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TECHNICAL MEMORANDUM FOR NO FURTHER ACTION POTENTIAL SOURCE OF CONTAMINATION 9 (PSC9) NAS CECIL FIELD FL

4/1/1998

ABB ENVIRONMENTAL

TECHNICAL MEMORANDUM FOR NO FURTHER ACTION

POTENTIAL SOURCE OF CONTAMINATION 9

NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

UNIT IDENTIFICATION CODE: N60200
CONTRACT NO.: N62467-89-D-0317/090

APRIL 1998

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
NORTH CHARLESTON, SOUTH CAROLINA
29418

TECHNICAL MEMORANDUM

POTENTIAL SOURCE OF CONTAMINATION 9

NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Unit Identification Code: N60200

Contract No.: N62467-89-D-0317/090

Prepared by:

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Naval Facilities Engineering Command
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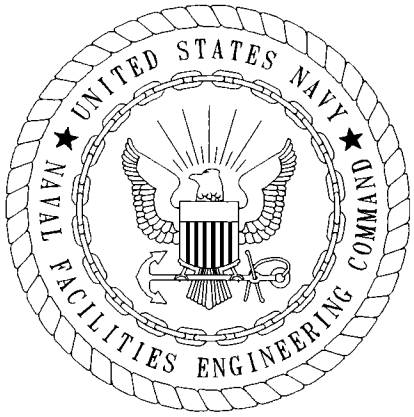
April 1998



CERTIFICATION OF TECHNICAL
DATA CONFORMITY (MAY 1987)

The Contractor, ABB Environmental Services, Inc., hereby certifies that, to the best of its knowledge and belief, the technical data delivered herewith under Contract No. N62467-89-D-0317/090 are complete and accurate and comply with all requirements of this contract.

DATE: April 22, 1998

NAME AND TITLE OF CERTIFYING OFFICIAL: Rao Angara
Task Order Manager

NAME AND TITLE OF CERTIFYING OFFICIAL: Eric A. Blomberg, P.G.
Project Technical Lead

(DFAR 252.227-7036)

This document that describes the field screening investigation of Potential Source of Contamination 9, Naval Air Station Cecil Field, Jacksonville, Florida, has been prepared under the direction of a Florida-registered professional geologist. The work and professional opinions rendered in this report were conducted or developed in accordance with commonly accepted procedures consistent with applicable standards of practice.

Eric A. Blomberg, P.G.

Professional Geologist No.: 1695
Expires July 31, 1998

Date: _____

EXECUTIVE SUMMARY

ABB Environmental Services, Inc. (ABB-ES), has been contracted by the Southern Division, Naval Facilities Engineering Command to complete a field screening investigation for Potential Source of Contamination (PSC) 9 at Naval Air Station Cecil Field.

PSC 9, Recent Grease Pits, is located approximately 700 feet southwest of the east-west flightline and approximately 1,300 feet east of Rowell Creek. Weekly disposal of grease and water from the facility's messes occurred for approximately 15 months during 1983 and 1984. Approximately 400 to 500 gallons of grease and water were disposed of weekly.

The investigation of PSC 9 began in 1985 with the Initial Assessment Study (IAS), conducted by Envirodyne, Inc. PSC 9 was evaluated based on (1) contaminant characteristics of kitchen grease and water, (2) groundwater and surface water migration pathways, and (3) Rowell Creek as a pollutant receptor. The IAS recommended that no confirmation study be conducted at the site.

In 1987, Harding Lawson Associates conducted the *Resource Conservation and Recovery Act (RCRA) Facilities Investigation* (Harding Lawson, 1988). The surface features noted during the IAS no longer existed, indicating that the site had been graded. Geophysical surveys, magnetometer and very low frequency electromagnetic, were conducted at the site. No magnetic anomalies were noted. No samples were collected during the RCRA Facilities Investigation.

In December 1994, ABB-ES conducted a site visit. The site visit confirmed that surface features from past disposal activities no longer existed.

In 1995, ABB-ES recommended that additional investigative work be conducted at PSC 9. The additional work plan was reported in the *Field Investigation Plan for Potential Sources of Contamination 4, 6, 9, 12, 18, and 19* (ABB-ES, 1995).

The conclusions pertaining to PSC 9 that follow have been based on the results of the field screening investigation:

- The soil is relatively permeable, fine-grained sand, with some silt and clay.
- Horizontal groundwater flow in the surficial aquifer is interpreted to be northwesterly toward the drainage ditch.
- No volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), or inorganics were detected in surface and subsurface soil above Florida Department of Environmental Protection cleanup goals.
- Biological technical assistance group (BTAG) flora and fauna criteria for naphthalene (0.1 milligram per kilogram [mg/kg]) was exceeded in one surface soil sample (CF9SS2) at a concentration of 0.3 J mg/kg.

- Aluminum, antimony, chromium, iron, lead, nickel, thallium, and vanadium were detected in surface soil above BTAG criteria.

- No VOCs, SVOCs, pesticides, or PCBs were detected in groundwater samples above State or Federal drinking water standards.

- Aluminum and iron were detected in groundwater above State and Federal secondary (not health-based) drinking water standards of 200 micrograms per liter ($\mu g/\ell$) and 300 $\mu g/\ell$; respectively.

- No adverse human health or ecological effects are expected in human or ecological receptors that come into contact with surface soil, subsurface soil, or groundwater at PSC 9.

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GLOSSARY

ABB-ES	ABB Environmental Services, Inc.
bls	below land surface
BTAG	biological technical assistance group
FDEP	Florida Department of Environmental Protection
GPR	ground-penetrating radar
IAS	initial assessment study
IR	Installation Restoration
mg/kg	milligrams per kilogram
$\mu g/\ell$	micrograms per liter
NAS	Naval Air Station
PCB	polychlorinated biphenyl
PRE	preliminary risk evaluation
PSC	potential source of contamination
RCRA	Resource Conservation and Recovery Act
RFI	Resource Conservation and Recovery Act (RCRA) facility investigation
SVOC	semivolatile organic compound
TAL	target analyte list
TCL	target compound list
USEPA	U.S. Environmental Protection Agency
VLF	very low frequency
VOC	volatile organic compound

1.0 INTRODUCTION

ABB Environmental Services, Inc. (ABB-ES), has been contracted by the Department of the Navy, Southern Division, Naval Facilities Engineering Command to conduct a field screening investigation for Potential Source of Contamination (PSC) 9 at Naval Air Station (NAS) Cecil Field in Jacksonville, Florida. The PSC investigation is being completed under contract number N62467-89-D-0317/090 as part of the Navy's Installation Restoration (IR) program.

The goals of the PSC investigation are to assess the presence of contamination and provide information for a preliminary risk evaluation (PRE). The PRE will use the investigative results to determine the nature, pathway, and extent of contamination and to identify potential risks to human and ecological receptors.

The purpose of this technical memorandum is to decide whether or not further investigation of the site is needed as part of the IR program. This technical memorandum summarizes the related field operations, results, conclusions, and recommendations of the PSC 9 field screening investigation.

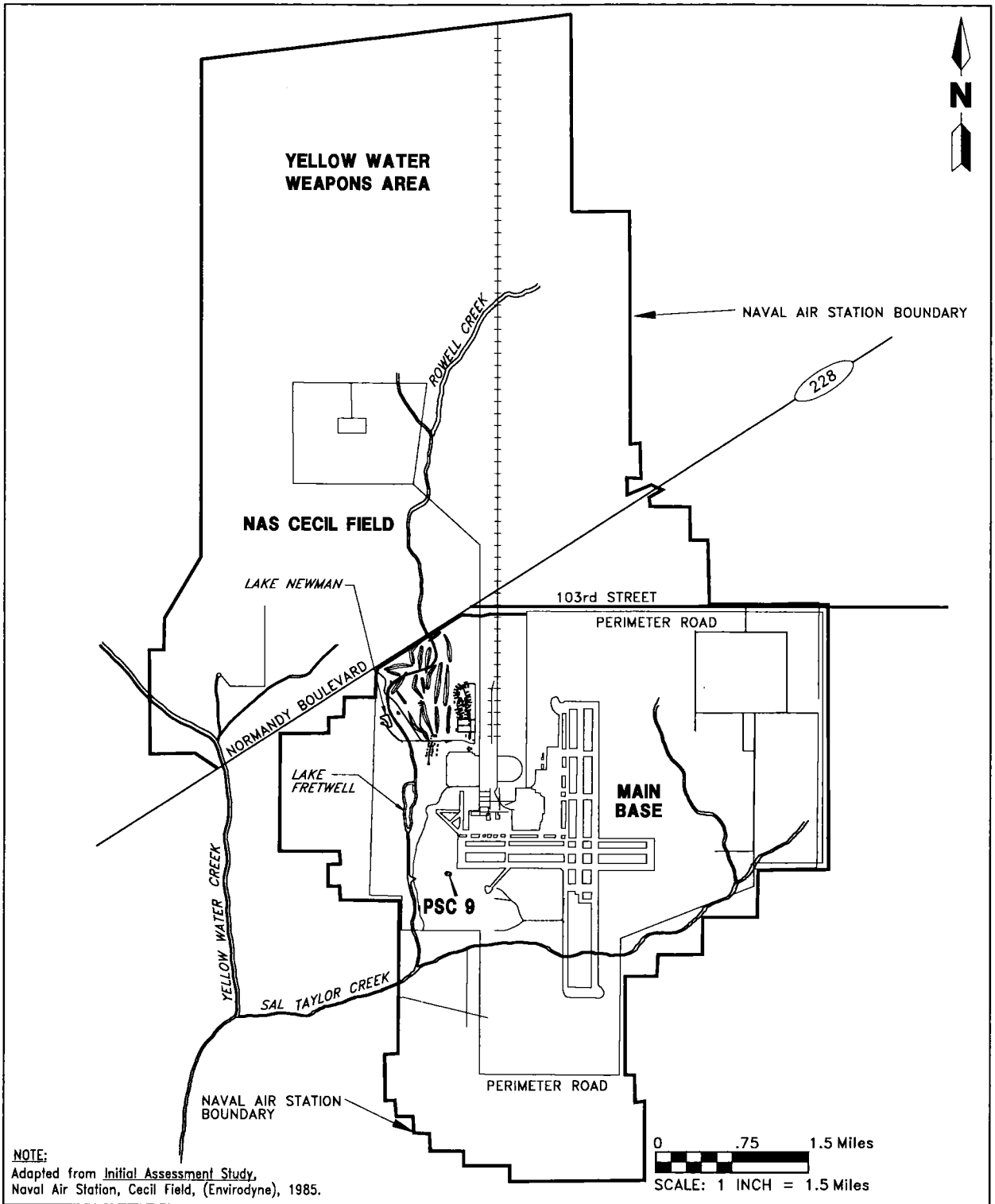
2.0 SITE DESCRIPTION AND HISTORY

2.1 SITE HISTORY. The history of PSC 9, Recent Grease Pits, is presented in the Field Investigation Plan (ABB-ES, 1995). PSC 9 was used to dispose of grease and water from the facility's messes. Weekly disposal operations consisted of hauling grease and water to the site in 500-gallon-capacity trucks and placing the waste into a particular pit. Each pit was used for approximately 4 to 6 months, until it became full, at which time it was covered with soil and a new pit excavated. The site was operated during 1983 and the beginning of 1984. Disposal activities were halted due to allegedly high clay content in the soil, which prevented the grease from seeping into the ground. Based on installation records, 400 to 500 gallons of grease and water were disposed of weekly for 15 months, resulting in an estimated total disposal volume of 24,000 to 30,000 gallons (approximately 9,000 cubic feet). Previous investigations do not mention any other liquid wastes being disposed of at the site (Envirodyne, 1985; Harding Lawson, 1988).

2.2 PHYSICAL SETTING. PSC 9 is located in the southwestern part of the main base (Figure 2-1). PSC 9 is located approximately 700 feet southwest of the east-west flightline and approximately 1,300 feet east of Rowell Creek (Figure 2-2). The areal extent of the site was reported to be approximately 100 feet by 200 feet, which is approximately 0.5 acre. The grease pits varied in size, but exact dimensions are not known. Each pit reportedly had a 1- to 2-foot earthen berm around it. Currently, there is no visible evidence of these disposal pits. The grass-covered site is marked by two placards, placed approximately 500 feet apart, one east and one west of the site. North of the site is a small ditch, which drains to the west into Rowell Creek. South of the site is an unpaved service road, which parallels the drainage ditch (Figure 2-2).

2.3 CONCEPTUAL UNDERSTANDING. Based on the historical information, waste liquids (cooking grease, water, and any cleansers associated with the water) resulting from the installation messes, were disposed of in three open, shallow, unlined pits. No other types of materials, including hazardous materials, are known to have been disposed of in these pits. The three pits are not believed to be of equal size, but could possibly vary from 1,200 to 2,000 cubic feet in total volume to accommodate the 4,000 cubic feet volume of waste liquids. These pits, then, could be relatively small, each possibly having dimensions similar to 3 feet deep (limited by interpreted depth to water table) by 5 to 10 feet wide and 50 to 100 feet long.

The shallow soils, 0 to 5 feet below land surface (bls), in the PSC 9 area are unconsolidated fine-grained sands with varying amounts of silt and clay. Locally, hard pans may exist within the first few feet of the soil. Discarded materials were allowed to percolate through these soils. Waste materials could enter the vadose zone (the unsaturated water-bearing zone above the water table) and the phreatic zone (saturated zone) soils. High clay content in the soil, however, may have prevented percolation of the waste, particularly the grease. By its hydrophobic (affinity to separate from water) nature, the grease would separate from the waste water and remain above the water. It is assumed that the waste water would percolate downward or migrate laterally away from the disposal pits.



NOTE:
Adapted from Initial Assessment Study,
Naval Air Station, Cecil Field, (Envirodyne), 1985.

FIGURE 2-1
SITE LOCATION MAP

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NAVAL AIR STATION CECIL FIELD
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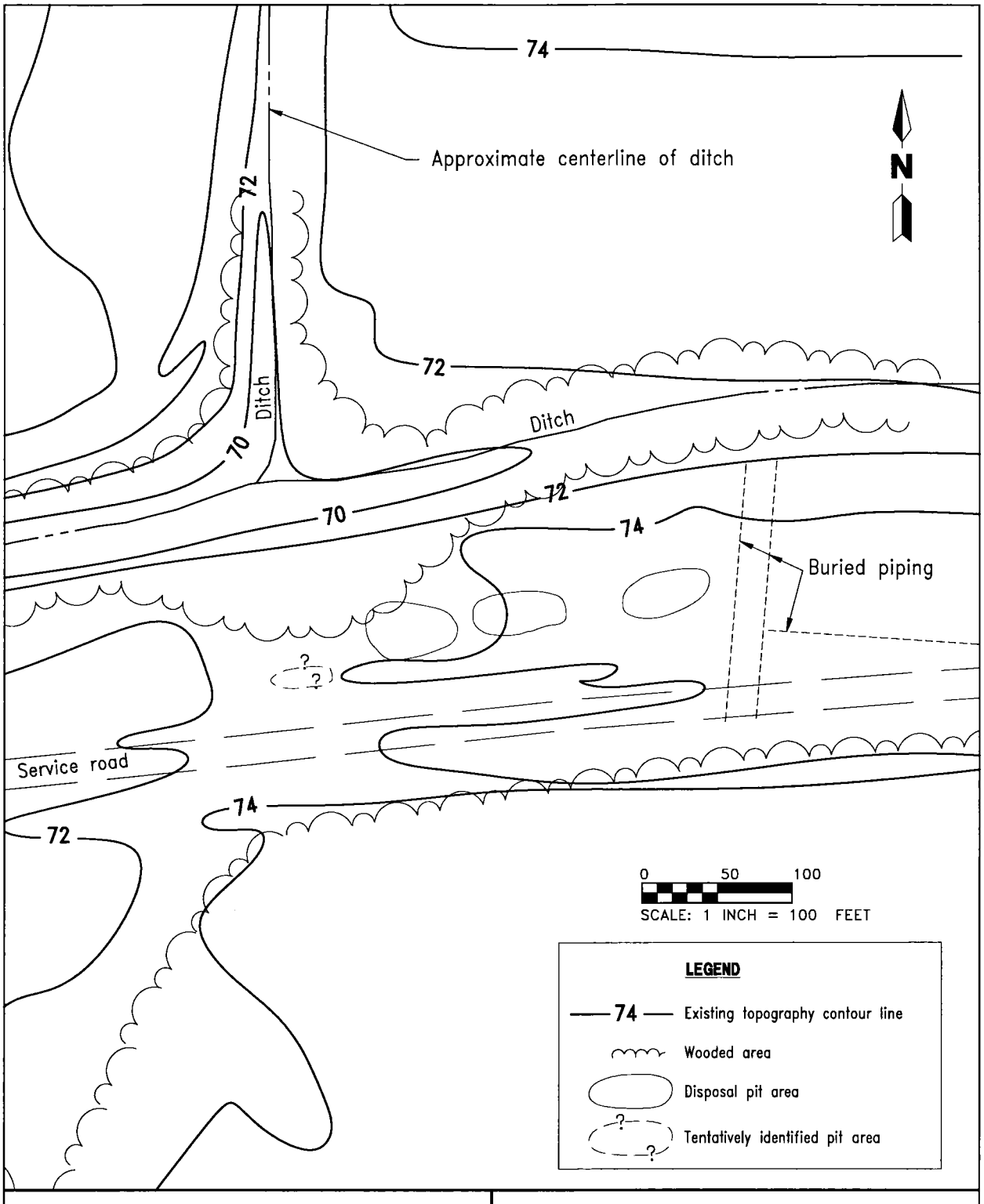

FIGURE 2-2
SITE MAP

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There are no known existing quantitative or qualitative environmental or hydrological data for PSC 9. Sloping directions of the land surface and a shallow drainage ditch north of the site suggest that groundwater flow in the upper part of the surficial aquifer would be in a northwesterly direction. It is expected that the grease remained in the disposal pits, and the water and any associated cleansers migrated downward or toward the drainage ditch.

