

**FINAL
STUDY AREA SCREENING
EVALUATION REPORT
FOR
BUILDING 56**

**NAVAL CONSTRUCTION BATTALION CENTER
DAVISVILLE, RHODE ISLAND**

**COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT**

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**Submitted by:
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1.0 INTRODUCTION

Halliburton NUS Corporation (HNUS) has prepared this SASE report summarizing the investigation activities that were performed by HNUS at Building 56 (the site) located at the Naval Construction Battalion Center (NCBC) in Davisville, Rhode Island. This report was prepared at the request of the United States Navy under Contract Task Order (CTO) Number 127 of the Comprehensive Long-Term Environmental Action Navy (CLEAN) Contract Number N62472-90-D-1298.

The objective of the Building 56 investigation was to verify the impact, if any, of the storage of materials inside Building 56 on the building interiors, soil beneath the building, and an associated drainage system.

This report includes: a description of the site; a discussion of the site's regulatory and operational history; a summary of the SASE sampling program; descriptions of potential contaminant migration pathways at the site, including groundwater, surface water, soil, and air pathways; evaluation of analytical data relevant to each contaminant migration pathway at the site; and an investigation summary and conclusions section.

2.0 SITE DESCRIPTION AND REGULATORY HISTORY

The following summarizes the site description and history presented in the Study Area Screening Evaluation Work Plan (TRC, 1993a). Building 56 is located in the northwestern portion of the Main Center of the NCBC-Davisville. The building was used for a variety of hazardous material mixing and storage operations. Currently, containerized hazardous materials are temporarily stored in the building prior to shipment for off-site disposal.

2.1 LOCATION

NCBC-Davisville is located in the northeast portion of the town of North Kingstown, Rhode Island, approximately 18 miles south of Providence (Figure 2-1). NCBC-Davisville is composed of three areas including the Main Center, the West Davisville storage area, and Camp Fogarty, a training facility located approximately four miles west of the Main Center (Figure 2-2). Adjoining the NCBC-Davisville boundary on the south is the decommissioned Naval Air Station- (NAS) Quonset Point that was declared excess to the Navy in April 1973.

Building 56 is located on the northwest portion of the Main Center of NCBC-Davisville. Residential property is located less than 1,000 feet northeast of the Building.

2.1.1 Site Description

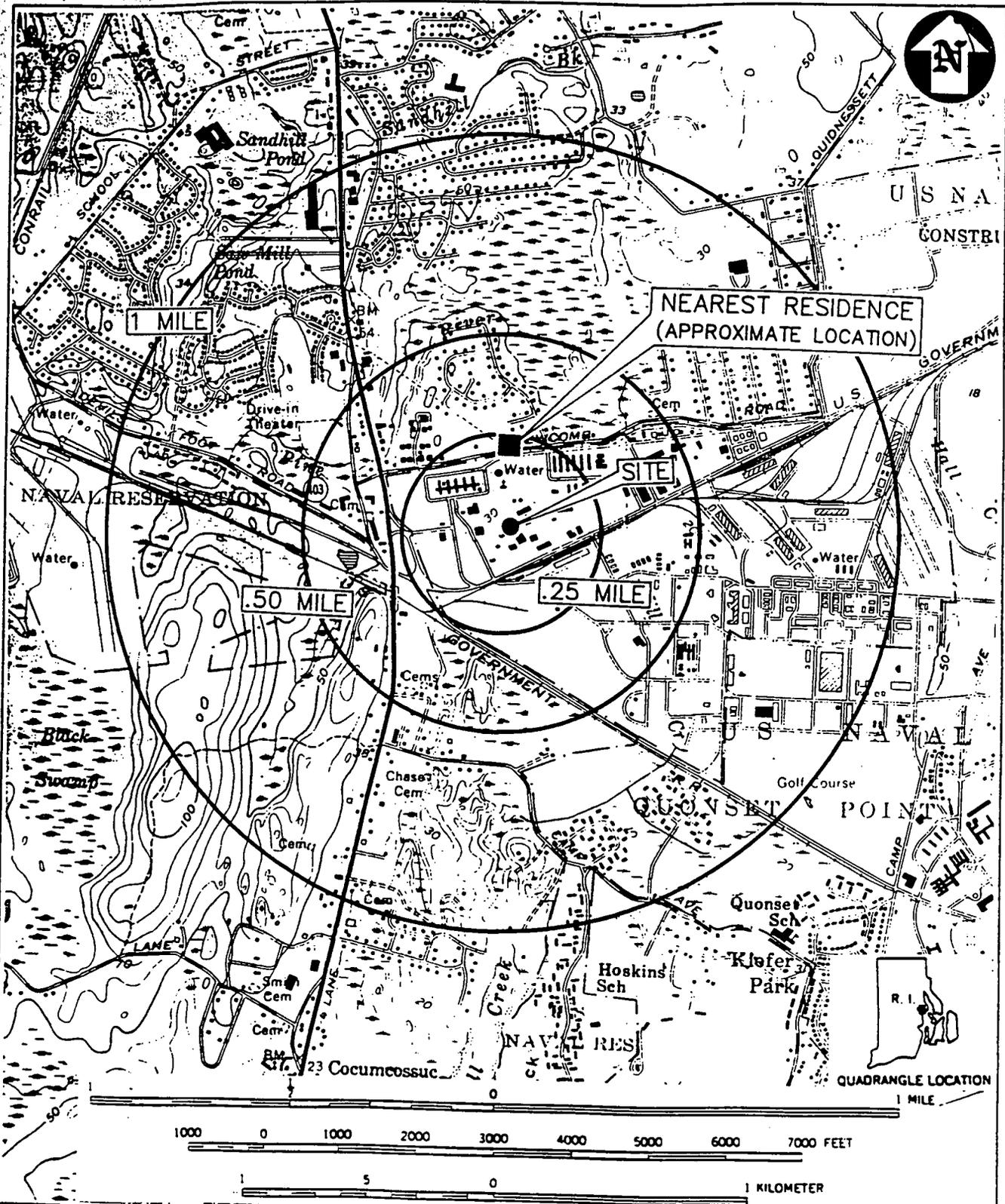
NCBC-Davisville was primarily used for training naval seamen in construction operations, and as storage and freight yards for construction materials. As a result, the site is comprised primarily of warehouse space and freight yards, most of which are presently empty. NCBC-Davisville closed on April 1, 1994. Most of the staff and materials have been moved offsite. Currently, facilities management and security staff engaged with base realignment remain on base.

Building 56 consists of a one story concrete building containing an office, a locker area, a storage room, and a garage area (Figure 2-3). The floor is concrete, and no floor drains were observed inside the building. The storage and garage area is accessed by a large overhead garage door, and contains a bermed area currently used for the storage of drummed waste.

The topography in the vicinity of the building is flat. The ground surface on three sides of the building is paved, the rear of the building is a gravel parking area. The area outside the garage door is an open concrete wash pad pitched to direct drainage to a sanitary sewer connection. A semi-permanent equipment ramp has been constructed over the central portion of the pad. The ramp is used by fork lifts and other drum handling equipment used to move wastes into the building. The ramp blocks access to the drain located within the pad. The drain ties in to a sanitary sewer line approximately 190 feet to the west.

2.2 PREVIOUS INVESTIGATIONS AND REGULATORY HISTORY

An investigation of the NCBC-Davisville was conducted as part of the Department of the Navy's Assessment and Control of Installation Pollutants (NACIP) program. The first phase of the NACIP program, the Initial Assessment Study (IAS), was completed by Fred C. Hart Associates in September 1984. The scope of this study was to identify areas on NCBC property where potential contamination from past waste disposal or handling practices may pose human health or environmental risks. Building 56 was not included in this study (TRC, 1993a), nor was Building 56 included in the Confirmation Study conducted by TRC in 1987 (TRC, 1987). Building 56 was included, however, in a Federal Facilities Interagency Agreement (FFA), signed by the Navy, the State of Rhode Island, and the EPA on March 23, 1992. The FFA was developed, in part, to ensure that environmental impacts associated



LOCATION MAP

BUILDING 56

US NAVY - NCBC DAVISVILLE, RI

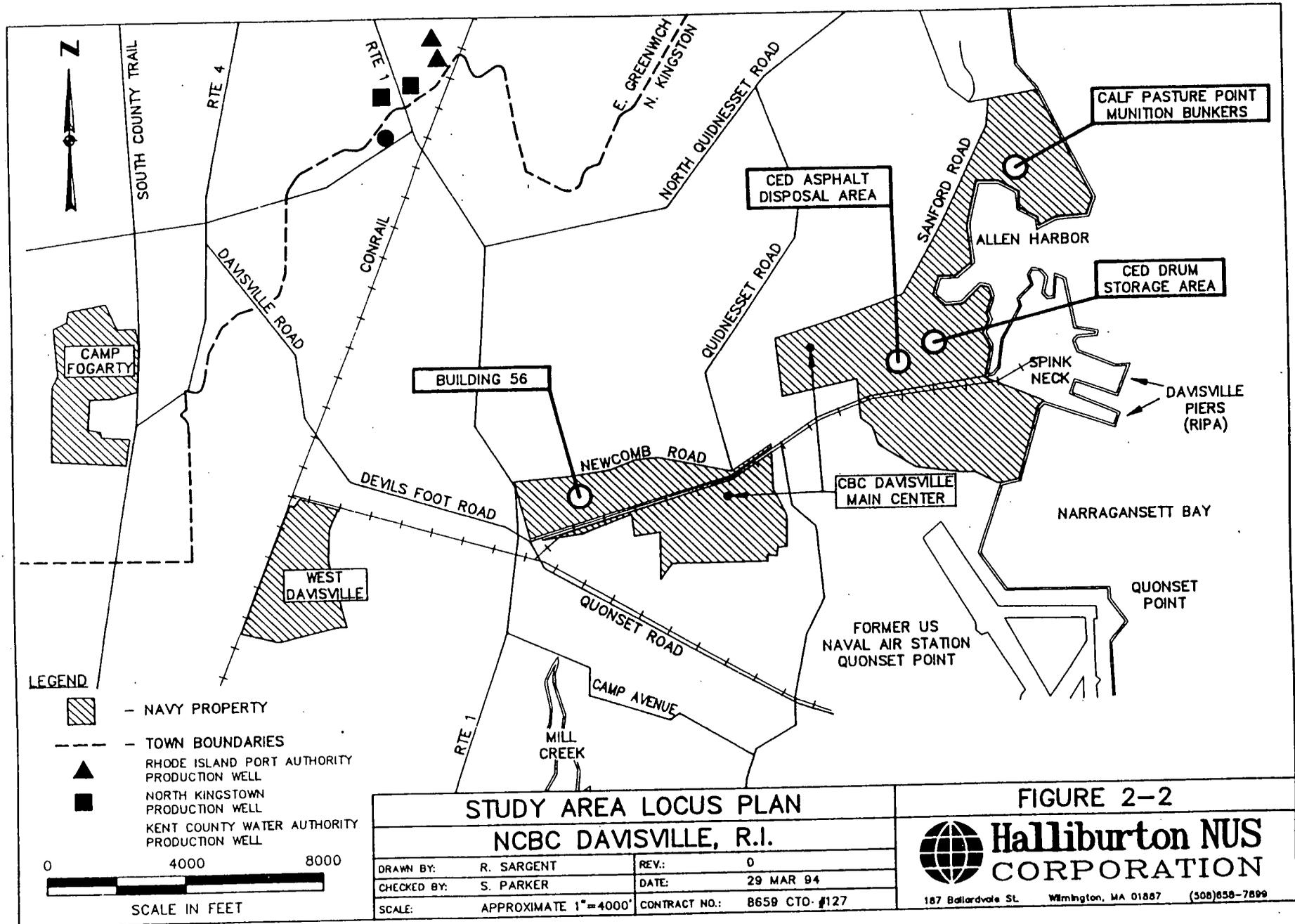
FIGURE 2-1



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187 Ballardvale St. Wilmington, MA 01887 (508)658-7899

DRAWN BY:	R. SARGENT	REV.:	0
CHECKED BY:	W. MARTIN	DATE:	21 OCT 93
SCALE:	AS SHOWN	PROJECT NO.:	8438 CTD #127



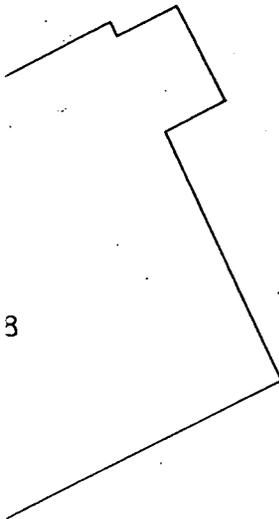
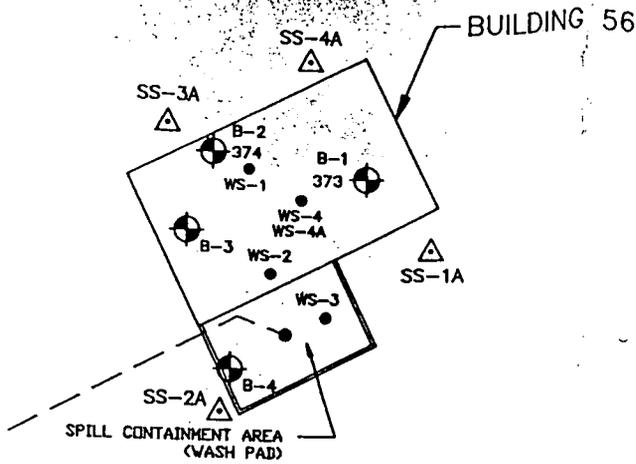
STUDY AREA LOCUS PLAN	
NCBC DAVISVILLE, R.I.	
DRAWN BY: R. SARGENT	REV.: 0
CHECKED BY: S. PARKER	DATE: 29 MAR 94
SCALE: APPROXIMATE 1"=4000'	CONTRACT NO.: 8659 CTO-#127

FIGURE 2-2



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3

LEGEND

- SURFACE SOIL SAMPLE LOCATION
- BORING LOCATION
- WIPE SAMPLE LOCATION
- MANHOLE
- FLOOR DRAIN
- DRAIN SAMPLE LOCATION
- UNDERGROUND SANITARY SEWER PIPE & DRAIN FROM BUILDING 56 (DIRECTION OF FLOW)

SITE MAP - SASE	
BUILDING 56	
NCBC DAVISVILLE, R.I.	
BY: R. SARGENT	REV.: 0
BY: G. GLENNON	DATE: 15 APR 94
1" = 30'	CONTRACT NO.: N62472-90-D-1298

FIGURE 2-3

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with past and present activities at NCBC are thoroughly investigated and remediated, as necessary. This Study Area Screening Evaluation was conducted to fulfill the requirements of the FFA relating to Building 56.

On April 7, 1992 TRC personnel inspected the internal and external structure and condition of the building, wastes located in the building, and the outdoor concrete pad and berm. No violations or significant problems were observed during the inspection (TRC, 1993a).

3.0 OPERATIONAL HISTORY AND SAMPLING PROGRAM

Reportedly, Building 56 was constructed in 1944 and was used to "re-refine oil" (TRC, 1993a). In the early 1950's the building was converted to paint storage, mixing, and spraying. Between 1960 and September 1984, Building 56 was used as a Pest Control Shop where pesticides were stored and mixed prior to use on-site. Table 3-1 lists pesticides commonly used at NCBC from 1951 to 1983 (Fred C. Hart, 1984).

In 1982 the Janitorial and Grounds shop was transferred from Building 67 to Building 56 (Fred C. Hart, 1984) and in 1983 the building was refurbished to its present condition, to consolidate pesticide mixing operations at NCBC-Davisville. The exterior concrete pad was built at this time, and was reportedly used as a location for rinsing pesticide application tanks after use. Rinsate from washing operations was routed to a drain in the wash pad which discharged into the sanitary sewer system. Mr. Richard Sassman, Engineering Technician NCBC-Davisville, reported the building was never used for the intended purpose of consolidating pesticide operations, however Mr. Sassman did report that the bermed pad adjacent to the building may have been used to mix pesticides during this timeframe.

Building 56 was classified as a Solid Waste Management Unit (SWMU) in 1980 when the site was issued a RCRA storage facility permit. Available information indicates that, at present, containerized hazardous materials at NCBC are temporarily stored (less than 90 days) in Building 56 awaiting off-site disposal (TRC, 1993a).

3.1 STUDY AREA SCREENING EVALUATION (SASE) SAMPLING PROGRAM

The SASE fieldwork activities, conducted by HNUS during June 1993 and February 1994, are summarized below.

3.1.1 Surficial Soil Sampling

On February 15, 1994, HNUS collected surface soil samples from a depth of 0'-1' at four locations at Building 56. Refer to Figure 2-3 for sample locations. The surface soil samples were analyzed for TCL organic compounds and TAL inorganic analytes. The results of the surface soil analyses are presented and discussed for each applicable exposure pathway in Sections 4.2, 6.2, and 7.2.

3.1.2 Subsurface Soil Sampling

On June 22 and 23, 1993, HNUS and subcontractor personnel advanced three soil borings (B-1, B-2, B-3) inside Building 56, through the concrete floor to a depth of 10 feet. A fourth boring (B-4) was advanced through the wash pad, southwest of the loading platform. The boring was advanced 81 feet to refusal. Bedrock was not confirmed. No groundwater monitoring wells were installed at these soil boring locations and the borings were closed by backfilling with a mixture of bentonite and sand. Boring locations are depicted on Figure 2-3. Continuous split barrel samples were collected in borings B-1, B-2, and B-3 within the building to a maximum of ten feet below ground surface. Continuous split barrel samples were collected from boring B-4 to the water table then collected every five feet to the top of bedrock. Soil samples were logged according to the Unified Soil Classification System. The subsurface soil samples collected from the 2'-4' interval were analyzed

TABLE 3-1
 PESTICIDES (HERBICIDES AND INSECTICIDES)
 COMMONLY USED AT NCBC DAVISVILLE AND NAS QUONSET POINT FROM 1951 TO 1983
 BUILDING 66
 DAVISVILLE, RHODE ISLAND

Year	Name	Active Percent	Amount in Storage	
1951	Mercury Compounds	Unknown	Unknown	
1967	2,4,5-T	Unknown	Unknown	
	Dureban 4E	Unknown	Unknown	
	Abate 4E	Unknown	Unknown	
1968	Diesel fuel	Unknown	Unknown	
1970	Aspon	Unknown	Unknown	
	Lead arsenate	Unknown	Unknown	
	Malathion	50	Unknown	
	Chlordane	74	Unknown	
1971	DDT	0.25	275 gal	
	Chlordane	5-10	610 lbs + 225 gals	
	DDT	5-15	100 lbs	
	Kerosene	10	40 gal	
	Methyl bromide	10	100 lbs	
	Baygon	1-13	8 gal	
	Malathion	4-57	250 lb + 90 gals	
	Naled	15	1 gal	
	Diazinon	10-17	10 gal + 10 lb	
	Kepone	12.5	5 lb	
	Abate	57	90 gal	
	Pyrethrum	6.6	30 lb + 40 gal	
	Dichlorvas	12.8	5 gal	
	Fumarin	0.25	250 lb	
	Diaphacinone	0.25	21 lb	
	Shoxin	0.5	10 bottles	
	Pival	0.25	15 lbs	
	Calcium cyanide	42	2 lbs	
	Genite 923	50	30 gal	
	Pentachlorophenol	4	20 gal	
	Pentagel	8.8	70 gal	
	2,4,5-T	68	20 gal	
	2,4-D	49	40 gal	
	Abate 4E	Unknown	Unknown	
	Sodium arsenite	Unknown	Unknown	
	1981	Diazinon	0.5	Unknown
	1982	Pyrethrum	0.5	Unknown
		Anticoagulant-Mice Inbait	0.25	Unknown
	1983	Chlordane	1.0	Unknown
		Duroban 2E	0.5	Unknown
OFU Vapo		0.5	Unknown	
Malathion		0.5	Unknown	
Sevin		Unknown	Unknown	
OFU Urox		0.5	Unknown	
Ficam W		0.5	Unknown	
Antiquac		0.25	Unknown	

for TCL organic compounds and TAL inorganic analytes. The results of the subsurface soil analyses are presented and discussed in Section 4.2. Boring logs and soil descriptions are presented in Appendix B.

The soil sample collected from the 0'-1' interval of each soil boring is considered to be a surface soil sample in the evaluation of each applicable exposure pathway in Sections 4.2, 6.2, and 7.2.

3.1.3 Drain Sampling

On June 29, 1993, HNUS collected a drain sediment sample from a sanitary sewer line approximately 190 feet southwest of Building 56 to evaluate the effect of site activities on the drain system. This drain was constructed during building renovations conducted in 1982. As previously discussed, the drain servicing the pad is located under a building service ramp, and is not readily accessible for sampling. This drain discharges directly to this sewer line; however, the sewer also accepted sanitary waste from a large base housing complex upgradient from this junction. The housing complex is currently vacant and pesticide mixing is reportedly no longer conducted at Building 56.

The sediment sample was analyzed for TCL organic compounds and TAL inorganic analytes. The results of the analyses are presented and discussed in Section 5.2.

3.1.4 Wipe Sampling

On June 30, 1993, HNUS collected wipe samples (WS-1 through WS-4) from four discolored areas of the floor and concrete pad of Building 56. On February 15, 1994, HNUS collected a duplicate wipe sample (WS-4A) from a location adjacent to location WS-4. Refer to Figure 2-3 for the wipe sample locations. The wipe samples were analyzed for TCL semivolatile organic compounds, pesticides, PCBs, and TAL inorganic analytes. The results of these analyses are discussed in Section 6.2.

4.0 GROUNDWATER PATHWAY

4.1 GROUNDWATER PATHWAY DESCRIPTION

This section provides information concerning the characteristics of the groundwater pathway at the site.

4.1.1 Regional Geology

NCBC-Davisville is located within the southern portion of the Narragansett Basin which is underlain primarily by the Rhode Island formation. The bedrock is folded and metamorphosed. Varying assemblages of quartz-mica-schist are mapped locally. Outcroppings are scattered in the vicinity of NCBC.

Unconsolidated sediments in the NCBC-Davisville area are glacial in origin, eroded and transported during the most recent glacial advance filling the existing valleys (Shafer, 1961). Overburden deposits are comprised of glacial till and outwash, consisting of sand, silt, clay, and gravel.

The till is characteristically poorly sorted, dense, and variable in texture. Outwash deposits from glacial meltwaters are composed of sorted sands, silts, and gravels deposited in streams (glaciofluvial deposits) or lakes (glaciolacustrine deposits). These units are characteristically less dense and more permeable than till.

Post-glacial deposits, including shore, swamp, and marsh deposits, have also been identified in the NCBC-Davisville area. The shore deposits are derived from shoreline marine processes and are composed of sands and gravels. The swamp deposits occur in freshwater swamps and salt water marshes and generally consist of organic peat and inorganic silt and sand (Shafer, 1961). The NCBC-Davisville area has been extensively altered by construction activities and emplacement of artificial fill materials.

4.1.2 Site Geology

This section presents the results of the soil and rock boring activities conducted at Building 56 during the SASE as they relate to the characterization of the site geology.

A review of boring logs indicate that the unconsolidated materials at Building 56 are comprised of sand with varying amounts of silt and gravel. Both uniformly fine grained sand graded and widely graded sands are described throughout the boring logs. Silt and gravel lenses were also noted in borings advanced at the site.

Surficial materials at Building 56 include outwash deposits consisting of fine to coarse sand and silty sand with thin silt and gravel interbeds. This sequence was observed to extend to a depth of 64 feet in boring B-4. From this depth, the unit becomes increasingly coarse grained. Refusal was encountered at 81 feet in a dense sand with numerous boulders.

There is no site-specific bedrock information available at Building 56.

4.1.3 Hydrogeology

Previous investigations, (TRC, 1982) have indicated that groundwater movement is from the western highlands, zones of recharge to the eastern low-lying areas, zones of discharge (Allen Harbor and Narragansett Bay).

Two potential sources of groundwater underlie the Coastal River basin: a lower, bedrock aquifer, and an upper unconsolidated aquifer. As previously reported, the bedrock beneath the NCBC-Davisville area consists of metamorphosed rock. This type of bedrock unit typically has a negligible amount of primary porosity and very limited secondary porosity (i.e. joints, fractures, bedding planes). Therefore, wells finished in the bedrock are not expected to yield large quantities of water (TRC, 1987).

The primary aquifer beneath the NCBC-Davisville area consists of glaciofluvial deposits. This subsurface reservoir is the principal source of potable water in the local area. Wells with specific capacities between 5 and 300 gallons per minute per foot of drawdown have been reported (TRC, 1987).

The water table at the site was encountered at a depth of 12 feet in borehole B-4. Site soils are primarily sand with low percentages of silt and are estimated to have a moderate to high hydraulic conductivity based on visual characteristics.

4.1.4 Water Supply Information

Building 56 is located in an area with a Rhode Island Department of Environmental Management (DEM) Class "GB" groundwater classification. "GB" classified groundwater is primarily located in highly urbanized areas or in the vicinity of disposal sites for solid waste, hazardous waste or sewage sludge, and may not be appropriate for human consumption without treatment, due to known or presumed deterioration.

No active groundwater supply wells exist at NCBC-Davisville on Navy property (TRC, 1993a). All potable water supplies within the NCBC area are supplied by groundwater sources. A group of five public groundwater supply wells is located near the intersection of U.S. Route 1 (Boston Post Road) and Route 402. These wells are located approximately 0.25 miles north-northwest of the site in the Hunt River reservoir. Two of the wells are owned and managed by the Town of North Kingstown, two of the wells are owned and managed by the Rhode Island Port Authority, and one well is owned and managed by the Kent County Water Authority.

Other public drinking water supply wells are located approximately 2.0 miles north of the NCBC area and are operated by the Rhode Island Port Authority and Economic Corporation (RIPA EC) and by the Water Works Commission of North Kingstown. RIPA obtains its water from a series of three groundwater supply wells located in the Hunt River Reservoir. The North Kingstown Water Department provides water to the non-military portion of Davisville and to North Kingstown. This water is produced by a series of ten groundwater supply wells located in North Kingstown. The North Kingstown Water Department indicated that all ten wells are actively used for water supply purposes. Approximately 30,000 people are served by these groundwater sources (TRC, 1993a).

The closest known private well to Building 56 is located approximately 1.7 miles northeast of the site, at the intersection of Quidnessett Road and Fletcher Road. Additional private wells are located to the west on Newcomb Road and Potter Road and further north on Fletcher Road.

Documented water supply wells are located in apparent upgradient and cross-gradient locations from Building 56. Therefore, it is unlikely that groundwater in the vicinity of the supply wells is impacted by site conditions.

4.2 GROUNDWATER PATHWAY DATA EVALUATION

This section provides an evaluation of the analytical data pertaining to contaminant migration from soils to groundwater, referred to as the groundwater pathway. The data evaluation tables in this and subsequent pathway data evaluation sections present only those analytes that were detected in at least one sample. The tables compare the maximum detected concentration of each analyte to the maximum background concentration (inorganic analytes only) and a risk-based Soil Screening Level (SSL). Frequency of detection is then only evaluated for those analytes with maximum detected concentrations which exceed the maximum background concentration (inorganic analytes only) and the SSL.

The source of maximum background concentrations in the data evaluation tables is the NCBC Draft Remedial Investigation Report presented by TRC Environmental Corporation (1993b). The background samples were collected by TRC from 7 unimpacted areas located as close to NCBC sites as possible. Identification of unimpacted areas was made on the basis of aerial photographs and the review of organic analytical data.

The groundwater pathway SSL is a chemical concentration in soil which represents a level of contamination above which there is a potential for migration of the specific compound to groundwater. A contaminant concentration exceeding the SSL may represent sufficient concern to warrant further site-specific study. Contaminant concentrations in soil which exceed the screening level would not necessarily designate a site as contaminated, nor trigger a response action. However, they may suggest that a further evaluation of potential risks posed by the site may be appropriate. Further evaluation of SSL exceedances include consideration of the frequency of detection and evaluation of the magnitude of the specific SSL exceedance.

The source of the SSLs presented in the data evaluation tables is the EPA Draft Soil Screening Level Guidance (September 1993). SSL values proposed by EPA are presented, when available. SSLs for analytes for which EPA has not proposed an SSL were calculated by applying a partitioning equation provided in the Draft SSL Guidance to the following groundwater standards, in order of precedence: non-zero Maximum Contaminant Level Goal (MCLG); Maximum Contaminant Level (MCL); and an aqueous concentration corresponding to a 10^{-6} risk for carcinogens or a hazard quotient of 1 for noncarcinogens. A dilution and attenuation factor (DAF) of 10, which the Draft Guidance suggests is generally appropriate, was then applied to the calculated SSL value. In certain cases where there were insufficient data to calculate an SSL for an analyte, data for a chemically similar analyte were used. The spreadsheet and source documents used to calculate the SSLs are presented in Appendix C. This spreadsheet indicates the source of each SSL used in the data evaluation tables.

4.2.1 Surface Soil

Tables 4-1 and 4-2 present a summary of the analytical data for the surface soil samples collected from eight locations at Building 56. Surface soil samples were collected from a depth of less than one foot below the ground surface, and include the surface sample collected from each soil boring. Sample locations SS-3A and SS-4A were collected north of the Building in unpaved areas; other surficial soil samples were collected beneath the building slab or paved areas.

A total of 32 organic compounds and 17 inorganic analytes were detected in surficial soils.

TABLE 4-1
GROUNDWATER PATHWAY DATA EVALUATION
ORGANIC COMPOUNDS IN SURFACE SOIL SAMPLES
FROM 8 LOCATIONS
BUILDING 56
DAVISVILLE, RHODE ISLAND

COMPOUND	MAXIMUM DETECTED CONCENTRATION (µg/kg)	GROUND-WATER SSL (µg/kg)	MAXIMUM DETECTED CONCENTRATION > SSL?	FREQUENCY OF DETECTION
Methylene chloride	27	7.0	Yes	5/8
Acetone	27	1,020	No	NE
2-Butanone	10 J	1,600	No	NE
Tetrachloroethene	4 J	30.0	No	NE
Acenaphthene	64 J	194,200	No	NE
2,4-Dinitrotoluene	21 J	NA	NE	1/8
Fluorene	21 J	205,400	No	NE
Phenanthrene	220 J	1,060,000	No	NE
Carbazole	22 J	NA	NE	1/8
Anthracene	62 J	2,940,000	No	NE
Fluoranthene	540	1,060,000	No	NE
Pyrene	490	799,000	No	NE
Butylbenzylphthalate	30 J	341,000	No	NE
Benzo(a)anthracene	240	1,400	No	NE
Chrysene	280	400	No	NE
bis(2-Ethylhexyl)phthalate	55 J	1.00E + 8	No	NE
di-n-Octyl phthalate	130 J	5.04E + 10	No	NE
Benzo(b)fluoranthene	250	3,200	No	NE
Benzo(k)fluoranthene	250	3,200	No	NE
Benzo(a)pyrene	200	7,100	No	NE
Indeno(1,2,3-cd)pyrene	110	13,800	No	NE
Dibenz(a,h)anthracene	36	20,800	No	NE
Benzo(g,h,i)perylene	88	1,700	No	NE
di-n-Butylphthalate	100 J	11,900,000	No	NE
alpha-BHC	9.2 J	1.0	Yes	1/8
Endrin	5.7 J	1,070	No	NE
4,4'-DDE	8.6	1,910	No	NE
Endosulfan II	5 J	1,000	No	NE
4,4'-DDD	5.3 J	1,220	No	NE
Endrin aldehyde	7.4 J	1,070	No	NE
alpha-Chlordane	14 J	2,000	No	NE
gamma-Chlordane	8.5 J	2,000	No	NE
Aroclor-1260	140 J	8,200	No	NE

J Quantitation is approximate.
NA Not Available.
NE Not Evaluated.

TABLE 4-2
GROUNDWATER PATHWAY DATA EVALUATION
INORGANIC ANALYTES IN SURFACE SOIL SAMPLES
FROM 8 LOCATIONS
BUILDING 56
DAVISVILLE, RHODE ISLAND

ANALYTE	MAXIMUM DETECTED CONCENTRATION (mg/kg)	MAXIMUM BACKGROUND CONCENTRATION (mg/kg)	MAXIMUM DETECTED CONCENTRATION > MAXIMUM BACKGROUND?	GROUND-WATER SSL (mg/kg)	MAXIMUM DETECTED CONCENTRATION > SSL?	FREQUENCY OF DETECTION
Aluminum	5,780	8,560	No	NE	NE	NE
Arsenic	1.5	8.1	No	NE	NE	NE
Barium	66.3 J	15.5	Yes	543	No	NE
Beryllium	0.65	0.66	No	NE	NE	NE
Calcium	4,700	628	Yes	NE ⁽¹⁾	NE	NE
Chromium	13.4	9.6	Yes	2,210	No	NE
Cobalt	4.3	4.6	No	NE	NE	NE
Copper	7.1	15	No	NE	NE	NE
Iron	11,400	12,000	No	NE	NE	NE
Lead	208	53.8	Yes	15.9	Yes	8/8
Magnesium	2,440	1,220	Yes	NE ⁽¹⁾	NE	NE
Manganese	155	150	Yes	261	No	NE
Nickel	7.3	5	Yes	82.0	No	NE
Potassium	1,370	728	Yes	NE ⁽¹⁾	NE	NE
Sodium	313	119	Yes	NE ⁽¹⁾	NE	NE
Vanadium	13.6	24.6	No	NE	NE	NE
Zinc	224	172	Yes	1,730	No	NE

J Quantitation is approximate.
NE Not Evaluated.

(1) Analyte is an essential human nutrient.

Four volatile organic compounds were detected in surficial soil samples. Methylene chloride and acetone were both detected at maximum concentrations of 27 micrograms per kilogram ($\mu\text{g}/\text{kg}$) (Table 4-1). Tetrachloroethene was detected at a maximum concentration of 4 $\mu\text{g}/\text{kg}$; and 2-butanone was detected in one sample at a concentration of 10 $\mu\text{g}/\text{kg}$. Only methylene chloride exceeded its groundwater SSL (7.0 $\mu\text{g}/\text{kg}$).

Nineteen semivolatile organic compounds were detected in site surficial samples. These compounds included PAHs and phthalate compounds. SSLs are not available for two of these compounds: 2,4-dinitrotoluene (one detect at a concentration of 21 $\mu\text{g}/\text{kg}$), and carbazole (one detect at a concentration of 22 $\mu\text{g}/\text{kg}$). The other semivolatile organic compounds were detected below their respective groundwater SSLs.

Eight pesticides were detected in surficial soils at low concentrations: alpha-BHC, endrin, 4,4'-DDE, endosulfan II, 4,4'-DDD, endrin aldehyde, alpha-chlordane, and gamma-chlordane. Each was detected at a frequency of 1/8. All were detected at maximum concentrations below 10 $\mu\text{g}/\text{kg}$. Alpha-BHC was detected above its groundwater SSL; others were detected below their respective groundwater SSLs.

A single detect of a PCB, Aroclor-1260 was noted in a surface soil sample at a concentration of 140 $\mu\text{g}/\text{kg}$. This is also below the PCB groundwater SSL of 8,200 $\mu\text{g}/\text{kg}$.

Seventeen inorganic analytes were detected in the surface soil samples (Table 4-2). Of these, ten were detected at concentrations which exceeded the maximum background concentration. Four of these analytes, calcium, magnesium, potassium, and sodium, were not evaluated further because they are considered essential human nutrients.

Of the remaining six analytes, only lead was detected at a concentration which exceeded its groundwater SSL. Lead was detected at a maximum concentration of 208 mg/kg and a frequency of 8/8. Lead was detected at concentrations above the SSL at a frequency of 4/8 in surficial soils at the site.

4.2.2 Subsurface Soil

Tables 4-3 and 4-4 present an evaluation of the analytical data for the subsurface soil samples collected from four boreholes at Building 56.

Of the 32 organic compounds detected in surficial soils, only four were detected in subsurface soils: methylene chloride, acetone, di-n-octylphthalate, and di-n-butylphthalate. Methylene chloride was the only compound in the group which was detected above its groundwater SSL of 7.0 $\mu\text{g}/\text{kg}$. Other organic compounds, which are primarily strongly hydrophobic compounds, are tied up in surficial soils and do not typically migrate to subsurface soils.

Sixteen inorganic analytes were detected in subsurface soil samples (Table 4-4). Of these, three were detected at concentrations which exceeded the maximum background concentration: arsenic, calcium, and thallium. One of these analytes, calcium, was not evaluated further because it is considered an essential human nutrient.

Of the remaining two analytes, only arsenic was detected at a concentration which exceeded its groundwater SSL. Arsenic was detected at a concentration of 31.7 mg/kg in a sample collected 2-4 feet below ground surface at borehole B-4. The SSL is 14 mg/kg . This was the only positive detection of arsenic at the site.

TABLE 4-3
GROUNDWATER PATHWAY DATA EVALUATION
ORGANIC COMPOUNDS IN SUBSURFACE SOIL SAMPLES
FROM 4 LOCATIONS
BUILDING 56
DAVISVILLE, RHODE ISLAND

COMPOUND	MAXIMUM DETECTED CONCENTRATION (µg/kg)	GROUND-WATER SSL (µg/kg)	MAXIMUM DETECTED CONCENTRATION > SSL?	FREQUENCY OF DETECTION
Methylene chloride	35	7.0	Yes	2/4
Acetone	64 J	1,020	No	NE
di-n-Octylphthalate	150	5.04E + 10	No	NE
di-n-Butylphthalate	100 J	11,900,000	No	NE

J Quantitation is approximate.
 NE Not Evaluated.

**TABLE 4-4
GROUNDWATER PATHWAY DATA EVALUATION
INORGANIC ANALYTES IN SUBSURFACE SOIL SAMPLES
FROM 4 LOCATIONS
BUILDING 56
DAVISVILLE, RHODE ISLAND**

ANALYTE	MAXIMUM DETECTED CONCENTRATION (mg/kg)	MAXIMUM BACKGROUND CONCENTRATION (mg/kg)	MAXIMUM DETECTED CONCENTRATION > MAXIMUM BACKGROUND?	GROUND-WATER SSL (mg/kg)	MAXIMUM DETECTED CONCENTRATION > SSL?	FREQUENCY OF DETECTION
Aluminum	2,900	8,560	No	NE	NE	NE
Arsenic	31.7	8.1	Yes	14.0	Yes	1/4
Barium	8.2	15.5	No	NE	NE	NE
Beryllium	0.42	0.66	No	NE	NE	NE
Calcium	2,180	628	Yes	NE ⁽¹⁾	NE	NE
Chromium	3.9	9.6	No	NE	No	NE
Cobalt	2.3	4.6	No	NE	NE	NE
Copper	2.6	15	No	NE	NE	NE
Iron	5,070	12,000	No	NE	NE	NE
Lead	3.2 J	53.8	No	NE	NE	NE
Magnesium	588	1,220	No	NE	NE	NE
Manganese	89	150	No	NE	NE	NE
Potassium	475	728	No	NE	NE	NE
Thallium	13.6	ND	Yes	300	No	NE
Vanadium	3.3	24.6	No	NE	NE	NE
Zinc	23.1	172	No	NE	NE	NE

J Quantitation is approximate.

NA Not Available.

ND Not Detected.

NE Not Evaluated.

(1) Analyte is an essential human nutrient.

No site-specific groundwater data are available.

Organic contaminants generally do not migrate from surface to subsurface soils in concentrations above groundwater SSLs. The only inorganic contaminant detected in subsurface soil samples at a concentration exceeding its groundwater SSL was arsenic, which was detected at one subsurface soil sample location (B4-S2). Arsenic was not detected in the associated surface soil sample (B4-S1). Lead concentrations in all of the subsurface soil samples were below the maximum background concentration and SSL. Based on this evaluation, the potential for the migration of contaminants to groundwater at the site is low.

5.0 SURFACE WATER PATHWAY

5.1 SURFACE WATER PATHWAY DESCRIPTION

NCBC-Davisville is located within the Potowomut-Wickford drainage basin, which comprises approximately 60 square miles in the central-south portion of Rhode Island. Streams divide the basin into several sub-basins. Building 56 lies within the Coastal River basin which drains from the highlands to the west and discharges into Narragansett Bay.

The topography in the vicinity of the building is flat. The area around the building is paved with bituminous concrete and packed gravels. The open concrete wash pad on the southeast corner of the building is pitched to direct runoff into a sanitary sewer line which discharges at the Rhode Island Port Authority wastewater treatment plant at Quonset Point.

Runoff from the other areas of the site is directed into the storm sewer system which discharges into Mill Creek located east of Building 56. Mill Creek flows through culverts for approximately 0.4 miles and then flows through a system of man-made channels before draining into Mill Cove (TRC, 1987).

Annual precipitation in the area has ranged from 24.8 to 66.2 inches with an average of 42.3 inches. The frequency of measurable precipitation events (0.01 inch or greater) averages once every three days and is evenly distributed throughout the year. The average snowfall is almost 40 inches and has varied from 11.3 to 75.6 inches (TRC, 1993a).

No year-round water bodies or water run-off channels were identified on the site during the SASE investigation. Surface runoff channels are poorly developed at the site because precipitation rapidly infiltrates into the relatively high-permeability soils. Water not entering the storm water culvert system will therefore exit the site through the groundwater pathway.

Shellfishing in Allen Harbor, an arm of Narragansett Bay, has been closed since approximately 1986 due to the presence of contaminants in the sediment in proximity to Calf Pasture Point landfill. Various species and varieties of finfish, squid, and lobster are caught in Narragansett Bay (RIDEM, 1989).

5.2 SURFACE WATER PATHWAY DATA EVALUATION

This section provides an evaluation of the analytical results from a drain sediment sample collected from a sanitary sewer line approximately 190 feet southwest of Building 56. The analytical results are presented in Tables 5-1 and 5-2. In accordance with the work plan, no surface water or sediment samples were collected from the storm water system.

Five pesticide-related compounds which were associated with past pesticide mixing and storage activities at Building 56 were detected in the drain sediment sample (Table 5-1). These five compounds (1,4-dichlorobenzene, endrin, endrin aldehyde, alpha-chlordane, and gamma-chlordane) are used as pesticides and fumigants. The concentrations of compounds detected in the drain sediment may be diluted by inflow of additional sediment from the housing complex. The sewer is a sanitary sewer, and reportedly, sediment is not readily introduced into the system except through the Building 56 drain. The quantity of sediment accumulated in the drain did not cover the bottom surface of the drain.

TABLE 5-1
SURFACE WATER PATHWAY DATA EVALUATION
ORGANIC COMPOUNDS IN A DRAIN SEDIMENT SAMPLE
BUILDING 56
DAVISVILLE, RHODE ISLAND

COMPOUND	DETECTED CONCENTRATION ($\mu\text{g}/\text{kg}$)
1,4-Dichlorobenzene	69 J
Phenanthrene	600 J
Anthracene	140 J
Carbazole	92 J
Fluoranthene	1,600 J
Pyrene	760 J
Butylbenzylphthalate	160 J
di-n-Butylphthalate	74 J
Benzo(a)anthracene	760
Chrysene	860
Benzo(b)fluoranthene	880
Benzo(k)fluoranthene	620
Benzo(a)pyrene	720
Indeno(1,2,3-cd)pyrene	660
Dibenz(a,h)anthracene	230 J
Benzo(g,h,i)perylene	480
Endrin	11 J
Endrin aldehyde	32 J
alpha-Chlordane	46
gamma-Chlordane	50

J Quantitation is approximate.

TABLE 5-2
SURFACE WATER PATHWAY DATA EVALUATION
INORGANIC ANALYTES IN A DRAIN SEDIMENT SAMPLE
BUILDING 56
DAVISVILLE, RHODE ISLAND

ANALYTE	DETECTED CONCENTRATION (mg/kg)
Aluminum	3,760
Arsenic	3.1
Barium	61.5 J
Calcium	2,000 J
Chromium	10.2 J
Cobalt	3.3
Copper	589
Iron	15,300
Lead	391 J
Magnesium	1,310 J
Manganese	131
Mercury	2.2
Nickel	7.8
Potassium	721 J
Silver	198
Sodium	1,170 J
Vanadium	7.8 J
Zinc	1,460

J Quantitation is approximate.

A total of fifteen other organic compounds were detected at relatively low concentrations from 74 $\mu\text{g}/\text{kg}$ (di-n-butylphthalate) to 1,600 $\mu\text{g}/\text{kg}$ (fluoranthene). These compounds include PAHs, and phthalates. The pavement surrounding Building 56 is a potential source of these compounds detected in the sediment sample.

No PCBs were detected in the sediment sample.

Eighteen metals were detected in the drain sample (Table 5-2). Several of these are components of various pesticides. Copper was detected at 589 milligrams per kilogram; mercury was present at 2.2 mg/kg; arsenic was detected at 3.1 mg/kg; lead was detected at 1.4 mg/kg; zinc was detected at 1,460 mg/kg; and chromium was detected at 10.2 mg/kg.

Pesticides were mixed and discharged into the Building 56 pad drain for a limited period in 1982. Building 56 facilities are no longer used in conjunction with pesticide mixing operations. There is no human contact with the small quantities of sediment retained in the drain. This sediment will eventually be discharged to the wastewater treatment plant.

6.0 SOIL EXPOSURE PATHWAY

6.1 SOIL EXPOSURE PATHWAY DESCRIPTION

The evaluation of the soil exposure pathway data in the following section assumes a residential reuse scenario for Building 56.

Access to the site is currently restricted by a barbed wire and chain link fence; however, this evaluation considers that there is unrestricted access to the site and to the building interior. Building 56 is currently locked when not occupied. The area around Building 56 is paved and the soils which are evaluated at the site are mostly covered by pavement and the Building slab. This evaluation is conducted, however, assuming unrestricted access to soils at the site.

6.2 SOIL EXPOSURE PATHWAY DATA EVALUATION

This section provides an evaluation of the analytical data pertaining to the soil exposure pathway. This pathway addresses a scenario which assumes long-term daily exposure via ingestion of soil (U.S. EPA, 1993). The data evaluation tables presented in this section were developed using the approach discussed in Section 4.2.

The soil exposure pathway SSL is a chemical concentration in soil that represents a level of contamination above which there may be sufficient concern to warrant further site-specific study. Contaminant concentrations in soil which exceed the screening level would not necessarily designate a site as contaminated, nor trigger a response action. However, they may suggest that a further evaluation of potential risks posed by the site may be appropriate. Further evaluation of SSL exceedances includes consideration of the frequency of detection and evaluation of the magnitude of the specific SSL exceedance.

The source of the SSLs presented in the data evaluation tables is the EPA Draft Soil Screening Level Guidance (September 1993). SSL values proposed by EPA are presented, when available. SSLs for analytes for which EPA has not proposed an SSL were calculated by applying an equation provided in the Draft SSL Guidance to the Oral Slope Factor for carcinogens or Oral Reference Dose for noncarcinogens. In certain cases where there was insufficient data to calculate an SSL for an analyte, data for a chemically similar analyte was used. The spreadsheet and source documents used to calculate the SSLs are presented in Appendix C. This spreadsheet indicates the source of each SSL used in the data evaluation tables.

6.2.1 Surface Soil

Tables 6-1 and 6-2 present an evaluation of the analytical data for the surface soil samples collected from eight locations at Building 56. Surface soil samples are considered to be soil samples collected at a depth of less than one foot from the ground surface, including the top sample collected from each soil boring.

A total of 32 organic compounds and 17 inorganic analytes were detected in surficial soils.

Four volatile organic compounds were detected in surficial soil samples. Methylene chloride, acetone, tetrachloroethene, and 2-butanone were detected at low concentrations below their compound specific soil exposure SSL (Table 6-1).

TABLE 6-1
SOIL EXPOSURE PATHWAY DATA EVALUATION
ORGANIC COMPOUNDS IN SURFACE SOIL SAMPLES
FROM 8 LOCATIONS
BUILDING 56
DAVISVILLE, RHODE ISLAND

COMPOUND	MAXIMUM DETECTED CONCENTRATION (µg/kg)	SOIL EXPOSURE SSL (µg/kg)	MAXIMUM DETECTED CONCENTRATION > SSL?	FREQUENCY OF DETECTION
Methylene chloride	27	85,000	No	NE
Acetone	27	7,820,000	No	NE
2-butanone	10 J	3,910,000	No	NE
Tetrachloroethene	4 J	12,000	No	NE
Acenaphthene	64 J	4,690,000	No	NE
2,4-Dinitrotoluene	21 J	NA	NE	1/8
Fluorene	21 J	3,130,000	No	NE
Phenanthrene	220 J	3,130,000	No	NE
Carbazole	22 J	NA	NE	1/8
Anthracene	62 J	23,500,000	No	NE
Fluoranthene	540	3,130,000	No	NE
Pyrene	490	2,350,000	No	NE
Butylbenzylphthalate	30 J	15,600,000	No	NE
Benzo(a)anthracene	240	9.0	Yes	3/8
Chrysene	280	110,000	No	NE
bis(2-Ethylhexyl)phthalate	55 J	4,570	No	NE
di-n-Octyl phthalate	130 J	1,560,000	No	NE
Benzo(b)fluoranthene	250	9.0	Yes	3/8
Benzo(k)fluoranthene	250	9.0	Yes	3/8
Benzo(a)pyrene	200	110	Yes	3/8
Indeno(1,2,3-cd)pyrene	110	9.0	Yes	3/8
Dibenz(a,h)anthracene	36	9.0	Yes	2/8
Benzo(g,h,i)perylene	88	NA	No	NE
di-n-Butylphthalate	100 J	7,820,000	No	NE
alpha-BHC	9.2 J	100	No	NE
Endrin	5.7 J	23,500	No	NE
4,4'-DDE	8.6	188	No	NE
Endosulfan II	5 J	469,000	No	NE
4,4'-DDD	5.3 J	267	No	NE
Endrin aldehyde	7.4 J	23,500	No	NE
alpha-Chlordane	14 J	490	No	NE
gamma-Chlordane	8.5 J	490	No	NE
Aroclor-1260	140 J	1,000	No	NE

J Quantitation is approximate.
NA Not Available.
NE Not Evaluated.

TABLE 6-2
SOIL EXPOSURE PATHWAY DATA EVALUATION
INORGANIC ANALYTES IN SURFACE SOIL SAMPLES
FROM 8 LOCATIONS
BUILDING 56
DAVISVILLE, RHODE ISLAND

ANALYTE	MAXIMUM DETECTED CONCENTRATION (mg/kg)	MAXIMUM BACKGROUND CONCENTRATION (mg/kg)	MAXIMUM DETECTED CONCENTRATION > MAXIMUM BACKGROUND?	SOIL EXPOSURE SSL (mg/kg)	MAXIMUM DETECTED CONCENTRATION > SSL?	FREQUENCY OF DETECTION
Aluminum	5,780	8,560	No	NE	NE	NE
Arsenic	1.5	8.1	No	NE	NE	NE
Barium	66.3 J	15.5	Yes	5,470	No	NE
Beryllium	0.65	0.66	No	NE	NE	NE
Calcium	4,700	628	Yes	NE ⁽¹⁾	NE	NE
Chromium	13.4	9.6	Yes	78,200	No	NE
Cobalt	4.3	4.6	No	NE	NE	NE
Copper	7.1	15	No	NE	NE	NE
Iron	11,400	12,000	No	NE	NE	NE
Lead	208	53.8	Yes	150 ⁽²⁾	Yes	8/8
Magnesium	2,440	1,220	Yes	NE ⁽¹⁾	NE	NE
Manganese	155	150	Yes	391	No	NE
Nickel	7.3	5	Yes	1,600	No	NE
Potassium	1,370	728	Yes	NE ⁽¹⁾	NE	NE
Sodium	313	119	Yes	NE ⁽¹⁾	NE	NE
Vanadium	13.6	24.6	No	NE	NE	NE
Zinc	224	172	Yes	23,500	No	NE

J Quantitation is approximate.

