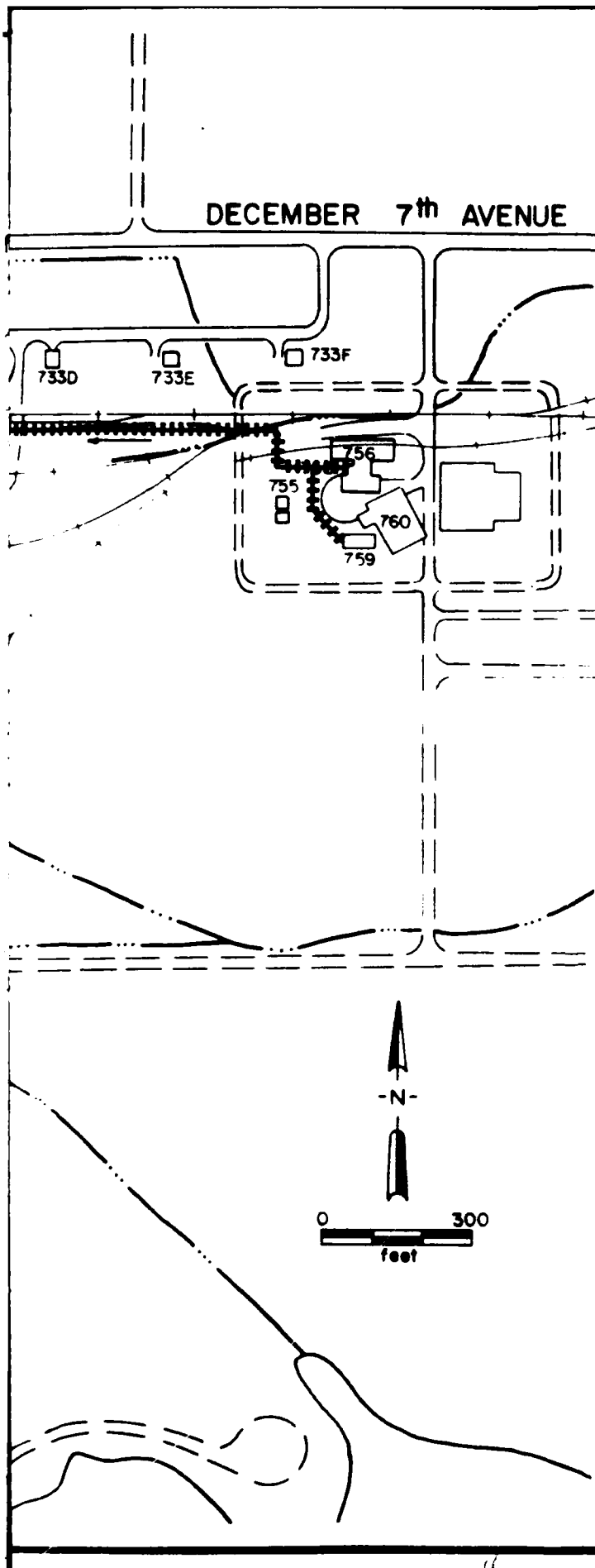


A

DECEMBER 7th

To Basin A
Via Open Ditch





LEGEND

- Building, Existing
- Building, Removed
- Road, Paved
- Road, Unpaved
- 36 Section Number
- Railroad
-
- Sewer Main, Removed
- Sewer Main, Overhead
- Manhole, with Number
- Pumping Station
- Arrow Indicating Flow Direction
- Trench, with Number

Note: Manhole numbers appear as designated by the Shell Chemical Company, with Army numbers given as appropriate in parentheses.

Prepared for:

Program Manager's Office for
Rocky Mountain Arsenal Cleanup
Aberdeen Proving Ground, Maryland

FIGURE SPSA-10-1

Phase I and Phase II Analytes
Detected Within or Above
Indicator Levels

Rocky Mountain Arsenal

Prepared by: Ebasco Services Incorporated

W21	W25	W27	Trench CS01	Trench CS02
8.0 - 9.0	6.9 - 7.9	6.5 - 7.5	Bore 7	Bore 3
BCHPD 2 CCL4 5 CLC6H5 5 CHCL3 20 DBCP 800/BIL 130MB 20 Xylene 20 TCLEE 9 MEC6H5 20 Aldrin 50 Isodrin 1 As 300 Cd 10 Cr 45 Cu 36 Pb 25 Zn 98	Benzene 20 BCHPD 20 CCL4 20 CLC6H5 20 CHCL3 400 DBCP 6000/10000 ETC6H5 20 130MB 100 CH2CL2 6 Xylene 40 TCLEE 40 MEC6H5 300 Aldrin 10000 PPDDT 70 Dieldrin 100 CL6CP 90 Isodrin 300 As 130 Cd 5 Cu 42 Hg 8.8 Zn 92 TDGCL 14 CLC2A 230	BCHPD 2 DBCP BIL/10 TCLEE 4 Aldrin 100 PPDDE 2 PPDDT 30 Dieldrin 90 As 15 Cu 41 Hg 2 Pb 49 Zn 130	4.0 - 5.0 CH2CL2 2 TCLEE 6 Dieldrin 1 As 15 Cu 51 Hg 0.26 Zn 260	7.8 - 8.8 BCHPD 30 CCL4 60 CHCL3 20 DBCP 5000/BIL 130MB 0.9 TCLEE 10 MEC6H5 90 Aldrin 200 Dieldrin 6 CL6CP 50 Isodrin 20 As 12 Hg 0.44 Pb 56
12.0 - 13.0	11.8 - 12.8	11.5 - 12.5	Bore 8	Trench CS02 Bore 4
BCHPD 0.7 CCL4 0.4 CHCL3 5 DBCP 70/BIL 130MB 1 CH2CL2 3 MIBK 5 TCLEE 0.7 MEC6H5 3 As 46 Cu 34 Zn 85 TDGCL 3.2	Benzene 1 BCHPD 8 CCL4 4 CHCL3 6 DBCP 2000/80 130MB 1 CH2CL2 9 TCLEE 5 MEC6H5 7 Aldrin 200 PPDDT 5 Cu 43 Hg 0.065 Zn 85	Benzene 1 BCHPD 30 CCL4 20 CHCL3 5 DBCP 200/50 TCLEE 10 MEC6H5 50 Aldrin 90 CPMSO2 0.3 PPDDT 2 Dieldrin 2 CL6CP 0.8 Isodrin 6 Supona 2 Cu 36 Hg 0.061 Zn 100	4.0 - 5.0 As 24 Cu 37 Zn 110	7.8 - 8.8 BCHPD 9 CCL4 20 CHCL3 3 CLC6H5 2 DBCP 5000/BIL DCPD BIL/6 130MB 2 TCLEE 10 MEC6H5 50 PPDDT 2 Aldrin 1000 Dieldrin 70 CL6CP 100 Isodrin 200 Supona 2 As 12 Cu 24 Hg 0.19
17.0 - 18.0	16.2 - 17.2	16.2 - 17.2	Bore 9	Trench CS01 Bore 5
BCHPD 2 CCL4 0.7 CLC6H5 2 CHCL3 1 DBCP 60/5 TCLEE 0.9 Aldrin 100 Dieldrin 0.8 Isodrin 10 Parathion 30 Supona 3 As 12 Pb 25 Zn 99	BCHPD 4 CCL4 10 CHCL3 10 DBCP 400/100 CH2CL2 2 TCLEE 0.9 MEC6H5 10 Aldrin 100 PPDDT 0.8 Dieldrin 1 CL6CP 0.7 Isodrin 3 Supona 0.7 Cr 72 Cu 38 Zn 84	BCHPD 4 CCL4 10 CHCL3 10 DBCP 400/100 CH2CL2 2 TCLEE 0.9 MEC6H5 10 Aldrin 100 PPDDT 0.8 Dieldrin 1 CL6CP 0.7 Isodrin 3 Supona 0.7 Cr 72 Cu 38 Zn 84	4.0 - 5.0 Cu 29 Zn 86	7.8 - 8.8 BCHPD 10 CCL4 40 CHCL3 20 DBCP 4000/100 TCLEE 6 MEC6H5 30 Aldrin 500 Hg 0.4E Pb 56
22.0 - 23.0	21.2 - 22.1	21.2 - 22.2	Bore 10	Trench CS02 Bore 6
CHCL3 0.8 Cu 40 Zn 89	Cu 37 Zn 95	BCHPD 1 CCL4 2 CHCL3 7 DBCP 30/9 CH2CL2 2 MEC6H5 1 Cu 41 Zn 86	3.0 Dieldrin 5 As 13 Cr 64 Cu 35 Hg 2.3 Pb 39 Zn 820	7.8 - 8.8 BCHPD 0.9 CCL4 5 CHCL3 3 DBCP 200/4000 TCLEE 2 MEC6H5 0.7 PPDDT 500 Aldrin 2000 Dieldrin 200 Isodrin 400 As 10 Cu 34 Hg 1.1 Pb 61 Zn 90
27.0 - 27.2	26.2 - 27.2	26.2 - 27.2	Trench CS01 Bore 11	Trench CS02 Bore 8
Benzene 1 CHCL3 7 DBCP BIL/4 MEC6H5 0.5 Aldrin 10 Dieldrin 1 Supona 4 Cu 42 Zn 99	CHCL3 1 Cu 26 Zn 110	BCHPD 2 CCL4 4 CHCL3 10 CH2CL2 3 MEC6H5 3 Aldrin 39 Cu 39 Zn 93	4.0 - 5.0 Aldrin 1 Dieldrin 0.5	7.8 - 8.8 DBCP BIL/4 Aldrin 3 Cu 21 Zn 61
6-1	Trench CS01 Bore 2	Trench CS01 Bore 5	Trench CS02 Bore 1	Trench CS02 Bore 8
12.5 - 13.5 Cu 47 Pb 36 Zn 85	4.0 - 5.0 Dieldrin 0.5 As 6.5 Cu 35 Zn 110	4.0 - 5.0 130MB 0.7 TCLEE 0.5 Dieldrin 2 As 12 Cu 33 Hg 0.075 Zn 120	7.8 - 8.8 BCHPD 20 CCL4 90 CLC6H5 20 CHCL3 40 DBCP 7000/4000 130MB 3 TCLEE 20 MEC6H5 200 Aldrin 500 Dieldrin 50 CL6CP 500 Isodrin 70 As 80 Hg 0.51 Pb 80	7.8 - 8.8 BCHPD 50 CCL4 100 CHCL3 30 DBCP 5000/8000 130MB 3 TCLEE 30 MEC6H5 200 Aldrin 2000 As 31 Cd 1.3 Cu 32 Hg 0.45 Zn 99
17.5 - 18.5 112TCE 0.8 Cu 42 Zn 110	Trench CS01 Bore 3	Trench CS01 Bore 6	Trench CS02 Bore 2	Trench CS02 Bore 8
23.5 - 24.5 111TCE 0.5 CCL4 0.6 TCLEE 1 Cu 46 Zn 100	4.0 - 5.0 Dieldrin 0.5 As 12 Cu 34 Zn 120	4.0 - 5.0 CH2CL2 2 TCLEE 3 Aldrin 0.4 Dieldrin 0.3 As 5.3 Cu 34 Hg 0.16 Zn 160	7.8 - 8.8 BCHPD 50 CCL4 100 CHCL3 30 DBCP 5000/8000 130MB 3 TCLEE 30 MEC6H5 200 Aldrin 2000 As 31 Cd 1.3 Cu 32 Hg 0.45 Zn 99	7.8 - 8.8 BCHPD 70 CCL4 200 CLC6H5 4 CHCL3 50 DBCP 1000/2000 130MB 1 TCLEE 10 MEC6H5 300 Aldrin 1000 Isodrin 40 Hg 0.05
29.0 - 30.0 Cu 30 Zn 80	Trench CS01 Bore 4	Trench CS01 Bore 6	Trench CS02 Bore 2	Trench CS02 Bore 8
4-3	4.0 - 5.0 TCLEE 3 Aldrin 0.4 Dieldrin 0.3 As 5.3 Cu 34 Hg 0.16 Zn 160	4.0 - 5.0 CH2CL2 2 TCLEE 3 Dieldrin 2 As 8.2 Cu 32 Hg 0.12 Zn 110	7.8 - 8.8 BCHPD 50 CCL4 100 CHCL3 30 DBCP 5000/8000 130MB 3 TCLEE 30 MEC6H5 200 Aldrin 2000 As 31 Cd 1.3 Cu 32 Hg 0.45 Zn 99	7.8 - 8.8 BCHPD 70 CCL4 200 CLC6H5 4 CHCL3 50 DBCP 1000/2000 130MB 1 TCLEE 10 MEC6H5 300 Aldrin 1000 Isodrin 40 Hg 0.05
3.2 - 4.2 CH2CL2 1 Aldrin 2				
8.2 - 9.2 CH2CL2 1 TCLEE 0.6				
12.2 - 13.2 CH2CL2 1 Zn 82				
17.2 - 18.2 Cu 20 Zn 72				
22.2 - 23.2 Zn 73				

Trench CS02 Bore 3

7.8 - 8.8	BCHPD	30
	CCL4	80
	CHCL3	20
	DBCP	5000/BIL
	130MB	0.9
	TCLEE	10
	MEC6H5	90
	Aldrn	200
	Dieldrn	6
	CL6CP	50
	Isodrn	20
	As	12
	Hg	0.44
	Pb	59

Trench CS02 Bore 7

7.8 - 8.8	BCHPD	6
	CCL4	10
	CHCL3	2
	DBCP	60/BIL
	DCPD	2/BIL
	TCLEE	4
	MEC6H5	0.4
	Aldrn	20000
	Isodrn	400
	As	11
	Cu	25
	Hg	0.64
	Zn	77

Trench CS03 Bore 7

11.5 - 12.5	Cu	28
	Zn	72
15.5 - 18.5	As	3.5
	Cu	33
	Zn	89
20.5 - 21.5	As	7.1
	Cu	33
	Zn	77
25.5 - 26.5	Cu	28
	Zn	96

Trench MKE 3 Bore 3

8.6 - 9.9	Aldrn	100
	Dieldrn	20
	Isodrn	13/8
	Supona	30
	DBCP	2
	Cd	2.8
	Cu	76
	Hg	0.27
	Zn	83

Trench MKE 6 Bore 3

8.6 - 9.2	Aldrn	800
	Dieldrn	10
	Isodrn	40
	DBCP	55/50
	As	250
	Cd	6.3
	Cu	43
	Hg	1.6
	Zn	190

Trench CS02 Bore 4

7.8 - 8.8	BCHPD	9
	CCL4	20
	CHCL3	3
	CL6H5	2
	DBCP	5000/BIL
	DCPD	BIL/8
	130MB	2
	TCLEE	10
	MEC6H5	50
	PPDDT	2
	Aldrn	1000
	Dieldrn	70
	CL6CP	100
	Isodrn	200
	Supona	2
	As	12
	Cu	24
	Hg	0.19

11.8 - 12.8

Benzene	5
CCL4	200
CL6H5	4
CHCL3	40
DBCP	2000/20000
ETC6H5	3
130MB	10
TCLEE	90
MEC6H5	60
Xylene	9
Aldrn	40000
Isodrn	1000
Cu	26
Hg	0.29
Zn	74

Trench CS03 Bore 8

10.8	As	3.6
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Trench MKE 2 Bore 1

5.9 - 8.8	PPDDT	30
	Aldrn	100
	Dieldrn	70
	CL6CP	30
	Isodrn	30
	Supona	30
	DBCP	32000/BIL
	As	140
	Cd	4.2
	Cu	55
	Hg	2.3
	Pb	73
	Zn	86

Trench MKE 4 Bore 2

7.7 - 8.2	PPDE	0.8
	PPDDT	10
	Dieldrn	30
	CL6CP	20
	Isodrn	40
	Supona	20
	DBCP	540/200
	As	120
	Cd	5.3
	Cu	36
	Hg	0.92
	Zn	90

Trench MKE 7 Bore 1

5.7 - 6.4	BIL
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Trench MKE 7 Bore 2

5.7 - 8.7	BIL
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Trench MKE 7 Bore 3

5.8 - 6.5	BIL
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Trench CS02 Bore 5

7.8 - 8.8	BCHPD	10
	CCL4	40
	CHCL3	20
	DBCP	4000/1000
	TCLEE	6
	MEC6H5	30
	Aldrn	5000
	Hg	0.48
	Pb	59

Trench CS03 Bore 1

11.5 - 12.5	TCLEE	3
	CL6CP	3000
	Hg	0.066
	Pb	640
	Zn	62

Trench MKE 2 Bore 2

5.7 - 6.5	PPDDT	7
	Aldrn	100
	Dieldrn	10
	CL6CP	1
	Isodrn	10
	Parathon	20
	DBCP	370/80
	As	190
	Cd	5.8
	Cu	1500
	Hg	0.7
	Pb	89
	Zn	120

Trench MKE 4 Bore 3

7.6 - 7.9	PPDDT	30
	Aldrn	20
	Dieldrn	2
	CL6CP	30
	Isodrn	1
	DBCP	60/50
	As	170
	Cd	6.6
	Cu	32
	Hg	2.2
	Zn	72
7.7 - 8.2	PPDE	2
	PPDDT	40
	Aldrn	20
	Dieldrn	3
	Isodrn	2
	Supona	2
	DBCP	70/20
	As	150
	Cu	7.7
	Hg	0.39
	Zn	100

Trench MKE 19 Bore 1

3.6 - 4.4	As	7.1
	Cu	71
	Hg	3.5
	Zn	97

Trench MKE 19 Bore 2

3.6 - 4.6	As	5.1
	Cu	44
	Hg	0.18
	Zn	95

Trench MKE 19 Bore 3

3.4 - 4.2	As	14
	Cu	41
	Hg	5.4
	Zn	85

Trench CS02 Bore 6

7.8 - 8.8	BCHPD	0.9
	CCL4	5
	CHCL3	3
	DBCP	200/4000
	TCLEE	2
	MEC6H5	0.7
	PPDDT	500
	Aldrn	20000
	Dieldrn	200
	Isodrn	400
	As	10
	Cu	34
	Hg	1.3
	Pb	6.1
	Zn	90

Trench CS03 Bore 2

11.5 - 12.5	CCL4	9
	TCLEE	3
	CL6CP	4000
	Hg	0.093
	Pb	150
	Zn	72

Trench MKE 2 Bore 3

5.8 - 6.8	PPDDT	20
	Aldrn	100
	Atrazine	10
	Dieldrn	30
	Isodrn	30
	Supona	30
	DBCP	6800/100
	As	130
	Cd	5.8
	Cu	84
	Hg	4.7
	Pb	36
	Zn	230

Trench MKE 6 Bore 1

8.2 - 8.8	PPDE	7
	Aldrn	200
	Isodrn	20
	Supona	8
	DBCP	440/300
	As	740
	Cd	34
	Cu	150
	Hg	8.6
	Pb	97
	Zn	480

Trench MKE 20 Bore 1

4.2 - 4.8	Aldrn	0.6
	DBCP	0.6
	As	4.4
	Cu	32
	Hg	0.17
	Pb	29
	Zn	150

Trench CS02 Bore 8

7.8 - 8.8	DBCP	BIL/0.4
	Aldrn	3
	Cu	25
	Zn	67
11.8 - 12.8	Benzene	2
	BCHPD	70
	CCL4	200
	CL6H5	4
	CHCL3	50
	DBCP	1000/200
	130MB	1
	TCLEE	10
	MEC6H5	300
	Aldrn	1000
	Isodrn	40
	Hg	0.057

Trench CS03 Bore 3

11.5 - 12.5	CL6CP	300
	Cu	21
	Zn	73

Trench CS03 Bore 4

11.5 - 12.5	1,2 DCLE	40
	CCL4	3
	CHCL3	2
	TCLEE	10
	Dieldrn	1
	CL6CP	2000
	As	3.3
	Cu	26
	Hg	0.087
	Zn	83

Trench MKE 3 Bore 1

8.7 - 9.5	PPDE	4
	PPDDT	30
	Aldrn	100
	Atrazine	4
	Dieldrn	100
	Isodrn	30
	Supona	4
	DBCP	95/70
	As	150
	Cd	3.1
	Hg	0.58

Trench MKE 6 Bore 2

8.2 - 9.2	Aldrn	300
	Dieldrn	40
	Isodrn	20
	DBCP	280/100
	As	800
	Cd	27
	Cu	37
	Hg	3.4
	Pb	35
	Zn	100

Trench MKE 20 Bore 2

4.0 - 4.5	Cu	80
	Pb	52
	Zn	160

Trench MKE 20 Bore 3

4.1 - 5.0	Dieldrn	0.3
	As	3.4
	Cu	40
	Hg	0.13
	Pb	56
	Zn	780

Trench CS03 Bore 5

11.5 - 12.5	As	3.4
	Cu	38
	Zn	100

Trench CS03 Bore 6

11.5 - 12.5	Hg	0.20
	Cu	34
	Zn	92
20.5 - 21.5	Cu	33
	Zn	78
25.5 - 26.5	Cu	48
	Zn	75

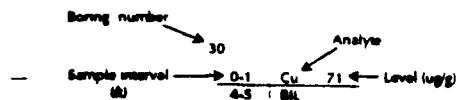
Trench MKE 21 Bore 1

8.0 - 9.0	Pb	28
	Zn	68

Trench MKE 21 Bore 2

7.8 - 9.0	BIL
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Legend



- III TCE - 1, 1, 1 Trichloroethane
- II TCE - 1, 1, 2 Trichloroethane
- BCHPD - Bicycloheptadiene
- CCl4 - Carbon tetrachloride
- ClC6H5 - Chlorobenzene
- CHCl3 - Chloroform
- DBCP - Dibromochloropropane
- ETC6H5 - Ethylbenzene
- 13 DMB - m - Xylene
- CH2CL2 - Methylene chloride
- MIBK - Methylisobutyl Ketone
- Xylene - o - and p - Xylene
- TCL6E - Tetrachloroethylene
- TRCLE - Trichloroethylene
- CPMSO2 - Chlorophenylmethyl sulfone
- DBCP - Dibromochloropropane (VO/SVO)
- PPDDE - Dichlorodiphenylethane
- PPDOT - Dichlorodiphenyltrichloroethane
- CL6CP - Hexachlorocyclopentadiene
- TDGCL - Thiodiglycol
- CLC2A - Chloroacetic acid
- DCCPD - Dicyclopentadiene
- MEC6H5 - Toluene
- 1, 2 DCE - 1, 2 Dichloroethane
- As - Arsenic
- Cd - Cadmium
- Cr - Chromium
- Cu - Copper
- Pb - Lead
- Hg - Mercury
- Zn - Zinc
- BIL - Below indicator level
- * - VO analysis/SVO analysis