3.0 PREVIOUS INVESTIGATIONS

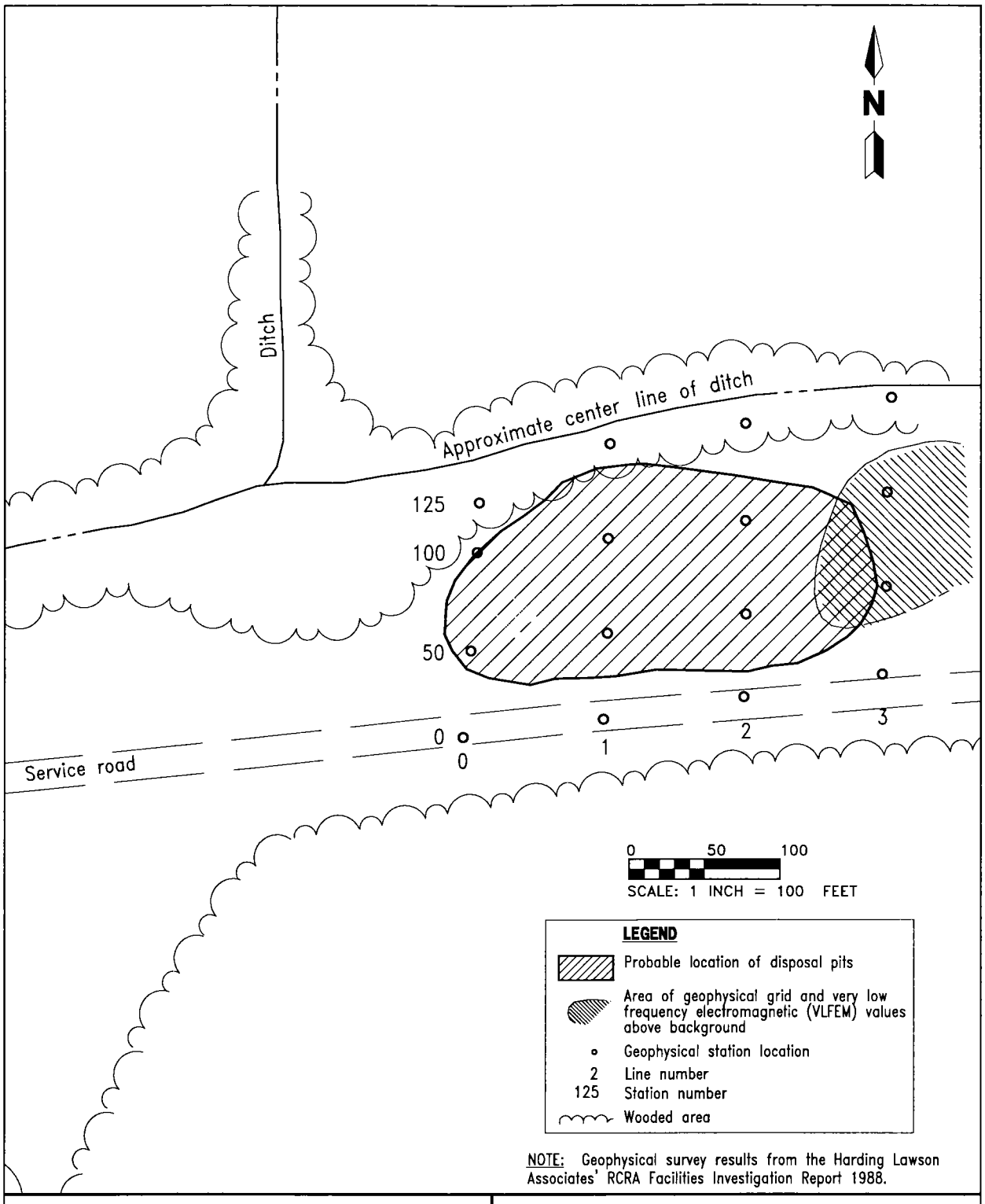
The investigation of PSC 9 began in 1985, with the Initial Assessment Study (IAS) conducted by Envirodyne Engineers, Inc. (1985). The purpose of the IAS was to "identify and assess sites posing a potential threat to human health or the environment due to contamination from past hazardous substance disposal operations" (Envirodyne, 1985). PSCs were identified, based on historical records, aerial photographs, field inspections, and personal interviews.

During the Envirodyne field inspection, PSC 9 was noted to be a depressed area, being approximately 3 feet lower than the service road, which forms its southern border. A 5-foot-high berm bordered the site on the north side. A definite grease odor was noted during the site inspection. There were no reports of visible soil staining or outlines of specific pits.

No samples were collected from the site. PSC 9 was evaluated based on contaminant characteristics of kitchen grease and water, groundwater and surface water migration pathways, and Rowell Creek as the pollutant receptor. PSC 9 was assessed to have no significant source of potential surface or groundwater contamination, resulting in a recommendation that no confirmation study be conducted at the site.

In 1987, Harding Lawson Associates conducted the Resource Conservation and Recovery Act (RCRA) Facilities Investigation (RFI). The surface features noted in the IAS no longer existed, indicating the site had been graded. Geophysical surveys were conducted on a 100-foot by 50-foot grid, measuring 150 feet by 300 feet. The long axis of the survey grid was oriented west to east and paralleled the service road (Figure 3-1). Two surveys, magnetometer and very low frequency (VLF) electromagnetic (EM), were conducted at the site. No magnetic anomalies were noted. VLF values in the eastern part of the site were greater than background, indicating that the area may have been disturbed. Interpretation of aerial photographs indicated that the VLF anomaly is a disturbed area (lacking vegetation) that predates the disposal activity. No samples were collected during the RFI.

In December 1994, ABB-ES conducted a site visit. This visit confirmed that surface features from past disposal operations no longer exist. PSC 9 is relatively flat and slopes northward toward the shallow drainage ditch. Site topography suggests that surface drainage would be to the north toward the drainage ditch and to the west toward Rowell Creek. The site is an open field, covered with grass and weeds. Some bushes and tall grasses exist along the drainage ditch. No stressed vegetation was noted at PSC 9. Surface soils at PSC 9 appear to be disturbed and/or transported from another location.



NOTE: Geophysical survey results from the Harding Lawson Associates' RCRA Facilities Investigation Report 1988.

FIGURE 3-1
GEOPHYSICAL GRID AND VLFEM SURVEY RESULTS

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TECHNICAL MEMORANDUM FOR NO FURTHER ACTION, POTENTIAL SOURCE OF CONTAMINATION 9

NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA

4.0 INVESTIGATIVE AND SAMPLING PROGRAM

4.1 SITE GEOLOGY. A full description of the regional geology at NAS Cecil Field is presented in the General Information Report (ABB-ES, 1996).

The subsurface geologic materials recovered during installation of two monitoring wells at PSC 9 are generally undifferentiated geologic deposits of fine- to medium-grained, poorly-to-well-sorted quartz sand mixed with varying amounts of silt and clay. No waste materials were encountered during the monitoring well installation. Boring logs are presented in Appendix B.

4.2 MONITORING WELL INSTALLATION. Groundwater conditions in the upper part of the surficial aquifer were assessed by installing two shallow monitoring wells at PSC 9 in August 1997. The two monitoring wells (CF9MW1S and CF9MW2S) were installed to depths of 13 and 15 feet bls, respectively. Monitoring well CF9MW1S was installed in the pit area, and monitoring well CF9MW2S was installed in the interpreted downgradient direction of the pit area.

4.3 SITE HYDROGEOLOGY. The surficial aquifer system in the area of PSC 9 is located in the undifferentiated geologic deposits. These unconsolidated deposits overlie the top of a clay unit (Hawthorn Group), which separates the surficial aquifer system from the intermediate aquifer system. The surficial aquifer system is under water table conditions (unconfined).

Water-level measurement data collected during this investigation are interpreted to indicate that groundwater flow is to the northwest toward the drainage ditch. Water-level measurement data collected monthly from April to September 1997 indicate that the water table is generally 2 to 3 feet bls. Groundwater elevation data for the surficial aquifer have been plotted on a plan view map on Figure 4-1. Water-level measurements are presented in Appendix B.

4.4 GEOPHYSICAL SURVEY. In February 1997, ABB-ES conducted a ground-penetrating radar (GPR) survey to locate anomalies in soil density. The GPR survey indicated the presence of three "trench-like" features in the west-central portion of the survey area approximately 40 to 60 feet north of the service road. A possible fourth disposal pit location farther to the west was also identified. Buried piping on the east side of PSC 9 was also identified during the GPR survey. This buried piping is interpreted to contain electrical lines that go to the flightline beacons and the south power check station. The locations of the three primary features, the possible fourth feature, and the buried piping are presented on Figure 4-2. The two easternmost trench-like features indicated in the GPR survey are located within the western part of the Harding Lawson Associates' geophysical survey area, while the westernmost trench-like features are located outside (west) of the Harding Lawson Associates' survey area.

4.5 SAMPLING PROGRAM.

4.5.1 Soil Sampling To assess the presence of soil contamination, six surface soil samples and three subsurface soil samples were collected at PSC 9 in May

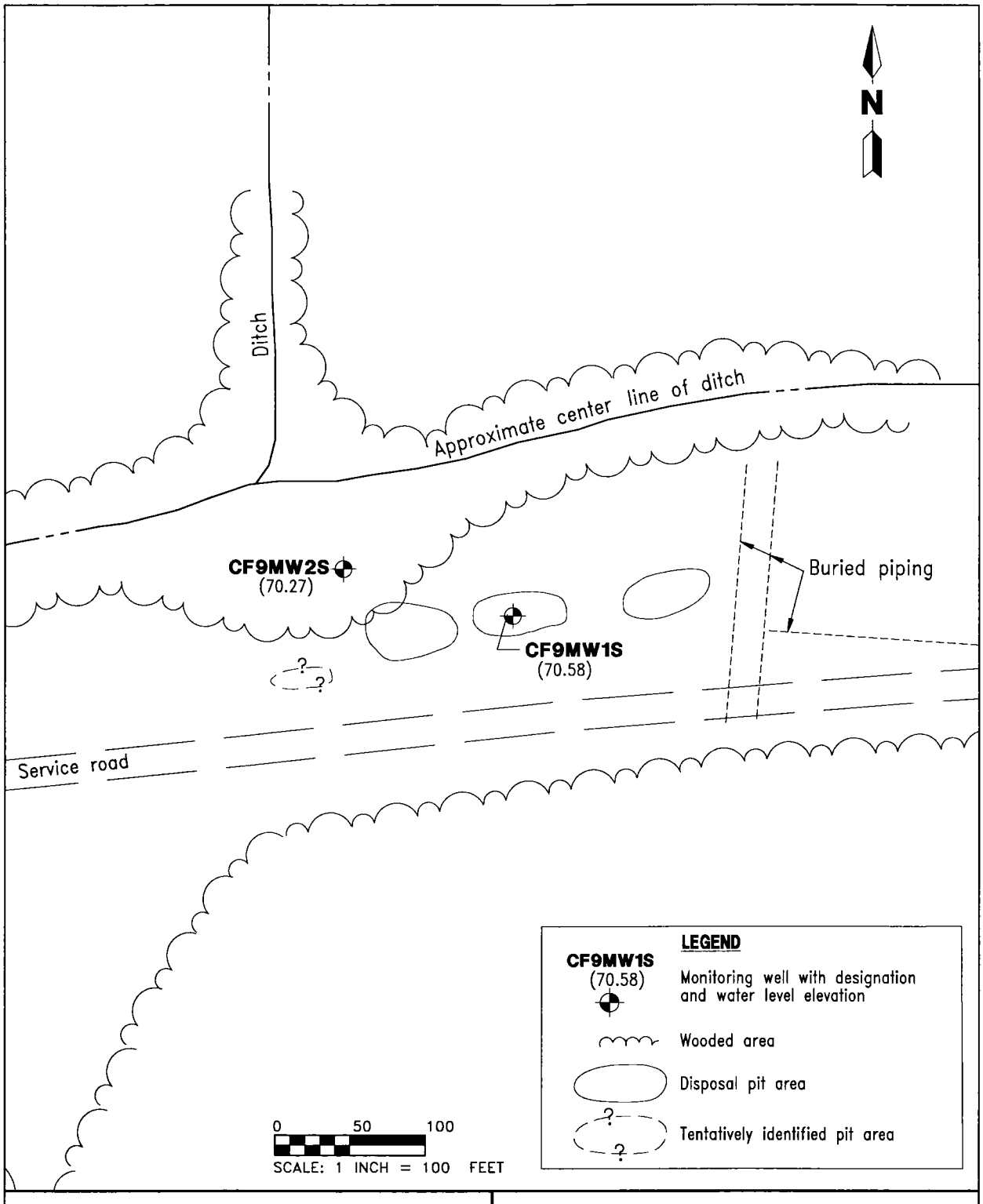

FIGURE 4-1
SEPTEMBER 1997 WATER LEVELS

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NAVAL AIR STATION CECIL FIELD
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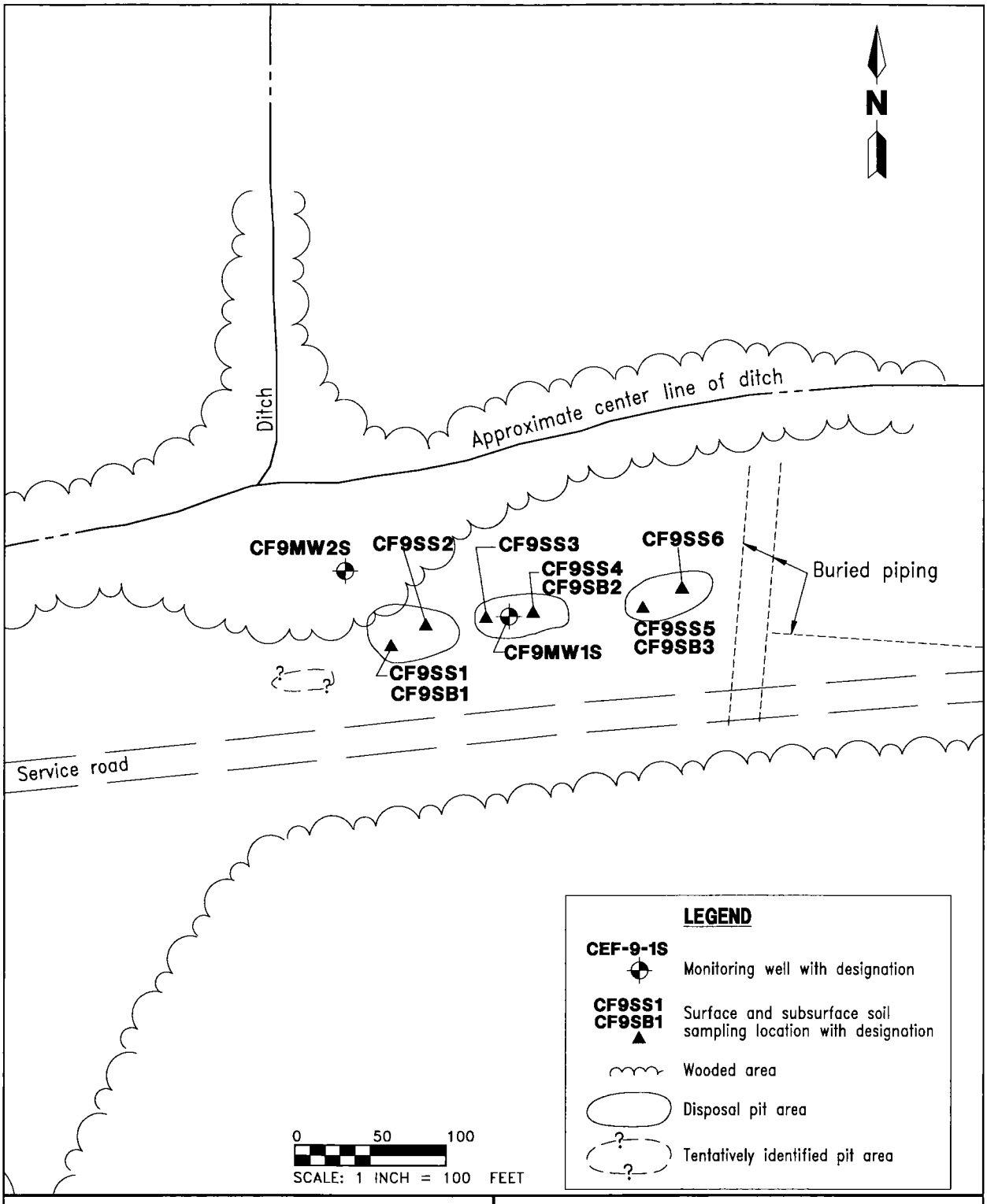

FIGURE 4-2
CONFIRMATORY SAMPLING LOCATIONS

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1997. The surface soil and subsurface soil samples were collected from areas where disposal activities appeared to have occurred based on geophysical survey results. The samples were analyzed by an approved analytical laboratory for target compound list (TCL) organics and target analyte list (TAL) inorganics. Analytical results are found in Appendix A and are discussed in Chapter 5.0 of this technical memorandum.

4.5.2 **Groundwater Sampling** To assess the presence of groundwater contamination, groundwater samples were collected from two monitoring wells at PSC 9 during July 1997. The groundwater samples were analyzed by an approved analytical laboratory for TCL organics and TAL inorganics. Analytical results are found in Appendix A and are discussed in Chapter 5.0 of this technical memorandum.

4.5.3 **Surface Water and Sediment Sampling** At the time of the field investigation, no surface water was found in the drainage ditches at PSC 9; therefore, no surface water and sediment samples were collected. PSC 9 was visited on more than one occasion to collect surface water and sediment samples, but the drainage ditch was dry each time.

5.0 NATURE AND EXTENT OF WASTES

5.1 SURFACE SOIL. Six surface soil samples (CF9SS1 through CF9SS6) were collected between 0 and 1 foot bls. Summaries of the confirmatory analytical results for surface soil samples are presented on Figures 5-1 and 5-2 and are summarized in Tables 5-1 and 5-2. A complete analytical data set for PSC 9 confirmatory samples is presented in Appendix A.

Surface soil analytical results were compared to guidance criteria from the following sources: (1) the most conservative soil cleanup goals for Florida, as listed in a memorandum dated September 29, 1995, (Florida Department of Environmental Protection [FDEP], 1995); (2) background concentrations in soil or detection limits soil criteria for evaluating the severity of contamination under the Dutch Soil Cleanup (Interim) Act (Richardson, 1987); (3) U.S. Environmental Protection Agency (USEPA) Region III biological technical assistance groups (BTAG) Screening Levels, (USEPA, 1995); and (4) NAS Cecil Field screening criteria for inorganics as established by the NAS Cecil Field partnering team. The NAS Cecil Field screening values were determined by using the nonparametric upper-outside value cutoffs as described in *Understanding Robust and Exploratory Data Analysis* (Hoaglin et al., 1983). These screening values were developed from data collected throughout NAS Cecil Field.

Volatile Organic Compounds (VOCs) in Surface Soil. No VOCs were detected in PSC 9 surface soil samples.

Semivolatile Organic Compounds (SVOCs) in Surface Soil. One SVOC, naphthalene, was detected in surface soil sample CF9SS2 at a concentration of 0.3 J milligrams per kilogram (mg/kg). This concentration is below the FDEP residential-based soil cleanup criterion of 1,300 mg/kg. This concentration does, however, exceed the Dutch screening and BTAG criterion of 0.1 mg/kg. It should be noted that the duplicate sample taken at surface soil location CF9SS2 (CF9SS2D) reported no detection of naphthalene.

Pesticides and Polychlorinated Biphenyls (PCBs) in Surface Soil. One pesticide, methoxychlor, was detected in surface soil sample CF9SS5 at a concentration of 0.0077 J mg/kg. This concentration is below the FDEP residential-based soil cleanup goal, Dutch screening, and BTAG criteria for methoxychlor, which are 380 mg/kg, 0.1 mg/kg, and 0.1 mg/kg, respectively.

Inorganics in Surface Soil. Sixteen inorganic analytical parameters were detected in the confirmatory surface soil samples collected at PSC 9. Only aluminum, calcium, and chromium exceeded NAS Cecil Field screening criteria. However, none of these inorganic concentrations exceeded the FDEP residential-based soil cleanup goals or Dutch screening criteria. The analytical results are summarized in Table 5-2.