NA Not Available.

NE Not Evaluated.

(1) Analyte is an essential human nutrient.

Nineteen semi-volatile organic compounds were detected in site surficial samples. These compounds included PAHs and phthalate compounds. SSLs are not available for two of these compounds, 2,4-dinitrotoluene (one detect at a concentration of 21 J), and carbazole (one detect at a concentration of 22 J).

Six PAHs were detected in the surface soil samples at concentrations which exceeded their soil exposure SSLs: benzo(a)anthracene; benzo(b)fluoranthene; benzo(k)fluoranthene; benzo(a)pyrene; indeno(1,2,3-cd)pyrene; and dibenz(a,h)anthracene. Exceedances of SSL concentrations occurred in three of the eight surficial samples collected. The pavement surrounding Building 56 is a potential source of the PAHs detected in the surface soil samples. Based on the observed distribution of PAHs, additional evaluation of the occurrence of PAHs may be warranted at the site.

Eight pesticides were detected in surficial soils at low concentrations; each at a frequency of detection of 1/8. Alpha-BHC, endrin, 4,4'-DDE, endosulfan II, 4,4'-DDD, endrin aldehyde, and alpha- and gamma-chlordane were detected at maximum concentrations below 10 µg/kg, and below their respective soil exposure SSLs.

A single detect of a PCB, Aroclor-1260, was noted in a surface soil sample at a concentration of 140 J µg/kg. This is also below the soil exposure SSL.

Seventeen inorganic analytes were detected in surface soil samples (Table 6-2). Of these, ten were detected at a concentration which exceeded the maximum respective background concentration. Four of these analytes, calcium, magnesium, potassium, and sodium, were not evaluated further because they are considered essential human nutrients. Of the remaining analytes, only lead was detected at concentrations which exceeded its soil exposure SSL of 150 mg/kg. Lead was detected at a maximum concentration of 208 mg/kg and a frequency of 8/8. However, lead was detected in concentrations above the soil exposure SSL in only one surficial soil sample collected at the site. The occurrence of lead above soil exposure SSLs appears to be very limited at the site.

The Rhode Island Department of Health (1992) "lead-free" standard for soil was used in the evaluation of the lead results. This standard, 150 mg/kg, is designed to be protective of children in residential settings. Lead was detected over the "lead-free" standard in only one surface soil sample (SS-4A). This singular occurrence of lead above a regulatory level may pose a minimal risk at the site.

6.2.2 Wipe Samples

Tables 6-3 and 6-4 present an evaluation of the analytical results from wipe sampling conducted in Building 56 in June 1993 and February 1994. This evaluation considers unrestricted access to the interior of Building 56.

Since national standards for contamination of building interiors have not been established, the maximum concentration of each analyte detected in wipe samples from five locations inside Building 56 is compared to a Building Interior Cleanup Standard proposed by the New Jersey Department of Environmental Protection (1992). New Jersey's proposed clean-up standards adopt existing regulatory standards, such as the 1990 U.S. Department of Housing and Urban Development (HUD) clearance criteria for lead abatement projects, and use models to calculate contaminant-specific clean-up goals.

TABLE 6-3
SOIL EXPOSURE PATHWAY DATA EVALUATION
ORGANIC COMPOUNDS IN WIPE SAMPLES
FROM 5 LOCATIONS
BUILDING 56
DAVISVILLE, RHODE ISLAND

COMPOUND	MAXIMUM DETECTED CONCENTRATION ($\mu\text{g}/100 \text{ cm}^2$)	NEW JERSEY CLEANUP STANDARD ⁽¹⁾ ($\mu\text{g}/100 \text{ cm}^2$)	MAXIMUM DETECTED CONCENTRATION > NJCS?	FREQUENCY OF DETECTION
Acenaphthene	6 J	2.2	Yes	1/5
Dibenzofuran	8 J	NA	NE	1/5
Fluorene	8 J	1.5	Yes	1/5
Phenanthrene	27	NA	NE	2/5
Anthracene	6 J	10.9	Yes	1/5
Carbazole	2 J	NA	NE	2/5
di-n-Butylphthalate	2 J	3.6	Yes	5/5
Fluoranthene	34	1.5	Yes	3/5
Pyrene	25	1.1	Yes	2/5
Butylbenzylphthalate	1 J	7.3	Yes	1/5
Benzo(a)anthracene	2 J	0.53	Yes	2/5
Chrysene	5 J	0.53	Yes	2/5
di-n-Octylphthalate	3 J	0.73	Yes	4/5
Benzo(b)fluoranthene	2 J	0.53	Yes	2/5
Benzo(k)fluoranthene	1 J	0.53	Yes	2/5
Benzo(a)pyrene	0.8 J	0.53	Yes	1/5
Heptachlor	0.053 J	0.018	Yes	1/5
Dieldrin	0.21 J	0.002	Yes	2/5
4,4'-DDE	0.15	11.3	No	NE
Endrin aldehyde	0.7 J	NA	NE	2/5

J Quantitation is approximate.
 NA Not Available.
 NE Not Evaluated.

(1) New Jersey cleanup standard for accessible surfaces of building interiors.

TABLE 6-4
SOIL EXPOSURE PATHWAY DATA EVALUATION
INORGANIC ANALYTES IN WIPE SAMPLES
FROM 5 LOCATIONS
BUILDING 56
DAVISVILLE, RHODE ISLAND

ANALYTE	MAXIMUM DETECTED CONCENTRATION ($\mu\text{g}/100 \text{ cm}^2$)	NEW JERSEY CLEANUP STANDARD ⁽³⁾ ($\mu\text{g}/100 \text{ cm}^2$)	MAXIMUM DETECTED CONCENTRATION > NJCS?	FREQUENCY OF DETECTION
Aluminum	1,020	NA	NE	5/5
Arsenic	1.1	2.2	No	NE
Barium	16.6	2.54	Yes	5/5
Calcium	2,200	NE ⁽¹⁾	NE	NE
Chromium	4.9	36.3	No	NE
Cobalt	2.1	0.290	Yes	3/5
Copper	16.7	1.45	Yes	3/5
Iron	4,030	NE ⁽¹⁾	NE	NE
Lead	122	21.5 ⁽²⁾	Yes	5/5
Magnesium	336	NE ⁽¹⁾	NE	NE
Manganese	45.2	0.182	Yes	5/5
Mercury	0.48	240	No	NE
Potassium	291	NE ⁽¹⁾	NE	NE
Sodium	258	NE ⁽¹⁾	NE	NE
Vanadium	2.6	0.254	Yes	2/5
Zinc	100	10.9	Yes	5/5
Cyanide	1.3	0.726	Yes	1/1 ⁽⁴⁾

J Quantitation is approximate.
 NA Not Available.
 NE Not Evaluated.

- (1) Analyte is an essential human nutrient.
- (2) Rhode Island Department of Health standard for lead in dust on interior floors.
- (3) New Jersey cleanup standard for accessible surfaces of building interiors, unless otherwise specified.
- (4) Only the duplicate wipe sample collected in February 1994 was analyzed for cyanide.

The cleanup standards for carcinogenic effects are based on a scenario which assumes daily exposure of an adult, via ingestion, to an 8.9 m² accessible contaminated surface over a 70-year period. The cleanup standards for noncarcinogenic effects are based on a scenario which assumes exposure of a worker, via ingestion, to an 8.9 m² accessible contaminated surface for 5 days per week, over a 25-year period. Numerical cleanup standard values proposed by New Jersey are presented, when available. Cleanup standard values for analytes for which New Jersey has not proposed a numerical value were calculated using equations provided in the proposed cleanup standard regulations. The spreadsheet used to calculate the cleanup standard values is presented in Appendix C.

The New Jersey Clean-up Standards have no regulatory impact on sites located in Rhode Island. They are referenced here only to provide comparative contaminant concentrations for the evaluation of surficial contamination (primarily dust) inside buildings, where no national or State of Rhode Island standards exist. The State of Rhode Island has established a "lead-free" standard for building interior surfaces; this standard is used in the evaluation of lead wipe sample results.

Twenty organic compounds were detected in the wipe samples. New Jersey cleanup standards were unavailable for four of these compounds: dibenzofuran, phenanthrene, carbazole, and endrin aldehyde. Of the remaining 16 compounds, all (except 4,4'-DDE) were detected at concentrations above the applicable New Jersey cleanup standard. Of these, di-n-butylphthalate had the highest frequency of detection (5/5); acenaphthene, fluorene, anthracene, butylbenzylphthalate, benzo(a)pyrene, and heptachlor had the lowest frequencies of detection (1/5).

Seventeen inorganic analytes were detected in the wipe samples. A New Jersey cleanup standard was unavailable for aluminum, which was detected at 5 of 5 locations. New Jersey cleanup standards were not evaluated for the essential human nutrients calcium, iron, magnesium, potassium, and sodium. Of the remaining 11 analytes, 8 (barium, cobalt, copper, lead, manganese, vanadium, zinc, and cyanide) were detected at concentrations above the applicable New Jersey cleanup standard. The Rhode Island Department of Health (1992) standard for lead in dust on interior floors was used in the evaluation of the lead results. This standard is designed to be protective of children in residential settings.

6.3 ECOLOGICAL RECEPTORS

During September and October 1989, the Rhode Island Department of Environmental Management Natural Heritage Program (RIDEM NHP) conducted a rare and endangered species survey of the NCBC facility. The focus of the survey was to identify areas on the base that may have the potential to serve as habitat for rare and endangered species. According to the RIDEM NHP, no rare species are known to reside on NCBC property. A species of interest that has maintained a nest site at the base for several years is the osprey (Pandion haliaetus). No specific recommendations regarding rare species are applicable to the Allen Harbor area. However, Allen Harbor is an important estuarine system requiring protection.

7.0 AIR PATHWAY

7.1 AIR PATHWAY DESCRIPTION

Site soils are, for the most part, overlain by impermeable covers such as pavement and building slab. The evaluation of the air exposure pathway data in the following section, however, assumes unrestricted access to site soils in a residential reuse scenario.

7.2 AIR PATHWAY DATA EVALUATION

This section provides an evaluation of the analytical data pertaining to the air pathway. This pathway addresses a scenario which assumes long-term daily inhalation of chemicals present in soil. The data evaluation tables presented in this section were developed using the approach discussed in Section 4.2.

The air pathway SSL is a chemical concentration in soil that represents a level of contamination above which there may be sufficient concern to warrant further site-specific study. Contaminant concentrations in soil which exceed the screening level would not necessarily designate a site as contaminated, nor trigger a response action. However, they may suggest that a further evaluation of potential risks posed by the site may be appropriate. Further evaluation of SSL exceedances includes consideration of the frequency of detection and evaluation of the magnitude of the specific SSL exceedance.

The source of the SSLs presented in the data evaluation tables is the EPA Draft Soil Screening Level Guidance (September 1993). SSL values proposed by EPA are presented, when available. SSLs for analytes for which EPA has not proposed an SSL were calculated by applying an equation provided in the Draft SSL Guidance to the Inhalation Unit Risk Factor for carcinogens or Inhalation Reference Concentration for noncarcinogens. In certain cases where there was insufficient data to calculate an SSL for an analyte, data for a chemically similar analyte was used. The spreadsheet and source documents used to calculate the SSLs are presented in Appendix C. This spreadsheet indicates the source of each SSL used in the data evaluation tables.

Based on available file information, no air sampling activities have been conducted at the NCBC Building 56 site.

7.2.1 Surface Soil

Tables 7-1 and 7-2 present an evaluation of the analytical data for the surface soil samples collected from eight locations at Building 56. Surface soil samples are considered to be samples collected at a depth of less than one foot from the ground surface, including the top sample collected from each soil boring.

Thirty-two organic compounds were detected in the surface soil samples. Air pathway SSLs were available for 12 of these compounds; none exceeded their respective SSL.

Seventeen inorganic analytes were detected in the surface soil samples (Table 7-2). Of these, nine were detected at a concentration which exceeded the maximum respective background concentration. Four of these analytes, calcium, magnesium, potassium, and sodium, were not evaluated further because they are considered essential human nutrients.

TABLE 7-1
AIR PATHWAY DATA EVALUATION
ORGANIC COMPOUNDS IN SURFACE SOIL SAMPLES
FROM 8 LOCATIONS
BUILDING 56
DAVISVILLE, RHODE ISLAND

COMPOUND	MAXIMUM DETECTED CONCENTRATION (µg/kg)	AIR PATHWAY SSL (µg/kg)	MAXIMUM DETECTED CONCENTRATION > SSL?	FREQUENCY OF DETECTION
Methylene chloride	27	44,000	No	NE
Acetone	27	NA	NE	5/8
2-butanone	10 J	53,600,000	No	NE
Tetrachloroethene	4 J	41,000	No	NE
Acenaphthene	64 J	NA	NE	2/8
2,4-Dinitrotoluene	21 J	NA	NE	1/8
Fluorene	21 J	NA	NE	1/8
Phenanthrene	220 J	NA	NE	3/8
Carbazole	22 J	NA	NE	1/8
Anthracene	62 J	NA	NE	1/8
Fluoranthene	540	NA	NE	3/8
Pyrene	490	NA	NE	3/8
Butylbenzylphthalate	30 J	NA	NE	2/8
Benzo(a)anthracene	240	1,020	No	NE
Chrysene	280	800	No	NE
bis(2-Ethylhexyl)phthalate	55 J	NA	NE	1/8
di-n-Octyl phthalate	130 J	NA	NE	1/8
Benzo(b)fluoranthene	250	1,020	No	NE
Benzo(k)fluoranthene	250	1,020	No	NE
Benzo(a)pyrene	200	13,300	No	NE
Indeno(1,2,3-cd)pyrene	110	630,000	No	NE
Dibenz(a,h)anthracene	36	630,000	No	NE
Benzo(g,h,i)perylene	88	NA	NE	3/8
di-n-Butylphthalate	100 J	NA	NE	3/8
alpha-BHC	9.2 J	1,000	No	NE
Endrin	5.7 J	NA	NE	1/8
4,4'-DDE	8.6	NA	NE	1/8
Endosulfan II	5 J	NA	NE	1/8
4,4'-DDD	5.3 J	NA	NE	1/8
Endrin aldehyde	7.4 J	NA	NE	1/8
alpha-Chlordane	14 J	600	No	1/8
gamma-Chlordane	8.5 J	600	No	1/8
Aroclor-1260	140 J	NA	NE	1/8

J Quantitation is approximate.
NA Not Available.
NE Not Evaluated.

TABLE 7-2
AIR PATHWAY DATA EVALUATION
INORGANIC ANALYTES IN SURFACE SOIL SAMPLES
FROM 8 LOCATIONS
BUILDING 56
DAVISVILLE, RHODE ISLAND

ANALYTE	MAXIMUM DETECTED CONCENTRATION (mg/kg)	MAXIMUM BACKGROUND CONCENTRATION (mg/kg)	MAXIMUM DETECTED CONCENTRATION > MAXIMUM BACKGROUND?	AIR PATHWAY SSL (mg/kg)	MAXIMUM DETECTED CONCENTRATION > SSL?	FREQUENCY OF DETECTION
Aluminum	5,780	8,560	No	NE	NE	NE
Arsenic	1.5	8.1	No	NE	NE	NE
Barium	66.3 J	15.5	Yes	235,000	No	NE
Beryllium	0.65	0.66	No	NE	NE	NE
Calcium	4,700	628	Yes	NE ⁽¹⁾	NE	NE
Chromium	13.4	9.6	Yes	940	No	NE
Cobalt	4.3	4.6	No	NE	NE	NE
Copper	7.1	15	No	NE	NE	NE
Iron	11,400	12,000	No	NE ⁽¹⁾	NE	NE
Lead	208	53.8	Yes	150 ⁽²⁾	Yes	8/8
Magnesium	2,440	1,220	Yes	NE ⁽¹⁾	NE	NE
Manganese	155	150	Yes	23,500	No	NE
Nickel	7.3	5	Yes	47,000	No	NE
Potassium	1,370	728	Yes	NE ⁽¹⁾	NE	NE
Sodium	313	119	Yes	NE ⁽¹⁾	NE	NE
Vanadium	13.6	24.6	No	NE	NE	NE
Zinc	224	172	Yes	NA	NE	8/8

J Quantitation is approximate.

NA Not Available.

NE Not Evaluated.

(1) Analyte is an essential human nutrient.

(2) Rhode Island Department of Health "lead-free" standard for soil.

Of the remaining analytes, only lead was detected at concentrations which exceeded its air pathway SSL of 150 mg/kg. Lead was detected at a maximum concentration of 208 mg/kg and a frequency of 8/8. However, lead was detected in concentrations above the air pathway SSL in only one surficial soil sample collected at the site. The occurrence of lead above the air pathway SSL therefore appears to be very limited at the site.

The Rhode Island Department of Health (1992) "lead-free" standard for soil was used in the evaluation of the lead results. This standard, 150 mg/kg, is designed to be protective of children in residential settings. Lead was detected over the "lead-free" standard in only one surface soil sample (SS-4A). This singular occurrence of lead above a regulatory level may pose a minimal risk at the site.

Air pathway SSLs are generally unavailable for organic contaminants present in surficial soils at the site. Organic contaminants detected at the site are detected in relatively low concentrations, and are detected at relatively low frequencies. Currently, most of the site surficial soils are overlain by impermeable cover; and the possibility of airborne transport of soils is minimal. However, upon removal of the site pavement and/or building slab, the possibility of airborne transport of site soils and associated contaminants will increase. Potential receptors include the residential area north of the site, Allen Harbor, and wetlands adjacent to the Harbor.

8.0 SUMMARY AND CONCLUSIONS

The objective this Study Area Screening Evaluation at Building 56 was to verify the impact, if any, of the storage of materials inside Building 56 on the building interiors, soil beneath the building, and an associated drainage system. The site, as currently defined, is limited to the building and an exterior concrete pad.

Field activities included the advancement of three soil borings to ten feet beneath the building concrete floor and one soil boring through the wash pad to the top of bedrock, collection of wipe samples, and the collection of a drain sediment sample at one location. Surficial soil samples in locations proximate to building access ways were also collected.

Four exposure pathways at the site (groundwater, soil, surface water, and air) were identified and analytical data pertaining to each pathway was evaluated through comparisons with applicable standards (maximum background concentrations, Soil Screening Levels, and Rhode Island and New Jersey standards).

An evaluation of the analytical data pertaining to the groundwater pathway determined that methylene chloride, alpha-BHC, and lead were detected in surface soil samples at concentrations which exceeded their groundwater SSLs. Methylene chloride and arsenic were detected in subsurface soil samples at concentrations which exceeded their groundwater SSLs. Organic contaminants generally do not migrate from surface to subsurface soils in concentrations above groundwater SSLs. Lead was detected at one surface soil sample location at a concentration which exceeded its groundwater SSL; however, lead was not detected in any subsurface soil samples at concentrations above its groundwater SSL. The only inorganic contaminant detected in subsurface soils at a concentration which exceeded its groundwater SSL was arsenic, which was detected at one subsurface soil sample location. Based on this evaluation, the potential for the migration of contaminants to groundwater at the site is low.

An evaluation of the analytical data pertaining to the surface water pathway determined that several contaminants were detected in a drain sediment sample collected from a sanitary sewer line approximately 190 feet southwest of Building 56. These contaminants included five pesticide-related compounds (1,4-dichlorobenzene, endrin, endrin aldehyde, alpha-chlordane, and gamma-chlordane) which were associated with past pesticide mixing and storage activities at Building 56. Building 56 facilities are no longer used in conjunction with pesticide mixing operations. There is no human contact with the small quantities of sediment retained in the drain. The sediment will eventually be discharged to the wastewater treatment plant.

An evaluation of the analytical data pertaining to the soil exposure pathway determined that several contaminants were detected in surface soil samples at concentrations which exceeded their soil exposure SSLs. These contaminants include lead and five PAHs: (benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, and dibenz(a,h)anthracene. The pavement surrounding Building 56 is a potential source of the PAHs detected in the surface soil samples. Fifteen organic compounds and eight inorganic analytes were detected in wipe samples at concentrations which exceeded the applicable Rhode Island or New Jersey standard.

Air pathway SSLs are generally unavailable for organic contaminants detected in surficial soils at the site. Organic contaminants detected at the site were detected in relatively low concentrations, and were detected at relatively low frequencies. Where an SSL was available, the detected concentration

did not exceed it. Lead was detected in one surface soil sample at a concentration which exceeded its air pathway SSL. Currently, most of the site surficial soils are overlain by impermeable cover; and the possibility of airborne transport of soils is minimal. However, upon removal of the site pavement and/or building slab, the possibility of airborne transport of site soils and associated contaminants will increase. Potential receptors include the residential area north of the site, Allen Harbor, and wetlands adjacent to the Harbor.

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REFERENCES

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APPENDIX A
ANALYTICAL RESULTS

DATA QUALIFIER DEFINITIONS

- J** - Quantitation is approximate due to limitations identified during data validation.
- U** - Result is non-detected at the indicated detection limit/quantitation limit.
- UJ** - Result is non-detected and the indicated detection limit is estimated.
- R or UR** - Rejected.

SITE: CTO 127, NCBC, DAVISVILLE, RHODE ISLAND
 BUILDING 56 SOIL BORING RESULTS
 LABORATORY: SOUTHWEST LABORATORY OF OKLAHOMA

CLIENT ID: 03-B1-S1-062393 03-B1-S2-062393 03-B2-S1-062393 03-B2-S2-062393
 LABORATORY ID: 14317.15 14317.16 14317.17 14317.18

TCL VOLATILES SOILS (ug/Kg)	CRQL	MDL	03-B1-S1-062393 14317.15		03-B1-S2-062393 14317.16		03-B2-S1-062393 14317.17		03-B2-S2-062393 14317.18	
CHLOROMETHANE	10	0.7	10	U	10	U	11	U	11	U
BROMOMETHANE	10	0.7	10	U	10	U	11	U	11	U
VINYL CHLORIDE	10	0.4	10	U	10	U	11	U	11	U
CHLOROETHANE	10	0.4	10	U	10	U	11	U	11	U
METHYLENE CHLORIDE	10	0.7	21		35		27		18	U
ACETONE	10	4.2	16	U	30	U	34	U	64	J
CARBON DISULFIDE	10	0.7	10	U	10	U	11	U	11	U
1,1-DICHLOROETHENE	10	0.7	10	U	10	U	11	U	11	U
1,1-DICHLOROETHANE	10	0.5	10	U	10	U	11	U	11	U
1,2-DICHLOROETHENE (TOTAL)	10	1	10	U	10	U	11	U	11	U
CHLOROFORM	10	0.6	10	U	10	U	11	U	11	U
1,2-DICHLOROETHANE	10	0.8	10	U	10	U	11	U	11	U
2-BUTANONE	10	3.2	10	U	10	U	11	U	11	U
1,1,1-TRICHLOROETHANE	10	0.5	10	U	10	U	11	U	11	U
CARBON TETRACHLORIDE	10	0.9	10	U	10	U	11	U	11	U
BROMODICHLOROMETHANE	10	0.8	10	U	10	U	11	U	11	U
1,2-DICHLOROPROPANE	10	0.7	10	U	10	U	11	U	11	U
CIS-1,3-DICHLOROPROPENE	10	0.5	10	U	10	U	11	U	11	U
TRICHLOROETHENE	10	2.6	10	U	10	U	11	U	11	U
DIBROMOCHLOROMETHANE	10	1.3	10	U	10	U	11	U	11	U
1,1,2-TRICHLOROETHANE	10	1.4	10	U	10	U	11	U	11	U
BENZENE	10	0.4	10	U	10	U	11	U	11	U
TRANS-1,3-DICHLOROPROPENE	10	0.8	10	U	10	U	11	U	11	U
BROMOFORM	10	1.8	10	U	10	U	11	U	11	U
4-METHYL-2-PENTANONE	10	4.8	10	U	10	U	11	U	11	U
2-HEXANONE	10	4.1	10	U	10	U	11	U	11	U
TETRACHLOROETHENE	10	0.9	1	J	10	U	11	U	11	U
1,1,2,2-TETRACHLOROETHANE	10	2.7	10	U	10	U	11	U	11	U
TOLUENE	10	0.7	10	U	10	U	11	U	11	U
CHLOROBENZENE	10	1	10	U	10	U	11	U	11	U
ETHYLBENZENE	10	0.7	10	U	10	U	11	U	11	U
STYRENE	10	1.1	10	U	10	U	11	U	11	U
XYLENE (TOTAL)	10	1.7	10	U	10	U	11	U	11	U
% SOLIDS:			97.0		97.0		93.0		90.0	

SITÉ: CTO 127, NCBC, DAVISVILLE, RHODE ISLAND
 BUILDING 56 SOIL BORING RESULTS
 LABORATORY: SOUTHWEST LABORATORY OF OKLAHOMA

CLIENT ID:	03-B3-S1-062393	03-B3-S2-062393	03-B4-S1-062293	03-B4-S2-062293		
LABORATORY ID:	14317.19	14317.20	14267.11	14267.12		
TCL VOLATILES SOILS (ug/Kg)	CRQL	MDL				
CHLOROMETHANE	10	0.7	10 U	11 U	10 U	11 U
BROMOMETHANE	10	0.7	10 U	11 U	10 U	11 U
VINYL CHLORIDE	10	0.4	10 U	11 U	10 U	11 U
CHLOROETHANE	10	0.4	10 U	11 U	10 U	11 U
METHYLENE CHLORIDE	10	0.7	11 U	14 U	10 U	13 U
ACETONE	10	4.2	13 U	23 U	10 U	14 U
CARBON DISULFIDE	10	0.7	10 U	11 U	10 U	11 U
1,1-DICHLOROETHENE	10	0.7	10 U	11 U	10 U	11 U
1,1-DICHLOROETHANE	10	0.5	10 U	11 U	10 U	11 U
1,2-DICHLOROETHENE (TOTAL)	10	1	10 U	11 U	10 U	11 U
CHLOROFORM	10	0.6	10 U	11 U	10 U	11 U
1,2-DICHLOROETHANE	10	0.8	10 U	11 U	10 U	11 U
2-BUTANONE	10	3.2	10 UJ	11 UJ	10 U	11 U
1,1,1-TRICHLOROETHANE	10	0.5	10 U	11 U	10 U	11 U
CARBON TETRACHLORIDE	10	0.9	10 U	11 U	10 U	11 U
BROMODICHLOROMETHANE	10	0.8	10 U	11 U	10 U	11 U
1,2-DICHLOROPROPANE	10	0.7	10 U	11 U	10 U	11 U
CIS-1,3-DICHLOROPROPENE	10	0.5	10 U	11 U	10 U	11 U
TRICHLOROETHENE	10	2.6	10 U	11 U	10 U	11 U
DIBROMOCHLOROMETHANE	10	1.3	10 U	11 U	10 U	11 U
1,1,2-TRICHLOROETHANE	10	1.4	10 U	11 U	10 U	11 U
BENZENE	10	0.4	10 U	11 U	10 U	11 U
TRANS-1,3-DICHLOROPROPENE	10	0.8	10 U	11 U	10 U	11 U
BROMOFORM	10	1.8	10 U	11 U	10 U	11 U
4-METHYL-2-PENTANONE	10	4.8	10 U	11 U	10 U	11 U
2-HEXANONE	10	4.1	10 U	11 U	10 U	11 U
TETRACHLOROETHENE	10	0.9	10 U	11 U	10 U	11 U
1,1,2,2-TETRACHLOROETHANE	10	2.7	10 U	11 U	10 U	11 U
TOLUENE	10	0.7	10 U	11 U	10 U	11 U
CHLOROBENZENE	10	1	10 U	11 U	10 U	11 U
ETHYLBENZENE	10	0.7	10 U	11 U	10 U	11 U
STYRENE	10	1.1	10 U	11 U	10 U	11 U
XYLENE (TOTAL)	10	1.7	10 U	11 U	10 U	11 U
% SOLIDS:			98.0	91.0	98.6	92.9

SITE: CTO 127, NCBC DAVISVILLE, RHODE ISLAND
 BUILDING 56 SOIL BORING RESULTS
 LABORATORY: SOUTHWEST LABORATORY OF OKLAHOMA

CLIENT ID:
 LABORATORY ID:

03-B1-S1-062393 03-B1-S2-062393 03-B2-S1-062393 03-B2-S2-062393
 14317.15 14317.16 14317.17 14317.18

TCL SEMIVOLATILES SOILS (ug/Kg)	CRQL	MDL	03-B1-S1-062393 14317.15	03-B1-S2-062393 14317.16	03-B2-S1-062393 14317.17	03-B2-S2-062393 14317.18
PHENOL	330	36	340 U	340 U	360 U	370 U
BIS(2-CHLOROETHYL)ETHER	330	27	340 U	340 U	360 U	370 U
2-CHLOROPHENOL	330	37	340 U	340 U	360 U	370 U
1,3-DICHLOROBENZENE	330	40	340 U	340 U	360 U	370 U
1,4-DICHLOROBENZENE	330	43	340 U	340 U	360 U	370 U
1,2-DICHLOROBENZENE	330	47	340 U	340 U	360 U	370 U
2-METHYLPHENOL	330	47	340 U	340 U	360 U	370 U
BIS(2-CHLOROISOPROPYL)ETHER	330	40	340 U	340 U	360 U	370 U
4-METHYLPHENOL	330	47	340 U	340 U	360 U	370 U
N-NITROSO-DI-N-PROPYLAMINE	330	47	340 U	340 U	360 U	370 U
HEXACHLOROETHANE	330	27	340 U	340 U	360 U	370 U
NITROBENZENE	330	53	340 U	340 U	360 U	370 U
ISOPHORONE	330	40	340 U	340 U	360 U	370 U
2-NITROPHENOL	330	33	340 U	340 U	360 U	370 U
2,4-DIMETHYLPHENOL	330	77	340 U	340 U	360 U	370 U
2,4-DICHLOROPHENOL	330	40	340 U	340 U	360 U	370 U
1,2,4-TRICHLOROBENZENE	330	40	340 U	340 U	360 U	370 U
NAPHTHALENE	330	47	340 U	340 U	360 U	370 U
4-CHLOROANILINE	330	57	340 U	340 U	360 U	370 U
BIS(2-CHLOROETHOXY)METHANE	330	47	340 U	340 U	360 U	370 U
HEXACHLOROBUTADIENE	330	47	340 U	340 U	360 U	370 U
4-CHLORO-3-METHYLPHENOL	330	57	340 U	340 U	360 U	370 U
2-METHYLNAPHTHALENE	330	47	340 U	340 U	360 U	370 U
HEXACHLOROCYCLOPENTADIENE	330	110	340 U	340 U	360 U	370 U
2,4,6-TRICHLOROPHENOL	330	53	340 U	340 U	360 U	370 U
2,4,5-TRICHLOROPHENOL	800	80	820 U	820 U	860 U	890 U
2-CHLORONAPHTHALENE	330	73	340 U	340 U	360 U	370 U
2-NITROANILINE	800	77	820 U	820 U	860 U	890 U
DIMETHYL PHTHALATE	330	83	340 U	340 U	360 U	370 U
ACENAPHTHYLENE	330	70	340 U	340 U	360 U	370 U
2,6-DINITROTOLUENE	330	60	340 U	340 U	360 U	370 U
3-NITROANILINE	800	55	820 U	820 U	860 U	890 U
ACENAPHTHENE	330	97	340 U	340 U	360 U	370 U

SITE: CTO 127, NCBC DAVISVILLE, RHODE ISLAND
 BUILDING 56 SOIL BORING RESULTS
 LABORATORY: SOUTHWEST LABORATORY OF OKLAHOMA

CLIENT ID: 03-B1-S1-062393 03-B1-S2-062393 03-B2-S1-062393 03-B2-S2-062393
 LABORATORY ID: 14317.15 14317.16 14317.17 14317.18

TCL SEMIVOLATILES SOILS (ug/Kg)	CRQL	MDL								
2,4-DINITROPHENOL	800	43	820	U	820	U	860	U	890	U
4-NITROPHENOL	800	120	820	U	820	U	860	U	890	U
DIBENZOFURAN	330	73	340	U	340	U	360	U	370	U
2,4-DINITROTOLUENE	330	57	340	U	340	U	360	U	370	U
DIETHYLPHTHALATE	330	50	340	U	340	U	360	U	370	U
4-CHLOROPHENYL-PHENYLETHER	330	40	340	U	340	U	360	U	370	U
FLUORENE	330	37	340	U	340	U	360	U	370	U
4-NITROANILINE	800	43	820	U	820	U	860	U	890	U
4,6-DINITRO-2-METHYLPHENOL	800	160	820	U	820	U	860	U	890	U
N-NITROSODIPHENYLAMIN(1)	330	33	340	U	340	U	360	U	370	U
4-BROMOPHENYL-PHENYLETHER	330	53	340	U	340	U	360	U	370	U
HEXACHLOROBENZENE	330	57	340	U	340	U	360	U	370	U
PENTACHLOROPHENOL	800	93	820	U	820	U	860	U	890	U
PHENANTHRENE	330	77	340	U	340	U	360	U	370	U
ANTHRACENE	330	73	340	U	340	U	360	U	370	U
CARBAZOLE	330	47	340	U	340	U	360	U	370	U
DI-N-BUTYLPHTHALATE	330	50	340	U	340	U	360	U	370	U
FLUORANTHENE	330	80	340	U	340	U	360	U	370	U
PYRENE	330	73	340	U	340	U	360	U	370	U
BUTYLBENZYLPHTHALATE	330	43	340	U	340	U	360	U	370	U
3,3'-DICHLOROBENZIDINE	330	80	340	U	340	U	360	U	370	U
BENZO(A)ANTHRACENE	330	47	340	U	340	U	360	U	370	U
CHRYSENE	330	30	340	U	340	U	360	U	370	U
BIS(2-ETHYLHEXYL)PHTHALATE	330	57	370	U	340	U	360	U	370	U
DI-N-OCTYL PHTHALATE	330	47	340	U	340	U	360	U	370	U
BENZO(B)FLUORANTHENE	330	120	340	U	340	U	360	U	370	U
BENZO(K)FLUORANTHENE	330	150	340	U	340	U	360	U	370	U
BENZO(A)PYRENE	330	77	340	U	340	U	360	U	370	U
INDENO(1,2,3-CD)PYRENE	330	57	340	U	340	U	360	U	370	U
DIBENZ(A,H)ANTHRACENE	330	67	340	U	340	U	360	U	370	U
BENZO(G,H,I)PERYLENE	330	97	340	U	340	U	360	U	370	U

% SOLIDS: 97.0 97.0 93.0 90.0

SITE: CTO 127, NCBC DAVISVILLE, RHODE ISLAND
 BUILDING 56 SOIL BORING RESULTS
 LABORATORY: SOUTHWEST LABORATORY OF OKLAHOMA

CLIENT ID:
 LABORATORY ID:

03-B3-S1-062393 03-B3-S2-062393 03-B4-S1-062293 03-B4-S2-062293
 14317.19 14317.20 14267.11 14267.12

TCL SEMIVOLATILES SOILS (ug/Kg)	CRQL	MDL	03-B3-S1-062393	03-B3-S2-062393	03-B4-S1-062293	03-B4-S2-062293
PHENOL	330	36	340 U	360 U	330 U	350 U
BIS(2-CHLOROETHYL)ETHER	330	27	340 U	360 U	330 U	350 U
2-CHLOROPHENOL	330	37	340 U	360 U	330 U	350 U
1,3-DICHLOROBENZENE	330	40	340 U	360 U	330 U	350 U
1,4-DICHLOROBENZENE	330	43	340 U	360 U	330 U	350 U
1,2-DICHLOROBENZENE	330	47	340 U	360 U	330 U	350 U
2-METHYLPHENOL	330	47	340 U	360 U	330 U	350 U
BIS(2-CHLOROISOPROPYL)ETHER	330	40	340 U	360 U	330 U	350 U
4-METHYLPHENOL	330	47	340 U	360 U	330 U	350 U
N-NITROSO-DI-N-PROPYLAMINE	330	47	340 U	360 U	330 U	350 U
HEXACHLOROETHANE	330	27	340 U	360 U	330 U	350 U
NITROBENZENE	330	53	340 U	360 U	330 U	350 U
ISOPHORONE	330	40	340 U	360 U	330 U	350 U
2-NITROPHENOL	330	33	340 U	360 U	330 U	350 U
2,4-DIMETHYLPHENOL	330	77	340 U	360 U	330 U	350 U
2,4-DICHLOROPHENOL	330	40	340 U	360 U	330 U	350 U
1,2,4-TRICHLOROBENZENE	330	40	340 U	360 U	330 U	350 U
NAPHTHALENE	330	47	340 U	360 U	330 U	350 U
4-CHLOROANILINE	330	57	340 U	360 U	330 U	350 U
BIS(2-CHLOROETHOXY)METHANE	330	47	340 U	360 U	330 U	350 U
HEXACHLOROBUTADIENE	330	47	340 U	360 U	330 U	350 U
4-CHLORO-3-METHYLPHENOL	330	57	340 U	360 U	330 U	350 U
2-METHYLNAPHTHALENE	330	47	340 U	360 U	330 U	350 U
HEXACHLOROCYCLOPENTADIENE	330	110	340 U	360 U	330 U	350 U
2,4,6-TRICHLOROPHENOL	330	53	340 U	360 U	330 U	350 U
2,4,5-TRICHLOROPHENOL	800	80	810 U	880 U	810 U	850 U
2-CHLORONAPHTHALENE	330	73	340 U	360 U	330 U	350 U
2-NITROANILINE	800	77	810 U	880 U	810 U	850 U
DIMETHYL PHTHALATE	330	83	340 U	360 U	330 U	350 U
ACENAPHTHYLENE	330	70	340 U	360 U	330 U	350 U
2,6-DINITROTOLUENE	330	60	340 U	360 U	330 U	350 U
3-NITROANILINE	800	55	810 U	880 U	810 U	850 U
ACENAPHTHENE	330	97	340 U	360 U	330 U	350 U

SITE: CTO 127, NCBC DAVISVILLE, RHODE ISLAND
 BUILDING 56 SOIL BORING RESULTS
 LABORATORY: SOUTHWEST LABORATORY OF OKLAHOMA

CLIENT ID: 03-B3-S1-062393 03-B3-S2-062393 03-B4-S1-062293 03-B4-S2-062293
 LABORATORY ID: 14317.19 14317.20 14267.11 14267.12

TCL SEMIVOLATILES SOILS (ug/Kg)	CRQL	MDL	03-B3-S1-062393		03-B3-S2-062393		03-B4-S1-062293		03-B4-S2-062293	
2,4-DINITROPHENOL	800	43	810	U	880	U	810	U	850	U
4-NITROPHENOL	800	120	810	U	880	U	810	U	850	U
DIBENZOFURAN	330	73	340	U	360	U	330	U	350	U
2,4-DINITROTOLUENE	330	57	340	U	360	U	330	U	350	U
DIETHYLPHTHALATE	330	50	340	U	360	U	330	U	350	U
4-CHLOROPHENYL-PHENYLETHER	330	40	340	U	360	U	330	U	350	U
FLUORENE	330	37	340	U	360	U	330	U	350	U
4-NITROANILINE	800	43	810	U	880	U	810	U	850	U
4,6-DINITRO-2-METHYLPHENOL	800	160	810	U	880	U	810	U	850	U
N-NITROSODIPHENYLAMIN(1)	330	33	340	U	360	U	330	U	350	U
4-BROMOPHENYL-PHENYLETHER	330	53	340	U	360	U	330	U	350	U
HEXACHLOROBENZENE	330	57	340	U	360	U	330	U	350	U
PENTACHLOROPHENOL	800	93	810	U	880	U	810	U	850	U
PHENANTHRENE	330	77	340	U	360	U	330	U	350	U
ANTHRACENE	330	73	340	U	360	U	330	U	350	U
CARBAZOLE	330	47	340	U	360	U	330	U	350	U
DI-N-BUTYLPHTHALATE	330	50	340	U	360	U	65	J	100	J
FLUORANTHENE	330	80	340	U	360	U	330	U	350	U
PYRENE	330	73	340	U	360	U	330	U	350	U
BUTYLBENZYLPHTHALATE	330	43	340	U	360	U	330	U	350	U
3,3'-DICHLOROBENZIDINE	330	80	340	U	360	U	330	U	350	U
BENZO(A)ANTHRACENE	330	47	340	U	360	U	330	U	350	U
CHRYSENE	330	30	340	U	360	U	330	U	350	U
BIS(2-ETHYLHEXYL)PHTHALATE	330	57	340	U	360	U	55	J	350	U
DI-N-OCTYL PHTHALATE	330	47	340	U	360	U	130	J	150	J
BENZO(B)FLUORANTHENE	330	120	340	U	360	U	330	U	350	U
BENZO(K)FLUORANTHENE	330	150	340	U	360	U	330	U	350	U
BENZO(A)PYRENE	330	77	340	U	360	U	330	U	350	U
INDENO(1,2,3-CD)PYRENE	330	57	340	U	360	U	330	U	350	U
DIBENZ(A,H)ANTHRACENE	330	67	340	U	360	U	330	U	350	U
BENZO(G,H,I)PERYLENE	330	97	340	U	360	U	330	U	350	U

% SOLIDS: 98.0 91.0 98.6 92.9

SITE: CTO 127, NCBC, DAVISVILLE, RHODE ISLAND
 BUILDING 56 SOIL BORING RESULTS
 LABORATORY: SOUTHWEST LABORATORY OF OKLAHOMA

CLIENT ID:	03-B1-S1-062393	03-B1-S2-062393	03-B2-S1-062393	03-B2-S2-062393		
LABORATORY ID:	14317.15	14317.16	14317.17	14317.18		
TCL PESTICIDES/PCB SOILS (ug/Kg)	CRQL	MDL				
ALPHA-BHC	1.7	0.06	1.8 UJ	1.8 U	1.8 U	1.9 U
BETA-BHC	1.7	0.12	1.8 UJ	1.8 U	1.8 U	1.9 U
DELTA-BHC	1.7	0.06	1.8 UJ	1.8 U	1.8 U	1.9 U
GAMMA-BHC (LINDANE)	1.7	0.06	1.8 UJ	1.8 U	1.8 U	1.9 U
HEPTACHLOR	1.7	0.06	1.8 UJ	1.8 U	1.8 U	1.9 U
ALDRIN	1.7	0.03	1.8 UJ	1.8 U	1.8 U	1.9 U
HEPTACHLOR EPOXIDE	1.7	0.03	1.8 UJ	1.8 U	1.8 U	1.9 U
ENDOSULFAN I	1.7	0.06	1.8 UJ	1.8 U	1.8 U	1.9 U
DIELDRIN	3.3	0.06	3.4 UJ	3.4 U	3.5 U	3.7 U
4,4'-DDE	3.3	0.06	3.4 UJ	3.4 U	3.5 U	3.7 U
ENDRIN	3.3	0.15	3.4 UJ	3.4 U	3.5 U	3.7 U
ENDOSULFAN II	3.3	0.12	3.4 UJ	3.4 U	3.5 U	3.7 U
4,4'-DDD	3.3	0.09	3.4 UJ	3.4 U	3.5 U	3.7 U
ENDOSULFAN SULFATE	3.3	0.12	3.4 UJ	3.4 U	3.5 U	3.7 U
4,4'-DDT	3.3	0.12	3.4 UJ	3.4 U	3.5 U	3.7 U
METHOXYCHLOR	17	0.57	18 UJ	18 U	18 U	19 U
ENDRIN KETONE	3.3	0.09	3.4 UJ	3.4 U	3.5 U	3.7 U
ENDRIN ALDEHYDE	3.3	0.09	3.4 UJ	3.4 U	3.5 U	3.7 U
ALPHA-CHLORDANE	1.7	0.06	1.8 UJ	1.8 U	1.8 U	1.9 U
GAMMA-CHLORDANE	1.7	0.09	1.8 UJ	1.8 U	1.8 U	1.9 U
TOXAPHENE	170	0.9	180 UJ	180 U	180 U	190 U
AROCLOR-1016	33	0.9	34 UJ	34 U	35 U	37 U
AROCLOR-1221	67	0.12	69 UJ	69 U	72 U	74 U
AROCLOR-1232	33	0.3	34 UJ	34 U	35 U	37 U
AROCLOR-1242	33	0.3	34 UJ	34 U	35 U	37 U
AROCLOR-1248	33	1.2	34 UJ	34 U	35 U	37 U
AROCLOR-1254	33	1.5	34 UJ	34 U	35 U	37 U
AROCLOR-1260	33	1.2	34 UJ	34 U	35 U	37 U
% SOLIDS:			97.0	97.0	93.0	90.0

SITE: CTO 127, NCBC, DAVISVILLE, RHODE ISLAND
 BUILDING 56 SOIL BORING RESULTS
 LABORATORY: SOUTHWEST LABORATORY OF OKLAHOMA

CLIENT ID: 03-B3-S1-062393 03-B3-S2-062393 03-B4-S1-062293 03-B4-S2-062293
 LABORATORY ID: 14317.19 14317.20 14267.11 14267.12

TCL PESTICIDES/PCB SOILS (ug/Kg)	CRQL	MDL	03-B3-S1-062393 14317.19		03-B3-S2-062393 14317.20		03-B4-S1-062293 14267.11		03-B4-S2-062293 14267.12	
ALPHA-BHC	1.7	0.06	1.7	U	1.9	UJ	1.7	U	1.8	U
BETA-BHC	1.7	0.12	1.7	U	1.9	UJ	1.7	U	1.8	U
DELTA-BHC	1.7	0.06	1.7	U	1.9	UJ	1.7	U	1.8	U
GAMMA-BHC (LINDANE)	1.7	0.06	1.7	U	1.9	UJ	1.7	U	1.8	U
HEPTACHLOR	1.7	0.06	1.7	U	1.9	UJ	1.7	U	1.8	U
ALDRIN	1.7	0.03	1.7	U	1.9	UJ	1.7	U	1.8	U
HEPTACHLOR EPOXIDE	1.7	0.03	1.7	U	1.9	UJ	1.7	U	1.8	U
ENDOSULFAN I	1.7	0.06	1.7	U	1.9	UJ	1.7	U	1.8	U
DIELDRIN	3.3	0.06	3.4	U	3.6	UJ	3.3	U	3.5	U
4,4'-DDE	3.3	0.06	3.4	U	3.6	UJ	3.3	U	3.5	U
ENDRIN	3.3	0.15	3.4	U	3.6	UJ	3.3	U	3.5	U
ENDOSULFAN II	3.3	0.12	3.4	U	3.6	UJ	3.3	U	3.5	U
4,4'-DDD	3.3	0.09	3.4	U	3.6	UJ	3.3	U	3.5	U
ENDOSULFAN SULFATE	3.3	0.12	3.4	U	3.6	UJ	3.3	U	3.5	U
4,4'-DDT	3.3	0.12	3.4	U	3.6	UJ	3.3	U	3.5	U
METHOXYCHLOR	17	0.57	17	U	19	UJ	17	U	18	U
ENDRIN KETONE	3.3	0.09	3.4	U	3.6	UJ	3.3	U	3.5	U
ENDRIN ALDEHYDE	3.3	0.09	3.4	U	3.6	UJ	3.3	U	3.5	U
ALPHA-CHLORDANE	1.7	0.06	1.7	U	1.9	UJ	1.7	U	1.8	U
GAMMA-CHLORDANE	1.7	0.09	1.7	U	1.9	UJ	1.7	U	1.8	U
TOXAPHENE	170	0.9	170	U	190	UJ	170	U	180	U
AROCLOR-1016	33	0.9	34	U	36	UJ	33	U	35	U
AROCLOR-1221	67	0.12	68	U	74	UJ	68	U	71	U
AROCLOR-1232	33	0.3	34	U	36	UJ	33	U	35	U
AROCLOR-1242	33	0.3	34	U	36	UJ	33	U	35	U
AROCLOR-1248	33	1.2	34	U	36	UJ	33	U	35	U
AROCLOR-1254	33	1.5	34	U	36	UJ	33	U	35	U
AROCLOR-1260	33	1.2	34	U	36	UJ	33	U	35	U
% SOLIDS:			98.0		91.0		98.6		92.9	

SITE: CTO 127, NCBC DAVISVILLE, RHODE ISLAND
 BUILDING 56 SOIL BORING RESULTS
 LABORATORY: SOUTHWEST LABORATORY OF OKLAHOMA

CLIENT ID:	03-B1-S1-062393	03-B1-S2-062393	03-B2-S1-062393	03-B2-S2-062393		
LABORATORY ID:	14317.15	14317.16	14317.17	14317.18		
TAL METAL SOILS (mg/Kg)	CRDL	IDL				
ALUMINUM	40	6.8	5290	2900	1790	2030
ANTIMONY	12	3.2	4.7 UJ	4.7 UJ	5.0 UJ	5.1 UJ
ARSENIC	2	0.4	0.76	0.62 U	0.66 U	0.67 U
BARIUM	40	1.8	11.8	8.2	5.3	6
BERYLLIUM	1	0.2	0.63	0.39	0.32	0.35
CADMIUM	1	0.6	0.61 U	0.62 U	0.66 U	0.67 U
CALCIUM	1000	46	607	2180	1230	888
CHROMIUM	2	1.2	4.8	3.9	1.7	2.8
COBALT	10	1.2	4.3	1.8	2.9	2.3
COPPER	5	0.4	5.8	2.2	1.9	2.6
IRON	20	1.6	9490	5070	4650	4680
LEAD	0.6	0.4	4.7 J	3.2 J	2.1 J	2.5 J
MAGNESIUM	1000	38.6	1190	588	267	450
MANGANESE	1.8	0.4	151	89	78.6	83.7
MERCURY	0.1	0.1	0.10 U	0.10 U	0.11 U	0.11 U
NICKEL	8	3	3.5	1.4 U	1.5 U	1.6 U
POTASSIUM	1000	148.6	709	475	275	326
SELENIUM	1	0.2	0.41 U	0.41 U	0.44 U	0.45 U
SILVER	2	0.4	1.4 UJ	1.4 UJ	1.5 UJ	1.6 UJ
SODIUM	1000	50.4	173 U	217 U	192 U	156 U
THALLIUM	2	0.6	0.20 U	0.21 U	0.22 U	0.22 U
VANADIUM	10	1.2	6.1	2.8	3.3	3.3
ZINC	4	0.4	30.6	19.7	39.5	23.1
% SOLIDS:			97.8	96.9	91.5	89.7