Prepared for:

Program Manager's Office for
Rocky Mountain Arsenal Cleanup
Aberdeen Proving Ground, Maryland

FIGURE SPSA-10-2

Phase I and Phase II Analytes Detected
Within or Above Indicator Levels

Rocky Mountain Arsenal
Prepared by: Ebasco Services Incorporated

TABLE SPSA-10-1
SOIL CONTAMINANT CONCENTRATIONS
FOR SITE SPSA-10

Contaminant	Max. (ug/g)	Depth (ft)	Sampling Area	Boring Number
Aldrin	40000	11.8-12.8	CS02	7
Atrazine	10	5.8-6.8	MKE2	3
Benzene	20	6.9-7.9	MH	W25
Bicycloheptadiene	70	11.8-12.8	CS02	8
Carbon tetrachloride	200	11.8-12.8	CS02	7
		11.8-12.8	CS02	8
Chloroacetic acid	230	6.9-7.9	MH	W25
Chlorobenzene	20	7.8-8.8	CS02	1
		6.9-7.9	MH	W25
		6.9-7.9	MH	W25
Chloroform	400	6.9-7.9	MH	W27
Chlorophenylmethyl sulfone	0.3	11.5-12.5	MH	
Dibromochloropropane	32000	5.9-6.8	MKE2	1
PPDDE ^{1/}	7	8.2-8.8	MKE6	1
PPDDT ^{2/}	500	7.8-8.8	CS02	6
1,2-Dichloroethane	40	11.5-12.5	CS03	4
Dicyclopentadiene	8	7.8-8.8	CS02	4
Diieldrin	200	7.8-8.8	CS02	6
Ethylbenzene	20	6.9-7.9	MH	W25
Hexachlorobutadiene ^{3/}	100	8.7-9.5	MKE0	31
Hexachlorocyclopentadiene	4000	11.5-12.5	CS03	2
Isodrin	1000	11.8-12.8	CS02	7
Methylene chloride	9	11.8-12.8	MH	W25
Methylisobutyl ketone	5	12.0-13.0	MH	W21
Parathion	30	17-18	MH	W21
Supona	30	5.9-6.8	MKE2	1
		5.8-6.8	MKE2	3
		9.6-9.9	MKE3	3
Tetrachlorobenzene ^{3/}	3	7.6-7.9	MKE0	44

TABLE SPSA-10-1 (Continued)
SOIL CONTAMINANT CONCENTRATIONS
FOR SITE SPSA-10

Contaminant	Max. (ug/g)	Depth (ft)	Sampling Area	Boring Number
Tetrachloroethylene	90	11.8-12.8	CS02	7
Thiodiglycol	14	6.9-7.9	MH	W25
Toluene	300	6.9-7.9	MH	W25
Trichlorobenzene ^{3/}	2	11.8-12.8	CS02	8
1,1,1-Trichloroethane	0.5	7.6-7.9	MKE0	44
1,1,2-Trichloroethane	0.8	23.5-24.5	MH	6-1
Trichloroethylene	0.6	17.5-18.5	MH	6-1
m-Xylene	100	8.2-9.2	MH	4-3
o-p-Xylene	40	6.9-7.9	MH	W25
Arsenic	740	6.9-7.9	MH	W25
Cadmium	34	8.2-8.8	MKE6	1
Chromium	64	8.2-8.8	MKE6	1
Copper	1500	3.0	CS01	10
Lead	97	5.7-6.5	MKE2	2
Mercury	8.8	8.2-8.8	MKE6	1
Zinc	820	6.9-7.9	MH	W25
		3.0	CS01	10

1/ PPDE 2,2-bis(Para-chlorophe-,D)-1,1-dichloroethene

2/ PPDDT 2,2-bis(Para-chloropheny)-1,1,1-trichloroethane

3/ Nontarget contaminant. Refer to the exposure assessment nontarget screen in Appendix A.

SPSA South Plants Study Area

Max. Maximum

ug/g microgram per gram

ft foot/feet

SPSA-10-2
EXPOSURE EVALUATIONS FOR REGULATED VISITORS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI OPN
ALDRIN	1.5E+00	1.0E+06	1.5E+00	2.7E+04*	3.9E-02a	2.7E+04*	0.0E+00
ATRAZINE	4.1E+04	2.2E+11	4.1E+04	2.4E-04	4.5E-11	2.4E-04	0.0E+00
BENZENE	8.6E+02	8.1E+03	7.8E+02	2.3E-02	2.5E-03	2.6E-02	0.0E+00
BICYCLOHEPTADIENE	3.2E+05	4.0E+06	2.9E+05	2.2E-04	1.8E-05	2.4E-04	0.0E+00
CARBON TETRACHLORIDE	2.0E+02	1.9E+03	1.8E+02	1.0E+00*	1.1E-01*	1.1E+00*	0.0E+00
CHLOROACETIC ACID	1.7E+04	0.0E+00	1.7E+04	1.4E-02	0.0E+00	1.4E-02	0.0E+00
CHLOROBENZENE	1.6E+05	9.5E+05	1.4E+05	1.2E-04	2.1E-05	1.4E-04	0.0E+00
CHLOROFORM	4.0E+03	2.8E+04	3.5E+03	9.9E-02	1.4E-02	1.1E-01*	0.0E+00
CHLOROPHENYLMETHYL SULFONE	1.6E+05	1.1E+08	1.6E+05	1.8E-06	2.8E-09	1.8E-06	0.0E+00
PPDDE	7.4E+01	1.9E+09	7.4E+01	9.5E-02	3.6E-09	9.5E-02	0.0E+00
PPDDT	7.4E+01	1.0E+06	7.4E+01	6.8E+00*	1.8E-07a	6.8E+00*	0.0E+00
DIBROMOCHLOROPROPANE	1.8E+01	1.4E+03	1.8E+01	1.8E+03*	2.3E+01*	1.8E+03*	0.0E+00
1,2-DICHLOROETHANE	2.8E+02	4.5E+04	2.8E+02	1.4E-01*	8.9E-04	1.4E-01*	0.0E+00
DICYCLOPENTADIENE	5.4E+04	7.0E+04	3.1E+04	1.5E-04	1.1E-04	2.6E-04	0.0E+00
DIELDRIN	1.6E+00	1.0E+06	1.6E+00	1.3E+02*	4.3E-04a	1.3E+02*	0.0E+00
ETHYLBENZENE	8.3E+05	3.3E+07	8.1E+05	2.4E-05	6.0E-07	2.5E-05	0.0E+00
HEXACHLOROCYCLOPENTADIENE	1.7E+04	1.0E+06	1.6E+04	2.4E-01*	7.3E-03a	2.5E-01*	0.0E+00
ISODRIN	5.8E+02	1.0E+06	5.8E+02	1.7E+00*	1.3E-06a	1.7E+00*	0.0E+00
METHYLISOBUTYL KETONE	4.1E+05	2.8E+07	4.0E+05	1.2E-05	1.8E-07	1.2E-05	0.0E+00
METHYLENE CHLORIDE	3.3E+03	1.4E+04	2.6E+03	2.7E-03	6.6E-04	3.4E-03	0.0E+00
PARATHION	5.0E+04	1.1E+11	5.0E+04	6.1E-04	2.8E-10	6.1E-04	0.0E+00
SUPONA	1.2E+03	4.7E+11	1.2E+03	2.4E-02	6.3E-11	2.4E-02	0.0E+00
TETRACHLOROETHYLENE	5.1E+02	6.5E+04	5.1E+02	1.8E-01*	1.4E-03	1.8E-01*	0.0E+00
THIODIGLYCOL	3.3E+05	0.0E+00	3.3E+05	4.2E-05	0.0E+00	4.2E-05	0.0E+00
TOLUENE	2.5E+06	1.5E+08	2.4E+06	1.2E-04	2.0E-06	1.2E-04	0.0E+00
1,1,1-TRICHLOROETHANE	7.5E+05	4.2E+08	7.5E+05	6.7E-07	1.2E-09	6.7E-07	0.0E+00
1,1,2-TRICHLOROETHANE	4.3E+02	3.5E+04	4.3E+02	1.9E-03	2.3E-05	1.9E-03	0.0E+00
TRICHLOROETHYLENE	2.3E+03	1.4E+05	2.3E+03	2.6E-04	4.3E-06	2.7E-04	0.0E+00
M-XYLENE	1.4E+07	2.7E+07	9.4E+06	7.0E-06	3.6E-06	1.1E-05	0.0E+00
O,P-XYLENE	1.4E+07	2.9E+07	9.5E+06	2.8E-06	1.4E-06	4.2E-06	0.0E+00
ARSENIC	2.2E+01	0.0E+00	2.2E+01	3.4E+01*	0.0E+00	3.4E+01*	0.0E+00
CADMIUM	4.5E+02	0.0E+00	4.5E+02	7.5E-02	0.0E+00	7.5E-02	0.0E+00
CHROMIUM	6.9E+01	0.0E+00	6.9E+01	9.2E-01*	0.0E+00	9.2E-01*	0.0E+00
COPPER	4.2E+05	0.0E+00	4.2E+05	3.6E-03	0.0E+00	3.6E-03	0.0E+00
LEAD	1.5E+04	0.0E+00	1.5E+04	6.3E-03	0.0E+00	6.3E-03	0.0E+00
MERCURY	3.3E+03	0.0E+00	3.3E+03	2.7E-03	0.0E+00	2.7E-03	0.0E+00
ZINC	2.0E+06	0.0E+00	2.0E+06	4.1E-04	0.0E+00	4.1E-04	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPPLV for this contaminant is considered to be equal to pure compound. The SPPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-10-3
EXPOSURE EVALUATIONS FOR CASUAL VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI OPN
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	
ALDRIN	1.5E+00	1.0E+06	1.5E+00	2.7E+04*	3.9E-02a	2.7E+04*	0.0E+00
ATRAZINE	4.1E+04	2.2E+11	4.1E+04	2.4E-04	4.5E-11	2.4E-04	0.0E+00
BENZENE	8.6E+02	8.1E+03	7.8E+02	2.3E-02	2.5E-03	2.6E-02	0.0E+00
BICYCLOHEPTADIENE	3.2E+05	4.0E+06	2.9E+05	2.2E-04	1.8E-05	2.4E-04	0.0E+00
CARBON TETRACHLORIDE	2.0E+02	1.9E+03	1.8E+02	1.0E+00*	1.1E-01*	1.1E+00*	0.0E+00
CHLOROACETIC ACID	1.7E+04	0.0E+00	1.7E+04	1.4E-02	0.0E+00	1.4E-02	0.0E+00
CHLOROBENZENE	1.6E+05	9.5E+05	1.4E+05	1.2E-04	2.1E-05	1.4E-04	0.0E+00
CHLOROFORM	4.0E+03	2.8E+04	3.5E+03	9.9E-02	1.4E-02	1.1E-01*	0.0E+00
CHLOROPHENYLMETHYL SULFONE	1.6E+05	1.1E+08	1.6E+05	1.8E-06	2.8E-09	1.8E-06	0.0E+00
PPDE	7.4E+01	1.9E+09	7.4E+01	9.5E-02	3.6E-09	9.5E-02	0.0E+00
PPDT	7.4E+01	1.0E+06	7.4E+01	6.8E+00*	1.8E-07a	6.8E+00*	0.0E+00
DIBROMOCHLOROPROPANE	1.8E+01	1.4E+03	1.8E+01	1.8E+03*	2.3E+01*	1.8E+03*	0.0E+00
1,2-DICHLOROETHANE	2.8E+02	4.5E+04	2.8E+02	1.4E-01*	8.9E-04	1.4E-01*	0.0E+00
DICYCLOPENTADIENE	5.4E+04	7.0E+04	3.1E+04	1.5E-04	1.1E-04	2.6E-04	0.0E+00
DIELDRIN	1.6E+00	1.0E+06	1.6E+00	1.3E+02*	4.3E-04a	1.3E+02*	0.0E+00
ETHYLBENZENE	8.3E+05	3.3E+07	8.1E+05	2.4E-05	6.0E-07	2.5E-05	0.0E+00
HEXACHLOROCYCLOPENTADIENE	1.7E+04	1.0E+06	1.6E+04	2.4E-01*	7.3E-03a	2.5E-01*	0.0E+00
ISODRIN	5.8E+02	1.0E+06	5.8E+02	1.7E+00*	1.3E-06a	1.7E+00*	0.0E+00
METHYLISOBUTYL KETONE	4.1E+05	2.8E+07	4.0E+05	1.2E-05	1.8E-07	1.2E-05	0.0E+00
METHYLENE CHLORIDE	3.3E+03	1.4E+04	2.6E+03	2.7E-03	6.6E-04	3.4E-03	0.0E+00
PARATHION	5.0E+04	1.1E+11	5.0E+04	6.1E-04	2.8E-10	6.1E-04	0.0E+00
SUPONA	1.2E+03	4.7E+11	1.2E+03	2.4E-02	6.3E-11	2.4E-02	0.0E+00
TETRACHLOROETHYLENE	5.1E+02	6.5E+04	5.1E+02	1.8E-01*	1.4E-03	1.8E-01*	0.0E+00
THIODIGLYCOL	3.3E+05	0.0E+00	3.3E+05	4.2E-05	0.0E+00	4.2E-05	0.0E+00
TOLUENE	2.5E+06	1.5E+08	2.4E+06	1.2E-04	2.0E-06	1.2E-04	0.0E+00
1,1,1-TRICHLOROETHANE	7.5E+05	4.2E+08	7.5E+05	6.7E-07	1.2E-09	6.7E-07	0.0E+00
1,1,2-TRICHLOROETHANE	4.3E+02	3.5E+04	4.3E+02	1.9E-03	2.3E-05	1.9E-03	0.0E+00
TRICHLOROETHYLENE	2.3E+03	1.4E+05	2.3E+03	2.6E-04	4.3E-06	2.7E-04	0.0E+00
M-XYLENE	1.4E+07	2.7E+07	9.4E+06	7.0E-06	3.6E-06	1.1E-05	0.0E+00
O,P-XYLENE	1.4E+07	2.9E+07	9.5E+06	2.8E-06	1.4E-06	4.2E-06	0.0E+00
ARSENIC	2.2E+01	0.0E+00	2.2E+01	3.4E+01*	0.0E+00	3.4E+01*	0.0E+00
CADMIUM	4.5E+02	0.0E+00	4.5E+02	7.5E-02	0.0E+00	7.5E-02	0.0E+00
CHROMIUM	6.9E+01	0.0E+00	6.9E+01	9.2E-01*	0.0E+00	9.2E-01*	0.0E+00
COPPER	4.2E+05	0.0E+00	4.2E+05	3.6E-03	0.0E+00	3.6E-03	0.0E+00
LEAD	1.5E+04	0.0E+00	1.5E+04	6.3E-03	0.0E+00	6.3E-03	0.0E+00
MERCURY	3.3E+03	0.0E+00	3.3E+03	2.7E-03	0.0E+00	2.7E-03	0.0E+00
ZINC	2.0E+06	0.0E+00	2.0E+06	4.1E-04	0.0E+00	4.1E-04	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPPLV for this contaminant is considered to be equal to pure compound. The SPPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-10-4

EXPOSURE EVALUATIONS FOR RECREATIONAL VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	OPN
ALDRIN	2.1E-01	6.8E+04	2.1E-01	1.9E+05*	5.9E-01*	1.9E+05*	0.0E+00
ATRAZINE	1.8E+04	3.4E+10	1.8E+04	5.7E-04	2.9E-10	5.7E-04	0.0E+00
BENZENE	1.2E+02	1.2E+03	1.1E+02	1.7E-01*	1.6E-02	1.8E-01*	0.0E+00
BICYCLOHEPTADIENE	1.4E+05	1.4E+06	1.2E+05	5.2E-04	4.9E-05	5.7E-04	0.0E+00
CARBON TETRACHLORIDE	2.7E+01	2.9E+02	2.5E+01	7.4E+00*	7.0E-01*	8.1E+00*	0.0E+00
CHLOROACETIC ACID	7.0E+03	0.0E+00	7.0E+03	3.3E-02	0.0E+00	3.3E-02	0.0E+00
CHLOROBENZENE	6.8E+04	3.4E+05	5.7E+04	2.9E-04	5.8E-05	3.5E-04	0.0E+00
CHLOROFORM	5.6E+02	4.4E+03	5.0E+02	7.1E-01*	9.1E-02	8.0E-01*	0.0E+00
CHLOROPHENYLMETHYL SULFONE	7.0E+04	1.7E+07	6.9E+04	4.3E-06	1.8E-08	4.3E-06	0.0E+00
PPDE	1.0E+01	1.3E+08	1.0E+01	6.9E-01*	5.4E-08	6.9E-01*	0.0E+00
PPDT	1.0E+01	1.0E+06	1.0E+01	4.9E+01*	2.6E-06a	4.9E+01*	0.0E+00
DIBROMOCHLOROPROPANE	2.5E+00	9.4E+01	2.4E+00	1.3E+04*	3.4E+02*	1.3E+04*	0.0E+00
1,2-DICHLOROETHANE	3.9E+01	7.0E+03	3.8E+01	1.0E+00*	5.7E-03	1.0E+00*	0.0E+00
DICYCLOPENTADIENE	1.8E+04	2.5E+04	1.1E+04	4.4E-04	3.2E-04	7.5E-04	0.0E+00
DIELDRIN	2.2E-01	1.0E+06	2.2E-01	9.2E+02*	6.4E-03a	9.2E+02*	0.0E+00
ETHYLBENZENE	3.5E+05	1.2E+07	3.4E+05	5.7E-05	1.7E-06	5.8E-05	0.0E+00
HEXACHLOROCYCLOPENTADIENE	5.7E+03	1.0E+06	5.3E+03	7.1E-01*	4.7E-02a	7.5E-01*	0.0E+00
ISODRIN	2.5E+02	1.0E+06	2.5E+02	4.1E+00*	8.4E-06a	4.1E+00*	0.0E+00
METHYLISOBUTYL KETONE	1.7E+05	1.0E+07	1.7E+05	2.9E-05	4.9E-07	2.9E-05	0.0E+00
METHYLENE CHLORIDE	4.5E+02	2.1E+03	3.7E+02	2.0E-02	4.3E-03	2.4E-02	0.0E+00
PARATHION	2.1E+04	1.7E+10	2.1E+04	1.4E-03	1.8E-09	1.4E-03	0.0E+00
SUPONA	5.3E+02	7.3E+10	5.3E+02	5.7E-02	4.1E-10	5.7E-02	0.0E+00
TETRACHLOROETHYLENE	7.1E+01	1.0E+04	7.1E+01	1.3E+00*	9.0E-03	1.3E+00*	0.0E+00
THIODIGLYCOL	1.4E+05	0.0E+00	1.4E+05	9.9E-05	0.0E+00	9.9E-05	0.0E+00
TOLUENE	1.1E+06	2.3E+07	1.0E+06	2.8E-04	1.3E-05	3.0E-04	0.0E+00
1,1,1-TRICHLOROETHANE	3.2E+05	1.5E+08	3.2E+05	1.6E-06	3.3E-09	1.6E-06	0.0E+00
1,1,2-TRICHLOROETHANE	6.0E+01	5.4E+03	5.9E+01	1.3E-02	1.5E-04	1.4E-02	0.0E+00
TRICHLOROETHYLENE	3.2E+02	2.1E+04	3.1E+02	1.9E-03	2.8E-05	1.9E-03	0.0E+00
M-XYLENE	5.8E+06	9.9E+06	3.7E+06	1.7E-05	1.0E-05	2.7E-05	0.0E+00
O,P-XYLENE	5.8E+06	1.0E+07	3.7E+06	6.9E-06	3.9E-06	1.1E-05	0.0E+00
ARSENIC	3.9E+00	0.0E+00	3.9E+00	1.9E+02*	0.0E+00	1.9E+02*	0.0E+00
CADMIUM	5.8E+01	0.0E+00	5.8E+01	5.9E-01*	0.0E+00	5.9E-01*	0.0E+00
CHROMIUM	8.8E+00	0.0E+00	8.8E+00	7.3E+00*	0.0E+00	7.3E+00*	0.0E+00
COPPER	2.5E+05	0.0E+00	2.5E+05	6.0E-03	0.0E+00	6.0E-03	0.0E+00
LEAD	9.2E+03	0.0E+00	9.2E+03	1.0E-02	0.0E+00	1.0E-02	0.0E+00
MERCURY	2.0E+03	0.0E+00	2.0E+03	4.5E-03	0.0E+00	4.5E-03	0.0E+00
ZINC	1.1E+06	0.0E+00	1.1E+06	7.8E-04	0.0E+00	7.8E-04	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPPLV for this contaminant is considered to be equal to pure compound. The SPPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-10-5
EXPOSURE EVALUATIONS FOR COMMERCIAL WORKERS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI ENC
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	
ALDRIN	1.9E+00	0.0E+00	1.9E+00	2.1E+04*	0.0E+00	2.1E+04*	NA
ATRAZINE	2.3E+04	0.0E+00	2.3E+04	4.4E-04	0.0E+00	4.4E-04	NA
BENZENE	1.1E+03	0.0E+00	1.1E+03	1.8E-02	0.0E+00	1.8E-02	NA
BICYCLOHEPTADIENE	1.8E+05	0.0E+00	1.8E+05	4.0E-04	0.0E+00	4.0E-04	NA
CARBON TETRACHLORIDE	2.5E+02	0.0E+00	2.5E+02	8.1E-01*	0.0E+00	8.1E-01*	NA
CHLOROACETIC ACID	9.2E+03	0.0E+00	9.2E+03	2.5E-02	0.0E+00	2.5E-02	NA
CHLOROBENZENE	8.8E+04	0.0E+00	8.8E+04	2.3E-04	0.0E+00	2.3E-04	NA
CHLOROFORM	5.1E+03	0.0E+00	5.1E+03	7.8E-02	0.0E+00	7.8E-02	NA
CHLOROPHENYLMETHYL SULFONE	9.1E+04	0.0E+00	9.1E+04	3.3E-06	0.0E+00	3.3E-06	NA
PPDE	9.3E+01	0.0E+00	9.3E+01	7.5E-02	0.0E+00	7.5E-02	NA
PPDOT	9.3E+01	0.0E+00	9.3E+01	5.4E+00*	0.0E+00	5.4E+00*	NA
DIBROMOCHLOROPROPANE	2.3E+01	0.0E+00	2.3E+01	1.4E+03*	0.0E+00	1.4E+03*	NA
1,2-DICHLOROETHANE	3.5E+02	0.0E+00	3.5E+02	1.1E-01*	0.0E+00	1.1E-01*	NA
DICYCLOPENTADIENE	1.7E+04	0.0E+00	1.7E+04	4.6E-04	0.0E+00	4.6E-04	NA
DIELDRIN	2.0E+00	0.0E+00	2.0E+00	1.0E+02*	0.0E+00	1.0E+02*	NA
ETHYLBENZENE	4.6E+05	0.0E+00	4.6E+05	4.4E-05	0.0E+00	4.4E-05	NA
HEXACHLOROCYCLOPENTADIENE	5.5E+03	0.0E+00	5.5E+03	7.3E-01*	0.0E+00	7.3E-01*	NA
ISODRIN	3.2E+02	0.0E+00	3.2E+02	3.1E+00*	0.0E+00	3.1E+00*	NA
METHYLISOBUTYL KETONE	2.2E+05	0.0E+00	2.2E+05	2.2E-05	0.0E+00	2.2E-05	NA
METHYLENE CHLORIDE	4.1E+03	0.0E+00	4.1E+03	2.2E-03	0.0E+00	2.2E-03	NA
PARATHION	2.7E+04	0.0E+00	2.7E+04	1.1E-03	0.0E+00	1.1E-03	NA
SUPONA	6.9E+02	0.0E+00	6.9E+02	4.4E-02	0.0E+00	4.4E-02	NA
TETRACHLOROETHYLENE	6.5E+02	0.0E+00	6.5E+02	1.4E-01*	0.0E+00	1.4E-01*	NA
THIODIGLYCOL	1.8E+05	0.0E+00	1.8E+05	7.6E-05	0.0E+00	7.6E-05	NA
TOLUENE	1.4E+06	0.0E+00	1.4E+06	2.2E-04	0.0E+00	2.2E-04	NA
1,1,1-TRICHLOROETHANE	4.2E+05	0.0E+00	4.2E+05	1.2E-06	0.0E+00	1.2E-06	NA
1,1,2-TRICHLOROETHANE	5.5E+02	0.0E+00	5.5E+02	1.5E-03	0.0E+00	1.5E-03	NA
TRICHLOROETHYLENE	2.9E+03	0.0E+00	2.9E+03	2.1E-04	0.0E+00	2.1E-04	NA
M-XYLENE	7.0E+06	0.0E+00	7.0E+06	1.4E-05	0.0E+00	1.4E-05	NA
O,P-XYLENE	7.0E+06	0.0E+00	7.0E+06	5.7E-06	0.0E+00	5.7E-06	NA
ARSENIC	2.0E+01	0.0E+00	2.0E+01	3.7E+01*	0.0E+00	3.7E+01*	NA
CADMIUM	3.6E+02	0.0E+00	3.6E+02	9.5E-02	0.0E+00	9.5E-02	NA
CHROMIUM	5.5E+01	0.0E+00	5.5E+01	1.2E+00*	0.0E+00	1.2E+00*	NA
COPPER	1.8E+05	0.0E+00	1.8E+05	8.5E-03	0.0E+00	8.5E-03	NA
LEAD	6.5E+03	0.0E+00	6.5E+03	1.5E-02	0.0E+00	1.5E-02	NA
MERCURY	1.4E+03	0.0E+00	1.4E+03	6.3E-03	0.0E+00	6.3E-03	NA
ZINC	7.8E+05	0.0E+00	7.8E+05	1.0E-03	0.0E+00	1.0E-03	NA