Eight inorganics (aluminum, antimony, chromium, iron, lead, nickel, thallium, and vanadium) were detected at concentrations greater than BTAG flora and/or fauna criteria. Aluminum was detected in all six surface soil samples at concentrations ranging from 1,150 to 13,100 mg/kg. The BTAG flora criterion for aluminum is 1 mg/kg. Antimony was detected in only one sample (CF9SS2) at a concentration of 1.3 J mg/kg, which is above the BTAG flora criterion of 0.48 mg/kg. Chromium was detected in all six samples at concentrations ranging from 1.7 J to 13.2

Table 5-1
Organic Compounds in Surface Soil

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Analytical Parameter	Frequency of Detection[1]	Range of Reporting Limits	Range of Detected Concentrations	FDEP Soil Cleanup Goals[2]	Dutch Numbers[3]	BTAG Criteria[4] (Soil Screening) Flora/Fauna
Surface Soil						
Semivolatile Organic Compounds (mg/kg)						
Naphthalene	1/6	0.38	0.3 J	1,300	0.1	0.1/0.1
Pesticides and PCBs (mg/kg)						
Methoxychlor	1/6	0.019	0.0077 J	380	0.1	0.1/0.1

[1] Frequency of detection is the number of samples in which the analyte was detected divided by the total number of samples analyzed (9SS1, 9SS2, 9SS3, 9SS4, 9SS5, and 9SS6 including a duplicate at 9SS2).
[2] FDEP memorandum dated September 29, 1995. Values presented are the lesser of the cleanup goals based on a residential land-use scenario.
[3] Dutch Soil Cleanup (Interim) Act from Richardson, G.M., 1987. Values presented are the lesser of the cleanup goals based on background concentrations in Dutch soil or detection limits using Contract Laboratory Program methods.
[4] U.S. Environmental Protection Agency Region III BTAG Screening Levels, August 1995.

Notes: **Bold** indicates at least one sample exceeds at least one criterion.

FDEP = Florida Department of Environmental Protection.
BTAG = biological technical assistance group.
mg/kg = milligrams per kilogram.
J = estimated value.
PCB = polychlorinated biphenyl.

Table 5-2
Inorganic Compounds in Surface Soil

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Analytical Parameter	Frequency of Detection[1]	Range of Reporting Limits	Range of Detected Concentrations	NAS Cecil Field Screening Criteria	FDEP Soil Cleanup Goals[2]	Dutch Numbers[3]	BTAG Criteria[4] (Soil Screening) Flora/Fauna
Surface Soil							
Inorganic Analytes (mg/kg)							
Aluminum ✓	6/6	40	1,150 to 13,100	4,400	75,000	NG	1/NG
Antimony ✗	1/6	12	1.3 J	9	26	NG	0.48/NG
Arsenic	4/6	2	0.51 J to [5]0.75 J	2	0.8	20	328/NG
Barium	6/6	40	1.9 J to 10 J	14	5,200	200	440/440
Calcium	6/6	1,000	[5]126 J to 25,900 J	9	NG	NG	NG
Chromium ✓	6/6	2	1.7 J to 13.2	8	290	100	0.02/0.0075
Copper	6/6	5	1.1 J to 3.6 J	6	NG	50	15/NG
Iron ✗	6/6	20	224 to [5]771	1,490	NG	NG	3,260/12
Lead ✗	6/6	0.6	0.98 to 8	197	500	50	2/0.01
Magnesium	6/6	1,000	51.1 J to 241 J	329	NG	NG	4,400/4,400
Manganese	6/6	3	1.8 J to 7.9	22	370	NG	330/330
Nickel ✗	5/6	8	0.45 J to 2.8 J	4	1,500	50	2/NG
Potassium	4/6	1,000	24.2 J to [5]61.3 J	102	NG	NG	NG/NG
Thallium ✗	1/6	1	[5]0.8 J	3	[6]6.3	NG	0.001/NG
Vanadium ✗	6/6	10	1.3 J to 5	6	490	NG	0.5/58
Zinc	6/6	4	1.6 J to 7	36	23,000	200	10/NG

[1] Frequency of detection is the number of samples in which the analyte was detected over the total number of samples analyzed (9SS1, 9SS2, 9SS3, 9SS4, 9SS5, and 9SS6 including a duplicate at 9SS2).
[2] FDEP memorandum dated September 29, 1995. Values presented are the lesser of the cleanup goals based on a residential land-use scenario.
[3] Dutch Soil Cleanup (Interim) Act from Richardson, G.M., 1987. Values presented are the lesser of the cleanup goals based on background concentrations in Dutch soil or detection limits.
[4] U.S.Environmental Protection Agency Region III BTAG Screening Levels, August 1995.
[5] Average of sample and duplicate.
[6] U.S. Environmental Protection Agency Region III cleanup value for thallium sulfate.

Notes: **Bold** indicates at least one sample exceeds at least one criterion. Bkg criteria

NAS = Naval Air Station.
FDEP = Florida Department of Environmental Protection.
BTAG = biological technical assistance group.
mg/kg = milligrams per kilogram.
NG = none given.
J = estimated value.

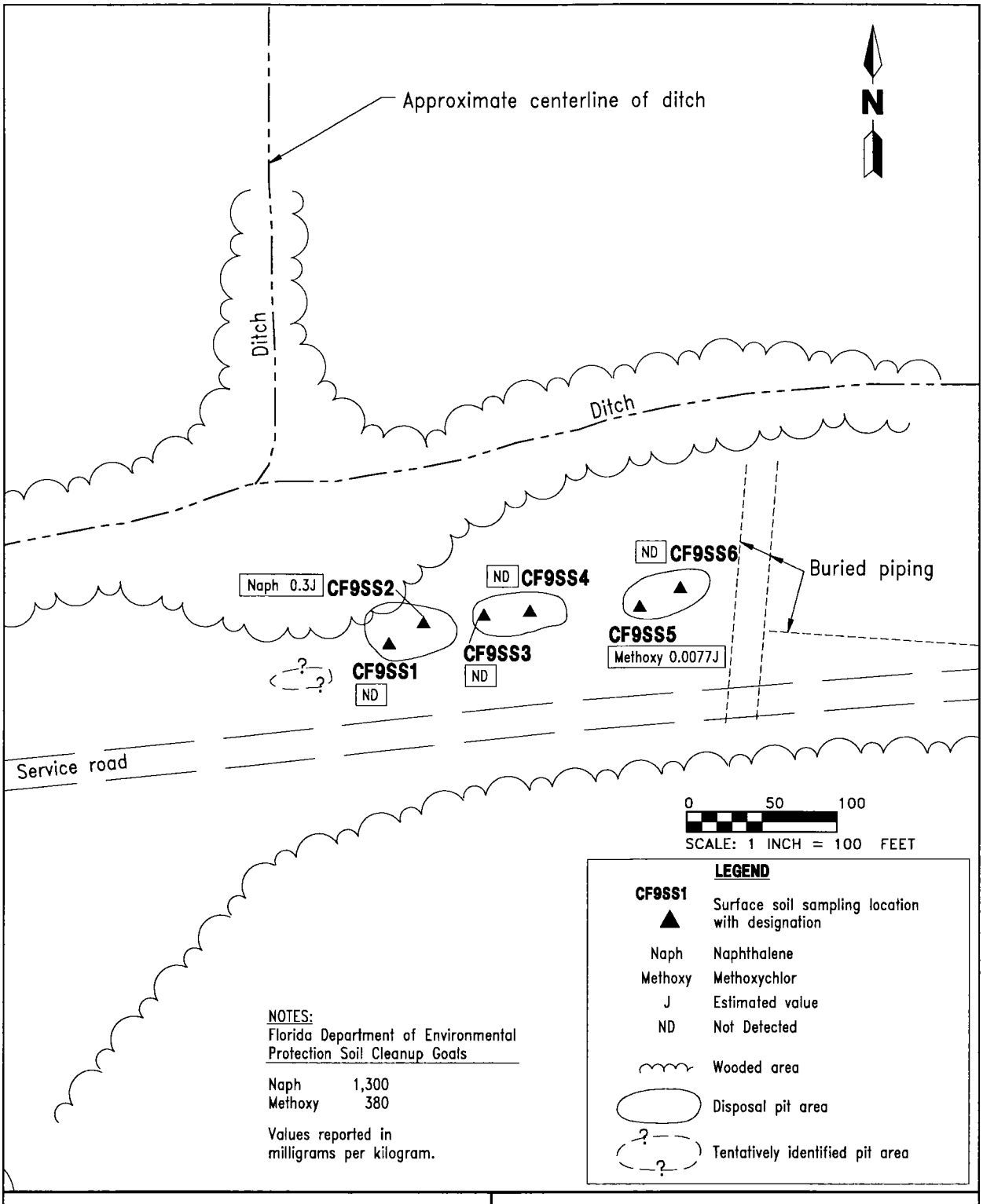

FIGURE 5-1
ORGANIC COMPOUNDS IN SURFACE SOIL

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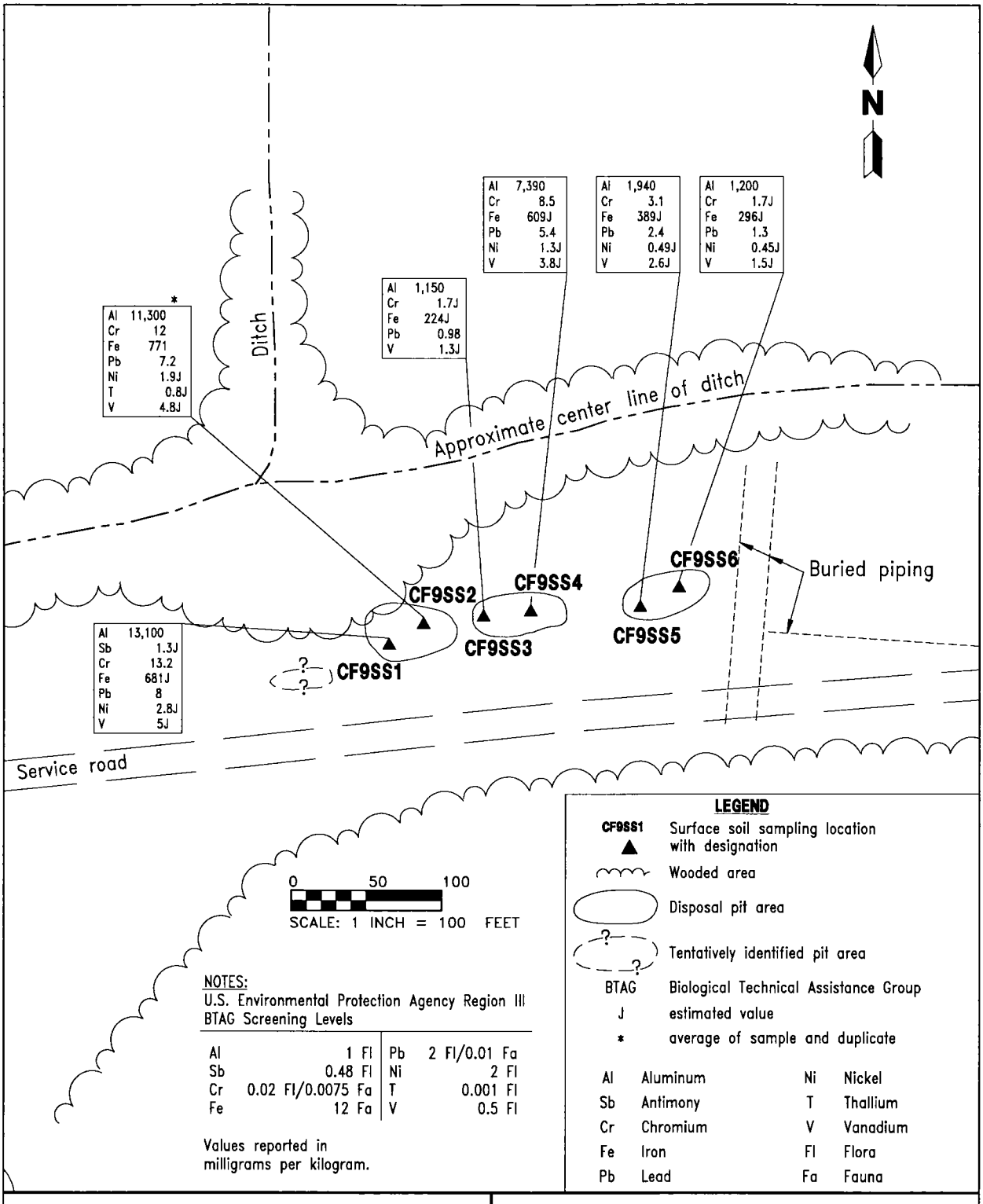
TECHNICAL MEMORANDUM FOR NO FURTHER ACTION, POTENTIAL SOURCE OF CONTAMINATION 9

NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA



NOTES:
U.S. Environmental Protection Agency Region III BTAG Screening Levels

Al	1 Fl	Pb	2 Fl/0.01 Fa
Sb	0.48 Fl	Ni	2 Fl
Cr	0.02 Fl/0.0075 Fa	T	0.001 Fl
Fe	12 Fa	V	0.5 Fl

Values reported in milligrams per kilogram.

FIGURE 5-2
INORGANIC COMPOUNDS IN SURFACE SOIL

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TECHNICAL MEMORANDUM FOR NO FURTHER ACTION, POTENTIAL SOURCE OF CONTAMINATION 9

NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA

mg/kg. These concentrations exceed chromium BTAG flora and fauna criteria of 0.02 and 0.0075 mg/kg, respectively. Iron was detected in all six samples at concentrations ranging from 224 to 771 (average of sample and duplicate) mg/kg. These concentrations exceed the BTAG fauna criterion of 12 mg/kg for iron. Lead was detected in all six samples at concentrations ranging from 0.98 to 8 mg/kg. Both flora and fauna BTAG criteria (2 and 0.01 mg/kg, respectively) for lead were exceeded. Nickel was detected in five of the six samples at concentrations ranging from 0.45 J to 2.8 J mg/kg. The sample from CF9SS1 (2.8 J mg/kg) exceeds the BTAG flora criterion for nickel of 2 mg/kg. Thallium was detected in only one of the six samples at a concentration of 1.1 J (CF9SS2); thallium was not, however, detected in the duplicate sample (CF9SS2D). This concentration exceeds the flora BTAG criterion for thallium of 0.001 mg/kg. The average value of CF9SS2 and its duplicate is 0.8 mg/kg. Vanadium was detected in all six samples at concentrations ranging from 1.3 J to 5 mg/kg. These concentrations exceed the flora BTAG criterion for vanadium of 0.5 mg/kg.

5.2 SUBSURFACE SOIL. Three confirmatory subsurface soil samples (CF9SB1 through CF9SB3) were collected between 1 and 2 feet bls. Summaries of the confirmatory analytical results for subsurface soil samples are presented in Table 5-3. A complete analytical data set for PSC 9 confirmatory samples is presented in Appendix A.

Subsurface soil analytical results were compared to the following criteria: (1) industrial land-use soil cleanup goals for Florida, as listed in a memorandum dated September 29, 1995, (FDEP, 1995); and (2) background concentrations in soil or detection limits soil criteria for evaluating the severity of contamination under the Dutch Soil Cleanup (Interim) Act (Richardson, 1987).

VOCs in Subsurface Soil. No VOCs were detected in subsurface soil samples.

SVOCs in Subsurface Soil. No SVOCs were detected in subsurface soil samples.

Pesticides and PCBs in Subsurface Soil. No pesticides or PCBs were detected in subsurface soil samples.

Inorganics in Subsurface Soil. Fourteen inorganic analytical parameters were detected in the confirmatory subsurface soil samples collected at PSC 9. None of these inorganic concentrations were greater than FDEP industrial land-use soil cleanup goals or Dutch screening criteria.

5.3 GROUNDWATER. Two confirmatory groundwater samples (CF9MW1S and CF9MW2S) were collected at PSC 9. The groundwater data were compared to State and Federal drinking water standards and NAS Cecil Field screening criteria for inorganics as established by the NAS Cecil Field partnering team. The NAS Cecil Field screening values were determined by using the nonparametric upper-outside value cutoffs as described in *Understanding Robust and Exploratory Data Analysis* (Hoaglin et al., 1983). These screening values were developed from data collected throughout NAS Cecil Field. Summaries of the confirmatory analytical results for groundwater samples are presented on Figures 5-3 and 5-4 and in Tables 5-4 and 5-5. A complete analytical data set for PSC 9 confirmatory samples is presented in Appendix A.

Table 5-3
Inorganic Compounds in Subsurface Soil

Technical Memorandum for No Further Action
Potential Source of Contamination 9
Naval Air Station Cecil Field
Jacksonville, Florida

Analytical Parameter	Frequency of Detection[1]	Range of Reporting Limits	Range of Detected Concentrations	FDEP Soil Cleanup Goals[2]	FDEP Soil Cleanup Goals[3]	Dutch Numbers[4]
Subsurface Soil						
Inorganic Analytes (mg/kg)						
Aluminum	3/3	40	2,040 to [5]5,980	1E+06	NC	NG
Arsenic	1/3	2	0.6 J	3.7	NC	20
Barium	3/3	40	2.8 J to [5]6.4 J	84,000	NC	200
Calcium	3/3	1,000	88.9 J to 9,670 J	NG	NG	NG
Chromium	3/3	2	2.7 to [5]6.9	430	NC	100
Copper	3/3	5	1.4 J to 1.9 J	NG	NG	50
Iron	3/3	20	341 to [5]976 J	NG	NG	NG
Lead	3/3	0.6	1.6 to [5]4.4	1,000	NC	50
Magnesium	3/3	1,000	57.6 J to [5]136 J	NG	NG	NG
Manganese	3/3	3	1.8 J to [5]4.5	5,500	NG	NG
Nickel	2/3	8	0.53 J to [5]1.4 J	26,000	NC	50
Potassium	1/3	1,000	[5]32.5 J	NG	NG	NG
Vanadium	3/3	10	1.7 J to [5]4.4 J	4,800	NC	NG
Zinc	3/3	4	1.7 J to [5]2.4 J	560,000	NC	200

[1] Frequency of detection is the number of samples in which the analyte was detected over the total number of samples analyzed. Samples analyzed were 9SB1, 9SB2, and 9SB3, including a duplicate at 9SB2.
[2] FDEP memorandum dated September 29, 1995. Values presented are based on an industrial land-use scenario.
[3] FDEP memorandum dated September 29, 1995. Values presented are based on soil leaching.
[4] Dutch Soil Cleanup (Interim) Act from Richardson, G.M., 1987. Values presented are the lesser of the cleanup goals-based background concentrations in soil or detection limits.
[5] Average of sample and duplicate.

Notes: FDEP = Florida Department of Environmental Protection.
mg/kg = milligrams per kilogram.
1E+06=1,000,000 mg/kg.
NC = not calculated.
NG = none given.
J = estimated value.