SITE: CTO 127, NCBC DAVISVILLE, RHODE ISLAND
 BUILDING 56 SOIL BORING RESULTS
 LABORATORY: SOUTHWEST LABORATORY OF OKLAHOMA

CLIENT ID:	03-B3-S1-062393	03-B3-S2-062393	03-B4-S1-062293	03-B4-S2-062293					
LABORATORY ID:	14317.19	14317.20	14267.11	14267.12					
TAL METAL SOILS (mg/Kg)	CRDL	IDL							
ALUMINUM	40	6.8	4630	1980	2480	J	2760	J	
ANTIMONY	12	3.2	4.6	UJ	5.0	UJ	5.0	UR	
ARSENIC	2	0.4	0.61	U	0.66	U	0.61	U	
BARIUM	40	1.8	13.8		6.1		7.2	6.6	
BERYLLIUM	1	0.2	0.65		0.33		0.41	0.42	
CADMIUM	1	0.6	0.61	U	0.66	U	0.61	U	
CALCIUM	1000	46	495		1040		412	U	
CHROMIUM	2	1.2	5		1.4		1.5	U	
COBALT	10	1.2	3.8		2.1		1.2	U	
COPPER	5	0.4	7.1		1.6		1.8	U	
IRON	20	1.6	9600		3800		4270	J	
LEAD	0.6	0.4	5.7	J	2.4	J	8.4	2.5	
MAGNESIUM	1000	38.6	1520		394		303	504	
MANGANESE	1.8	0.4	154		76.4		83	J	
MERCURY	0.1	0.1	0.10	U	0.11	U	0.10	U	
NICKEL	8	3	3.5		1.5	U	1.4	U	
POTASSIUM	1000	148.6	822		323		492	351	
SELENIUM	1	0.2	0.4	U	0.44	U	0.41	U	
SILVER	2	0.4	1.4	UJ	1.5	UJ	1.4	UJ	
SODIUM	1000	50.4	168	U	169	U	54.0	U	
THALLIUM	2	0.6	0.20	U	0.22	U	0.20	U	
VANADIUM	10	1.2	5		2.8		2.8	U	
ZINC	4	0.4	34		12.7		24.9	J	
% SOLIDS:			99.1		91.5		98.6		92.9

SITE: CTO #127, NCBC DAVISVILLE, RHODE ISLAND
 BUILDING 56 DRAIN SAMPLE RESULTS
 LABORATORY: SOUTHWEST LABORATORY OF OKLAHOMA

CLIENT ID:
 LABORATORY ID:

3-DS1-S1-62993
 14394.35

TCL VOLATILES SOILS (ug/Kg)	CRQL	MDL		
CHLOROMETHANE	10	0.7	11	U
BROMOMETHANE	10	0.7	11	U
VINYL CHLORIDE	10	0.4	11	U
CHLOROETHANE	10	0.4	11	U
METHYLENE CHLORIDE	10	0.7	19	U
ACETONE	10	4.2	11	U
CARBON DISULFIDE	10	0.7	11	U
1,1-DICHLOROETHENE	10	0.7	11	U
1,1-DICHLOROETHANE	10	0.5	11	U
1,2-DICHLOROETHENE (TOTAL)	10	1	11	U
CHLOROFORM	10	0.6	11	U
1,2-DICHLOROETHANE	10	0.8	11	U
2-BUTANONE	10	3.2	11	U
1,1,1-TRICHLOROETHANE	10	0.5	11	U
CARBON TETRACHLORIDE	10	0.9	11	U
BROMODICHLOROMETHANE	10	0.8	11	U
1,2-DICHLOROPROPANE	10	0.7	11	U
CIS-1,3-DICHLOROPROPENE	10	0.5	11	U
TRICHLOROETHENE	10	2.6	11	U
DIBROMOCHLOROMETHANE	10	1.3	11	U
1,1,2-TRICHLOROETHANE	10	1.4	11	U
BENZENE	10	0.4	11	U
TRANS-1,3-DICHLOROPROPENE	10	0.8	11	U
BROMOFORM	10	1.8	11	U
4-METHYL-2-PENTANONE	10	4.8	11	U
2-HEXANONE	10	4.1	11	U
TETRACHLOROETHENE	10	0.9	11	U
1,1,2,2-TETRACHLOROETHANE	10	2.7	11	U
TOLUENE	10	0.7	11	U
CHLOROBENZENE	10	1	11	U
ETHYLBENZENE	10	0.7	11	U
STYRENE	10	1.1	11	U
XYLENE (TOTAL)	10	1.7	11	U

% SOLIDS:

87.0

SITE: CTO #127, NCBC DAVISVILLE, RHODE ISLAND
 BUILDING 56 DRAIN SAMPLE RESULTS
 LABORATORY: SOUTHWEST LABORATORY OF OKLAHOMA

CLIENT ID:
 LABORATORY ID:

3-DS1-S1-62993
 14394.35

TCL SEMIVOLATILES SOILS	(ug/Kg)	CRQL	MDL		
PHENOL		330	36	380	U
BIS(2-CHLOROETHYL)ETHER		330	27	380	U
2-CHLOROPHENOL		330	37	380	U
1,3-DICHLOROBENZENE		330	40	380	U
1,4-DICHLOROBENZENE		330	43	69	J
1,2-DICHLOROBENZENE		330	47	380	U
2-METHYLPHENOL		330	47	380	U
BIS(2-CHLOROISOPROPYL)ETHER		330	40	380	U
4-METHYLPHENOL		330	47	380	U
N-NITROSO-DI-N-PROPYLAMINE		330	47	380	U
HEXACHLOROETHANE		330	27	380	U
NITROBENZENE		330	53	380	U
ISOPHORONE		330	40	380	U
2-NITROPHENOL		330	33	380	U
2,4-DIMETHYLPHENOL		330	77	380	U
2,4-DICHLOROPHENOL		330	40	380	U
1,2,4-TRICHLOROBENZENE		330	40	380	U
NAPHTHALENE		330	47	380	U
4-CHLOROANILINE		330	57	380	U
BIS(2-CHLOROETHOXY)METHANE		330	47	380	U
HEXACHLOROBUTADIENE		330	47	380	U
4-CHLORO-3-METHYLPHENOL		330	57	380	U
2-METHYLNAPHTHALENE		330	47	380	U
HEXACHLOROCYCLOPENTADIENE		330	110	380	U
2,4,6-TRICHLOROPHENOL		330	53	380	U
2,4,5-TRICHLOROPHENOL		800	80	920	U
2-CHLORONAPHTHALENE		330	73	380	U
2-NITROANILINE		800	77	920	U
DIMETHYL PHTHALATE		330	83	380	U
ACENAPHTHYLENE		330	70	110	J
2,6-DINITROTOLUENE		330	60	380	U
3-NITROANILINE		800	55	920	U
ACENAPHTHENE		330	97	380	U

SITE: CTO #127, NCBC DAVISVILLE, RHODE ISLAND
 BUILDING 56 DRAIN SAMPLE RESULTS
 LABORATORY: SOUTHWEST LABORATORY OF OKLAHOMA

CLIENT ID:
 LABORATORY ID:

3-DS1-S1-62993
 14394.35

TCL SEMIVOLATILES SOILS (ug/Kg)	CRQL	MDL		
2,4-DINITROPHENOL	800	43	920	U
4-NITROPHENOL	800	120	920	U
DIBENZOFURAN	330	73	380	U
2,4-DINITROTOLUENE	330	57	380	U
DIETHYLPHTHALATE	330	50	380	U
4-CHLOROPHENYL-PHENYLETHER	330	40	380	U
FLUORENE	330	37	380	U
4-NITROANILINE	800	43	920	U
4,6-DINITRO-2-METHYLPHENOL	800	160	920	U
N-NITROSODIPHENYLAMIN(1)	330	33	380	U
4-BROMOPHENYL-PHENYLETHER	330	53	380	U
HEXACHLOROBENZENE	330	57	380	U
PENTACHLOROPHENOL	800	93	920	U
PHENANTHRENE	330	77	600	J
ANTHRACENE	330	73	140	J
CARBAZOLE	330	47	92	J
DI-N-BUTYLPHTHALATE	330	50	74	J
FLUORANTHENE	330	80	1600	J
PYRENE	330	73	760	J
BUTYLBENZYLPHTHALATE	330	43	160	J
3,3'-DICHLOROBENZIDINE	330	80	380	U
BENZO(A)ANTHRACENE	330	47	760	
CHRYSENE	330	30	860	
BIS(2-ETHYLHEXYL)PHTHALATE	330	57	380	U
DI-N-OCTYL PHTHALATE	330	47	380	U
BENZO(B)FLUORANTHENE	330	120	880	
BENZO(K)FLUORANTHENE	330	150	620	
BENZO(A)PYRENE	330	77	720	
INDENO(1,2,3-CD)PYRENE	330	57	660	
DIBENZ(A,H)ANTHRACENE	330	67	230	J
BENZO(G,H,I)PERYLENE	330	97	480	

% SOLIDS:

87.0

SITE: CTO #127, NCBC DAVISVILLE, RHODE ISLAND
 BUILDING 56 DRAIN SAMPLE RESULTS
 LABORATORY: SOUTHWEST LABORATORY OF OKLAHOMA

CLIENT ID:
 LABORATORY ID:

3-DS1-S1-62993
 14394.35

TCL PESTICIDES/PCB SOILS (ug/Kg)	CRQL	MDL		
ALPHA-BHC	1.7	0.06	3.9	U
BETA-BHC	1.7	0.12	3.9	U
DELTA-BHC	1.7	0.06	3.9	U
GAMMA-BHC (LINDANE)	1.7	0.06	3.9	U
HEPTACHLOR	1.7	0.06	3.9	U
ALDRIN	1.7	0.03	3.9	U
HEPTACHLOR EPOXIDE	1.7	0.03	3.9	U
ENDOSULFAN I	1.7	0.06	3.9	U
DIELDRIN	3.3	0.06	7.6	U
4,4'-DDE	3.3	0.06	7.6	U
ENDRIN	3.3	0.15	11	J
ENDOSULFAN II	3.3	0.12	7.6	U
4,4'-DDD	3.3	0.09	7.6	U
ENDOSULFAN SULFATE	3.3	0.12	7.6	U
4,4'-DDT	3.3	0.12	7.6	U
METHOXYCHLOR	17	0.57	39	U
ENDRIN KETONE	3.3	0.09	7.6	U
ENDRIN ALDEHYDE	3.3	0.09	32	J
ALPHA-CHLORDANE	1.7	0.06	46	
GAMMA-CHLORDANE	1.7	0.09	50	
TOXAPHENE	170	0.9	390	U
AROCLOR-1016	33	0.9	76	U
AROCLOR-1221	67	0.12	150	U
AROCLOR-1232	33	0.3	76	U
AROCLOR-1242	33	0.3	76	U
AROCLOR-1248	33	1.2	76	U
AROCLOR-1254	33	1.5	76	U
AROCLOR-1260	33	1.2	76	U

% SOLIDS:

87.0

SITE: CTO #127, NCBC DAVISVILLE, RHODE ISLAND
 BUILDING 56 DRAIN SAMPLE RESULTS
 LABORATORY: SOUTHWEST LABORATORY OF OKLAHOMA

CLIENT ID: 3-DS1-S1-62993
 LABORATORY ID: 14394.35

TAL METAL SOILS (mg/Kg)	CRDL	IDL		
ALUMINUM	40	6.8	3760	
ANTIMONY	12	3.2	4.3	UR
ARSENIC	2	0.4	3.1	
BARIUM	40	1.8	61.5	J
BERYLLIUM	1	0.2	0.23	U
CADMIUM	1	0.6	1.7	U
CALCIUM	1000	46	2000	J
CHROMIUM	2	1.2	10.2	J
COBALT	10	1.2	3.3	
COPPER	5	0.4	589	
IRON	20	1.6	15300	
LEAD	0.6	0.4	391	J
MAGNESIUM	1000	38.6	1310	J
MANGANESE	1.8	0.4	131	
MERCURY	0.1	0.1	2.2	
NICKEL	8	3	7.8	
POTASSIUM	1000	148.6	721	J
SELENIUM	1	0.2	0.45	U
SILVER	2	0.4	198	
SODIUM	1000	50.4	1170	J
THALLIUM	2	0.6	0.9	U
VANADIUM	10	1.2	7.8	J
ZINC	4	0.4	1460	
%SOLIDS:			88.2	

SITE: CTO #127, NCBC DAVISVILLE, RHODE ISLAND
 BUILDING 56 WIPE SAMPLE RESULTS
 LABORATORY: SOUTHWEST LABORATORY OF OKLAHOMA

CLIENT ID: 3-WS1-S1-63093 3-WS2-S1-63093 3-WS3-S1-63093 3-WS4-S1-63093
 LABORATORY ID: 14409.18 14409.19 14409.20 14409.21

TCL SEMIVOLATILE WIPES (ug/wipe)

	CRQL	MDL								
PHENOL	10	1.2	10	U	10	U	10	U	10	U
BIS(2-CHLOROETHYL)ETHER	10	0.8	10	U	10	U	10	U	10	U
2-CHLOROPHENOL	10	0.8	10	U	10	U	10	U	10	U
1,3-DICHLOROBENZENE	10	0.6	10	U	10	U	10	U	10	U
1,4-DICHLOROBENZENE	10	0.7	10	U	10	U	10	U	10	U
1,2-DICHLOROBENZENE	10	0.8	10	U	10	U	10	U	10	U
2-METHYLPHENOL	10	0.6	10	U	10	U	10	U	10	U
BIS(2-CHLOROISOPROPYL)ETHER	10	0.9	10	U	10	U	10	U	10	U
4-METHYLPHENOL	10	0.6	10	U	10	U	10	U	10	U
N-NITROSO-DI-N-PROPYLAMINE	10	0.7	10	U	10	U	10	U	10	U
HEXACHLOROETHANE	10	0.8	10	U	10	U	10	U	10	U
NITROBENZENE	10	0.6	10	U	10	U	10	U	10	U
ISOPHORONE	10	0.5	10	U	10	U	10	U	10	U
2-NITROPHENOL	10	0.7	10	U	10	U	10	U	10	U
2,4-DIMETHYLPHENOL	10	0.7	10	U	10	U	10	U	10	U
2,4-DICHLOROPHENOL	10	0.5	10	U	10	U	10	U	10	U
1,2,4-TRICHLOROBENZENE	10	0.8	10	U	10	U	10	U	10	U
NAPHTHALENE	10	0.7	10	U	10	U	10	U	10	U
4-CHLOROANILINE	10	1	10	U	10	U	10	U	10	U
BIS(2-CHLOROETHOXY)METHANE	10	0.4	10	U	10	U	10	U	10	U
HEXACHLOROBUTADIENE	10	0.6	10	U	10	U	10	U	10	U
4-CHLORO-3-METHYLPHENOL	10	1	10	U	10	U	10	U	10	U
2-METHYLNAPHTHALENE	10	0.6	10	U	10	U	10	U	10	U
HEXACHLOROCYCLOPENTADIENE	10	NA	10	U	10	U	10	U	10	U
2,4,6-TRICHLOROPHENOL	10	1.5	10	U	10	U	10	U	10	U
2,4,5-TRICHLOROPHENOL	25	0.8	25	U	25	U	25	U	25	U
2-CHLORONAPHTHALENE	10	1	10	U	10	U	10	U	10	U
2-NITROANILINE	25	1	25	U	25	U	25	U	25	U
DIMETHYL PHTHALATE	10	0.5	10	U	10	U	10	U	10	U
ACENAPHTHYLENE	10	1.2	10	U	10	U	10	U	10	U
2,6-DINITROTOLUENE	10	1.3	10	U	10	U	10	U	10	U
3-NITROANILINE	25	2.4	25	U	25	U	25	U	25	U
ACENAPHTHENE	10	1.5	10	U	10	U	10	U	0.6	J

SITE: CTO #127, NCBC DAVISVILLE, RHODE ISLAND
 BUILDING 56 WIPE SAMPLE RESULTS
 LABORATORY: SOUTHWEST LABORATORY OF OKLAHOMA

CLIENT ID:	3-WS1-S1-63093	3-WS2-S1-63093	3-WS3-S1-63093	3-WS4-S1-63093						
LABORATORY ID:	14409.18	14409.19	14409.20	14409.21						
TCL SEMIVOLATILE WIPES (ug/wipe)										
2,4-DINITROPHENOL	25	1.1	25	U	25	U	25	U	25	U
4-NITROPHENOL	25	2.4	25	U	25	U	25	U	25	U
DIBENZOFURAN	10	1.3	10	U	10	U	10	U	10	U
2,4-DINITROTOLUENE	10	1.6	10	U	10	U	10	U	10	U
DIETHYLPHTHALATE	10	1	10	U	10	U	10	U	10	U
4-CHLOROPHENYL-PHENYLETHER	10	1.1	10	U	10	U	10	U	10	U
FLUORENE	10	1.2	10	U	10	U	10	U	0.8	J
4-NITROANILINE	25	1.4	25	U	25	U	25	U	25	U
4,6-DINITRO-2-METHYLPHENOL	25	2.1	25	U	25	U	25	U	25	U
N-NITROSODIPHENYLAMIN(1)	10	1.3	10	U	10	U	10	U	10	U
4-BROMOPHENYL-PHENYLETHER	10	1.8	10	U	10	U	10	U	10	U
HEXACHLOROBENZENE	10	1.8	10	U	10	U	10	U	10	U
PENTACHLOROPHENOL	25	1.6	25	U	25	U	25	U	25	U
PHENANTHRENE	10	3.1	10	U	10	U	10	U	27	U
ANTHRACENE	10	2.1	10	U	10	U	10	U	0.6	J
CARBAZOLE	10	2.6	10	U	10	U	10	U	1	J
DI-N-BUTYLPHTHALATE	10	2.5	1	J	1	J	2	J	2	J
FLUORANTHENE	10	2.1	10	U	0.6	J	10	U	34	J
PYRENE	10	1.2	10	U	10	U	10	U	25	J
BUTYLBENZYLPHTHALATE	10	1.5	10	U	10	U	10	U	10	U
3,3-DICHLOROBENZIDINE	10	0.7	10	U	10	U	10	U	10	U
BENZO(A)ANTHRACENE	10	1.4	10	U	10	U	10	U	2	J
CHRYSENE	10	1	10	U	10	U	10	U	5	J
BIS(2-ETHYLHEXYL)PHTHALATE	10	1.9	10	U	10	U	10	U	10	U
DI-N-OCTYL PHTHALATE	10	1.2	3	J	0.6	J	10	U	1	J
BENZO(B)FLUORANTHENE	10	2.7	10	U	10	U	10	U	2	J
BENZO(K)FLUORANTHENE	10	2.6	10	U	10	U	10	U	1	J
BENZO(A)PYRENE	10	1	10	U	10	U	10	U	0.8	J
INDENO(1,2,3-CD)PYRENE	10	2	10	U	10	U	10	U	10	U
DIBENZ(A,H)ANTHRACENE	10	2.3	10	U	10	U	10	U	10	U
BENZO(G,H,I)PERYLENE	10	2.1	10	U	10	U	10	U	10	U

SITE: CTO #127, NCBC DAVISVILLE, RHODE ISLAND
 BUILDING 56 WIPE SAMPLE RESULTS
 LABORATORY: SOUTHWEST LABORATORY OF OKLAHOMA

CLIENT ID:	3-WS1-S1-63093	3-WS2-S1-63093	3-WS3-S1-63093	3-WS4-S1-63093
LABORATORY ID:	14409.18	14409.19	14409.20	14409.21

TCL PESTICIDES WIPES (UG/WIPE)	CRQL	MDL/IDL								
ALPHA-BHC	0.05	0.002	0.05	UJ	0.05	U	0.05	U	0.05	UJ
BETA-BHC	0.05	0.004	0.05	UJ	0.05	U	0.05	U	0.05	UJ
DELTA-BHC	0.05	0.002	0.05	UJ	0.05	U	0.05	U	0.05	UJ
GAMMA-BHC (LINDANE)	0.05	0.002	0.05	UJ	0.05	U	0.05	U	0.05	UJ
HEPTACHLOR	0.05	0.002	0.05	UJ	0.05	U	0.05	U	0.053	J
ALDRIN	0.05	0.001	0.05	UJ	0.05	U	0.05	U	0.05	UJ
HEPTACHLOR EPOXIDE	0.05	0.001	0.05	UJ	0.05	U	0.05	U	0.05	UJ
ENDOSULFAN I	0.05	0.002	0.05	UJ	0.05	U	0.05	U	0.05	UJ
DIELDRIN	0.1	0.002	0.1	UJ	0.1	U	0.1	U	0.21	J
4,4'-DDE	0.1	0.002	0.1	UJ	0.1	U	0.1	U	0.1	UJ
ENDRIN	0.1	0.005	0.1	UJ	0.1	U	0.1	U	0.1	UJ
ENDOSULFAN II	0.1	0.004	0.1	UJ	0.1	U	0.1	U	0.1	UJ
4,4'-DDD	0.1	0.003	0.1	UJ	0.1	U	0.1	U	0.1	UJ
ENDOSULFAN SULFATE	0.1	0.004	0.1	UJ	0.1	U	0.1	U	0.1	UJ
4,4'-DDT	0.1	0.004	0.1	UJ	0.1	U	0.1	U	0.1	UJ
METHOXYCHLOR	0.5	0.019	0.5	UJ	0.5	U	0.5	U	0.5	UJ
ENDRIN KETONE	0.1	0.003	0.1	UJ	0.1	U	0.1	U	0.1	UJ
ENDRIN ALDEHYDE	0.1	0.003	0.1	UJ	0.12	J	0.1	U	0.7	J
ALPHA-CHLORDANE	0.05	0.002	0.05	UJ	0.05	U	0.05	U	0.05	UJ
GAMMA-CHLORDANE	0.05	0.003	0.05	UJ	0.05	U	0.05	U	0.05	UJ
TOXAPHENE	5	0.03	5	UJ	5	U	5	U	5	UJ
AROCLOR-1016	1	0.03	1	UJ	1	U	1	U	1	UJ
AROCLOR-1221	2	0.04	2	UJ	2	U	2	U	2	UJ
AROCLOR-1232	1	0.01	1	UJ	1	U	1	U	1	UJ
AROCLOR-1242	1	0.01	1	UJ	1	U	1	U	1	UJ
AROCLOR-1248	1	0.04	1	UJ	1	U	1	U	1	UJ
AROCLOR-1254	1	0.05	1	UJ	1	U	1	U	1	UJ
AROCLOR-1260	1	0.04	1	UJ	1	U	1	U	1	UJ

SITE: CTO # 127, NCBC DAVISVILLE, RHODE ISLAND
 BUILDING 56 WIPE SAMPLE RESULTS
 LABORATORY: SOUTHWEST LABORATORY OF OKLAHOMA

CLIENT ID:	3-WS1-S1-63093	3-WS2-S1-63093	3-WS3-S1-63093	3-WS4-S1-63093
LABORATORY ID:	14409.18	14409.19	14409.20	14409.21

TAL METAL WIPES (ug/wipe)

	CRDL	IDL								
ALUMINUM	40	6.8	192		198		1020		265	
ANTIMONY	12	3.2	1.9	UJ	1.9	UJ	1.9	UJ	1.9	UJ
ARSENIC	2	0.4	0.16		0.24		1.10		0.38	
BARIUM	40	1.8	4.3		5.6		16.6		10.9	
BERYLLIUM	1	0.2	0.10	U	0.10	U	0.10	U	0.10	U
CADMIUM	1	0.6	0.44	U	0.37	U	0.47	U	0.73	U
CALCIUM	1000	46	610		602		2200		1250	
CHROMIUM	2	1.2	2.3		2.1		4.9		4.8	
COBALT	10	1.2	0.50	UJ	0.50	UJ	0.82		0.88	
COPPER	5	0.4	4.2	U	3.9	U	9.7		8.2	
IRON	20	1.6	635		731		4030		1750	
LEAD	0.6	0.4	18.9		20.7		122		43.5	
MAGNESIUM	1000	38.6	89.8		118		336		171	
MANGANESE	1.8	0.4	5.4		6.2		45.2		13.3	
MERCURY	0.1	0.1	0.04		0.08		0.02	U	0.48	
NICKEL	8	3	2.1	U	2.1	U	2.1	U	2.1	U
POTASSIUM	1000	148.6	91.2		164		291		162	
SELENIUM	1	0.2	0.2	U	0.2	U	0.2	U	0.2	U
SILVER	2	0.4	0.3	U	0.3	U	0.3	U	0.3	U
SODIUM	1000	50.4	265	U	295	U	332	U	374	U
THALLIUM	2	0.6	0.2	U	0.2	U	0.2	U	0.2	U
VANADIUM	10	1.2	0.6	U	0.6	U	2.8		0.84	
ZINC	4	0.4	24.6		42.9		100		72.6	

SITE: CTO 127, NCBC DAVISVILLE, RI
 BUILDING 56
 SURFACE SOIL RESULTS - ROUND 2
 LABORATORY: SOUTHWEST LABORATORY OF OKLAHOMA

CLIENT ID:	3-SS1A-S1-021594	3-SS2A-S1-021594	3-SS3A-S1-021594	3-SS4A-S1-021594		
LABORATORY ID:	17595.16	17595.17	17595.18	17595.19		
% SOLIDS:	95	92	92	86		
TCL VOLATILES SOILS (UG/KG)	CRQL	MDL		FIELD DUPLICATE PAIR		
CHLOROMETHANE	10	1.9	10 U	11 U	11 U	12 U
BROMOMETHANE	10	2.8	10 U	11 U	11 U	12 U
VINYL CHLORIDE	10	1.9	10 U	11 U	11 U	12 U
CHLOROETHANE	10	2.9	10 U	11 U	11 U	12 U
METHYLENE CHLORIDE	10	2.1	14 U	15	15	6 J
ACETONE	10	3.7	46 U	27	14	12 U
CARBON DISULFIDE	10	1.4	10 U	11 U	11 U	12 U
1,1-DICHLOROETHENE	10	1.1	10 U	11 U	11 U	12 U
1,1-DICHLOROETHANE	10	1.6	10 U	11 U	11 U	12 U
1,2-DICHLOROETHENE (TOTAL)	10	1.2	10 U	11 U	11 U	12 U
CHLOROFORM	10	1.3	10 U	11 U	11 U	12 U
1,2-DICHLOROETHANE	10	2.8	10 U	11 U	11 U	12 U
2-BUTANONE	10	3.9	10 J	11 U	11 U	12 U
1,1,1-TRICHLOROETHANE	10	0.6	10 U	11 U	11 U	12 U
CARBON TETRACHLORIDE	10	1.2	10 U	11 U	11 U	12 U
BROMODICHLOROMETHANE	10	0.7	10 U	11 U	11 U	12 U
1,2-DICHLOROPROPANE	10	1	10 U	11 U	11 U	12 U
CIS-1,3-DICHLOROPROPENE	10	1	10 U	11 U	11 U	12 U
TRICHLOROETHENE	10	1.1	10 U	11 U	11 U	12 U
DIBROMOCHLOROMETHANE	10	1.4	10 U	11 U	11 U	12 U
1,1,2-TRICHLOROETHANE	10	1.1	10 U	11 U	11 U	12 U
BENZENE	10	1.2	10 U	11 U	11 U	12 U
TRANS-1,3-DICHLOROPROPENE	10	0.9	10 U	11 U	11 U	12 U
BROMOFORM	10	2.5	10 U	11 U	11 U	12 U
4-METHYL-2-PENTANONE	10	4	10 U	11 U	11 U	12 U
2-HEXANONE	10	4.8	10 U	11 U	11 U	12 U
TETRACHLOROETHENE	10	1.3	2 J	2 J	4 J	3 J
1,1,2,2-TETRACHLOROETHANE	10	1.7	10 U	11 U	11 U	12 U
TOLUENE	10	0.9	10 U	11 U	11 U	12 U
CHLOROBENZENE	10	0.8	10 U	11 U	11 U	12 U
ETHYLBENZENE	10	2.6	10 U	11 U	11 U	12 U
STYRENE	10	0.9	10 U	11 U	11 U	12 U
XYLENE (TOTAL)	10	1.7	10 U	11 U	11 U	12 U

SITE: CTO 127, NCBC DAVISVILLE, RI
 BUILDING 56
 SURFACE SOIL RESULTS - ROUND 2
 LABORATORY: SOUTHWEST LABORATORY OF OKLAHOMA

CLIENT ID: 3-SS4A-S2-201594
 LABORATORY ID: 17595.20
 FIELD DUPLICATE PAIR

% SOLIDS: 84

TCL VOLATILES SOILS (UG/KG)	CRQL	MDL		
CHLOROMETHANE	10	1.9	12	U
BROMOMETHANE	10	2.8	12	U
VINYL CHLORIDE	10	1.9	12	U
CHLOROETHANE	10	2.9	12	U
METHYLENE CHLORIDE	10	2.1	4	J
ACETONE	10	3.7	13	U
CARBON DISULFIDE	10	1.4	12	U
1,1-DICHLOROETHENE	10	1.1	12	U
1,1-DICHLOROETHANE	10	1.6	12	U
1,2-DICHLOROETHENE (TOTAL)	10	1.2	12	U
CHLOROFORM	10	1.3	12	U
1,2-DICHLOROETHANE	10	2.8	12	U
2-BUTANONE	10	3.9	12	U
1,1,1-TRICHLOROETHANE	10	0.6	12	U
CARBON TETRACHLORIDE	10	1.2	12	U
BROMODICHLOROMETHANE	10	0.7	12	U
1,2-DICHLOROPROPANE	10	1	12	U
CIS-1,3-DICHLOROPROPENE	10	1	12	U
TRICHLOROETHENE	10	1.1	12	U
DIBROMOCHLOROMETHANE	10	1.4	12	U
1,1,2-TRICHLOROETHANE	10	1.1	12	U
BENZENE	10	1.2	12	U
TRANS-1,3-DICHLOROPROPENE	10	0.9	12	U
BROMOFORM	10	2.5	12	U
4-METHYL-2-PENTANONE	10	4	12	U
2-HEXANONE	10	4.8	12	U
TETRACHLOROETHENE	10	1.3	1	J
1,1,2,2-TETRACHLOROETHANE	10	1.7	12	U
TOLUENE	10	0.9	12	U
CHLORO BENZENE	10	0.8	12	U
ETHYL BENZENE	10	2.6	12	U
STYRENE	10	0.9	12	U
XYLENE (TOTAL)	10	1.7	12	U

SITE: CTO 127, NCBC DAVISVILLE, RHODE ISLAND
 BUILDING 56
 SURFACE SOIL RESULTS - ROUND 2
 LABORATORY: SOUTHWEST LABORATORY OF OKLAHOMA

CLIENT ID:	3-SS1A-S1-021594	3-SS2A-S1-021594	3-SS3A-S1-021594	3-SS4A-S1-021594	3-SS4A-S2-021594
LABORATORY ID:	17595.16	17595.17	17595.18	17595.19	17595.20
% SOLIDS:	95	92	92	FIELD DUPLICATE PAIR	
				86	84
TCL SEMIVOLATILES SOILS (UG/KG)					
PHENOL	350 U	360 U	360 U	380 U	390 U
BIS(2-CHLOROETHYL)ETHER	350 U	360 U	360 U	380 U	390 U
2-CHLOROPHENOL	350 U	360 U	360 U	380 U	390 U
1,3-DICHLOROBENZENE	350 U	360 U	360 U	380 U	390 U
1,4-DICHLOROBENZENE	350 U	360 U	360 U	380 U	390 U
1,2-DICHLOROBENZENE	350 U	360 U	360 U	380 U	390 U
2-METHYLPHENOL	350 U	360 U	360 U	380 U	390 U
BIS(2-CHLOROISOPROPYL)ETHER	350 U	360 U	360 U	380 U	390 U
4-METHYLPHENOL	350 U	360 U	360 U	380 U	390 U
N-NITROSO-DI-N-PROPYLAMINE	350 U	360 U	360 U	380 U	390 U
HEXACHLOROETHANE	350 U	360 U	360 U	380 U	390 U
NITROBENZENE	350 U	360 U	360 U	380 U	390 U
ISOPHORONE	350 U	360 U	360 U	380 U	390 U
2-NITROPHENOL	350 U	360 U	360 U	380 U	390 U
2,4-DIMETHYLPHENOL	350 U	360 U	360 U	380 U	390 U
2,4-DICHLOROPHENOL	350 U	360 U	360 U	380 U	390 U
1,2,4-TRICHLOROBENZENE	350 U	360 U	360 U	380 U	390 U
NAPHTHALENE	350 U	360 U	360 U	380 U	390 U
4-CHLOROANILINE	350 U	360 U	360 U	380 U	390 U
BIS(2-CHLOROETHOXY)METHANE	350 U	360 U	360 U	380 U	390 U
HEXACHLOROBUTADIENE	350 U	360 U	360 U	380 U	390 U
4-CHLORO-3-METHYLPHENOL	350 U	360 U	360 U	380 U	390 U
2-METHYLNAPHTHALENE	350 U	360 U	360 U	380 U	390 U
HEXACHLOROCYCLOPENTADIENE	350 U	360 U	360 U	380 U	390 U
2,4,6-TRICHLOROPHENOL	350 U	360 U	360 U	380 U	390 U
2,4,5-TRICHLOROPHENOL	840 U	870 U	870 U	930 U	950 U
2-CHLORONAPHTHALENE	350 U	360 U	360 U	380 U	390 U
2-NITROANILINE	840 U	870 U	870 U	930 U	950 U
DIMETHYL PHTHALATE	350 U	360 U	360 U	380 U	390 U
ACENAPHTHYLENE	350 U	360 U	64 J	20 J	390 U
2,6-DINITROTOLUENE	350 U	360 U	360 U	21 J	390 U
3-NITROANILINE	840 U	870 U	870 U	930 UJ	950 UJ
ACENAPHTHENE	350 U	360 U	360 U	380 U	390 U

SITE: CTO 127, NCBC DAVISVILLE, RHODE ISLAND
 BUILDING 56
 SURFACE SOIL RESULTS - ROUND 2
 LABORATORY: SOUTHWEST LABORATORY OF OKLAHOMA

CLIENT ID:	3-SS1A-S1-021594	3-SS2A-S1-021594	3-SS3A-S1-021594	3-SS4A-S1-021594	3-SS4A-S2-021594
LABORATORY ID:	17595.16	17595.17	17595.18	17595.19	17595.20
% SOLIDS:	95	92	92	FIELD DUPLICATE PAIR 86 84	
TCL SEMIVOLATILES SOILS (UG/KG)					
2,4-DINITROPHENOL	840 U	870 U	870 U	930 U	950 U
4-NITROPHENOL	840 U	870 U	870 U	930 U	950 U
DIBENZOFURAN	350 U	360 U	360 U	380 U	390 U
2,4-DINITROTOLUENE	350 U	360 U	360 U	380 U	390 U
DIETHYLPHTHALATE	350 U	360 U	360 U	380 U	390 U
4-CHLOROPHENYL-PHENYLETHER	350 U	360 U	360 U	380 U	390 U
FLUORENE	350 U	360 U	21 J	380 U	390 U
4-NITROANILINE	840 U	870 U	870 U	930 U	950 U
4,6-DINITRO-2-METHYLPHENOL	840 U	870 U	870 U	930 U	950 U
N-NITROSODIPHENYLAMIN(1)	350 U	360 U	360 U	380 U	390 U
4-BROMOPHENYL-PHENYLETHER	350 U	360 U	360 U	380 U	390 U
HEXACHLOROBENZENE	350 U	360 U	360 U	380 U	390 U
PENTACHLOROPHENOL	840 U	870 U	870 U	930 U	950 U
PHENANTHRENE	350 U	25 J	220 J	29 J	32 J
ANTHRACENE	350 U	360 U	62 J	380 U	390 U
CARBAZOLE	350 U	360 U	360 U	22 J	390 U
DI-N-BUTYLPHTHALATE	27 J	360 U	360 U	51 J	27 J
FLUORANTHENE	350 U	60 J	540	100 J	85 J
PYRENE	350 U	53 J	490	86 J	62 J
BUTYLBENZYLPHTHALATE	350 U	30 J	360 U	24 J	390 U
3,3'-DICHLOROBENZIDINE	350 U	360 U	360 U	380 U	390 U
BENZO(A)ANTHRACENE	350 U	30 J	240 J	57 J	32 J
CHRYSENE	350 U	43 J	280 J	63 J	46 J
BIS(2-ETHYLHEXYL)PHTHALATE	350 U	360 U	360 U	380 U	390 U
DI-N-OCTYL PHTHALATE	350 U	360 U	360 U	380 U	390 U
BENZO(B)FLUORANTHENE	350 U	40 J	250 J	57 J	48 J
BENZO(K)FLUORANTHENE	350 U	45 J	250 J	70 J	38 J
BENZO(A)PYRENE	350 U	37 J	200 J	50 J	33 J
INDENO(1,2,3-CD)PYRENE	350 U	27 J	110 J	47 J	32 J
DIBENZ(A,H)ANTHRACENE	350 U	360 U	36 J	21 J	390 U
BENZO(G,H,I)PERYLENE	350 U	25 J	88 J	42 J	29 J

SITE: CTO 127, NCBC DAVISVILLE, RHODE ISLAND
 BUILDING 56
 SURFACE SOIL RESULTS - ROUND 2
 SDG NO: 17595
 LABORATORY: SOUTHWEST LABORATORY OF OKLAHOMA

CLIENT ID:	3-SS1A-S1-021594	3-SS2A-S1-021594	3-SS3A-S1-021594	3-SS4A-S1-021594	3-SS4A-S2-021594		
LABORATORY ID:	17595.16	17595.17	17595.18	17595.19	17595.20		
% SOLIDS:	95	92	92	86	84		
TCL PESTICIDES/PCB SOILS (UG/KG)	CRQL	MDL					
ALPHA-BHC	1.7	0.07	18 U	18 U	9.2 J	20 U	2 UJ
BETA-BHC	1.7	0.15	18 U	18 U	18 U	20 U	2 UJ
DELTA-BHC	1.7	0.07	18 U	18 U	18 U	20 U	2 UJ
GAMMA-BHC (LINDANE)	1.7	0.07	18 U	18 U	18 U	20 U	2 UJ
HEPTACHLOR	1.7	0.16	18 U	18 U	18 U	20 U	2 UJ
ALDRIN	1.7	0.07	18 U	18 U	18 U	20 U	2 UJ
HEPTACHLOR EPOXIDE	1.7	0.05	18 U	18 U	18 U	20 U	2 UJ
ENDOSULFAN I	1.7	0.08	18 U	18 U	18 U	20 U	2 UJ
DIELDRIN	3.3	0.24	35 U	36 U	36 U	38 U	3.9 UJ
4,4'-DDE	3.3	0.1	8.6 J	36 U	36 U	38 U	3.9 UJ
ENDRIN	3.3	0.15	35 U	36 U	36 U	5.7 J	3.9 UJ
ENDOSULFAN II	3.3	0.13	35 U	36 U	5 J	38 U	3.9 UJ
4,4'-DDD	3.3	0.09	5.3 J	36 U	36 U	38 U	3.9 UJ
ENDOSULFAN SULFATE	3.3	2.9	35 U	36 U	36 U	38 U	3.9 UJ
4,4'-DDT	3.3	0.14	35 U	36 U	36 U	38 U	3.9 UJ
METHOXYCHLOR	17	0.66	180 U	180 U	180 U	200 U	20 UJ
ENDRIN KETONE	3.3	0.12	35 UJ	36 UJ	36 U	38 UJ	3.9 UJ
ENDRIN ALDEHYDE	3.3	0.1	35 U	36 U	7.4 J	38 U	3.9 UJ
ALPHA-CHLORDANE	1.7	0.12	18 U	18 U	14 J	20 U	2 UJ
GAMMA-CHLORDANE	1.7	0.09	18 U	18 U	8.5 J	20 U	2 UJ
TOXAPHENE	170	1	1800 U	1800 U	1800 U	2000 U	200 UJ
AROCLOR-1016	33	1	350 U	360 U	360 U	380 U	39 UJ
AROCLOR-1221	67	1.3	710 U	730 U	730 U	780 U	80 UJ
AROCLOR-1232	33	0.33	350 U	360 U	360 U	380 U	39 UJ
AROCLOR-1242	33	0.33	350 U	360 U	360 U	380 U	39 UJ
AROCLOR-1248	33	1.3	350 U	360 U	360 U	380 U	39 UJ
AROCLOR-1254	33	1.7	350 U	360 U	360 U	380 U	39 UJ
AROCLOR-1260	33	1.3	350 U	360 U	140 J	380 U	39 UJ

SITE: CTO 127, NCBC DAVISVILLE, RHODE ISLAND
 BUILDING 56
 SURFACE SOIL RESULTS - ROUND 2
 LABORATORY: SOUTHWEST LABORATORY OF OKLAHOMA

CLIENT ID:	3-SS1A-S1-021594		3-SS2A-S1-021594		3-SS3A-S1-021594		3-SS4A-S1-021594		3-SS4A-S2-021594			
LABORATORY ID:	17595.16		17595.17		17595.18		17595.19		17595.20			
							FIELD DUPLICATE PAIR					
% SOLIDS:	95		92		92		86		84			
TAL METAL SOILS (MG/KG)	CRQL	IDL										
ALUMINUM	20	7.4	3610		5780		5430		3750		2820	
ANTIMONY	6	2	11.7	UJ	12.4	UJ	12.3	UJ	13.5	UJ	13	UJ
ARSENIC	1	0.2	0.97		1.2		1.5		1.1		1.1	J
BARUM	20	0.8	11.8	J	31.3	J	66.3	J	20.1	J	14.1	J
BERYLLIUM	5	0.1	0.4	J	0.55	J	0.63	J	0.32	J	0.37	J
CADMIUM	0.5	0.2	0.63	UJ	0.66	UJ	0.66	UJ	0.72	UJ	0.7	UJ
CALCIUM	500	24	4340		4700		422		497		446	
CHROMIUM	1	0.3	7.5		13.4		10.9		5.3		4.3	
COBALT	5	0.4	1.6	U	3.8	U	3.3	U	1.7	U	2.3	U
COPPER	2.5	0.2	4.7	U	9.6	U	12.7	U	9.5	U	8.5	U
IRON	10	0.5	5630		11000		11400		7640		4810	
LEAD	0.3	0.1	20.8	J	105	J	90.4	J	208	J	68.5	J
MAGNESIUM	500	17.3	906		2440		1800		771		511	
MANGANESE	1.5	0.1	87		143		151		155		99.2	
MERCURY	0.1	0.1	0.1	U	0.11	U	0.11	U	0.12	U	0.12	U
NICKEL	4	1.1	2.9		7.3		5.5		2.8		2.8	
POTASSIUM	500	42.7	539	U	1370		1140		854	U	340	U
SELENIUM	0.5	0.2	0.63	UJ	0.66	UJ	0.66	UJ	0.72	UJ	0.7	UJ
SILVER	1	0.3	1.9	UJ	2	UJ	2	UJ	2.2	UJ	2.1	UJ
SODIUM	500	29.8	184		313		173		213		227	
THALLIUM	1	0.3	0.27	UJ	0.22	UJ	0.24	UJ	0.32	UJ	0.28	UJ
VANADIUM	5	0.3	4.2	J	13.6	J	9.6	J	5.4	J	4	J
ZINC	2	0.3	40.7	U	69.4	J	100	J	224	J	126	J
CYANIDE	0.5	NA	0.52	U	0.55	U	0.55	U	0.6	U	0.58	U

SITE: CTO 127, NCBC DAVISVILLE, RHODE ISLAND
 BUILDING 56
 WIPE SAMPLE RESULTS - ROUND 2
 LABORATORY: SOUTHWEST LABORATORY OF OKLAHOMA

CLIENT ID:	3-WS4A-S1	3-WS4A-S2				
LABORATORY ID:	17596.02	17596.03				
TCL SEMIVOLATILES WIPES (UG/WIPE)	CRQL	MDL				
PHENOL	10	3.7	10	U	10	U
BIS(2-CHLOROETHYL)ETHER	10	4	10	U	10	U
2-CHLOROPHENOL	10	4	10	U	10	U
1,3-DICHLOROBENZENE	10	3	10	U	10	U
1,4-DICHLOROBENZENE	10	3.1	10	U	10	U
1,2-DICHLOROBENZENE	10	3.6	10	U	10	U
2-METHYLPHENOL	10	4.3	10	U	10	U
BIS(2-CHLOROISOPROPYL)ETHER	10	4.6	10	U	10	U
4-METHYLPHENOL	10	4	10	U	10	U
N-NITROSO-DI-N-PROPYLAMINE	10	3	10	U	10	U
HEXACHLOROETHANE	10	2.8	10	U	10	U
NITROBENZENE	10	3.6	10	U	10	U
ISOPHORONE	10	3	10	U	10	U
2-NITROPHENOL	10	3.5	10	U	10	U
2,4-DIMETHYLPHENOL	10	4.8	10	U	10	U
2,4-DICHLOROPHENOL	10	3.7	10	U	10	U
1,2,4-TRICHLOROBENZENE	10	2.9	10	U	10	U
NAPHTHALENE	10	3.7	10	U	10	U
4-CHLOROANILINE	10	9.8	10	U	10	U
BIS(2-CHLOROETHOXY)METHANE	10	3.3	10	U	10	U
HEXACHLOROBUTADIENE	10	3	10	U	10	U
4-CHLORO-3-METHYLPHENOL	10	3.2	10	U	10	U
2-METHYLNAPHTHALENE	10	3.3	10	U	10	U
HEXACHLOROCYCLOPENTADIENE	10	NA	10	U	10	U
2,4,6-TRICHLOROPHENOL	10	3.5	10	U	10	U
2,4,5-TRICHLOROPHENOL	25	3.4	25	U	25	U
2-CHLORONAPHTHALENE	10	3.2	10	U	10	U
2-NITROANILINE	25	3	25	U	25	U
DIMETHYL PHTHALATE	10	2.44	10	U	10	U
ACENAPHTHYLENE	10	3.3	10	U	10	U
2,6-DINITROTOLUENE	10	2.9	10	U	10	U
3-NITROANILINE	25	2.5	25	U	25	U
ACENAPHTHENE	10	3.3	10	U	10	U

SITE: CTO 127, NCBC DAVISVILLE, RHODE ISLAND
 BUILDING 56
 WIPE SAMPLE RESULTS - ROUND 2
 LABORATORY: SOUTHWEST LABORATORY OF OKLAHOMA

CLIENT ID:	3-WS4A-S1	3-WS4A-S2		
LABORATORY ID:	17596.02	17596.03		
TCL SEMIVOLATILES WIPES (UG/WIPE)	CRQL	MDL		
2,4-DINITROPHENOL	25	2.6	10 U	10 U
4-NITROPHENOL	25	2.3	25 UR	25 UR
DIBENZOFURAN	10	3.2	10 U	10 U
2,4-DINITROTOLUENE	10	2.1	25 U	25 U
DIETHYLPHTHALATE	10	2.9	10 U	10 U
4-CHLOROPHENYL-PHENYLETHER	10	3.6	10 U	10 U
FLUORENE	10	3	10 U	10 U
4-NITROANILINE	25	2.1	25 U	25 U
4,6-DINITRO-2-METHYLPHENOL	25	2.5	25 U	25 U
N-NITROSODIPHENYLAMIN(1)	10	2	10 U	10 U
4-BROMOPHENYL-PHENYLETHER	10	2.8	10 U	10 U
HEXACHLOROBENZENE	10	2.2	10 U	10 U
PENTACHLOROPHENOL	25	2	25 U	25 U
PHENANTHRENE	10	2.3	4 J	15
ANTHRACENE	10	2.4	10 U	10 U
CARBAZOLE	10	2.2	0.9 J	2 J
DI-N-BUTYLPHTHALATE	10	2.8	2 J	2 J
FLUORANTHENE	10	1.2	13	30
PYRENE	10	1.6	6 J	15
BUTYLBENZYLPHTHALATE	10	1.8	10 U	1 J
3,3'-DICHLOROBENZIDINE	10	0.7	10 U	10 U
BENZO(A)ANTHRACENE	10	1.4	10 U	1 J
CHRYSENE	10	1.7	3 J	5 J
BIS(2-ETHYLHEXYL)PHTHALATE	10	1.5	10 U	10 U
DI-N-OCTYL PHTHALATE	10	2	0.6 J	0.7 J
BENZO(B)FLUORANTHENE	10	1.4	2 J	1 J
BENZO(K)FLUORANTHENE	10	2.2	10 U	1 J
BENZO(A)PYRENE	10	0.9	10 U	10 U
INDENO(1,2,3-CD)PYRENE	10	1.5	10 U	10 U
DIBENZ(A,H)ANTHRACENE	10	2	10 U	10 U
BENZO(G,H,I)PERYLENE	10	1.6	10 U	10 U

SITE: CTO 127, NCBC DAVISVILLE, RHODE ISLAND
 BUILDING 56
 WIPE SAMPLE RESULTS - ROUND 2
 LABORATORY: SOUTHWEST LABORATORY OF OKLAHOMA

CLIENT ID: 3-WS4A-S1 3-WS4A-S2
 LABORATORY ID: 17596.02 17596.03

TCL PESTICIDES WIPES (UG/WIPE)	CRQL	MDL				
ALPHA-BHC	0.05	0.002	0.05	U	0.05	U
BETA-BHC	0.05	0.004	0.05	U	0.05	U
DELTA-BHC	0.05	0.002	0.05	U	0.05	U
GAMMA-BHC (LINDANE)	0.05	0.002	0.05	U	0.05	U
HEPTACHLOR	0.05	0.005	0.05	U	0.05	U
ALDRIN	0.05	0.002	0.05	U	0.05	U
HEPTACHLOR EPOXIDE	0.05	0.002	0.05	U	0.05	U
ENDOSULFAN I	0.05	0.002	0.05	U	0.05	U
DIELDRIN	0.1	0.007	0.1	U	0.15	J
4,4'-DDE	0.1	0.003	0.15		0.11	J
ENDRIN	0.1	0.005	0.1	U	0.1	U
ENDOSULFAN II	0.1	0.004	0.1	U	0.1	U
4,4'-DDD	0.1	0.003	0.1	U	0.1	U
ENDOSULFAN SULFATE	0.1	0.089	0.1	U	0.1	U
4,4'-DDT	0.1	0.004	0.1	U	0.1	U
METHOXYCHLOR	0.5	0.02	0.5	U	0.5	U
ENDRIN KETONE	0.1	0.004	0.1	U	0.1	U
ENDRIN ALDEHYDE	0.1	0.003	0.1	U	0.1	U
ALPHA-CHLORDANE	0.05	0.004	0.05	U	0.05	U
GAMMA-CHLORDANE	0.05	0.003	0.05	U	0.05	U
TOXAPHENE	5	0.03	5	U	5	U
AROCLOR-1016	1	0.03	1	U	1	U
AROCLOR-1221	2	0.04	2	U	2	U
AROCLOR-1232	1	0.01	1	U	1	U
AROCLOR-1242	1	0.01	1	U	1	U
AROCLOR-1248	1	0.04	1	U	1	U
AROCLOR-1254	1	0.05	1	U	1	U
AROCLOR-1260	1	0.04	1	U	1	U

SITE: CTO 127, NCBC DAVISVILLE, RHODE ISLAND
 BUILDING 56
 WIPE SAMPLE RESULTS – ROUND 2
 LABORATORY: SOUTHWEST LABORATORY OF OKLAHOMA

CLIENT ID:	3-WS4A-S1	3-WS4A-S2			
LABORATORY ID:	17596.02	17596.03			
TAL METALS WIPES (UG/WIPE)	CRQL	IDL			
ALUMINUM	20	7.4	214		71.5
ANTIMONY	6	2	3	UJ	3 UJ
ARSENIC	1	0.2	0.4	U	0.4 U
BARIUM	20	0.8	7.2		1.9
BERYLLIUM	5	0.1	0.2	U	0.2 U
CADMIUM	0.5	0.2	0.4	U	0.4 U
CALCIUM	500	24	657		192
CHROMIUM	1	0.3	2.7		1
COBALT	5	0.4	2.1		0.8 U
COPPER	2.5	0.2	16.7		4.9
IRON	10	0.5	647		180
LEAD	0.3	0.1	34.8		11
MAGNESIUM	500	17.3	195		55.9
MANGANESE	1.5	0.1	7.1		2.3
MERCURY	0.1	0.1	0.03		0.1
NICKEL	4	1.1	2	U	2 U
POTASSIUM	500	42.7	57.4	UJ	57.4 UJ
SELENIUM	0.5	0.2	0.6	U	0.6 U
SILVER	1	0.3	0.4	U	0.4 U
SODIUM	500	29.8	258		233
THALLIUM	1	0.3	0.2	U	0.2 U
VANADIUM	5	0.3	1	UJ	1 UJ
ZINC	2	0.3	73.7		18.5
CYANIDE	0.5	NA	1.3		1

APPENDIX B
BORING LOGS

BORING LOG

HALLIBURTON NUS ENVIRONMENTAL CORPORATION

PROJECT: NCBC - CTO 127 LOCATION: Building 56 DRILLED BY: C. Stamas/EDI BORING NO.: B1
 DATE STARTED: 6/23/93 INCLINATION: Vertical LOGGED BY: P. Young GROUND ELEV.: Not surveyed
 DATE COMPLETED: 6/23/93 BEARING: N/A CHECKED BY: W. Martin TOTAL DEPTH: 10 feet

ELEV. feet	DEPTH feet	SAMPLE				REMARKS ON ADVANCE OF BORING	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
		TYPE-NO.	BLOWS PER 6"	PEN. in.	REC. in.			
0-0		S-1	5 - 17 18 - 19	24	14	4 in. of backfill material		S-1 (0 ft. to 1 ft. 2 in.) SILTY SAND, fine - coarse sand with subrounded to rounded gravel up to 1 in., brown. (SM)
-2		S-2	18 - 19 14 - 18	24	14	0 ppm on sample		S-2 (2 ft. to 3 ft. 2 in.) SAND, fine sand with slight trace of silt, poorly sorted, evidence of cross bedding, white/tan. (SP)
-4		S-3	19 - 15 13 - 12	24	16	0 ppm on sample		S-3 (4 ft. to 5 ft. 4 in.) SAND, similar to S-2. (SP)
-6		S-4	15 - 13 13 - 13	24	20	0 ppm on sample		S-4A (6 ft. to 8 ft.) SAND, similar to S-2. (SP) S-4B (6 ft. to 8 ft.) SILTY SAND, similar to S-1 but with angular to rounded gravel up to 0.5 in. (SM)
-8		S-5	11 - 10 10 - 19	24	24	0 ppm on sample		S-5A (8 ft. to 9 ft. 1 in.) SILTY SAND, similar to S-1, dark brown. (SM) S-5B (9 ft. 1 in. to 10 ft.) SAND, similar to S-2. (SP)
-10								END OF BORING @ 10 FT. BOREHOLE ABANDONED AND BACKFILLED. NO MONITORING WELL INSTALLED.
-12								
-14								
-16								
-18								
-20								

LEGEND:
 TYPE-NO. - Type of sample
 C - Rock core sample
 S - Split barrel sample
 BLOWS PER 6" - 140 lb. hammer falling 30" to drive a split barrel sampler; coring time per foot of rock
 PEN - Penetration length of sampler
 REC - Length of sample recovered
 ∇ - Natural ground water table

NOTES:
 Borehole advanced by driving a 2 in. split barrel sampler with a 140 lb. weight. Continuous 2 in. split barrel samples were collected to a depth of 10 ft. No monitoring well installed.