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-10-6
EXPOSURE EVALUATIONS FOR INDUSTRIAL WORKERS

CONTAMINANT	DIRECT	INDIRECT		CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI	
	PPLV (mg/kg)	OSVI (mg/kg)	ESVI (mg/kg)	PPLV (mg/kg)	EI	EI	EI	OPN	ENC
ALDRIN	1.2E-01	1.4E+05	0.0E+00	1.2E-01	3.4E+05*	2.9E-01*	3.4E+05*	0.0E+00	NA
ATRAZINE	4.2E+03	3.0E+10	0.0E+00	4.2E+03	2.4E-03	3.4E-10	2.4E-03	0.0E+00	NA
BENZENE	6.7E+01	1.1E+03	0.0E+00	6.3E+01	3.0E-01*	1.9E-02	3.2E-01*	0.0E+00	NA
BICYCLOHEPTADIENE	3.3E+04	5.3E+05	0.0E+00	3.1E+04	2.1E-03	1.3E-04	2.3E-03	0.0E+00	NA
CARBON TETRACHLORIDE	1.5E+01	2.5E+02	0.0E+00	1.4E+01	1.3E+01*	8.1E-01*	1.4E+01*	0.0E+00	NA
CHLOROACETIC ACID	1.7E+03	0.0E+00	0.0E+00	1.7E+03	1.4E-01*	0.0E+00	1.4E-01*	0.0E+00	NA
CHLOROBENZENE	1.5E+04	1.3E+05	0.0E+00	1.3E+04	1.3E-03	1.6E-04	1.5E-03	0.0E+00	NA
CHLOROFORM	3.1E+02	3.8E+03	0.0E+00	2.9E+02	1.3E+00*	1.1E-01*	1.4E+00*	0.0E+00	NA
CHLOROPHENYLMETHYL SULFONE	1.7E+04	1.4E+07	0.0E+00	1.7E+04	1.8E-05	2.1E-08	1.8E-05	0.0E+00	NA
PPDDE	5.7E+00	2.6E+08	0.0E+00	5.7E+00	1.2E+00*	2.7E-08	1.2E+00*	0.0E+00	NA
PPDDT	5.7E+00	1.0E+06	1.0E+06	5.7E+00	8.7E+01*	1.3E-06a	8.7E+01*	0.0E+00	NA
DIBROMOCHLOROPROPANE	1.4E+00	1.9E+02	0.0E+00	1.4E+00	2.3E+04*	1.7E+02*	2.3E+04*	0.0E+00	NA
1,2-DICHLOROETHANE	2.2E+01	6.0E+03	0.0E+00	2.2E+01	1.8E+00*	6.7E-03	1.8E+00*	0.0E+00	NA
DICYCLOPENTADIENE	1.2E+03	9.4E+03	0.0E+00	1.0E+03	6.8E-03	8.5E-04	7.7E-03	0.0E+00	NA
DIELDRIN	1.2E-01	1.0E+06	1.0E+06	1.2E-01	1.6E+03*	3.2E-03a	1.6E+03*	0.0E+00	NA
ETHYLBENZENE	8.5E+04	4.5E+06	0.0E+00	8.3E+04	2.4E-04	4.5E-06	2.4E-04	0.0E+00	NA
HEXACHLOROCYCLOPENTADIENE	3.8E+02	1.0E+06	1.0E+06	3.8E+02	1.0E+01*	5.4E-02a	1.0E+01*	0.0E+00	NA
ISODRIN	5.9E+01	1.0E+06	1.0E+06	5.9E+01	1.7E+01*	9.8E-06a	1.7E+01*	0.0E+00	NA
METHYL ISOBUTYL KETONE	4.0E+04	3.7E+06	0.0E+00	3.9E+04	1.3E-04	1.3E-06	1.3E-04	0.0E+00	NA
METHYLENE CHLORIDE	2.5E+02	1.8E+03	0.0E+00	2.2E+02	3.6E-02	5.0E-03	4.1E-02	0.0E+00	NA
THION	5.1E+03	1.4E+10	0.0E+00	5.1E+03	5.9E-03	2.1E-09	5.9E-03	0.0E+00	NA
SOPONA	1.3E+02	6.3E+10	0.0E+00	1.3E+02	2.4E-01*	4.8E-10	2.4E-01*	0.0E+00	NA
TETRACHLOROETHYLENE	4.1E+01	8.6E+03	0.0E+00	4.1E+01	2.2E+00*	1.0E-02	2.2E+00*	0.0E+00	NA
THIODIGLYCOL	3.4E+04	0.0E+00	0.0E+00	3.4E+04	4.1E-04	0.0E+00	4.1E-04	0.0E+00	NA
TOLUENE	2.6E+05	2.0E+07	0.0E+00	2.6E+05	1.2E-03	1.5E-05	1.2E-03	0.0E+00	NA
1,1,1-TRICHLOROETHANE	7.8E+04	5.6E+07	0.0E+00	7.8E+04	6.4E-06	8.9E-09	6.4E-06	0.0E+00	NA
1,1,2-TRICHLOROETHANE	3.4E+01	4.6E+03	0.0E+00	3.3E+01	2.4E-02	1.7E-04	2.4E-02	0.0E+00	NA
TRICHLOROETHYLENE	1.8E+02	1.8E+04	0.0E+00	1.7E+02	3.4E-03	3.3E-05	3.4E-03	0.0E+00	NA
M-XYLENE	8.8E+05	3.7E+06	0.0E+00	7.1E+05	1.1E-04	2.7E-05	1.4E-04	0.0E+00	NA
O,P-XYLENE	8.8E+05	3.8E+06	0.0E+00	7.2E+05	4.5E-05	1.0E-05	5.6E-05	0.0E+00	NA
ARSENIC	1.6E+00	0.0E+00	0.0E+00	1.6E+00	4.6E+02*	0.0E+00	4.6E+02*	0.0E+00	NA
CADMIUM	7.6E+00	0.0E+00	0.0E+00	7.6E+00	4.5E+00*	0.0E+00	4.5E+00*	0.0E+00	NA
CHROMIUM	1.1E+00	0.0E+00	0.0E+00	1.1E+00	5.6E+01*	0.0E+00	5.6E+01*	0.0E+00	NA
COPPER	5.7E+04	0.0E+00	0.0E+00	5.7E+04	2.6E-02	0.0E+00	2.6E-02	0.0E+00	NA
LEAD	2.2E+03	0.0E+00	0.0E+00	2.2E+03	4.4E-02	0.0E+00	4.4E-02	0.0E+00	NA
MERCURY	4.6E+02	0.0E+00	0.0E+00	4.6E+02	1.9E-02	0.0E+00	1.9E-02	0.0E+00	NA
ZINC	1.4E+05	0.0E+00	0.0E+00	1.4E+05	5.9E-03	0.0E+00	5.9E-03	0.0E+00	NA

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPPLV for this contaminant is considered to be equal to pure compound. The SPPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

2.32 SITE SPSA-11: SANITARY SEWER SYSTEM (formerly Sanitary Sewer-South Plants; EBASCO, 1988u/RIC 88196R06)

2.32.1 Site-Specific Considerations

Figures SPSA-11-1 and SPSA-11-2 and Table SPSA-11-1 depict the target contaminants for Site SPSA-11. Borings 1 through 7 from Trench SS03; 1 through 9 from Trench SS04; and 1 through 4 from Trench MKE17 were included in this exposure assessment, consistent with the South Plants SAR. The historical search conducted under the contamination assessment revealed that previous investigations detected the presence of bicycloheptadiene, benzene, chlorophenylmethyl sulfide, chlorophenylmethyl sulfone, dibromochloropropane, dicyclopentadiene, diisopropylmethyl phosphonate, Endrin, tetrachloroethylene, toluene, trichloroethylene, Vapona, lead, and mercury (EBASCO, 1988u/RIC 88196R06); however, they were not detected in soil during the soil investigations. Since this site is a sewer line, many of the chemicals from the RMA target contaminant list were suspected to be present in Site SPSA-11 (EBASCO, 1988u/RIC 88196R06).

2.32.2 Spatial Distribution of Measured Contaminant Concentrations

The locations and concentrations of the target contaminants that were detected in Site SPSA-11 are shown in Figure SPSA-11-1 and SPSA-11-2. Table SPSA-11-1 summarizes the maximum concentrations of contaminants measured in soil above indicator levels for the ICP metals, arsenic, and mercury and CRLs for organic contaminants from the Phase I and Phase II investigations. The boring number and depth where the maximum value was observed are shown. Data were included for ICP metals, arsenic, and mercury from 0-10 ft only because direct soil exposure below 10 ft is assumed to be negligible (see Volume VI-a). Table SPSA-11-1 is not separated into Horizon 1 and Horizon 2 since the borings are located in trenches. No groundwater data table was included for Site SPSA-11 since this site is a sewer line (see Volume VI-A).

2.32.3 Site Exposure Summary

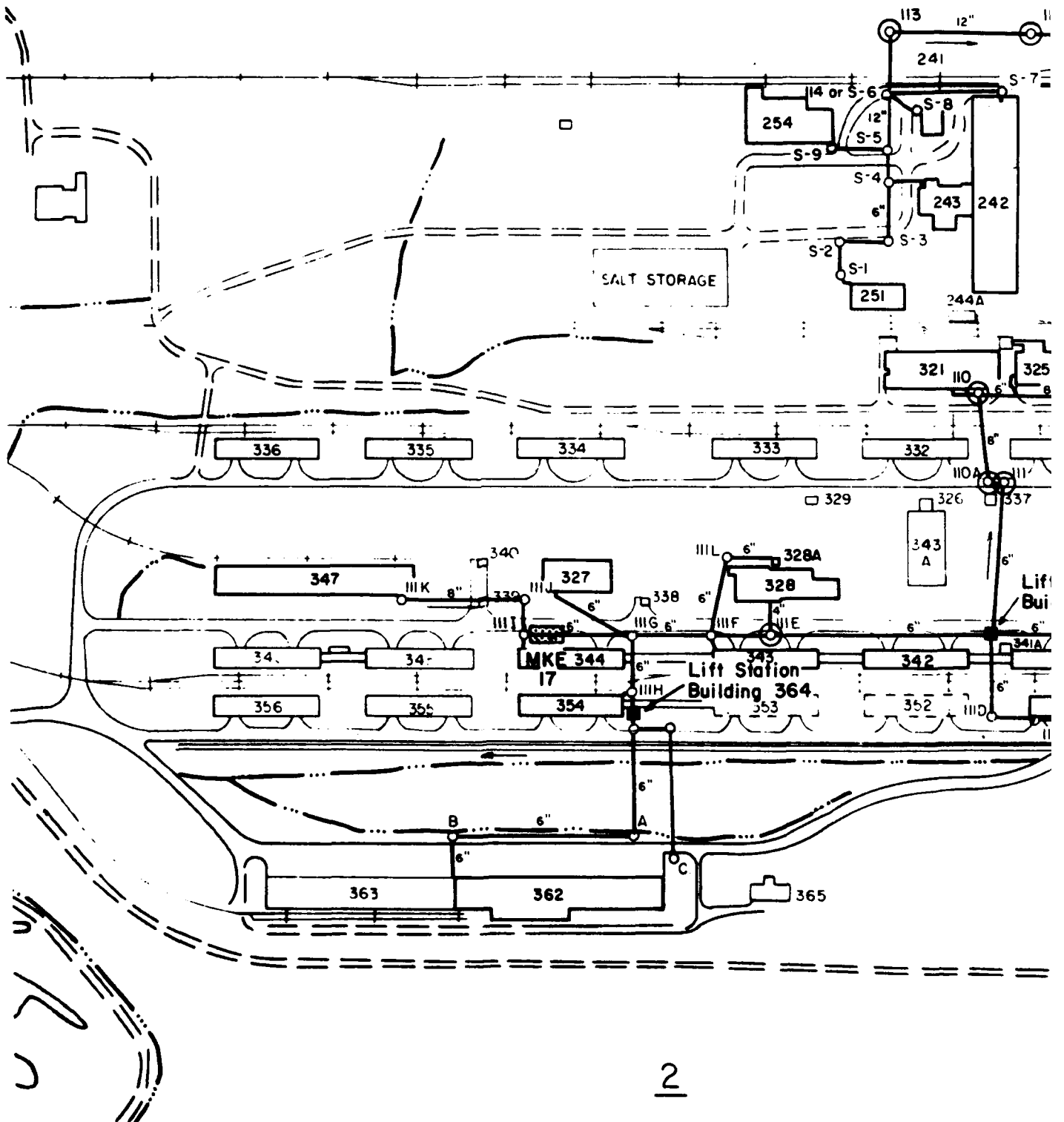
Tables SPSA-11-2 through SPSA-11-6 present Draft PPLVs and EIs for each site contaminant. The COCs are summarized below for each exposed population and with the critical exposure pathway identified.

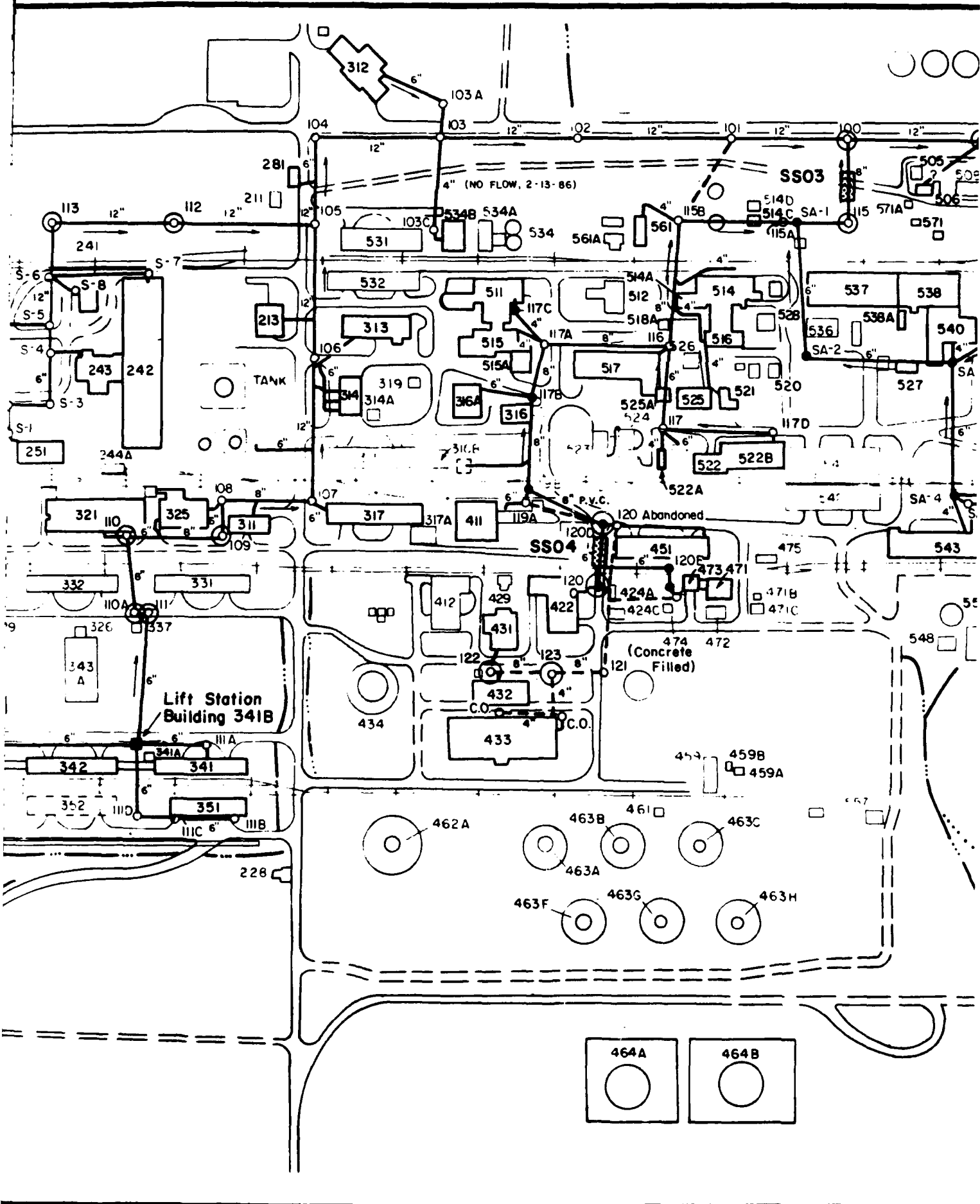
Contaminants of Concern	Regulated Visitor	Casual Visitor	Recreational Visitor	Commercial Worker	Industrial Worker
Aldrin	Direct	Direct	Direct	Direct	Direct
Dieldrin	Direct	Direct	Direct	Direct	Direct

Note: Direct exposure pathways for soils include soil ingestion, suspended particulate inhalation, and dermal contact.

The results of the soil exposure summary indicate that exposure to contamination from the direct pathways are the primary contributors to the exceedance of the cumulative PPLVs. Site SPSA-11 is designated as a Priority 1 site, based on the most sensitive exposed population PPLV (i.e., the industrial worker).