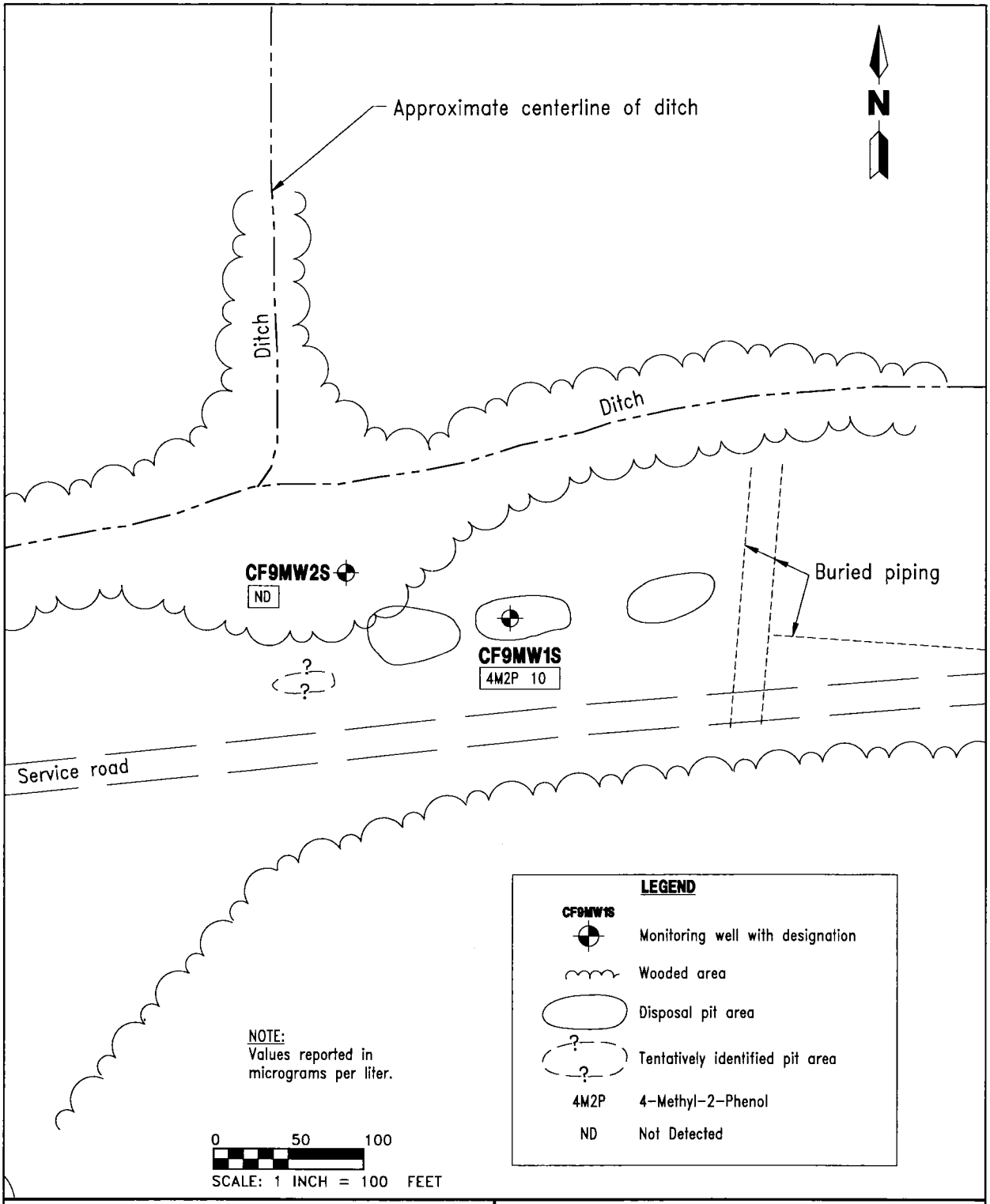

FIGURE 5-3
ORGANIC COMPOUNDS IN GROUNDWATER

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TECHNICAL MEMORANDUM FOR NO FURTHER ACTION, POTENTIAL SOURCE OF CONTAMINATION 9

NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA

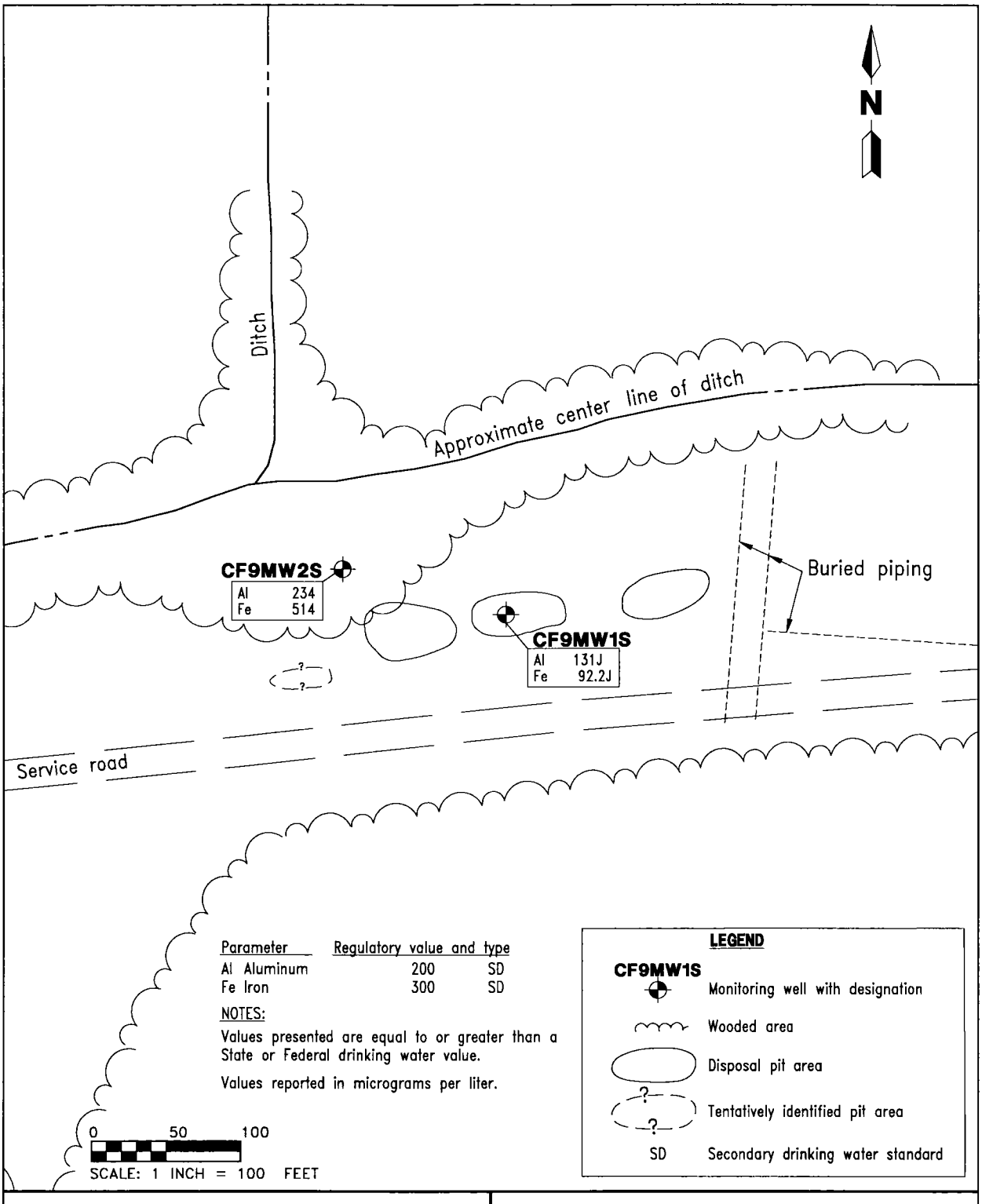

FIGURE 5-4
INORGANIC COMPOUNDS IN GROUNDWATER

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TECHNICAL MEMORANDUM FOR NO FURTHER ACTION, POTENTIAL SOURCE OF CONTAMINATION 9

NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA

Table 5-4
Organic Compounds in Groundwater

Technical Memorandum for No Further Action
Potential Source of Contamination 9
Naval Air Station Cecil Field
Jacksonville, Florida

Analytical Parameter	Frequency of Detection[1]	Range of Reporting Limits	Range of Detected Concentrations	FDEP Regulatory Value[2]
Groundwater				
Volatile Organic Compounds ($\mu g/\ell$)				
4-Methyl-2-pentanone	1/2	10	10	350 G

[1] Frequency of detection is the number of samples in which the analyte was detected over the total number of samples analyzed (9MW1S and 9MW2S).
[2] Regulatory values represent values for drinking water standards or guidance values from either State or Federal agencies.

Notes: FDEP = Florida Department of Environmental Protection.
$\mu g/\ell$ = micrograms per liter.
G= guidance value.

Table 5-5
Inorganic Compounds in Groundwater

Technical Memorandum for No Further Action
Potential Source of Contamination 9
Naval Air Station Cecil Field
Jacksonville, Florida

Analytical Parameter	Frequency of Detection[1]	Range of Reporting Limits	Range of Detected Concentrations	NAS Cecil Field Screening Criteria	FDEP Regulatory Value[2]
Groundwater					
Inorganic Analytes (µg/ℓ)					
Aluminum	2/2	200	131 J to 234	13,100	200 SD
Barium	2/2	200	5.8 J to 7.4 J	88.2	2,000 PD
Calcium	2/2	5,000	1,690 J to 3,060 J	81,100	NG
Iron	2/2	100	92.2 J to 514	7,760	300 SD
Magnesium	2/2	5,000	255 J to 852 J	10,000	NG
Manganese	2/2	15	1.1 J to 6.6 J	96.2	50 SD
Mercury	2/2	0.2	0.1 J to 0.11 J	0.34	2 PD
Sodium	2/2	5,000	1,690 J to 3,940 J	16,500	160,000 PD
Vanadium	1/2	50	1.6 J	20.2	49 G
Zinc	2/2	20	19.3 J to 30.7	76.8	5,000 SD

[1] Frequency of detection is the number of samples in which the analyte was detected over the total number of samples analyzed (9MW1S and 9MW2S).
[2] Values represent regulatory drinking water standards or guidance values from either State or Federal agencies.

Notes: NAS = Naval Air Station.
FDEP = Florida Department of Environmental Protection.
µg/ℓ = micrograms per liter.
SD = secondary drinking water standard - not a health-based criterion.
J = estimated value.
PD = primary drinking water standard.
NG = none given.
G = guidance value.

VOCs in Groundwater. One VOC, 4-methyl-2-pentanone, was detected in only one groundwater sample, CF9MW1S, at a concentration of 10 micrograms per liter ($\mu g/\ell$). The State of Florida guidance concentration for 4-methyl-2-pentanone is 350 $\mu g/\ell$ (Figure 5-3).

SVOCs in Groundwater. No SVOCs were detected in groundwater samples at PSC 9.

Pesticides and PCBs in Groundwater. No pesticides or PCBs were detected in groundwater samples at PSC 9.

Inorganics in Groundwater. Ten inorganic analytical parameters were detected in the confirmatory groundwater samples collected at PSC 9. The confirmatory inorganic analytical results for groundwater are summarized in Table 5-4.

Only aluminum and iron were detected at concentrations above State or Federal drinking water standards. However, aluminum and iron were below the NAS Cecil Field screening criteria of 13,100 $\mu g/\ell$ for aluminum and 7,760 $\mu g/\ell$ for iron, as established by the NAS Cecil Field partnering team. The distributions of aluminum and iron concentrations in groundwater samples are presented on Figure 5-4.

Aluminum was detected in both samples at concentrations ranging from 131 J to 234 $\mu g/\ell$. The sample from CF9MW2S (234 $\mu g/\ell$) exceeds the State of Florida secondary drinking water standard of 200 $\mu g/\ell$. Iron was detected in both samples at concentrations from 92.2 J to 514 $\mu g/\ell$. The sample from CF9MW1S (514 $\mu g/\ell$) exceeds the State of Florida secondary drinking water standard of 300 $\mu g/\ell$.

6.0 PRELIMINARY RISK EVALUATION

A PRE was performed to evaluate the potential risks to human health and the environment posed by chemicals detected at PSC 9. This evaluation is not as comprehensive as a risk assessment due to the limited information available on the nature and extent of the chemicals present in soil and groundwater at PSC 9. To compensate for the limited amount of information, stringent criteria (both regulatory and guidance) are used in a PRE to identify whether or not site conditions can be expected to pose significant risk to warrant more detailed investigation and assessment.

6.1 PUBLIC HEALTH PRE. A human health PRE was conducted to evaluate the potential risks to human receptors at PSC 9. The PRE assumes residential exposures to surface soil and groundwater, and an industrial exposure to the subsurface soil, at PSC 9. The human health PRE methodology is described in Appendix C.

6.1.1 Site Description and Human Health Exposure Pathways PSC 9 is presently not developed. Potential receptors include trespassers, site maintenance workers, and excavation workers.

6.1.2 Surface Soil No VOCs, SVOCs, pesticides, PCBs, or inorganics were detected above FDEP residential-based soil cleanup goals. The only inorganics detected above NAS Cecil Field screening criteria were aluminum, calcium, and chromium. However, the maximum detected concentration of aluminum (13,100 mg/kg) was considerably below the FDEP soil cleanup goal for aluminum of 75,000 mg/kg. Calcium is considered an essential nutrient by the USEPA. The maximum detected concentration of chromium (13.2 mg/kg) was considerably below the FDEP residential-based cleanup goal and the Dutch screening criterion for chromium of 290 mg/kg and 100 mg/kg, respectively. The human health risk ratios for these inorganics and a comparison of the exceedance above FDEP soil cleanup goals are presented in Table 6-1.

6.1.3 Subsurface Soil No VOCs, SVOCs, pesticides, PCBs, or inorganics were detected above FDEP industrial-based soil cleanup goals. Therefore, a human health PRE was not required for subsurface soil.

6.1.4 Groundwater

6.1.4.1 Organics No VOCs, SVOCs, pesticides, or PCBs were detected in groundwater above State or Federal drinking water standards.

6.1.4.2 Inorganics No inorganics were detected in groundwater above NAS Cecil Field screening criteria. Only aluminum and iron were detected at concentrations above State or Federal secondary drinking water standards. As noted in Appendix C, it is inappropriate to use secondary drinking water standards to calculate a health-based risk ratio. However, as a risk management tool, it can be useful to present a ratio of maximum detected groundwater concentration of an analyte to the secondary drinking water standard. This is presented in Table 6-2 as an exceedance ratio. Table 6-2 also provides the USEPA classification of carcinogen or noncarcinogen for the analyte.

Table 6-1
Surface Soil Analytes Detected above Human Health Screening Criteria or NAS Cecil Field Screening Criteria

Technical Memorandum for No Further Action
Potential Source of Contamination 9
Naval Air Station Cecil Field
Jacksonville, Florida

Analyte	Frequency of Detection[1]	Screening Concentration[2]	NAS Cecil Field Screening Criteria[3]	FDEP Soil Cleanup Goals[4]	Human Health Risk Ratio	C or N[5]
Volatile Organic Compounds (mg/kg)						
None detected above screening values.						
Semivolatile Organic Compounds (mg/kg)						
None detected above screening values.						
Pesticides and PCBs (mg/kg)						
None detected above screening values.						
Inorganic Analytes (mg/kg)						
Aluminum	6/6	13,100	4,400	75,000	0.17	N
Calcium	6/6	25,900	9	NG	NG	N
Chromium	6/6	13.2	8	290	0.04	N

[1] Frequency of detection is the number of samples in which the analyte was detected over the total number of samples analyzed. Samples analyzed were 9SS1, 9SS2, 9SS3, 9SS4, 9SS5, and 9SS6, including a duplicate at 9SS2.
[2] Maximum detected concentration selected for screening criteria.
[3] NAS Cecil Field screening criteria established by the NAS Cecil Field partnering team (inorganics only).
[4] FDEP memorandum dated September 29, 1995. Values are the lesser of the cleanup goals based on a residential land-use scenario.
[5] C = the analyte is considered a carcinogen by the USEPA. N = the analyte is considered a noncarcinogen by the USEPA.

Notes: See Appendix C for methods and assumptions used in calculation of screening values and for a list of references cited in this table.

NAS = Naval Air Station.
FDEP = Florida Department of Environmental Protection.
mg/kg = micrograms per kilogram.
NG = none given.
USEPA = U.S. Environmental Protection Agency.

Table 6-2
Groundwater Analytes Detected above Screening Criteria

Technical Memorandum for No Further Action
Potential Source of Contamination 9
Naval Air Station Cecil Field
Jacksonville, Florida

Analyte	Frequency of Detection[1]	Screening Concentration[2]	NAS Cecil Field Screening Criteria[3]	Regulatory Level[4]	Exceedance Ratio[5]	C or N[6]
Volatile Organic Compounds (µg/ℓ)						
None detected above screening values.						
Semivolatile Organic Compounds (µg/ℓ)						
None detected above screening values.						
Pesticides and PCBs (µg/ℓ)						
None detected above screening values.						
Inorganics, Unfiltered (µg/ℓ)						
Aluminum	2/2	234	13,100	200 SD	1.17	N
Iron	2/2	514	7,760	300 SD	1.71	N

[1] Frequency of detection is the number of samples in which the analyte was detected over the total number of samples analyzed. Wells sampled were 9MW1S and 9MW2S.
[2] Maximum detected concentration selected for screening criteria.
[3] NAS Cecil Field screening criteria established by the NAS Cecil Field partnering team (inorganics only).
[4] Secondary drinking water standards from State or Federal standards.
[5] Ratio of exceedance is the maximum detected concentration over the regulatory standard. This is not a risk ratio, as secondary groundwater standards are not risk based.
[6] C = the analyte is considered a carcinogen by the USEPA. N = the analyte is considered a noncarcinogen by the USEPA.

Notes: See Appendix C for methods and assumptions used in calculation of screening values and for a list of references cited in this table.

NAS = Naval Air Station.
µg/ℓ = micrograms per liter.
USEPA = U.S. Environmental Protection Agency.
SD = secondary drinking water standard.

The exceedance ratios for aluminum and iron are 1.17 and 1.71, respectively. These analytes are considered noncarcinogens by the USEPA. Although these analytes exceeded State or Federal secondary drinking water standards, they did not exceed NAS Cecil Field screening criteria.

6.1.5 Human Health PRE Conclusions This PRE analysis indicates that no adverse health effects would be expected in human receptors who come in contact with either the surface soil, subsurface soil, or groundwater at PSC 9. This conclusion is based on conservative exposure assumptions that are protective of all receptors, including sensitive subpopulations.

6.2 PRELIMINARY ECOLOGICAL RISK EVALUATION. An ecological PRE was conducted to evaluate potential risks to ecological receptors at PSC 9. Ecological habitats and receptors, and exposure pathways were characterized during site walkovers conducted by ABB-ES ecological risk assessors in September 1995 and October 1997. The PRE was conducted following the methodology presented in Appendix C.

6.2.1 Study-Area Characterization The ecological communities identified at PSC 9 included overgrown fields and disturbed uplands, which are dominated by shrubs, and herbaceous plants and grasses. These habitats would likely be of value to terrestrial wildlife, as well as to a variety of plants and invertebrates. The receptors most likely to utilize the site include terrestrial species such as the American robin (*Turdus migratorius*) and the cotton mouse (*Peromyscus gossypinus*). Additional wildlife species that may use the site would include the short-tailed shrew (*Blarina brevicauda*) and the red fox (*Vulpes vulpes*). In addition, terrestrial invertebrates and plants may also be present.