DATE: 09/13/93 PROJECT NO.: 8659
 PAGE: 1 OF 1 BORING NO.: B1

BORING LOG

HALLIBURTON NUS ENVIRONMENTAL CORPORATION

PROJECT: NCBC - CTO 127 LOCATION: Building 58 DRILLED BY: C. Stamas/EDI BORING NO.: B2
 DATE STARTED: 8/23/93 INCLINATION: Vertical LOGGED BY: P. Young GROUND ELEV.: Not surveyed
 DATE COMPLETED: 8/23/93 BEARING: N/A CHECKED BY: W. Martin TOTAL DEPTH: 10 feet

ELEV. feet	DEPTH feet	SAMPLE				REMARKS ON ADVANCE OF BORING	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
		TYPE-NO.	BLOWS PER 6"	PEN. in.	REC. in.			
0	0	S-1	2 - 1 1 - 1	24	0	Concrete chips		S-1 (0 ft.) No recovery, concrete chips and dust.
2	2	S-2	1 - 1 3 - 4	24	2			S-2 (2 ft. to 2 ft. 2 in.) SILTY SAND, fine - coarse sand, silt, tan. (SM)
4	4	S-3	6 - 10 11 - 14	24	19	0 ppm on sample. 6 in. fill and 3 in. concrete pieces.		S-3 (4 ft. to 5 ft. 7 in.) SAND, fine sand with slight trace of silt, gray/white with seams of black, evidence of cross bedding, poorly graded. (SP)
6	6	S-4	16 - 13 11 - 19	24	15	0 ppm on sample		S-4 (6 ft. to 7 ft. 3 in.) SAND, similar to S-3. (SP)
8	8	S-5	low 20's	24	16	0 ppm on sample		S-5 (8 ft. to 8 ft. 4 in.) SAND, similar to S-3 but with more seams of black sand. (SP)
10	10							END OF BORING @ 10 FT. BOREHOLE ABANDONED AND BACKFILLED. NO MONITORING WELL INSTALLED.
12	12							
14	14							
16	16							
18	18							
20	20							

LEGEND:
 TYPE-NO. - Type of sample
 C - Rock core sample
 S - Split barrel sample
 BLOWS PER 6" - 140 lb. hammer falling 30" to drive a split barrel sampler; coring time per foot of rock
 PEN - Penetration length of sampler
 REC - Length of sample recovered
 ∇ - Natural ground water table

NOTES:
 Borehole advanced by driving a 2 in. split barrel sampler with a 140 lb. weight. Continuous 2 in. split barrel samples were collected to a depth of 10 ft. No monitoring well installed.

DATE: 09/13/93 PROJECT NO.: 8659
 PAGE: 1 OF 1 BORING NO.: B2

BORING LOG

HALLIBURTON NUS ENVIRONMENTAL CORPORATION

PROJECT: NCBC - CTO 127 LOCATION: Building 58 DRILLED BY: C. Stamas/EDI BORING NO.: B3
 DATE STARTED: 6/23/93 INCLINATION: Vertical LOGGED BY: P. Young GROUND ELEV.: Not surveyed
 DATE COMPLETED: 6/23/93 BEARING: N/A CHECKED BY: W. Martin TOTAL DEPTH: 10 feet

ELEV. feet	DEPTH feet	SAMPLE				REMARKS ON ADVANCE OF BORING	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
		TYPE-NO.	BLOWS PER 6"	PEN. in.	REC. in.			
0	0	S-1	6 - 8 16 - 18	24	14	0 ppm on sample. 2 in. concrete chips and dust.	<p>S-1 (0 ft. to 1 ft. 2 in.) SILTY SAND, fine - coarse sand with subrounded to rounded gravel up to 1 in., brown. (SM)</p> <p>S-2 (2 ft. to 3 ft.) SILTY GRAVELLY SAND, fine - coarse sand, with fine - medium gravel, some silt, well graded, tan. (GW)</p> <p>S-3 (4 ft. to 5 ft.) SAND, fine sand with slight trace of silt, gray/white; also 3 in. layer of silty sand, fine - coarse sand with 2 in. subangular gravel, gray. (SP-SM)</p> <p>S-4 (6 ft. to 7 ft.) SAND, similar to S-3 but with cross bedding throughout entire sample, black/gray/white. (SP)</p> <p>S-5 (8 ft. to 9 ft. 4 in.) SAND, similar to S-4 except with fine - medium sand in last 3 in. (SP)</p> <p>END OF BORING @ 10 FT. BOREHOLE ABANDONED AND BACKFILLED. NO MONITORING WELL INSTALLED.</p>	
-2		S-2	15 - 13 13 - 17	24	12	0 ppm on sample. 3 in. concrete chips and dust.		
-4		S-3	17 - 17 13 - 10	24	12	0 ppm on sample		
-6		S-4	17 - 13 15 - 13	24	12	0 ppm on sample		
-8		S-5	19 - 17 13 - 10	24	16	0 ppm on sample		
-10								
-12								
-14								
-16								
-18								
-20								

LEGEND:
 TYPE-NO. - Type of sample
 C - Rock core sample
 S - Split barrel sample
 BLOWS PER 6" - 140 lb. hammer falling 30" to drive a split barrel sampler; coring time per foot of rock
 PEN - Penetration length of sampler
 REC - Length of sample recovered
 ∇ - Natural ground water table

NOTES:
 Borehole advanced by driving a 2 in. split barrel sampler with a 140 lb. weight. Continuous split barrel samples were collected to a depth of 10 ft. No monitoring well installed. 3 in. layer of fill beneath concrete floor.

DATE: 09/13/93 PROJECT NO.: 8659
 PAGE: 1 OF 1 BORING NO.: B3

BORING LOG

HALLIBURTON NUS ENVIRONMENTAL CORPORATION

PROJECT: NCBC - CTO 127 LOCATION: Building 58 DRILLED BY: C. Stamas/EDI BORING NO.: B4
 DATE STARTED: 8/22/93 INCLINATION: Vertical LOGGED BY: P. Young GROUND ELEV.: Not surveyed
 DATE COMPLETED: 8/22/93 BEARING: N/A CHECKED BY: W. Martin TOTAL DEPTH: 81 feet

ELEV. feet	DEPTH feet	SAMPLE				REMARKS ON ADVANCE OF BORING	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
		TYPE-NO.	BLOWS PER 6"	PEN. in.	REC. in.			
0	0	S-1	2 - 2 3 - 6	24	12	0 ppm on sample		S-1 (0 to 1 ft.) SAND, fine - coarse sand with trace of silt, subrounded to rounded gravel up to 1 in, well graded, light tan to brown. (SW)
2	2	S-2	9 - 8 7 - 7	24	10	0 ppm on sample		S-2 (2 ft. to 2 ft. 10 in.) SAND, similar to S-1. (SW)
4	4	S-3	4 - 8 6 - 6	24	18	0 ppm on sample		S-3 (4 ft. to 5 ft. 6 in.) SILTY SAND, fine sand with >12% silt, grayish white. (SM)
6	6	S-4	8 - 8 12 - 12	24	22	0 ppm on sample		S-4 (6 ft. to 7 ft. 10 in.) SILTY SAND, similar to S-3. (SM)
8	8	S-5	6 - 9 9 - 11	24	19	0 ppm on sample		S-5 (8 ft. to 9 ft. 7 in.) SILTY SAND, similar to S-3 except tan color. (SM)
10	10	S-6	6 - 10 8 - 8	24	19	0 ppm on sample		S-6 (10 ft. to 11 ft. 7 in.) SILTY SAND, similar to S-3 except tan color and lower end of split spoon is damp. (SM)
12	12	S-7	3 - 3 4 - 5	24	17	0 ppm on sample ∇ @ 12 ft. on 6/22/93		S-7 (12 ft. to 13 ft. 5 in.) SILTY SAND, similar to S-3 except light brown color and wet sample. (SM)
14	14							
16	16							
18	18							
20	20							

LEGEND:
 TYPE-NO. - Type of sample
 C - Rock core sample
 S - Split barrel sample
 BLOWS PER 6" - 140 lb. hammer falling 30" to drive a split barrel sampler; coring time per foot of rock
 PEN - Penetration length of sampler
 REC - Length of sample recovered
 ∇ - Natural ground water table

NOTES:
 Borehole advanced by rotating 8-inch outside diameter hollow stem augers to 81 ft. Continuous 2 in. split barrel samples collected until water table (WT) intersected (∇ @ 12 ft. on 6/22/93). Additional samples collected at 5 foot intervals to approximately 10 ft. below the WT or to a point of refusal.
 Auger initially augered through 3 in. of concrete.
 Borehole B-4 backfilled and abandoned.

DATE: 09/13/93 PROJECT NO.: 8659
 PAGE: 1 OF 5 BORING NO.: B4

BORING LOG

HALLIBURTON NUS ENVIRONMENTAL CORPORATION

PROJECT: NCBC - CTO 127 LOCATION: Building 58 DRILLED BY: C. Stamas/EDI BORING NO.: B4
 DATE STARTED: 8/22/93 INCLINATION: Vertical LOGGED BY: P. Young GROUND ELEV.: Not surveyed
 DATE COMPLETED: 8/22/93 BEARING: N/A CHECKED BY: W. Martin TOTAL DEPTH: 81 feet

ELEV. feet	DEPTH feet	SAMPLE				REMARKS ON ADVANCE OF BORING	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
		TYPE-NO.	BLOWS PER 6"	PEN. in.	REC. in.			
-20		S-8	3 - 4 4 - 5	24	13			S-8 (20 ft. to 21 ft. 1 in.) SAND, fine sand with very slight trace of silt, poorly graded, tan. (SP)
-22								
-24		S-9	1 - 3 4 - 4	24	22			S-9 (25 ft. to 26 ft. 10 in.) SAND, similar to S-8. (SP)
-26								
-28								
-30		S-10	4 - 10 12 - 11	24	24	0 ppm on sample		S-10A (30 ft. to 31 ft.) SAND, fine sand with some medium sand and trace of silt, poorly graded, tan. (SP) S-10B (31 ft. to 32 ft.) SILTY SANDY GRAVEL, fine to coarse sand with subangular to rounded gravel up to 1 in., dark brown/black. (GM)
-32								
-34								
-36		S-11	9 - 12 18 - 20	24	24			S-11A (35 ft. to 36 ft.) SAND, similar to S-10A. (SP) S-11B (36 ft. to 36 ft. 5 in.) SILTY SAND, coarse sand with some fine - medium sand, brown/tan. (SM) S-11C (36 ft. 5 in to 36 ft. 9 in.) SILTY SAND, fine - medium sand, brown/black. (SM) S-11D (36 ft. 9 in. to 37 ft.) SILT, tan/light brown. (ML)
-38								
-40								

LEGEND:
 TYPE-NO. - Type of sample
 C - Rock core sample
 S - Split barrel sample
 BLOWS PER 6" - 140 lb. hammer falling 30" to drive a split barrel sampler; coring time per foot of rock
 PEN - Penetration length of sampler
 REC - Length of sample recovered
 ∇ - Natural ground water table

NOTES:

Borehole advanced by rotating 8-inch outside diameter hollow stem augers to 81 ft. Continuous 2 in. split barrel samples collected until water table (WT) intersected (∇ @ 12 ft. on 8/22/93). Additional samples collected at 5 foot intervals to approximately 10 ft. below the WT or to a point of refusal. Auger initially augered through 3 in. of concrete. Borehole B-4 backfilled and abandoned.

DATE: 09/13/93 PROJECT NO.: 8659
 PAGE: 2 OF 5 BORING NO.: B4

BORING LOG

HALLIBURTON NUS ENVIRONMENTAL CORPORATION

PROJECT: NCBC - CTO 127 LOCATION: Building 56 DRILLED BY: C. Stamas/EDI BORING NO.: B4
 DATE STARTED: 8/22/93 INCLINATION: Vertical LOGGED BY: P. Young GROUND ELEV.: Not surveyed
 DATE COMPLETED: 8/22/93 BEARING: N/A CHECKED BY: W. Martin TOTAL DEPTH: 81 feet

ELEV. feet	DEPTH feet	SAMPLE				REMARKS ON ADVANCE OF BORING	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
		TYPE-NO.	BLOWS PER 6"	PEN. in.	REC. in.			
-40		S-12	4 - 7 10 - 12	24	24	0 ppm on sample		S-12A (40 ft. to 41 ft. 8 in.) SAND, similar to S-10A, tan. (SP) S-12B (41 ft. 8 in. to 42 ft.) SILTY SAND, fine - medium sand, black. (SM)
-42								
-44								
-46		S-13	4 - 10 19 - 34	24	24	0 ppm on sample		S-13 (45 ft. to 47 ft.) SILTY SAND, fine - medium sand with some coarse sand, brown/black; 2 in. layer of fine sand, brown. (SM)
-48								
-50		S-14	*	24	15	* Weight of drill rod drove split barrel sampler.		S-14 (50 ft. to 51 ft. 3 in.) SILTY SAND, fine - coarse sand with some silt, gray/black. (SM)
-52								
-54								
-56		S-15	1 - 6 29 - 40	24	24	0 ppm on sample		S-15 (55 ft. to 57 ft.) SILTY SAND, similar to S-14 except with a 4 in. silty sand layer in the middle of fine - medium sand, broken piece of rock in end of split spoon. (SM)
-58								
-60								

LEGEND:
 TYPE-NO. - Type of sample
 C - Rock core sample
 S - Split barrel sample
 BLOWS PER 6" - 140 lb. hammer falling 30" to drive a split barrel sampler; coring time per foot of rock
 PEN - Penetration length of sampler
 REC - Length of sample recovered
 ∇ - Natural ground water table

NOTES:
 Borehole advanced by rotating 8-inch outside diameter hollow stem augers to 81 ft. Continuous 2 in. split barrel samples collected until water table (WT) intersected (∇ @ 12 ft. on 6/22/93). Additional samples collected at 5 foot intervals to approximately 10 ft. below the WT or to a point of refusal.
 Auger initially augered through 3 in. of concrete.
 Borehole B-4 backfilled and abandoned.

BORING LOG

HALLIBURTON NUS ENVIRONMENTAL CORPORATION

PROJECT: NCBC - CTO 127 LOCATION: Building 56 DRILLED BY: C. Stamas/EDI BORING NO.: B4
 DATE STARTED: 6/22/93 INCLINATION: Vertical LOGGED BY: P. Young GROUND ELEV.: Not surveyed
 DATE COMPLETED: 6/22/93 BEARING: N/A CHECKED BY: W. Martin TOTAL DEPTH: 81 feet

ELEV. feet	DEPTH feet	SAMPLE				REMARKS ON ADVANCE OF BORING	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
		TYPE-NO.	BLOWS PER 6"	PEN. in.	REC. in.			
-60		S-16	6 - 7 10 - 20	24	21	0 ppm on sample		S-16 (60 ft. to 61 ft. 9 in.) SILTY SAND, similar to S-14 except with coarse sand and a 1 in. piece of subangular rock in end of split spoon. (SM)
-62								
-64								
-66		S-17	29 - 52 50 - 39	24	6	0 ppm on sample. Driller attributes high blow count to soil in augers. 18 in. wash/6 in. sample		S-17 (65 ft. to 67 ft.) SILTY GRAVELLY SAND, fine - coarse sand with subangular to rounded gravel up to 1 in., well graded, dark brown/ black. (SW-SM)
-68								
-70		S-18	22 - 29 30 - 36	24	12	Wash - 12 in.		S-18 (70 ft. to 72 ft.) SILTY GRAVELLY SAND, similar to S-17 except with some sandier areas, red-brown to black. (SW-SM)
-72								
-74								
-76		S-19	54 - 79 120/5"	17	17	Boulders at 77 ft. to 79 ft.		S-19 (75 ft. to 76 ft. 5 in.) SILTY GRAVELLY SAND, similar to S-17 except very dense and a 3 in. fine - coarse sand layer approximately 8 in. above end of split spoon. (SW-SM)
-78								
-80								

LEGEND:
 TYPE-NO. - Type of sample
 C - Rock core sample
 S - Split barrel sample
 BLOWS PER 6" - 140 lb. hammer falling 30" to drive a split barrel sampler; coring time per foot of rock
 PEN - Penetration length of sampler
 REC - Length of sample recovered
 ∇ - Natural ground water table

NOTES:
 Borehole advanced by rotating 8-inch outside diameter hollow stem augers to 81 ft. Continuous 2 in. split barrel samples collected until water table (WT) intersected (∇ @ 12 ft. on 6/22/93). Additional samples collected at 5 foot intervals to approximately 10 ft. below the WT or to a point of refusal. Auger initially augered through 3 in. of concrete. Borehole B-4 backfilled and abandoned.

DATE: 08/13/93 PROJECT NO.: 8659
 PAGE: 4 OF 5 BORING NO.: B4

BORING LOG

HALLIBURTON NUS ENVIRONMENTAL CORPORATION

PROJECT: NCBC - CTO 127 LOCATION: Building 58 DRILLED BY: C. Stamas/EDI BORING NO.: B4
 DATE STARTED: 6/22/93 INCLINATION: Vertical LOGGED BY: P. Young GROUND ELEV.: Not surveyed
 DATE COMPLETED: 6/22/93 BEARING: N/A CHECKED BY: W. Martin TOTAL DEPTH: 81 feet

ELEV. feet	DEPTH feet	SAMPLE				REMARKS ON ADVANCE OF BORING	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
		TYPE- NO.	BLOWS PER 6"	PEN. in.	REC. in.			
	80					Auger grinding on rock at 81 ft.	END OF BORING @ 81 FT. BOREHOLE ABANDONED AND BACKFILLED. NO MONITORING WELL INSTALLED IN B-4.	
	82							
	84							
	86							
	88							
	90							
	92							
	94							
	96							
	98							
	100							

LEGEND:
 TYPE-NO. - Type of sample
 C - Rock core sample
 S - Split barrel sample
 BLOWS PER 6" - 140 lb. hammer falling 30" to drive a split barrel sampler; coring time per foot of rock
 PEN - Penetration length of sampler
 REC - Length of sample recovered
 ∇ - Natural ground water table

NOTES:
 Borehole advanced by rotating 8-inch outside diameter hollow stem augers to 81 ft. Continuous 2 in. split barrel samples collected until water table (WT) intersected (∇ @ 12 ft. on 6/22/93). Additional samples collected at 5 foot intervals to approximately 10 ft. below the WT or. to a point of refusal. Auger initially augered through 3 in. of concrete. Borehole B-4 backfilled and abandoned.

DATE: 09/13/93 PROJECT NO.: 8659
 PAGE: 5 OF 5 BORING NO.: B4

BORING LOG

HALLIBURTON NUS ENVIRONMENTAL CORPORATION

PROJECT: NCBC - CTO 127 LOCATION: CED Asphalt Area DRILLED BY: C. Stamas/EDI BORING NO.: B-1
 DATE STARTED: 8/24/93 INCLINATION: Vertical LOGGED BY: K. Jalkut GROUND ELEV.: Not surveyed
 DATE COMPLETED: 8/24/93 BEARING: N/A CHECKED BY: W.J. Martin TOTAL DEPTH: 18 feet

ELEV. feet	DEPTH feet	SAMPLE				REMARKS ON ADVANCE OF BORING	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
		TYPE-NO.	BLOWS PER 6"	PEN. in.	REC. in.			
0	0							Approximately 6 inches of asphalt was moved aside and regraded with 2 ft. of fill 0 - 2 ft. - FILL
	2	S-1	25 - 36 29 - 30	24	20	0 ppm on sample; dry, friable sediment with gravel; graphitic sheen on sieve sample		S-1 (2 ft. to 3 ft. 8 in.) SAND with gravel, trace to some silt. Grey-brown, fine to medium sand with a trace of coarse sand; widely graded; coarse (1.5 in.) and fine (0.25 in.), subangular and sub- rounded gravel present; 5-12% fines; (SW-SM)
	4	S-2	28 - 35 48 - 45	24	22	0 ppm on sample; dry, friable sediment with gravel; graphitic sheen on sieve sample		S-2 (4 ft. to 5 ft. 10 in.) SAND with gravel, trace to some silt. Grey-brown; similar to S-1; gravels 0.25 in. to 2 in. in size; (SW-SM)
	6	S-3	22 - 25 22 - 22	24	15	0 ppm on sample; dry, friable sediment with gravel; graphitic sheen on sieve sample		S-3 (6 ft. to 7 ft. 3 in.) SAND with gravel, trace to some silt. Grey-brown; similar to S-2; (SW-SM)
	8	S-4	14 - 17 19 - 15	24	10	0 ppm on sample; dry, friable sediment with gravel; graphitic sheen on sieve sample		S-4 (8 ft. to 8 ft. 10 in.) SAND, trace of silt, trace of gravel. Greyish-brown, fine to medium sand with traces of coarse sand; widely graded; trace percentage of silt; trace percentage of fine (0.25 in.), subangular gravel; (SW)
	10	S-5	7 - 11 11 - 14	24	12	0 ppm on sample; dry, friable sediment with gravel; graphitic sheen on sieve sample		S-5 (10 ft. to 11 ft.) SAND, trace of silt, trace of gravel. Greyish brown; similar to S-4; (SW)
	12							

LEGEND:
 TYPE-NO. - Type of sample
 C - Rock core sample
 S - Split barrel sample
 BLOWS PER 6" - 140 lb. hammer falling 30" to drive a split barrel sampler; coring time per foot of rock
 PEN - Penetration length of sampler
 REC - Length of sample recovered
 ∇ - Natural ground water table

NOTES:
 Borehole advanced by rotating 8-inch outside diameter hollow stem augers to 18 ft. Continuous split barrel samples collected at 2 foot intervals to a depth 2 ft. below the water table (∇ roughly @ 15.5 ft. on 6-24-93). Observed reddish colored sands beneath the saturated zone.

PROJECT: NCBC - CTO 127 LOCATION: CEC Asphalt Area DRILLED BY: C. Stamas/EDI BORING NO.: B-1
 DATE STARTED: 8/24/93 INCLINATION: Vertical LOGGED BY: K. Jalkut GROUND ELEV.: Not surveyed
 DATE COMPLETED: 8/24/93 BEARING: N/A CHECKED BY: W.J. Martin TOTAL DEPTH: 18 feet

ELEV. feet	DEPTH feet	SAMPLE				REMARKS ON ADVANCE OF BORING	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
		TYPE-NO.	BLOWS PER 6"	PEN. in.	REC. in.			
-12		S-6	7 - 9 11 - 10	24	18	0 ppm on sample; graphitic sheen on sieve sample		S-6 (12 ft. to 13 ft. 6 in.) SAND, trace of silt. Greyish-brown, fine to medium sand with traces of coarse sand; widely graded; trace percentage of silt; (SW)
-14		S-7	6 - 8 14 - 18	24	17	0 ppm on sample; damp sediment @ 15.5 ft., possible water table @ 15.5 ft.; graphitic sheen on sieve sample		S-7 (14 ft. to 15 ft. 2 in.) SAND, trace of silt. Tan to brown, fine sand; uniformly graded; cross-bedded and highlighted by a reddish coloration; trace percentage of silt; (SP)
-16		S-8	7 - 7 9 - 7	24	15	0 ppm on sample; saturated sediment; graphitic sheen on sieve sample		S-8 (16 ft. to 17 ft. 3 in.) SAND, trace of silt. Tan to brown with reddish colored cross beds; similar to S-7; (SP)
-18								END OF BORING AT 18 FT. BOREHOLE BACKFILLED WITH SAND, PORTLAND CEMENT, AND LOCAL COBBLES. NO WELL INSTALLED.
-20								
-22								
-24								

LEGEND:
 TYPE-NO. - Type of sample
 C - Rock core sample
 S - Split barrel sample
 BLOWS PER 6" - 140 lb. hammer falling 30" to drive a split barrel sampler; coring time per foot of rock
 PEN - Penetration length of sampler
 REC - Length of sample recovered
 ∇ - Natural ground water table

NOTES:
 Borehole advanced by rotating 8-inch outside diameter hollow stem augers to 18 ft. Continuous split barrel samples collected at 2 foot intervals to a depth 2 ft. below the water table (∇ roughly @ 15.5 ft. on 6-24-93). Observed reddish colored sands beneath the saturated zone.

DATE: 10/25/93 PROJECT NO.: 8859
 PAGE: 2 OF 2 BORING NO.: B-1

BORING LOG

HALLIBURTON NUS ENVIRONMENTAL CORPORATION

PROJECT: NCBC - CTO 127 LOCATION: CED Asphalt Area DRILLED BY: C. Stamas/EDI BORING NO.: B-2
 DATE STARTED: 8-24-93 INCLINATION: Vertical LOGGED BY: K. Jalkut GROUND ELEV.: Not surveyed
 DATE COMPLETED: 8-24-93 BEARING: N/A CHECKED BY: W.J. Martin TOTAL DEPTH: 18 ft.

ELEV. feet	DEPTH feet	SAMPLE				REMARKS ON ADVANCE OF BORING	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
		TYPE-NO.	BLOWS PER 6"	PEN. in.	REC. in.			
0	0							Approximately 18 inches of asphalt was moved aside and regraded with 2 ft. of fill 0 to 2 ft. - FILL
	2	S-1	5 - 10 16 - 10	24	16	0 ppm on sample; dry, friable sediment with gravel; graphitic sheen on sieve sample		S-1 (2 ft. to 3 ft. 4 in.) SAND with gravel, trace to some silt. Grey-brown, fine to medium sand with traces of coarse sand; widely graded; fine (0.25 in.) and coarse (1 in.), subangular and subrounded gravels present; trace to some silt present; (SW-SM)
	4	S-2	10 - 15 20 - 26	24	19	0 ppm on sample; dry, friable sediment with gravel; graphitic sheen on sieve sample		S-2 (4 ft. to 5 ft. 7 in.) SAND with gravel, trace of silt. Grey-brown, fine and medium sand with traces of coarse sand; widely graded; several pieces of fine (0.25 in.) and coarse (1 in.), subrounded to subangular gravels present; trace percentage of fines present; (SW)
	6	S-3	30 - 19 18 - 11	24	20	0 ppm on sample; dry, friable sediment with gravel; graphitic sheen on sieve sample		S-3 (6 ft. to 7 ft. 8 in.) SAND with gravel, trace of silt. Grey-brown; mostly fine sand with a trace of medium and coarse sand; uniformly graded; fine (0.25 in.) and coarse (1 in.), subrounded and sub-subangular gravel pieces present; trace percentage of fines present; (SP)
	8	S-4	7 - 9 10 - 10	24	14	0 ppm on sample; dry, friable sediment with gravel; graphitic sheen on sieve sample		S-4 (8 ft. to 9 ft. 2 in.) SAND with gravel, trace of silt. Grey brown; similar to S-2; (SW)
	10	S-5	8 - 8 19 - 12	24	12	0 ppm on sample; graphitic sheen on sieve sample		S-5 (10 ft. to 11 ft.) SAND with traces of gravel and silt. Reddish brown; fine sand with traces of medium sand; uniformly graded; traces of fine (0.25 in.) gravel present; trace percentage of fines present; cross-bedded nature to the sands with a reddish coloration; (SP)
	12							

LEGEND:
 TYPE-NO. - Type of sample
 C - Rock core sample
 S - Split barrel sample
 BLOWS PER 6" - 140 lb. hammer falling 30" to drive a split barrel sampler; coring time per foot of rock
 PEN - Penetration length of sampler
 REC - Length of sample recovered
 ∇ - Natural ground water table

NOTES:
 Borehole advanced by rotating 8-inch outside diameter hollow stem augers to 18 feet. Continuous split barrel samples collected at 2 foot intervals to a depth of 2 feet below the water table (∇ roughly @ 15.5 ft. on 8-24-93). Cross-bedded sands appeared to have a reddish coloration.

DATE: 10/25/93 PROJECT NO.: 8659
 PAGE: 1 OF 2 BORING NO.: B-2

PROJECT: NCBC - CTO 127 LOCATION: CED Asphalt Area DRILLED BY: C. Stamas/EOI BORING NO.: B-2
 DATE STARTED: 8-24-93 INCLINATION: Vertical LOGGED BY: K. Jalkut GROUND ELEV.: Not surveyed
 DATE COMPLETED: 8-24-93 BEARING: N/A CHECKED BY: W.J. Martin TOTAL DEPTH: 18 ft.

ELEV. feet	DEPTH feet	SAMPLE				REMARKS ON ADVANCE OF BORING	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
		TYPE-NO.	BLOWS PER 6"	PEN. in.	REC. in.			
	12	S-6	13 - 9 10 - 6	24	21	0 ppm on sample; graphitic sheen on sample		S-6 (12 ft. to 13 ft. 9 in.) SAND, trace of silt. Brown; fine to medium sand with a trace of coarse sand; widely graded; trace percent of fines present; (SW)
	14	S-7	8 - 6 6 - 4	24	24	0 ppm on sample; ∇ @ 15.5 ft.; graphitic sheen on sieve sample		S-7A (14 ft. to 14 ft. 6 in) SAND, trace to some silt. Dark brown; mostly fine sand with traces of medium and coarse sand; uniformly graded; trace percentage of fines present; (SP-SM) S-7B (14 ft. 6 in. to 16 ft.) SAND, trace of silt. Brown; mostly fine sand with traces of medium and coarse sand; uniformly graded; trace percentage of fines present; (SP)
	16	S-8	6 - 8 10 - 12	24	15	0 ppm on sample; saturated sample; graphitic sheen on sieve sample		S-8 (16 ft. to 17 ft. 3 in.) SAND, trace of silt. Brown; similar to S-7B; (SP)
	18							END OF BORING AT 18 FT. BOREHOLE BACKFILLED WITH PORTLAND CEMENT, SAND AND LOCAL COBBLES.
	20							
	22							
	24							

LEGEND:
 TYPE-NO. - Type of sample
 C - Rock core sample
 S - Split barrel sample
 BLOWS PER 6" - 140 lb. hammer falling 30" to drive a split barrel sampler; coring time per foot of rock
 PEN - Penetration length of sampler
 REC - Length of sample recovered
 ∇ - Natural ground water table

NOTES:
 Borehole advanced by rotating 8-inch outside diameter hollow stem augers to 18 feet. Continuous split barrel samples collected at 2 foot intervals to a depth of 2 feet below the water table (∇ roughly @ 15.5 ft. on 6-24-93). Cross-bedded sands appeared to have a reddish coloration.

DATE: 10/25/93 PROJECT NO.: 8859
 PAGE: 2 OF 2 BORING NO.: B-2

BORING LOG

HALLIBURTON NUS ENVIRONMENTAL CORPORATION

PROJECT: NCBC - CTO 127 LOCATION: CED Asphalt Area DRILLED BY: C. Stamas/EDI BORING NO.: B-3
 DATE STARTED: 8-24-93 INCLINATION: Vertical LOGGED BY: K. Jalkut GROUND ELEV.: Not surveyed
 DATE COMPLETED: 8-24-93 BEARING: N/A CHECKED BY: W.J. Martin TOTAL DEPTH: 17 ft.

ELEV. feet	DEPTH feet	SAMPLE				REMARKS ON ADVANCE OF BORING	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
		TYPE-NO.	BLOWS PER 6"	PEN. in.	REC. in.			
0	0							Approximately 6 inches of asphalt was moved aside and regraded with 1 foot of fill 0 to 1 ft - FILL
		S-1	9 - 20 29 - 45	24	16	0 ppm on sample; dry, friable sediment with gravel; graphitic sheen on sieve sample		S-1 (1 ft. to 2 ft. 4 in.) SAND with gravel, trace of silt. Brown; fine to coarse sand; widely graded; fine (0.25 in.) and coarse (1 in.), angular and subrounded gravels present; trace percentage of fines present; (SW-SM)
		S-2	24 - 28 29 - 66	24	19	Similar to S-1; slow advancement - augers grinding; slow penetration with split barrel sampler		S-2 (3 ft. to 4 ft. 7 in.) SAND with gravel, trace of silt. Brown; fine and medium sand with traces of coarse sand; widely graded; fine (0.25 to 0.5 in.) and coarse (1.5 in.), subrounded and subangular gravels present; trace percentage of fines present; (SW-SM)
		S-3	22 - 100 100 - 76	24	20	Similar to S-2		S-3 (5 ft. to 6 ft. 8 in.) SAND with gravel, trace of silt. Brown; similar to S-2; (SW-SM)
		S-4	49 - 36 28 - 19	24	20	Similar to S-3		S-4A (7 ft. to 8 ft.) SAND with gravel, trace of silt. Brown; similar to S-3; (SW-SM) S-4B (8 ft. to 8 ft. 8 in.) SAND with a trace of gravel and a trace of silt. Brown; fine and medium sand with traces of coarse sand; widely graded; trace amounts of fine (0.25 to 0.50 in.), subrounded gravel present; trace percentage of fines present; (SW)

LEGEND:
 TYPE-NO. - Type of sample
 C - Rock core sample
 S - Split barrel sample
 BLOWS PER 6" - 140 lb. hammer falling 30" to drive a split barrel sampler; coring time per foot of rock
 PEN - Penetration length of sampler
 REC - Length of sample recovered
 ∇ - Natural ground water table

NOTES:
 Borehole advanced by rotating 8-inch outside diameter hollow stem augers to 17 ft. Continuous split barrel samples collected at 2 foot intervals to a depth of 2 ft. below the water table (∇ roughly @ 14.5 ft. on 8-24-93).

DATE: 10/25/93 PROJECT NO.: 8659
 PAGE: 1 OF 2 BORING NO.: B-3

BORING LOG

HALLIBURTON NUS ENVIRONMENTAL CORPORATION

PROJECT: NCBC - CTO 127 LOCATION: CED Asphalt Area DRILLED BY: C. Stamas/EDI BORING NO.: B-3
 DATE STARTED: 8-24-93 INCLINATION: Vertical LOGGED BY: K. Jalkut GROUND ELEV.: Not surveyed
 DATE COMPLETED: 8-24-93 BEARING: N/A CHECKED BY: W.J. Martin TOTAL DEPTH: 17 ft.

ELEV. feet	DEPTH feet	SAMPLE				REMARKS ON ADVANCE OF BORING	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
		TYPE-NO.	BLOWS PER 6"	PEN. in.	REC. in.			
	0	S-5	10 - 11 10 - 13	24	19	Similar to S-4;		S-5A (9 ft. to 9 ft. 9 in.) SAND with gravel, trace of silt. Brown; fine and medium sand with traces of coarse sand; widely graded; fine (0.50 in.) and coarse (2 in.), subrounded to subangular gravels present; trace percentage of fines present; (SW-SM) S-5B (9 ft. 9 in. to 10 ft. 1 in.) SAND, trace of silt. Brown; mostly fine sand with traces of medium and coarse sand; mostly uniformly graded; trace percentage of silt; (SP)
	11	S-6	20 - 19 15 - 30	24	0	NO RECOVERY - Pushed rock ahead of the split barrel sampler		S-5C (10 ft. 1 in. to 10 ft. 7 in.) SAND, trace of silt. Dark brown; fine sand; uniformly graded; trace percentage of fines; (SP) S-6 (11 ft.) NO RECOVERY
	13	S-7	4 - 4 5 - 7	24	17	0 ppm on sample; damp sediment; ∇ roughly at 14.5 ft.; auger advancement - moderate; sheen on sieve sample		S-7 (13 ft. to 14 ft. 5 in.) SAND, trace of silt. Grey-brown; fine sand; uniformly graded; trace percentage of fines; (SP)
	15	S-8	5 - 5 7 - 10	24	22	0 ppm on sample; saturated sediment; auger advancement and sheen similar to S-7		S-8 (15 ft. to 16 ft. 10 in.) SAND, trace of silt. Brown; fine sand; uniformly graded; trace percentage of silt; (SP)
	17							END OF BORING AT 17 FT. BOREHOLE BACKFILLED WITH PORTLAND CEMENT AND SAND. NO WELL INSTALLED.

LEGEND:
 TYPE-NO. - Type of sample
 C - Rock core sample
 S - Split barrel sample
 BLOWS PER 6" - 140 lb. hammer falling 30" to drive a split barrel sampler; coring time per foot of rock
 PEN - Penetration length of sampler
 REC - Length of sample recovered
 ∇ - Natural ground water table

NOTES:
 Borehole advanced by rotating 8-inch outside diameter hollow stem augers to 17 ft. Continuous split barrel samples collected at 2 foot intervals to a depth of 2 ft. below the water table (∇ roughly @ 14.5 ft. on 6-24-93).

DATE: 10/25/93 PROJECT NO.: 8859
 PAGE: 2 OF 2 BORING NO.: B-3

BORING LOG

HALLIBURTON NUS ENVIRONMENTAL CORPORATION

PROJECT: NCBC - CTO 127 LOCATION: CE0 Asphalt Area DRILLED BY: T. Belsky/Geosearch BORING NO.: B-4
 DATE STARTED: 6-21-93 INCLINATION: Vertical LOGGED BY: K. Jalkut GROUND ELEV.: Not surveyed
 DATE COMPLETED: 6-22-93 BEARING: N/A CHECKED BY: W.J. Martin TOTAL DEPTH: 70 ft.

ELEV. feet	DEPTH feet	SAMPLE				REMARKS ON ADVANCE OF BORING	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
		TYPE-NO.	BLOWS PER 6"	PEN. in.	REC. in.			
0	0	S-1	99 - 13 21 - 23	24	17	0 ppm on sample; gravelly; slow auger advance - grinding; graphitic sheen		S-1 (0 ft. to 17 in.) SAND with gravel, trace of silt. Brown; mostly fine sand with a trace of medium and coarse sand; mostly uniformly graded; coarse (>1 in.), angular gravels present; 5 percent or less fines present; (SP)
-2		S-2	26 - 20 31 - 40	24	17	Similar to S-1		S-2 (2 ft. to 3 ft. 5 in.) SAND with gravel, trace to some silt. Grey brown; fine and medium sand with a trace of coarse sand; widely graded; coarse (1 to 1.5 in.), angular gravel pieces with a white, powdery residue present; approximately 5 to 12 percent fines present; (SW-SM)
-4		S-3	26 - 29 27 - 31	24	20	Similar to S-2		S-3 (4 ft. to 5 ft. 8 in.) SAND with gravel, trace to some silt. Grey brown; similar to S-2 with additional fine (0.25 in.), subrounded gravel and 1 broken quartz pebble present; approximately 5 to 12 percent fines present; (SW-SM)
-6		S-4	36 - 100/5	24	11	Similar to S-3		S-4 (6 ft. to 6 ft. 11 in.) SAND with gravel, trace to some silt. Grey brown; mostly fine sand with a trace of medium and coarse sand; uniformly graded; fine (0.25 in.), subrounded gravel present; roughly 5 to 12 percent fines present; (SP-SM)
-8		S-5	24 - 20 17 - 13	24	15	Similar to S-4, but with less grinding; auger advance moderate		S-5A (8 ft. to 8 ft. 4 in.) SAND with gravel, trace of silt. Grey brown; fine and medium sand with a trace of coarse sand; widely graded; coarse (2 in.), subangular gravel piece present; 5 percent or less fines present; (SW)
-10		S-6	15 - 15 12 - 14	24	0	Pushed rock ahead of sampler		S-5B (8 ft. 4 in. to 9 ft. 3 in.) SAND, trace of silt. Brown; fine sand; uniformly graded; less than 5 percent fines present; (SP) S-6 (10 ft.) NO RECOVERY
-12		S-7	13 - 9 9 - 9	24	19	0 ppm on sample; graphitic sheen on sieve sample		S-7A (12 ft. to 12 ft. 4 in.) SAND, trace of silt. Brown; similar to S-5B; (SP) S-7B (12 ft. 4 in. to 13 ft. 7 in.) SAND with gravel, trace of silt. Light brown; fine and medium sand with a trace of coarse sand; widely graded; fine (0.25 in.), subrounded gravel pieces present; 5 percent or less fines present; (SW)

LEGEND:
 TYPE-NO. - Type of sample
 C - Rock core sample
 S - Split barrel sample
 BLOWS PER 6" - 140 lb. hammer falling 30" to drive a split barrel sampler; coring time per foot of rock
 PEN - Penetration length of sampler
 REC - Length of sample recovered
 ∇ - Natural ground water table

NOTES:
 Borehole advanced by rotating 8-inch outside diameter hollow stem augers. Continuous split spoon samples collected at 2 foot intervals to the water table (∇ roughly @ 17.5 ft. on 6-21-93). Thereafter, split spoon samples collected at 5 foot intervals until point of refusal reached.

DATE: 10/25/93 PROJECT NO.: 8859
 PAGE: 1 OF 5 BORING NO.: B-4

BORING LOG

HALLIBURTON NUS ENVIRONMENTAL CORPORATION

PROJECT: NCBC - CTO 127 LOCATION: CED Asphalt Area DRILLED BY: T. Belsky/Geosearch BORING NO.: B-4
 DATE STARTED: 8-21-93 INCLINATION: Vertical LOGGED BY: K. Jalkut GROUND ELEV.: Not surveyed
 DATE COMPLETED: 8-22-93 BEARING: N/A CHECKED BY: M.J. Martin TOTAL DEPTH: 70 ft.

ELEV. feet	DEPTH feet	SAMPLE				REMARKS ON ADVANCE OF BORING	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
		TYPE-NO.	BLOWS PER 6"	PEN. in.	REC. in.			
	14	S-8	6 - 8 7 - 10	24	18	Similar to S-7; dry sediment		S-8 (14 ft. to 15 ft. 6 in.) SAND, trace of silt. Brown; mostly fine sand with a trace of medium sand; uniformly graded; less than 5 percent fines present; (SP)
	16	S-9	12 - 8 7 - 5	24	18	0 ppm on sample; damp sediment; ∇ roughly @ 17.5 ft. on 6-21-93		S-9 (16 ft. to 17 ft. 5 in.) SAND, trace of silt. Brown; fine sand; uniformly graded; less than 5 percent fines present; (SP)
	20	S-10	5 - 6 5 - 5	24	21	0 ppm on sample; saturated soil; auger advance moderately fast; graphitic sheen		S-10 (20 ft. to 21 ft. 9 in.) SAND, trace of silt. Brown; fine sand with a trace of medium sand; uniformly graded; less than 5 percent fines present; (SP)
	26	S-11	5 - 6 8 - 10	24	19	0 ppm on sample; auger advance is slow; graphitic sheen on sample		S-11A (25 ft. to 25 ft. 5 in.) SAND, trace of silt. Brown; similar to S-10; (SP) S-11B (25 ft. 5 in. to 26 ft. 7 in.) SAND with gravel, trace of silt. Brown; fine to coarse sand; widely graded; fine (0.25 in.) to coarse (>1 in.), subrounded and subangular gravel pieces present; 5 percent or less fines present; (SW)

LEGEND:
 TYPE-NO. - Type of sample
 C - Rock core sample
 S - Split barrel sample
 BLOWS PER 6" - 140 lb. hammer falling 30" to drive a split barrel sampler; coring time per foot of rock
 PEN - Penetration length of sampler
 REC - Length of sample recovered
 ∇ - Natural ground water table

NOTES:

Borehole advanced by rotating 8-inch outside diameter hollow stem augers. Continuous split spoon samples collected at 2 foot intervals to the water table (∇ roughly @ 17.5 ft. on 6-21-93). Thereafter, split spoon samples collected at 5 foot intervals until point of refusal reached.

DATE: 10/25/93 PROJECT NO.: 8859
 PAGE: 2 OF 5 BORING NO.: B-4

BORING LOG

HALLIBURTON NUS ENVIRONMENTAL CORPORATION

PROJECT: NCBC - CTO 127 LOCATION: CED Asphalt Area DRILLED BY: T. Belsky/Geosearch BORING NO.: B-4
 DATE STARTED: 6-21-93 INCLINATION: Vertical LOGGED BY: K. Jalkut GROUND ELEV.: Not surveyed
 DATE COMPLETED: 6-22-93 BEARING: N/A CHECKED BY: W.J. Martin TOTAL DEPTH: 70 ft.

ELEV. feet	DEPTH feet	SAMPLE				REMARKS ON ADVANCE OF BORING	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
		TYPE- NO.	BLOWS PER 6"	PEN. in.	REC. in.			
-28								
-30		S-12	5 - 7 12 - 11	24	24	Similar to S-11		S-12A (30 ft. to 31 ft. 4 in.) SAND, trace of silt. Brown-red; fine sand with a trace of medium sand; uniformly graded; less than 5 percent fines present; evidence of bedding highlighted by a reddish coloration; mica present; (SP) S-12B (31 ft. 4 in. to 32 ft.) SAND, trace of silt. Grey-black; fine sand; uniformly graded; less than 5 percent fines present; (SP)
-32								
-34		S-13	7 - 10 6 - 5	24	24	0 ppm on sample; auger advance slow to moderate; graphitic sheen		S-13A (35 ft. to 36 ft.) SAND, trace of silt. Grey-black; mostly fine sand with a trace of medium sand; uniformly graded; less than 5 percent fines present; (SP) S-13B (36 ft. to 37 ft.) SAND, trace of silt. Grey-black; fine sand; similar to S-12B, with interbedded, brown, fine sand layers; (SP)
-36								
-38								
-40		S-14	5 - 7 6 - 6	24	24	Similar to S-13		S-14A (40 ft. to 40 ft. 9 in.) SAND, trace of silt. Grey-black; similar to S-13A; (SP) S-14B (40 ft. 9 in. to 42 ft.) SAND, trace of silt. Grey-black; similar to S-12B; (SP)
-42								

LEGEND:
 TYPE-NO. - Type of sample
 C - Rock core sample
 S - Split barrel sample
 BLOWS PER 6" - 140 lb. hammer falling 30" to drive a split barrel sampler; coring time per foot of rock
 PEN - Penetration length of sampler
 REC - Length of sample recovered
 ∇ - Natural ground water table

NOTES:
 Borehole advanced by rotating 8-inch outside diameter hollow stem augers. Continuous split spoon samples collected at 2 foot intervals to the water table (∇ roughly @ 17.5 ft. on 6-21-93). Thereafter, split spoon samples collected at 5 foot intervals until point of refusal reached.

DATE: 10/25/93 PROJECT NO.: 8859
 PAGE: 3 OF 5 BORING NO.: B-4

BORING LOG

HALLIBURTON NUS ENVIRONMENTAL CORPORATION

PROJECT: NCBC - CTO 127 LOCATION: CED Asphalt Area DRILLED BY: T. Belsky/Geosearch BORING NO.: B-5
 DATE STARTED: 6-21-93 INCLINATION: Vertical LOGGED BY: K. Jalkut GROUND ELEV.: Not surveyed
 DATE COMPLETED: 6-21-93 BEARING: N/A CHECKED BY: W. J. Martin TOTAL DEPTH: 22 ft.