DECEMBER 7th AVENUE





○○○

103 A

SS03

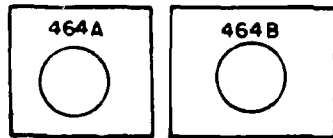
4" (NO FLOW, 2-13-86)

TANK



Lift Station Building 341B

SS04


(Concrete Filled)



LEGEND


-  Building, Existing
-  Building, Removed

 Road, Paved

 Road, Unpaved


 Section Number

 Railroad

 Sewer Main, with S
Arrow Indicates Dir
Flow


 Sewer Main, Aband

SS03  Sewer Main Excavc

 Cleanout

 Brick Manhole, w

SA-1  Precast Manhole, w

 Manhole Inspected
Survey

 Pumping Station

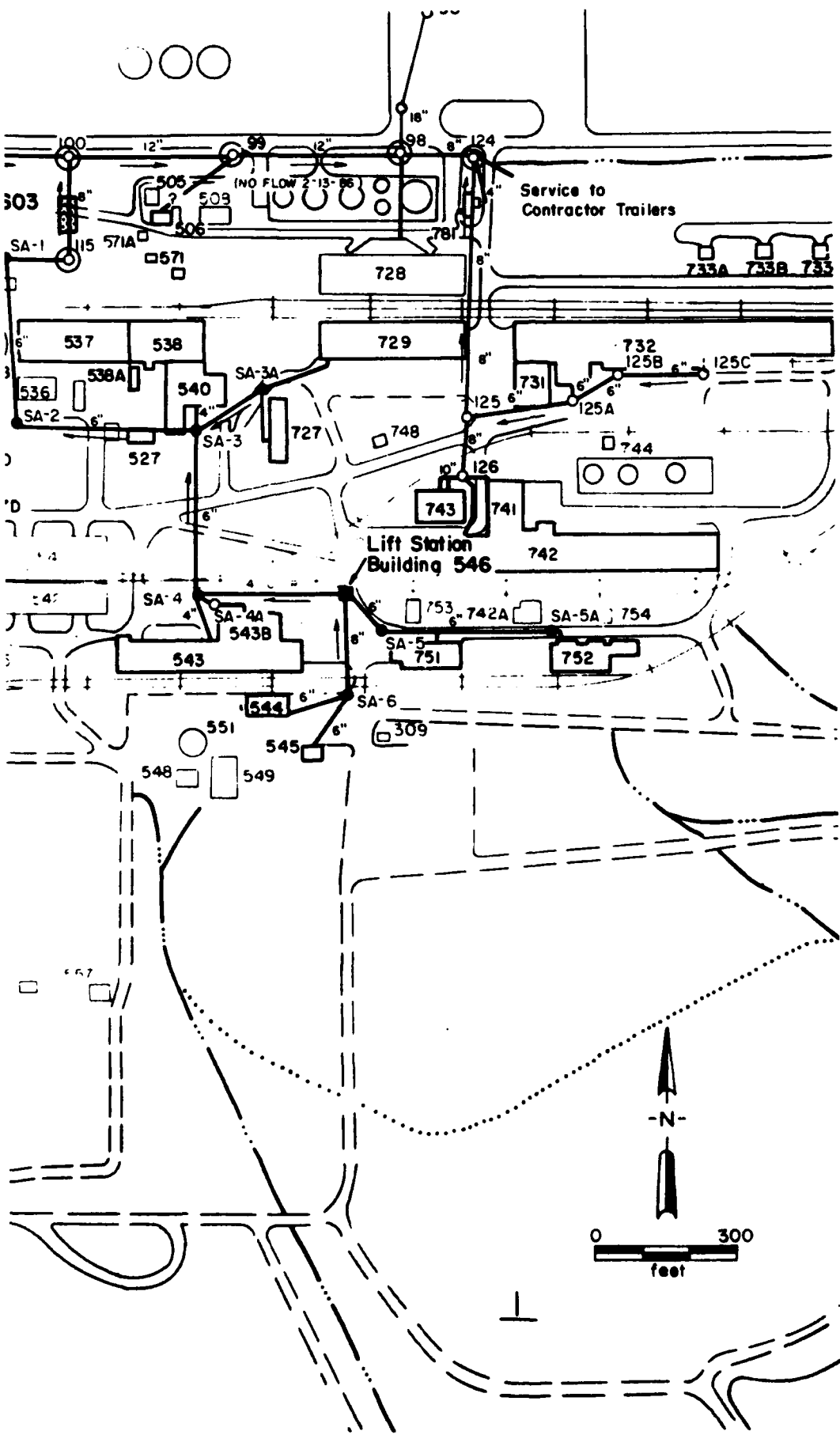
 Stream or Ditch

 Stream or Ditch,

After: COE 1984, COE 19
COE 1980b, and MK

Prepared for:
Program Manager's Office
Rocky Mountain Arsenal Cl
Aberdeen Proving Ground,

FIGURE SPSA-II-1
Phase I and Phase II Analy
Detected Within or Above
Indicator Levels
Rocky Mountain Arsenal
Prepared by: Ebasco Services



LEGEND

 Building, Existing


 Building, Removed

 Road, Paved

 Road, Unpaved


36 Section Number

 Railroad

 8" Sewer Main, with Size
Arrow Indicates Direction of Flow


 Sewer Main, Abandoned

SS03  Sewer Main Excavation Site

C.O.  Cleanout

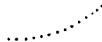
 Brick Manhole, with Number

SA-1  Precast Manhole, with Number

 Manhole Inspected During Survey

 Pumping Station

 Stream or Ditch

 Stream or Ditch, Abandoned

After: COE 1984, COE 1980a,
COE 1980b, and MKE 1986.

Prepared for:

Program Manager's Office for
Rocky Mountain Arsenal Cleanup
Aberdeen Proving Ground, Maryland

FIGURE SPSA-II-1

Phase I and Phase II Analytes
Detected Within or Above
Indicator Levels
Rocky Mountain Arsenal
Prepared by: Ebasco Services Incorporated

Trench SS03
Bore 1
12-13 CHCL3 5

Trench SS03
Bore 2
12-13 CHCL3 4

Trench SS03
Bore 3
12-13 BIL

Trench SS03
Bore 4
12-13 BIL

Trench SS03
Bore 5
12-13 BIL

Trench SS03
Bore 6
12.5-13.5 CHCL3 1
16-17 As 3.1
21-22 As 3.3

Trench SS03
Bore 7
12-13 CHCL3 6
17-18 CHCL3 20

Trench SS04
Bore 1
7.5-8.5 Aldnn 7
Cu 37
Zn 84

Trench SS04
Bore 2
7.5-8.5 Cu 31
Zn 83

Trench SS04
Bore 3
7.5-8.5 Aldnn 1
Cu 38
Zn 110

Trench SS04
Bore 4
7.5-8.5 Dieldnn 0.3
Cu 33
Zn 85

Trench SS04
Bore 5
7.5-8.5 Cu 37
Zn 110

Trench SS04
Bore 6
7.5-8.5 Cu 23
Zn 82

Trench SS04
Bore 7
7.5-8.5 Aldnn 2
Cu 39
Zn 99

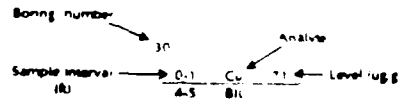
Trench SS04
Bore 8
7.5-8.5 Cu 52
Zn 75
12.5-13.5 Cu 40
Zn 110
16.5-17.5 As 5
Cu 35
Zn 84

Trench SS04
Bore 9
7.5-8.5 As 3.2
Cu 38
11.5-12.5 Zn 88
Cu 34
16.5-17.5 Zn 82
Cu 38
Zn 94

Trench MKE 17
Bore 1
6.8-7.5 BIL

Trench MKE 17
Bore 2
Bore 3
Bore 4
6.7-7.8 BIL

Legend



CHCL3 Chloroform
As Arsenic
Cu Copper
Zn Zinc
BIL Below indicator level

Prepared for:

Program Manager's Office for
Rocky Mountain Arsenal Cleanup
Aberdeen Proving Ground, Maryland

FIGURE SPSA-11-2

Phase I and Phase II Analytes Detected
Within or Above Indicator Levels

Rocky Mountain Arsenal
Prepared by Ebasco Services Incorporated

TABLE SPSA-11-1
 SOIL CONTAMINANT CONCENTRATIONS
 FOR SITE SPSA-11

Contaminant	Max. (ug/g)	Depth (ft)	Sampling Area	Boring Number
Aldrin	7	7.5-8.5	SS04	1
Chloroform	20	17-18	SS03	7
Dieldrin	0.3	7.5-8.5	SS04	4
Copper	52	7.5-8.5	SS04	8
Zinc	110	7.5-8.5	SS04	3
		7.5-8.5	SS04	5
		12.5-13.5	SS04	8

2-342

SPSA
 Max.
 ug/g
 ft

South Plants Study Area
 Maximum
 microgram per gram
 foot/feet

SPSA-11-2
EXPOSURE EVALUATIONS FOR REGULATED VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI OPN
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	
ALDRIN	1.5E+00	5.0E+06	1.5E+00	4.7E+00*	1.4E-06	4.7E+00*	0.0E+00
CHLOROFORM	4.0E+03	5.3E+03	2.3E+03	4.9E-03	3.8E-03	8.7E-03	0.0E+00
DIELDRIN	1.6E+00	4.2E+06	1.6E+00	1.9E-01*	7.1E-08	1.9E-01*	0.0E+00
COPPER	4.2E+05	0.0E+00	4.2E+05	1.2E-04	0.0E+00	1.2E-04	0.0E+00
ZINC	2.0E+06	0.0E+00	2.0E+06	5.5E-05	0.0E+00	5.5E-05	0.0E+00

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-11-3
EXPOSURE EVALUATIONS FOR CASUAL VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI EI	EI EI	EI EI	OPN
ALDRIN	1.5E+00	5.0E+06	1.5E+00	4.7E+00*	1.4E-06	4.7E+00*	0.0E+00
CHLOROFORM	4.0E+03	5.3E+03	2.3E+03	4.9E-03	3.8E-03	8.7E-03	0.0E+00
DIELDRIN	1.6E+00	4.2E+06	1.6E+00	1.9E-01*	7.1E-08	1.9E-01*	0.0E+00
COPPER	4.2E+05	0.0E+00	4.2E+05	1.2E-04	0.0E+00	1.2E-04	0.0E+00
ZINC	2.0E+06	0.0E+00	2.0E+06	5.5E-05	0.0E+00	5.5E-05	0.0E+00

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-11-4

EXPOSURE EVALUATIONS FOR RECREATIONAL VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI EI	EI EI	EI EI	OPN
ALDRIN	2.1E-01	3.3E+05	2.1E-01	3.4E+01*	2.1E-05	3.4E+01*	0.0E+00
CHLOROFORM	5.6E+02	8.2E+02	3.3E+02	3.6E-02	2.4E-02	6.0E-02	0.0E+00
DIELDRIN	2.2E-01	2.8E+05	2.2E-01	1.4E+00*	1.1E-06	1.4E+00*	0.0E+00
COPPER	2.5E+05	0.0E+00	2.5E+05	2.1E-04	0.0E+00	2.1E-04	0.0E+00
ZINC	1.1E+06	0.0E+00	1.1E+06	1.0E-04	0.0E+00	1.0E-04	0.0E+00

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-11-5
EXPOSURE EVALUATIONS FOR COMMERCIAL WORKERS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI ENC
ALDRIN	1.9E+00	0.0E+00	1.9E+00	3.7E+00*	0.0E+00	3.7E+00*	NA
CHLOROFORM	5.1E+03	0.0E+00	5.1E+03	3.9E-03	0.0E+00	3.9E-03	NA
DIELDRIN	2.0E+00	0.0E+00	2.0E+00	1.5E-01*	0.0E+00	1.5E-01*	NA
COPPER	1.8E+05	0.0E+00	1.8E+05	3.0E-04	0.0E+00	3.0E-04	NA
ZINC	7.8E+05	0.0E+00	7.8E+05	1.4E-04	0.0E+00	1.4E-04	NA

*: EI is equal to or exceeds 1.0E-01

SPSA-11-6
EXPOSURE EVALUATIONS FOR INDUSTRIAL WORKERS

CONTAMINANT	DIRECT	INDIRECT		CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI	
	PPLV (mg/kg)	OSVI (mg/kg)	ESVI (mg/kg)	PPLV (mg/kg)	EI	EI	EI	OPN	ENC
ALDRIN	1.2E-01	6.7E+05	0.0E+00	1.2E-01	6.0E+01*	1.1E-05	6.0E+01*	0.0E+00	NA
CHLOROFORM	3.1E+02	7.0E+02	0.0E+00	2.2E+02	6.4E-02	2.8E-02	9.3E-02	0.0E+00	NA
DIELDRIN	1.2E-01	5.7E+05	0.0E+00	1.2E-01	2.5E+00*	5.3E-07	2.5E+00*	0.0E+00	NA
COPPER	5.7E+04	0.0E+00	0.0E+00	5.7E+04	9.1E-04	0.0E+00	9.1E-04	0.0E+00	NA
ZINC	1.4E+05	0.0E+00	0.0E+00	1.4E+05	7.9E-04	0.0E+00	7.9E-04	0.0E+00	NA

*: EI is equal to or exceeds 1.0E-01

2.33 SITE SPSA-12: PROCESS WATER SYSTEM (formerly Process Water System; EBASCO, 1988w/RIC 88256R04)

2.33.1 Site-Specific Considerations

Figure SPSA-12-1 through SPSA-12-4 and Table SPSA-12-1 depict the target contaminants for Site SPSA-12. Fire hydrant 85W/Borings 1 through 8, Trench PW0/Borings 1 through 5 and 7 through 10, and Trench PW02/Borings 1 through 8. The history search conducted under the contamination assessment revealed that the process water system was used for water circulation only and not for chemical transportation. However, this system was historically contaminated with pesticide residues. According to site history, no other chemicals from the RMA target contaminant list were suspected to be present in Site SPSA-12 (EBASCO, 1988w/RIC 88256R04).

2.33.2 Spatial Distribution of Measured Contaminant Concentrations

The locations and concentrations of the target contaminants that were detected in Site SPSA-12 are shown in Figures SPSA-12-1 through SPSA-12-4. The following contaminants were not included in the figure since they were not considered a target contaminant during the Phase I and Phase II investigations: pyrene or fluoranthene occurring in Trench PW01 in Boring 3 (0-1 ft) and Boring 5 (0-1 ft). Although not shown in this figure, these chemicals were included in the South Plants SAR and in this exposure assessment because they passed through the screening process performed in the RMA Chemical Index (EBASCO, 1988c/RIC 88357R01).

Table SPSA-12-1 summarizes the maximum concentrations of contaminants measured in soil above indicator levels for the ICP metals, arsenic, and mercury and CRLs for organic contaminants from the Phase I and Phase II investigations. The boring number and depth where the maximum value was observed are shown. No data were included for ICP metals, arsenic, mercury in Horizon 2 because direct soil exposure below 10 ft is assumed to be negligible (see Volume VI-A). No groundwater data table was included for Site SPSA-12 since this site is a sewer line (see Volume VI-A).

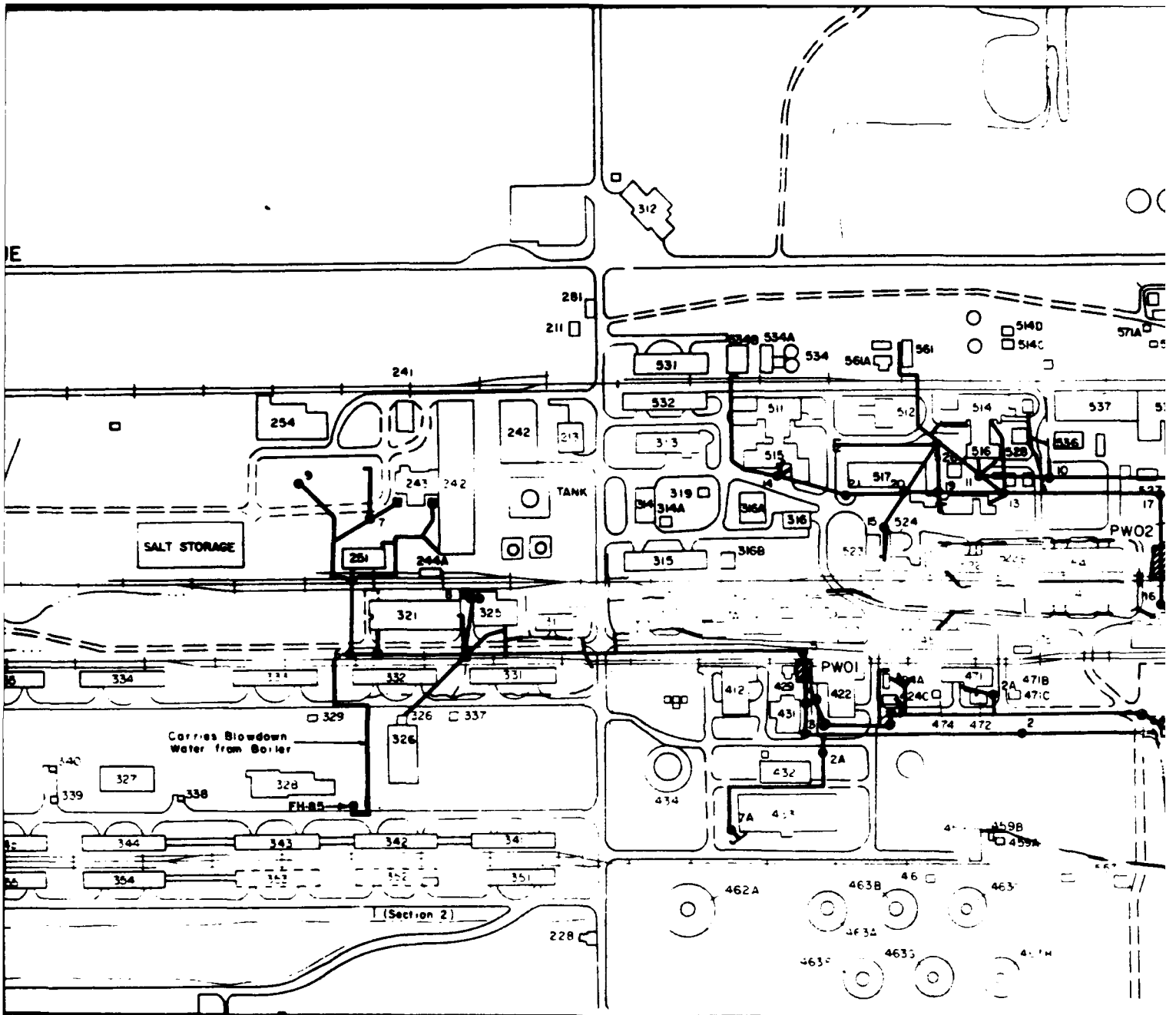
2.33.3 Site Exposure Summary

Tables SPSA-12-2 through SPSA-12-6 present Draft PPLVs and EIs for each site contaminant. The COCs are summarized below for each exposed population and with the critical exposure pathway identified.

Contaminants of Concern	Regulated Visitor	Casual Visitor	Recreational Visitor	Commercial Worker	Industrial Worker
Aldrin	Direct	Direct	Direct	Direct	Direct
Dieldrin	Direct	Direct	Direct	Direct	Direct

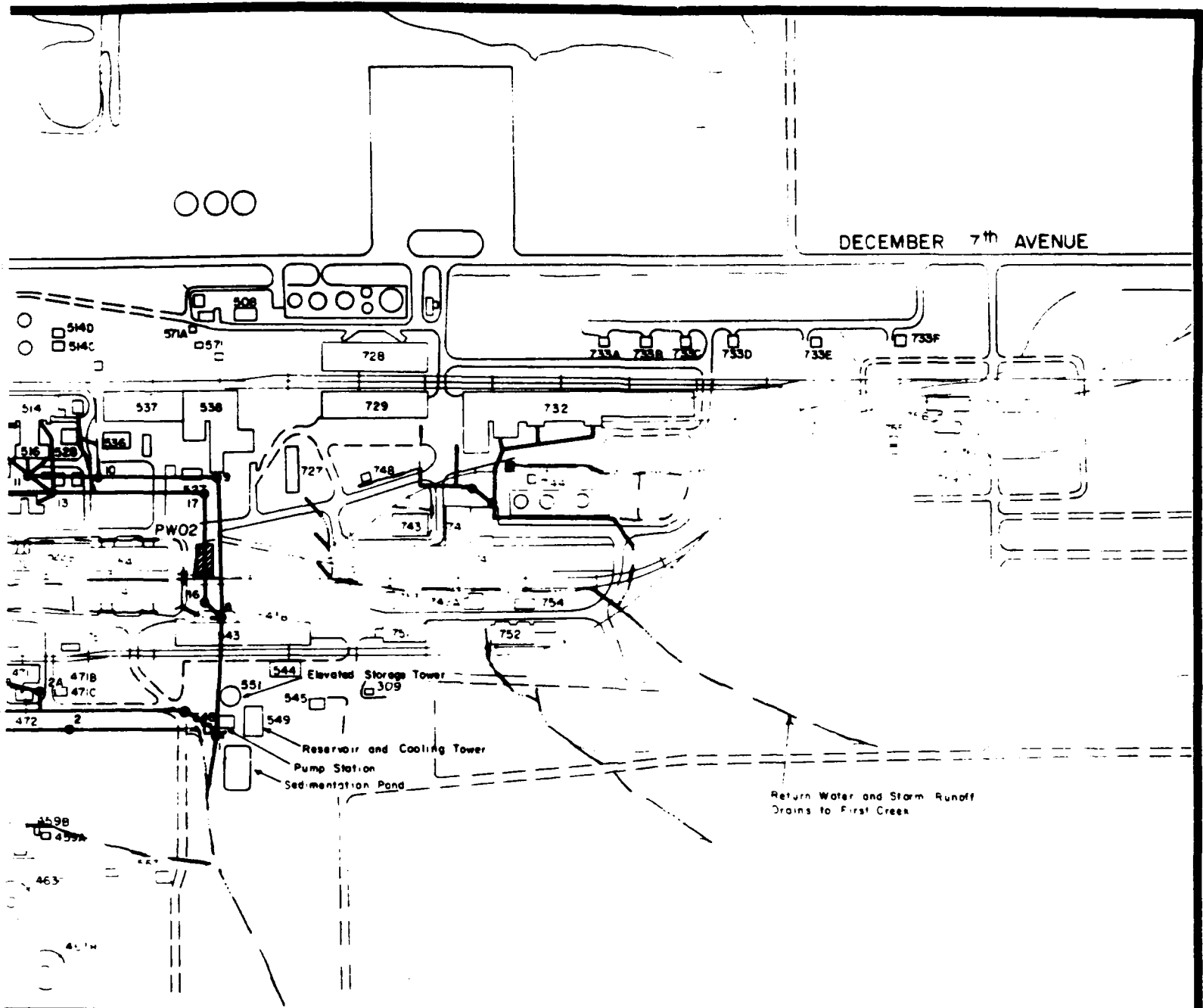
Note: Direct exposure pathways for soils include soil ingestion, suspended particulate inhalation, and dermal contact.

The results of the soil exposure summary indicate that exposure to contamination from the direct pathways are the primary contributors to the exceedance of the cumulative PPLVs. Site SPSA-12 is designated as a Priority 1 site, based on the most sensitive exposed population PPLV (i.e., the industrial worker).