6.2.2 Identification of Potential Exposure Pathways Surface soil, subsurface soil, and groundwater samples were collected to support the PRE at PSC 9. Surface soil was the only medium evaluated in this PRE. Ecological receptors that would likely use this site would not burrow into subsurface soil, eliminating any chance of exposure. Exposure pathways for terrestrial wildlife include ingestion of prey items that have bioaccumulated contaminants in tissue, and direct contact and incidental ingestion of surface soil. Exposure pathways for soil invertebrates include direct contact and incidental ingestion of surface soil. Exposure pathways for plants include direct contact with surface soil. Groundwater was not evaluated in this PRE, as it does not discharge on site, and therefore no ecological exposure pathway exists.

6.2.3 Contaminant Evaluation Tables 5-1 and 5-2 summarize the analytes detected in surface soil. Maximum detected concentrations were compared to NAS Cecil Field screening criteria, the Dutch criteria A Soil Cleanup Values (Richardson, 1987), and the USEPA Region III BTAG criteria for flora and fauna (USEPA, 1995). This Tier I evaluation is consistent with methodology outlined in Appendix C.

A Tier II evaluation, as outlined in Appendix C, was conducted for analytes that were lacking any Tier I screening values or that were detected above the Tier I screening values and the NAS Cecil Field screening criteria. As a part of the Tier II evaluation, risk ratios were calculated for each of the screening criteria provided.

6.2.3.1 **Surface Soil** Tier I screening values were available for all of the analytes detected in surface soil, except calcium and potassium. However, both

of these analytes are essential nutrients and would not likely present a risk to ecological receptors. No pesticides or PCBs were detected above their Tier I screening values. One SVOC (naphthalene) was detected in surface soil at a concentration that exceeded available Tier I screening values. Three inorganics (aluminum, calcium, and chromium) were detected at concentrations above the NAS Cecil Field screening criteria. Table 6-3 presents the Tier II risk ratios for these organic and inorganic analytes.

Calcium was not included in the Tier II ecological risk ratios because it is considered an essential nutrient by the USEPA. No invertebrate screening value was identified for aluminum in the Tier II evaluation for surface soil at PSC 9. No calculated risk ratios for wildlife or invertebrates were above 1 indicating no potential for toxicity to these receptors. The plant risk ratio for naphthalene was also well below 1. The plant risk ratios for aluminum and chromium were 260 and 13.2, respectively. Although the risk ratios for aluminum and chromium exceed the screening criteria of 1, it is unlikely that these analytes would cause toxic effects to plants as the screening criteria is conservative. The plant screening criterion for aluminum (50 mg/kg) presented in Will and Suter (1995) is based on one study using an agricultural species and is given a low degree of confidence by those authors. It is likely that non-agricultural plant species occurring in the wild would have a much higher tolerance to aluminum. The plant screening criteria for chromium (1 mg/kg) presented in Will and Suter (1995), is also given a low degree of confidence, as it is also based on a small number of studies. In addition, no stressed vegetation was observed at the site during the site walkovers.

Table 6-3
Tier II Ecological Risk Ratios for Surface Soil Analytes Detected above Ecological Tier I Screening Values

Technical Memorandum for No Further Action
Potential Source of Contamination 9
Naval Air Station Cecil Field
Jacksonville, Florida

Analyte	Frequency of Detection[1]	Maximum Detected Concentration	Plant Screening Value (mg/kg)[2]	Invertebrate Screening Value (mg/kg)[3]	Wildlife Screening Value (mg/kg)[4]	Risk Ratios (P, I, W)[5]
Semivolatile Organic Compounds (mg/kg)						
Naphthalene	1/6	0.3	100	34	3,300	0.003 P 0.009 I 0.0001 W
Inorganic Analytes (mg/kg)						
Aluminum	6/6	13,100	50	NA	54,000	260 P 0.24 W
Chromium	6/6	13.2	1	50	14,000	13.2 P 0.26 I 0.0009 W

[1] Frequency of detection is the number of samples in which the analyte was detected over the total number of samples analyzed. Samples analyzed were 9SS1, 9SS2, 9SS3, 9SS4, 9SS5, and 9SS6, including a duplicate at 9SS2.
[2] Phytotoxicity screening values are from Will and Suter, 1995. The screening value is the lowest observed effect concentration from among plant growth studies conducted in solid media. (See Appendix C, Table C-2 for further information.)
[3] Invertebrate screening values are from Neuhauser et al., 1985, and others. (See Appendix C, Table C-2.)
[4] Wildlife screening values are protective contaminant levels (PCLs) from Appendix C, Table C-2, and are derived as described in Appendix C. The value presented represents the lowest PCL for the short-tailed shrew, cotton mouse, American robin, red-tailed hawk, or red fox.
[5] The screening value is exceeded for receptor group, as represented by the following letter code:
P = Plant screening value
I = Invertebrate screening value
W = Wildlife screening value

Notes: See Appendix C for methods and assumptions used in calculation of screening values and for a list of references cited in this table.

mg/kg = milligrams per kilogram.
NA = not available.

7.0 CONCLUSIONS AND RECOMMENDATIONS

7.1 CONCLUSIONS. Disposal activities were conducted at PSC 9, recent grease pits, for approximately 15 months during 1983 and 1984. Approximately 400 to 500 gallons of grease and water were disposed of weekly. Field investigations at PSC 9 have included records reviews, visual observations since 1985, geophysical surveys (magnetometer, very low frequency electromagnetic, and ground-penetrating radar), surface and subsurface soil, groundwater sample and analysis, and piezometric measurements at two monitoring wells.

Conclusions pertaining to PSC 9 are listed below.

- The soil is relatively permeable, fine-grained sand, with some silt and clay, with no evidence of waste materials.
- Horizontal groundwater flow in the surficial aquifer is interpreted to be northwesterly toward the drainage ditch.
- No VOCs, SVOCs, pesticides, PCBs, or inorganics were detected in surface and subsurface soils above FDEP cleanup goals.
- BTAG flora and fauna criterion for naphthalene (0.1 mg/kg) was exceeded in one surface soil sample (CF9SS2) at a concentration of 0.3 J mg/kg.
- Aluminum, antimony, chromium, iron, lead, nickel, thallium, and vanadium were detected in surface soil above BTAG criteria.
- No VOCs, SVOCs, pesticides, and PCBs were detected in groundwater samples above State and Federal drinking water standards.
- Aluminum and iron were detected in groundwater above State and Federal secondary (not health-based) drinking water standards of 200 $\mu g/\ell$ and 300 $\mu g/\ell$, respectively.
- No adverse human health or ecological effects are expected in human or ecological receptors that come into contact with either the surface soil, subsurface soil, or groundwater at PSC 9.

7.2 RECOMMENDATIONS. In accordance with the PRE methodology in Appendix C, evaluation of the data gathered during the field investigation at PSC 9 indicates that significant ecological and human health risks are not expected at the site; therefore, no further action is warranted.

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APPENDIX A

CONFIRMATORY ANALYTICAL DATA

NAS CECIL FIELD -- POTENTIAL SOURCE OF CONTAMINATION 9
SURFACE SOIL -- VOLATILES -- REPORT NO. 9463

Lab Sample Number:	C9GHM				C9GHP				C9GHQ				C9GHR			
Site	PSC9				PSC9				PSC9				PSC9			
Locator	CF9SS1				CF9SS2				CF9SS2D				CF9SS3			
Collect Date:	07-MAY-97				07-MAY-97				07-MAY-97				07-MAY-97			
	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL
CLP VOLATILES 90-SOW																
Chloromethane	11	U	ug/kg	11	11	U	ug/kg	11	11	U	ug/kg	11	11	U	ug/kg	11
Bromomethane	11	U	ug/kg	11	11	U	ug/kg	11	11	U	ug/kg	11	11	U	ug/kg	11
Vinyl chloride	11	U	ug/kg	11	11	U	ug/kg	11	11	U	ug/kg	11	11	U	ug/kg	11
Chloroethane	11	U	ug/kg	11	11	U	ug/kg	11	11	U	ug/kg	11	11	U	ug/kg	11
Methylene chloride	11	U	ug/kg	11	11	U	ug/kg	11	11	U	ug/kg	11	11	U	ug/kg	11
Acetone	11	U	ug/kg	11	11	U	ug/kg	11	11	U	ug/kg	11	11	U	ug/kg	11
Carbon disulfide	11	U	ug/kg	11	11	U	ug/kg	11	11	U	ug/kg	11	11	U	ug/kg	11
1,1-Dichloroethene	11	U	ug/kg	11	11	U	ug/kg	11	11	U	ug/kg	11	11	U	ug/kg	11
1,1-Dichloroethane	11	U	ug/kg	11	11	U	ug/kg	11	11	U	ug/kg	11	11	U	ug/kg	11
1,2-Dichloroethene (total)	11	U	ug/kg	11	11	U	ug/kg	11	11	U	ug/kg	11	11	U	ug/kg	11
Chloroform	11	U	ug/kg	11	11	U	ug/kg	11	11	U	ug/kg	11	11	U	ug/kg	11
1,2-Dichloroethane	11	U	ug/kg	11	11	U	ug/kg	11	11	U	ug/kg	11	11	U	ug/kg	11
2-Butanone	11	U	ug/kg	11	11	U	ug/kg	11	11	U	ug/kg	11	11	U	ug/kg	11
1,1,1-Trichloroethane	11	U	ug/kg	11	11	U	ug/kg	11	11	U	ug/kg	11	11	U	ug/kg	11
Carbon tetrachloride	11	U	ug/kg	11	11	U	ug/kg	11	11	U	ug/kg	11	11	U	ug/kg	11
Bromodichloromethane	11	U	ug/kg	11	11	U	ug/kg	11	11	U	ug/kg	11	11	U	ug/kg	11
1,2-Dichloropropane	11	U	ug/kg	11	11	U	ug/kg	11	11	U	ug/kg	11	11	U	ug/kg	11
cis-1,3-Dichloropropene	11	U	ug/kg	11	11	U	ug/kg	11	11	U	ug/kg	11	11	U	ug/kg	11
Trichloroethene	11	U	ug/kg	11	11	U	ug/kg	11	11	U	ug/kg	11	11	U	ug/kg	11
Dibromochloromethane	11	U	ug/kg	11	11	U	ug/kg	11	11	U	ug/kg	11	11	U	ug/kg	11
1,1,2-Trichloroethane	11	U	ug/kg	11	11	U	ug/kg	11	11	U	ug/kg	11	11	U	ug/kg	11
Benzene	11	U	ug/kg	11	11	U	ug/kg	11	11	U	ug/kg	11	11	U	ug/kg	11
trans-1,3-Dichloropropene	11	U	ug/kg	11	11	U	ug/kg	11	11	U	ug/kg	11	11	U	ug/kg	11
Bromoform	11	U	ug/kg	11	11	U	ug/kg	11	11	U	ug/kg	11	11	U	ug/kg	11
4-Methyl-2-pentanone	11	U	ug/kg	11	11	U	ug/kg	11	11	U	ug/kg	11	11	U	ug/kg	11
2-Hexanone	11	U	ug/kg	11	11	U	ug/kg	11	11	U	ug/kg	11	11	U	ug/kg	11
Tetrachloroethene	11	U	ug/kg	11	11	U	ug/kg	11	11	U	ug/kg	11	11	U	ug/kg	11
Toluene	11	U	ug/kg	11	11	U	ug/kg	11	11	U	ug/kg	11	11	U	ug/kg	11
1,1,2,2-Tetrachloroethane	11	U	ug/kg	11	11	U	ug/kg	11	11	U	ug/kg	11	11	U	ug/kg	11
Chlorobenzene	11	U	ug/kg	11	11	U	ug/kg	11	11	U	ug/kg	11	11	U	ug/kg	11
Ethylbenzene	11	U	ug/kg	11	11	U	ug/kg	11	11	U	ug/kg	11	11	U	ug/kg	11
Styrene	11	U	ug/kg	11	11	U	ug/kg	11	11	U	ug/kg	11	11	U	ug/kg	11
Xylenes (total)	11	U	ug/kg	11	11	U	ug/kg	11	11	U	ug/kg	11	11	U	ug/kg	11

U = NOT DETECTED J = ESTIMATED VALUE
UJ = REPORTED QUANTITATION LIMIT IS QUALIFIED AS ESTIMATED
R = RESULT IS REJECTED AND UNUSABLE

NAS CECIL FIELD -- POTENTIAL SOURCE OF CONTAMINATION 9
SURFACE SOIL -- VOLATILES -- REPORT NO. 9463

Lab Sample Number:		C9GHT				C9GHX				C9GJ1		
Site		PSC9				PSC9				PSC9		
Locator		CF9SS4				CF9SS5				CF9SS6		
Collect Date:		07-MAY-97				07-MAY-97				07-MAY-97		
	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL
CLP VOLATILES 90-SOW												
Chloromethane	11	U	ug/kg	11	11	U	ug/kg	11	10	U	ug/kg	10
Bromomethane	11	U	ug/kg	11	11	U	ug/kg	11	10	U	ug/kg	10
Vinyl chloride	11	U	ug/kg	11	11	U	ug/kg	11	10	U	ug/kg	10
Chloroethane	11	U	ug/kg	11	11	U	ug/kg	11	10	U	ug/kg	10
Methylene chloride	11	U	ug/kg	11	11	U	ug/kg	11	10	U	ug/kg	10
Acetone	11	U	ug/kg	11	11	U	ug/kg	11	10	U	ug/kg	10
Carbon disulfide	11	U	ug/kg	11	11	U	ug/kg	11	10	U	ug/kg	10
1,1-Dichloroethene	11	U	ug/kg	11	11	U	ug/kg	11	10	U	ug/kg	10
1,1-Dichloroethane	11	U	ug/kg	11	11	U	ug/kg	11	10	U	ug/kg	10
1,2-Dichloroethene (total)	11	U	ug/kg	11	11	U	ug/kg	11	10	U	ug/kg	10
Chloroform	11	U	ug/kg	11	11	U	ug/kg	11	10	U	ug/kg	10
1,2-Dichloroethane	11	U	ug/kg	11	11	U	ug/kg	11	10	U	ug/kg	10
2-Butanone	11	U	ug/kg	11	11	U	ug/kg	11	10	U	ug/kg	10
1,1,1-Trichloroethane	11	U	ug/kg	11	11	U	ug/kg	11	10	U	ug/kg	10
Carbon tetrachloride	11	U	ug/kg	11	11	U	ug/kg	11	10	U	ug/kg	10
Bromodichloromethane	11	U	ug/kg	11	11	U	ug/kg	11	10	U	ug/kg	10
1,2-Dichloropropane	11	U	ug/kg	11	11	U	ug/kg	11	10	U	ug/kg	10
cis-1,3-Dichloropropene	11	U	ug/kg	11	11	U	ug/kg	11	10	U	ug/kg	10
Trichloroethene	11	U	ug/kg	11	11	U	ug/kg	11	10	U	ug/kg	10
Dibromochloromethane	11	U	ug/kg	11	11	U	ug/kg	11	10	U	ug/kg	10
1,1,2-Trichloroethane	11	U	ug/kg	11	11	U	ug/kg	11	10	U	ug/kg	10
Benzene	11	U	ug/kg	11	11	U	ug/kg	11	10	U	ug/kg	10
trans-1,3-Dichloropropene	11	U	ug/kg	11	11	U	ug/kg	11	10	U	ug/kg	10
Bromoform	11	U	ug/kg	11	11	U	ug/kg	11	10	U	ug/kg	10
4-Methyl-2-pentanone	11	U	ug/kg	11	11	U	ug/kg	11	10	U	ug/kg	10
2-Hexanone	11	U	ug/kg	11	11	U	ug/kg	11	10	U	ug/kg	10
Tetrachloroethene	11	U	ug/kg	11	11	U	ug/kg	11	10	U	ug/kg	10
Toluene	11	U	ug/kg	11	11	U	ug/kg	11	10	U	ug/kg	10
1,1,2,2-Tetrachloroethane	11	U	ug/kg	11	11	U	ug/kg	11	10	U	ug/kg	10
Chlorobenzene	11	U	ug/kg	11	11	U	ug/kg	11	10	U	ug/kg	10
Ethylbenzene	11	U	ug/kg	11	11	U	ug/kg	11	10	U	ug/kg	10
Styrene	11	U	ug/kg	11	11	U	ug/kg	11	10	U	ug/kg	10
Xylenes (total)	11	U	ug/kg	11	11	U	ug/kg	11	10	U	ug/kg	10

U = NOT DETECTED J = ESTIMATED VALUE
UJ = REPORTED QUANTITATION LIMIT IS QUALIFIED AS ESTIMATED
R = RESULT IS REJECTED AND UNUSABLE