ELEV. feet	DEPTH feet	SAMPLE				REMARKS ON ADVANCE OF BORING	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
		TYPE-NO.	BLOWS PER 6"	PEN. in.	REC. in.			
0	0	S-1	5 - 11 15 - 18	24	17	0 ppm on sample; gravelly; grinding - auger advancement slow; graphitic sheen		S-1 (0 ft. to 1 ft. 5 in.) SAND with gravel, trace to some silt. Brown; mostly fine sand with trace of medium sand; uniformly graded; fine (0.25 in.) and coarse (> 1 in.), subrounded and angular gravel present; approximately 5 to 12 percent fines present; (SP-SM)
	2	S-2	17 - 44 40 - 46	24	19	Similar to S-1; slow penetration with split barrel sampler		S-2 (2 ft. to 3 ft. 7 in.) SAND with gravel, trace to some silt. Brown; mostly fine sand with a trace of medium and coarse sand; uniformly graded; fine (0.125 to 0.25 in.) and coarse (1.5 in.), subrounded and subangular gravel present; approximately 5 to 12 percent fines present; (SP-SM)
	4	S-3	13 - 42 41 - 33	24	15	Similar to S-2		S-3 (4 ft. to 5 ft. 3 in.) SAND with gravel, trace to some silt. Brown; mostly fine sand with a trace of medium sand; uniformly graded; fine (0.50 in.) to coarse (1 to 2 in.), subrounded and subangular gravel present; approximately 5 to 12 percent fines present; (SP-SM)
	6	S-4	28 - 32 34 - 23	24	17	Similar to S-3		S-4 (6 ft. to 7 ft. 5 in.) SAND with gravel, trace of silt. Brown; fine and medium sand with a trace of coarse sand; widely graded; fine (0.25 to 0.50 in.) and coarse (1.5 in.), subrounded and angular gravels present; approximately 5 percent or less fines present; (SW)
	8	S-5	37 - 26 23 - 27	24	23	Similar to S-4		S-5A (8 ft. to 8 ft. 11 in.) SAND with gravel, trace of silt. Brown; fine and medium sand; uniformly graded; fine (0.25 in.) to coarse (1 in.), subrounded and angular gravels present; approximately 5 percent or less fines present; (SW) S-5B (8 ft. 11 in. to 9 ft. 11 in.) SAND with gravel, trace of silt. Brown; fine and medium sand with a trace of coarse sand; widely graded; fine (0.25 in. to 0.50 in.) and coarse (>1 in.), subrounded and subangular gravels present; approximately 5 percent or less fines present; (SW)
	10	S-6	8 - 10 15 - 11	24	21	Similar to S-5, with moderate advancement; moderate sampler penetration		S-6 (10 ft. to 11 ft. 9 in.) SAND with gravel, trace of silt. Brown; fine and medium sand with a trace of coarse sand; widely graded; fine (0.25 to 0.50 in.) and coarse (0.75 to 1.5 in.), subrounded and subangular gravels present; quartz pebble present; 5 percent or less fines present; (SW)
	12							

LEGEND:
 TYPE-NO. - Type of sample
 C - Rock core sample
 S - Split barrel sample
 BLOWS PER 6" - 140 lb. hammer falling 30" to drive a split barrel sampler; coring time per foot of rock
 PEN - Penetration length of sampler
 REC - Length of sample recovered
 ∇ - Natural ground water table

NOTES:

Borehole advanced by rotating 8-inch outside diameter hollow stem augers to 22 ft. Collected continuous split barrel samples at 2 foot intervals to the water table (∇ roughly @ 17.5 ft. on 6-21-93). Thereafter, collected a sample approximately 5 ft. below the water table.

DATE: 10/25/93 PROJECT NO.: 8659
 PAGE: 1 OF 2 BORING NO.: B-5

BORING LOG

HALLIBURTON NUS ENVIRONMENTAL CORPORATION

PROJECT: NCBC - CTO 127 LOCATION: CED Asphalt Area DRILLED BY: T. Belsky/Geosearch BORING NO.: B-5
 DATE STARTED: 8-21-93 INCLINATION: Vertical LOGGED BY: K. Jalkut GROUND ELEV.: Not surveyed
 DATE COMPLETED: 8-21-93 BEARING: N/A CHECKED BY: W. J. Martin TOTAL DEPTH: 22 ft.

ELEV. feet	DEPTH feet	SAMPLE				REMARKS ON ADVANCE OF BORING	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
		TYPE-NO.	BLOWS PER 6"	PEN. in.	REC. in.			
-12		S-7	9 - 15 11 - 7	24	18	Similar to S-6		S-7 (12 ft. to 13 ft. 6 in.) SAND with gravel, trace of silt. Brown; fine and medium sand with a trace of coarse sand; widely graded; fine (0.5 in.), subangular gravel present; 5 percent or less fines present; (SW)
-14		S-8	9 - 7 6 - 6	24	19	0 ppm on sample; graphitic sheen; moderate auger advancement - no grinding; easy sampler penetration		S-8 (14 ft. to 15 ft. 7 in.) SAND, with a trace of gravel, trace of silt. Brown; fine and medium sand with a trace of coarse sand; widely graded; trace of fine (0.25 in.), subrounded gravel present; 5 percent or less fines present; (SW)
-16		S-9	8 - 8 6 - 6	24	17	Similar to S-8; damp sediment - ∇ roughly @ 17.5 ft.		S-9 (16 ft. to 17 ft. 5 in.) SAND, with a trace of gravel, trace of silt. Brown; similar to S-8; (SW)
-18								
-20		S-10	7 - 6 9 - 9	24	15	Similar to S-9; saturated soil		S-10 (20 ft. to 21 ft. 3 in.) SAND, trace of silt. Brown; fine sand; uniformly graded; less than 5 percent fines present; (SP)
-22								END OF BORING AT 22 FT. BOREHOLE BACKFILLED WITH BENTONITE CHIPS, SAND, PORTLAND CEMENT. NO WELL INSTALLED.
-24								

LEGEND:
 TYPE-NO. - Type of sample
 C - Rock core sample
 S - Split barrel sample
 BLOWS PER 6" - 140 lb. hammer falling 30" to drive a split barrel sampler; coring time per foot of rock
 PEN - Penetration length of sampler
 REC - Length of sample recovered
 ∇ - Natural ground water table

NOTES:
 Borehole advanced by rotating 8-inch outside diameter hollow stem augers to 22 ft. Collected continuous split barrel samples at 2 foot intervals to the water table (∇ roughly @ 17.5 ft. on 6-21-93). Thereafter, collected a sample approximately 5 ft. below the water table.

DATE: 10/25/93 PROJECT NO.: 8859
 PAGE: 2 OF 2 BORING NO.: B-5

APPENDIX C
SCREENING CRITERIA CALCULATION SPREADSHEET
AND
SOURCE DOCUMENTATION

SCREENING CRITERIA VALUES SPREADSHEET

Analyte/Compound	RfDo (mg/kg/day)	RfDi (mg/kg/day)	SfO (kd-day/mg)	SfI (kd-day/mg)	Koc (L/kg)	Henry's Const. (atm-m3/mol)	Vi (cm3/mol)	MW (g/mol)	Di (cm2/sec)	Dai (cm2/sec)	Kas (g/cm3)	Alpha (cm2/sec)	VF (m3/kg)
1,1-Dichloroethane	1.00E-01	1.43E-01			3.00E+01	4.26E-03	7.99E+01	98.96	9.17E-02	2.59E-02	2.91E-01	1.08E-03	3.89E+03
1,1-Dichloroethene	9.00E-03		6.00E-01	1.75E-01	6.50E+01	1.90E-01	7.60E+01	96.94	9.38E-02	2.65E-02	5.99E+00	1.25E-02	6.29E+02
1,1,1-Trichloroethane	9.00E-02	2.86E-01			1.52E+02	3.00E-02	9.74E+01	133.41	8.19E-02	2.32E-02	4.05E-01	1.32E-03	3.46E+03
1,1,1,2-Tetrachloroethane	3.00E-02		2.60E-02	2.59E-02	1.18E+02	3.80E-04	1.15E+02	167.85	7.50E-02	2.12E-02	6.60E-03	2.09E-05	2.92E+04
1,1,2-Trichloroethane	4.00E-03		5.70E-02	5.60E-02	5.60E+01	7.42E-04	9.74E+01	133.41	8.19E-02	2.32E-02	2.72E-02	9.38E-05	1.37E+04
1,1,2,2-Tetrachloroethane			2.00E-01	2.03E-01	1.18E+02	3.80E-04	1.15E+02	167.85	7.50E-02	2.12E-02	6.60E-03	2.09E-05	2.92E+04
1,2-Dichlorobenzene	9.00E-02	5.71E-02			1.70E+03	1.93E-03	1.26E+02	147.01	7.29E-02	2.06E-02	2.33E-03	7.17E-06	4.99E+04
1,2-Dichloroethane		2.86E-03	9.10E-02	9.10E-02	1.40E+01	9.14E-04	7.99E+01	98.98	9.17E-02	2.59E-02	1.34E-01	5.09E-04	5.81E+03
1,2-Dichloroethene	2.00E-02				5.90E+01	6.70E-02	7.60E+01	96.94	9.38E-02	2.65E-02	2.33E+00	6.85E-03	1.20E+03
1,2-Dichloropropane		1.14E-03	6.80E-02		5.10E+01	2.31E-03	1.00E+02	112.99	8.22E-02	2.32E-02	9.29E-02	3.18E-04	7.38E+03
1,2,4-Trichlorobenzene	1.00E-02	2.57E-03			9.20E+03	2.30E-03	1.43E+02	181.45	6.78E-02	1.92E-02	5.13E-04	1.47E-06	1.10E+05
1,3-Dichloropropene	3.00E-04	5.71E-03	1.80E-01	1.30E-01	4.80E+01	1.30E-03	9.64E+01	110.98	8.38E-02	2.37E-02	5.55E-02	1.95E-04	9.49E+03
1,4-Dichlorobenzene		2.29E-01	2.40E-02		1.70E+03	3.10E-03	1.26E+02	147.01	7.29E-02	2.06E-02	3.74E-03	1.15E-05	3.93E+04
2-Butanone	5.00E-02	3.00E-01			1.70E+01	2.08E-05	1.64E+02	72.1	7.02E-02	1.98E-02	2.51E-03	7.44E-06	4.90E+04
2-Chlorophenol	5.00E-03				7.30E+01	1.03E-05		128.56	0.00E+00	0.00E+00	2.89E-04	0.00E+00	0.00E+00
2-Hexanone					7.50E+01	7.53E-06	1.28E+02	100.2	7.50E-02	2.12E-02	2.06E-04	6.53E-07	1.65E+05
2-Methylnaphthalene	2.00E-02					4.60E-04		142.2	0.00E+00	0.00E+00	ERR	ERR	0.00E+00
2-Methylphenol	5.00E-02				2.45E+01	3.92E-06		108.1	0.00E+00	0.00E+00	3.28E-04	0.00E+00	0.00E+00
2,3,7,8-TCDD			1.50E+05	1.50E+05	3.30E+06	2.10E-03	2.55E+02	3.22E+02	5.06E-02	1.43E-02	1.30E-06	2.79E-09	1.20E+06
2,4-Dichlorophenol	3.00E-03								0.00E+00	0.00E+00	ERR	ERR	0.00E+00
2,4-Dimethylphenol	2.00E-02				9.60E+01	1.70E-05		122.2	0.00E+00	0.00E+00	3.63E-04	0.00E+00	0.00E+00
2,4-Dinitrophenol	2.00E-03								0.00E+00	0.00E+00	ERR	ERR	0.00E+00
2,4,5-Trichlorophenol	1.00E-01								0.00E+00	0.00E+00	ERR	ERR	0.00E+00
2,4,6-Trichlorophenol			1.10E-02	1.10E-02					0.00E+00	0.00E+00	ERR	ERR	0.00E+00
3,3'-Dichlorobenzidine			4.50E-01						0.00E+00	0.00E+00	ERR	ERR	0.00E+00
4-Chloro-3-methylphenol	2.00E+00				6.04E+02	2.50E-06		142.6	0.00E+00	0.00E+00	8.49E-06	0.00E+00	0.00E+00
4-Chloroaniline	4.00E-03				5.20E+01	1.07E-05		127.6	0.00E+00	0.00E+00	4.22E-04	0.00E+00	0.00E+00
4-Methyl-2-pentanone	5.00E-02	2.00E-02			1.13E+02	4.16E-05	1.28E+02	100.2	7.50E-02	2.12E-02	7.55E-04	2.39E-06	8.64E+04
4-Methylphenol	5.00E-03				2.43E+01	1.29E-06		108.1	0.00E+00	0.00E+00	1.09E-04	0.00E+00	0.00E+00
4,4'-DDD			2.40E-01		7.70E+05	2.20E-08		320	0.00E+00	0.00E+00	5.86E-11	0.00E+00	0.00E+00
4,4'-DDE			3.40E-01		4.40E+06	6.80E-05		318	0.00E+00	0.00E+00	3.17E-08	0.00E+00	0.00E+00
4,4'-DDT	5.00E-04		3.40E-01	3.40E-01	3.90E+06	1.58E-05		354.5	0.00E+00	0.00E+00	8.31E-09	0.00E+00	0.00E+00
Acenaphthene	6.00E-02				4.60E+03	9.10E-05		154.2	0.00E+00	0.00E+00	4.06E-05	0.00E+00	0.00E+00
Acetone	1.00E-01				3.50E-01	3.43E-05	6.69E+01	58.08	1.06E-01	3.00E-02	2.01E-01	8.75E-04	4.39E+03
Aldrin	3.00E-05		1.70E+01	1.70E+01	9.60E+04	1.60E-05		365	0.00E+00	0.00E+00	3.42E-07	0.00E+00	0.00E+00
Alpha-BHC			6.30E+00	6.30E+00	3.80E+03	6.00E-06		291	0.00E+00	0.00E+00	3.24E-06	0.00E+00	0.00E+00
Aniline		2.86E-04	5.70E-03		4.40E+01	9.00E-06		93.12	0.00E+00	0.00E+00	4.19E-04	0.00E+00	0.00E+00
Anthracene	3.00E-01				1.40E+04	8.60E-05		178.2	0.00E+00	0.00E+00	1.26E-05	0.00E+00	0.00E+00
Antimony	4.00E-04							121.75	0.00E+00	0.00E+00	ERR	ERR	0.00E+00
Aroclor			7.70E+00		5.30E+05	2.60E-03	2.65E+02	328.4	4.97E-02	1.40E-02	1.01E-05	2.11E-08	9.19E+05
Arsenic	3.00E-04		1.75E+00	1.51E+01				74.92	0.00E+00	0.00E+00	ERR	ERR	0.00E+00
Barium	7.00E-02	1.43E-04						137.34	0.00E+00	0.00E+00	ERR	ERR	0.00E+00
Benzene		1.43E-04	2.90E-02	2.90E-02	6.50E+01	5.50E-03	9.10E+01	78.12	8.95E-02	2.53E-02	1.73E-01	6.40E-04	5.15E+03
Benzoic acid	4.00E+00				1.50E+02	7.00E-08		122.13	0.00E+00	0.00E+00	9.57E-07	0.00E+00	0.00E+00
Benzo(a)anthracene			7.30E+00	6.10E+00	2.00E+05	1.00E-06		228.28	0.00E+00	0.00E+00	1.03E-08	0.00E+00	0.00E+00
Benzo(a)pyrene			7.30E+00	6.10E+00	5.50E+06	4.90E-07		252	0.00E+00	0.00E+00	1.83E-10	0.00E+00	0.00E+00
Benzo(b)fluoranthene			7.30E+00	6.10E+00	5.50E+05	1.22E-05		252.3	0.00E+00	0.00E+00	4.55E-08	0.00E+00	0.00E+00
Benzo(g,h,i)perylene					1.60E+06	1.44E-07		276	0.00E+00	0.00E+00	1.85E-10	0.00E+00	0.00E+00
Benzo(k)fluoranthene			7.30E+00	6.10E+00	5.50E+05	3.87E-05		252.3	0.00E+00	0.00E+00	1.44E-07	0.00E+00	0.00E+00
Beryllium	5.00E-03		4.30E+00	8.40E+00				9.01	0.00E+00	0.00E+00	ERR	ERR	0.00E+00
Beta-BHC			1.80E+00	1.80E+00	3.80E+03	4.50E-07		291	0.00E+00	0.00E+00	2.43E-07	0.00E+00	0.00E+00
Bis(2-chloroethyl)ether			1.10E+00	1.16E+00	1.39E+01	1.30E-05		143	0.00E+00	0.00E+00	1.92E-03	0.00E+00	0.00E+00
Bis(2-chloroisopropyl)ether	4.00E-02		7.00E-02	3.50E-02	6.10E+01	1.10E-04		171.1	0.00E+00	0.00E+00	3.70E-03	0.00E+00	0.00E+00
Bis(2-ethylhexyl)phthalate	2.00E-02		1.40E-02		2.00E+09	3.00E-07	4.93E+02	390.62	3.66E-02	1.03E-02	3.08E-13	4.76E-16	6.12E+09
Bromodichloromethane	2.00E-02		6.20E-02		6.10E+01	2.41E-03	8.29E+01	163.83	8.62E-02	2.44E-02	8.10E-02	2.92E-04	7.73E+03
Bromomethane	1.40E-03	1.00E-03			5.90E+00	1.97E-01	4.63E+01	94.94	1.14E-01	3.23E-02	6.84E+01	2.94E-02	6.93E+01

SCREENING CRITERIA VALUES SPREADSHEET

Analyte/Compound	RfDo (mg/kg/day)	RfDi (mg/kg/day)	SFo (kd-day/mg)	SFi (kd-day/mg)	Koc (L/kg)	Henry's Const. (atm-m3/mol)	Vi (cm3/mol)	MW (g/mol)	Di (cm2/sec)	Dai (cm2/sec)	Kas (g/cm3)	Alpha (cm2/sec)	VF (m3/kg)
Butylberzylphthalate	2.00E-01				1.70E+05	8.30E-06		312	0.00E+00	0.00E+00	1.00E-07	0.00E+00	0.00E+00
Cadmium	5.00E-04			6.30E+00				112.4	0.00E+00	0.00E+00	ERR	ERR	0.00E+00
Caprolactam	5.00E-01								0.00E+00	0.00E+00	ERR	ERR	0.00E+00
Carbon disulfide	1.00E-01	2.86E-03			1.42E+02	1.13E-02		76.14	0.00E+00	0.00E+00	1.63E-01	0.00E+00	0.00E+00
Carbon tetrachloride	7.00E-04	5.71E-04	1.30E-01	5.25E-02	4.39E+02	2.30E-02	9.45E+01	153.82	8.20E-02	2.32E-02	1.07E-01	3.67E-04	6.87E+03
Chlordane	6.00E-05		1.30E+00	1.29E+00	1.40E+05	9.40E-05		409.8	0.00E+00	0.00E+00	1.38E-06	0.00E+00	0.00E+00
Chlorobenzene	2.00E-02	5.71E-03			3.30E+02	3.58E-03	1.08E+02	112.56	7.97E-02	2.25E-02	2.22E-02	7.47E-05	1.54E+04
Chloroethane	2.00E-02	2.86E+00			1.49E+01	1.48E-01	6.24E+01	65.42	1.07E-01	3.02E-02	2.04E+01	2.28E-02	2.19E+02
Chloroform	1.00E-02		6.10E-03	8.05E-02	4.40E+01	2.88E-03	7.70E+01	119.38	9.13E-02	2.58E-02	1.34E-01	5.08E-04	5.81E+03
Chloromethane			1.30E-02	6.30E-03	4.30E+00	4.00E-02	4.19E+01	50.49	1.30E-01	3.68E-02	1.91E+01	2.72E-02	2.10E+02
Chromium (III)	1.00E+00	5.71E-07						52	0.00E+00	0.00E+00	ERR	ERR	0.00E+00
Chromium (VI)	5.00E-03			4.20E+01				52	0.00E+00	0.00E+00	ERR	ERR	0.00E+00
Chrysene			7.30E+00	6.10E+00	2.00E+05	1.05E-06		228.3	0.00E+00	0.00E+00	1.08E-08	0.00E+00	0.00E+00
Cobalt	8.00E-03							58.93	0.00E+00	0.00E+00	ERR	ERR	0.00E+00
Copper	4.00E-02							63.54	0.00E+00	0.00E+00	ERR	ERR	0.00E+00
Cyanide	2.00E-02								0.00E+00	0.00E+00	ERR	ERR	0.00E+00
Dibenz(a,h)anthracene			7.30E+00	6.10E+00	3.30E+06	7.30E-08		278.4	0.00E+00	0.00E+00	4.53E-11	0.00E+00	0.00E+00
Dibromochloromethane	2.00E-02		8.40E-02		8.40E+01	9.90E-04	8.50E+01	208.29	8.39E-02	2.37E-02	2.42E-02	8.55E-05	1.44E+04
Dieldrin	5.00E-05		1.60E+01	1.60E+01	1.70E+03	4.57E-10		381	0.00E+00	0.00E+00	5.51E-10	0.00E+00	0.00E+00
Diethylphthalate	8.00E-01				1.42E+02	1.20E-06		222.2	0.00E+00	0.00E+00	1.73E-05	0.00E+00	0.00E+00
Dimethylphthalate	1.00E+01				1.74E+01	2.15E-06		194.2	0.00E+00	0.00E+00	2.53E-04	0.00E+00	0.00E+00
Di-n-butylphthalate	1.00E-01				1.70E+05	2.80E-07	3.09E+02	278.3	4.66E-02	1.32E-02	3.38E-09	6.65E-12	5.18E+07
Di-n-octylphthalate	2.00E-02				3.60E+09	1.70E-05		391	0.00E+00	0.00E+00	9.68E-12	0.00E+00	0.00E+00
Endosulfan	6.00E-03				9.60E-03	1.91E-05		406.9	0.00E+00	0.00E+00	4.08E+00	0.00E+00	0.00E+00
Endrin	3.00E-04				1.70E+03	4.00E-07		381	0.00E+00	0.00E+00	4.82E-07	0.00E+00	0.00E+00
Ethylbenzene	1.00E-01	2.86E-01			1.10E+03	6.60E-03	1.32E+02	106.16	7.37E-02	2.08E-02	1.23E-02	3.83E-05	2.16E+04
Fluoranthene	4.00E-02				3.80E+04	6.50E-06		202.3	0.00E+00	0.00E+00	3.51E-07	0.00E+00	0.00E+00
Fluorene	4.00E-02				7.30E+03	6.40E-05		116.2	0.00E+00	0.00E+00	1.80E-05	0.00E+00	0.00E+00
Gamma-BHC	3.00E-04		1.30E+00		3.80E+03	7.80E-06		291	0.00E+00	0.00E+00	4.21E-06	0.00E+00	0.00E+00
Heptachlor	5.00E-04		4.50E+00	4.55E+00	1.20E+04	4.00E-03		373.5	0.00E+00	0.00E+00	6.83E-04	0.00E+00	0.00E+00
Heptachlor epoxide	1.30E-05		9.10E+00	9.10E+00	2.20E+02	3.90E-04		389.2	0.00E+00	0.00E+00	3.63E-03	0.00E+00	0.00E+00
Hexachlorobenzene	8.00E-04		1.60E+00	1.61E+00	1.20E+06	6.80E-04	1.96E+02	284.79	5.75E-02	1.62E-02	1.16E-06	2.82E-09	2.51E+06
Hexachlorobutadiene	2.00E-04		7.80E-02	7.70E-02	2.90E+04	2.56E-02	1.83E+02	260.76	5.95E-02	1.68E-02	1.81E-03	4.56E-06	6.26E+04
Hexachloroethane	1.00E-03		1.40E-02	1.40E-02	2.00E+04	2.49E-03	1.50E+02	236.74	6.54E-02	1.85E-02	2.55E-04	7.06E-07	1.59E+05
Indeno(1,2,3-cd)pyrene			7.30E+00	6.10E+00	1.60E+06	6.95E-08		276.3	0.00E+00	0.00E+00	8.90E-11	0.00E+00	0.00E+00
Isophorone	2.00E-01		9.50E-04		8.70E+01	5.75E-06		138.2	0.00E+00	0.00E+00	1.35E-04	0.00E+00	0.00E+00
Lead	1.00E-07							207.19	0.00E+00	0.00E+00	ERR	ERR	0.00E+00
Manganese	5.00E-03	1.43E-05						54.94	0.00E+00	0.00E+00	ERR	ERR	0.00E+00
Mercury	3.00E-04	8.57E-05						200.59	0.00E+00	0.00E+00	ERR	ERR	0.00E+00
Methoxychlor	5.00E-03				8.00E+04	1.58E-05		345.66	0.00E+00	0.00E+00	4.05E-07	0.00E+00	0.00E+00
Methylene chloride	6.00E-02	8.57E-01	7.50E-03	1.64E-03	8.80E+00	2.03E-03	5.95E+01	84.94	1.05E-01	2.97E-02	4.73E-01	1.96E-03	2.82E+03
Naphthalene	4.00E-03				9.40E+02	4.60E-04	1.40E+02	128.2	7.04E-02	1.99E-02	1.00E-03	2.99E-06	7.73E+04
Nickel	2.00E-02			8.40E-01				58.71	0.00E+00	0.00E+00	ERR	ERR	0.00E+00
N-nitroso-di-n-propylamir			7.00E+00						0.00E+00	0.00E+00	ERR	ERR	0.00E+00
N-nitrosodiphenylamine			4.90E-03		6.48E+02	6.60E-04		198.2	0.00E+00	0.00E+00	2.09E-03	0.00E+00	0.00E+00
Pentachlorophenol	3.00E-02		1.20E-01		5.30E+04	2.80E-06		266.35	0.00E+00	0.00E+00	1.08E-07	0.00E+00	0.00E+00
Phenol	6.00E-01				1.42E+01	4.54E-07		94.11	0.00E+00	0.00E+00	6.55E-05	0.00E+00	0.00E+00
Pyrene	3.00E-02				3.80E+04	5.10E-06		202.3	0.00E+00	0.00E+00	2.75E-07	0.00E+00	0.00E+00
Selenium	5.00E-03							78.96	0.00E+00	0.00E+00	ERR	ERR	0.00E+00
Silver	5.00E-03							107.87	0.00E+00	0.00E+00	ERR	ERR	0.00E+00
Styrene	2.00E-01	2.86E-01	3.00E-02	2.00E-03	5.68E+02	2.28E-03	1.28E+02	104.14	7.48E-02	2.12E-02	8.23E-03	2.60E-05	2.62E+04
Tetrachloroethene	1.00E-02		5.20E-02	2.03E-03	3.64E+02	1.53E-02	1.11E+02	165.83	7.62E-02	2.15E-02	8.62E-02	2.74E-04	7.97E+03
Thallium	7.00E-05							204.37	0.00E+00	0.00E+00	ERR	ERR	0.00E+00
Tin	6.00E-01							118.69	0.00E+00	0.00E+00	ERR	ERR	0.00E+00
Toluene	2.00E-01	1.14E-01			3.00E+02	6.66E-03	1.11E+02	92.13	8.06E-02	2.28E-02	4.55E-02	1.54E-04	1.07E+04
Toxaphene			1.10E+00	1.12E+00	9.64E+02	2.10E-01		414	0.00E+00	0.00E+00	4.47E-01	0.00E+00	0.00E+00

SCREENING CRITERIA VALUES SPREADSHEET

Analyte/Compound	RfDo (mg/kg/day)	RfDi (mg/kg/day)	SFo (kd-day/mg)	SFi (kd-day/mg)	Koc (L/kg)	Henry's Const. (atm-m ³ /mol)	Vi (cm ³ /mol)	MW (g/mol)	Di (cm ² /sec)	Dai (cm ² /sec)	Kas (g/cm ³)	Alpha (cm ² /sec)	VF (m ³ /kg)
Trichloroethene	6.00E-03		1.10E-02	6.00E-03	1.26E+02	9.10E-03	9.38E+01	131.39	8.34E-02	2.36E-02	1.48E-01	5.11E-04	5.78E+03
Vanadium	7.00E-03							50.94	0.00E+00	0.00E+00	ERR	ERR	0.00E+00
Vinyl acetate	1.00E+00	5.71E-02							0.00E+00	0.00E+00	ERR	ERR	0.00E+00
Vinyl chloride			1.90E+00	3.00E-01	8.20E+00	8.14E-02	5.84E+01	62.5	1.11E-01	3.12E-02	2.04E+01	2.35E-02	2.15E+02
Xylenes	2.00E+00	8.57E-02			8.70E+02	6.82E-03	1.32E+02	106.16	7.37E-02	2.08E-02	1.61E-02	5.00E-05	1.89E+04
Zinc	3.00E-01							65.37	0.00E+00	0.00E+00	ERR	ERR	0.00E+00

SCREENING CRITERIA VALUES SPREADSHEET

Analyte/Compound	URF	RfC	Kd (l/kg)	Air	Air	Air	Air	Soil Exp.	Soil Exp.	Soil Exp.	Soil Exp.
	(ug/m3)-1	(mg/m3)		Inh SSLc (mg/kg)	Inh SSLnc (mg/kg)	Inh SSLmin (mg/kg)	Inh SSLmin w/unit conv. units	Ing SSLc (mg/kg)	Ing SSLnc (mg/kg)	Ing SSLmin (mg/kg)	Ing SSLmin w/unit conv. units
1,1-Dichloroethane	NA	5.01E-01		NA	4.50E+02	450.000	450,000 ug/kg	need data	7800.000	7800.000	7,800,000 ug/kg
1,1-Dichloroethene	5.00E-05	NA		1.70E-01	NA	0.170	170 ug/kg	1.100	703.926	1.100	1,100 ug/kg
1,1,1-Trichloroethane	NA	1.00E+00		NA	4.20E+02	420.000	420,000 ug/kg	need data	7000.000	7000.000	7,000,000 ug/kg
1,1,1,2-Tetrachloroethane	7.40E-06	NA		9.60E+00	NA	9.595	9,595 ug/kg	2.463	2346.420	2.463	2,463 ug/kg
1,1,2-Trichloroethane	1.60E-05	NA		2.09E+00	NA	2.090	2,090 ug/kg	1.123	312.856	1.123	1,123 ug/kg
1,1,2,2-Tetrachloroethane	5.80E-05	NA		1.22E+00	NA	1.224	1,224 ug/kg	0.320	need data	0.320	320 ug/kg
1,2-Dichlorobenzene	NA	2.00E-01		NA	1.04E+04	10391.526	10,391,526 ug/kg	need data	7039.260	7039.260	7,039,260 ug/kg
1,2-Dichloroethane	2.60E-05	1.00E-02		5.44E-01	6.06E+01	0.544	544 ug/kg	0.704	need data	0.704	704 ug/kg
1,2-Dichloroethene	NA	NA		NA	NA	need data	need data ug/kg	need data	1564.280	1564.280	1,564,280 ug/kg
1,2-Dichloropropane	NA	3.99E-03		NA	3.07E+01	30.725	30,725 ug/kg	0.942	need data	0.942	942 ug/kg
1,2,4-Trichlorobenzene	NA	9.00E-03		9.30E+01	1.03E+03	93.000	93,000 ug/kg	780.000	782.140	780.000	780,000 ug/kg
1,3-Dichloropropene	3.71E-05	2.00E-02		6.21E-01	1.98E+02	0.621	621 ug/kg	0.356	23.464	0.356	356 ug/kg
1,4-Dichlorobenzene	NA	8.02E-01		8.00E+01	3.29E+04	80.000	80,000 ug/kg	27.000	need data	27.000	27,000 ug/kg
2-Butanone	NA	1.05E+00		NA	5.36E+04	53600.462	53,600,462 ug/kg	need data	3910.700	3910.700	3,910,700 ug/kg
2-Chlorophenol	NA	NA		NA	NA	need data	need data ug/kg	need data	391.070	391.070	391,070 ug/kg
2-Hexanone	NA	NA		NA	NA	need data	need data ug/kg	need data	need data	need data	need data ug/kg
2-Methylnaphthalene	NA	NA		NA	NA	need data	need data ug/kg	need data	1564.280	1564.280	1,564,280 ug/kg
2-Methylphenol	NA	NA		NA	NA	need data	need data ug/kg	need data	3910.700	3910.700	3,910,700 ug/kg
2,3,7,8-TCDD	4.29E+01	NA		1.43E-04	NA	1.43E-04	1.43E-01 ug/kg	4.27E-07	need data	4.27E-07	4.27E-04 ug/kg
2,4-Dichlorophenol	NA	NA		NA	NA	need data	need data ug/kg	need data	234.642	234.642	234,642 ug/kg
2,4-Dimethylphenol	NA	NA		NA	NA	need data	need data ug/kg	need data	1564.280	1564.280	1,564,280 ug/kg
2,4-Dinitrophenol	NA	NA		NA	NA	need data	need data ug/kg	need data	156.428	156.428	156,428 ug/kg
2,4,5-Trichlorophenol	NA	NA		NA	NA	need data	need data ug/kg	need data	7821.400	7821.400	7,821,400 ug/kg
2,4,6-Trichlorophenol	3.14E-06	NA		1.10E+00	NA	1.097	1,097 ug/kg	5.821	need data	5.821	5,821 ug/kg
3,3'-Dichlorobenzidine	NA	NA		NA	NA	need data	need data ug/kg	0.142	need data	0.142	142 ug/kg
4-Chloro-3-methylphenol	NA	NA		NA	NA	need data	need data ug/kg	need data	156428.000	156428.000	156,428,000 ug/kg
4-Chloroaniline	NA	NA		NA	NA	need data	need data ug/kg	need data	312.856	312.856	312,856 ug/kg
4-Methyl-2-pentanone	NA	7.00E-02		NA	6.30E+03	6304.388	6,304,388 ug/kg	need data	3910.700	3910.700	3,910,700 ug/kg
4-Methylphenol	NA	NA		NA	NA	need data	need data ug/kg	need data	391.070	391.070	391,070 ug/kg
4,4'-DDD	NA	NA		NA	NA	need data	need data ug/kg	0.267	need data	0.267	267 ug/kg
4,4'-DDE	NA	NA		NA	NA	need data	need data ug/kg	0.188	need data	0.188	188 ug/kg
4,4'-DDT	9.71E-05	NA		3.90E+00	NA	3.900	3,900 ug/kg	1.900	39.107	1.900	1,900 ug/kg
Acenaphthene	NA	NA		NA	NA	need data	need data ug/kg	need data	4692.840	4692.840	4,692,840 ug/kg
Acetone	NA	NA		NA	NA	need data	need data ug/kg	need data	7821.400	7821.400	7,821,400 ug/kg
Aldrin	4.86E-03	NA		9.08E-01	NA	0.908	908 ug/kg	0.004	2.346	0.004	4 ug/kg
Alpha-BHC	1.80E-03	NA		1.00E+00	NA	1.000	1,000 ug/kg	0.100	need data	0.100	100 ug/kg
Aniline	NA	1.00E-03		NA	4.71E+05	470798.900	4.71E+08 ug/kg	11.234	need data	11.234	11,234 ug/kg
Anthracene	NA	NA		NA	NA	need data	need data ug/kg	need data	23464.200	23464.200	23,464,200 ug/kg
Antimony	NA	NA	No Kd	NA	NA	need data	need data mg/kg	need data	31.286	31.286	31 mg/kg
Aroclor	NA	NA		NA	NA	need data	need data ug/kg	1.000	need data	1.000	1,000 ug/kg
Arsenic	4.31E-03	NA	3.32E+00	2.60E+03	NA	2600.000	2,600,000 mg/kg	0.370	23.464	0.370	0,370 mg/kg
Barium	NA	5.01E-04	2.71E+01	NA	2.35E+05	235399.450	235,399,450 mg/kg	need data	5,474.980	5,474.980	5,474,980 mg/kg
Benzene	8.29E-06	5.01E-04		2.50E+00	2.69E+00	2.500	2,500 ug/kg	22.000	need data	22.000	22,000 ug/kg
Benzoic acid	NA	NA		NA	NA	need data	need data ug/kg	need data	312856.000	312856.000	312,856,000 ug/kg
Benzo(a)anthracene	1.74E-03	NA		1.02E+00	NA	1.021	1,021 ug/kg	0.009	need data	0.009	9 ug/kg
Benzo(a)pyrene	1.74E-03	NA		1.33E+01	NA	13.300	13,300 ug/kg	0.110	need data	0.110	110 ug/kg
Benzo(b)fluoranthene	1.74E-03	NA		1.02E+00	NA	1.021	1,021 ug/kg	0.009	need data	0.009	9 ug/kg
Benzo(g,h,i)perylene	NA	NA		NA	NA	need data	need data ug/kg	need data	need data	need data	need data ug/kg
Benzo(k)fluoranthene	1.74E-03	NA		1.02E+00	NA	1.021	1,021 ug/kg	0.009	need data	0.009	9 ug/kg
Beryllium	2.40E-03	NA	No Kd	9.95E-01	NA	0.995	0,995 mg/kg	0.015	391.070	0.015	0,015 mg/kg
Beta-BHC	5.14E-04	NA		1.07E+00	NA	1.074	1,074 ug/kg	0.036	need data	0.036	36 ug/kg
Bis(2-chloroethyl)ether	3.31E-04	NA		1.08E+00	NA	1.082	1,082 ug/kg	0.058	need data	0.058	58 ug/kg
Bis(2-chloroisopropyl)ether	1.00E-05	NA		1.10E+00	NA	1.097	1,097 ug/kg	0.915	3128.560	0.915	915 ug/kg
Bis(2-ethylhexyl)phthalate	NA	NA		NA	NA	need data	need data ug/kg	4.574	1564.280	4.574	4,574 ug/kg
Bromodichloromethane	NA	NA		NA	NA	need data	need data ug/kg	1.033	1564.280	1.033	1,033 ug/kg
Bromomethane	NA	3.50E-03		NA	2.53E-01	0.253	253 ug/kg	need data	109.500	109.500	109,500 ug/kg

SCREENING CRITERIA VALUES SPREADSHEET

Analyte/Compound	URF (ug/m3)-1	RfC (mg/m3)	Kd (l/kg)	Air Inh SSLc (mg/kg)	Air Inh SSLnc (mg/kg)	Air Inh SSLmin (mg/kg)	Air Inh SSLmin w/unit conv. units	Soil Exp. Ing SSLc (mg/kg)	Soil Exp. Ing SSLnc (mg/kg)	Soil Exp. Ing SSLmin (mg/kg)	Soil Exp. Ing SSLmin w/unit conv. units
Butylbenzylphthalate	NA	NA		NA	NA	need data	need data ug/kg	need data	15642.800	15642.800	15,642,800 ug/kg
Cadmium	1.80E-03	NA	6.69E+00	6.20E+03	NA	6200.000	6,200,000 mg/kg	need data	39.000	39.000	39,000 mg/kg
Caprolactam	NA	NA		NA	NA	need data	need data ug/kg	need data	39107.000	39107.000	39,107,000 ug/kg
Carbon disulfide	NA	1.00E-02		NA	4.71E+06	4707989.000	4.71E+09 ug/kg	need data	7821.400	7821.400	7,821,400 ug/kg
Carbon tetrachloride	1.50E-05	2.00E-03		1.50E+00	1.43E+01	1.500	1,500 ug/kg	4.900	54.750	4.900	4,900 ug/kg
Chlordane	3.69E-04	NA		6.00E-01	NA	0.600	600 ug/kg	0.490	4.693	0.490	490 ug/kg
Chlorobenzene	NA	2.00E-02		NA	1.70E+02	170.000	170,000 ug/kg	need data	1600.000	1600.000	1,600,000 ug/kg
Chloroethane	NA	1.00E+01		NA	2.28E+03	2284.389	2,284,389 ug/kg	need data	1564.280	1564.280	1,564,280 ug/kg
Chloroform	2.30E-05	NA		1.10E+00	NA	1.100	1,100 ug/kg	100.000	782.140	100.000	100,000 ug/kg
Chloromethane	1.80E-06	NA		2.84E-01	NA	0.284	284 ug/kg	4.926	need data	4.926	4,926 ug/kg
Chromium (III)	NA	2.00E-06	2.21E+03	NA	9.40E+02	939.952	939,952 mg/kg	need data	78,214.000	78,214.000	78,214,000 mg/kg
Chromium (VI)	1.20E-02	NA	3.66E+01	9.15E+01	NA	91.453	91,453 mg/kg	need data	390.000	390.000	390,000 mg/kg
Chrysene	1.74E-03	NA		8.00E-01	NA	0.800	800 ug/kg	110.000	need data	110.000	110,000 ug/kg
Cobalt	NA	NA	5.46E+01	NA	NA	need data	need data mg/kg	need data	625.712	625.712	625,712 mg/kg
Copper	NA	NA	2.22E+01	NA	NA	need data	need data mg/kg	need data	3,128.560	3,128.560	3,128,560 mg/kg
Cyanide	NA	NA	No Kd	NA	NA	need data	need data mg/kg	need data	1,564.280	1,564.280	1,564,280 mg/kg
Dibenz(a,h)anthracene	1.74E-03	NA		6.30E+02	NA	629.675	629,675 ug/kg	0.009	need data	0.009	9 ug/kg
Dibromochloromethane	NA	NA		NA	NA	need data	need data ug/kg	0.762	1564.280	0.762	762 ug/kg
Dieldrin	4.57E-03	NA		5.10E+00	NA	5.100	5,100 ug/kg	0.040	3.911	0.040	40 ug/kg
Diethylphthalate	NA	NA		NA	NA	need data	need data ug/kg	need data	62571.200	62571.200	62,571,200 ug/kg
Dimethylphthalate	NA	NA		NA	NA	need data	need data ug/kg	need data	782140.000	782140.000	7,821,400 ug/kg
Di-n-butylphthalate	NA	NA		NA	NA	need data	need data ug/kg	need data	7821.400	7821.400	7,821,400 ug/kg
Di-n-octylphthalate	NA	NA		NA	NA	need data	need data ug/kg	need data	1564.280	1564.280	1,564,280 ug/kg
Endosulfan	NA	NA		NA	NA	need data	need data ug/kg	need data	469.284	469.284	469,284 ug/kg
Endrin	NA	NA		NA	NA	need data	need data ug/kg	need data	23.464	23.464	23,464 ug/kg
Ethylbenzene	NA	1.00E+00		NA	5.80E+01	58.000	58,000 ug/kg	need data	7800.000	7800.000	7,800,000 ug/kg
Fluoranthene	NA	NA		NA	NA	need data	need data ug/kg	need data	3128.560	3128.560	3,128,560 ug/kg
Fluorene	NA	NA		NA	NA	need data	need data ug/kg	need data	3128.560	3128.560	3,128,560 ug/kg
Gamma-BHC	NA	NA		NA	NA	need data	need data ug/kg	need data	0.049	0.049	49 ug/kg
Heptachlor	1.30E-03	NA		8.44E+02	NA	844.179	844,179 ug/kg	0.014	39.107	0.014	14 ug/kg
Heptachlor epoxide	2.60E-03	NA		4.22E+02	NA	422.090	422,090 ug/kg	0.007	1.017	0.007	7 ug/kg
Hexachlorobenzene	4.60E-04	NA		1.33E+01	NA	13.290	13,290 ug/kg	0.040	62.571	0.040	40 ug/kg
Hexachlorobutadiene	2.20E-05	NA		6.92E+00	NA	6.922	6,922 ug/kg	0.821	15.643	0.821	821 ug/kg
Hexachloroethane	4.00E-06	NA		9.67E+01	NA	96.743	96,743 ug/kg	4.574	78.214	4.574	4,574 ug/kg
Indeno(1,2,3-cd)pyrene	1.74E-03	NA		6.30E+02	NA	629.675	629,675 ug/kg	0.009	need data	0.009	9 ug/kg
Isophorone	NA	NA		NA	NA	need data	need data ug/kg	67.405	15642.800	67.405	67,405 ug/kg
Lead	NA	NA	9.95E+01	NA	NA	need data	need data mg/kg	need data	0.008	0.008	150,000 mg/kg
Manganese	NA	5.01E-05	1.48E+02	NA	2.35E+04	23539.945	23,539,945 mg/kg	need data	391.070	391.070	391,070 mg/kg
Mercury	NA	3.00E-04	No Kd	NA	4.10E+01	41.000	41,000 mg/kg	need data	23.000	23.000	23,000 mg/kg
Methoxychlor	NA	NA		NA	NA	need data	need data ug/kg	need data	391.070	391.070	391,070 ug/kg
Methylene chloride	4.69E-07	3.00E+00		4.40E+01	8.81E+03	44.000	44,000 ug/kg	85.000	4692.840	85.000	85,000 ug/kg
Naphthalene	NA	NA		NA	5.20E+01	52.000	52,000 ug/kg	need data	3100.000	3100.000	3,100,000 ug/kg
Nickel	2.40E-04	NA	No Kd	4.70E+04	NA	47000.000	47,000,000 mg/kg	need data	1,600.000	1,600.000	1,600,000 mg/kg
N-nitroso-di-n-propylamin	NA	NA		NA	NA	need data	need data ug/kg	0.009	need data	0.009	9 ug/kg
N-nitrosodiphenylamine	NA	NA		NA	NA	need data	need data ug/kg	13.068	need data	13.068	13,068 ug/kg
Pentachlorophenol	NA	NA		NA	NA	need data	need data ug/kg	5.300	2346.420	5.300	5,300 ug/kg
Phenol	NA	NA		NA	NA	need data	need data ug/kg	need data	46928.400	46928.400	46,928,400 ug/kg
Pyrene	NA	NA		NA	NA	need data	need data ug/kg	need data	2346.420	2346.420	2,346,420 ug/kg
Selenium	NA	NA	2.72E+00	NA	NA	need data	need data mg/kg	need data	391.070	391.070	391,070 mg/kg
Silver	NA	NA	1.10E+02	NA	NA	need data	need data mg/kg	need data	391.070	391.070	391,070 mg/kg
Styrene	5.71E-07	1.00E+00		1.11E+02	2.73E+04	111.404	111,404 ug/kg	2.135	15642.800	2.135	2,135 ug/kg
Tetrachloroethene	5.80E-07	NA		4.10E+01	NA	41.000	41,000 ug/kg	12.000	782.140	12.000	12,000 ug/kg
Thallium	NA	NA	5.99E+04	NA	NA	need data	need data mg/kg	need data	5.475	5.475	5,475 mg/kg
Tin	NA	NA	No Kd	NA	NA	need data	need data mg/kg	need data	46,928.400	46,928.400	46,928,400 mg/kg
Toluene	NA	3.99E-01		1.50E+02	4.45E+03	150.000	150,000 ug/kg	16000.000	16000.000	16,000,000 ug/kg	
Toxaphene	3.20E-04	NA		3.43E+03	NA	3429.479	3,429,479 ug/kg	0.058	need data	0.058	58 ug/kg

SCREENING CRITERIA VALUES SPREADSHEET

Analyte/Compound	URF (ug/m3)-1	RfC (mg/m3)	Kd (l/kg)	Air Inh SSLc (mg/kg)	Air Inh SSLnc (mg/kg)	Air Inh SSLmin (mg/kg)	Air Inh SSLmin w/unit conv. units	Soil Exp. Ing SSLc (mg/kg)	Soil Exp. Ing SSLnc (mg/kg)	Soil Exp. Ing SSLmin (mg/kg)	Soil Exp. Ing SSLmin w/unit conv. units
Trichloroethene	1.71E-06	NA		1.30E+01	NA	13.000	13,000 ug/kg	58,000	469.284	58,000	58,000 ug/kg
Vanadium	NA	NA	No Kd	NA	NA	need data	need data mg/kg	need data	547.498	547.498	547.498 mg/kg
Vinyl acetate	NA	2.00E-01		NA	9.40E+07	93995165.000	9.40E+10 ug/kg	need data	78214.000	78214.000	78,214,000 ug/kg
Vinyl chloride	8.57E-05	NA		2.00E-02	NA	0.020	20 ug/kg	0.340	need data	0.340	340 ug/kg
Xylenes	NA	3.00E-01		NA	9.70E+01	97.000	97,000 ug/kg	need data	160000.000	160000.000	160,000,000 ug/kg
Zinc	NA	NA	1.64E+01	NA	NA	need data	need data mg/kg	need data	23,464.200	23,464.200	23,464.200 mg/kg