Legend

- | | | | |
|----------------|-----------------------------|-------------------|----------------------------|
| ⊙ ² | Boring Location with Number | --- | Process Water Return Ditch |
| ■ | Catch Basin | ▨ ^{PW01} | Trench with Number |
| ● ² | Manhole with number | FH | Fire Hydrant |
| — | Process Water Return Pipe | | |



n Ditch

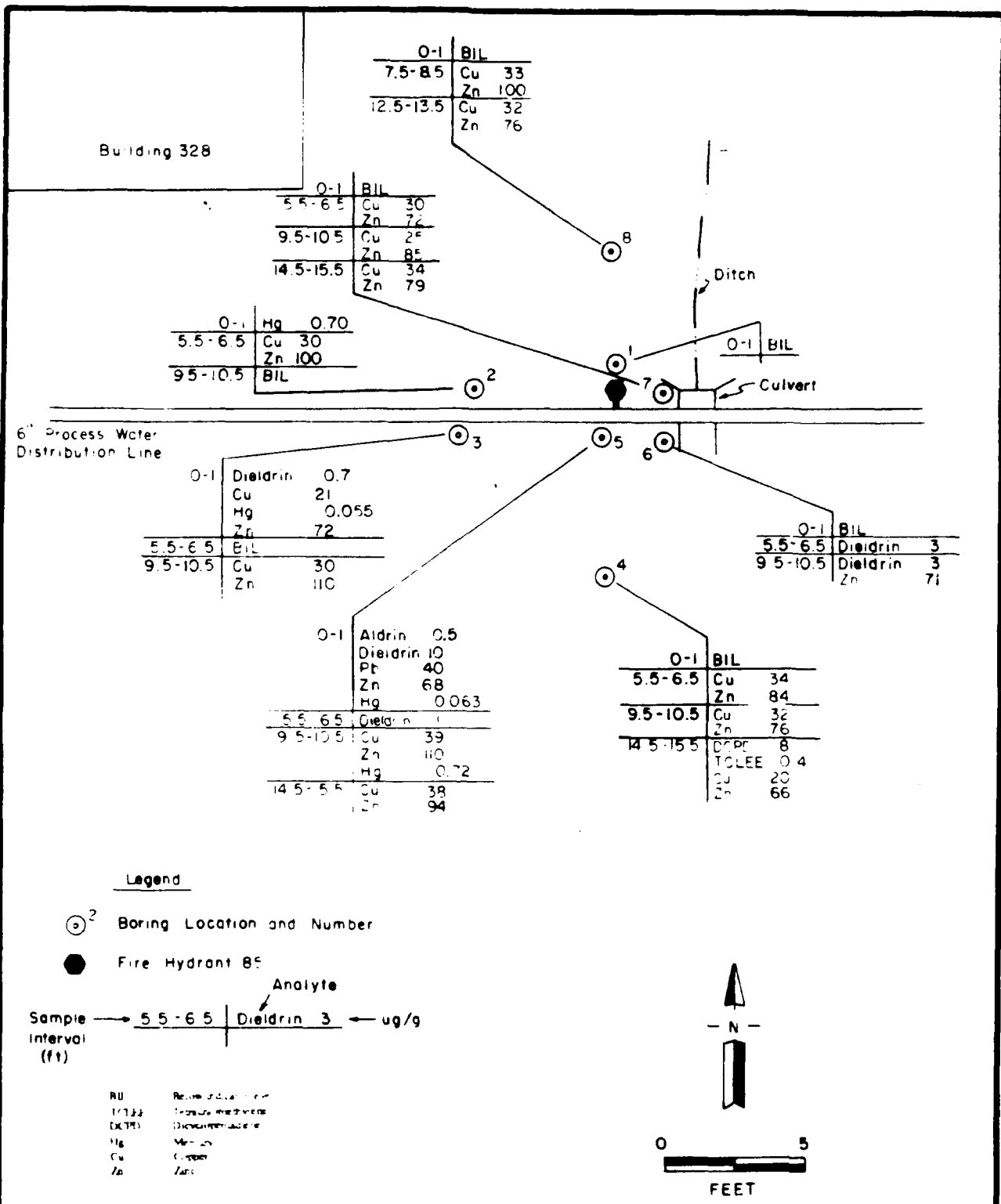
Prepared for :

Program Manager's Office for
 Rocky Mountain Arsenal Cleanup
 Aberdeen Proving Ground, Maryland

FIGURE SPSA-12-1

Phase I and Phase II Analytes Detected
 Within or Above Indicator Levels

Rocky Mountain Arsenal
 Prepared by: Ebasco Services Incorporated

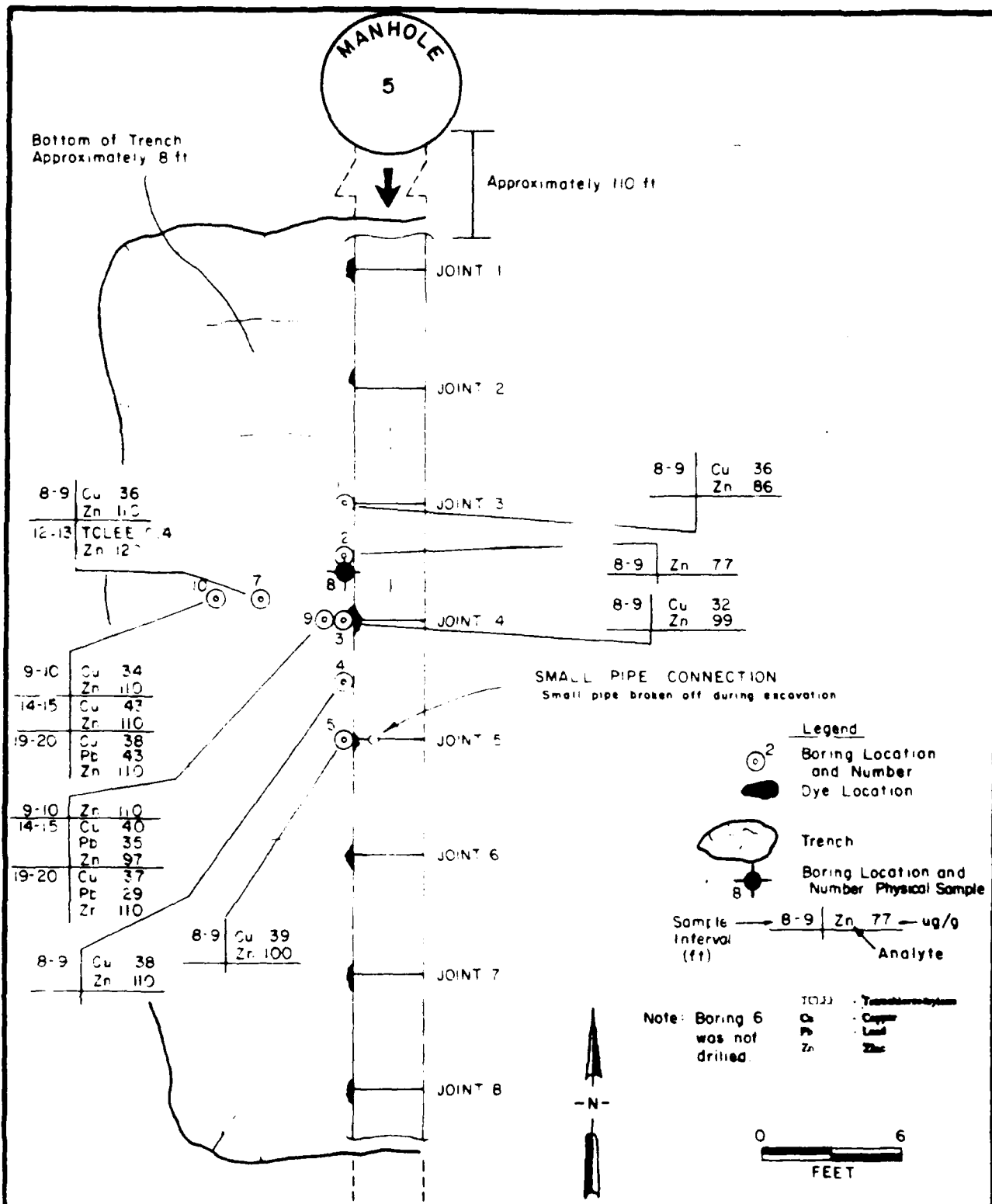


Prepared for:

Program Manager's Office for
Rocky Mountain Arsenal Cleanup
Aberdeen Proving Ground, Maryland

FIGURE SPSA-12-2

Phase I and Phase II Analytes Detected
Within or Above Indicator Levels
Rocky Mountain Arsenal
Prepared by Ebasco Services Incorporated



Prepared for:

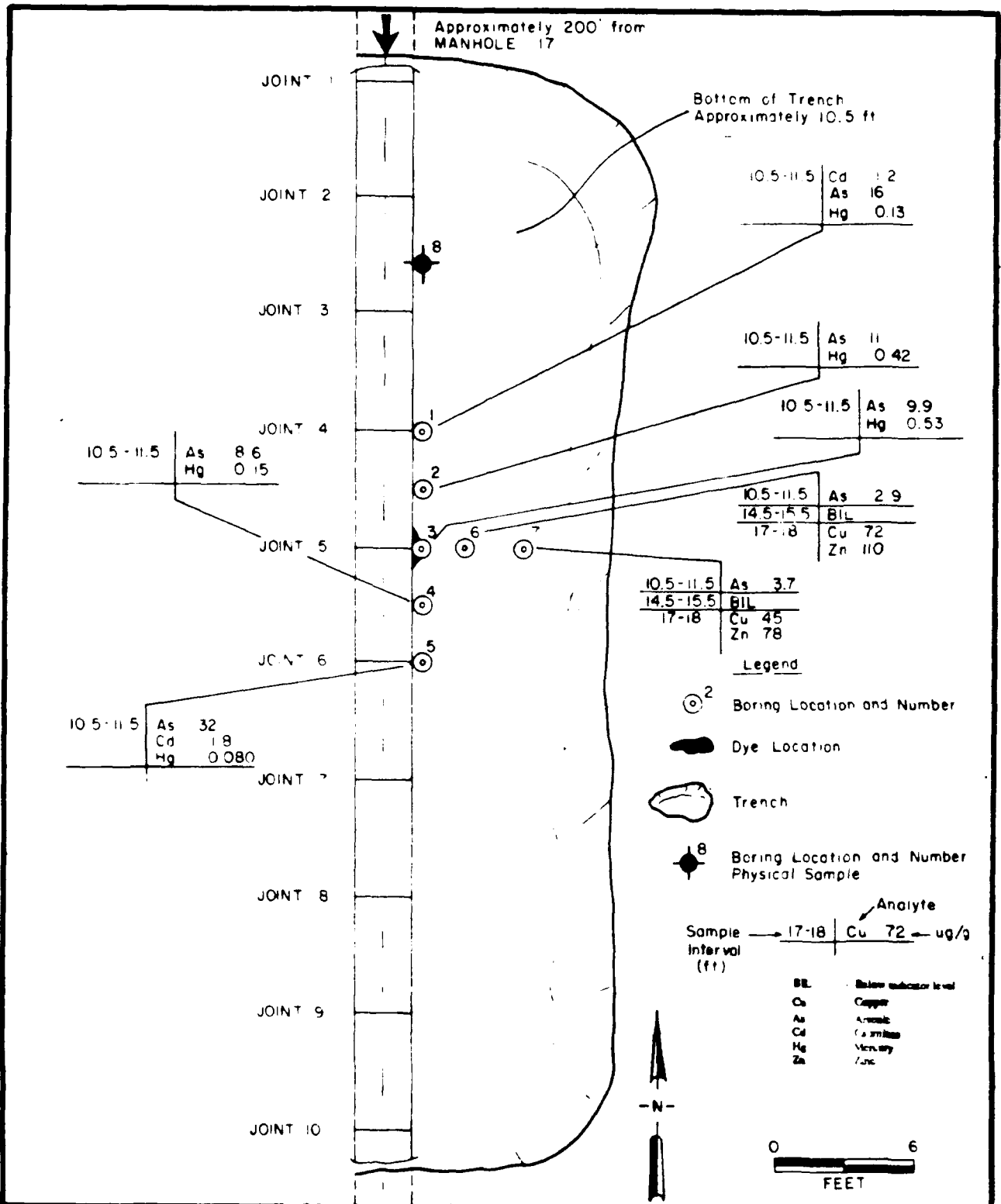
Program Managers Office for
Rocky Mountain Arsenal Cleanup
Aberdeen Proving Ground, Maryland

FIGURE SPSA-12-3

Phase I and Phase II Analytes Detected
Within or Above Indicator Levels

Rocky Mountain Arsenal

Prepared by Ebasco Services Incorporated



Prepared for:

Program Manager's Office for
 Rocky Mountain Arsenal Cleanup
 Aberdeen Proving Ground, Maryland

FIGURE SPSA-12-4

Phase I and Phase II Analytes Detected
 Within or Above Indicator Levels

Rocky Mountain Arsenal
 Prepared by Ebasco Services Incorporated

TABLE SPSA-12-1
SOIL CONTAMINANT CONCENTRATIONS
FOR SITE SPSA-12

Contaminant	Horizon 1			Horizon 2		
	Max. (ug/g)	Depth (ft)	Boring Number	Max. (ug/g)	Depth (ft)	Boring Number
Aldrin	0.5	0-1	5,FH85 ^{1/}	0.5	0-1	5,FH85
Dicyclopentadiene	--	--	--	8	14.5-15.5	4,FH85
Dieldrin	10	0-1	5,FH85	10	0-1	5,FH85
Fluoranthene or Pyrene ^{2/}	3.0	0-1	5,PW01 ^{2/}	3	0-1	5,FH85
Tetrachloroethylene	--	--	--	0.4	12-13	7,PW01
	--	--	--	--	14.5-15.5	4,FH85
Copper	35	5.5-6.5	5,FH85	--	--	--
		8-9	5,PW01	--	--	--
		9.5-10.5	5,Fh85	--	--	--
Lead	40	0-1	5,FH85	--	--	--
Mercury	0.72	9.5-10.5	5,FH85	--	--	--
Zinc	110	8-9	7,PW01	--	--	--
		8-9	4,PW01	--	--	--
		8-9	10,PW01	--	--	--
		9-10	9,PW01	--	--	--
		9.5-10.5	3,FH85	--	--	--
		9.5-10.5	5,FH85	--	--	--

1/ FH85 Fire Hydrant 85

2/ PW01 Trench PW01

3/ Nontarget contaminant. Refer to the exposure assessment nontarget screen in Appendix A.

SPSA South Plants Study Area

Max. Maximum

ug/g microgram per gram

ft foot/feet

REA4/TBL0081.REA VI-G 9/12/90 9:11 am sma

SPSA-12-2

EXPOSURE EVALUATIONS FOR REGULATED VISITORS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI OPN
ALDRIN	1.5E+00	2.3E+05	1.5E+00	3.3E-01*	2.2E-06	3.3E-01*	0.0E+00
DICYCLOPENTADIENE	5.4E+04	1.0E+04	8.6E+03	0.0E+00	7.8E-04	7.8E-04	0.0E+00
DIELDRIN	1.6E+00	1.0E+06	1.6E+00	6.4E+00*	1.2E-04*	6.4E+00*	0.0E+00
TETRACHLOROETHYLENE	5.1E+02	7.7E+04	5.1E+02	0.0E+00	5.2E-06	5.2E-06	0.0E+00
COPPER	4.2E+05	0.0E+00	4.2E+05	8.4E-05	0.0E+00	8.4E-05	0.0E+00
LEAD	1.5E+04	0.0E+00	1.5E+04	2.6E-03	0.0E+00	2.6E-03	0.0E+00
MERCURY	3.3E+03	0.0E+00	3.3E+03	2.2E-04	0.0E+00	2.2E-04	0.0E+00
ZINC	2.0E+06	0.0E+00	2.0E+06	5.5E-05	0.0E+00	5.5E-05	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPLV for this contaminant is considered to be equal to pure compound. The SPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-12-3
EXPOSURE EVALUATIONS FOR CASUAL VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI OPN
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	
ALDRIN	1.5E+00	2.3E+05	1.5E+00	3.3E-01*	2.2E-06	3.3E-01*	0.0E+00
DICYCLOPENTADIENE	5.4E+04	1.0E+04	8.6E+03	0.0E+00	7.8E-04	7.8E-04	0.0E+00
DIELDRIN	1.6E+00	1.0E+06	1.6E+00	6.4E+00*	1.2E-04a	6.4E+00*	0.0E+00
TETRACHLOROETHYLENE	5.1E+02	7.7E+04	5.1E+02	0.0E+00	5.2E-06	5.2E-06	0.0E+00
COPPER	4.2E+05	0.0E+00	4.2E+05	8.4E-05	0.0E+00	8.4E-05	0.0E+00
LEAD	1.5E+04	0.0E+00	1.5E+04	2.6E-03	0.0E+00	2.6E-03	0.0E+00
MERCURY	3.3E+03	0.0E+00	3.3E+03	2.2E-04	0.0E+00	2.2E-04	0.0E+00
ZINC	2.0E+06	0.0E+00	2.0E+06	5.5E-05	0.0E+00	5.5E-05	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPLV for this contaminant is considered to be equal to pure compound. The SPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-12-4
EXPOSURE EVALUATIONS FOR RECREATIONAL VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI OPN
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	
ALDRIN	2.1E-01	1.5E+04	2.1E-01	2.4E+00*	3.2E-05	2.4E+00*	0.0E+00
DICYCLOPENTADIENE	1.8E+04	3.7E+03	3.1E+03	0.0E+00	2.2E-03	2.2E-03	0.0E+00
DIELDRIN	2.2E-01	1.0E+06	2.2E-01	4.6E+01*	1.7E-03 ^a	4.6E+01*	0.0E+00
TETRACHLOROETHYLENE	7.1E+01	1.2E+04	7.1E+01	0.0E+00	3.3E-05	3.3E-05	0.0E+00
COPPER	2.5E+05	0.0E+00	2.5E+05	1.4E-04	0.0E+00	1.4E-04	0.0E+00
LEAD	9.2E+03	0.0E+00	9.2E+03	4.3E-03	0.0E+00	4.3E-03	0.0E+00
MERCURY	2.0E+03	0.0E+00	2.0E+03	3.7E-04	0.0E+00	3.7E-04	0.0E+00
ZINC	1.1E+06	0.0E+00	1.1E+06	1.0E-04	0.0E+00	1.0E-04	0.0E+00

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPPLV for this contaminant is considered to be equal to pure compound. The SPPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA-12-5
EXPOSURE EVALUATIONS FOR COMMERCIAL WORKERS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI ENC
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	
ALDRIN	1.9E+00	0.0E+00	1.9E+00	2.6E-01*	0.0E+00	2.6E-01*	NA
DICYCLOPENTADIENE	1.7E+04	0.0E+00	1.7E+04	0.0E+00	0.0E+00	0.0E+00	NA
DIELDRIN	2.0E+00	0.0E+00	2.0E+00	5.0E+00*	0.0E+00	5.0E+00*	NA
TETRACHLOROETHYLENE	6.5E+02	0.0E+00	6.5E+02	0.0E+00	0.0E+00	0.0E+00	NA
COPPER	1.8E+05	0.0E+00	1.8E+05	2.0E-04	0.0E+00	2.0E-04	NA
LEAD	6.5E+03	0.0E+00	6.5E+03	6.1E-03	0.0E+00	6.1E-03	NA
MERCURY	1.4E+03	0.0E+00	1.4E+03	5.2E-04	0.0E+00	5.2E-04	NA
ZINC	7.8E+05	0.0E+00	7.8E+05	1.4E-04	0.0E+00	1.4E-04	NA

*: EI is equal to or exceeds 1.0E-01

SPSA-12-6
EXPOSURE EVALUATIONS FOR INDUSTRIAL WORKERS

CONTAMINANT	DIRECT	INDIRECT		CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI	
	PPLV (mg/kg)	OSVI (mg/kg)	ESVI (mg/kg)	PPLV (mg/kg)	EI	EI	EI	OPN	ENC
ALDRIN	1.2E-01	3.1E+04	0.0E+00	1.2E-01	4.3E+00*	1.6E-05	4.3E+00*	0.0E+00	NA
DICYCLOPENTADIENE	1.2E+03	1.4E+03	0.0E+00	6.3E+02	0.0E+00	5.9E-03	5.9E-03	0.0E+00	NA
DIELDRIN	1.2E-01	1.0E+06	1.0E+06	1.2E-01	8.2E+01*	8.7E-04 ^a	8.2E+01*	0.0E+00	NA
TETRACHLOROETHYLENE	4.1E+01	1.0E+04	0.0E+00	4.1E+01	0.0E+00	3.9E-05	3.9E-05	0.0E+00	NA
COPPER	5.7E+04	0.0E+00	0.0E+00	5.7E+04	6.1E-04	0.0E+00	6.1E-04	0.0E+00	NA
LEAD	2.2E+03	0.0E+00	0.0E+00	2.2E+03	1.8E-02	0.0E+00	1.8E-02	0.0E+00	NA
MERCURY	4.6E+02	0.0E+00	0.0E+00	4.6E+02	1.6E-03	0.0E+00	1.6E-03	0.0E+00	NA
ZINC	1.4E+05	0.0E+00	0.0E+00	1.4E+05	7.9E-04	0.0E+00	7.9E-04	0.0E+00	NA

a: This contaminant saturates the soil gas and produces a vapor flux which is below one-tenth of the critical flux. The SPPPLV for this contaminant is considered to be equal to pure compound. The SPPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

*: EI is equal to or exceeds 1.0E-01

2.34 SITE SPSA-12a: AERATION BASIN (formerly Site 2-7: Aeration Basin; EBASCO, 1987n/RIC 87006R18 and EBASCO, 1988v/RIC 87006R18A)

2.34.1 Site-Specific Considerations

Figure SPSA-12a-1 and Tables SPSA-12a-1 and SPSA-12b-2 depict the target contaminants for Site SPSA-12a. Borings 1 through 13 were included in the exposure assessment, consistent with the South Plants SAR. This site was used to cool and independently recirculate the process water used in the condenser and turbine of the power plant. Therefore, chemicals from the RMA target contaminant list that are associated with these activities were suspected to be present in Site SPSA-12a (EBASCO, 1987n/RIC 87006R18).

2.34.2 Spatial Distribution of Measured Contaminant Concentrations

The locations and concentrations of the target contaminants that were detected in Site SPSA-12a are shown in Figure SPSA-12a-1. The following contaminants were not included in this figure, since they were not considered target contaminants during the Phase I and Phase II investigations: 1,1,2,2-Tetrachloroethane, occurring in Borings 1 (0-1 ft) and 4 (0-1 ft) and trichloropropene, occurring in Boring 4 (0-1 ft). Although not shown in this figure, these chemicals were included in the South Plants SAR and in this exposure assessment because they passed through the screening process performed in the RMA Chemical Index (EBASCO, 1988c/RIC 88357R01).

Table SPSA-12a-1 summarizes the maximum concentrations of contaminants measured in soil above indicator levels for the ICP metals, arsenic, and mercury and CRLs for organic contaminants from the Phase I and Phase II investigations. The boring number and depth where the maximum value was observed are shown. No data were included for ICP metals, arsenic, and mercury in Horizon 2 because direct soil exposure below 10 ft is assumed to be negligible (see Volume VI-A). Table SPSA-12a-2 summarizes the maximum concentrations detected in groundwater together with the well number, location, sampling interval, and depth to groundwater.