NAS CECIL FIELD -- POTENTIAL SOURCE OF CONTAMINATION 9
SURFACE SOIL -- SEMIVOLATILES -- REPORT NO. 9464

Lab Sample Number:	C9GHM				C9GHP				C9GHQ				C9GHR			
Site	PSC9				PSC9				PSC9				PSC9			
Locator	CF9SS1				CF9SS2				CF9SS2D				CF9SS3			
Collect Date:	07-MAY-97				07-MAY-97				07-MAY-97				07-MAY-97			
	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL
CLP SEMIVOLATILES 90-SOW																
Phenol	380	U	ug/kg	380	380	U	ug/kg	380	370	U	ug/kg	370	380	U	ug/kg	380
bis(2-Chloroethyl) ether	380	U	ug/kg	380	380	U	ug/kg	380	370	U	ug/kg	370	380	U	ug/kg	380
2-Chlorophenol	380	U	ug/kg	380	380	U	ug/kg	380	370	U	ug/kg	370	380	U	ug/kg	380
1,3-Dichlorobenzene	380	U	ug/kg	380	380	U	ug/kg	380	370	U	ug/kg	370	380	U	ug/kg	380
1,4-Dichlorobenzene	380	U	ug/kg	380	380	U	ug/kg	380	370	U	ug/kg	370	380	U	ug/kg	380
1,2-Dichlorobenzene	380	U	ug/kg	380	380	U	ug/kg	380	370	U	ug/kg	370	380	U	ug/kg	380
2-Methylphenol	380	U	ug/kg	380	380	U	ug/kg	380	370	U	ug/kg	370	380	U	ug/kg	380
2,2-oxybis(1-Chloropropane)	380	U	ug/kg	380	380	U	ug/kg	380	370	U	ug/kg	370	380	U	ug/kg	380
4-Methylphenol	380	U	ug/kg	380	380	U	ug/kg	380	370	U	ug/kg	370	380	U	ug/kg	380
N-Nitroso-di-n-propylamine	380	U	ug/kg	380	380	U	ug/kg	380	370	U	ug/kg	370	380	U	ug/kg	380
Hexachloroethane	380	U	ug/kg	380	380	U	ug/kg	380	370	U	ug/kg	370	380	U	ug/kg	380
Nitrobenzene	380	U	ug/kg	380	380	U	ug/kg	380	370	U	ug/kg	370	380	U	ug/kg	380
Isophorone	380	U	ug/kg	380	380	U	ug/kg	380	370	U	ug/kg	370	380	U	ug/kg	380
2-Nitrophenol	380	U	ug/kg	380	380	U	ug/kg	380	370	U	ug/kg	370	380	U	ug/kg	380
2,4-Dimethylphenol	380	U	ug/kg	380	380	U	ug/kg	380	370	U	ug/kg	370	380	U	ug/kg	380
bis(2-Chloroethoxy) methane	380	U	ug/kg	380	380	U	ug/kg	380	370	U	ug/kg	370	380	U	ug/kg	380
2,4-Dichlorophenol	380	U	ug/kg	380	380	U	ug/kg	380	370	U	ug/kg	370	380	U	ug/kg	380
1,2,4-Trichlorobenzene	380	U	ug/kg	380	380	U	ug/kg	380	370	U	ug/kg	370	380	U	ug/kg	380
Naphthalene	380	U	ug/kg	380	300	J	ug/kg	380	370	U	ug/kg	370	380	U	ug/kg	380
4-Chloroaniline	380	U	ug/kg	380	380	U	ug/kg	380	370	U	ug/kg	370	380	U	ug/kg	380
Hexachlorobutadiene	380	U	ug/kg	380	380	U	ug/kg	380	370	U	ug/kg	370	380	U	ug/kg	380
4-Chloro-3-methylphenol	380	U	ug/kg	380	380	U	ug/kg	380	370	U	ug/kg	370	380	U	ug/kg	380
2-Methylnaphthalene	380	U	ug/kg	380	380	U	ug/kg	380	370	U	ug/kg	370	380	U	ug/kg	380
Hexachlorocyclopentadiene	380	U	ug/kg	380	380	U	ug/kg	380	370	U	ug/kg	370	380	U	ug/kg	380
2,4,6-Trichlorophenol	380	U	ug/kg	380	380	U	ug/kg	380	370	U	ug/kg	370	380	U	ug/kg	380
2,4,5-Trichlorophenol	910	U	ug/kg	910	920	U	ug/kg	920	900	U	ug/kg	900	910	U	ug/kg	910
2-Chloronaphthalene	380	U	ug/kg	380	380	U	ug/kg	380	370	U	ug/kg	370	380	U	ug/kg	380
2-Nitroaniline	910	U	ug/kg	910	920	U	ug/kg	920	900	U	ug/kg	900	910	U	ug/kg	910
Dimethylphthalate	380	U	ug/kg	380	380	U	ug/kg	380	370	U	ug/kg	370	380	U	ug/kg	380
Acenaphthylene	380	U	ug/kg	380	380	U	ug/kg	380	370	U	ug/kg	370	380	U	ug/kg	380
2,6-Dinitrotoluene	380	U	ug/kg	380	380	U	ug/kg	380	370	U	ug/kg	370	380	U	ug/kg	380
3-Nitroaniline	910	U	ug/kg	910	920	U	ug/kg	920	900	U	ug/kg	900	910	U	ug/kg	910
Acenaphthene	380	U	ug/kg	380	380	U	ug/kg	380	370	U	ug/kg	370	380	U	ug/kg	380
2,4-Dinitrophenol	910	U	ug/kg	910	920	U	ug/kg	920	900	U	ug/kg	900	910	U	ug/kg	910
4-Nitrophenol	910	U	ug/kg	910	920	U	ug/kg	920	900	U	ug/kg	900	910	U	ug/kg	910
Dibenzofuran	380	U	ug/kg	380	380	U	ug/kg	380	370	U	ug/kg	370	380	U	ug/kg	380
2,4-Dinitrotoluene	380	U	ug/kg	380	380	U	ug/kg	380	370	U	ug/kg	370	380	U	ug/kg	380
Diethylphthalate	380	U	ug/kg	380	380	U	ug/kg	380	370	U	ug/kg	370	380	U	ug/kg	380
4-Chlorophenyl-phenylether	380	U	ug/kg	380	380	U	ug/kg	380	370	U	ug/kg	370	380	U	ug/kg	380
Fluorene	380	U	ug/kg	380	380	U	ug/kg	380	370	U	ug/kg	370	380	U	ug/kg	380
4-Nitroaniline	910	U	ug/kg	910	920	U	ug/kg	920	900	U	ug/kg	900	910	U	ug/kg	910
4,6-Dinitro-2-methylphenol	910	U	ug/kg	910	920	U	ug/kg	920	900	U	ug/kg	900	910	U	ug/kg	910
N-Nitrosodiphenylamine	380	U	ug/kg	380	380	U	ug/kg	380	370	U	ug/kg	370	380	U	ug/kg	380
4-Bromophenyl-phenylether	380	U	ug/kg	380	380	U	ug/kg	380	370	U	ug/kg	370	380	U	ug/kg	380
Hexachlorobenzene	380	U	ug/kg	380	380	U	ug/kg	380	370	U	ug/kg	370	380	U	ug/kg	380
Pentachlorophenol	910	U	ug/kg	910	920	U	ug/kg	920	900	U	ug/kg	900	910	U	ug/kg	910
Phenanthrene	380	U	ug/kg	380	380	U	ug/kg	380	370	U	ug/kg	370	380	U	ug/kg	380
Anthracene	380	U	ug/kg	380	380	U	ug/kg	380	370	U	ug/kg	370	380	U	ug/kg	380
Carbazole	380	U	ug/kg	380	380	U	ug/kg	380	370	U	ug/kg	370	380	U	ug/kg	380
Di-n-butylphthalate	380	U	ug/kg	380	380	U	ug/kg	380	370	U	ug/kg	370	380	U	ug/kg	380

NAS CECIL FIELD -- POTENTIAL SOURCE OF CONTAMINATION 9
SURFACE SOIL -- SEMIVOLATILES -- REPORT NO. 9464

Lab Sample Number:	C9GHM				C9GHP				C9GHQ				C9GHR			
Site	PSC9				PSC9				PSC9				PSC9			
Locator	CF9SS1				CF9SS2				CF9SS2D				CF9SS3			
Collect Date:	07-MAY-97				07-MAY-97				07-MAY-97				07-MAY-97			
	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL
Fluoranthene	380	U	ug/kg	380	380	U	ug/kg	380	370	U	ug/kg	370	380	U	ug/kg	380
Pyrene	380	U	ug/kg	380	380	U	ug/kg	380	370	U	ug/kg	370	380	U	ug/kg	380
Butylbenzylphthalate	380	U	ug/kg	380	380	U	ug/kg	380	370	U	ug/kg	370	380	U	ug/kg	380
3,3-Dichlorobenzidine	380	U	ug/kg	380	380	U	ug/kg	380	370	U	ug/kg	370	380	U	ug/kg	380
Benzo (a) anthracene	380	U	ug/kg	380	380	U	ug/kg	380	370	U	ug/kg	370	380	U	ug/kg	380
Chrysene	380	U	ug/kg	380	380	U	ug/kg	380	370	U	ug/kg	370	380	U	ug/kg	380
bis(2-Ethylhexyl) phthalate	380	U	ug/kg	380	380	U	ug/kg	380	370	U	ug/kg	370	380	U	ug/kg	380
Di-n-octylphthalate	380	U	ug/kg	380	380	U	ug/kg	380	370	U	ug/kg	370	380	U	ug/kg	380
Benzo (b) fluoranthene	380	U	ug/kg	380	380	U	ug/kg	380	370	U	ug/kg	370	380	U	ug/kg	380
Benzo (k) fluoranthene	380	U	ug/kg	380	380	U	ug/kg	380	370	U	ug/kg	370	380	U	ug/kg	380
Benzo (a) pyrene	380	U	ug/kg	380	380	U	ug/kg	380	370	U	ug/kg	370	380	U	ug/kg	380
Indeno (1,2,3-cd) pyrene	380	U	ug/kg	380	380	U	ug/kg	380	370	U	ug/kg	370	380	U	ug/kg	380
Dibenzo (a,h) anthracene	380	U	ug/kg	380	380	U	ug/kg	380	370	U	ug/kg	370	380	U	ug/kg	380
Benzo (g,h,i) perylene	380	U	ug/kg	380	380	U	ug/kg	380	370	U	ug/kg	370	380	U	ug/kg	380

U = NOT DETECTED J = ESTIMATED VALUE
UJ = REPORTED QUANTITATION LIMIT IS QUALIFIED AS ESTIMATED
R = RESULT IS REJECTED AND UNUSABLE

NAS CECIL FIELD -- POTENTIAL SOURCE OF CONTAMINATION 9
SURFACE SOIL -- SEMIVOLATILES -- REPORT NO. 9464

Lab Sample Number:		C9GHT				C9GHX				C9GJ1		
Site		PSC9				PSC9				PSC9		
Locator		CF9SS4				CF9SS5				CF9SS6		
Collect Date:		07-MAY-97				07-MAY-97				07-MAY-97		
	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL
CLP SEMIVOLATILES 90-SOW												
Phenol	370	U	ug/kg	370	350	U	ug/kg	350	350	U	ug/kg	350
bis(2-Chloroethyl) ether	370	U	ug/kg	370	350	U	ug/kg	350	350	U	ug/kg	350
2-Chlorophenol	370	U	ug/kg	370	350	U	ug/kg	350	350	U	ug/kg	350
1,3-Dichlorobenzene	370	U	ug/kg	370	350	U	ug/kg	350	350	U	ug/kg	350
1,4-Dichlorobenzene	370	U	ug/kg	370	350	U	ug/kg	350	350	U	ug/kg	350
1,2-Dichlorobenzene	370	U	ug/kg	370	350	U	ug/kg	350	350	U	ug/kg	350
2-Methylphenol	370	U	ug/kg	370	350	U	ug/kg	350	350	U	ug/kg	350
2,2-oxybis(1-Chloropropane)	370	U	ug/kg	370	350	U	ug/kg	350	350	U	ug/kg	350
4-Methylphenol	370	U	ug/kg	370	350	U	ug/kg	350	350	U	ug/kg	350
N-Nitroso-di-n-propylamine	370	U	ug/kg	370	350	U	ug/kg	350	350	U	ug/kg	350
Hexachloroethane	370	U	ug/kg	370	350	U	ug/kg	350	350	U	ug/kg	350
Nitrobenzene	370	U	ug/kg	370	350	U	ug/kg	350	350	U	ug/kg	350
Isophorone	370	U	ug/kg	370	350	U	ug/kg	350	350	U	ug/kg	350
2-Nitrophenol	370	U	ug/kg	370	350	U	ug/kg	350	350	U	ug/kg	350
2,4-Dimethylphenol	370	U	ug/kg	370	350	U	ug/kg	350	350	U	ug/kg	350
bis(2-Chloroethoxy) methane	370	U	ug/kg	370	350	U	ug/kg	350	350	U	ug/kg	350
2,4-Dichlorophenol	370	U	ug/kg	370	350	U	ug/kg	350	350	U	ug/kg	350
1,2,4-Trichlorobenzene	370	U	ug/kg	370	350	U	ug/kg	350	350	U	ug/kg	350
Naphthalene	370	U	ug/kg	370	350	U	ug/kg	350	350	U	ug/kg	350
4-Chloroaniline	370	U	ug/kg	370	350	U	ug/kg	350	350	U	ug/kg	350
Hexachlorobutadiene	370	U	ug/kg	370	350	U	ug/kg	350	350	U	ug/kg	350
4-Chloro-3-methylphenol	370	U	ug/kg	370	350	U	ug/kg	350	350	U	ug/kg	350
2-Methylnaphthalene	370	U	ug/kg	370	350	U	ug/kg	350	350	U	ug/kg	350
Hexachlorocyclopentadiene	370	U	ug/kg	370	350	U	ug/kg	350	350	U	ug/kg	350
2,4,6-Trichlorophenol	370	U	ug/kg	370	350	U	ug/kg	350	350	U	ug/kg	350
2,4,5-Trichlorophenol	890	U	ug/kg	890	850	U	ug/kg	850	840	U	ug/kg	840
2-Chloronaphthalene	370	U	ug/kg	370	350	U	ug/kg	350	350	U	ug/kg	350
2-Nitroaniline	890	U	ug/kg	890	850	U	ug/kg	850	840	U	ug/kg	840
Dimethylphthalate	370	U	ug/kg	370	350	U	ug/kg	350	350	U	ug/kg	350
Acenaphthylene	370	U	ug/kg	370	350	U	ug/kg	350	350	U	ug/kg	350
2,6-Dinitrotoluene	370	U	ug/kg	370	350	U	ug/kg	350	350	U	ug/kg	350
3-Nitroaniline	890	U	ug/kg	890	850	U	ug/kg	850	840	U	ug/kg	840
Acenaphthene	370	U	ug/kg	370	350	U	ug/kg	350	350	U	ug/kg	350
2,4-Dinitrophenol	890	U	ug/kg	890	850	U	ug/kg	850	840	U	ug/kg	840
4-Nitrophenol	890	U	ug/kg	890	850	U	ug/kg	850	840	U	ug/kg	840
Dibenzofuran	370	U	ug/kg	370	350	U	ug/kg	350	350	U	ug/kg	350
2,4-Dinitrotoluene	370	U	ug/kg	370	350	U	ug/kg	350	350	U	ug/kg	350
Diethylphthalate	370	U	ug/kg	370	350	U	ug/kg	350	350	U	ug/kg	350
4-Chlorophenyl-phenylether	370	U	ug/kg	370	350	U	ug/kg	350	350	U	ug/kg	350
Fluorene	370	U	ug/kg	370	350	U	ug/kg	350	350	U	ug/kg	350

NAS CECIL FIELD -- POTENTIAL SOURCE OF CONTAMINATION 9
SURFACE SOIL -- SEMIVOLATILES -- REPORT NO. 9464

Lab Sample Number:	C9GHT				C9GHX				C9GJ1			
Site	PSC9				PSC9				PSC9			
Locator	CF9SS4				CF9SS5				CF9SS6			
Collect Date:	07-MAY-97				07-MAY-97				07-MAY-97			
	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL
4-Nitroaniline	890	U	ug/kg	890	850	U	ug/kg	850	840	U	ug/kg	840
4,6-Dinitro-2-methylphenol	890	U	ug/kg	890	850	U	ug/kg	850	840	U	ug/kg	840
N-Nitrosodiphenylamine	370	U	ug/kg	370	350	U	ug/kg	350	350	U	ug/kg	350
4-Bromophenyl-phenylether	370	U	ug/kg	370	350	U	ug/kg	350	350	U	ug/kg	350
Hexachlorobenzene	370	U	ug/kg	370	350	U	ug/kg	350	350	U	ug/kg	350
Pentachlorophenol	890	U	ug/kg	890	850	U	ug/kg	850	840	U	ug/kg	840
Phenanthrene	370	U	ug/kg	370	350	U	ug/kg	350	350	U	ug/kg	350
Anthracene	370	U	ug/kg	370	350	U	ug/kg	350	350	U	ug/kg	350
Carbazole	370	U	ug/kg	370	350	U	ug/kg	350	350	U	ug/kg	350
Di-n-butylphthalate	370	U	ug/kg	370	350	U	ug/kg	350	350	U	ug/kg	350
Fluoranthene	370	U	ug/kg	370	350	U	ug/kg	350	350	U	ug/kg	350
Pyrene	370	U	ug/kg	370	350	U	ug/kg	350	350	U	ug/kg	350
Butylbenzylphthalate	370	U	ug/kg	370	350	U	ug/kg	350	350	U	ug/kg	350
3,3-Dichlorobenzidine	370	U	ug/kg	370	350	U	ug/kg	350	350	U	ug/kg	350
Benzo (a) anthracene	370	U	ug/kg	370	350	U	ug/kg	350	350	U	ug/kg	350
Chrysene	370	U	ug/kg	370	350	U	ug/kg	350	350	U	ug/kg	350
bis(2-Ethylhexyl) phthalate	370	U	ug/kg	370	350	U	ug/kg	350	350	U	ug/kg	350
Di-n-octylphthalate	370	U	ug/kg	370	350	U	ug/kg	350	350	U	ug/kg	350
Benzo (b) fluoranthene	370	U	ug/kg	370	350	U	ug/kg	350	350	U	ug/kg	350
Benzo (k) fluoranthene	370	U	ug/kg	370	350	U	ug/kg	350	350	U	ug/kg	350
Benzo (a) pyrene	370	U	ug/kg	370	350	U	ug/kg	350	350	U	ug/kg	350
Indeno (1,2,3-cd) pyrene	370	U	ug/kg	370	350	U	ug/kg	350	350	U	ug/kg	350
Dibenzo (a,h) anthracene	370	U	ug/kg	370	350	U	ug/kg	350	350	U	ug/kg	350
Benzo (g,h,i) perylene	370	U	ug/kg	370	350	U	ug/kg	350	350	U	ug/kg	350

U = NOT DETECTED J = ESTIMATED VALUE
UJ = REPORTED QUANTITATION LIMIT IS QUALIFIED AS ESTIMATED
R = RESULT IS REJECTED AND UNUSABLE

NAS CECIL FIELD -- POTENTIAL SOURCE OF CONTAMINATION 9
SURFACE SOIL -- PESTICIDES AND PCBs -+ REPORT NO. 9465

Lab Sample Number:	C9GHM				C9GHP				C9GHQ				C9GHR			
Site	PSC9				PSC9				PSC9				PSC9			
Locator	CF9SS1				CF9SS2				CF9SS2D				CF9SS3			
Collect Date:	07-MAY-97				07-MAY-97				07-MAY-97				07-MAY-97			
	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL
CLP PESTICIDES/PCBS 90-SOW																
alpha-BHC	1.9	U	ug/kg	1.9	1.9	U	ug/kg	1.9	1.9	U	ug/kg	1.9	1.9	U	ug/kg	1.9
beta-BHC	1.9	U	ug/kg	1.9	1.9	U	ug/kg	1.9	1.9	U	ug/kg	1.9	1.9	U	ug/kg	1.9
delta-BHC	1.9	U	ug/kg	1.9	1.9	U	ug/kg	1.9	1.9	U	ug/kg	1.9	1.9	U	ug/kg	1.9
gamma-BHC (Lindane)	1.9	U	ug/kg	1.9	1.9	U	ug/kg	1.9	1.9	U	ug/kg	1.9	1.9	U	ug/kg	1.9
Heptachlor	1.9	U	ug/kg	1.9	1.9	U	ug/kg	1.9	1.9	U	ug/kg	1.9	1.9	U	ug/kg	1.9
Aldrin	1.9	U	ug/kg	1.9	1.9	U	ug/kg	1.9	1.9	U	ug/kg	1.9	1.9	U	ug/kg	1.9
Heptachlor epoxide	1.9	U	ug/kg	1.9	1.9	U	ug/kg	1.9	1.9	U	ug/kg	1.9	1.9	U	ug/kg	1.9
Endosulfan I	1.9	U	ug/kg	1.9	1.9	U	ug/kg	1.9	1.9	U	ug/kg	1.9	1.9	U	ug/kg	1.9
Dieldrin	3.8	U	ug/kg	3.8	3.8	U	ug/kg	3.8	3.8	U	ug/kg	3.8	3.8	U	ug/kg	3.8
4,4-DDE	3.8	U	ug/kg	3.8	3.8	U	ug/kg	3.8	3.8	U	ug/kg	3.8	3.8	U	ug/kg	3.8
Endrin	3.8	U	ug/kg	3.8	3.8	U	ug/kg	3.8	3.8	U	ug/kg	3.8	3.8	U	ug/kg	3.8
Endosulfan II	3.8	U	ug/kg	3.8	3.8	U	ug/kg	3.8	3.8	U	ug/kg	3.8	3.8	U	ug/kg	3.8
4,4-DDD	3.8	U	ug/kg	3.8	3.8	U	ug/kg	3.8	3.8	U	ug/kg	3.8	3.8	U	ug/kg	3.8
Endosulfan sulfate	3.8	U	ug/kg	3.8	3.8	U	ug/kg	3.8	3.8	U	ug/kg	3.8	3.8	U	ug/kg	3.8
4,4-DDT	3.8	U	ug/kg	3.8	3.8	U	ug/kg	3.8	3.8	U	ug/kg	3.8	3.8	U	ug/kg	3.8
Methoxychlor	19	U	ug/kg	19	19	U	ug/kg	19	19	U	ug/kg	19	19	U	ug/kg	19
Endrin ketone	3.8	U	ug/kg	3.8	3.8	U	ug/kg	3.8	3.8	U	ug/kg	3.8	3.8	U	ug/kg	3.8
Endrin aldehyde	3.8	U	ug/kg	3.8	3.8	U	ug/kg	3.8	3.8	U	ug/kg	3.8	3.8	U	ug/kg	3.8
alpha-Chlordane	1.9	U	ug/kg	1.9	1.9	U	ug/kg	1.9	1.9	U	ug/kg	1.9	1.9	U	ug/kg	1.9
gamma-Chlordane	1.9	U	ug/kg	1.9	1.9	U	ug/kg	1.9	1.9	U	ug/kg	1.9	1.9	U	ug/kg	1.9
Toxaphene	190	U	ug/kg	190	190	U	ug/kg	190	190	U	ug/kg	190	190	U	ug/kg	190
Aroclor-1016	38	U	ug/kg	38	38	U	ug/kg	38	38	U	ug/kg	38	38	U	ug/kg	38
Aroclor-1221	76	U	ug/kg	76	77	U	ug/kg	77	75	U	ug/kg	75	75	U	ug/kg	75
Aroclor-1232	38	U	ug/kg	38	38	U	ug/kg	38	38	U	ug/kg	38	38	U	ug/kg	38
Aroclor-1242	38	U	ug/kg	38	38	U	ug/kg	38	38	U	ug/kg	38	38	U	ug/kg	38
Aroclor-1248	38	U	ug/kg	38	38	U	ug/kg	38	38	U	ug/kg	38	38	U	ug/kg	38
Aroclor-1254	38	U	ug/kg	38	38	U	ug/kg	38	38	U	ug/kg	38	38	U	ug/kg	38
Aroclor-1260	38	U	ug/kg	38	38	U	ug/kg	38	38	U	ug/kg	38	38	U	ug/kg	38