SCREENING CRITERIA VALUES SPREADSHEET

Analyte/Compound	Groundwater Ing./Inh SSLmin (mg/l)	Groundwater Ing./Inh SSLmin w/unit conv. units	Wipe Ing NJCSsc (ug/100 cm2)	Wipe Ing NJCSnc (ug/100 cm2)	Wipe Ing NJCSmin (ug/100 cm2)	Groundwater Ing./Inh MCLG/MCL/Cw (mg/l)	Groundwater Ing./Inh MCLG/MCL/Cw (ug/l)
1,1-Dichloroethane	6.200	6,200 ug/kg	need data	3.630	3.630	3.5000	3,500.0000
1,1-Dichloroethene	0.020	20 ug/kg	0.033	0.327	0.033	0.0070	7.0000
1,1,1-Trichloroethane	0.700	700 ug/kg	need data	3.267	3.267	0.2000	200.0000
1,1,1,2-Tetrachloroethane	1.003	1,003 ug/kg	0.109	1.089	0.109	0.0013	1.3462
1,1,2-Trichloroethane	1.003	1,003 ug/kg	0.015	0.145	0.015	0.0030	3.0000
1,1,2,2-Tetrachloroethane	1.000	1,000 ug/kg	192.500	need data	192.500	1.75E-05	0.0175
1,2-Dichlorobenzene	21.400	21,400 ug/kg	need data	3.267	3.267	0.6000	600.0000
1,2-Dichloroethane	1.001	1,001 ug/kg	42.308	need data	42.308	0.0050	5.0000
1,2-Dichloroethene	1.083	1,083 ug/kg	need data	0.726	0.726	0.0700	70.0000
1,2-Dichloropropane	1.005	1,005 ug/kg	56.618	need data	56.618	0.0050	5.0000
1,2,4-Trichlorobenzene	2.300	2,300 ug/kg	need data	0.363	0.363	0.0700	70.0000
1,3-Dichloropropene	1.000	1,000 ug/kg	21.389	0.011	0.011	0.0002	0.1944
1,4-Dichlorobenzene	0.800	800 ug/kg	1604.167	need data	1604.167	0.0750	75.0000
2-Butanone	1.595	1,595 ug/kg	need data	1.815	1.815	1.7500	1,750.0000
2-Chlorophenol	1.256	1,256 ug/kg	need data	0.182	0.182	0.1750	175.0000
2-Hexanone	need data	need data ug/kg	need data	need data	need data	need data	need data
2-Methylnaphthalene	need data	need data ug/kg	need data	0.726	0.726	0.7000	700.0000
2-Methylphenol	1.858	1,858 ug/kg	need data	1.815	1.815	1.7500	1,750.0000
2,3,7,8-TCDD	1.00E+00	1.00E+03 ug/kg	0.000	need data	2.57E-05	3.00E-08	0.0000
2,4-Dichlorophenol	need data	need data ug/kg	need data	0.109	0.109	0.1050	105.0000
2,4-Dimethylphenol	2.344	2,344 ug/kg	need data	0.726	0.726	0.7000	700.0000
2,4-Dinitrophenol	need data	need data ug/kg	need data	0.073	0.073	0.0700	70.0000
2,4,5-Trichlorophenol	need data	need data ug/kg	need data	3.630	3.630	3.5000	3,500.0000
2,4,6-Trichlorophenol	need data	need data ug/kg	350.000	need data	350.000	0.0003	0.3182
3,3'-Dichlorobenzidine	need data	need data ug/kg	8.556	need data	8.556	7.78E-06	0.0078
4-Chloro-3-methylphenol	846.600	846,600 ug/kg	need data	72.600	72.600	70.0000	70,000.0000
4-Chloroaniline	1.146	1,146 ug/kg	need data	0.145	0.145	0.1400	140.0000
4-Methyl-2-pentanone	4.955	4,955 ug/kg	need data	1.815	1.815	1.7500	1,750.0000
4-Methylphenol	1.085	1,085 ug/kg	need data	0.182	0.182	0.1750	175.0000
4,4'-DDD	1.225	1,225 ug/kg	16.042	need data	16.042	1.46E-05	0.0146
4,4'-DDE	1.906	1,906 ug/kg	11.324	need data	11.324	1.03E-05	0.0103
4,4'-DDT	2.300	2,300 ug/kg	11.324	0.018	0.018	0.0001	0.1029
Acenaphthene	194.200	194,200 ug/kg	need data	2.178	2.178	2.1000	2,100.0000
Acetone	1.025	1,025 ug/kg	need data	3.630	3.630	3.5000	3,500.0000
Aldrin	1.004	1,004 ug/kg	0.226	0.001	0.001	2.06E-06	0.0021
Alpha-BHC	0.001	1 ug/kg	0.611	need data	0.611	5.56E-07	0.0006
Aniline	1.001	1,001 ug/kg	675.439	need data	675.439	0.0006	0.6140
Anthracene	2941.000	2,941,000 ug/kg	need data	10.890	10.890	10.5000	10,500.0000
Antimony	need data	need data mg/kg	need data	300.000	300.000	0.0060	6.0000
Aroclor	8.200	8,200 ug/kg	2.700	need data	2.700	0.0005	0.5000
Arsenic	14.000	14,000 mg/kg	2.200	0.011	2.200	0.0500	50.0000
Barium	543.253	543,253 mg/kg	need data	2.541	2.541	2.0000	2,000.0000
Benzene	0.010	10 ug/kg	132.759	need data	132.759	0.0050	5.0000
Benzoic acid	421.000	421,000 ug/kg	need data	145.200	145.200	140.0000	140,000.0000
Benzo(a)anthracene	1.400	1,400 ug/kg	0.527	need data	0.527	0.0001	0.1000
Benzo(a)pyrene	7.100	7,100 ug/kg	0.527	need data	0.527	0.0002	0.2000
Benzo(b)fluoranthene	3.200	3,200 ug/kg	0.527	need data	0.527	0.0002	0.2000
Benzo(g,h,i)perylene	need data	need data ug/kg	need data	need data	need data	need data	need data
Benzo(k)fluoranthene	3.200	3,200 ug/kg	0.527	need data	0.527	0.0002	0.2000
Beryllium	need data	need data mg/kg	0.895	0.182	0.182	0.0040	4.0000
Beta-BHC	1.000	1,000 ug/kg	21.389	need data	21.389	1.94E-06	0.0019
Bis(2-chloroethyl)ether	1.000	1,000 ug/kg	3.500	need data	3.500	3.18E-06	0.0032
Bis(2-chloroisopropyl)ether	1.001	1,001 ug/kg	55.000	1.452	1.452	0.0005	0.5000
Bis(2-ethylhexyl)phthalate	100001.000	1.00E+08 ug/kg	275.000	0.726	0.726	0.0025	2.5000
Bromodichloromethane	1.122	1,122 ug/kg	62.097	0.726	0.726	0.1000	100.0000
Bromomethane	1.006	1,006 ug/kg	need data	0.051	0.051	0.0490	49.0000

SCREENING CRITERIA VALUES SPREADSHEET

Analyte/Compound	Groundwater Ing./Inh. SSLmin (mg/l)	Groundwater Ing./Inh. SSLmin w/unit conv. units	Wipe Ing. NJCS (ug/100 cm2)	Wipe Ing. NJCSnc (ug/100 cm2)	Wipe Ing. NJCSmin (ug/100 cm2)	Groundwater Ing./Inh. MCLG/MCL/Cw (mg/l)	Groundwater Ing./Inh. MCLG/MCL/Cw (ug/l)
Butylbenzylphthalate	341.000	341,000 ug/kg	need data	7.260	7.260	0.1000	100.0000
Cadmium	8.100	8.100 mg/kg	need data	280.000	280.000	0.0050	5.0000
Caprolactam	need data	need data ug/kg	need data	18.150	18.150	17.5000	17,500.0000
Carbon disulfide	10.940	10,940 ug/kg	need data	3.630	3.630	3.5000	3,500.0000
Carbon tetrachloride	0.030	30 ug/kg	29.615	0.025	0.025	0.0050	5.0000
Chlordane	2.000	2,000 ug/kg	2.962	0.002	0.002	0.0020	2.0000
Chlorobenzene	0.500	500 ug/kg	need data	0.726	0.726	0.1000	100.0000
Chloroethane	1.209	1,209 ug/kg	need data	0.726	0.726	0.7000	700.0000
Chloroform	0.200	200 ug/kg	631.148	0.363	0.363	0.1000	100.0000
Chloromethane	1.000	1,000 ug/kg	2961.538	need data	2961.538	0.0003	0.2692
Chromium (III)	2,209.348	2,209.348 mg/kg	need data	36.300	36.300	0.1000	100.0000
Chromium (VI)	19.000	19,000 mg/kg	need data	0.182	0.182	0.1000	100.0000
Chrysene	0.400	400 ug/kg	0.527	need data	0.527	0.0002	0.2000
Cobalt	153.875	153.875 mg/kg	need data	0.290	0.290	0.2800	280.0000
Copper	289.573	289.573 mg/kg	need data	1.452	1.452	1.3000	1,300.0000
Cyanide	need data	need data mg/kg	need data	0.726	0.726	0.2000	200.0000
Dibenzo(a,h)anthracene	20.800	20,800 ug/kg	0.527	need data	0.527	0.0003	0.3000
Dibromochloromethane	1.168	1,168 ug/kg	0.073	0.726	0.073	0.1000	100.0000
Dieldrin	0.001	1 ug/kg	0.241	0.002	0.002	2.19E-06	0.0022
Diethylphthalate	80.520	80,520 ug/kg	need data	29.040	29.040	28.0000	28,000.0000
Dimethylphthalate	122.800	122,800 ug/kg	need data	363.000	363.000	350.0000	350,000.0000
Di-n-butylphthalate	11901.000	11,901,000 ug/kg	need data	3.630	3.630	3.5000	3,500.0000
Di-n-octylphthalate	50400001.000	5.04E+10 ug/kg	need data	0.726	0.726	0.7000	700.0000
Endosulfan	1.000	1,000 ug/kg	need data	0.218	0.218	0.2100	210.0000
Endrin	1.068	1,068 ug/kg	need data	0.011	0.011	0.0020	2.0000
Ethylbenzene	3.300	3,300 ug/kg	need data	3.630	3.630	0.7000	700.0000
Fluoranthene	1065.000	1,065,000 ug/kg	need data	1.452	1.452	1.4000	1,400.0000
Fluorene	205.400	205,400 ug/kg	need data	1.452	1.452	1.4000	1,400.0000
Gamma-BHC	1.002	1,002 ug/kg	2.962	0.011	0.011	2.69E-05	0.0269
Heptachlor	1.096	1,096 ug/kg	0.856	0.018	0.018	0.0004	0.4000
Heptachlor epoxide	1.001	1,001 ug/kg	0.423	0.000	0.000	0.0002	0.2000
Hexachlorobenzene	25.000	25,000 ug/kg	2.406	0.029	0.029	0.0010	1.0000
Hexachlorobutadiene	1.580	1,580 ug/kg	0.001	0.007	0.001	0.0010	1.0000
Hexachloroethane	2.000	2,000 ug/kg	275.000	0.036	0.036	0.0025	2.5000
Indeno(1,2,3-cd)pyrene	13.800	13,800 ug/kg	0.527	need data	0.527	0.0004	0.4000
Isophorone	1.064	1,064 ug/kg	0.726	7.260	0.726	0.0368	36.8421
Lead	15.923	15.923 mg/kg	need data	21.500	21.500	0.0150	15.0000
Manganese	260.723	260.723 mg/kg	need data	0.182	0.182	0.1750	175.0000
Mercury	3.000	3,000 mg/kg	need data	240.000	240.000	0.0020	2.0000
Methoxychlor	65.000	65,000 ug/kg	need data	0.182	0.182	0.0400	40.0000
Methylene chloride	0.007	7 ug/kg	513.333	2.178	2.178	0.0050	5.0000
Naphthalene	25.000	25,000 ug/kg	need data	0.145	0.145	0.1400	140.0000
Nickel	82.000	82,000 mg/kg	need data	0.726	0.726	0.1000	100.0000
N-nitroso-di-n-propylamine	need data	need data ug/kg	0.550	need data	0.550	5.00E-07	0.0005
N-nitrosodiphenylamine	1.009	1,009 ug/kg	785.714	need data	785.714	0.0007	0.7143
Pentachlorophenol	0.009	9 ug/kg	32.083	1.089	1.089	0.0010	1.0000
Phenol	6.964	6,964 ug/kg	need data	21.780	21.780	21.0000	21,000.0000
Pyrene	799.000	799,000 ug/kg	need data	1.089	1.089	1.0500	1,050.0000
Selenium	2.359	2,359 mg/kg	need data	0.182	0.182	0.0500	50.0000
Silver	193.408	193.408 mg/kg	need data	0.182	0.182	0.1750	175.0000
Styrene	2.136	2,136 ug/kg	128.333	7.260	7.260	0.1000	100.0000
Tetrachloroethene	0.030	30 ug/kg	74.038	0.363	0.363	0.0050	5.0000
Thallium	300.371	300.371 mg/kg	need data	0.003	0.003	0.0005	0.5000
Tin	need data	need data mg/kg	need data	21.780	21.780	21.0000	21,000.0000
Toluene	3.600	3,600 ug/kg	need data	7.260	7.260	1.0000	1,000.0000
Toxaphene	1.058	1,058 ug/kg	3.500	need data	3.500	0.0030	3.0000

SCREENING CRITERIA VALUES SPREADSHEET

Analyte/Compound	Groundwater Ing./Inh. SSLmin (mg/l)	Groundwater Ing./Inh. SSLmin w/unit conv. units	Wipe Ing. NJCSc (ug/100 cm2)	Wipe Ing. NJCSnc (ug/100 cm2)	Wipe Ing. NJCSmin (ug/100 cm2)	Groundwater Ing./Inh. MCLG/MCL/Cw (mg/l)	Groundwater Ing./Inh. MCLG/MCL/Cw (ug/l)
Trichloroethene	0.010	10 ug/kg	350.000	0.218	0.218	0.0050	5.0000
Vanadium	need data	need data mg/kg	need data	0.254	0.254	0.2450	245.0000
Vinyl acetate	need data	need data ug/kg	need data	36.300	36.300	35.0000	35,000.0000
Vinyl chloride	0.002	2 ug/kg	2.026	need data	2.026	0.0020	2.0000
Xylenes	57.000	57,000 ug/kg	need data	72.600	72.600	10.0000	10,000.0000
Zinc	1,727.688	1,727.688 mg/kg	need data	10.890	10.890	10.5000	10,500.0000

NOTES

Cw	-	Concentration in water corresponding to 10 ⁻⁶ risk for carcinogens or hazard quotient of 1 for noncarcinogens.
Kd	-	Distribution coefficient
Koc	-	Organic Carbon Partitioning Coefficient
MCL	-	Maximum Contaminant Level
MCLG	-	Maximum Contaminant Level Goal
MW	-	Molecular Weight
NJCS	-	New Jersey Cleanup Standard
RfDi	-	Inhalation Reference Dose
RfDo	-	Oral Reference Dose
SFi	-	Inhalation Slope Factor
SFo	-	Oral Slope Factor
SSL	-	Soil Screening Level
URF	-	Unit Risk Factor
VF	-	Soil-to-Air Volatilization Factor

1. Shaded values in the Screening Criteria Values Spreadsheet are values presented in EPA or state guidance documents specified below. Values which are not shaded were determined using equations presented in the EPA Draft Soil Screening Level Guidance dated September 1993.
2. The primary source for the SSLs is the EPA Draft Soil Screening Level Guidance dated September 1993.
3. The primary source for the slope factors and reference doses used to calculate the SSLs presented in the Screening Criteria Values Spreadsheet is the U.S. EPA Region III Risk-Based Concentration Table, dated January 7, 1994.
4. In accordance with U.S. EPA Region 1 guidance (1989), oral and inhalation slope factors for benzo(a)pyrene were applied to benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene.
5. MCLs and MCLGs were obtained from the EPA publication, "Drinking Water Regulations and Advisories," dated December 1993.
6. New Jersey Cleanup Standards are published in "Cleanup Standards for Contaminated Sites." Proposed New Rules: NJAC 7:26D. 1992.
7. Groundwater pathway and air pathway SSLs for naphthalene serve as surrogates for 2-methyl naphthalene.
8. SSLs for fluoranthene serve as surrogates for phenanthrene.
9. SSLs for endosulfan serve as surrogates for endosulfan I, endosulfan II, and endosulfan sulfate.
10. SSLs for endrin serve as surrogates for endrin aldehyde.
11. The groundwater SSL for barium was calculated using the distribution coefficient (K_d) for strontium (Dragun, 1988).

12. Rhode Island Department of Health "lead-free" standards (1992) were used as screening values for lead in soil and wipe samples.
13. Spreadsheet cells containing formulas which cannot be solved due to insufficient data display the message "need data."
14. SSLs were rounded using U.S. EPA Contract Laboratory Program rounding rules prior to insertion into the report tables.



Draft Soil Screening **RECEIVED** Guidance

JAN 2 1994

Office of Emergency and Remedial Response
Hazardous Site Control Division

HALLIBURTON NUS
ENVIRONMENTAL CORPORATION
WILLINGTON, MA 01897
Quick Reference Fact Sheet

NOTICE: This document is draft and should only be used in the context of demonstration pilots being overseen by the U.S. EPA. The memo used to support the approach discussed herein will undergo rigorous technical review and public comment before this document is finalized and with SSLs for approximately 60 additional chemicals in the summer of 1994.

BACKGROUND

On June 19, 1991, the U.S. Environmental Protection Agency's (EPA's) Administrator charged the Office of Solid Waste and Emergency Response (OSWER) with conducting a 30-day study to outline options for accelerating the rate of cleanups at National Priority List (NPL) sites. The study found that the current investigation/remedy selection process takes over 3 years to complete because each site is treated as a unique problem, requiring the preparation of site-specific risk assessments, cleanup levels, and technical solutions. The study proposed that standardizing the remedial planning and remedy selection process would significantly reduce the time it takes to start cleanups and would improve consistency across the Regions. One of the specific proposals was for OSWER to "examine the means to develop standards or guidelines for contaminated soils."

On June 23, 1993, EPA announced the development of Soil Trigger Levels as one of the Administrative improvements to the Superfund program. This fact sheet presents Soil Screening Levels (SSLs) (formerly known as trigger levels) for 30 chemicals and represents OSWER's first step toward standardizing the evaluation and cleanup of contaminated soils under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA).

An SSL is a chemical concentration in soil that represents a level of contamination above which there is sufficient concern to warrant further site-specific study. Concentrations in soil above this screening level would *not* automatically designate a site as "dirty," nor trigger a response action. However, they suggest that a further evaluation of the potential risks that may be posed by site contaminants is appropriate. Generally, if contaminant concentrations in soil fall below the screening level and the site meets specific residential use conditions, no further study or action is warranted for that area under CERCLA (Superfund). However, some States have developed screening numbers that are more stringent than those presented in this fact sheet, and therefore further study may be warranted under State programs.

PURPOSE OF SSLs

The primary purpose of the SSLs is to accelerate decision making concerning contaminated soils. Initial applications focus remedial investigations by eliminating from further study site areas that do not warrant further study under CERCLA. In fostering prompt identification of the contaminants exposure areas of concern, the SSLs may also help simplify accelerate the baseline risk assessment and may serve Preliminary Remediation Goals (PRGs) under special conditions. EPA will explore other potential applications; proceeds to refine and expand this guidance. Such applications may include removal response actions, site assessment/ listing, voluntary cleanups, and Resource Conservation Recovery Act (RCRA) Corrective Actions.

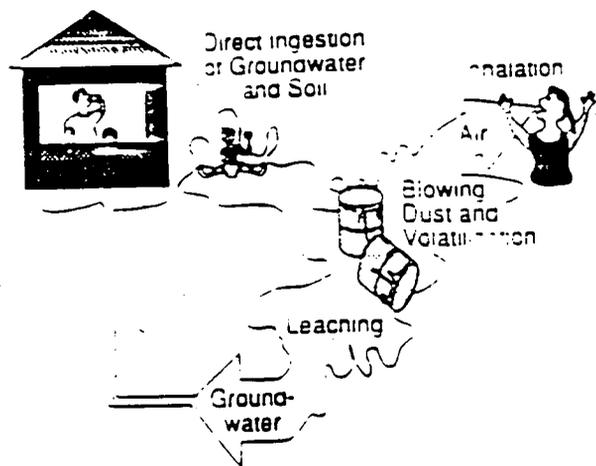
ATTRIBUTES OF SSLs

The 30 SSLs presented in this document have been developed using residential land use human exposure assumptions, considering three pathways of exposure to the contaminants (see Figure 1):

- ingestion of soil
- inhalation of volatiles and fugitive dusts
- migration of contaminants through soil to an underlying potable aquifer.

These pathways have proven to be the most common route of human exposure to contaminants in the residential setting at hazardous waste sites evaluated by EPA. Also, substantial efforts have been made to model these particular pathways.

Other routes/pathways may contribute significantly to the risks posed by exposure to specific contaminants (e.g., dermal exposure or exposure via food chain contamination). OSWER will continue to seek consensus on the appropriate methods required to quantify additional routes/pathways generically. The results of these efforts may be included in the final guidance.



Not Addressed:

- Ecological effects
- Dermal absorption
- Indoor exposure to volatiles from soil and water
- Consumption of fish, beef, or dairy products
- Land uses other than residential

Figure 1. Pathways addressed by soil screening.

An overview of key SSL attributes includes:

- SSLs calculated for the ingestion and inhalation pathways are based on standard equations modified from the *Human Health Evaluation Manual (Part B)* (U.S. EPA, 1991).
- SSLs for migration to groundwater pathways are based on a partitioning equation coupled with a dilution and attenuation factor (DAF).
- Conservative default values were used to calculate levels protective of "high end" individual exposures.
- SSLs are generally based on a 10^{-6} risk for carcinogens, or a hazard quotient of 1 for noncarcinogens; SSLs for protection of groundwater are based on nonzero maximum contaminant level goals (MCLGs), or maximum contaminant levels (MCLs), if available, or these same risk-based targets otherwise.
- SSLs are calculated for individual exposure pathways.

The SSLs correspond to a 10^{-6} risk level for carcinogens and a hazard quotient of 1 for noncarcinogens and the potential for additive effects has not been "built in" to the SSLs through apportionment. For carcinogens, EPA believes that setting a 10^{-6} risk level for individual chemicals and pathways will generally lead to cumulative risks within the risk range (10^{-4} to 10^{-9}) for the combinations of chemicals typically found at Superfund sites.

For noncarcinogens, there is no widely accepted "risk range." Thus, for developing national numbers, options are either (1) to set the risk level for individual contaminants at the reference

dose (RfD) or reference concentration (RfC), (i.e., a hazard quotient of 1), or (2) to set chemical-specific concentrations by apportioning risk based on some arbitrarily chosen fraction of the acceptable risk level (e.g., one-fifth or one-tenth the RfD/RfC). The Agency believes, and the Science Advisory Board agrees (U.S. EPA, 1993b), that noncancer risks should be added only for those chemicals with the same toxic endpoint or mechanism of action. Because the combination of contaminants will vary from site to site, the potential for additive effects and the need to apportion risk must be a site-specific determination.

Practically speaking, however, the five SSLs listed in Table 1 that are based on noncarcinogenic effects (RfDs) all have different endpoints of toxicity (i.e., the crucial effects on which the RfDs are based are different). Thus risks for cumulative exposure would not be additive. Furthermore, for the noncarcinogenic volatiles (e.g., ethylbenzene and toluene), the SSLs based on the ingestion pathway are very high, higher than what is physically possible. In these cases, it is necessary to establish a reasonable "ceiling limit" for the amount of chemical that may be in the soil matrix at sites likely to use this guidance. For the purposes of this guidance, this "ceiling limit" is based on the soil saturation limit (C_{sw}), not toxicity, and serves as the SSL for that chemical. For these reasons, straight apportionment of SSLs in this fact sheet would be inappropriate.

For the groundwater pathway only, SSLs are part of a four-tiered approach to evaluating soil contaminants that may leach to groundwater. The tiers reflect increasing levels of site specificity and cost but generally decreasing levels of conservatism. The first tier SSLs rely heavily on concentration levels derived from mathematical models and general assumptions. If contaminant levels at a site do not exceed the first tier SSLs and other site exposure pathways are accounted for in the assumptions used to derive the SSLs, then the area or site is no longer of concern under CERCLA remedial authority. If contaminant levels at a site equal or exceed the first tier SSLs, or other pathways of concern are present, the site investigation may be initiated or one may consider higher tier screening analyses. The other three tiers are distinguished by their approach to evaluating the soil-to-groundwater pathway. Tier 2 uses site-specific values in a partitioning equation, Tier 3 uses a leach test, and Tier 4 involves full-scale site-specific modeling.

LIMITATIONS OF SSLs

SSLs do not trigger the need for response actions or define "unacceptable" levels of contaminants in soil. In addition, the levels are not necessarily protective of all known human exposure pathways, reasonable land uses, or ecological threats.

SSLs were not developed as nationwide cleanup levels standards. They are risk-based levels that have not yet been modified based on the Superfund remedy selection criteria and are designed to tailor final cleanup levels to site-specific conditions (NCP Section 300.430 (3)(2)(i)(A)).

Table 1. Superfund Proposed Soil Screening Levels^a

Chemical	Pathway-specific values for surface soils (mg/kg)		Surface soil SSLs (mg/kg) ^b	Groundwater pathway levels (mg/kg)		
	Ingestion	Inhalation		Unadjusted	With 10 DAF ^c	With 100 DAF ^c
α-BHC	0.1 ^d	1.0 ^d	0.1 ^d	0.0001 ^e	0.001 ^d	0.01 ^d
Benzene	22 ^d	2.5 ^d	2.5 ^d	0.001 ^e	0.01 ^d	0.1
Benzo(a)pyrene	0.11 ^d	13.3 ^d	0.11 ^d	0.71 ^d	7.1	71
Carbon tetrachloride	4.9 ^d	1.5 ^d	1.5 ^d	0.003 ^e	0.03	0.3
Chloroethane	0.49 ^d	0.6 ^d	0.49 ^d	0.2 ^d	2	20
Chlorobenzene	1,600 ^f	170 ^g	170 ^g	0.05	0.5	5
Chloroform	100 ^d	1.1 ^d	1.1 ^d	0.02	0.2	2
Chrysene	110 ^d	0.8 ^g	0.8 ^g	0.04	0.4	4
DDT	1.9 ^d	3.9 ^d	1.9 ^d	0.23	2.3	23
1,4-Dichlorobenzene	27 ^d	80 ^g	27 ^d	0.08 ^e	0.8	8
1,1-Dichloroethane	7,800 ^f	450 ^g	450 ^g	0.62	6.2	62
1,1-Dichloroethene	1.1 ^d	0.17 ^d	0.17 ^d	0.002 ^e	0.02	0.2
Dieldrin	0.04 ^d	5.1 ^d	0.04 ^d	0.0001 ^e	0.001 ^d	0.01
Ethylbenzene	7,800 ^f	58 ^g	58 ^g	0.33	3.3	33
Methylene chloride	85 ^d	44 ^d	44 ^d	0.001 ^e	0.007 ^e	0.07
Naphthalene	3,100 ^f	52 ^g	52 ^g	2.5	25	250
PCB-1260	1 ^f	— ^h	— ^h	0.82	8.2	82
Pentachloroaniline	5.3 ^d	— ^h	— ^h	0.001 ^{e,i}	0.009 ^{e,i}	0.09 ⁱ
Tetrachloroethene	12 ^d	41 ^d	12 ^d	0.003 ^e	0.03	0.3
Toluene	16,000 ^f	150 ^d	150 ^g	0.36	3.6	36
1,2,4-Trichlorobenzene	780 ^f	93 ^d	93 ^g	0.23 ^e	2.3	23
1,1,1-Trichloroethane	7,000 ^f	420 ^g	420 ^g	0.07	0.7	7
Trichloroethene	58 ^d	13 ^d	13 ^d	0.001 ^e	0.01 ^d	0.1
Vinyl chloride	0.34 ^d	0.02 ^d	0.02 ^d	0.0002 ^e	0.002 ^e	0.02
Xylenes (mixed)	160,000 ^f	97 ^g	97 ^g	5.7	57	570
Arsenic	0.37 ^d	2,600 ^d	0.37 ^d	1.4 ^f	14 ^f	140 ^f
Cadmium	39 ^f	6,200 ^d	39 ^f	0.81 ^f	8.1 ^f	81 ^f
Chromium (VI)	390 ^f	930 ^d	390 ^f	1.9 ^f	19 ^f	190 ^f
Mercury	23 ^f	41 ^f	23 ^f	0.3 ^f	3 ^f	30 ^f
Nickel	1,600 ^f	47,000 ^d	1,600 ^f	8.2 ^f	82 ^f	820 ^f

^a Screening Levels based on human health criteria only.

^b Surface soil SSLs represent the lower of ingestion and inhalation values.

^c DAF = Dilution and attenuation factor.

^d Calculated values correspond to a cancer risk level of 1 in 1,000,000.

^e Level is at or below Contract Laboratory Program required quantitation limit for Regular Analytical Services (RAS).

^f Calculated values correspond to a noncancer hazard quotient of 1.

^g Soil saturation concentration (C_{sat}).

^h No toxicity criteria available for that route of exposure.

ⁱ A preliminary remediation goal of 1 ppm has been set for PCBs based on *Guidance on Remedial Actions for Superfund Sites with PCB Contamination* (U.S. EPA, 1990) and on Agency-wide efforts to manage PCB contamination.

^j SSLs for pH of 6.8.

However, SSLs can serve as PRGs in the following cases:

- Where site conditions mimic the model assumptions underlying the SSLs (i.e., all pathways of concern at a given site match those accounted for in the SSLs), or
- Where the site manager or owner decides not to incur costs of additional site-specific study to arrive at less conservative but still protective levels.

The primary condition for use of the SSLs is that exposure pathways of concern and site conditions must match those taken into account by the levels. Thus, at all sites it will be necessary to develop a simple conceptual site model to identify likely source areas, exposure pathways, and potential receptors to assist in determining the extent to which the SSLs can serve as PRGs. In addition to developing a conceptual site model

The following questions should always be considered by the decisionmaker before applying the SSLs:

- Are there potential ecological concerns?
- Is there potential for land use other than residential?
- Are there other likely human exposure pathways that were not considered in development of the SSLs (e.g., local fish consumption; raising of beef, dairy, or other livestock)?
- Are there unusual site conditions (e.g., unusually large area of contamination, unusually high fugitive dust levels)?

If any of these four conditions exist, then SSLs cannot be used to screen out sites or portions of sites from further evaluation. In addition, SSLs should not be viewed independently of either natural or anthropogenic background concentrations. Where natural background levels are higher than SSLs, generally the SSLs will be of little value since it is inappropriate to conduct further study or action to address contaminants below background. Similarly, when anthropogenic background levels exceed the SSLs, EPA does not encourage additional study or action without first attempting to coordinate such action with the authority responsible for managing the more broadly contaminated area. In either case, the collection of site-specific data is highly recommended.

HOW TO USE SSLs

Table 1 contains SSLs for 30 chemicals. The first column to the right of the chemical name presents values based on soil ingestion. The second column presents the lower of two values derived to protect for either inhalation of volatiles or soil particulates. The third column simply presents the lowest number of the first two columns and may be used as the SSL for surface soils under most residential circumstances. For sites where groundwater is a pathway of concern, SSL values for the migration to the groundwater pathway apply. Three different SSLs address migration of contaminants to groundwater; the selection of an appropriate SSL for this pathway depends on site-specific conditions as discussed below. The first column of groundwater values reflects the levels calculated by the partitioning equation with no correction factor added for dilution and attenuation in the subsurface (unadjusted). The next two columns reflect the levels adjusted by factors of 10 and 100, respectively (10 and 100 DAF), to account for such dilution and attenuation.

As mentioned above, the first step in applying the SSL guidance is to develop a simple conceptual model of the site based on available site sampling data, historical records, aerial photographs, and site hydrogeologic information. This model will establish a hypothesis about the possible contaminant sources, their fate and transport, potential exposure pathways, and human or environmental receptors. If the conceptual model indicates that potential exposure pathways and receptors are fully accounted for in the SSL methodology, the SSLs may be directly applied to the site. However, if the model indicates that the site is either very large or complex or that there are exposure pathways NOT accounted for in the SSL

methodology, SSLs will not be suitable to fully evaluate the site. They can be used, however, in the site evaluation since SSLs have been derived on a pathway-specific basis, and, thus, it will only be necessary to evaluate those exposure pathways that are not already considered in the SSL methodology.

The second step involves collecting a representative sample set for each exposure area. (See Measuring Soil Levels for more detailed guidance on sample numbers and locations.) An exposure area is defined as that geographic area in which an individual may be exposed to contamination regularly. It may involve the entire site, portions of a site, or a simple residential lot. To maximize efficiency, data collection should be coordinated with other early sampling efforts that may be undertaken to gain a better understanding of basic site hydrogeology, ecological threats, or the potential for application of various treatment technologies. For example, the decision may be made early on to collect data for site-specific modeling purposes at a particular site; in this case, the site manager should work to limit total trips to the site and minimize the number of samples collected and their location.

The third step is to compare site-specific data with the SSL in Table 1. At this point, it is reasonable to revisit the original conceptual site model with the actual site data in hand to reconfirm their accuracy. Generally, this comparison will result in one of three outcomes:

1. Site-measured values indicate that an area falls well below any SSL in the table. These areas of the site can be eliminated from further evaluation.
2. Site-measured data indicate that one or more SSLs have clearly been exceeded by a wide margin. In this case, the SSLs have helped to identify contaminants and exposure pathways of concern on which to focus further analysis and data gathering efforts.
3. A site-measured value exceeds one pathway-specific value but not the others. In this case it is reasonable to focus additional site-specific data collection efforts only on that which will help determine whether there is truly a risk from that pathway at the site. When an exceedence is marginal or significant, a closer look at site-specific conditions and exposures may result in the area being eliminated from further study. If this is the case for the groundwater pathway, a manager may choose to collect data specified in the next higher tier(s).

For an NPL site at which SSLs are exceeded, a quick analysis can determine whether the cumulative risks posed by the site exceed the 10^{-4} risk level for carcinogens (or hazard index (HI) of 1 for noncarcinogens), which generally is the trigger for remedial action under Superfund. Where the basis for response action exists, and exposure pathways of concern are addressed by the SSLs, the SSLs become PRGs as defined in the *Human Health Evaluation Manual, Part B* (U.S. EPA, 1991).

In accordance with the National Contingency Plan (NCP), the decisionmaker will need to consider a variety of factors in determining whether any modification of the SSLs (PRGs) is appropriate in setting final cleanup levels (NCP Section 100.430(e)(2)(i)(A)). Ultimately, final cleanup levels are set through the evaluation of the NCP's nine criteria, including cost, long-term effectiveness, and implementability. If groundwater is the driving pathway, even at this final stage, the option exists to consider other SSLs in identifying final cleanup levels.

TECHNICAL BACKGROUND

The models and assumptions used to develop the SSLs construct scenarios representative of a "reasonable maximum exposure" (RME) in the residential setting. U.S. EPA (1989b) outlined the Superfund program's approach to calculating an RME. Since that time, the EPA (U.S. EPA, 1991) has coined a new term that corresponds to the definition of RME: "high-end individual exposure." The Superfund program's method to estimate the high-end (outlined in U.S. EPA, 1989b) is to combine an arithmetic average value for site concentration with high-end values for intake and duration. The estimate of high-end exposure is then compared to chemical-specific Agency toxicity criteria found in the Integrated Risk Information System (IRIS) and Health Effects Assessment Summary Tables (HEAST). The method used to set SSLs combines high-end default values for the intake and duration parameters with Agency toxicity criteria to back-calculate to a screening level in soil. Therefore, attainment of SSLs should be measured based on an arithmetic average.

Although the generic assumptions are not considered overly conservative, EPA recognizes that site-specific conditions may differ significantly from the generic assumptions used in the models. Therefore, for the groundwater pathway the subsequent users of the SSLs allow for the substitution of some of the generic fate and transport assumptions with site-specific data to derive alternative "screening levels" that are more site-specific. Bear in mind, however, that one purpose of the SSLs is to define a level in soil below which no further study or action would be required. Therefore, alternative levels using site-specific data, although less conservative, must still be protective of "high-end" individual exposures.

The following sections present the equations and generic assumptions used to calculate the Screening Levels for each pathway evaluated.

Direct Ingestion

Agency toxicity criteria for noncarcinogens establish a level of "daily" exposure that is not expected to cause deleterious effects over a lifetime of exposure (i.e., 70 years). Depending on the contaminant, however, exceeding the RfD (i.e., the "acceptable" daily level) for a short period of time may be cause for concern. For example, if there is reason to believe that exposure to soil may be higher at a particular stage of an individual's lifetime, one would want to protect for that shorter

period of high exposure. Because a number of studies have shown that inadvertent ingestion of soil is common among children age 6 and younger (Calabrese et al., 1989; Davis et al., 1990; Van Wijnen et al., 1990), OERR set SSLs at concentrations that are protective of this increased exposure during childhood by ensuring that the chronic Reference Dose (or RfC) is not exceeded during this shorter (6-year) time period (Equation 1). If there is reason to believe that exposures at a site may be significant over a short period of time (e.g., extensive soil excavation work in a dry region), depending on the contaminant, the site manager should consider the potential for acute health effects as well.

Equation 1: Screening Level Equation for Ingestion of Noncarcinogenic Contaminants in Residential Soil

$$\text{Screening Level (mg/kg)} = \frac{\text{THQ} \times \text{BW} \times \text{AT} \times 365 \text{ d/yr}}{\text{IR}/\text{RID}_0 \times 10^{-6} \text{ kg/mg} \times \text{EF} \times \text{ED} \times \text{IR}}$$

Parameter/Definition (units)	Default
THQ/target hazard quotient (unitless)	1
RID ₀ /oral reference dose (mg/kg-d)	Chemical-specific
BW/body weight (kg)	15
AT/averaging time (yr)	6 ^a
EF/exposure frequency (d/yr)	350
ED/exposure duration (yr)	6
IR/soil ingestion rate (mg/d) ²	200

^a For noncarcinogens, Averaging Time is equal to Exposure Duration.

For carcinogens, both the magnitude and duration of exposure are important. Duration is crucial because the toxicity criteria are based on "lifetime average daily dose." Therefore, the total dose received, whether it be over 5 years or 50 years, is averaged over a lifetime of 70 years. To be protective of exposures to carcinogens in the residential setting, OERR focuses on exposures to individuals who may live in the same residence for a "high-end" period of time (i.e., 30 years). As mentioned previously, exposure to soil is higher during childhood and decreases with age. Thus, Equation 2 uses time-weighted average soil ingestion rate for children and adults. The derivation of this time-weighted average is presented in U.S. EPA (1991).

Inhalation of Volatiles and Fugitive Dusts

Agency toxicity criteria indicate that risks from exposure to some chemicals via inhalation far outweigh the risks via ingestion; therefore, the SSLs have been designed to address this pathway. The models and assumptions used to calculate SSLs for inhalation of volatiles and fugitive dusts are updated from the equations presented in U.S. EPA's HHEM Part 1 guidance (U.S. EPA, 1991) and are presented in Equations

Equation 2: Screening Level Equation for Ingestion of Carcinogenic Contaminants in Residential Soil

$$\text{Screening Level (mg/kg)} = \frac{\text{TR} \times \text{AT} \times 365 \text{ d/yr}}{\text{SF}_o \times 10^{-6} \text{ kg/mg} \times \text{EF} \times \text{IF}_{\text{soil/air}}}$$

Parameter/Definition (units)	Default
TR/target cancer risk (unitless)	10 ⁻⁶
SF _o oral slope factor (mg/kg-d) ⁻¹	Chemical-specific
AT/averaging time (yr)	70
EF/exposure frequency (d/yr)	350
IF _{soil/air} age-adjusted soil ingestion factor (mg-yr/kg-d)	114

Equation 3: Screening Level Equation for Inhalation of Carcinogenic Contaminants in Residential Soil

$$\text{Screening Level (mg/kg)} = \frac{\text{TR} \times \text{AT} \times 365 \text{ d/yr}}{\text{URF} \times 1000 \text{ } \mu\text{g/mg} \times \text{EF} \times \text{ED} \times \left[\frac{1}{\text{VF}} + \frac{1}{\text{PEF}} \right]}$$

Parameter/Definition (units)	Default
TR/target cancer risk (unitless)	10 ⁻⁶
URF/inhalation unit risk factor (μg/m ³) ⁻¹	Chemical-specific
AT/averaging time (yr)	70
EF/exposure frequency (d)	350
ED/exposure duration (yr)	30
VF/soil-to-air volatilization factor (m ³ /kg)	Chemical-specific
PEF/particulate emission factor (m ³ /kg)	4.51 x 10 ²

through 7. The volatilization factor (VF), soil saturation limit (C_{sat}), and dispersion model have all been revised.

Another change from the Part B methodology is the separation of the ingestion and inhalation pathways. Agency toxicity criteria for oral exposures are presented as internal doses in units of mg/kg-d; whereas, the inhalation criteria are presented as concentrations in air (μg/m³ or mg/m³) that require conversion to an estimate of internal dose to be comparable to the oral route. EPA's Office of Research and Development (ORD) now believes that the conversion from concentration in air to internal dose is not always appropriate and suggests evaluating these exposure routes separately.

As explained in Part B, the basic principle of the volatilization model is applicable only if the soil concentration is at or below soil saturation. Thus, for those compounds for which the SSL exceeds the soil saturation limit (C_{sat}), the SSL is set at C_{sat}.

Equation 4: Screening Level Equation for Inhalation of Noncarcinogenic Contaminants in Residential Soil

$$\text{Screening Level (mg/kg)} = \frac{\text{THQ} \times \text{AT} \times 365 \text{ d/yr}}{\text{EF} \times \text{ED} \times \left[\frac{1}{\text{RIC}} + \frac{1}{\text{VF}} + \frac{1}{\text{PEF}} \right]}$$

Parameter/Definition (units)	Default
THQ/target hazard quotient (unitless)	1
AT/averaging time (yr)	30
EF/exposure frequency (d)	350
ED/exposure duration (yr)	30
RIC/inhalation reference concentration (mg/m ³)	Chemical-specific
VF/soil-to-air volatilization factor (m ³ /kg)	Chemical-specific
PEF/particulate emission factor (m ³ /kg)	4.7 x 10 ²

Equation 5: Derivation of the Volatilization Factor

$$\text{VF (m}^3\text{/kg)} = (Q/C) \times \frac{(3.14 \times \alpha \times \pi)^{1/2}}{(2 \times D_m \times P_s \times K_{ow})} \times 10^{-4} \text{ m}^2\text{/cm}^2$$

where:

$$\alpha = \frac{D_m \times P_s}{P_s + (\rho_w / (1 - P_s)) K_{ow}}$$

Parameter/Definition (units)	Default
VF/volatilization factor (m ³ /kg)	-
(Q/C)/inverse of the mean conc. at the center of a 0.5-acre square source (g/m ² -s per kg/m ³)	101.8
D _m /effective diffusivity (cm ² /s)	D _o (Pa ^{2.33} , p _o ²)
P _s /air filled soil porosity (unitless)	P _r - θ _l
P _t /total soil porosity (unitless)	1 - (β/ρ _s)
θ/soil moisture content (cm ³ -water/g-soil)	10% or 0.1
β/soil bulk density (g/cm ³)	1.5
ρ _s /true soil density or particle density (g/cm ³)	2.65
K _{ow} /soil-air partition coefficient (g-soil/cm ³ -air)	(H/K _d) x 41 (41 is conversion factor)
T/exposure interval (s)	7.9 x 10 ⁴ s
D _o /diffusivity in air (cm ² /s)	Chemical-specific
H/Henry's law constant (atm-m ³ /mol)	Chemical-specific
K _d /soil-water partition coefficient (cm ³ /g)	K _{oc} x OC
K _{oc} /organic carbon partition coefficient (cm ³ /g)	Chemical-specific
OC/organic carbon content of soil (fraction)	2% or 0.02

Equation 6: Derivation of the Soil Saturation Limit

$$C_{sat} = \frac{(K_d \times C_w \times \theta) + (C_w \times P_s) + (C_w \times H' \times P_s)}{\theta}$$

Parameter/Definition (units)	Default
C_w / soil saturation concentration (mg/kg)	--
K_d / soil-water partition coefficient (L/kg)	$K_{oc} \times OC$
K_{oc} / organic carbon partition coefficient (L/kg)	Chemical-specific
OC / organic carbon content of soil (fraction)	2% or 0.02
C_w / upper-limit of free moisture in soil (mg/L-water)	$S \times \theta_m$
θ_m / soil moisture content (kg-water/kg-soil)	10% or 0.1
S / solubility in water (mg/L-water)	Chemical-specific
β / soil bulk density (kg/L)	1.5
P_s / water-filled soil porosity (unitless)	$P_t - \theta$
H' / Henry's law constant (unitless)	$H \times 41$, where 41 is a conversion factor
H / Henry's law constant (atm-m ³ /mol)	Chemical-specific
P_t / air-filled soil porosity (unitless)	$P_t - \theta$
θ / soil moisture content (L-water/kg soil)	10% or 0.1
P_t / total soil porosity (unitless)	$1 - (\beta/\rho_s)$
ρ_s / true soil density or particle density (kg/L)	2.65

Equation 7: Derivation of the Particulate Emission Factor

$$PEF(m^2/kg) = (Q/C) \times \frac{3600 \pm/h}{0.036 \times (1-G) \times (U_m/U_t)^2 \times F(x)}$$

Parameter/Definition (units)	Default
PEF/particulate emission factor (m ² /kg)	4.7×10^3
(Q/C) / inverse of the mean conc. at the center of a 0.5-acre, square source (g/m ² -s per kg/m ³)	101.8
0.036 / resorbable fraction (g/m ² -h)	0.036
G / fraction of vegetative cover (unitless)	0
U_m / mean annual wind speed (m/s)	4.5
U_t / equivalent threshold value of wind speed at 10 m (m/s)	12.8
F(x) / function dependent on U_m/U_t , derived using Cowherd (1985) (unitless)	0.0497

The particulate emission factor (PEF) derived by using the default values in Equation 7 is approximately 0.2 µg/m³. This represents an annual average emission rate estimate that is not appropriate for estimating acute effects. Over the next few months, OSWER will be investigating the impact of acute exposure estimates on the SSLs.

Migration to Groundwater

The methodology for addressing potential contamination of groundwater from contaminants in soil reflects the complex nature of contaminant fate and transport in the subsurface. SSLs for migration to groundwater are based on a tiered approach (see Figure 2). Tier 1 SSLs (presented in Table 1) are based on the commonly used linear form of the Freundlich partitioning equation that describes the ability of contaminants to sorb to organic carbon in soil (Dragun, 1988). Equation 8 incorporates the linear Freundlich equation, along with an adjustment to relate sorbed concentration in soil to the analytically measured total soil concentration.

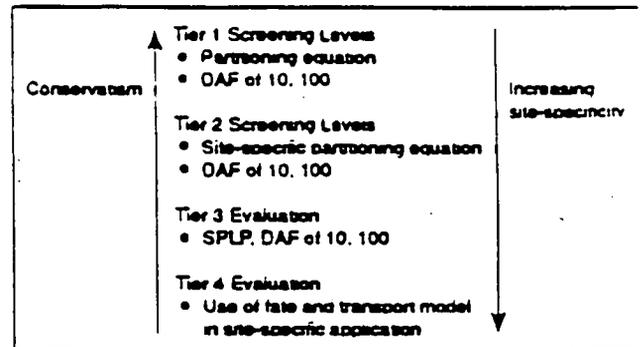


Figure 2. Tiered approach groundwater pathway.

Equation 8: Soil Screening Level Partitioning Equation for Migration to Groundwater

$$\text{Screening Level in Soil (mg/kg)} = C_w [(K_{oc} \times f_{oc}) + (\theta \times S/BD)]$$

Parameter/Definition (units)	Default
C_w / acceptable groundwater limit (mg/L)	MCL
K_{oc} / organic carbon partitioning coefficient (L/kg)	Chemical-specific
f_{oc} / fraction of organic carbon in soil (unitless)	0.002
θ / soil porosity (L _{water} /L _{soil})	0.5
S / fraction water content (L _{water} /L _{soil})	0.3
BD / soil bulk density (kg/L _{soil})	1.5

In this equation, nonzero groundwater MCLGs were used for the acceptable groundwater limits for each contaminant. For the 30 SSLs presented in this guidance, generally the non-zero

MCLGs were the same as the MCLs. If nonzero MCLGs were not available, MCLs were used, and, if MCLs were not available, risk-specific concentrations were derived using Agency toxicity criteria, a target cancer risk of 10^{-6} , and/or a noncancer Hazard Quotient of 1. Default values obtained from U.S. EPA's ORD Laboratory in Athens, Georgia, are used for soil porosity, fraction water content, and bulk density (U.S. EPA, 1985). The soil organic carbon content value of 0.002 used for calculating the SSLs was selected from information on the distribution of this parameter in U.S. soils (Carset et al., 1988). The value used for the organic carbon partitioning coefficient (K_{oc}) is the geometric mean of measured values reported in the literature (from a comprehensive literature search (Truesdale, 1992)). For inorganic constituents, the EPA MINTEQA2 chemical speciation model was used to calculate K_d values, which were then used in Equation 8 in place of the K_{oc} and f_{oc} parameters. K_d values for metals are significantly affected by a variety of soil conditions, the most significant of which is pH. For this reason, metal K_d values for three pH conditions were used to develop the SSLs: 4.9, 6.8, and 8.0. Table 1 contains SSLs for inorganics corresponding to a pH of 6.8. Table 2 contains inorganic SSLs corresponding to pH values of 4.9 and 8.0. If pH conditions at a site are not known, the SSL corresponding to a pH of 6.8 should be used. Table 2 also includes SSLs for pentachlorophenol (PCP), whose partitioning behavior is also highly pH dependent.

The partitioning equation relates contaminant concentrations in soil adsorbed to soil organic carbon to soil leachate contaminant concentrations in the unsaturated zone. Contaminant migration through the unsaturated zone to the water table generally reduces the soil leachate concentration by attenuation processes such as adsorption and degradation. Groundwater transport in the saturated zone further reduces concentrations through attenuation and dilution. Generally, to account for those mechanisms in the subsurface environment, a correction factor should be applied to the partitioning equation value. Use of the EPA's Composite Model for leachate migration with Transformation Products (EPACMTP) (U.S. EPA, 1993a) has identified a DAF of 10 as an

appropriate correction factor to be applied to the partitioning value in most cases. However, there are specific circumstances under which use of a DAF is not recommended, such as in areas of very shallow groundwater or karst topography. Likewise, there are other circumstances in which a higher DAF may be appropriate. Further discussion of these situations as well as details on the EPACMTP model are included on the next page of this fact sheet.

The assumptions factored into the Tier 1 levels are conservative, rendering the SSLs fairly stringent. If site concentrations do not exceed the SSLs multiplied by the appropriate DAF, then the pathway is excluded from further investigation. However, if site concentrations do exceed the Tier 1 SSLs, they may be used as PRGs (when appropriate), or a Tier 2, 3, or 4 investigation may be conducted. Each tier requires more site-specific information but may lead to a less stringent "screening" concentration.

The Tier 2 levels represent a minimal increase in site-specificity and perhaps less conservative Screening Levels. The partitioning equation used in the Tier 1 calculation (Equation 8) remains as the base for the Tier 2 levels along with the same DAF (either 1, 10, or 100). However, site-measured values of organic carbon, soil porosity, fraction water content, and soil bulk density are substituted into the equation to calculate Screening Levels more tailored to site characteristics. If site concentrations do not exceed the Tier 2 SSLs, then the pathway is excluded from further investigation or concern. The rationale behind this decision is that, because Tier 2 incorporates site-specific information, the levels are more representative of actual site conditions than Tier 1. If site concentrations exceed the Tier 2 SSLs, the user has the option of conducting a Tier 3 or 4 investigation, realizing the increase in site-specificity and cost associated with collecting additional site data.

The Tier 3 investigation involves conducting a specific leach test, the Synthetic Precipitation Leaching Procedure (SPL) (U.S. EPA, 1992c). If the leach test results divided by the

Table 2. Proposed Groundwater Pathway SSLs for Inorganics and Pentachlorophenol, as a Function of pH^a

Chemical	pH	Proposed groundwater pathway SSLs (mg/kg)					
		Unadjusted		With 10 DAF ^b		With 100 DAF ^b	
		4.9	8.0	4.9	8.0	4.9	8.0
Arsenic		1.2	1.6	12.5	15.7	125	157
Cadmium		0.006	10.0	0.08	100	0.81	1,001
Chromium (VI)		3.1	1.4	31.4	13.6	314	136
Mercury		0.0002	0.42	0.002	4.2	0.02	42.2
Nickel		0.32	15.7	3.2	157	31.7	1,573
Pentachlorophenol		0.017	0.0009 ^c	0.17	0.009 ^c	1.7	0.09

^aScreening Levels based on human health criteria only.

^bDAF = Dilution/attenuation factor.

^cLevel at or below Contract Laboratory Program required quantitation limit for Regular Analytical Services (RAS).