2.34.3 Site Exposure Summary

Tables SPSA-12a-3 through SPSA-12a-7 present Draft PPLVs, EIs, and VEIs for each site contaminant. Since the depth to groundwater below Site SPSA-12a is greater than 10 ft, the enclosed space vapor inhalation SPPPLV is included in the calculation of the cumulative quantity. The COCs are summarized below for each exposed population and with the critical exposure pathway identified.

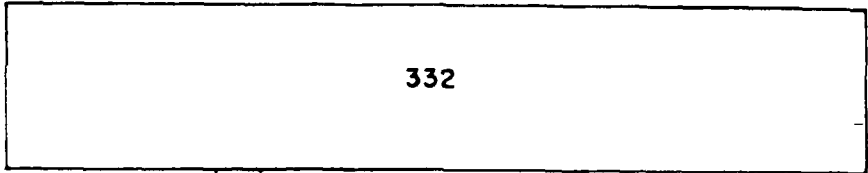
Contaminants of Concern	Regulated Visitor	Casual Visitor	Recreational Visitor	Commercial Worker	Industrial Worker
Dieldrin	Direct	Direct	Direct	Direct	Direct
Aldrin	--	--	Direct	Indirect	Dir/Ind
1,1,2,2-Tetrachloroethane	--	--	--	--	Direct

Note: Direct exposure pathways for soils include soil ingestion, suspended particulate inhalation, and dermal contact.
Indirect exposure pathways include open and enclosed space vapor inhalation.

The results of the soil exposure summary indicate that exposure to contamination from the direct and indirect pathways both contribute to the exceedance of the cumulative PPLVs. Site SPSA-12a is designated as a Priority 1 site, based on the most sensitive exposed population PPLV (i.e., the industrial worker).

The following groundwater contaminants result in an unacceptable exposure due to vapor inhalation as indicated by a VEI value greater than 1:

- Benzene (enclosed)
- Carbon tetrachloride (enclosed)



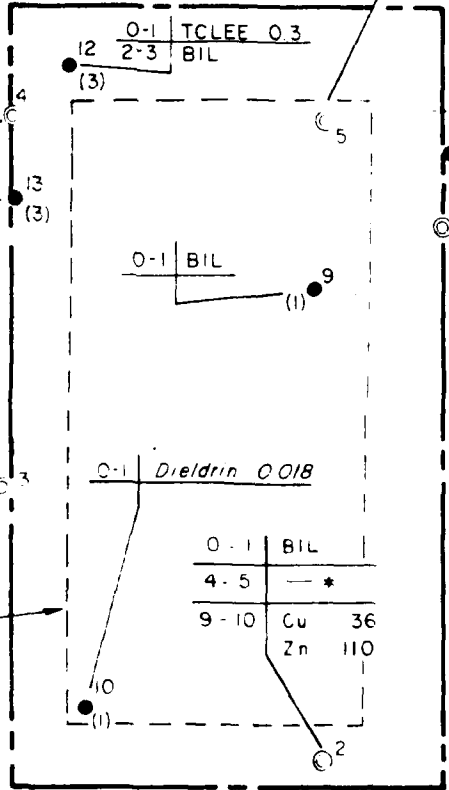
0-1	Aldrin	0.010
	PPDE	0.014
	PPDDT	0.023
	Dieldrin	1.2
	Endrin	0.14
	CL6CP	0.047
	Isodrin	0.0027
	Hg	0.25

1-2	BIL
5-6	BIL

2-3	BIL
4-5	BIL

0-1	Hg	0.050
4-5	BIL	
7.5-10	Cu	26
	Hg	0.13
	Zn	83

0-1	BIL
2-3	BIL



0-1	Dieldrin	0.6
	Cu	370
	Hg	0.12
	Zn	74
4-5	Hg	0.076
	Zn	170
9-10	Cu	31
	Zn	74
14-15	Cu	29
	Zn	92

0-1	Dieldrin	0.031
2-3	BIL	
3.7-4.7	BIL	

0-1	BIL
2-3	BIL

0-1	BIL	
4-5	BIL	
9-10	Cu	37
	Hg	0.080
	Zn	99

0-1	BIL	
4-5	— *	
9-10	Cu	36
	Zn	110

0-1	PPDE	0.0075
	PPDDT	0.018
	Dieldrin	0.49
	Endrin	0.041
	Cu	20
	Hg	0.067
2-3	BIL	
4-5	BIL	

Edge of concrete basin

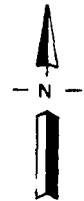
Legend

- ⊙ Phase I borings
- ⊙⁶ Phase II boring and total depth drilled (ft)
- * Sample not recovered

Sample Interval (ft) → 0-1 | Hg 0.20 ← Level (ug/g)
 2-3 | Aldrin 0.012

Analyte detected by different method in Phase II - see text

- CL6CP - Hexachlorocyclopentadiene
- PPDE - 2,2-bis(Para-chlorophenyl)-1,1-dichloroethane
- PPDDT - 2,2-bis(Para-chlorophenyl)-1,1,1-trichloroethane
- TCLEE - Tetrachloroethylene
- Cu - Copper
- Hg - Mercury
- Zn - Zinc
- BIL - Below indicator level



Prepared for :

Program Manager's Office for
 Rocky Mountain Arsenal Cleanup
 Aberdeen Proving Ground, Maryland

FIGURE SPSA-12a-1

Phase I and Phase II Analytes Detected
 Within or Above Indicator Levels

Rocky Mountain Arsenal
 Prepared by Ebasco Services Incorporated

TABLE SPSA-12a-1
SOIL CONTAMINANT CONCENTRATIONS
FOR SITE SPSA-12a

Contaminant	Horizon 1			Horizon 2		
	Max. (ug/g)	Depth (ft)	Boring Number	Max. (ug/g)	Depth (ft)	Boring Number
Aldrin	0.010	0-1	6	0.010	0-1	6
PPDDE ^{1/}	0.014	0-1	6	0.014	0-1	6
PPDDT ^{2/}	0.023	0-1	6	0.023	0-1	6
Dieldrin	1.2	0-1	6	1.2	0-1	6
Endrin	0.14	0-1	6	0.14	0-1	6
Hexachlorocyclopentadiene	0.047	0-1	6	0.047	0-1	6
Isodrin	0.0027	0-1	6	0.0027	0-1	6
1,1,2,2-Tetrachloroethane ^{3/}	1.0	0-1	1	1.0	0-1	1
		0-1	4		0-1	4
Tetrachloroethylene	0.3	0-1	12	0.3	0-1	12
Trichloropropene ^{3/}	0.10	0-1	4	0.10	0-1	4
Copper	370	0-1	1	--	--	--
Mercury	0.25	0-1	6	--	--	--
Zinc	170	4-5	1	--	--	--

1/ PPDDE 2,2-bis(Para-chlorophenyl)-1,1-dichloroethene

2/ PPDDT 2,2-bis(Para-chlorophenyl)-1,1,1-trichloroethane

3/ Nontarget contaminant. Refer to the exposure assessment nontarget screen in Appendix A.

SPSA South Plants Study Area

Max. Maximum

ug/g microgram per gram

ft foot/feet

TABLE SPSA-12a-2
GROUNDWATER CONTAMINANT CONCENTRATIONS (UG/L)
FOR SITE SPSA-12a

AVERAGE SITE DEPTH TO GROUNDWATER: 17 Feet

CHEMICAL	CONCENTRATION MAXIMUM	LOCATION (WELL NUMBER)	SAMPLE DATE
BENZENE	890	02545	03/9/88
CARBON TETRACHLORIDE	7.1	02545	01/11/89
CHLOROFORM	18	02545	01/11/89
CHLOROBENZENE	340	02545	01/11/89
DIBROMOCHLOROPROPANE	0.93	02545	01/11/89
DIISOPROPYLMETHYL PHOSPHONATE	0.65	02545	01/11/89
DIELDRIN	0.092	02545	01/11/89
DIMETHYLMETHYL PHOSPHONATE	0.25	02545	01/11/89
PPDDT	0.14	02545	01/11/89
TETRACHLOROETHYLENE	24	02545	01/11/89
TRICHLOROETHYLENE	8.6	02545	01/11/89

EACH VALUE PRESENTED IS THE MAXIMUM CONCENTRATION FOR THE LISTED ANALYTE FOR THE PERIOD March 17, 1987 TO February 28, 1989.
DATA SOURCE: DP ASSOCIATES, RMA Database, July 19, 1990

SPSA12a-3

EXPOSURE EVALUATIONS FOR REGULATED VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI EI	EI EI	EI EI	OPM
ALDRIN	1.5E+00	7.4E+04	1.5E+00	6.7E-02	1.3E-06	6.7E-02	0.0E+00
BENZENE	8.6E+02	0.0E+00	8.6E+02	0.0E+00	0.0E+00	0.0E+00	3.0E-03
CARBON TETRACHLORIDE	2.0E+02	0.0E+00	2.0E+02	0.0E+00	0.0E+00	0.0E+00	4.2E-04
CHLOROBENZENE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	1.0E-05
CHLOROFORM	4.0E+03	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	9.0E-06
PPDE	7.4E+01	5.3E+06	7.4E+01	1.9E-04	2.6E-09	1.9E-04	0.0E+00
PPDT	7.4E+01	1.1E+07	7.4E+01	3.1E-04	2.1E-09	3.1E-04	2.6E-07
DIBROMOCHLOROPROPANE	1.8E+01	0.0E+00	1.8E+01	0.0E+00	0.0E+00	0.0E+00	6.6E-06
DIELDRIN	1.6E+00	4.0E+04	1.6E+00	7.6E-01*	3.0E-05	7.6E-01*	7.2E-09
DIISOPROPYLMETHYL PHOSPHONATE	6.6E+05	0.0E+00	6.6E+05	0.0E+00	0.0E+00	0.0E+00	5.1E-11
DIMETHYMETHYL PHOSPHONATE	1.5E+05	0.0E+00	1.5E+05	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENDRIN	2.5E+03	3.2E+07	2.5E+03	5.6E-05	4.3E-09	5.7E-05	0.0E+00
HEXACHLOROCYCLOPENTADIENE	1.7E+04	4.1E+03	3.3E+03	2.8E-06	1.1E-05	1.4E-05	0.0E+00
ISODRIN	5.8E+02	6.4E+06	5.8E+02	4.7E-06	4.2E-10	4.7E-06	0.0E+00
1,1,2,2-TETRACHLOROETHANE	1.3E+02	2.4E+03	1.2E+02	7.9E-03	4.1E-04	8.3E-03	0.0E+00
TETRACHLOROETHYLENE	5.1E+02	1.5E+05	5.1E+02	5.9E-04	2.1E-06	5.9E-04	3.6E-05
TRICHLOROETHYLENE	2.3E+03	0.0E+00	2.3E+03	0.0E+00	0.0E+00	0.0E+00	2.6E-05
COPPER	4.2E+05	0.0E+00	4.2E+05	8.9E-04	0.0E+00	8.9E-04	0.0E+00
MERCURY	3.3E+03	0.0E+00	3.3E+03	7.6E-05	0.0E+00	7.6E-05	0.0E+00
ZINC	2.0E+06	0.0E+00	2.0E+06	8.6E-05	0.0E+00	8.6E-05	0.0E+00

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA12a-4
EXPOSURE EVALUATIONS FOR CASUAL VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI OPN
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	
ALDRIN	1.5E+00	7.4E+04	1.5E+00	6.7E-02	1.3E-06	6.7E-02	0.0E+00
BENZENE	8.6E+02	0.0E+00	8.6E+02	0.0E+00	0.0E+00	0.0E+00	3.0E-03
CARBON TETRACHLORIDE	2.0E+02	0.0E+00	2.0E+02	0.0E+00	0.0E+00	0.0E+00	4.2E-04
CHLOROBENZENE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	1.0E-05
CHLOROFORM	4.0E+03	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	9.0E-06
PPDDE	7.4E+01	5.3E+06	7.4E+01	1.9E-04	2.6E-09	1.9E-04	0.0E+00
PPDDT	7.4E+01	1.1E+07	7.4E+01	3.1E-04	2.1E-09	3.1E-04	2.6E-07
DIBROMOCHLOROPROPANE	1.8E+01	0.0E+00	1.8E+01	0.0E+00	0.0E+00	0.0E+00	6.6E-06
DIELDRIN	1.6E+00	4.0E+04	1.6E+00	7.6E-01*	3.0E-05	7.6E-01*	7.2E-09
DIISOPROPYLMETHYL PHOSPHONATE	6.6E+05	0.0E+00	6.6E+05	0.0E+00	0.0E+00	0.0E+00	5.1E-11
DIMETHYLMETHYL PHOSPHONATE	1.5E+05	0.0E+00	1.5E+05	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENDRIN	2.5E+03	3.2E+07	2.5E+03	5.6E-05	4.3E-09	5.7E-05	0.0E+00
HEXACHLOROCYCLOPENTADIENE	1.7E+04	4.1E+03	3.3E+03	2.8E-06	1.1E-05	1.4E-05	0.0E+00
ISODRIN	5.8E+02	6.4E+06	5.8E+02	4.7E-06	4.2E-10	4.7E-06	0.0E+00
1,1,2,2-TETRACHLOROETHANE	1.3E+02	2.4E+03	1.2E+02	7.9E-03	4.1E-04	8.3E-03	0.0E+00
TETRACHLOROETHYLENE	5.1E+02	1.5E+05	5.1E+02	5.9E-04	2.1E-06	5.9E-04	3.6E-05
TRICHLOROETHYLENE	2.3E+03	0.0E+00	2.3E+03	0.0E+00	0.0E+00	0.0E+00	2.6E-05
COPPER	4.2E+05	0.0E+00	4.2E+05	8.9E-04	0.0E+00	8.9E-04	0.0E+00
MERCURY	3.3E+03	0.0E+00	3.3E+03	7.6E-05	0.0E+00	7.6E-05	0.0E+00
ZINC	2.0E+06	0.0E+00	2.0E+06	8.6E-05	0.0E+00	8.6E-05	0.0E+00

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA12a-5
EXPOSURE EVALUATIONS FOR RECREATIONAL VISITORS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI OPM
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	
ALDRIN	2.1E-01	4.9E+03	2.1E-01	4.8E-01*	2.0E-05	4.8E-01*	0.0E+00
BENZENE	1.2E+02	0.0E+00	1.2E+02	0.0E+00	0.0E+00	0.0E+00	4.6E-02
CARBON TETRACHLORIDE	2.7E+01	0.0E+00	2.7E+01	0.0E+00	0.0E+00	0.0E+00	6.3E-03
CHLOROBENZENE	6.8E+04	0.0E+00	6.8E+04	0.0E+00	0.0E+00	0.0E+00	6.5E-05
CHLOROFORM	5.6E+02	0.0E+00	5.6E+02	0.0E+00	0.0E+00	0.0E+00	1.4E-04
PPDE	1.0E+01	3.5E+05	1.0E+01	1.4E-03	4.0E-08	1.4E-03	0.0E+00
PPDDT	1.0E+01	7.4E+05	1.0E+01	2.3E-03	3.1E-08	2.3E-03	3.9E-06
DIBROMOCHLOROPROPANE	2.5E+00	0.0E+00	2.5E+00	0.0E+00	0.0E+00	0.0E+00	9.9E-05
DIELDRIN	2.2E-01	2.7E+03	2.2E-01	5.5E+00*	4.5E-04	5.5E+00*	1.1E-07
DIISOPROPYLMETHYL PHOSPHONATE	2.8E+05	0.0E+00	2.8E+05	0.0E+00	0.0E+00	0.0E+00	3.3E-10
DIMETHYLMETHYL PHOSPHONATE	6.3E+04	0.0E+00	6.3E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENDRIN	1.1E+03	5.0E+06	1.1E+03	1.3E-04	2.8E-08	1.3E-04	0.0E+00
HEXACHLOROCYCLOPENTADIENE	5.7E+03	1.5E+03	1.2E+03	8.3E-06	3.1E-05	4.0E-05	0.0E+00
ISODRIN	2.5E+02	5.2E+03	2.4E+02	1.1E-05	5.2E-07	1.1E-05	0.0E+00
1,1,2,2-TETRACHLOROETHANE	1.8E+01	3.7E+02	1.7E+01	5.7E-02	2.7E-03	6.0E-02	0.0E+00
TETRACHLOROETHYLENE	7.1E+01	2.2E+04	7.1E+01	4.2E-03	1.3E-05	4.2E-03	5.5E-04
TRICHLOROETHYLENE	3.2E+02	0.0E+00	3.2E+02	0.0E+00	0.0E+00	0.0E+00	3.9E-04
COPPER	2.5E+05	0.0E+00	2.5E+05	1.5E-03	0.0E+00	1.5E-03	0.0E+00
MERCURY	2.0E+03	0.0E+00	2.0E+03	1.3E-04	0.0E+00	1.3E-04	0.0E+00
ZINC	1.1E+06	0.0E+00	1.1E+06	1.6E-04	0.0E+00	1.6E-04	0.0E+00

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA12a-6
EXPOSURE EVALUATIONS FOR COMMERCIAL WORKERS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI ENC
ALDRIN	1.9E+00	4.0E-01	3.3E-01	5.3E-02	2.5E-01*	3.1E-01*	0.0E+00
BENZENE	1.1E+03	0.0E+00	1.1E+03	0.0E+00	0.0E+00	0.0E+00	6.4E+00
CARBON TETRACHLORIDE	2.5E+02	0.0E+00	2.5E+02	0.0E+00	0.0E+00	0.0E+00	8.8E-01
CHLOROBENZENE	8.8E+04	0.0E+00	8.8E+04	0.0E+00	0.0E+00	0.0E+00	6.3E-02
CHLOROFORM	5.1E+03	0.0E+00	5.1E+03	0.0E+00	0.0E+00	0.0E+00	1.9E-02
PPDE	9.3E+01	1.9E+01	1.6E+01	1.5E-04	7.2E-04	8.7E-04	0.0E+00
PPDT	9.3E+01	1.9E+01	1.6E+01	2.5E-04	1.2E-03	1.4E-03	5.4E-04
DIBROMOCHLOROPROPANE	2.3E+01	0.0E+00	2.3E+01	0.0E+00	0.0E+00	0.0E+00	1.4E-02
DIELDRIN	2.0E+00	5.8E+01	1.9E+00	6.0E-01*	2.1E-02	6.2E-01*	1.5E-05
DIISOPROPYLMETHYL PHOSPHONATE	3.7E+05	0.0E+00	3.7E+05	0.0E+00	0.0E+00	0.0E+00	3.2E-07
DIMETHYLMETHYL PHOSPHONATE	8.2E+04	0.0E+00	8.2E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENDRIN	1.4E+03	2.9E+02	2.4E+02	1.0E-04	4.9E-04	5.9E-04	0.0E+00
HEXACHLOROCYCLOPENTADIENE	5.5E+03	1.9E+01	1.9E+01	8.6E-06	2.5E-03	2.5E-03	0.0E+00
ISODRIN	3.2E+02	6.7E+01	5.5E+01	8.4E-06	4.0E-05	4.9E-05	0.0E+00
1,1,2-TETRACHLOROETHANE	1.6E+02	3.4E+01	2.8E+01	6.2E-03	3.0E-02	3.6E-02	0.0E+00
TETRACHLOROETHYLENE	6.5E+02	2.0E+03	4.9E+02	4.6E-04	1.5E-04	6.1E-04	7.6E-02
TRICHLOROETHYLENE	2.9E+03	0.0E+00	2.9E+03	0.0E+00	0.0E+00	0.0E+00	5.4E-02
COPPER	1.8E+05	0.0E+00	1.8E+05	2.1E-03	0.0E+00	2.1E-03	0.0E+00
MERCURY	1.4E+03	0.0E+00	1.4E+03	1.8E-04	0.0E+00	1.8E-04	0.0E+00
ZINC	7.8E+05	0.0E+00	7.8E+05	2.2E-04	0.0E+00	2.2E-04	0.0E+00

*: EI is equal to or exceeds 1.0E-01

SPSA12a-7
EXPOSURE EVALUATIONS FOR INDUSTRIAL WORKERS

CONTAMINANT	DIRECT	INDIRECT		CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI	
	PPLV (mg/kg)	OSVI (mg/kg)	ESVI (mg/kg)	PPLV (mg/kg)	EI	EI	EI	OPN	ENC
ALDRIN	1.2E-01	9.9E+03	4.0E-01	9.0E-02	8.6E-01*	2.5E-01*	1.1E+00*	0.0E+00	0.0E+00
BENZENE	6.7E+01	0.0E+00	0.0E+00	6.7E+01	0.0E+00	0.0E+00	0.0E+00	2.3E-02	1.9E+01
CARBON TETRACHLORIDE	1.5E+01	0.0E+00	0.0E+00	1.5E+01	0.0E+00	0.0E+00	0.0E+00	3.2E-03	2.7E+00
CHLOROBENZENE	1.5E+04	0.0E+00	0.0E+00	1.5E+04	0.0E+00	0.0E+00	0.0E+00	7.5E-05	6.3E-02
CHLOROFORM	3.1E+02	0.0E+00	0.0E+00	3.1E+02	0.0E+00	0.0E+00	0.0E+00	6.7E-05	5.7E-02
PPDDE	5.7E+00	7.1E+05	1.9E+01	4.4E+00	2.4E-03	7.2E-04	3.2E-03	0.0E+00	0.0E+00
PPDDT	5.7E+00	1.5E+06	1.9E+01	4.4E+00	4.0E-03	1.2E-03	5.2E-03	1.9E-06	1.6E-03
DIBROMOCHLOROPROPANE	1.4E+00	0.0E+00	0.0E+00	1.4E+00	0.0E+00	0.0E+00	0.0E+00	4.9E-05	4.1E-02
DIELDRIN	1.2E-01	5.3E+03	1.9E+01	1.2E-01	9.8E+00*	6.3E-02	9.9E+00*	5.4E-08	4.5E-05
DIISOPROPYLMETHYL PHOSPHONATE	6.8E+04	0.0E+00	0.0E+00	6.8E+04	0.0E+00	0.0E+00	0.0E+00	3.8E-10	3.2E-07
DIMETHYMETHYL PHOSPHONATE	1.5E+04	0.0E+00	0.0E+00	1.5E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENDRIN	2.5E+02	4.3E+06	8.6E+02	2.0E+02	5.5E-04	1.6E-04	7.1E-04	0.0E+00	0.0E+00
HEXACHLOROCYCLOPENTADIENE	3.8E+02	5.5E+02	5.8E+01	4.6E+01	1.2E-04	9.0E-04	1.0E-03	0.0E+00	0.0E+00
ISODRIN	5.9E+01	8.5E+05	2.0E+02	4.6E+01	4.6E-05	1.3E-05	5.9E-05	0.0E+00	0.0E+00
1,1,2,2-TETRACHLOROETHANE	9.9E+00	3.2E+02	3.4E+01	7.4E+00	1.0E-01*	3.3E-02	1.3E-01*	0.0E+00	0.0E+00
TETRACHLOROETHYLENE	4.1E+01	1.9E+04	2.0E+03	4.0E+01	7.3E-03	1.6E-04	7.5E-03	2.7E-04	2.3E-01
TRICHLOROETHYLENE	1.8E+02	0.0E+00	0.0E+00	1.8E+02	0.0E+00	0.0E+00	0.0E+00	1.9E-04	1.6E-01
COPPER	5.7E+04	0.0E+00	0.0E+00	5.7E+04	6.5E-03	0.0E+00	6.5E-03	0.0E+00	0.0E+00
MERCURY	4.6E+02	0.0E+00	0.0E+00	4.6E+02	5.4E-04	0.0E+00	5.4E-04	0.0E+00	0.0E+00
	1.4E+05	0.0E+00	0.0E+00	1.4E+05	1.2E-03	0.0E+00	1.2E-03	0.0E+00	0.0E+00

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

2.35 SITE SPSA-12b: SEDIMENTATION POND (formerly South Plants Regional Study/South Plants Manufacturing Complex; EBASCO, 1988z/RIC 88306R01; Process Water System; EBASCO, 1988w/RIC 88256R04)

2.35.1 Site-Specific Considerations

Figure SPSA-12b-1 and Tables SPSA-12b-1 and SPSA-12b-2 depict the target contaminants for Site SPSA-12b. Boring 45 from South Plants Regional Study/South Plants Manufacturing Complex and Boring 1 from the Process Water System was included in this exposure assessment, consistent with the South Plants SAR. The historical search conducted under the contaminant assessment revealed that the sedimentation pond had been used to settle particulate matter from cooling tower blowdown water (EBASCO, 1988z/RIC 88306R01). According to site history, no chemicals from the RMA target contaminant list were suspected to be present in Site SPSA-12b (EBASCO, 1988z/RIC 88306R01).