U = NOT DETECTED J = ESTIMATED VALUE
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R = RESULT IS REJECTED AND UNUSABLE

NAS CECIL FIELD -- POTENTIAL SOURCE OF CONTAMINATION 9
SURFACE SOIL -- PESTICIDES AND PCBs -- REPORT NO. 9465

Lab Sample Number:	C9GHT				C9GHX				C9GJ1			
Site	PSC9				PSC9				PSC9			
Locator	CF9SS4				CF9SS5				CF9SS6			
Collect Date:	07-MAY-97				07-MAY-97				07-MAY-97			
	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL
CLP PESTICIDES/PCBS 90-SOW												
alpha-BHC	1.8	U	ug/kg	1.8	1.8	U	ug/kg	1.8	1.8	U	ug/kg	1.8
beta-BHC	1.8	U	ug/kg	1.8	1.8	U	ug/kg	1.8	1.8	U	ug/kg	1.8
delta-BHC	1.8	U	ug/kg	1.8	1.8	U	ug/kg	1.8	1.8	U	ug/kg	1.8
gamma-BHC (Lindane)	1.8	U	ug/kg	1.8	1.8	U	ug/kg	1.8	1.8	U	ug/kg	1.8
Heptachlor	1.8	U	ug/kg	1.8	1.8	U	ug/kg	1.8	1.8	U	ug/kg	1.8
Aldrin	1.8	U	ug/kg	1.8	1.8	U	ug/kg	1.8	1.8	U	ug/kg	1.8
Heptachlor epoxide	1.8	U	ug/kg	1.8	1.8	U	ug/kg	1.8	1.8	U	ug/kg	1.8
Endosulfan I	1.8	U	ug/kg	1.8	1.8	U	ug/kg	1.8	1.8	U	ug/kg	1.8
Dieldrin	3.7	U	ug/kg	3.7	3.5	U	ug/kg	3.5	3.5	U	ug/kg	3.5
4,4-DDE	3.7	U	ug/kg	3.7	3.5	U	ug/kg	3.5	3.5	U	ug/kg	3.5
Endrin	3.7	U	ug/kg	3.7	3.5	U	ug/kg	3.5	3.5	U	ug/kg	3.5
Endosulfan II	3.7	U	ug/kg	3.7	3.5	U	ug/kg	3.5	3.5	U	ug/kg	3.5
4,4-DDD	3.7	U	ug/kg	3.7	3.5	U	ug/kg	3.5	3.5	U	ug/kg	3.5
Endosulfan sulfate	3.7	U	ug/kg	3.7	3.5	U	ug/kg	3.5	3.5	U	ug/kg	3.5
4,4-DDT	3.7	U	ug/kg	3.7	3.5	U	ug/kg	3.5	3.5	U	ug/kg	3.5
Methoxychlor	18	U	ug/kg	18	7.7	J	ug/kg	18	18	U	ug/kg	18
Endrin ketone	3.7	U	ug/kg	3.7	3.5	U	ug/kg	3.5	3.5	U	ug/kg	3.5
Endrin aldehyde	3.7	U	ug/kg	3.7	3.5	U	ug/kg	3.5	3.5	U	ug/kg	3.5
alpha-Chlordane	1.8	U	ug/kg	1.8	1.8	U	ug/kg	1.8	1.8	U	ug/kg	1.8
gamma-Chlordane	1.8	U	ug/kg	1.8	1.8	U	ug/kg	1.8	1.8	U	ug/kg	1.8
Toxaphene	180	U	ug/kg	180	180	U	ug/kg	180	180	U	ug/kg	180
Aroclor-1016	37	U	ug/kg	37	35	U	ug/kg	35	35	U	ug/kg	35
Aroclor-1221	74	U	ug/kg	74	71	U	ug/kg	71	70	U	ug/kg	70
Aroclor-1232	37	U	ug/kg	37	35	U	ug/kg	35	35	U	ug/kg	35
Aroclor-1242	37	U	ug/kg	37	35	U	ug/kg	35	35	U	ug/kg	35
Aroclor-1248	37	U	ug/kg	37	35	U	ug/kg	35	35	U	ug/kg	35
Aroclor-1254	37	U	ug/kg	37	35	U	ug/kg	35	35	U	ug/kg	35
Aroclor-1260	37	U	ug/kg	37	35	U	ug/kg	35	35	U	ug/kg	35

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NAS CECIL FIELD -- POTENTIAL SOURCE OF CONTAMINATION 9
SURFACE SOIL -- METALS -- REPORT NO. 9466

Lab Sample Number:	C9GHM				C9GHP				C9GHQ				C9GHR			
Site	PSC9				PSC9				PSC9				PSC9			
Locator	CF9SS1				CF9SS2				CF9SS2D				CF9SS3			
Collect Date:	07-MAY-97				07-MAY-97				07-MAY-97				07-MAY-97			
	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL
CLP METALS AND CYANIDE																
Aluminum	13100		mg/kg	40	11400		mg/kg	40	11200		mg/kg	40	1150		mg/kg	40
Antimony	1.3	J	mg/kg	12	.69	UJ	mg/kg	12	.68	UJ	mg/kg	12	.68	UJ	mg/kg	12
Arsenic	.57	J	mg/kg	2	1.5	J	mg/kg	2	.45	U	mg/kg	2	.62	J	mg/kg	2
Barium	10	J	mg/kg	40	8.7	J	mg/kg	40	8.5	J	mg/kg	40	1.9	J	mg/kg	40
Beryllium	.23	U	mg/kg	1	.23	U	mg/kg	1	.23	U	mg/kg	1	.23	U	mg/kg	1
Cadmium	.23	U	mg/kg	1	.23	U	mg/kg	1	.23	U	mg/kg	1	.23	U	mg/kg	1
Calcium	147	J	mg/kg	1000	131	J	mg/kg	1000	122	J	mg/kg	1000	151	J	mg/kg	1000
Chromium	13.2		mg/kg	2	12.3		mg/kg	2	11.8		mg/kg	2	1.7	J	mg/kg	2
Cobalt	1.3	U	mg/kg	10	1.3	U	mg/kg	10	1.3	U	mg/kg	10	1.3	U	mg/kg	10
Copper	1.7	J	mg/kg	5	2.2	J	mg/kg	5	2.5	J	mg/kg	5	1.1	J	mg/kg	5
Iron	681	J	mg/kg	20	780	J	mg/kg	20	762	J	mg/kg	20	224	J	mg/kg	20
Lead	8		mg/kg	.6	7.3		mg/kg	.6	7		mg/kg	.6	.98		mg/kg	.6
Magnesium	116	J	mg/kg	1000	129	J	mg/kg	1000	124	J	mg/kg	1000	51.1	J	mg/kg	1000
Manganese	3.2	J	mg/kg	3	3.5		mg/kg	3	3.2	J	mg/kg	3	1.8	J	mg/kg	3
Mercury	.06	U	mg/kg	.1	.06	U	mg/kg	.1	.06	U	mg/kg	.1	.06	U	mg/kg	.1
Nickel	2.8	J	mg/kg	8	2	J	mg/kg	8	1.8	J	mg/kg	8	.46	U	mg/kg	8
Potassium	54.7	J	mg/kg	1000	69.7	J	mg/kg	1000	52.9	J	mg/kg	1000	15.1	U	mg/kg	1000
Selenium	.91	U	mg/kg	1	.92	U	mg/kg	1	.9	U	mg/kg	1	.91	U	mg/kg	1
Silver	.23	U	mg/kg	2	.23	U	mg/kg	2	.23	U	mg/kg	2	.23	U	mg/kg	2
Sodium	58.4	U	mg/kg	1000	59.4	U	mg/kg	1000	58.2	U	mg/kg	1000	58.8	U	mg/kg	1000
Thallium	.91	U	mg/kg	2	1.1	J	mg/kg	2	.9	U	mg/kg	2	.91	U	mg/kg	2
Vanadium	5	J	mg/kg	10	5	J	mg/kg	10	4.7	J	mg/kg	10	1.3	J	mg/kg	10
Zinc	2.2	J	mg/kg	4	3.3	J	mg/kg	4	2	J	mg/kg	4	1.6	J	mg/kg	4
Cyanide	.08	U	mg/kg	.5	.08	U	mg/kg	.5	.08	U	mg/kg	.5	.08	U	mg/kg	.5

U = NOT DETECTED J = ESTIMATED VALUE
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R = RESULT IS REJECTED AND UNUSABLE

NAS CECIL FIELD -- POTENTIAL SOURCE OF CONTAMINATION 9
SURFACE SOIL -- METALS -- REPORT NO. 9466

	Lab Sample Number:	C9GHT				C9GHX				C9GJ1			
	Site	PSC9				PSC9				PSC9			
	Locator	CF9SS4				CF9SS5				CF9SS6			
	Collect Date:	07-MAY-97				07-MAY-97				07-MAY-97			
		VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL
CLP METALS AND CYANIDE													
Aluminum		7390		mg/kg	40	1940		mg/kg	40	1200		mg/kg	40
Antimony		.66	UJ	mg/kg	12	.64	UJ	mg/kg	12	.63	UJ	mg/kg	12
Arsenic		.51	J	mg/kg	2	.43	U	mg/kg	2	.42	U	mg/kg	2
Barium		6	J	mg/kg	40	3.6	J	mg/kg	40	2.4	J	mg/kg	40
Beryllium		.22	U	mg/kg	1	.21	U	mg/kg	1	.21	U	mg/kg	1
Cadmium		.22	U	mg/kg	1	.21	U	mg/kg	1	.21	U	mg/kg	1
Calcium		765	J	mg/kg	1000	25900	J	mg/kg	1000	4910	J	mg/kg	1000
Chromium		8.5		mg/kg	2	3.1		mg/kg	2	1.7	J	mg/kg	2
Cobalt		1.3	U	mg/kg	10	1.2	U	mg/kg	10	1.2	U	mg/kg	10
Copper		1.3	J	mg/kg	5	2.5	J	mg/kg	5	3.6	J	mg/kg	5
Iron		609	J	mg/kg	20	389	J	mg/kg	20	296	J	mg/kg	20
Lead		5.4		mg/kg	.6	2.4		mg/kg	.6	1.3		mg/kg	.6
Magnesium		108	J	mg/kg	1000	241	J	mg/kg	1000	98.2	J	mg/kg	1000
Manganese		3.1	J	mg/kg	3	7.9		mg/kg	3	3.3		mg/kg	3
Mercury		.06	U	mg/kg	.1	.05	U	mg/kg	.1	.05	U	mg/kg	.1
Nickel		1.3	J	mg/kg	8	.49	J	mg/kg	8	.45	J	mg/kg	8
Potassium		24.2	J	mg/kg	1000	29.3	J	mg/kg	1000	13.9	U	mg/kg	1000
Selenium		.89	U	mg/kg	1	.85	U	mg/kg	1	.84	U	mg/kg	1
Silver		.22	U	mg/kg	2	.21	U	mg/kg	2	.21	U	mg/kg	2
Sodium		57.1	U	mg/kg	1000	54.9	U	mg/kg	1000	54.3	U	mg/kg	1000
Thallium		.89	U	mg/kg	2	.85	U	mg/kg	2	.84	U	mg/kg	2
Vanadium		3.8	J	mg/kg	10	2.6	J	mg/kg	10	1.5	J	mg/kg	10
Zinc		1.8	J	mg/kg	4	7		mg/kg	4	2.7	J	mg/kg	4
Cyanide		.08	U	mg/kg	.5	.07	U	mg/kg	.5	.07	U	mg/kg	.5

U = NOT DETECTED J = ESTIMATED VALUE
UJ = REPORTED QUANTITATION LIMIT IS QUALIFIED AS ESTIMATED
R = RESULT IS REJECTED AND UNUSABLE

NAS CECIL FIELD -- POTENTIAL SOURCE OF CONTAMINATION 9
SUBSURFACE SOIL -- VOLATILES -- REPORT NO. 9467

Lab Sample Number:	C9GHN				C9GHV				C9GHW				C9GJ0			
Site	PSC9				PSC9				PSC9				PSC9			
Locator	CF9SB1				CF9SB2				CF9SB2D				CF9SB3			
Collect Date:	07-MAY-97				07-MAY-97				07-MAY-97				07-MAY-97			
	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL
CLP VOLATILES 90-SOW																
Chloromethane	12	U	ug/kg	12	12	U	ug/kg	12	12	U	ug/kg	12	11	U	ug/kg	11
Bromomethane	12	U	ug/kg	12	12	U	ug/kg	12	12	U	ug/kg	12	11	U	ug/kg	11
Vinyl chloride	12	U	ug/kg	12	12	U	ug/kg	12	12	U	ug/kg	12	11	U	ug/kg	11
Chloroethane	12	U	ug/kg	12	12	U	ug/kg	12	12	U	ug/kg	12	11	U	ug/kg	11
Methylene chloride	12	U	ug/kg	12	12	U	ug/kg	12	12	U	ug/kg	12	11	U	ug/kg	11
Acetone	12	U	ug/kg	12	12	U	ug/kg	12	12	U	ug/kg	12	11	U	ug/kg	11
Carbon disulfide	12	U	ug/kg	12	12	U	ug/kg	12	12	U	ug/kg	12	11	U	ug/kg	11
1,1-Dichloroethene	12	U	ug/kg	12	12	U	ug/kg	12	12	U	ug/kg	12	11	U	ug/kg	11
1,1-Dichloroethane	12	U	ug/kg	12	12	U	ug/kg	12	12	U	ug/kg	12	11	U	ug/kg	11
1,2-Dichloroethene (total)	12	U	ug/kg	12	12	U	ug/kg	12	12	U	ug/kg	12	11	U	ug/kg	11
Chloroform	12	U	ug/kg	12	12	U	ug/kg	12	12	U	ug/kg	12	11	U	ug/kg	11
1,2-Dichloroethane	12	U	ug/kg	12	12	U	ug/kg	12	12	U	ug/kg	12	11	U	ug/kg	11
2-Butanone	12	U	ug/kg	12	12	U	ug/kg	12	12	U	ug/kg	12	11	U	ug/kg	11
1,1,1-Trichloroethane	12	U	ug/kg	12	12	U	ug/kg	12	12	U	ug/kg	12	11	U	ug/kg	11
Carbon tetrachloride	12	U	ug/kg	12	12	U	ug/kg	12	12	U	ug/kg	12	11	U	ug/kg	11
Bromodichloromethane	12	U	ug/kg	12	12	U	ug/kg	12	12	U	ug/kg	12	11	U	ug/kg	11
1,2-Dichloropropane	12	U	ug/kg	12	12	U	ug/kg	12	12	U	ug/kg	12	11	U	ug/kg	11
cis-1,3-Dichloropropene	12	U	ug/kg	12	12	U	ug/kg	12	12	U	ug/kg	12	11	U	ug/kg	11
Trichloroethene	12	U	ug/kg	12	12	U	ug/kg	12	12	U	ug/kg	12	11	U	ug/kg	11
Dibromochloromethane	12	U	ug/kg	12	12	U	ug/kg	12	12	U	ug/kg	12	11	U	ug/kg	11
1,1,2-Trichloroethane	12	U	ug/kg	12	12	U	ug/kg	12	12	U	ug/kg	12	11	U	ug/kg	11
Benzene	12	U	ug/kg	12	12	U	ug/kg	12	12	U	ug/kg	12	11	U	ug/kg	11
trans-1,3-Dichloropropene	12	U	ug/kg	12	12	U	ug/kg	12	12	U	ug/kg	12	11	U	ug/kg	11
Bromoform	12	U	ug/kg	12	12	U	ug/kg	12	12	U	ug/kg	12	11	U	ug/kg	11
4-Methyl-2-pentanone	12	U	ug/kg	12	12	U	ug/kg	12	12	U	ug/kg	12	11	U	ug/kg	11
2-Hexanone	12	U	ug/kg	12	12	U	ug/kg	12	12	U	ug/kg	12	11	U	ug/kg	11
Tetrachloroethene	12	U	ug/kg	12	12	U	ug/kg	12	12	U	ug/kg	12	11	U	ug/kg	11
Toluene	12	U	ug/kg	12	12	U	ug/kg	12	12	U	ug/kg	12	11	U	ug/kg	11
1,1,2,2-Tetrachloroethane	12	U	ug/kg	12	12	U	ug/kg	12	12	U	ug/kg	12	11	U	ug/kg	11
Chlorobenzene	12	U	ug/kg	12	12	U	ug/kg	12	12	U	ug/kg	12	11	U	ug/kg	11
Ethylbenzene	12	U	ug/kg	12	12	U	ug/kg	12	12	U	ug/kg	12	11	U	ug/kg	11
Styrene	12	U	ug/kg	12	12	U	ug/kg	12	12	U	ug/kg	12	11	U	ug/kg	11
Xylenes (total)	12	U	ug/kg	12	12	U	ug/kg	12	12	U	ug/kg	12	11	U	ug/kg	11

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NAS CECIL FIELD -- POTENTIAL SOURCE OF CONTAMINATION 9
SUBSURFACE SOIL -- SEMIVOLATILES -- REPORT NO. 9468