DAF of 10 exceed the acceptable groundwater limit (e.g., nonzero MCLG, MCL, 10⁻⁶ risk-based values), then further investigation would be warranted. The SPLP may not be applicable to all contaminated soils (e.g., oily types of waste do not yield suitable results). Therefore the user is advised to use discretion when applying the SPLP. Additional guidance on the use and limitations of the SPLP will be provided in the final guidance.

Tier 4 represents the highest level of site-specificity in evaluating the migration to groundwater pathway. In this investigation, site-specific data are collected and used in a fate and transport model to confirm the threat to groundwater and further determine site-specific cleanup goals as would typically be done for the remedial investigation/feasibility study (RI/FS). A DAF is not used in this tier because the model would account for fate and transport mechanisms in the subsurface. The advantage of this approach is that it accounts for site hydrogeologic, climatologic, and contaminant source characteristics and may result in fully protective but less stringent remediation goals. However, the additional cost of collecting the data required to apply the model should be factored into the decision to conduct a Tier 4 investigation. An evaluation of 10 fate and transport models for potential use in the Tier 4 evaluation will be included in the technical background document for this fact sheet scheduled to be issued by OERR by January of 1994.

The tiered framework for migration to groundwater represents a sliding scale of increasing site-specificity and decreasing conservatism. The assumptions factored into the Tier 1 SSLs are conservative and therefore result in fairly stringent levels that may not be appropriate in all situations. However, the framework allows the user the flexibility to move away from this conservative level by incorporating increasing levels of site empirical data. In this way, site managers or owners of small, relatively uncomplicated sites may benefit from the Tier 1 levels by bypassing the additional costs associated with collecting additional data to conduct further investigations. However, it is likely to be in the interest of site managers or owners of large and complex sites to conduct a more site-specific investigation to develop remediation goals that are more tailored to site-specific conditions.

DETERMINING THE DILUTION/ ATTENUATION FACTOR

For wastes disposed of on land, the leaching of contaminants into the subsurface and subsequent migration into and through groundwater typically constitute a very significant pathway for human and environmental exposure. As contaminants move through the soil and groundwater, they are subjected to a number of physical, chemical, and biological processes that affect the eventual contaminant concentration level at receptor points. These processes include, but are not limited to, attenuation due to sorption of contaminants onto soil and aquifer grains, chemical transformation (e.g., hydrolysis, redox reactions, precipitation), biological degradation, and dilution due to mixing of the leachate from the disposal unit with

ambient groundwater. The contaminant concentration arriving at a receptor point is therefore generally lower than the original contaminant concentration in the leachate leaving the site.

The reduction in concentration can be expressed succinctly as the DAF, defined as the ratio of original leachate concentration to the receptor point concentration. The lowest possible value of DAF is therefore 1, corresponding to the situation where there is no dilution or attenuation of a contaminant at all; i.e., the concentration at the receptor point is the same as that of the leachate as it leaves the waste site. High DAF values on the other hand correspond to a high degree of dilution or attenuation of the contaminant from the leachate to the receptor point.

The Agency has developed subsurface fate and transport models to assess the impact on groundwater quality due to migration of contaminants from wastes on land. Specifically, these models predict the DAF for a potential site of a domestic drinking water receptor well, which may withdraw water from the saturated zone under, or downgradient of, a contaminated area. The model used to develop DAFs for this guidance is the EPACMTP, which consists of three main modules:

1. An unsaturated zone flow and contaminant fate and transport module
2. A saturated zone groundwater flow and contaminant fate and transport module
3. A Monte Carlo driver module, which generates model parameters from nationwide probability distributions.

The unsaturated and saturated zone modules simulate the migration of contaminants from the base of a land disposal unit to a downgradient receptor well. The Agency has extensively verified both the unsaturated and saturated zone modules against other available analytical and numerical models to ensure accuracy and efficiency. Both the unsaturated zone and the saturated zone modules of the EPACMTP, used for the calculation of DAFs for the SSLs, have been reviewed by the EPA Science Advisory Board and found to be suitable for generic applications such as the derivation of nationwide DAFs.

Modeling Procedure

For nationwide Monte Carlo model applications, the input to the model is in the form of probability distributions of each of the model input parameters. The output from the model consists of the probability distribution of DAF values representing the likelihood that any specific DAF value is exceeded.

For each model input parameter, a probability distribution is provided, describing the nationwide likelihood that the parameter has a certain value. The parameters are divided into four main groups:

1. Source-specific parameters, e.g., area of the waste unit, infiltration rate
2. Chemical-specific parameters, e.g., hydrolysis constants, organic carbon partition coefficient
3. Unsaturated zone-specific parameters, e.g., depth to water table, soil hydraulic conductivity
4. Saturated zone-specific parameters, e.g., saturated zone thickness, ambient groundwater flow rate, location of nearest receptor well.

During the Monte Carlo simulation, values for each model parameter are randomly drawn from their respective probability distributions. In the calculation of the DAFs for the SSLs, site data from over 1,300 sites were used to define parameter ranges and distributions. Each combination of randomly drawn parameter values represents one out of a practically infinite universe of possible waste sites. The fate and transport modules are executed for the specific set of model parameters, yielding a corresponding DAF value. This procedure is repeated, typically on the order of several thousand times, to ensure that the entire universe of possible parameter combinations (waste sites) is adequately sampled. At the conclusion of the analysis, a cumulative frequency distribution of DAF values is constructed and plotted.

The Agency performed a number of sensitivity analyses consisting of fixing one parameter at a time to determine the parameter(s) that have the greatest impact on DAFs. The results of the sensitivity analyses indicate that the climate (net precipitation), soil types, and size of the contaminated area have the greatest effect on the DAFs. The Agency feels that the size of the contaminated area lends itself most readily to practical application of the SSLs.

To calculate the DAF for the SSLs, the drinking water well was located 25 feet downgradient of the edge of the contaminated area, and the location of the intake point (receptor well screen) was assumed to vary within the boundaries of 15 and 300 feet within the aquifer (these values are based on empirical data reflecting a national sample distribution of depth of residential drinking water wells). The sensitivity analyses indicated that the placement of the well 25 feet downgradient of the contaminated area is more conservative than allowing the well to be located directly beneath the contaminated area. The location of the intake point allows for mixing within the aquifer. OSWER believes that this is a reasonable assumption because there will always be some dilution attributed to the pumping of water for residential use from an aquifer. The placement of the well was assumed to vary uniformly within the boundary of the plume. Figure 3 shows a schematic of the compliance point location. From these analyses, the largest allowable areas corresponding to DAFs of 10 and 100 at the 90th percentile protection level are approximately 10 and 1 acre, respectively. Therefore, for sites of up to 10 acres, a DAF of 10 should be applied to the unadjusted SSLs, while for sites at or below 1 acre, a DAF of 100 should be applied to the unadjusted SSLs. If a 95th percentile protectiveness level is used, a DAF of 10 is

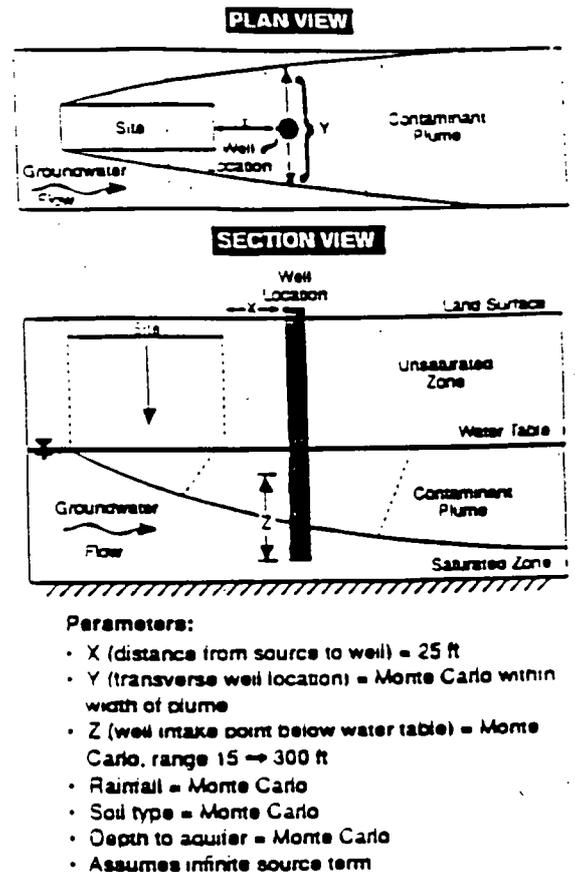


Figure 3. Soil to groundwater pathway—calculating the DAF.

protective for areas under 1/2 acre and a DAF of 10 protective for areas less than 1/10 acre. OSWER considering whether the 90th or 95th percentile protective level should be used in the final guidance. When site located in areas of unusually shallow water table, within 5 feet of surface, the unadjusted SSLs should be used. In this scenario, contamination is located in or directly above saturated zone; therefore, any dilution and attenuation processes within the unsaturated zone would be negligible.

MEASURING SOIL LEVELS

As described in U.S. EPA (1992b), exposure to contaminants over a long (chronic) period of time is represented by an arithmetic average concentration; therefore, attainment of the SSLs should be based on the arithmetic concentration as well. The issue then becomes the number of samples required to adequately estimate the mean and the over which the sample concentrations should be averaged. Studies by EPA's Exposure Assessment Group indicate that 20 to 30 samples per exposure area are needed to calculate an upper confidence limit (UCL₉₅) on the arithmetic mean that is very close to the true mean (U.S. EPA, 1992). i.e., to adequately estimate the true mean without underestimating it. An appropriate exposure/averaging area can be

size, depending on site-specific conditions. At some sites, this may be the entire site; at others, this may be only a portion of the site. For the purposes of this guidance, the Agency believes that the size of a typical residential lot (1/4 acre) is an appropriate averaging area for the most conservative case (i.e., residential land use). For large sites that could be divided into many areas equivalent to the size of a residential lot, the number of samples needed to characterize the site becomes quite high. This, coupled with the costs of analytical services for each sample, could make the sampling costs onerous. Therefore, OERR recommends following guidance for measuring soil contaminant levels at NPL sites.

Sample Pattern

A grid pattern such as a triangular or square/rectangular grid is recommended to establish sample locations for each exposure area (U.S. EPA, 1987). Biased sampling must also be used in areas of suspected contamination or stained soils and must be evaluated separately from the samples obtained by systematic sampling.

Number of Samples

As mentioned, it is necessary to balance the need to achieve statistical confidence in determining a meaningful arithmetic mean concentration of contaminants in each exposure area with the cost of obtaining the 20 to 30 samples recommended by ORD. Compositing of discrete samples is an option since EPA is interested in determining the arithmetic mean of the contaminant concentration(s). Twenty discrete samples can be composited down to four or five composite samples, while maintaining confidence that the area average is not grossly underestimated. Compositing may mask contaminant levels that are slightly higher than the SSL, but areas of high contamination will still be detected. Compositing is both a reasonable approach and an efficient use of resources, since Superfund is interested in average exposure over time. However, none of the composite samples should exceed the prescribed SSL for any contaminant. For volatile organic compounds (VOCs), compositing is not appropriate (U.S. EPA, 1989a, 1992a). Therefore, OERR advocates that 10 discrete samples should be taken per exposure area for VOCs, and no sample can exceed the Screening Level(s). Both the discrete VOC samples and the composites must be analyzed by Contract Laboratory Program (CLP) (or equivalent) methods. (NOTE: Seven of the 30 contaminant SSLs for the groundwater migration pathway at a DAF of 10 are below CLP RAS or CLP-equivalent detection limits. For these contaminants, special analytical services should be requested for recalibration of the instruments. For example, to measure low levels of VOCs, the gas chromatograph/mass spectrometer (GC/MS) can be recalibrated to detect at 1, 2, 5, 10, and 25 ppb.

Use of Field Methods

Where available and appropriate, field methods (soil gas surveys, immunoassays, X-ray fluorescence) can be used.

Again, for compounds other than VOCs, compositing samples is acceptable as long as it is consistent with the field methodology. If any sample concentration exceeds an SSL, further site study is required. In addition, 10% to 20% of field samples must be sent to a CLP (or equivalent) laboratory for confirmatory analysis (U.S. EPA, 1992a). Please note that field methods must be capable of achieving appropriate detection limits for most groundwater SSLs.

Depth

When measuring soil levels at the surface for the inhalation and ingestion pathways, samples should be taken at a depth of 6 inches. Additional sampling beyond 6 inches may be appropriate, depending on the contaminant's mobility, to account for geographic differences in construction practices where soil disturbances are reasonably expected. For example, in the Northeast, the ground may be excavated to 15 feet before laying the foundation and constructing the basement of a home. Excavated overburden is commonly used as fill material around the property so that contaminants that were at depth are now near the surface. Thus, it is important to be cognizant of construction practices in the area.

For the groundwater pathway, the entire soil column, from the surface to the top of the aquifer, should be sampled. For the evaluation of vertical stratification, samples should not be averaged over depth (i.e., the soil core should not be composited over depth), but rather individual samples should be evaluated at appropriate depth intervals. One soil core per exposure area may be sufficient. However, where dense nonaqueous phase liquids (DNAPLs) are suspected, soil cores may be taken more frequently.

Sampling for Background Contamination

For metals, background sampling is necessary to be certain that OSWER is not defining levels below background as of regulatory concern. If a statistical comparison of background concentration and site samples indicates that background metals concentrations are significantly above the SSLs, use of the SSLs will be of limited value, as discussed earlier.

Additional Sampling Needed for Groundwater Tier 2

To use groundwater Tier 2, site-specific soil characteristics must be determined by sampling. Parameters to measure include bulk density, porosity, organic carbon content, and water content.

Geostatistics

For large areas where the data are not widely scattered, geostatistical approaches, such as kriging, can be used to estimate sample concentration trends across the exposure area (U.S. EPA, 1989a).

WHERE TO GO FOR FURTHER INFORMATION

For additional copies of this Fact Sheet, call the National Technical Information Service (NTIS) at (703) 487-4650.

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NOTICE: The policies set out in this document are intended solely as guidance; they are not final U.S. Environmental Protection Agency (EPA) actions. These policies are not intended, nor can they be relied upon, to create any rights enforceable by any party in litigation with the United States. EPA officials may decide to follow the guidance provided in this document, or to act at variance with the guidance, based on an analysis of site-specific circumstances. The Agency also reserves the right to change this guidance at any time without public notice.

This guidance is based on policies in the Final Rule of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), which was published on March 8, 1990 (55 *Federal Register* 8666). The NCP should be considered the authoritative source.

Source for RfDs, RfDs, CFSs, CFS values
used to calculate SSCs.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Region III

841 Chestnut Street

Philadelphia, Pennsylvania 19107

January 7, 1994

SUBJECT: Risk-Based Concentration Table. First Quarter 1994

FROM: Roy L. Smith, Ph.D., Senior Toxicologist
Technical Support Section (3HW13)

TO: RBC Table mailing list

Attached is the EPA Region III risk-based concentration table, which we have distributed quarterly to all interested parties since 1991. If you are not currently on the mailing list, but would like to be, please contact Anna Pouiton (phone: 215-597-3179, fax: 215-597-9890) and give her your name, address, and phone and fax numbers.

The table contains reference doses and carcinogenic potency slopes (obtained from IRIS through January 1, 1994, HEAST through July 1993, OHEA-Cincinnati, and other EPA sources) for nearly 600 chemicals. These toxicity constants have been combined with "standard" exposure scenarios to calculate chemical concentrations corresponding to fixed levels of risk (i.e., a hazard quotient of 1, or lifetime cancer risk of 10^{-6} , whichever occurs at a lower concentration) in water, air, fish tissue, and soil.

The Region III toxicologists use this table as a risk-based screen for Superfund sites, and as a desk reference for emergencies and requests for immediate information. The table also provides a useful benchmark for evaluating site investigation data and preliminary remediation goals. The table has no official status as either regulation or guidance, and should be used only as a predictor of generic single-contaminant health risk estimates. *The table is specifically not intended as (1) a stand-alone decision-making tool, (2) a substitute for EPA guidance for preparing baseline risk assessments, (3) a source of site-specific cleanup levels, or (4) a rule to determine if a waste is hazardous under RCRA.* In general, chemical concentrations above the levels in the table suggest a need for a closer look by a toxicologist, but should not be used as the sole basis for taking any action.

The toxicity information in the table has been assembled by hand, and (despite extensive checking and years of use) may contain errors. It's advisable to cross-check before relying on any numbers in the table. If you find any errors, please send me a note.

This issue of the table is printed in a new format, which was developed because it fits more information on each page, while (hopefully) retaining legibility. The table now includes the CAS number of each contaminant, which should reduce confusion about multi-named compounds. Also, each risk-based concentration is now accompanied by a footnote indicating its basis, whether carcinogenic or non-carcinogenic effects. Finally, all newly revised risk-based concentrations have been placed in shaded boxes for quick recognition, rather than summarized here.

I'd like to express my appreciation to all the users of the RBC Table who have contributed suggestions for improvements over the last three years. I hope your continued interest will help us make the table even better in the future. Have a great 1994!

Attachment

**Risk-Based Concentration Table
Background Information**

General: Separate carcinogenic and non-carcinogenic risk-based concentrations were calculated for each compound for each pathway. The concentration in the table is the lower of the two, rounded to two significant figures. The following terms and values were used in the calculations:

Exposure variables:	Value	Name
1-General:		
Carcinogenic potency slope oral (kg-d/mg):	•	CPSo
Carcinogenic potency slope inhaled (kg-d/mg):	•	CPSi
Reference dose oral (mg/kg/d):	•	RfDo
Reference dose inhaled (mg/kg/d):	•	RfDi
Target cancer risk:	1e-06	TR
Target hazard quotient:	1	THQ
Body weight, adult (kg):	70	BWa
Body weight, age 1-6 (kg):	15	BWc
Averaging time carcinogens (d):	25550	ATc
Averaging time non-carcinogens (d):	ED*365	ATn
Inhalation, adult (m ³ /d):	20	IRAA
Inhalation, child (m ³ /d):	12	IRAc
Inhalation factor, age-adjusted (m ³ -y/kg-d):	11.66	IFAadj
Tap water ingestion, adult (L/d):	2	IRWa
Tap water ingestion, age 1-6 (L/d):	1	IRWc
Tap water ingestion factor, age-adjusted (L-y/kg-d):	1.09	IFWadj
Fish ingestion (g/d):	54	IRF
Soil ingestion, adult (mg/d):	100	IRSa
Soil ingestion, age 1-6 (mg/d):	200	IRSc
Soil ingestion factor, age adjusted (mg-y/kg-d):	114.29	IFSadj
2-Residential:		
Exposure frequency (d/y):	350	EFr
Exposure duration, total (y):	30	EDtot

Exposure variables	Value	Name
Exposure duration, age 1-6 (y):	6	EDc
Volatilization factor (L/m ³):	0.5	VF
3-Occupational:		
Exposure frequency (d/y):	250	EFo
Exposure duration (y):	25	EDo
* = Contaminant-specific toxicity parameters		

The priority among sources of toxicological constants was as follows: (1) IRIS, (2) HEAST, (3) HEAST alternative method, (4) ECAO-Cincinnati, (5) withdrawn from IRIS, (6) withdrawn from HEAST, and (7) other EPA documents. Each source was used only if numbers from higher-priority sources were unavailable.

Algorithms:

1. Age-adjusted factors: Because contact rates with tap water, ambient air, and residential soil are different for children and adults, carcinogenic risks during the first 30 years of life were calculated using age-adjusted factors. These factors approximated the integrated exposure from birth until age 30 by combining contact rates, body weights, and exposure durations for two age groups - small children and adults. The age-adjusted factor for soil was obtained from RAGS IB; the others were developed by analogy.

a. Air inhalation ($[\text{m}^3 \cdot \text{y}]/[\text{kg} \cdot \text{d}]$):

$$IFA_{adj} = \frac{EDc \cdot IRAc}{BWc} + \frac{(ED_{tot} - EDc) \cdot IRAa}{BWA}$$

b. Tap water ingestion ($[\text{L} \cdot \text{y}]/[\text{kg} \cdot \text{d}]$):

$$IFW_{adj} = \frac{EDc \cdot IRWc}{BWc} + \frac{(ED_{tot} - EDc) \cdot IRWa}{BWA}$$

c. Soil ingestion ($[\text{mg} \cdot \text{y}]/[\text{kg} \cdot \text{d}]$):

$$IFS_{adj} = \frac{EDc \cdot IRSc}{BWc} + \frac{(ED_{tot} - EDc) \cdot IRSa}{BWA}$$

2. Residential water use ($\mu\text{g/L}$). Volatilization terms were calculated only for compounds with "****" in the "VOC" column. Compounds having a Henry's Law constant greater than 10^3 were considered volatile. The list may be incomplete, but is unlikely to include false positives. The equations and the volatilization factor (VF, above) were obtained from RAGS IB. Oral potency slopes and reference doses were used for both oral and inhaled exposures for volatile compounds lacking inhalation values. Inhaled potency slopes were substituted for unavailable oral potency slopes only for volatile compounds; inhaled RfDs were substituted for unavailable oral RfDs for both volatile and non-volatile compounds.

a. Carcinogens: Calculations were based on combined childhood and adult exposure.

$$\frac{TR \cdot ATc \cdot 1000 \frac{\mu\text{g}}{\text{L}}}{Efr \cdot ([VF \cdot IFAadj \cdot CPSi] + [IFWadj \cdot CPSo])}$$

b. Non-carcinogens: Calculations were based on adult exposure.

$$\frac{THQ \cdot BWa \cdot ATn \cdot 1000 \frac{\mu\text{g}}{\text{L}}}{Efr \cdot ED_{tot} \cdot \left(\frac{VF \cdot IRAa}{RfDi} + \frac{IRWa}{RfDo} \right)}$$

3. Air ($\mu\text{g}/\text{m}^3$). Oral potency slopes and references were used where inhalation values were not available.

a. Carcinogens: Calculations were based on combined childhood and adult exposure.

$$\frac{TR \cdot ATc \cdot 1000 \frac{\mu\text{g}}{\text{m}^3}}{Efr \cdot IFAadj \cdot CPSi}$$

b. Non-carcinogens: Calculations were based on adult exposure.

$$\frac{THQ \cdot RfDi \cdot BWa \cdot ATn \cdot 1000 \frac{\mu\text{g}}{\text{m}^3}}{Efr \cdot ED_{tot} \cdot IRAa}$$

4. Fish (mg/kg):

a. Carcinogens: Calculations were based on adult exposure.

$$\frac{TR \cdot BWa \cdot ATc}{Efr \cdot ED_{tot} \cdot \frac{IRF}{1000 \frac{\mu\text{g}}{\text{kg}}} \cdot CPSo}$$

b. Non-carcinogens: Calculations were based on adult exposure.

$$\frac{THQ \cdot RfDo \cdot BWa \cdot ATn}{Efr \cdot EDtot \cdot \frac{IRF}{1000 \frac{mg}{kg}}}$$

5. Soil commercial/industrial (mg/kg): The default exposure assumption that only 50% of incidental soil ingestion occurs at work has been omitted. Calculations were based on adult occupational exposure.

a. Carcinogens:

$$\frac{TR \cdot BWa \cdot ATc}{Efo \cdot Edo \cdot \frac{IRSa}{10^6 \frac{mg}{kg}} \cdot CPSo}$$

b. Non-carcinogens:

$$\frac{THQ \cdot RfDo \cdot BWa \cdot ATn}{Efo \cdot Edo \cdot \frac{IRSa}{10^6 \frac{mg}{kg}}}$$

6. Soil residential (mg/kg):

a. Carcinogens: Calculations were based on combined childhood and adult exposure.

$$\frac{TR \cdot ATc}{Efr \cdot \frac{IFSadj}{10^6 \frac{mg}{kg}} \cdot CPSo}$$

b. Non-carcinogens: Calculations were based on childhood exposure only.

$$\frac{THQ \cdot RfDo \cdot BWc \cdot ATn}{Efr \cdot EDc \cdot \frac{IRSc}{10^6 \frac{mg}{kg}}}$$

Sources: i=IRIS h=HEAST a=HEAST+h. x=W/D from IRIS y=W/D from HEAST c=EPA-ECAO o=Other EPA docs.

Basis of RBC: c=carcinogenic effects n=noncarcinogenic effects.

Contaminant	CAS	RfDi mg/kg/d	RfDi mg/kg/d	CPSo kg*d/mg	CPSi kg*d/mg	V O C	Tap water	Ambient	Fish	Industrial	Residential
							µg/L	air µg/m3	mg/kg	sol mg/kg	sol mg/kg
Acephate	30560191	4.00E-03 i		8.70E-03 i			7.7 o	0.72 o	0.36 o	330 c	73 c
Acetaldehyde	75070		2.57E-03 i		7.70E-03 i		94 n	0.81 o			
Acetochlor	34256821	2.00E-02 i					730 n	73 n	27 n	20000 n	16000 n
Acetone	67641	1.00E-01 i					3700 n	370 n	140 n	100000 n	7800 n
Acetone cyanohydrin	75865	7.00E-02 h	2.86E-03 h				2600 n	10 n	95 n	72000 n	5500 n
Acetonitrile	75078	6.00E-03 i	1.43E-02 h				220 n	52 n	8.1 n	6100 n	470 n
Acetophenone	98862	1.00E-01 i	5.71E-06 w				0.042 n	0.021 n	140 n	100000 n	7800 n
Acifluorfen	62476599	1.30E-02 i					470 n	47 n	18 n	13000 n	1000 n
Acrolein	107028	2.00E-02 h	5.71E-06 i				730 n	0.021 n	27 n	20000 n	1600 n
Acrylamide	79061	2.00E-04 i		4.50E+00 i	4.55E+00 i		0.015 o	0.0014 o	0.0007 o	0.64 c	0.14 c
Acrylic acid	79107	8.00E-02 i	8.57E-05 i				2900 n	0.31 n	110 n	82000 n	6300 n
Acrylonitrile	107131		5.71E-04 i	5.40E-01 i	2.38E-01 i		0.12 o	0.026 o	0.0058 c	5.3 c	1.2 c
Alachlor	15972608	1.00E-02 i		8.00E-02 h			0.84 o	0.078 c	0.039 o	36 o	8 c
Alar	1596845	1.50E-01 i					5500 n	550 n	200 n	150000 n	12000 n
Aldicarb	116063	1.00E-03 i					37 n	3.7 n	1.4 n	1000 n	78 n
Aldicarb sulfone	1646884	1.00E-03 i					37 n	3.7 n	1.4 n	1000 n	78 n
Aldrin	309002	3.00E-05 i		1.70E+01 i	1.71E+01 i		0.004 c	0.00037 o	0.00019 o	0.17 c	0.018 c
Allyl	74223646	2.50E-01 i					9100 n	910 n	340 n	260000 n	21000 n
Allyl alcohol	107186	5.00E-03 i					180 n	18 n	6.8 n	5100 n	390 n
Allyl chloride	107051	5.00E-02 w	2.86E-04 i				1800 n	1 n	68 n	51000 n	3900 n
Aluminum	7429905	2.90E+00 o					110000 n	11000 n	3900 n	1000000 n	230000 n
Aluminum phosphide	20899738	4.00E-04 i					15 n	1.5 n	0.54 n	410 n	31 n
Amdro	67485294	3.00E-04 i					11 n	1.1 n	0.41 n	310 n	23 n
Ametryn	834128	9.00E-03 i					330 n	33 n	12 n	9200 n	700 n
m-Aminophenol	591275	7.00E-02 h					2600 n	260 n	95 n	72000 n	5500 n
4-Aminopyridine	504245	2.00E-05 h					0.73 n	0.073 n	0.027 n	20 n	1.6 n
Amitraz	33089611	2.50E-03 i					91 n	9.1 n	3.4 n	2600 n	210 n
Ammonia	766417		2.86E-02 i				1000 n	100 n			
Ammonium sulfate	7778660	2.00E-01 i					7300 n	730 n	270 n	200000 n	16000 n
Aniline	62533		2.86E-01 i	5.70E-03 i			10 n	1 n	0.55 o	500 o	110 c
Antimony and compounds	7440160	4.00E-04 i					15 n	1.5 n	0.54 n	410 n	31 n
Antimony pentoxide	1314609	5.00E-04 h					18 n	1.8 n	0.68 n	510 n	39 n
Antimony potassium tartrate	304610	9.00E-04 h					33 n	3.3 n	1.2 n	920 n	70 n
Antimony tetroxide	1332316	4.00E-04 h					15 n	1.5 n	0.54 n	410 n	31 n
Antimony trioxide	1309644	4.00E-04 h					15 n	1.5 n	0.54 n	410 n	31 n
Apdlo	74115245	1.30E-02 i					470 n	47 n	18 n	13000 n	1000 n
Aramite	140578	5.00E-02 h		2.50E-02 i	2.49E-02 i		2.7 o	0.25 o	0.13 o	110 o	26 c
Arsenic	7440382	3.00E-04 i					11 n	1.1 n	0.41 n	310 n	23 n
Arsenic (as carcinogen)	744032	3.00E-04		1.75E+00 i	1.51E+01 i		0.038 o	0.00041 o	0.0018 o	1.6 o	0.37 c
Assure	76578148	9.00E-01 i					330 n	33 n	12 n	9200 n	700 n
Asulam	3317111	5.00E-02 i					1800 n	180 n	68 n	51000 n	3900 n
Atrazine	1912249	3.50E-02 i		2.22E-01 h			0.3 o	0.028 o	0.014 o	1.3 o	2.9 c

Sources: I=IRIS h=HEAST a=HEAST ah = W/D from IRIS y=W/D from HEAST c=EPA-ECAO o=Other EPA docs.

Basis of RBC: c=carcinogenic effects n=noncarcinogenic effects.

Contaminant	CAS	RfDo	RfDi	CPSo	CPSi	V O C	Tap water	Ambient air	Fish	Industrial soil	Residential soil
		mg/kg/d	mg/kg/d	kg*d/mg	kg*d/mg		µg/L	µg/m3	mg/kg	mg/kg	mg/kg
Avermectin B1	65195553	4.00E-04 /					15 n	1.5 n	0.54 n	410 n	31 n
Azobenzene	103333			1.10E-01 /	1.08E-01 /		0.61 o	0.058 o	0.029 o	26 o	5.8 c
Barium and compounds	7440393	7.00E-02 /	1.43E-04 h				2600 n	0.52 n	95 n	7200 n	5500 n
Baygon	114261	4.00E-03 /					150 n	15 n	5.4 n	4100 n	310 n
Bayleton	4312143	3.00E-02 /					1100 n	110 n	41 n	31000 n	2300 n
Baythroid	6839375	2.50E-02 /					910 n	91 n	34 n	26000 n	2000 n
Benefin	1861401	3.00E-01 /					11000 n	1100 n	410 n	310000 n	23000 n
Benomyl	17804352	5.00E-02 /					1800 n	180 n	68 n	51000 n	3900 n
Bentazon	25057890	2.50E-03 /					91 n	9.1 n	3.4 n	2600 n	200 n
Benzaldehyde	100527	1.00E-01 /				**	610 n	370 n	140 n	100000 n	7800 n
Benzene	71432		1.43E-04 o	2.90E-02 /	2.90E-02 /	***	0.36 o	0.22 c	0.11 o	99 c	22 c
Benzydine	92875	3.00E-03 /		2.30E+02 /	2.35E+02 /		0.00029 c	0.000027 c	0.000014 c	0.012 o	0.0028 c
Benzoic acid	65850	4.00E+00 /					150000 n	15000 n	5400 n	1000000 n	310000 n
Benzotrithloride	98077			1.30E+01 /			0.0052 o	0.00048 c	0.00024 c	0.22 o	0.049 c
Benzyl alcohol	100516	1.00E-01 h					11000 n	1100 n	410 n	310000 n	23000 n
Benzyl chloride	100447			1.70E-01 /		**	0.062 o	0.037 o	0.019 o	17 o	3.8 c
Beryllium and compounds	7440417	5.00E-03 /		4.30E+00 /	8.40E+00 /		0.016 c	0.00075 c	0.00073 c	0.67 o	0.15 c
Bidrin	141662	1.00E-04 /					3.7 n	0.37 n	0.14 n	100 n	7.8 n
Biphenthrin (Talstar)	82657043	1.50E-02 /					550 n	55 n	20 n	15000 n	1200 n
1,1-Biphenyl	92524	5.00E-02 /					1800 n	180 n	68 n	51000 n	3900 n
Bis(2-chloroethyl) ether	111444			1.10E+00 /	1.16E+00 /	***	0.0092 o	0.0054 o	0.0029 o	2.6 o	0.58 c
Bis(2-chloroisopropyl) ether	39638329	4.00E-02 /		7.00E-02 h	3.50E-02 h	**	0.26 o	0.18 o	0.045 o	41 o	9.1 c
Bis(chloromethyl) ether	542881			2.20E+02 /	2.17E+02 /	***	0.000049 c	0.000029 c	0.000014 c	0.013 o	0.0029 c
Bis(2-chloro-1-methylethyl) ether				7.00E-02 w	7.00E-02 w		0.96 o	0.089 o	0.045 o	41 o	9.1 c
Bis(2-ethylhexyl) phthalate (DEHP)	117817	2.00E-02 /		1.40E-02 /			4.8 o	0.45 o	0.23 o	200 o	46 c
Bisphenol A	80057	5.00E-02 /					1800 n	180 n	68 n	51000 n	3900 n
Boron (and borates)	7440428	9.00E-02 /	5.71E-03 h				3300 n	21 n	120 n	92000 n	7000 n
Boron trichloride	7637072		2.00E-04 h				7.3 n	0.73 n			
Bromochloromethane	75274	2.00E-02 /		6.20E-02 /		**	0.17 c	0.1 c	0.051 c	46 c	10 c
Bromocyclohexane	593612				1.10E-01 h	***	0.096 c	0.057 c			
Bromoform (tribromomethane)	75252	2.00E-02 /		7.90E-03 /	3.85E-03 /	***	2.4 o	1.6 o	0.4 c	360 c	81 c
Bromomethane	74839	1.40E-03 /	1.43E-03 /			**	8.7 n	5.2 n	1.9 n	1400 n	110 n
4-Bromophenyl phenyl ether	101553	5.80E-02 o					2100 n	210 n	78 n	59000 n	4500 n
Bromophos	2104963	5.00E-03 h					180 n	18 n	6.8 n	5100 n	390 n
Bromoxynil	1689845	2.00E-02 /					730 n	73 n	27 n	20000 n	1600 n
Bromoxynil octanoate	1689992	2.00E-02 /					730 n	73 n	27 n	20000 n	1600 n
1,3-Butadiene	106990				9.80E-01 /	**	0.011 o	0.0064 o			
1-Butanol	71361	1.00E-01 /					3700 n	370 n	140 n	100000 n	7800 n
Butyl benzyl phthalate	85687	2.00E-01 /					7300 n	730 n	270 n	200000 n	16000 n
Butylate	2000415	5.00E-02 /					1800 n	180 n	68 n	51000 n	3900 n
sec-Butylbenzene	135968	1.00E-02 o				**	61 n	37 n	14 n	10000 n	780 n
tert-Butylbenzene	104910	1.00E-02 o				**	61 n	37 n	14 n	10000 n	780 n

Sources: i-IRIS h-HEAST a-HEAST sh x-W/D from IRIS y-W/D from HEAST c-EPA-ECAO o-Other EPA docs.

Units of RBC: c=carcinogen effects n=noncarcinogen effects.

Contaminant	CAS	RfDi mg/kg/d	RfDi mg/kg/d	CPSo kg*d/mg	CPSi kg*d/mg	V O C	Tap water	Ambient	Fish	Industrial	Residential
							µg/L	air µg/m ³	mg/kg	sol mg/kg	sol mg/kg
Butylphthalyl butylglycolate	85701	1.00E+00 i					37000 n	3700 n	1400 n	100000 n	78000 n
Cacodylic acid	75605	3.00E-03 h					110 n	11 n	4.1 n	3100 n	230 n
Cadmium and compounds	7440439	5.00E-04 i			6.30E+00 i		18 n	0.00099 o	0.68 n	510 n	39 n
Caprolactam	105602	5.00E-01 i					18000 n	1800 n	680 n	510000 n	39000 n
Captafol	2425061	2.00E-01 i		8.60E-03 h			7.8 c	0.73 o	0.37 o	330 o	74 c
Captan	133062	1.30E-01 i		3.50E-03 h			19 o	1.8 o	0.9 o	820 o	180 c
Carbaryl	63252	1.00E-01 i					3700 n	370 n	140 n	100000 n	7800 n
Carbazole	86748			2.00E-02 h			3.4 o	0.31 o	0.16 o	140 o	32 c
Carbofuran	1563662	5.00E-01 i					180 n	18 n	6.8 n	5100 n	390 n
Carbon disulfide	75150	1.00E-01 i	2.86E-03 h			**	21 n	10 n	140 n	100000 n	7800 n
Carbon tetrachloride	56235	7.00E-04 i	5.71E-04 o	1.30E-01 i	5.25E-02 i **		0.16 o	0.12 o	0.024 c	22 c	4.9 c
Carbosulfan	55285148	1.00E-02 i					370 n	37 n	14 n	10000 n	780 n
Carboxin	5234684	1.00E-01 i					3700 n	370 n	140 n	100000 n	7800 n
Chloral	75876	2.00E-01 i					73 n	7.3 n	2.7 n	2000 n	160 n
Chloramben	133904	1.50E-02 i					550 n	55 n	20 n	15000 n	1200 n
Chloranil	118752			4.03E-01 h			0.17 o	0.016 o	0.0078 o	7.1 o	1.6 c
Chlordane	57749	6.00E-05 i		1.30E+00 i	1.29E+00 i		0.052 o	0.0049 o	0.0024 c	2.2 o	0.49 c
Chlorimuron-ethyl	90982324	2.00E-02 i					730 n	73 n	27 n	20000 n	1600 n
Chlorine dioxide	10049044		5.71E-05 i				2.1 n	0.21 n			
Chloroacetaldehyde	107200	6.90E-03 o					250 n	25 n	9.3 n	7100 n	540 n
Chloroacetic acid	79118	2.00E-03 h					73 n	7.3 n	2.7 n	2000 n	160 n
2-Chloroacetophenone	532274		8.57E-06 i				0.31 n	0.031 n			
4-Chloroaniline	106478	4.00E-03 i					150 n	15 n	5.4 n	4100 n	310 n
Chlorobenzene	108907	2.00E-02 i	5.71E-03 h			**	39 n	21 n	27 n	20000 n	1600 n
Chlorobenzilate	510156	2.00E-02 i		2.70E-01 h	2.70E-01 h		0.25 o	0.023 o	0.012 o	11 o	2.4 c
p-Chlorobenzoic acid	74113	2.00E-01 h					7300 n	730 n	270 n	200000 n	16000 n
4-Chlorobenzotrifluoride	98566	2.00E-02 h					730 n	73 n	27 n	20000 n	1600 n
2-Chloro-1,3-butadiene	126998	2.00E-02 h	2.00E-03 h			**	14 n	7.3 n	27 n	20000 n	1600 n
1-Chlorobutane	109693	4.00E-01 h				**	2400 n	1500 n	540 n	410000 n	31000 n
Chlorodifluoromethane	75456		1.41E+01 i			**	87000 n	52000 n			
Chloroethane	75000	2.00E-02 o	2.86E+00 i			**	710 n	10000 n	27 n	20000 n	1600 n
2-Chloroethyl vinyl ether	110758	2.50E-02 o				**	150 n	91 n	34 n	26000 n	2000 n
Chloroform	67663	1.00E-02 i		6.10E-03 i	8.05E-02 i **		0.15 o	0.078 o	0.52 o	470 o	100 c
Chloromethane	74873			1.30E-02 h	6.30E-03 h **		1.4 o	0.99 o	0.24 o	220 o	49 c
4-Chloro-2,2-methylaniline hydrochloride	3165933			4.60E-01 h			0.15 o	0.014 o	0.0069 o	6.2 o	1.4 c
4-Chloro-2-methylaniline	95692			5.80E-01 h			0.12 o	0.011 o	0.0054 o	4.9 o	1.1 c
beta-Chloronaphthalene	91587	8.00E-02 i					2900 n	290 n	110 n	82000 n	6300 n
o-Chloronitrobenzene	88733			2.50E-02 h		**	0.42 o	0.25 o	0.13 o	110 o	26 c
p-Chloronitrobenzene	121733			1.80E-02 h		**	0.59 o	0.35 o	0.18 o	160 o	35 c
2-Chlorophenol	95578	5.00E-03 i					180 n	18 n	6.8 n	5100 n	390 n
2-Chloropropane	75296		2.86E-02 h			**	170 n	100 n			
Chlorothalonil	1897456	1.50E-02 i		1.10E-02 h			6.1 o	0.57 o	0.29 o	260 o	58 c

Sources: *l*=IRIS *h*=HEAST *a*=HEAST *ab* *x*=W/D from IRIS *y*=W/D from HEAST *e*=EPA-ECAO *o*=Other EPA docs.

Basis of RBC: *c*=carcinogenic effects *n*=noncarcinogenic effects.

Contaminant	CAS	RfDo	RfDI	CPSo	CPSI	V O C	Tap water	Ambient air	Fish	Industrial soil	Residential soil
		mg/kg/d	mg/kg/d	kg·d/mg	kg·d/mg		µg/L	µg/m ³	mg/kg	mg/kg	mg/kg
o-Chlorotoluene	95498	2.00E-02 <i>l</i>				***	120 <i>n</i>	73 <i>n</i>	27 <i>n</i>	20000 <i>n</i>	1600 <i>n</i>
Chlorpropham	101213	2.00E-01 <i>l</i>					7300 <i>n</i>	730 <i>n</i>	270 <i>n</i>	200000 <i>n</i>	16000 <i>n</i>
Chlorpyrifos	2921882	3.00E-03 <i>l</i>					110 <i>n</i>	11 <i>n</i>	4.1 <i>n</i>	3100 <i>n</i>	230 <i>n</i>
Chlorpyrifos-methyl	5598130	1.00E-02 <i>h</i>					370 <i>n</i>	37 <i>n</i>	14 <i>n</i>	10000 <i>n</i>	780 <i>n</i>
Chlorsulfuron	64902723	5.00E-02 <i>h</i>					1800 <i>n</i>	180 <i>n</i>	68 <i>n</i>	51000 <i>n</i>	3900 <i>n</i>
Chlorthiophos	60238564	8.00E-04 <i>h</i>					29 <i>n</i>	2.9 <i>n</i>	1.1 <i>n</i>	820 <i>n</i>	63 <i>n</i>
Chromium III and compounds	16065831	1.00E+00 <i>l</i>	5.71E-07 <i>w</i>				37000 <i>n</i>	0.0021 <i>n</i>	1400 <i>n</i>	1000000 <i>n</i>	78000 <i>n</i>
Chromium VI and compounds	7440473	5.00E-03 <i>l</i>			4.20E+01 <i>l</i>		180 <i>n</i>	0.00015 <i>o</i>	6.8 <i>n</i>	5100 <i>n</i>	390 <i>n</i>
Coal tar	8001589				2.20E+00 <i>w</i>			0.0028 <i>o</i>			
Coke Oven Emissions	8007452				2.17E+00 <i>l</i>			0.0029 <i>o</i>			
Copper and compounds	7440508	3.71E-02 <i>h</i>					1400 <i>n</i>	140 <i>n</i>	50 <i>n</i>	38000 <i>n</i>	2900 <i>n</i>
Crotonaldehyde	123739	1.00E-02 <i>w</i>		1.90E+00 <i>h</i>	1.90E+00 <i>w</i>		0.035 <i>o</i>	0.0033 <i>o</i>	0.0017 <i>o</i>	1.5 <i>o</i>	0.34 <i>c</i>
Cumene	98828	4.00E-02 <i>l</i>	2.57E-03 <i>h</i>				1500 <i>n</i>	9.4 <i>n</i>	54 <i>n</i>	41000 <i>n</i>	3100 <i>n</i>
Cyanides:											
Barium cyanide	542621	1.00E-01 <i>h</i>					3700 <i>n</i>	370 <i>n</i>	140 <i>n</i>	100000 <i>n</i>	7800 <i>n</i>
Calcium cyanide	592018	4.00E-02 <i>l</i>					1500 <i>n</i>	150 <i>n</i>	54 <i>n</i>	41000 <i>n</i>	3100 <i>n</i>
Copper cyanide	544923	5.00E-03 <i>l</i>					180 <i>n</i>	18 <i>n</i>	6.8 <i>n</i>	5100 <i>n</i>	390 <i>n</i>
Cyanazine	21725462	2.00E-03 <i>h</i>		8.40E-01 <i>h</i>			0.08 <i>o</i>	0.0075 <i>o</i>	0.0038 <i>o</i>	3.4 <i>o</i>	0.76 <i>c</i>
Cyanogen	460195	4.00E-02 <i>l</i>					1500 <i>n</i>	150 <i>n</i>	54 <i>n</i>	41000 <i>n</i>	3100 <i>n</i>
Cyanogen bromide	506683	9.00E-02 <i>l</i>					3300 <i>n</i>	330 <i>n</i>	120 <i>n</i>	92000 <i>n</i>	7000 <i>n</i>
Cyanogen chloride	506774	5.00E-02 <i>l</i>					1800 <i>n</i>	180 <i>n</i>	68 <i>n</i>	51000 <i>n</i>	3900 <i>n</i>
Free cyanide	57125	2.00E-02 <i>l</i>					730 <i>n</i>	73 <i>n</i>	27 <i>n</i>	20000 <i>n</i>	1600 <i>n</i>
Hydrogen cyanide	74908	2.00E-02 <i>l</i>					730 <i>n</i>	73 <i>n</i>	27 <i>n</i>	20000 <i>n</i>	1600 <i>n</i>
Potassium cyanide	151508	5.00E-02 <i>l</i>					1800 <i>n</i>	180 <i>n</i>	68 <i>n</i>	51000 <i>n</i>	3900 <i>n</i>
Potassium silver cyanide	506616	2.00E-01 <i>l</i>					7300 <i>n</i>	730 <i>n</i>	270 <i>n</i>	200000 <i>n</i>	16000 <i>n</i>
Silver cyanide	506649	1.00E-01 <i>l</i>					3700 <i>n</i>	370 <i>n</i>	140 <i>n</i>	100000 <i>n</i>	7800 <i>n</i>
Sodium cyanide	143319	4.00E-02 <i>l</i>					1500 <i>n</i>	150 <i>n</i>	54 <i>n</i>	41000 <i>n</i>	3100 <i>n</i>
Zinc cyanide	557211	5.00E-02 <i>l</i>					1800 <i>n</i>	180 <i>n</i>	68 <i>n</i>	51000 <i>n</i>	3900 <i>n</i>
Cydohexanone	108911	5.00E+00 <i>l</i>				***	30000 <i>n</i>	18000 <i>n</i>	6800 <i>n</i>	1000000 <i>n</i>	390000 <i>n</i>
Cydohexamine	108918	2.00E-01 <i>l</i>					7300 <i>n</i>	730 <i>n</i>	270 <i>n</i>	200000 <i>n</i>	16000 <i>n</i>
Cyhalothrin/Karate	68085858	5.00E-03 <i>l</i>					180 <i>n</i>	18 <i>n</i>	6.8 <i>n</i>	5100 <i>n</i>	390 <i>n</i>
Cypermethrin	52315078	1.00E-02 <i>l</i>					370 <i>n</i>	37 <i>n</i>	14 <i>n</i>	10000 <i>n</i>	780 <i>n</i>
Cyromazine	66215278	7.50E-03 <i>l</i>					270 <i>n</i>	27 <i>n</i>	10 <i>n</i>	7700 <i>n</i>	590 <i>n</i>
Dacthal	1861321	5.00E-01 <i>l</i>					18000 <i>n</i>	1800 <i>n</i>	680 <i>n</i>	510000 <i>n</i>	39000 <i>n</i>
Dalapon	75990	3.00E-02 <i>l</i>					1100 <i>n</i>	110 <i>n</i>	41 <i>n</i>	31000 <i>n</i>	2300 <i>n</i>
Danitol	39515418	5.00E-04 <i>w</i>					18 <i>n</i>	1.8 <i>n</i>	0.68 <i>n</i>	510 <i>n</i>	39 <i>n</i>
DDD	72548			2.40E-01 <i>l</i>			0.28 <i>o</i>	0.026 <i>o</i>	0.013 <i>o</i>	12 <i>o</i>	2.7 <i>c</i>
DDE	72599			3.40E-01 <i>l</i>			0.2 <i>o</i>	0.018 <i>o</i>	0.0093 <i>o</i>	8.4 <i>o</i>	1.9 <i>c</i>
DDT	50293	5.00E-04 <i>l</i>		3.40E-01 <i>l</i>	3.40E-01 <i>l</i>		0.2 <i>o</i>	0.018 <i>o</i>	0.0093 <i>o</i>	8.4 <i>o</i>	1.9 <i>c</i>
Decabromodiphenyl ether	1163195	1.00E-02 <i>l</i>				**	61 <i>n</i>	37 <i>n</i>	14 <i>n</i>	10000 <i>n</i>	780 <i>n</i>
Denicton	8065483	4.00E-05 <i>l</i>					1.5 <i>n</i>	0.15 <i>n</i>	0.054 <i>n</i>	41 <i>n</i>	3.1 <i>n</i>
Dialate	2303164			1.0E-02 <i>h</i>		**	0.17 <i>o</i>	0.1 <i>o</i>	0.052 <i>o</i>		10 <i>c</i>

Sources: i=IRIS h=HEAST a=HEAST ab. x=W/D from IRIS y=W/D from HEAST c=EPA-ECAO o=Other EPA docs.

Basis of RBC: c=carcinogenic effects n=noncarcinogenic effects.