2.35.2 Spatial Distribution of Measured Contaminant Concentrations

The locations and concentrations of the target contaminants that were detected in Site SPSA-12b are shown in Figure SPSA-12b-1. Table SPSA-12b-1 summarizes the maximum concentrations of contaminants measured in soil above indicator levels for the ICP metals, arsenic, and mercury and CRLs for organic contaminants from the Phase I and Phase II investigations. The boring number and depth where the maximum value was observed are shown. No data were included for ICP metals, arsenic, and mercury in Horizon 2 because direct soil exposure below 10 ft is assumed to be negligible (see Volume VI-A). Table SPSA-12b-2 summarizes the maximum concentrations detected in groundwater together with the well number, location, sampling interval, and depth to groundwater.

2.35.3 Site Exposure Summary

Tables SPSA-12b-3 through SPSA-12b-7 present Draft PPLVs, EIs, and VEIs for each site contaminant. Since the depth to groundwater below Site SPSA-12b is greater than 10 ft, the enclosed space vapor inhalation SPPPLV is included in the calculation of the cumulative quantity. The COCs are summarized below for each exposed population and with the critical exposure pathway identified.

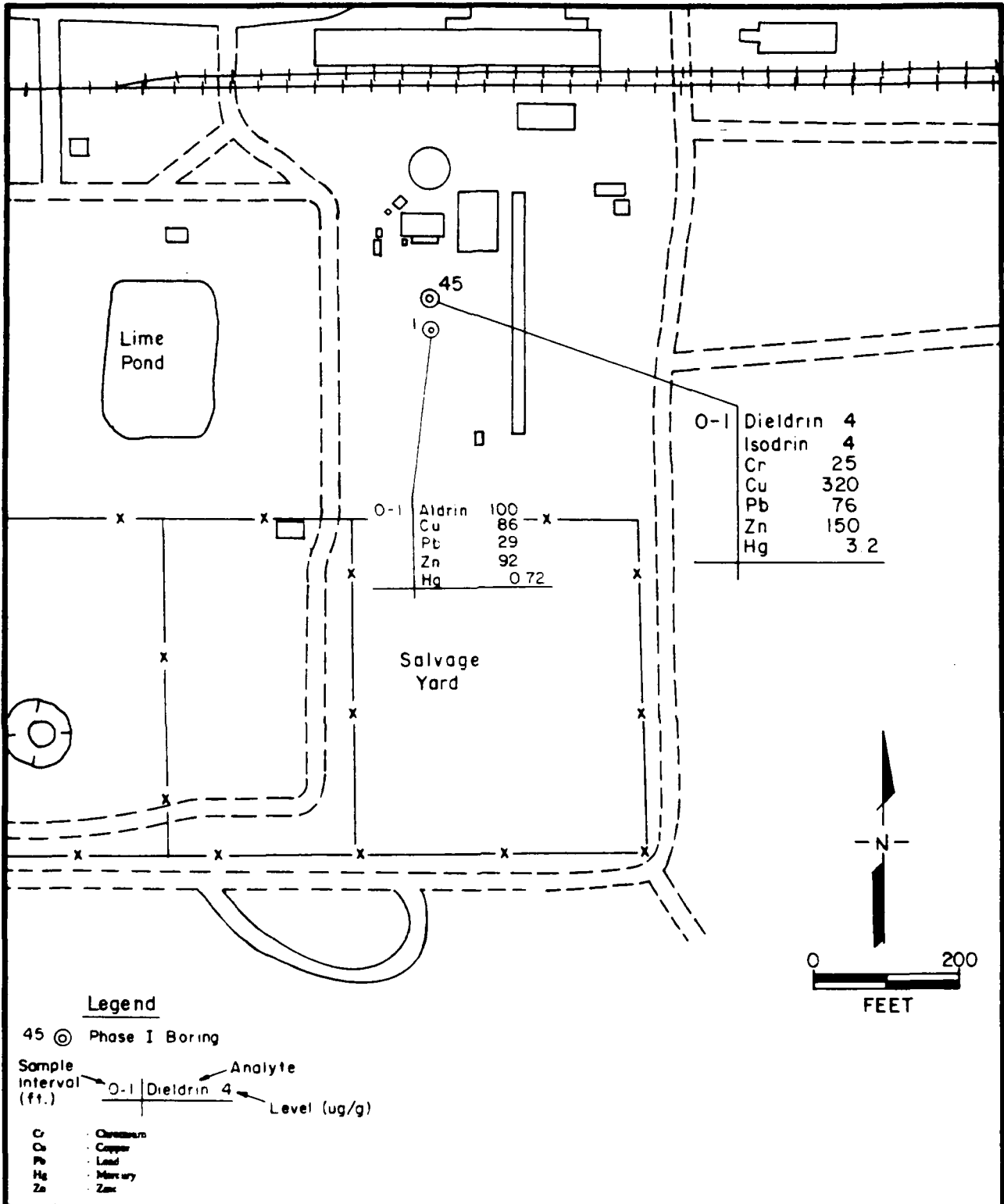
Contaminants of Concern	Regulated Visitor	Casual Visitor	Recreational Visitor	Commercial Worker	Industrial Worker
Aldrin	Direct	Direct	Direct	Dir/Ind	Dir/Ind
Dieldrin	Direct	Direct	Direct	Direct	Dir/Ind

Note: Direct exposure pathways for soils include soil ingestion, suspended particulate inhalation, and dermal contact.
 Indirect exposure pathways include open and enclosed space vapor inhalation.

The results of the soil exposure summary indicate that exposure to contamination from the direct and indirect pathways both contribute to the exceedance of the cumulative PPLVs. Site SPSA-12b is designated as a Priority 1 site, based on the most sensitive exposed population PPLV (i.e., the industrial worker).

The following groundwater contaminants result in an unacceptable exposure due to vapor inhalation as indicated by a VEI value greater than 1:

- Benzene (enclosed)
- Bicycloheptadiene (enclosed)
- Chloroform (enclosed)
- Dibromochloropropane (enclosed)



Prepared for:

Program Manager's Office for
 Rocky Mountain Arsenal Cleanup
 Aberdeen Proving Ground, Maryland

FIGURE SPSA-12b-1

Phase I and Phase II Analytes Detected Within or Above Indicator Levels

Rocky Mountain Arsenal, Task 20

Prepared by: Ebasco Services Incorporated

TABLE SPSA-12b-1
SOIL CONTAMINANT CONCENTRATIONS
FOR SITE SPSA-12b

Contaminant	Horizon 1			Horizon 2		
	Max. (ug/g)	Depth (ft)	Boring Number	Max. (ug/g)	Depth (ft)	Boring Number
Aldrin	100	0-1	1	100	0-1	1
Dieldrin	4	0-1	45	4	0-1	45
Isodrin	4	0-1	45	4	0-1	45
Copper	320	0-1	45	--	--	--
Lead	76	0-1	45	--	--	--
Mercury	3.2	0-1	45	--	--	--
Zinc	150	0-1	45	--	--	--

SPSA
Max.
ug/g
ft

South Plants Study Area
Maximum
microgram per gram
foot/feet

TABLE SPSA-12b-2

GROUNDWATER CONTAMINANT CONCENTRATIONS (UG/L)
FOR SITE SPSA-12b

AVERAGE SITE DEPTH TO GROUNDWATER: 16 Feet

CHEMICAL	CONCENTRATION MAXIMUM	LOCATION (WELL NUMBER)	SAMPLE DATE
1,1,1-TRICHLOROETHANE	2.5	01010	01/29/88
BICYCLOHEPTADIENE	17000	01519	03/15/88
BENZENE	5700	01519	03/15/88
CHLOROFORM	10000	01519	03/15/88
CHLOROPHENYLMETHYL SULFIDE	9.8	01519	03/15/88
CHLOROPHENYLMETHYL SULFONE	200	01519	03/15/88
DIBROMOCHLOROPROPANE	280	01519	03/15/88
DICYCLOPENTADIENE	11	01519	03/15/88
TOLUENE	8200	01519	03/15/88
TETRACHLOROETHYLENE	2.3	01010	01/29/88

EACH VALUE PRESENTED IS THE MAXIMUM CONCENTRATION FOR THE LISTED ANALYTE
FOR THE PERIOD March 17, 1987 TO February 28, 1989.
DATA SOURCE: DP ASSOCIATES, RMA Database, July 19, 1990

SPSA12b-3
EXPOSURE EVALUATIONS FOR REGULATED VISITORS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI OPN
ALDRIN	1.5E+00	5.2E+06	1.5E+00	6.7E+01*	1.9E-05	6.7E+01*	0.0E+00
BENZENE	8.6E+02	0.0E+00	8.6E+02	0.0E+00	0.0E+00	0.0E+00	3.0E-04
BICYCLOHEPTADIENE	3.2E+05	0.0E+00	3.2E+05	0.0E+00	0.0E+00	0.0E+00	7.2E-06
CHLOROFORM	4.0E+03	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	8.2E-05
CHLOROPHENYLMETHYL SULFIDE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	1.8E-10
CHLOROPHENYLMETHYL SULFONE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	4.4E-11
DIBROMOCHLOROPROPANE	1.8E+01	0.0E+00	1.8E+01	0.0E+00	0.0E+00	0.0E+00	3.0E-05
DICYCLOPENTADIENE	5.4E+04	0.0E+00	5.4E+04	0.0E+00	0.0E+00	0.0E+00	1.8E-06
DIELDRIN	1.6E+00	2.8E+06	1.6E+00	2.5E+00*	1.4E-06	2.5E+00*	0.0E+00
ISODRIN	5.8E+02	4.4E+08	5.8E+02	6.9E-03	9.1E-09	6.9E-03	0.0E+00
TETRACHLOROETHYLENE	5.1E+02	0.0E+00	5.1E+02	0.0E+00	0.0E+00	0.0E+00	5.5E-08
TOLUENE	2.5E+06	0.0E+00	2.5E+06	0.0E+00	0.0E+00	0.0E+00	6.5E-08
1,1,1-TRICHLOROETHANE	7.5E+05	0.0E+00	7.5E+05	0.0E+00	0.0E+00	0.0E+00	8.0E-11
COPPER	4.2E+05	0.0E+00	4.2E+05	7.7E-04	0.0E+00	7.7E-04	0.0E+00
LEAD	1.5E+04	0.0E+00	1.5E+04	4.9E-03	0.0E+00	4.9E-03	0.0E+00
MERCURY	3.3E+03	0.0E+00	3.3E+03	9.7E-04	0.0E+00	9.7E-04	0.0E+00
ZINC	2.0E+06	0.0E+00	2.0E+06	7.6E-05	0.0E+00	7.6E-05	0.0E+00

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA12b-4
EXPOSURE EVALUATIONS FOR CASUAL VISITORS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI OPN
ALDRIN	1.5E+00	5.2E+06	1.5E+00	6.7E+01*	1.9E-05	6.7E+01*	0.0E+00
BENZENE	8.6E+02	0.0E+00	8.6E+02	0.0E+00	0.0E+00	0.0E+00	3.0E-04
BICYCLOHEPTADIENE	3.2E+05	0.0E+00	3.2E+05	0.0E+00	0.0E+00	0.0E+00	7.2E-06
CHLOROFORM	4.0E+03	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	8.2E-05
CHLOROPHENYLMETHYL SULFIDE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	1.8E-10
CHLOROPHENYLMETHYL SULFONE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	4.4E-11
DIBROMOCHLOROPROPANE	1.8E+01	0.0E+00	1.8E+01	0.0E+00	0.0E+00	0.0E+00	3.0E-05
DICYCLOPENTADIENE	5.4E+04	0.0E+00	5.4E+04	0.0E+00	0.0E+00	0.0E+00	1.8E-06
DIELDRIN	1.6E+00	2.8E+06	1.6E+00	2.5E+00*	1.4E-06	2.5E+00*	0.0E+00
ISODRIN	5.8E+02	4.4E+08	5.8E+02	6.9E-03	9.1E-09	6.9E-03	0.0E+00
TETRACHLOROETHYLENE	5.1E+02	0.0E+00	5.1E+02	0.0E+00	0.0E+00	0.0E+00	5.5E-08
TOLUENE	2.5E+06	0.0E+00	2.5E+06	0.0E+00	0.0E+00	0.0E+00	6.5E-08
1,1,1-TRICHLOROETHANE	7.5E+05	0.0E+00	7.5E+05	0.0E+00	0.0E+00	0.0E+00	8.0E-11
COPPER	4.2E+05	0.0E+00	4.2E+05	7.7E-04	0.0E+00	7.7E-04	0.0E+00
LEAD	1.5E+04	0.0E+00	1.5E+04	4.9E-03	0.0E+00	4.9E-03	0.0E+00
MERCURY	3.3E+03	0.0E+00	3.3E+03	9.7E-04	0.0E+00	9.7E-04	0.0E+00
ZINC	2.0E+06	0.0E+00	2.0E+06	7.6E-05	0.0E+00	7.6E-05	0.0E+00

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA12b-5
EXPOSURE EVALUATIONS FOR RECREATIONAL VISITORS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI OPN
ALDRIN	2.1E-01	3.4E+05	2.1E-01	4.8E+02*	2.9E-04	4.8E+02*	0.0E+00
BENZENE	1.2E+02	0.0E+00	1.2E+02	0.0E+00	0.0E+00	0.0E+00	4.5E-03
BICYCLOHEPTADIENE	1.4E+05	0.0E+00	1.4E+05	0.0E+00	0.0E+00	0.0E+00	4.7E-05
CHLOROFORM	5.6E+02	0.0E+00	5.6E+02	0.0E+00	0.0E+00	0.0E+00	1.2E-03
CHLOROPHENYLMETHYL SULFIDE	7.0E+04	0.0E+00	7.0E+04	0.0E+00	0.0E+00	0.0E+00	1.2E-09
CHLOROPHENYLMETHYL SULFONE	7.0E+04	0.0E+00	7.0E+04	0.0E+00	0.0E+00	0.0E+00	2.8E-10
DIBROMOCHLOROPROPANE	2.5E+00	0.0E+00	2.5E+00	0.0E+00	0.0E+00	0.0E+00	4.6E-04
DICYCLOPENTADIENE	1.8E+04	0.0E+00	1.8E+04	0.0E+00	0.0E+00	0.0E+00	1.2E-05
DIELDRIN	2.2E-01	1.8E+05	2.2E-01	1.8E+01*	2.2E-05	1.8E+01*	0.0E+00
ISODRIN	2.5E+02	6.8E+07	2.5E+02	1.6E-02	5.9E-08	1.6E-02	0.0E+00
TETRACHLOROETHYLENE	7.1E+01	0.0E+00	7.1E+01	0.0E+00	0.0E+00	0.0E+00	8.3E-07
TOLUENE	1.1E+06	0.0E+00	1.1E+06	0.0E+00	0.0E+00	0.0E+00	4.2E-07
1,1,1-TRICHLOROETHANE	3.2E+05	0.0E+00	3.2E+05	0.0E+00	0.0E+00	0.0E+00	5.2E-10
COPPER	2.5E+05	0.0E+00	2.5E+05	1.3E-03	0.0E+00	1.3E-03	0.0E+00
LEAD	9.2E+03	0.0E+00	9.2E+03	8.2E-03	0.0E+00	8.2E-03	0.0E+00
MERCURY	2.0E+03	0.0E+00	2.0E+03	1.6E-03	0.0E+00	1.6E-03	0.0E+00
ZINC	1.1E+06	0.0E+00	1.1E+06	1.4E-04	0.0E+00	1.4E-04	0.0E+00

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA12b-6
EXPOSURE EVALUATIONS FOR COMMERCIAL WORKERS

CONTAMINANT	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI ENC
	PPLV (mg/kg)	PPLV (mg/kg)	PPLV (mg/kg)	EI	EI	EI	
ALDRIN	1.9E+00	4.0E-01	3.3E-01	5.3E+01*	2.5E+02*	3.1E+02*	0.0E+00
BENZENE	1.1E+03	0.0E+00	1.1E+03	0.0E+00	0.0E+00	0.0E+00	4.9E+01
BICYCLOHEPTADIENE	1.8E+05	0.0E+00	1.8E+05	0.0E+00	0.0E+00	0.0E+00	3.6E+00
CHLOROFORM	5.1E+03	0.0E+00	5.1E+03	0.0E+00	0.0E+00	0.0E+00	1.4E+01
CHLOROPHENYLMETHYL SULFIDE	9.1E+04	0.0E+00	9.1E+04	0.0E+00	0.0E+00	0.0E+00	8.9E-05
CHLOROPHENYLMETHYL SULFONE	9.1E+04	0.0E+00	9.1E+04	0.0E+00	0.0E+00	0.0E+00	2.2E-05
DIBROMOCHLOROPROPANE	2.3E+01	0.0E+00	2.3E+01	0.0E+00	0.0E+00	0.0E+00	5.0E+00
DICYCLOPENTADIENE	1.7E+04	0.0E+00	1.7E+04	0.0E+00	0.0E+00	0.0E+00	9.1E-01
DIELDRIN	2.0E+00	5.8E+01	1.9E+00	2.0E+00*	7.0E-02	2.1E+00*	0.0E+00
ISODRIN	3.2E+02	6.7E+01	5.5E+01	1.2E-02	6.0E-02	7.2E-02	0.0E+00
TETRACHLOROETHYLENE	6.5E+02	0.0E+00	6.5E+02	0.0E+00	0.0E+00	0.0E+00	9.1E-03
TOLUENE	1.4E+06	0.0E+00	1.4E+06	0.0E+00	0.0E+00	0.0E+00	3.3E-02
1,1,1-TRICHLOROETHANE	4.2E+05	0.0E+00	4.2E+05	0.0E+00	0.0E+00	0.0E+00	4.0E-05
COPPER	1.8E+05	0.0E+00	1.8E+05	1.8E-03	0.0E+00	1.8E-03	0.0E+00
LEAD	6.5E+03	0.0E+00	6.5E+03	1.2E-02	0.0E+00	1.2E-02	0.0E+00
MERCURY	1.4E+03	0.0E+00	1.4E+03	2.3E-03	0.0E+00	2.3E-03	0.0E+00
ZINC	7.8E+05	0.0E+00	7.8E+05	1.9E-04	0.0E+00	1.9E-04	0.0E+00

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

SPSA12b-7
EXPOSURE EVALUATIONS FOR INDUSTRIAL WORKERS

CONTAMINANT	DIRECT	INDIRECT		CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI	
	PPLV (mg/kg)	OSVI (mg/kg)	ESVI (mg/kg)	PPLV (mg/kg)	EI EI	EI EI	EI EI	OPN	ENC
ALDRIN	1.2E-01	6.9E+05	4.0E-01	9.0E-02	8.6E+02*	2.5E+02*	1.1E+03*	0.0E+00	0.0E+00
BENZENE	6.7E+01	0.0E+00	0.0E+00	6.7E+01	0.0E+00	0.0E+00	0.0E+00	2.2E-03	1.5E+02
BICYCLOHEPTADIENE	3.3E+04	0.0E+00	0.0E+00	3.3E+04	0.0E+00	0.0E+00	0.0E+00	5.4E-05	3.6E+00
CHLOROFORM	3.1E+02	0.0E+00	0.0E+00	3.1E+02	0.0E+00	0.0E+00	0.0E+00	6.1E-04	4.1E+01
CHLOROPHENYLMETHYL SULFIDE	1.7E+04	0.0E+00	0.0E+00	1.7E+04	0.0E+00	0.0E+00	0.0E+00	1.3E-09	8.9E-05
CHLOROPHENYLMETHYL SULFONE	1.7E+04	0.0E+00	0.0E+00	1.7E+04	0.0E+00	0.0E+00	0.0E+00	3.3E-10	2.2E-05
DIBROMOCHLOROPROPANE	1.4E+00	0.0E+00	0.0E+00	1.4E+00	0.0E+00	0.0E+00	0.0E+00	2.3E-04	1.5E+01
DICYCLOPENTADIENE	1.2E+03	0.0E+00	0.0E+00	1.2E+03	0.0E+00	0.0E+00	0.0E+00	1.4E-05	9.1E-01
DIELDRIN	1.2E-01	3.7E+05	1.9E+01	1.2E-01	3.3E+01*	2.1E-01*	3.3E+01*	0.0E+00	0.0E+00
ISODRIN	5.9E+01	5.9E+07	2.0E+02	4.6E+01	6.8E-02	2.0E-02	8.7E-02	0.0E+00	0.0E+00
TETRACHLOROETHYLENE	4.1E+01	0.0E+00	0.0E+00	4.1E+01	0.0E+00	0.0E+00	0.0E+00	4.1E-07	2.7E-02
TOLUENE	2.6E+05	0.0E+00	0.0E+00	2.6E+05	0.0E+00	0.0E+00	0.0E+00	4.9E-07	3.3E-02
1,1,1-TRICHLOROETHANE	7.8E+04	0.0E+00	0.0E+00	7.8E+04	0.0E+00	0.0E+00	0.0E+00	6.0E-10	4.0E-05
COPPER	5.7E+04	0.0E+00	0.0E+00	5.7E+04	5.6E-03	0.0E+00	5.6E-03	0.0E+00	0.0E+00
LEAD	2.2E+03	0.0E+00	0.0E+00	2.2E+03	3.5E-02	0.0E+00	3.5E-02	0.0E+00	0.0E+00
MERCURY	4.6E+02	0.0E+00	0.0E+00	4.6E+02	6.9E-03	0.0E+00	6.9E-03	0.0E+00	0.0E+00
ZINC	1.4E+05	0.0E+00	0.0E+00	1.4E+05	1.1E-03	0.0E+00	1.1E-03	0.0E+00	0.0E+00

EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

3.0 STUDY AREA EXPOSURE SUMMARY

The exposure assessment results for the SPSA at RMA are summarized in Table 3-1. Of the 35 sites evaluated, 33 sites were designated as Priority 1 sites based on the most sensitive exposed population PPLV (i.e., the industrial worker). These include:

- Army Agents and Shell Pesticide Processing Area (SPSA-1a)
- Mounded Material (SPSA-1b)
- Lime Pits (SPSA-1c)
- Drainage Ditches (SPSA-1d)
- Buried M-1 Pits (SPSA-1e)
- Buried Barrels containing Hexachlorocyclopentadine (SPSA-1f)
- Balance of SPSA-1 (SPSA-1g)
- South Tank Farm Area (SPSA-2a)
- Open Storage Area (SPSA-2b)
- Salvage Yard (SPSA-2c)
- Drainage Ditches (SPSA-2d)
- Balance of SPSA-2 (SPSA-2e)
- Drainage Ditches (SPSA-3a)
- Salt Storage Pad (SPSA-3b)
- Former Tank Storage Area (SPSA-3c)
- Revetted Tank Storage Area (SPSA-3d)
- Balance of SPSA-3 (SPSA-3e)
- Drainage Ditches (SPSA-4a)
- Balance of SPSA-4 (SPSA-4b)
- Drainage Ditch (SPSA-5a)
- Balance of SPSA-5 (SPSA-5b)
- Hydrazine Facility (SPSA-6)
- Drainage Ditches (SPSA-7a)
- Lagoon (SPSA-7b)
- Balance of SPSA-7 (SPSA-7c)
- Sanitary Landfill (SPSA-8a)
- Drainage Ditches (SPSA-8b)

- Drainage Ditch (SPSA-9a)
- Chemical Sewer System (SPSA-10)
- Sanitary Sewer System (SPSA-11)
- Process Water System (SPSA-12)
- Aeration Basin (SPSA-12a)
- Sedimentation Pond (SPSA-12b)

Two sites were designated as a Priority 2 site based on the most sensitive exposed population PPLV (i.e., the industrial worker). These include:

- Balance of SPSA-8 (SPSA-8c)
- Balance of SPSA-9 (SPSA-9b)

The COCs in soils and sediments (i.e., those displaying an EI greater than 0.1) for the SPSA, based on the most sensitive exposed population PPLV (i.e., the industrial worker), are:

- Aldrin
- Benzene
- Bicycloheptadiene
- Carbon tetrachloride
- Chlordane
- Chloroacetic acid
- Chloroform
- Chlorophenylmethyl sulfide
- Dibromochloropropane
- 1,2-Dichloroethane
- PPDDE
- PPDDT
- Dicyclopentadiene
- Dieldrin
- Endrin
- Hexachlorocyclopentadiene

- Isodrin
- Methylene chloride
- Methylisobutyl ketone^{1/}
- Supona
- 1,1,2,2-Tetrachloroethane
- Tetrachloroethylene
- Trichloroethylene
- Arsenic
- Cadmium
- Chromium
- Lead
- Mercury

The COSs in groundwater (i.e., those displaying a VEI greater than 1) for the SPSA are:

- Aldrin
- Benzene
- Bicycloheptadiene
- Carbon tetrachloride
- Chlorobenzene
- Chloroform
- Dibromochloropropane
- 1,1-Dichloroethylene
- Dicyclopentadiene
- Dimethyldisulfide
- Hexachlorocyclopentadiene
- Methylene chloride
- Methylisobutyl ketone
- Tetrachloroethylene
- 1,1,2-Trichloroethane
- Trichloroethylene

^{1/} Identified as a COC for the commercial worker only (see Volume VII, Section 4.2).

TABLE 3-1
 NUMBER OF EXCEEDANCES FOR CONTAMINANTS OF CONCERN
 IN THE SOUTH PLANTS SOUTH AREA

Contaminant of Concern	Number of Exceedances
Aldrin	27
Benzene	7
Bicycloheptadiene	1
Carbon tetrachloride	2
Chlordane	13
Chloroacetic acid	2
Chloroform	4
Chlorophenylmethyl sulfide	1
Dibromochloropropane	3
1,2-Dichloroethane	2
PPDDE	7
PPDDT	11
Dicyclopentadiene	8
Dieldrin	33
Endrin	1
Hexachlorocyclopentadiene	6
Isodrin	7
Methylene chloride	10
Methylisobutyl ketone ^{1/}	1
Supona	1
1,1,2,2-Tetrachloroethane	6
Tetrachloroethylene	2
Trichloroethylene	1
Arsenic	10
Cadmium	7
Chromium	7
Lead	5
Mercury	2

1/ Identified as a COC for the commercial worker only (see Volume VII, Section 4.2).

4.0 REFERENCES

RIC 87006R15

EBASCO (Ebasco Services Incorporated). 1987a. Final Contamination Assessment Report. Site 1-5: Lime Pits. Version 3.1. February 1987. Task No. 2 - South Plants. Contract No. DAAK11-84-D-0017. Prepared for: U.S. Army Program Manager's Office for RMA Contamination Cleanup.

RIC 87196R01

EBASCO. 1987b. Final Phase I Contamination Assessment Report. Site 1-1: Drainage Ditches. Version 3.4. May 1987. Task No. 7 - Lower Lakes. Contract No. DAAK11-84-D-0017. Prepared for: U.S. Army Program Manager's Office for RMA Contamination Cleanup.

RIC 87127R01

EBASCO. 1987c. Final Phase I Contamination Assessment Report. Site 1-10: South Tank Farm. Version 3.2. April 1987. Task No. 2 - South Plants. Contract No. DAAK11-84-D-0017. Prepared for: U.S. Army Program Manager's Office for RMA Contamination Cleanup.

RIC 87127R07

EBASCO. 1987d. Final Phase I Contamination Assessment Report. Site 1-9: Open Storage Area. Version 3.4. May 1987. Task No. 7 - Lower Lakes. Contract No. DAAK11-84-D-0017. Prepared for: U.S. Army Program Manager's Office for RMA Contamination Cleanup.

RIC 87127R05

EBASCO. 1987e. Final Phase I Contamination Assessment Report. Site 1-8: Salvage Yard. Version 3.3. May 1987. Task No. 2 - Army Sites South. Contract No. DAAK11-84-D-0017. Prepared for: U.S. Army Program Manager's Office for RMA Contamination Cleanup.

RIC 87127R02

EBASCO. 1987f. Final Phase I Contamination Assessment Report. Site 2-6: Salt Storage Pad. Version 3.2. April 1987. Task No. 2 - South Plants. Contract No. DAAK11-84-D-0017. Prepared for: U.S. Army Program Manager's Office for RMA Contamination Cleanup.

RIC 87006R20

EBASCO. 1987g. Final Phase I Contamination Assessment Report. Site 2-12: Revetted Tank Storage Area. Version . February 1987. Task No. 2 - South Plants. Contract No. DAAK11-84-D-0017. Prepared for: U.S. Army Program Manager's Office for RMA Contamination Cleanup.

RIC 87216R06

EBASCO. 1987h. Final Phase I Contamination Assessment Report. Site 2-1: Drainage Ditches. Version 3.3. July 1987. Task No. 7 - Lower Lakes. Contract No. DAAK11-84-D-0017. Prepared for: U.S. Army Program Manager's Office for RMA Contamination Cleanup.

RIC 87006R16

EBASCO. 1987i. Final Phase I Contamination Assessment Report. Site 2-3: Lagoon. Version 3.1. February 1988. Task No. 2 - South Plants. Contract No. DAAK11-84-D-0017. Prepared for: U.S. Army Program Manager's Office for RMA Contamination Cleanup.

RIC 87216R02

EBASCO. 1987j. Final Phase I Contamination Assessment Report. Site 2-2: Test Site. Version 3.2. July 1987. Task No. 2 - South Plants. Contract No. DAAK11-84-D-0017. Prepared for: U.S. Army Program Manager's Office for RMA Contamination Cleanup.

RIC 87006R17

EBASCO. 1987k. Final Phase I Contamination Assessment Report. Site 2-4: Excavation Pit. February 1987. Task No. 2 - South Plants. Contract No. DAAK11-84-D-0017. Prepared for: U.S. Army Program Manager's Office for RMA Contamination Cleanup.

RIC 87216R04

EBASCO. 1987l. Final Phase I Contamination Assessment Report. Site 2-13: Former Open Storage Area. Version 3.2. July 1987. Task No. 2 - South Plants. Contract No. DAAK11-84-D-0017. Prepared for: U.S. Army Program Manager's Office for RMA Contamination Cleanup.

RIC 87216R05

EBASCO. 1987m. Final Phase I Contamination Assessment Report. Sites 2-14a and 2-14b: Sanitary Landfills. Version 3.2. July 1987. Task No. 2 - South Plants. Contract No. DAAK11-84-D-0017. Prepared for: U.S. Army Program Manager's Office for RMA Contamination Cleanup.

RIC 87006R18

EBASCO. 1987n. Final Phase I Contamination Assessment Report. Site 2-7: Aeration Basin. February 1987. Task No. 2 - South Plants. Contract No. DAAK11-84-D-0017. Prepared for: U.S. Army Program Manager's Office for RMA Contamination Cleanup.

RIC 87127R06

EBASCO. 1987o. Final Phase I Contamination Assessment Report. Section 1 - Uncontaminated Area. Version 3.3. April 1987. Task No. 7 - Lower Lakes. Contract No. DAAK11-84-D-0017. Prepared for: U.S. Army Program Manager's Office for RMA Contamination Cleanup.

RIC 87127R08

EBASCO. 1987p. Final Phase I Contamination Assessment Report. Section 2 - Uncontaminated Area. Version 3.3. May 1987. Task No. 7 - Lower Lakes. Contract No. DAAK11-84-D-0017. Prepared for: U.S. Army Program Manager's Office for RMA Contamination Cleanup.

RIC 87006R19

EBASCO. 1987q. Final Phase I Contamination Assessment Report. Site 2-9: Open Storage Area. February 1987. Task No. 2 - South Plants. Contract No. DAAK11-84-D-0017. Prepared for: U.S. Army Program Manager's Office for RMA Contamination Cleanup.

RIC 88046R04

EBASCO. 1988a. Final Phase I Contamination Assessment Report. Site 1-3: Mounded Material. Version 3.2. February 1988. Task No. 2 - South Plants. Contract No. DAAK11-84-D-0017. Prepared for: U.S. Army Program Manager's Office for RMA Contamination Cleanup.

RIC 88046R04A

EBASCO. 1988b. Final Phase II Data Addendum. Site 1-3: Mounded Material. Version 3.1. October 1988. Task No. 20 - South Plants. Contract No. DAAK11-84-D-0017. Prepared for: U.S. Army Program Manager's Office for RMA Contamination Cleanup.

RIC 88357R01

EBASCO. 1988c. Proposed Final Rocky Mountain Arsenal Chemical Index Volumes I-II. May 1988. Contract No. DAAK11-84-D-0017. Prepared for: U.S. Army Program Manager's Office for RMA Contamination Cleanup.

RIC 87006R15A

EBASCO. 1988d. Final Phase II Data Addendum: Site 1-5: Lime Pits. Version 3.1. September 1988. Task No. 2 - South Plants. Contract No. DAAK11-84-D-0017. Prepared for: U.S. Army Program Manager's Office for RMA Contamination Cleanup.

RIC 87196R01A

EBASCO. 1988e. Final Phase II Data Addendum. Site 1-1: Drainage Ditches. Version 3.1. October 1988. Task No. 20 - Lower Lakes. Contract No. DAAK11-84-D-0017. Prepared for: U.S. Army Program Manager's Office for RMA Contamination Cleanup.

RIC 87127R01A

EBASCO. 1988f. Final Phase II Data Addendum. Site 1-10: South Tank Farm. Version 3.1. October 1988. Task No. 2 - South Plants. Contract No. DAAK11-84-D-0017. Prepared for: U.S. Army Program Manager's Office for RMA Contamination Cleanup.

RIC 87127R07A

EBASCO. 1988g. Final Phase II Data Addendum. Site 1-9: Open Storage Area. Version 3.1. October 1988. Task No. 20 - Lower Lakes. Contract No. DAAK11-84-D-0017. Prepared for: U.S. Army Program Manager's Office for RMA Contamination Cleanup.

RIC 87127R05A

EBASCO. 1988h. Final Phase II Data Addendum. Site 1-8: Salvage Yard. Version 3.1. October 1988. Task No. 2 - South Plants. Contract No. DAAK11-84-D-0017. Prepared for: U.S. Army Program Manager's Office for RMA Contamination Cleanup.

RIC 87127R02A

EBASCO. 1988i. Final Phase II Data Addendum. Site 2-6: Open Storage Area. Version 3.1. October 1988. Task No. 2 - South Plants. Contract No. DAAK11-84-D-0017. Prepared for: U.S. Army Program Manager's Office for RMA Contamination Cleanup.

RIC 88166R01

EBASCO. 1988j. Final Phase I Contamination Assessment Report. Site 2-8: Former Tank Storage Area. Version 3.2. May 1988. Task No. 2 - South Plants. Contract No. DAAK11-84-D-0017. Prepared for: U.S. Army Program Manager's Office for RMA Contamination Cleanup.

RIC 88166R01A

EBASCO. 1988k. Final Phase II Data Addendum. Site 2-8: Former Tank Storage Area. Version 3.1. October 1988. Task No. 2 - South Plants. Contract No. DAAK11-84-D-0017. Prepared for: U.S. Army Program Manager's Office for RMA Contamination Cleanup.

RIC 87006R20A

EBASCO. 1988l. Final Phase II Data Addendum. Site 2-12: Former Tank Location. Version 3.1. October 1988. Task No. 2 - South Plants. Contract No. DAAK11-84-D-0017. Prepared for: U.S. Army Program Manager's Office for RMA Contamination Cleanup.

RIC 87216R06A

EBASCO. 1988m. Final Phase II Data Addendum. Site 2-1: Drainage Ditches. Version 3.1. October 1988. Task No. 20 - Lower Lakes. Contract No. DAAK11-84-D-0017. Prepared for: U.S. Army Program Manager's Office for RMA Contamination Cleanup.

RIC 87216R01A

EBASCO. 1988n. Final Phase II Data Addendum. Site 1-11: Sanitary Landfill. Version 3.1. September 1988. Task No. 2 - South Plants. Contract No. DAAK11-84-D-0017. Prepared for: U.S. Army Program Manager's Office for RMA Contamination Cleanup.

RIC 88286R09

EBASCO. 1988o. Final Phase I Contamination Assessment Report. Site 1-7: Hydrazine Blending and Storage Facility. Version 3.2. September 1988. Task No. 11. Contract No. DAAK11-84-D-0017. Prepared for: U.S. Army Program Manager's Office for RMA Contamination Cleanup.

RIC 87006R16A

EBASCO. 1988p. Final Phase II Data Addendum. Site 2-3: Lagoon. Version 3.1. September 1988. Task No. 2 - South Plants. Contract No. DAAK11-84-D-0017. Prepared for: U.S. Army Program Manager's Office for RMA Contamination Cleanup.

RIC 87216R02A

EBASCO. 1988q. Final Phase II Data Addendum. Site 2-2: Test Site. Version 3.1. September 1988. Task No. 2 - South Plants. Contract No. DAAK11-84-D-0017. Prepared for: U.S. Army Program Manager's Office for RMA Contamination Cleanup.

RIC 87216R04A

EBASCO. 1988r. Final Phase II Data Addendum. Site 2-13: Former Open Storage Area. Version 3.1. September 1988. Task No. 2 - South Plants. Contract No. DAAK11-84-D-0017. Prepared for: U.S. Army Program Manager's Office for RMA Contamination Cleanup.

RIC 87216R05A

EBASCO. 1988s. Final Phase II Data Addendum. Site 2-14a: Sanitary Landfill. Version 3.1. October 1988. Task No. 2 - South Plants. Contract No. DAAK11-84-D-0017. Prepared for: U.S. Army Program Manager's Office for RMA Contamination Cleanup.

RIC 88286R08

EBASCO. 1988t. Final Phase I Contamination Assessment Report. Chemical Sewers - North Plants and South Plants. Version 3.2. September 1988. Task No. 10. Contract No. DAAK11-84-D-0017. Prepared for: U.S. Army Program Manager's Office for RMA Contamination Cleanup.

RIC 88196R06

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RIC 88256R04

EBASCO. 1988w. Final Phase I Contamination Assessment Report. Process Water System. Version 3.2. August 1988. Task No. 10. Contract No. DAAK11-84-D-0017. Prepared for: U.S. Army Program Manager's Office for RMA Contamination Cleanup.

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RIC 88286R07

EBASCO. 1988y. Final Phase I Contamination Assessment Report. Site 1-13/2-18: South Plants Manufacturing Complex/Shell Chemical Company Spill Sites. Version 3.1. July 1988. Task No. 2 - South Plants. Contract No. DAAK11-84-D-0017. Prepared for: U.S. Army Program Manager's Office for RMA Contamination Cleanup.

RIC 88306R01

EBASCO. 1988z. Final Phase I Contamination Assessment Report. Data Presentation Report. South Plants Regional Study Area/South Plants Manufacturing Complex. Version 3.2. October 1988. Task No. 2 - South Plants. Contract No. DAAK11-84-D-0017. Prepared for: U.S. Army Program Manager's Office for RMA Contamination Cleanup.

RIC 88286R10

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RIC 87006R19A

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APPENDIX A
NONTARGET SCREENING

NONTARGET SCREENING

A number of nontarget contaminants were originally identified through a screen (i.e., toxicity, concentration, frequency of occurrence) of the nontarget fraction of the Phases I and II RI data as part of the RMA Chemical Index (EBASCO, 1988c/RIC88357R01). These contaminants were carried through to the exposure assessment where an additional screening was performed to determine whether PPLVs should be developed for each of the site-specific nontarget contaminants. Development of PPLVs for these contaminants was based on four screening criteria, namely, frequency of occurrence, similarity of the nontarget concentration to that of target contaminants, suspicion that the detection was a laboratory contaminant, and co-occurrence of nontargets with targets in Arsenal soils (see Volume VI-A, Section 2.2.3.1).

The results of the nontarget evaluations for each site of South Plants Study Area, their screening parameters, and the decision to further consider or reject them, are presented in Table A-1.

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APPENDIX B
SOUTH PLANTS STUDY AREA

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TABLE B-1
SOUTH PLANTS STUDY AREA EI_{REPS}

Site	Contaminant	SPPPLV (ug/kg)		Mean Concentrations (ug/kg)	EI _{REP}
SPSA-1a	Aldrin	2,900	Ind ^{1/}	28	9.5 10 ⁻³
	Benzene	21	Ind	1.2	0.057
	Carbon tetrachloride	40	Ind	25	0.62*
	Chloroform	83	Ind	10	0.12*
	Dibromochloropropane	2.8	Ind	1	0.65*
	Dicyclopentadiene	23	Ind	21	0.93*
	Dieldrin	1,300	Ind	3.0	2.3 x 10 ⁻³
	Hexachloro- cyclopentadiene	1,100	Ind	45	0.040
	Methylene chloroethane	44	Ind	0.97	0.022
	1,1,2,2-Tetrachloroethane	28	Ind	0.010	3.6 x 10 ⁻⁴
	Tetrachloroethylene	210	Ind	2.7	0.012
	SPSA-1e	Dicyclopentadiene	7,800	Ind	30
SPSA-2a	Methylene chloride	600	Ind	13	0.022
	Dicyclopentadiene	560	Ind	48	0.082
SPSA-26	Benzene	81	Ind	7.1	0.086
	Dicyclopentadiene	39	Ind	36	0.92*
	Methylene chloride	170	Ind	7.1	0.040
SPSA-2e	Benzene	74	Ind	5.0	0.067
	Dibromochloropropane	1.8	Rec ^{2/}	2.0	1.1*
	Dicyclopentadiene	56	Ind	320	5.7*
SPSA-3b	Aldrin	6,300	Rec	8.0	1.3 x 10 ⁻³
	Dieldrin	2,900	Rec	0.13	2.1 x 10 ⁻³
	Hexachloro- cyclopentadiene	120	Ind	0.29	2.4 x 10 ⁻³
SPSA-3c	Dicyclopentadiene	23	Ind	9.2	0.39*

TABLE B-2
SOUTH PLANTS STUDY AREA D_{CRT} 's

Site	Contaminant	D_{CRT} (m)
SPSA-1a	Carbon tetrachloride	1,680
	Chloroform	851
	Dibromochloropropane	1,680
	Dicyclopentadiene	2,358
SPSA-2b	Dicyclopentadiene	901
SPSA-2e	Dibromochloropropane	2,127
	Dicyclopentadiene	> study area boundary
SPSA-3e	Dicyclopentadiene	1180
SPSA-7c	Benzene	962
SPSA-10	Dibromochloropropane	NA ^{1/}

1/ Site SPSA-10 is the chemical sewer line. Since a distance from the center of the site could not be define, no D_{CRT} was computed for this site.