Contaminant	CAS	RfDo mg/kg/d	RfDi mg/kg/d	CPSo kg*d/mg	CPSi kg*d/mg	V O C	Tap water	Ambient	Fish	Industrial	Residential
							µg/L	µg/m3	mg/kg	mg/kg	mg/kg
Diazinon	333415	9.00E-04 h					33 n	3.3 n	1.2 n	920 n	70 n
1,4-Dibromobenzene	106376	1.00E-02 i				***	61 n	37 n	14 n	10000 n	780 n
Dibromochloromethane	124481	2.00E-02 i		8.40E-02 i		***	0.13 o	0.075 o	0.038 o	34 o	7.6 c
1,2-Dibromo-3-chloropropane	96128		5.71E-05 i	1.40E+00 h	6.90E-07 h***		0.048 o	0.21 n	0.0023 o	2 o	0.46 c
1,2-Dibromoethane	106934		5.71E-05 h	8.50E+01 i	7.70E-01 i***		0.00075 o	0.0081 o	0.000037 o	0.034 o	0.0075 c
Dibutyl phthalate	84742	1.00E-01 i					3700 n	370 n	140 n	100000 n	7800 n
Dicamba	1918009	3.00E-02 i					1100 n	110 n	41 n	31000 n	2300 n
1,2-Dichlorobenzene	95501	9.00E-02 i	5.71E-02 h			***	370 n	210 n	120 n	92000 n	7000 n
1,3-Dichlorobenzene	541731	8.90E-02 o				***	540 n	320 n	120 n	91000 n	7000 n
1,4-Dichlorobenzene	106467		2.29E-01 i	2.40E-02 h		***	0.44 o	0.26 o	0.13 o	120 o	27 c
3,3'-Dichlorobenzidine	91941			4.50E-01 i			0.15 c	0.014 o	0.007 o	6.4 c	1.4 c
1,4-Dichloro-2-butene	764410				9.30E+00 h***		0.0011 o	0.0067 o			
Dichlorodifluoromethane	75718	2.00E-01 i	5.71E-02 h			***	390 n	210 n	270 n	20000 n	16000 n
1,1-Dichloroethane	75343	1.00E-01 h	1.43E-01 h			***	810 n	520 n	140 n	100000 n	7800 n
1,2-Dichloroethane (EDC)	107062		2.86E-01 o	9.10E-02 i	9.10E-02 i***		0.12 o	0.069 o	0.035 o	31 o	7 c
1,1-Dichloroethylene	75354	9.00E-03 i		6.00E-01 i	1.75E-01 i***		0.044 o	0.036 o	0.0053 o	4.8 o	1.1 c
1,2-Dichloroethylene (cis)	156592	1.00E-02 h				***	61 n	37 n	14 n	10000 n	780 n
1,2-Dichloroethylene (trans)	156605	2.00E-02 i				***	120 n	73 n	27 n	20000 n	1600 n
1,2-Dichloroethylene (mixture)	540590	9.00E-03 h				***	55 n	33 n	12 n	9200 n	700 n
2,4-Dichlorophenol	120832	3.00E-03 i				***	110 n	11 n	4.1 n	3100 n	230 n
2,4-Dichlorophenoxyacetic Acid (2,4-D)	94757	1.00E-02 i				***	61 n	37 n	14 n	10000 n	780 n
4-(2,4-Dichlorophenoxy)butyric Acid	94826	8.00E-03 i				***	290 n	29 n	11 n	8200 n	630 n
1,2-Dichloropropane	78875		1.14E-03 i	6.80E-02 h		***	0.16 o	0.092 o	0.046 o	42 o	9.4 c
2,3-Dichloropropanol	616239	3.00E-03 i				***	110 n	11 n	4.1 n	3100 n	230 n
1,3-Dichloropropene	542756	3.00E-04 i	5.71E-03 i	1.80E-01 h	1.30E-01 h***		0.077 o	0.048 o	0.018 o	16 o	3.5 c
Dichlorvos	62737	5.00E-04 i		2.90E-01 i			0.23 o	0.022 o	0.011 o	9.9 o	2.2 c
Dicofol	115322			4.40E-01 w			0.15 o	0.014 o	0.0072 o	6.5 o	1.5 c
Dicyclopentadiene	77736	3.00E-02 h	5.71E-05 h			***	0.42 n	0.21 n	41 n	31000 n	2300 n
Dieldrin	60571	5.00E-05 i		1.60E+01 i	1.61E+01 i		0.0042 o	0.00039 o	0.0002 o	0.18 o	0.04 c
Diesel emissions			1.43E-03 i				52 n	5.2 n			
Diethyl phthalate	84662	8.00E-01 i					29000 n	2900 n	1100 n	82000 n	63000 n
Diethylene glycol, monobutyl ether	112345		5.71E-03 h				210 n	21 n			
Diethylene glycol, monoethyl ether	111900	2.00E+00 h					73000 n	7300 n	2700 n	100000 n	160000 n
Diethylformamide	617845	1.10E-02 h					400 n	40 n	15 n	11000 n	860 n
Di(2-ethylhexyl)adipate	103231	6.00E-01 i		1.20E-03 i			56 o	5.2 o	2.6 o	2400 o	530 c
Diethylstilbestrol	56531			4.70E+03 h			0.000014 o	1.30E-06 o	6.70E-07 o	0.00061 o	0.00014 c
Difenoquat (Avenge)	4322486	8.00E-02 i					2900 n	290 n	110 n	82000 n	6300 n
Diflubenzuron	35367385	2.00E-02 i					730 n	73 n	27 n	20000 n	1600 n
Diisopropyl methylphosphonate (DIMP)	1445756	8.00E-02 i					2900 n	290 n	110 n	82000 n	6300 n
Dimethipin	55290647	2.00E-02 i					730 n	73 n	27 n	20000 n	1600 n
Dimethoate	60515	2.00E-04 i					7.3 n	0.73 n	0.27 n	200 n	16 n
3,3'-Dimethoxybenzidine	119904			1.40E-02 h			4.8 o	0.45 o	0.23 o	200 o	46 c

Sources: *l*=IRIS *b*=HEAST *a*=HEAST *ab* *x*=W/D from IRIS *y*=W/D from HEAST *e*=EPA-ECOA *o*=Other EPA docs.

Bas of RBC: *c*=carcinogenic effects *n*=noncarcinogenic effects.

Contaminant	CAS	RfD _o	RfD _i	CPS _o	CPS _i	V O C	Tap water	Ambient air	Fish	Industrial soil	Residential soil
		mg/kg/d	mg/kg/d	kg*d/mg	kg*d/mg		µg/L	µg/m ³	mg/kg	mg/kg	mg/kg
Dimethyl phthalate	131113	1.00E+01 <i>n</i>					370000 <i>n</i>	37000 <i>n</i>	14000 <i>n</i>	1000000 <i>n</i>	780000 <i>n</i>
Dimethyl terephthalate	120616	1.00E-01 <i>i</i>					3700 <i>n</i>	370 <i>n</i>	140 <i>n</i>	100000 <i>n</i>	7800 <i>n</i>
Dimethylamine	124403		5.71E-06 <i>w</i>				0.21 <i>n</i>	0.021 <i>n</i>			
2,4-Dimethylaniline hydrochloride	21436964			5.80E-01 <i>n</i>			0.12 <i>o</i>	0.011 <i>o</i>	0.0054 <i>o</i>	4.9 <i>o</i>	1.1 <i>c</i>
2,4-Dimethylaniline	95681			7.50E-01 <i>n</i>			0.09 <i>o</i>	0.0083 <i>o</i>	0.0042 <i>o</i>	3.8 <i>o</i>	0.85 <i>c</i>
N-N-Dimethylaniline	121697	2.00E-03 <i>i</i>					73 <i>n</i>	7.3 <i>n</i>	2.7 <i>n</i>	2000 <i>n</i>	160 <i>n</i>
3,3'-Dimethylbenzidine	119937			9.20E+00 <i>n</i>			0.0073 <i>o</i>	0.00068 <i>o</i>	0.00034 <i>o</i>	0.31 <i>o</i>	0.069 <i>c</i>
N,N-Dimethylformamide	68122	1.00E-01 <i>n</i>	8.57E-03 <i>i</i>				3700 <i>n</i>	31 <i>n</i>	140 <i>n</i>	100000 <i>n</i>	7800 <i>n</i>
1,1-Dimethylhydrazine	57147			2.60E+00 <i>n</i>	3.50E+00 <i>n</i>		0.026 <i>o</i>	0.0018 <i>o</i>	0.0012 <i>o</i>	1.1 <i>o</i>	0.25 <i>c</i>
1,2-Dimethylhydrazine	540738			3.70E+01 <i>w</i>	3.70E+01 <i>w</i>		0.0018 <i>o</i>	0.00017 <i>o</i>	0.000085 <i>o</i>	0.077 <i>o</i>	0.017 <i>c</i>
2,4-Dimethylphenol	105679	2.00E-02 <i>i</i>					730 <i>n</i>	73 <i>n</i>	27 <i>n</i>	20000 <i>n</i>	1600 <i>n</i>
2,6-Dimethylphenol	576261	6.00E-04 <i>i</i>					22 <i>n</i>	2.2 <i>n</i>	0.81 <i>n</i>	610 <i>n</i>	47 <i>n</i>
3,4-Dimethylphenol	95658	1.00E-03 <i>i</i>					37 <i>n</i>	3.7 <i>n</i>	1.4 <i>n</i>	1000 <i>n</i>	78 <i>n</i>
1,2-Dinitrobenzene	528290	4.00E-04 <i>n</i>					15 <i>n</i>	1.5 <i>n</i>	0.54 <i>n</i>	410 <i>n</i>	31 <i>n</i>
1,3-Dinitrobenzene	99650	1.00E-04 <i>i</i>					3.7 <i>n</i>	0.37 <i>n</i>	0.14 <i>n</i>	100 <i>n</i>	7.8 <i>n</i>
1,4-Dinitrobenzene	100254	4.00E-04 <i>n</i>					15 <i>n</i>	1.5 <i>n</i>	0.54 <i>n</i>	410 <i>n</i>	31 <i>n</i>
4,6-Dinitro-o-cyclohexyl phenol	131895	2.00E-03 <i>i</i>					73 <i>n</i>	7.3 <i>n</i>	2.7 <i>n</i>	2000 <i>n</i>	160 <i>n</i>
2,4-Dinitrophenol	51285	2.00E-03 <i>i</i>					73 <i>n</i>	7.3 <i>n</i>	2.7 <i>n</i>	2000 <i>n</i>	160 <i>n</i>
Dinitrotoluene mixture				6.80E-01 <i>i</i>			0.099 <i>o</i>	0.0092 <i>o</i>	0.0046 <i>o</i>	4.2 <i>o</i>	0.94 <i>c</i>
2,4-Dinitrotoluene	121142	2.00E-03 <i>i</i>					73 <i>n</i>	7.3 <i>n</i>	2.7 <i>n</i>	2000 <i>n</i>	160 <i>n</i>
2,6-Dinitrotoluene	606202	1.00E-03 <i>n</i>					37 <i>n</i>	3.7 <i>n</i>	1.4 <i>n</i>	1000 <i>n</i>	78 <i>n</i>
Dinoseb	88857	1.00E-03 <i>i</i>					37 <i>n</i>	3.7 <i>n</i>	1.4 <i>n</i>	1000 <i>n</i>	78 <i>n</i>
di-n-Octyl phthalate	117840	2.00E-02 <i>n</i>					730 <i>n</i>	73 <i>n</i>	27 <i>n</i>	20000 <i>n</i>	1600 <i>n</i>
1,4-Dioxane	123911			1.10E-02 <i>i</i>			6.1 <i>o</i>	0.57 <i>o</i>	0.29 <i>o</i>	260 <i>o</i>	58 <i>c</i>
Diphenamid	957517	3.00E-02 <i>i</i>					1100 <i>n</i>	110 <i>n</i>	41 <i>n</i>	31000 <i>n</i>	2300 <i>n</i>
Diphenylamine	122394	2.50E-02 <i>i</i>					910 <i>n</i>	91 <i>n</i>	34 <i>n</i>	26000 <i>n</i>	2000 <i>n</i>
1,2-Diphenylhydrazine	122667			8.00E-01 <i>i</i>	7.70E-01 <i>i</i>		0.084 <i>o</i>	0.0081 <i>o</i>	0.0039 <i>o</i>	3.6 <i>o</i>	0.8 <i>c</i>
Diquat	85007	2.20E-03 <i>i</i>					80 <i>n</i>	8 <i>n</i>	3 <i>n</i>	2200 <i>n</i>	170 <i>n</i>
Direct black 38	1937377			8.60E+00 <i>n</i>			0.0078 <i>o</i>	0.00073 <i>o</i>	0.00037 <i>o</i>	0.33 <i>o</i>	0.074 <i>c</i>
Direct blue 6	2602462			8.10E+00 <i>n</i>			0.0083 <i>o</i>	0.00077 <i>o</i>	0.00039 <i>o</i>	0.35 <i>o</i>	0.079 <i>c</i>
Direct brown 95	16071866			9.30E+00 <i>n</i>			0.0072 <i>o</i>	0.00067 <i>o</i>	0.00034 <i>o</i>	0.31 <i>o</i>	0.069 <i>c</i>
Disulfoton	298044	4.00E-05 <i>i</i>					1.5 <i>n</i>	0.15 <i>n</i>	0.054 <i>n</i>	41 <i>n</i>	3.1 <i>n</i>
1,4-Dithiane	505293	1.00E-02 <i>i</i>					370 <i>n</i>	37 <i>n</i>	14 <i>n</i>	10000 <i>n</i>	780 <i>n</i>
Diuron	330541	2.00E-03 <i>i</i>					73 <i>n</i>	7.3 <i>n</i>	2.7 <i>n</i>	2000 <i>n</i>	160 <i>n</i>
Doxline	2439103	4.00E-03 <i>i</i>					150 <i>n</i>	15 <i>n</i>	5.4 <i>n</i>	4100 <i>n</i>	310 <i>n</i>
Endosulfan	115297	6.00E-03 <i>n</i>					220 <i>n</i>	22 <i>n</i>	8.1 <i>n</i>	6100 <i>n</i>	470 <i>n</i>
Endothal	145733	2.00E-02 <i>i</i>					730 <i>n</i>	73 <i>n</i>	27 <i>n</i>	20000 <i>n</i>	1600 <i>n</i>
Endrin	72208	3.00E-04 <i>i</i>					11 <i>n</i>	1.1 <i>n</i>	0.41 <i>n</i>	310 <i>n</i>	23 <i>n</i>
Epichlorohydrin	106898	2.00E-03 <i>n</i>	2.86E-04 <i>i</i>	9.90E-03 <i>i</i>	4.20E-03 <i>i</i>		6.8 <i>o</i>	1 <i>n</i>	0.32 <i>o</i>	290 <i>o</i>	65 <i>c</i>
1,2-Epoxybutane	106887		5.71E-03 <i>i</i>				210 <i>n</i>	21 <i>n</i>			
Ethephon (2-chloroethyl phosphonic acid)	16672870	5.00E-03 <i>i</i>					180 <i>n</i>	18 <i>n</i>	6.8 <i>n</i>	5100 <i>n</i>	390 <i>n</i>
Ethion	563122	5.00E-04 <i>i</i>					18 <i>n</i>	1.8 <i>n</i>	0.68 <i>n</i>		39 <i>n</i>

Sources: i=IRIS h=HEAST a=HEAST alt. x=W/D from IRIS y=W/D from HEAST e=EPA-ECAO o=Other EPA docs.

Basis of RBC: c=carcinogenic effects n=noncarcinogenic effects.

Contaminant	CAS	RfD _o	RfD _i	CPS _o	CPS _i	V O C	Tap water	Ambient air	Fish	Industrial soil	Residential soil
		mg/kg/d	mg/kg/d	kg*d/mg	kg*d/mg		µg/L	µg/m ³	mg/kg	mg/kg	mg/kg
2-Ethoxyethanol acetate	111159	3.00E-01 h					11000 n	1100 n	410 n	310000 n	23000 n
2-Ethoxyethanol	110805	4.00E-01 h	5.71E-02 i				15000 n	210 n	540 n	410000 n	31000 n
Ethyl acrylate	140885			4.80E-02 h			1.4 c	0.13 o	0.066 o	60 o	13 c
EPIC (S-Ethyl dipropylthiocarbamate)	759944	2.50E-02 i					910 n	91 n	34 n	26000 n	2000 n
Ethyl ether	60297	2.00E-01 i					1200 n	730 n	270 n	200000 n	16000 n
Ethyl methacrylate	97632	9.00E-02 h					3300 n	330 n	120 n	92000 n	7000 n
Ethyl acetate	141786	9.00E-01 i					33000 n	3300 n	1200 n	920000 n	70000 n
Ethylbenzene	100414	1.00E-01 i	2.86E-01 i				1300 n	1000 n	140 n	100000 n	7800 n
Ethylene cyanohydrin	109784	3.00E-01 h					11000 n	1100 n	410 n	310000 n	23000 n
Ethylene diamine	107153	2.00E-02 h					730 n	73 n	27 n	20000 n	1600 n
Ethylene glycol	107211	2.00E+00 i					73000 n	7300 n	2700 n	1000000 n	160000 n
Ethylene glycol, monobutyl ether	111762		5.71E-03 h				210 n	21 n			
Ethylene oxide	75218			1.02E+00 h	3.50E-01 h		0.066 o	0.018 c	0.0031 c	2.8 o	0.63 c
Ethylene thiourea (ETU)	96457	8.00E-05 i		6.00E-01 h			0.11 c	0.01 c	0.0053 c	4.8 o	1.1 c
Ethyl p-nitrophenyl phenylphosphorothioate	2104645	1.00E-05 i					0.37 n	0.037 n	0.014 n	10 n	0.78 n
Ethyl nitrosourea	759739			1.40E+02 w			0.00048 o	0.000045 o	0.000023 o	0.02 o	0.0046 c
Ethylphthalyl ethyl glycolate Express	84720 10120	3.00E+00 i 8.00E-03 i					110000 n 290 n	11000 n 29 n	4100 n 11 n	1000000 n 8200 n	230000 n 630 n
Fenamiphos	22224926	2.50E-04 i					9.1 n	0.91 n	0.34 n	260 n	20 n
Fluometuron	2164172	1.30E-02 i					470 n	47 n	18 n	13000 n	1000 n
Fluoride	7782414	6.00E-02 i					2200 n	220 n	81 n	61000 n	4700 n
Fluoridone	59756604	8.00E-02 i					2900 n	290 n	110 n	82000 n	6100 n
Flurprimidol	56425913	2.00E-02 i					730 n	73 n	27 n	20000 n	1600 n
Flutolanil	6632965	6.00E-02 i					2200 n	220 n	81 n	61000 n	4700 n
Fluvalinate	69409945	1.00E-02 i					370 n	37 n	14 n	10000 n	780 n
Folpet	133073	1.00E-01 i		3.50E-03 i			19 o	1.8 o	0.9 o	820 o	180 c
Fomesafen	72178020			1.90E-01 i			0.35 o	0.033 o	0.017 o	15 o	3.4 c
Fonofos	944229	2.00E-03 i					73 n	7.3 n	2.7 n	2000 n	160 n
Formaldehyde	50000	2.00E-01 i			4.55E-02 i		7300 n	0.14 c	270 n	200000 n	16000 n
Fornic Acid	64186	2.00E+00 h					73000 n	7300 n	2700 n	1000000 n	160000 n
Fosetyl-al	39148248	3.00E+00 i					110000 n	11000 n	4100 n	1000000 n	230000 n
Furan	110009	1.00E-03 i					37 n	3.7 n	1.4 n	1000 n	78 n
Furazolidone	67458			3.80E+00 h			0.018 o	0.0016 o	0.00083 o	0.75 o	0.17 c
Furfural	98011	3.00E-03 i	1.43E-02 h				110 n	52 n	4.1 n	3100 n	230 n
Furium	531828			5.00E+01 h			0.0013 o	0.00013 o	0.000063 o	0.057 o	0.013 c
Furmecyclox	60568050			3.00E-02 i			2.2 o	0.21 o	0.11 o	95 o	21 c
Glufosinate-ammonium	77182822	4.00E-04 i					15 n	1.5 n	0.54 n	410 n	31 n
Glycidaldehyde	765344	4.00E-04 i	2.86E-04 h				15 n	1 n	0.54 n	410 n	31 n
Glyphosate	1071836	1.00E-01 i					3700 n	370 n	140 n	100000 n	7800 n
Haloxypol-methyl	69806402	5.00E-05 i					1.8 n	0.18 n	0.068 n	51 n	3.9 n
Harmony	79277273	1.30E-02 i					470 n	47 n	18 n	13000 n	1000 n
HCH (alpha)	319846			6.30E+00 i	6.30E+00 i		0.011 o	0.00099 o	0.0005 o	0.45 o	0.1 c

Sources: 1=IRIS b=HEAST a=HEAST ab. x=W/D from IRIS y=W/D from HEAST c=EPA-ECAO o=Other EPA docs.

Bas of RBC: c=carcinogen: effects n=noncarcinogen: effects.

Contaminant	CAS	RfDo	RfDi	CPSo	CPSi	V O C	Tap water	Ambient	Fish	Industrial	Residential
		mg/kg/d	mg/kg/d	kg*d/mg	kg*d/mg		µg/L	air µg/m3	mg/kg	mg/kg	mg/kg
HCH (beta)	319857			1.80E+00 /	1.80E+00 /		0.037 o	0.0035 o	0.0018 o	1.6 o	0.35 c
HCH (gamma) Lindane	58899	3.00E-04 /		1.30E+00 h			0.052 o	0.0048 o	0.0024 c	2.2 o	0.49 c
HCH-technical	608731			1.80E+00 /	1.79E+00 /		0.037 o	0.0035 o	0.0018 o	1.6 o	0.35 c
Heptachlor	76448	5.00E-04 /		4.50E+00 /	4.55E+00 / **		0.0023 o	0.0014 o	0.0007 o	0.64 o	0.14 c
Heptachlor epoxide	1024573	1.30E-05 /		9.10E+00 /	9.10E+00 / **		0.0012 o	0.00069 o	0.00035 o	0.31 o	0.07 c
Hexabromobenzene	87821	2.00E-03 /					12 n	7.3 n	2.7 n	2000 n	160 n
Hexachlorobenzene	118741	8.00E-04 /		1.60E+00 /	1.61E+00 / **		0.0066 o	0.0039 o	0.002 o	1.8 o	0.4 c
Hexachlorobutadiene	87683	2.00E-04 h		7.80E-02 /	7.70E-02 / **		0.14 o	0.081 o	0.04 o	37 o	8.2 c
Hexachlorocyclopentadiene	77474	7.00E-03 /	2.00E-05 h				0.15 n	0.073 n	9.5 n	7200 n	550 n
Hexachlorodibenzo-p-dioxin mixture	19408743			6.20E+03 /	4.55E+03 /		0.000011 o	1.40E-06 o	5.10E-07 o	0.00046 o	0.0001 c
Hexachloroethane	67721	1.00E-03 /		1.40E-02 /	1.40E-02 / **		0.75 o	0.45 o	0.23 o	200 o	46 c
Hexachlorophene	70304	3.00E-04 /					11 n	1.1 n	0.41 n	310 n	23 n
Hexahydro-1,3,5-trinitro-1,3,5-triazine	121824	3.00E-03 /		1.10E-01 /			0.61 o	0.057 o	0.029 o	26 o	5.8 c
n-Hexane	110543	6.00E-02 h	5.71E-02 /				350 n	210 n	81 n	61000 n	4700 n
Hexazinone	51235042	3.30E-02 /					1200 n	120 n	45 n	34000 n	2600 n
Hydrazine, hydrazine sulfate	302012			3.00E+00 /	1.71E+01 /		0.022 o	0.00037 o	0.0011 o	0.95 o	0.21 c
Hydrogen chloride	7647010		2.00E-03 /				73 n	7.3 n			
Hydrogen sulfide	7783064	3.00E-03 /	2.57E-04 /				110 n	0.94 n	4.1 n	3100 n	210 n
Hydroquinone	123319	4.00E-02 h					1500 n	150 n	54 n	41000 n	3100 n
Imazalil	3554440	1.30E-02 /					470 n	47 n	18 n	13000 n	1000 n
Imazaquin	81335377	2.50E-01 /					9100 n	910 n	340 n	260000 n	20000 n
Iprodione	36734197	4.00E-02 /					1500 n	150 n	54 n	41000 n	3100 n
Isobutanol	78831	3.00E-01 /					1800 n	1100 n	410 n	310000 n	23000 n
Isophorone	78591	2.00E-01 /		9.50E-04 /			71 o	6.6 o	3.3 o	3000 o	670 c
Isopropalin	33820530	1.50E-02 /					550 n	55 n	20 n	15000 n	1200 n
Isopropyl methyl phosphonic acid	1832548	1.00E-01 /					3700 n	370 n	140 n	100000 n	7800 n
Isoxaben	82558507	5.00E-02 /					1800 n	180 n	68 n	51000 n	3900 n
Kepone	143900			1.80E+01 o			0.0037 o	0.00035 o	0.00018 o	0.16 o	0.035 c
Lactofen	77501634	2.00E-03 /					73 n	7.3 n	2.7 n	2000 n	160 n
Lead (tetraethyl)	78042	1.00E-07 /					0.00037 n	0.00007 n	0.00014 n	0.1 n	0.0078 n
Linuron	330552	2.00E-03 /					73 n	7.3 n	2.7 n	2000 n	160 n
Lithium	7439932	2.00E-02 o					730 n	73 n	27 n	20000 n	1600 n
Londax	83056996	2.00E-01 /					7300 n	730 n	270 n	200000 n	16000 n
Malathion	121755	2.00E-02 /					730 n	73 n	27 n	20000 n	1600 n
Maleic anhydride	108316	1.00E-01 /					3700 n	370 n	140 n	100000 n	7800 n
Maleic hydrazide	123331	5.00E-01 /					18000 n	1800 n	680 n	510000 n	39000 n
Malononitrile	109773	2.00E-05 h					0.73 n	0.073 n	0.027 n	20 n	1.6 n
Mancozeb	8018017	3.00E-02 h					1100 n	110 n	41 n	31000 n	2300 n
Maneb	12427382	5.00E-03 /					180 n	18 n	6.8 n	5100 n	390 n
Manganese and compounds	7439965	5.00E-03 /	1.43e-05 /				180 n	0.052 n	6.8 n	5100 n	390 n
Mephosfolan	950107	9.00E-05 h					3.3 n	0.33 n	0.12 n	92 n	7 n
Mepiqua	24307264	3.00E-02 /					1100 n	110 n	41 n	3100 n	2300 n

Sources: I=IRIS h=HEAST a=HEAST alt. x=W/D from IRIS y=W/D from HEAST c=EPA-ECAO o=Other EPA docs.

Basis of RBC: c=carcinogen effects n=noncarcinogen effects.

Contaminant	CAS	RfD _o	RfD _i	CPS _o	CPS _i	VOC	Tap water	Ambient air	Fish	Industrial soil	Residential soil
		mg/kg/d	mg/kg/d	kg*d/mg	kg*d/mg		µg/L	µg/m ³	mg/kg	mg/kg	mg/kg
Mercury (inorganic)	7439976	3.00E-04 h	8.57E-05 h				11 n	0.31 n	0.41 n	310 n	23 n
Mercury (methyl)	22967926	3.00E-04 i					11 n	1.1 n	0.41 n	310 n	23 n
Merphos	150905	3.00E-05 i					1.1 n	0.11 n	0.041 n	31 n	2.3 n
Merphos oxide	78488	3.00E-05 i					1.1 n	0.11 n	0.041 n	31 n	2.3 n
Metalaxyl	57837191	6.00E-02 i					2200 n	220 n	81 n	61000 n	4700 n
Methacrylonitrile	126987	1.00E-04 i	2.00E-04 h				3.7 n	0.73 n	0.14 n	100 n	7.8 n
Methamidophos	10265926	5.00E-05 i					1.8 n	0.18 n	0.068 n	51 n	3.9 n
Methanol	67561	5.00E-01 i					18000 n	1800 n	680 n	51000 n	39000 n
Methidathion	950378	1.00E-01 i					37 n	3.7 n	1.4 n	1000 n	78 n
Methomyl	16752775	2.50E-02 i					910 n	91 n	34 n	26000 n	2000 n
Methoxychlor	72435	5.00E-03 i					180 n	18 n	6.8 n	5100 n	390 n
2-Methoxyethanol acetate	110496	2.00E-03 h					73 n	7.3 n	2.7 n	2000 n	160 n
2-Methoxyethanol	109864	1.00E-03 h	5.71E-03 i				37 n	2.1 n	1.4 n	1000 n	78 n
2-Methoxy-5-nitroaniline	99592			4.60E-02 h			1.5 o	0.14 o	0.069 o	62 o	14 c
Methyl acetate	79209	1.00E+00 h					37000 n	3700 n	1400 n	100000 n	78000 n
Methyl acrylate	96333	3.00E-02 h					1100 n	110 n	41 n	31000 n	2300 n
2-Methylaniline hydrochloride	636215			1.80E-01 h			0.37 o	0.035 o	0.018 o	16 o	3.5 c
2-Methylaniline	95534			2.40E-01 h			0.28 o	0.026 o	0.013 o	12 o	2.7 c
Methyl chlorocarbonate	79221	1.00E+00 w					37000 n	3700 n	1400 n	100000 n	78000 n
4-(2-Methyl-4-chlorophenoxy) butyric acid	94815	1.00E-02 i					370 n	37 n	14 n	10000 n	780 n
2-Methyl-4-chlorophenoxyacetic acid	94746	5.00E-04 i					18 n	1.8 n	0.68 n	510 n	39 n
2-(2-Methyl-14-chlorophenoxy)propionic acid	93652	1.00E-03 i					37 n	3.7 n	1.4 n	1000 n	78 n
Methyl cyclohexane	108872		8.57E-01 h				31000 n	3100 n			
Methylene bromide	74953	1.00E-02 h					61 n	37 n	14 n	1000 n	780 n
Methylene chloride	75092	6.00E-02 i	8.57E-01 h	7.50E-03 i	1.64E-03 i		4.1 o	3.8 o	0.42 o	380 o	85 c
4,4'-Methylene bis(2-chloroaniline)	101144	7.00E-04 h		1.30E-01 h	1.30E-01 h		0.52 o	0.048 o	0.024 o	22 o	4.9 c
4,4'-Methylenedibenzeneamine	101779			2.50E-01 h			0.27 o	0.025 o	0.013 o	11 c	2.6 c
4,4'-Methylenediphenyl isocyanate	101611			4.60E-02 i			1.5 o	0.14 o	0.069 o	62 o	14 c
Methyl ethyl ketone	101688		5.71E-06 h				0.035 n	0.021 n			
Methyl hydrazine	78933	6.00E-01 i	2.86E-01 i				22000 n	1000 n	810 n	61000 n	47000 n
Methyl isobutyl ketone	60344			1.10E+00 h			0.061 o	0.0057 o	0.0029 o	2.6 o	0.58 c
Methyl methacrylate	108101	5.00E-02 h	2.29E-02 h				1800 n	84 n	68 n	51000 n	3900 n
2-Methyl-5-nitroaniline	80626	8.00E-02 h					2900 n	290 n	110 n	82000 n	6300 n
Methyl parathion	99558			3.30E-02 h			2 o	0.19 o	0.096 o	87 o	19 c
2-Methylphenol (o-cresol)	298000	2.50E-04 i					9.1 n	0.91 n	0.34 n	260 n	20 n
3-Methylphenol (m-cresol)	95487	5.00E-02 i					1800 n	180 n	68 n	51000 n	3900 n
4-Methylphenol (p-cresol)	103394	5.00E-02 i					1800 n	180 n	68 n	51000 n	3900 n
Methyl styrene (mixture)	106445	5.00E-03 h					180 n	18 n	6.8 n	5100 n	390 n
Methyl styrene (alpha)	25013154	6.00E-03 h	1.14E-02 h				60 n	42 n	8.1 n	6100 n	470 n
Methyl tertbutyl ether (MTBE)	98839	7.00E-02 h					430 n	260 n	95 n	72000 n	5500 n
Methyl tertbutyl ether (MTBE)	1634044	5.00E-03 o	8.57E-01 i				180 n	3100 n	6.8 n	5100 n	390 n
Metolador (Dual)	51218452	1.50E-01 i					5500 n	550 n	200 n	150000 n	12000 n

Sources: i=IRIS h=HEAST a=HEAST alt. x=W/D from IRIS y=W/D from HEAST e=EPA-ECAO o=Other EPA docs.

Basis of RBC: c=carcinogen effects n=noncarcinogen effects.

Contaminant	CAS	RfDo	RfDi	CPSo	CPSi	V O C	Tap water	Ambient	Fish	Industrial	Residential
		mg/kg/d	mg/kg/d	kg·d/mg	kg·d/mg		µg/L	air µg/m ³	mg/kg	soil mg/kg	soil mg/kg
Metribuzin	21807649	2.50E-02 i					910 n	91 n	34 n	26000 n	2000 n
Mirex	2385855	2.00E-04 i		1.80E+00 h			0.037 o	0.0035 o	0.0018 o	1.6 o	0.35 c
Molinate	2212671	2.00E-03 i					73 n	7.3 n	2.7 n	2000 n	160 n
Molybdenum	7439987	5.00E-03 i					180 n	18 n	6.8 n	5100 n	390 n
Monochloramine	10599903	1.00E-01 i					3700 n	370 n	140 n	100000 n	7800 n
Naled	300765	2.00E-03 i					73 n	7.3 n	2.7 n	2000 n	160 n
Napropamide	15299997	1.00E-01 i					3700 n	370 n	140 n	100000 n	7800 n
Nickel refinery dust					8.40E-01 i			0.0075 o			
Nickel (soluble salts)	7440020	2.00E-02 i					730 n	73 n	27 n	20000 n	1600 n
Nickel subsulfide	12035722				1.70E+00 i			0.0037 o			
Nitrapyrin	1929824	1.50E-03 w					55 n	5.5 n	2 n	1500 n	120 n
Nitrate	14797558	1.60E+00 i					58000 n	5800 n	2200 n	100000 n	130000 n
Nitric Oxide	10102439	1.00E-01 i					3700 n	370 n	140 n	100000 n	7800 n
Nitrite	14797650	1.00E-01 i					3700 n	370 n	140 n	100000 n	7800 n
2-Nitroaniline	88744	6.00E-05 w	5.71E-05 h				2.2 n	0.21 n	0.081 n	61 n	4.7 n
3-Nitroaniline	99192	3.00E-03 o					110 n	11 n	4.1 n	3100 n	230 n
4-Nitroaniline	100016	3.00E-03 o					110 n	11 n	4.1 n	3100 n	230 n
Nitrobenzene	98953	5.00E-04 i	5.71E-04 h				3.4 n	2.1 n	0.68 n	510 n	39 n
Nitrofurantoin	67209	7.00E-02 h					2600 n	260 n	95 n	72000 n	5500 n
Nitrofurazone	59870			1.50E+00 h	9.40E+00 h		0.045 o	0.00067 o	0.0021 o	1.9 o	0.43 c
Nitrogen dioxide	10102440	1.00E+00 i					37000 n	3700 n	1400 n	100000 n	78000 n
Nitroguanidine	556887	1.00E-01 i					3700 n	370 n	140 n	100000 n	7800 n
4-Nitrophenol	100027	6.20E-02 o					2300 n	230 n	84 n	63000 n	4800 n
2-Nitropropane	79469		5.71E-03 i		9.40E+00 h		210 n	0.00067 o			
N-Nitrosodi-n-butylamine	924163			5.40E+00 i	5.60E+00 i		0.012 o	0.0011 o	0.00058 o	0.53 o	0.12 c
N-Nitrosodichloroamine	1116547			2.80E+00 i			0.024 o	0.0022 o	0.0011 o	1 o	0.23 c
N-Nitrosodiethylamine	55185			1.50E+02 i	1.51E+02 i		0.00045 o	0.000041 o	0.000021 o	0.019 o	0.0043 c
N-Nitrosodimethylamine	62799			5.10E+01 i	4.90E+01 i		0.0013 o	0.00013 o	0.000062 o	0.056 o	0.013 c
N-Nitrosodiphenylamine	86306			4.90E-03 i			14 o	1.3 o	0.64 o	580 o	130 c
N-Nitroso di-n-propylamine	621647			7.00E+00 i			0.0096 o	0.00089 o	0.00045 o	0.41 o	0.091 c
N-Nitroso-N-methylethylamine	10595956			2.20E+01 i			0.0031 o	0.00028 o	0.00014 o	0.13 o	0.029 c
N-Nitrosopyrrolidine	930552			2.10E+00 i	2.13E+00 i		0.032 o	0.0029 o	0.0015 o	1.4 o	0.3 c
m-Nitrotoluene	99081	1.00E-02 h				***	61 n	37 n	14 n	10000 n	780 n
o-Nitrotoluene	88722	1.00E-02 h				***	61 n	37 n	14 n	10000 n	780 n
p-Nitrotoluene	99990	1.00E-02 h				***	61 n	37 n	14 n	10000 n	780 n
Nordiazon	27314132	4.00E-02 i					1500 n	150 n	54 n	41000 n	3100 n
NuStar	85509199	7.00E-04 i					26 n	2.6 n	0.95 n	720 n	55 n
Octabromodiphenyl ether	32536520	3.00E-03 i					110 n	11 n	4.1 n	3100 n	230 n
Octahydro-1357-tetranitro-1357-tetrazocine	2691410	5.00E-02 i					1800 n	180 n	68 n	51000 n	3900 n
Octamethyl pyrophosphoramidate	152169	2.00E-03 h					73 n	7.3 n	2.7 n	2000 n	160 n
Oryzalin	19044883	5.00E-02 i					1800 n	180 n	68 n	51000 n	3900 n
Oxadiaz	19666309	5.00E-03 i					180 n	18 n	6.8 n	n	390 n

Sources: *l*-IRIS *h*-HEAST *s*-HEAST *st* *s*-W/D from IRIS *γ*-W/D from HEAST *c*-EPA-ECAO *o*-Other EPA docs

Units of RBC: *c*-carcinogenic effects *n*-noncarcinogenic effects

Contaminant	CAS	RfD _o mg/kg/d	RfDi mg/kg/d	CPS _o kg·d/mg	CPS _i kg·d/mg	V C	Tap water	Ambient	Fish	Industrial	Residential
							µg/L	air µg/m ³	mg/kg	soil mg/kg	soil mg/kg
Oxamyl	23135220	2.50E-02 <i>l</i>					910 <i>n</i>	91 <i>n</i>	34 <i>n</i>	26000 <i>n</i>	2000 <i>n</i>
Oxyfluorfen	42874033	3.00E-03 <i>l</i>					110 <i>n</i>	11 <i>n</i>	4.1 <i>n</i>	3100 <i>n</i>	230 <i>n</i>
Paclobutrazol	76738620	1.30E-02 <i>l</i>					470 <i>n</i>	47 <i>n</i>	18 <i>n</i>	13000 <i>n</i>	1000 <i>n</i>
Paraquat	1910425	4.50E-03 <i>l</i>					160 <i>n</i>	16 <i>n</i>	6.1 <i>n</i>	4600 <i>n</i>	350 <i>n</i>
Parathion	56382	6.00E-03 <i>h</i>					220 <i>n</i>	22 <i>n</i>	8.1 <i>n</i>	6100 <i>n</i>	470 <i>n</i>
Pebulate	1114712	5.00E-02 <i>h</i>					1800 <i>n</i>	180 <i>n</i>	68 <i>n</i>	51000 <i>n</i>	3900 <i>n</i>
Pendimethalin	40487421	4.00E-02 <i>l</i>					1500 <i>n</i>	150 <i>n</i>	54 <i>n</i>	41000 <i>n</i>	3100 <i>n</i>
Pentabromo-6-chloro cyclohexane	87841			2.30E-02 <i>h</i>			2.9 <i>o</i>	0.27 <i>o</i>	0.14 <i>o</i>	120 <i>o</i>	28 <i>c</i>
Pentabromodiphenyl ether	32534819	2.00E-01 <i>l</i>					73 <i>n</i>	7.3 <i>n</i>	2.7 <i>n</i>	2000 <i>n</i>	160 <i>n</i>
Pentachlorobenzene	608935	8.00E-04 <i>l</i>					4.9 <i>n</i>	2.9 <i>n</i>	1.1 <i>n</i>	820 <i>n</i>	63 <i>n</i>
Pentachloronitrobenzene	82689	3.00E-03 <i>l</i>		2.60E-01 <i>h</i>			0.041 <i>o</i>	0.024 <i>o</i>	0.012 <i>o</i>	11 <i>o</i>	2.5 <i>c</i>
Pentachlorophenol	87865	3.00E-02 <i>l</i>		1.20E-01 <i>l</i>			0.56 <i>o</i>	0.052 <i>o</i>	0.026 <i>o</i>	24 <i>c</i>	5.3 <i>c</i>
Permethrin	52645531	5.00E-02 <i>l</i>					1800 <i>n</i>	180 <i>n</i>	68 <i>n</i>	51000 <i>n</i>	3900 <i>n</i>
Phenmedipham	13684634	2.50E-01 <i>l</i>					9100 <i>n</i>	910 <i>n</i>	340 <i>n</i>	260000 <i>n</i>	20000 <i>n</i>
Phend	108952	6.00E-01 <i>l</i>					22000 <i>n</i>	2200 <i>n</i>	810 <i>n</i>	61000 <i>n</i>	47000 <i>n</i>
m-Phenylenediamine	108452	6.00E-03 <i>l</i>					220 <i>n</i>	22 <i>n</i>	8.1 <i>n</i>	6100 <i>n</i>	470 <i>n</i>
o-Phenylenediamine	95545	6.00E-03 <i>h</i>					220 <i>n</i>	22 <i>n</i>	8.1 <i>n</i>	6100 <i>n</i>	470 <i>n</i>
p-Phenylenediamine	106903	1.90E-01 <i>h</i>					6900 <i>n</i>	690 <i>n</i>	260 <i>n</i>	190000 <i>n</i>	15000 <i>n</i>
Phenylmercuric acetate	62384	8.00E-05 <i>l</i>					2.9 <i>n</i>	0.29 <i>n</i>	0.11 <i>n</i>	82 <i>n</i>	6.3 <i>n</i>
2-Phenylphenol	90437			1.94E-03 <i>h</i>			35 <i>o</i>	3.2 <i>o</i>	1.6 <i>o</i>	1500 <i>o</i>	330 <i>c</i>
Phorate	298022	2.00E-04 <i>h</i>					7.3 <i>n</i>	0.73 <i>n</i>	0.27 <i>n</i>	200 <i>n</i>	16 <i>n</i>
Phosmet	732116	2.00E-02 <i>l</i>					730 <i>n</i>	73 <i>n</i>	27 <i>n</i>	20000 <i>n</i>	1600 <i>n</i>
Phosphine	7803512	3.00E-04 <i>l</i>	8.57E-06 <i>h</i>				11 <i>n</i>	0.031 <i>n</i>	0.41 <i>n</i>	310 <i>n</i>	23 <i>n</i>
Phosphorus (white)	7723140	2.00E-05 <i>l</i>					0.73 <i>n</i>	0.073 <i>n</i>	0.027 <i>n</i>	20 <i>n</i>	1.6 <i>n</i>
p-Phthalic acid	100210	1.00E+00 <i>h</i>					37000 <i>n</i>	3700 <i>n</i>	1400 <i>n</i>	100000 <i>n</i>	78000 <i>n</i>
Phthalic anhydride	85449	2.00E+00 <i>l</i>	3.43E-01 <i>h</i>				71000 <i>n</i>	1300 <i>n</i>	2700 <i>n</i>	100000 <i>n</i>	160000 <i>n</i>
Pidoram	1918121	7.00E-02 <i>l</i>					2600 <i>n</i>	260 <i>n</i>	95 <i>n</i>	72000 <i>n</i>	5500 <i>n</i>
Pirimiphos-methyl	29232937	1.00E-02 <i>l</i>					370 <i>n</i>	37 <i>n</i>	14 <i>n</i>	10000 <i>n</i>	780 <i>n</i>
Polybrominated biphenyls		7.00E-06 <i>h</i>		8.90E+00 <i>h</i>			0.0076 <i>o</i>	0.0007 <i>o</i>	0.00015 <i>o</i>	0.32 <i>o</i>	0.072 <i>c</i>
Polychlorinated biphenyls (PCBs)	1116101			7.70E+00 <i>l</i>			0.0087 <i>o</i>	0.00081 <i>o</i>	0.00041 <i>o</i>	0.37 <i>o</i>	0.083 <i>c</i>
Aroclor 1016	12674112	7.00E-05 <i>l</i>					2.6 <i>n</i>	0.26 <i>n</i>	0.095 <i>n</i>	72 <i>n</i>	5.5 <i>n</i>
Polychlorinated terphenyls (PCTs)				4.50E+00 <i>o</i>			0.015 <i>o</i>	0.0014 <i>o</i>	0.0007 <i>o</i>	0.64 <i>o</i>	0.14 <i>c</i>
Polynuclear aromatic hydrocarbons											
Acenaphthene	83329	6.00E-02 <i>l</i>					2200 <i>n</i>	220 <i>n</i>	81 <i>n</i>	61000 <i>n</i>	4700 <i>n</i>
Anthracene	120127	3.00E-01 <i>l</i>					11000 <i>n</i>	1100 <i>n</i>	410 <i>n</i>	310000 <i>n</i>	23000 <i>n</i>
Benzo[a]pyrene	50328			7.30E+00 <i>l</i>	6.10E+00 <i>h</i>		0.0092 <i>o</i>	0.001 <i>o</i>	0.00043 <i>o</i>	0.39 <i>o</i>	0.088 <i>c</i>
Benzo[b]fluoranthene	205992			7.30E-01 <i>o</i>	6.10E-01 <i>o</i>		0.092 <i>o</i>	0.01 <i>o</i>	0.0043 <i>o</i>	3.9 <i>o</i>	0.88 <i>c</i>
Benzo[k]fluoranthene	207089			7.30E-02 <i>o</i>	6.10E-02 <i>o</i>		0.92 <i>o</i>	0.1 <i>o</i>	0.043 <i>o</i>	3.9 <i>o</i>	0.88 <i>c</i>
Benz[a]anthracene	56553			7.30E-01 <i>o</i>	6.10E-01 <i>o</i>		0.092 <i>o</i>	0.01 <i>o</i>	0.0043 <i>o</i>	3.9 <i>o</i>	0.88 <i>c</i>
Chrysene	218019			7.30E-03 <i>o</i>	6.10E-03 <i>o</i>		9.2 <i>o</i>	1 <i>o</i>	0.43 <i>o</i>	390 <i>o</i>	88 <i>c</i>
Dibenz[ah]anthracene	53703			7.30E+00 <i>o</i>	6.10E+00 <i>o</i>		0.0092 <i>o</i>	0.001 <i>o</i>	0.00043 <i>o</i>	0.39 <i>o</i>	0.088 <i>c</i>
Fluoranthene	206440	4.00E-02 <i>l</i>					1500 <i>n</i>	150 <i>n</i>	54 <i>n</i>	41000 <i>n</i>	3100 <i>n</i>

EPA Region III Risk-Based Concentrations: R.L. Smith (07-Jan-94)

Sources: l=IRIS h=HEAST a=HEAST al=x=W/D from IRIS y=W/D from HEAST e=EPA-ECAO o=Other EPA docs.

Basis of RBC: c=carcinogenic effects n=noncarcinogenic effects.

Contaminant	CAS	RfDo mg/kg/d	RfDi mg/kg/d	CPSo kg*d/mg	CPSi kg*d/mg	V O C	Tap water	Ambient air	Fish	Industrial soil	Residential soil
							µg/L	µg/m3	mg/kg	mg/kg	mg/kg
Fluorene	86737	4.00E-02 /					1500 n	150 n	54 n	41000 n	3100 n
Indeno[1,2,3-cd]pyrene	193395			7.30E-01 o	6.10E-01 o		0.092 c	0.01 o	0.0043 c	3.9 o	0.88 c
Naphthalene	91203	4.00E-02 w					1500 n	150 n	54 n	41000 n	3100 n
Pyrene	129000	3.00E-02 /					1100 n	110 n	41 n	31000 n	2300 n
Prochloraz	67747095	9.00E-03 /		1.50E-01 /			0.45 o	0.042 o	0.021 c	19 o	4.3 c
Propyluracil	26399360	6.00E-03 h					220 n	22 n	8.1 n	6100 n	470 n
Prometon	1610180	1.50E-02 /					550 n	55 n	20 n	15000 n	1200 n
Prometryn	7287196	4.00E-03 /					150 n	15 n	5.4 n	4100 n	310 n
Pronamide	23950585	7.50E-02 /					2700 n	270 n	100 n	77000 n	5900 n
Propachlor	1918167	1.30E-02 /					470 n	47 n	18 n	13000 n	1000 n
Propanil	709988	5.00E-03 /					180 n	18 n	6.8 n	5100 n	390 n
Propargite	2312358	2.00E-02 /					730 n	73 n	27 n	20000 n	1600 n
Propargyl alcohol	107197	2.00E-03 /					73 n	7.3 n	2.7 n	2000 n	160 n
Propazine	139402	2.00E-02 /					730 n	73 n	27 n	20000 n	1600 n
Propham	122429	2.00E-02 /					730 n	73 n	27 n	20000 n	1600 n
Propiconazole	60207901	1.30E-02 /					470 n	47 n	18 n	13000 n	1000 n
Propylene glycol	57556	2.00E+01 h					730000 n	73000 n	27000 n	1000000 n	1000000 n
Propylene glycol, monoethyl ether	52125538	7.00E-01 h					26000 n	2600 n	950 n	72000 n	55000 n
Propylene glycol, monomethyl ether	107982	7.00E-01 h	5.71E-01 /				26000 n	2100 n	950 n	72000 n	55000 n
Propylene oxide	75569		8.57E-03 /	2.40E-01 /	1.29E-02 /		0.28 o	0.49 o	0.013 c	12 o	2.7 c
Pursuit	81335775	2.50E-01 /					9100 n	910 n	340 n	260000 n	20000 n
Pydrin	51630581	2.50E-02 /					910 n	91 n	34 n	26000 n	2000 n
Pyridine	110861	1.00E-03 /					37 n	3.7 n	1.4 n	1000 n	78 n
Quinalphos	13593038	5.00E-04 /					18 n	1.8 n	0.68 n	510 n	39 n
Quinoline	91225			1.20E+01 h			0.0056 o	0.00052 o	0.00026 o	0.24 o	0.053 c
Resmethrin	10461868	3.00E-02 /					1100 n	110 n	41 n	31000 n	2300 n
Ronnel	299843	5.00E-02 h					1800 n	180 n	68 n	51000 n	3900 n
Rotenone	83794	4.00E-03 /					150 n	15 n	5.4 n	4100 n	310 n
Savey	78587050	2.50E-02 /					910 n	91 n	34 n	26000 n	2000 n
Selenous Acid	7784418	5.00E-03 /					180 n	18 n	6.8 n	5100 n	390 n
Selenium	7782492	5.00E-03 /					180 n	18 n	6.8 n	5100 n	390 n
Selenourea	630104	5.00E-03 h					180 n	18 n	6.8 n	5100 n	390 n
Sethoxydim	74051802	9.00E-02 /					3300 n	330 n	120 n	92000 n	7000 n
Silver and compounds	7440224	5.00E-03 /					180 n	18 n	6.8 n	5100 n	390 n
Sinazine	122349	5.00E-03 /		1.20E-01 h			0.56 o	0.052 o	0.026 o	24 o	5.3 c
Sodium azide	26628228	4.00E-03 /					150 n	15 n	5.4 n	4100 n	310 n
Sodium diethylidithiocarbamate	148185	3.00E-02 /		2.70E-01 h			0.25 o	0.023 o	0.012 o	11 o	2.4 c
Sodium fluoroacetate	62748	2.00E-05 /					0.73 n	0.073 n	0.027 n	20 n	1.6 n
Sodium metavanadate	13718268	1.00E-03 h					37 n	3.7 n	1.4 n	1000 n	78 n
Strontium, stable	7040266	6.00E-01 /					22000 n	2200 n	810 n	61000 n	47000 n
Stychnin	57200	3.00E-04 /					11 n	1.1 n	0.41 n	310 n	23 n
Styrene	100425	2.00E-01 /	2.00E-01 /				1000 n	1000 n	270 n	21000 n	16000 n