Lab Sample Number:	C9GHN				C9GHV				C9GHW				C9GJ0			
Site	PSC9				PSC9				PSC9				PSC9			
Locator	CF9SB1				CF9SB2				CF9SB2D				CF9SB3			
Collect Date:	07-MAY-97				07-MAY-97				07-MAY-97				07-MAY-97			
	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL
CLP SEMIVOLATILES 90-SOW																
Phenol	390	U	ug/kg	390	400	U	ug/kg	400	400	U	ug/kg	400	380	U	ug/kg	380
bis(2-Chloroethyl) ether	390	U	ug/kg	390	400	U	ug/kg	400	400	U	ug/kg	400	380	U	ug/kg	380
2-Chlorophenol	390	U	ug/kg	390	400	U	ug/kg	400	400	U	ug/kg	400	380	U	ug/kg	380
1,3-Dichlorobenzene	390	U	ug/kg	390	400	U	ug/kg	400	400	U	ug/kg	400	380	U	ug/kg	380
1,4-Dichlorobenzene	390	U	ug/kg	390	400	U	ug/kg	400	400	U	ug/kg	400	380	U	ug/kg	380
1,2-Dichlorobenzene	390	U	ug/kg	390	400	U	ug/kg	400	400	U	ug/kg	400	380	U	ug/kg	380
2-Methylphenol	390	U	ug/kg	390	400	U	ug/kg	400	400	U	ug/kg	400	380	U	ug/kg	380
2,2-oxybis(1-Chloropropane)	390	U	ug/kg	390	400	U	ug/kg	400	400	U	ug/kg	400	380	U	ug/kg	380
4-Methylphenol	390	U	ug/kg	390	400	U	ug/kg	400	400	U	ug/kg	400	380	U	ug/kg	380
N-Nitroso-di-n-propylamine	390	U	ug/kg	390	400	U	ug/kg	400	400	U	ug/kg	400	380	U	ug/kg	380
Hexachloroethane	390	U	ug/kg	390	400	U	ug/kg	400	400	U	ug/kg	400	380	U	ug/kg	380
Nitrobenzene	390	U	ug/kg	390	400	U	ug/kg	400	400	U	ug/kg	400	380	U	ug/kg	380
Isophorone	390	U	ug/kg	390	400	U	ug/kg	400	400	U	ug/kg	400	380	U	ug/kg	380
2-Nitrophenol	390	U	ug/kg	390	400	U	ug/kg	400	400	U	ug/kg	400	380	U	ug/kg	380
2,4-Dimethylphenol	390	U	ug/kg	390	400	U	ug/kg	400	400	U	ug/kg	400	380	U	ug/kg	380
bis(2-Chloroethoxy) methane	390	U	ug/kg	390	400	U	ug/kg	400	400	U	ug/kg	400	380	U	ug/kg	380
2,4-Dichlorophenol	390	U	ug/kg	390	400	U	ug/kg	400	400	U	ug/kg	400	380	U	ug/kg	380
1,2,4-Trichlorobenzene	390	U	ug/kg	390	400	U	ug/kg	400	400	U	ug/kg	400	380	U	ug/kg	380
Naphthalene	390	U	ug/kg	390	400	U	ug/kg	400	400	U	ug/kg	400	380	U	ug/kg	380
4-Chloroaniline	390	U	ug/kg	390	400	U	ug/kg	400	400	U	ug/kg	400	380	U	ug/kg	380
Hexachlorobutadiene	390	U	ug/kg	390	400	U	ug/kg	400	400	U	ug/kg	400	380	U	ug/kg	380
4-Chloro-3-methylphenol	390	U	ug/kg	390	400	U	ug/kg	400	400	U	ug/kg	400	380	U	ug/kg	380
2-Methylnaphthalene	390	U	ug/kg	390	400	U	ug/kg	400	400	U	ug/kg	400	380	U	ug/kg	380
Hexachlorocyclopentadiene	390	U	ug/kg	390	400	U	ug/kg	400	400	U	ug/kg	400	380	U	ug/kg	380
2,4,6-Trichlorophenol	390	U	ug/kg	390	400	U	ug/kg	400	400	U	ug/kg	400	380	U	ug/kg	380
2,4,5-Trichlorophenol	950	U	ug/kg	950	960	U	ug/kg	960	960	U	ug/kg	960	920	U	ug/kg	920
2-Chloronaphthalene	390	U	ug/kg	390	400	U	ug/kg	400	400	U	ug/kg	400	380	U	ug/kg	380
2-Nitroaniline	950	U	ug/kg	950	960	U	ug/kg	960	960	U	ug/kg	960	920	U	ug/kg	920
Dimethylphthalate	390	U	ug/kg	390	400	U	ug/kg	400	400	U	ug/kg	400	380	U	ug/kg	380
Acenaphthylene	390	U	ug/kg	390	400	U	ug/kg	400	400	U	ug/kg	400	380	U	ug/kg	380
2,6-Dinitrotoluene	390	U	ug/kg	390	400	U	ug/kg	400	400	U	ug/kg	400	380	U	ug/kg	380
3-Nitroaniline	950	U	ug/kg	950	960	U	ug/kg	960	960	U	ug/kg	960	920	U	ug/kg	920
Acenaphthene	390	U	ug/kg	390	400	U	ug/kg	400	400	U	ug/kg	400	380	U	ug/kg	380
2,4-Dinitrophenol	950	U	ug/kg	950	960	U	ug/kg	960	960	U	ug/kg	960	920	U	ug/kg	920
4-Nitrophenol	950	U	ug/kg	950	960	U	ug/kg	960	960	U	ug/kg	960	920	U	ug/kg	920
Dibenzofuran	390	U	ug/kg	390	400	U	ug/kg	400	400	U	ug/kg	400	380	U	ug/kg	380
2,4-Dinitrotoluene	390	U	ug/kg	390	400	U	ug/kg	400	400	U	ug/kg	400	380	U	ug/kg	380
Diethylphthalate	390	U	ug/kg	390	400	U	ug/kg	400	400	U	ug/kg	400	380	U	ug/kg	380
4-Chlorophenyl-phenylether	390	U	ug/kg	390	400	U	ug/kg	400	400	U	ug/kg	400	380	U	ug/kg	380
Fluorene	390	U	ug/kg	390	400	U	ug/kg	400	400	U	ug/kg	400	380	U	ug/kg	380
4-Nitroaniline	950	U	ug/kg	950	960	U	ug/kg	960	960	U	ug/kg	960	920	U	ug/kg	920
4,6-Dinitro-2-methylphenol	950	U	ug/kg	950	960	U	ug/kg	960	960	U	ug/kg	960	920	U	ug/kg	920
N-Nitrosodiphenylamine	390	U	ug/kg	390	400	U	ug/kg	400	400	U	ug/kg	400	380	U	ug/kg	380
4-Bromophenyl-phenylether	390	U	ug/kg	390	400	U	ug/kg	400	400	U	ug/kg	400	380	U	ug/kg	380
Hexachlorobenzene	390	U	ug/kg	390	400	U	ug/kg	400	400	U	ug/kg	400	380	U	ug/kg	380
Pentachlorophenol	950	U	ug/kg	950	960	U	ug/kg	960	960	U	ug/kg	960	920	U	ug/kg	920
Phenanthrene	390	U	ug/kg	390	400	U	ug/kg	400	400	U	ug/kg	400	380	U	ug/kg	380
Anthracene	390	U	ug/kg	390	400	U	ug/kg	400	400	U	ug/kg	400	380	U	ug/kg	380
Carbazole	390	U	ug/kg	390	400	U	ug/kg	400	400	U	ug/kg	400	380	U	ug/kg	380
Di-n-butylphthalate	390	U	ug/kg	390	400	U	ug/kg	400	400	U	ug/kg	400	380	U	ug/kg	380

NAS CECIL FIELD -- POTENTIAL SOURCE OF CONTAMINATION 9
SUBSURFACE SOIL -- SEMIVOLATILES -- REPORT NO. 9468

Lab Sample Number:	C9GHN				C9GHV				C9GHW				C9GJ0			
Site	PSC9				PSC9				PSC9				PSC9			
Locator	CF9SB1				CF9SB2				CF9SB2D				CF9SB3			
Collect Date:	07-MAY-97				07-MAY-97				07-MAY-97				07-MAY-97			
	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL
Fluoranthene	390	U	ug/kg	390	400	U	ug/kg	400	400	U	ug/kg	400	380	U	ug/kg	380
Pyrene	390	U	ug/kg	390	400	U	ug/kg	400	400	U	ug/kg	400	380	U	ug/kg	380
Butylbenzylphthalate	390	U	ug/kg	390	400	U	ug/kg	400	400	U	ug/kg	400	380	U	ug/kg	380
3,3-Dichlorobenzidine	390	U	ug/kg	390	400	U	ug/kg	400	400	U	ug/kg	400	380	U	ug/kg	380
Benzo (a) anthracene	390	U	ug/kg	390	400	U	ug/kg	400	400	U	ug/kg	400	380	U	ug/kg	380
Chrysene	390	U	ug/kg	390	400	U	ug/kg	400	400	U	ug/kg	400	380	U	ug/kg	380
bis(2-Ethylhexyl) phthalate	390	U	ug/kg	390	400	U	ug/kg	400	400	U	ug/kg	400	380	U	ug/kg	380
Di-n-octylphthalate	390	U	ug/kg	390	400	U	ug/kg	400	400	U	ug/kg	400	380	U	ug/kg	380
Benzo (b) fluoranthene	390	U	ug/kg	390	400	U	ug/kg	400	400	U	ug/kg	400	380	U	ug/kg	380
Benzo (k) fluoranthene	390	U	ug/kg	390	400	U	ug/kg	400	400	U	ug/kg	400	380	U	ug/kg	380
Benzo (a) pyrene	390	U	ug/kg	390	400	U	ug/kg	400	400	U	ug/kg	400	380	U	ug/kg	380
Indeno (1,2,3-cd) pyrene	390	U	ug/kg	390	400	U	ug/kg	400	400	U	ug/kg	400	380	U	ug/kg	380
Dibenzo (a,h) anthracene	390	U	ug/kg	390	400	U	ug/kg	400	400	U	ug/kg	400	380	U	ug/kg	380
Benzo (g,h,i) perylene	390	U	ug/kg	390	400	U	ug/kg	400	400	U	ug/kg	400	380	U	ug/kg	380

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R = RESULT IS REJECTED AND UNUSABLE

NAS CECIL FIELD -- POTENTIAL SOURCE OF CONTAMINATION 9
SUBSURFACE SOIL -- PESTICIDES AND PCBs -- REPORT NO. 9469

Lab Sample Number:	C9GHN				C9GHV				C9GHW				C9GJ0			
Site	PSC9				PSC9				PSC9				PSC9			
Locator	CF9SB1				CF9SB2				CF9SB2D				CF9SB3			
Collect Date:	07-MAY-97				07-MAY-97				07-MAY-97				07-MAY-97			
	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL
CLP PESTICIDES/PCBS 90-SOW																
alpha-BHC	2	U	ug/kg	2	2	U	ug/kg	2	2	U	ug/kg	2	1.9	U	ug/kg	1.9
beta-BHC	2	U	ug/kg	2	2	U	ug/kg	2	2	U	ug/kg	2	1.9	U	ug/kg	1.9
delta-BHC	2	U	ug/kg	2	2	U	ug/kg	2	2	U	ug/kg	2	1.9	U	ug/kg	1.9
gamma-BHC (Lindane)	2	U	ug/kg	2	2	U	ug/kg	2	2	U	ug/kg	2	1.9	U	ug/kg	1.9
Heptachlor	2	U	ug/kg	2	2	U	ug/kg	2	2	U	ug/kg	2	1.9	U	ug/kg	1.9
Aldrin	2	U	ug/kg	2	2	U	ug/kg	2	2	U	ug/kg	2	1.9	U	ug/kg	1.9
Heptachlor epoxide	2	U	ug/kg	2	2	U	ug/kg	2	2	U	ug/kg	2	1.9	U	ug/kg	1.9
Endosulfan I	2	U	ug/kg	2	2	U	ug/kg	2	2	U	ug/kg	2	1.9	U	ug/kg	1.9
Dieldrin	4	U	ug/kg	4	4	U	ug/kg	4	4	U	ug/kg	4	3.8	U	ug/kg	3.8
4,4-DDE	4	U	ug/kg	4	4	U	ug/kg	4	4	U	ug/kg	4	3.8	U	ug/kg	3.8
Endrin	4	U	ug/kg	4	4	U	ug/kg	4	4	U	ug/kg	4	3.8	U	ug/kg	3.8
Endosulfan II	4	U	ug/kg	4	4	U	ug/kg	4	4	U	ug/kg	4	3.8	U	ug/kg	3.8
4,4-DDD	4	U	ug/kg	4	4	U	ug/kg	4	4	U	ug/kg	4	3.8	U	ug/kg	3.8
Endosulfan sulfate	4	U	ug/kg	4	4	U	ug/kg	4	4	U	ug/kg	4	3.8	U	ug/kg	3.8
4,4-DDT	4	U	ug/kg	4	4	U	ug/kg	4	4	U	ug/kg	4	3.8	U	ug/kg	3.8
Methoxychlor	20	U	ug/kg	20	20	U	ug/kg	20	20	U	ug/kg	20	19	U	ug/kg	19
Endrin ketone	4	U	ug/kg	4	4	U	ug/kg	4	4	U	ug/kg	4	3.8	U	ug/kg	3.8
Endrin aldehyde	4	U	ug/kg	4	4	U	ug/kg	4	4	U	ug/kg	4	3.8	U	ug/kg	3.8
alpha-Chlordane	2	U	ug/kg	2	2	U	ug/kg	2	2	U	ug/kg	2	1.9	U	ug/kg	1.9
gamma-Chlordane	2	U	ug/kg	2	2	U	ug/kg	2	2	U	ug/kg	2	1.9	U	ug/kg	1.9
Toxaphene	200	U	ug/kg	200	200	U	ug/kg	200	200	U	ug/kg	200	190	U	ug/kg	190
Aroclor-1016	40	U	ug/kg	40	40	U	ug/kg	40	40	U	ug/kg	40	38	U	ug/kg	38
Aroclor-1221	79	U	ug/kg	79	80	U	ug/kg	80	80	U	ug/kg	80	77	U	ug/kg	77
Aroclor-1232	40	U	ug/kg	40	40	U	ug/kg	40	40	U	ug/kg	40	38	U	ug/kg	38
Aroclor-1242	40	U	ug/kg	40	40	U	ug/kg	40	40	U	ug/kg	40	38	U	ug/kg	38
Aroclor-1248	40	U	ug/kg	40	40	U	ug/kg	40	40	U	ug/kg	40	38	U	ug/kg	38
Aroclor-1254	40	U	ug/kg	40	40	U	ug/kg	40	40	U	ug/kg	40	38	U	ug/kg	38
Aroclor-1260	40	U	ug/kg	40	40	U	ug/kg	40	40	U	ug/kg	40	38	U	ug/kg	38

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NAS CECIL FIELD -- POTENTIAL SOURCE OF CONTAMINATION 9
SUBSURFACE SOIL -- METALS -- REPORT NO. 9470

Lab Sample Number:	C9GHN			C9GHV			C9GHW			C9GJ0		
Site	PSC9			PSC9			PSC9			PSC9		
Locator	CF9SB1			CF9SB2			CF9SB2D			CF9SB3		
Collect Date:	07-MAY-97			07-MAY-97			07-MAY-97			07-MAY-97		
	VALUE QUAL	UNITS	DL	VALUE QUAL	UNITS	DL	VALUE QUAL	UNITS	DL	VALUE QUAL	UNITS	DL
CLP METALS AND CYANIDE												
Aluminum	2050	mg/kg	40	5550	mg/kg	40	6410	mg/kg	40	2040	mg/kg	40
Antimony	.72 UJ	mg/kg	12	.72 UJ	mg/kg	12	.72 UJ	mg/kg	12	.69 UJ	mg/kg	12
Arsenic	.6 J	mg/kg	2	.48 U	mg/kg	2	.48 U	mg/kg	2	.46 U	mg/kg	2
Barium	2.8 J	mg/kg	40	5.7 J	mg/kg	40	7.2 J	mg/kg	40	2.9 J	mg/kg	40
Beryllium	.24 U	mg/kg	1	.24 U	mg/kg	1	.24 U	mg/kg	1	.23 U	mg/kg	1
Cadmium	.24 U	mg/kg	1	.24 U	mg/kg	1	.24 U	mg/kg	1	.23 U	mg/kg	1
Calcium	88.9 J	mg/kg	1000	405 J	mg/kg	1000	436 J	mg/kg	1000	9670 J	mg/kg	1000
Chromium	2.7	mg/kg	2	6.5	mg/kg	2	7.3	mg/kg	2	2.9	mg/kg	2
Cobalt	1.4 U	mg/kg	10	1.4 U	mg/kg	10	1.4 U	mg/kg	10	1.3 U	mg/kg	10
Copper	1.4 J	mg/kg	5	.94 J	mg/kg	5	1.2 J	mg/kg	5	1.9 J	mg/kg	5
Iron	341 J	mg/kg	20	952 J	mg/kg	20	1000 J	mg/kg	20	408 J	mg/kg	20
Lead	1.6	mg/kg	.6	3.8	mg/kg	.6	5.1	mg/kg	.6	2.6	mg/kg	.6
Magnesium	57.6 J	mg/kg	1000	127 J	mg/kg	1000	144 J	mg/kg	1000	128 J	mg/kg	1000
Manganese	1.8 J	mg/kg	3	5	mg/kg	3	4.1	mg/kg	3	3.5	mg/kg	3
Mercury	.06 U	mg/kg	.1	.06 U	mg/kg	.1	.06 U	mg/kg	.1	.06 U	mg/kg	.1
Nickel	.48 U	mg/kg	8	1.1 J	mg/kg	8	1.8 J	mg/kg	8	.53 J	mg/kg	8
Potassium	15.8 U	mg/kg	1000	28 J	mg/kg	1000	37.1 J	mg/kg	1000	15.2 U	mg/kg	1000
Selenium	.95 U	mg/kg	1	.97 U	mg/kg	1	.96 U	mg/kg	1	.92 U	mg/kg	1
Silver	.24 U	mg/kg	2	.24 U	mg/kg	2	.24 U	mg/kg	2	.23 U	mg/kg	2
Sodium	61.6 U	mg/kg	1000	62.2 U	mg/kg	1000	62.2 U	mg/kg	1000	59.2 U	mg/kg	1000
Thallium	.95 U	mg/kg	2	.97 U	mg/kg	2	.96 U	mg/kg	2	.92 U	mg/kg	2
Vanadium	1.7 J	mg/kg	10	4 J	mg/kg	10	4.8 J	mg/kg	10	2.2 J	mg/kg	10
Zinc	1.7 J	mg/kg	4	2.4 J	mg/kg	4	2.4 J	mg/kg	4	1.9 J	mg/kg	4
Cyanide	.08 U	mg/kg	.5	.09 U	mg/kg	.5	.09 U	mg/kg	.5	.08 U	mg/kg	.5

U = NOT DETECTED J = ESTIMATED VALUE
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R = RESULT IS REJECTED AND UNUSABLE

NAS CECIL FIELD -- POTENTIAL SOURCE OF CONTAMINATION 9
GROUNDWATER -- VOLATILES -- REPORT NO. 9471

Lab Sample Number:	CAPKT				CAPL3			
Site	PSC9				PSC9			
Locator	CF9MW1S				CF9MW2S			
Collect Date:	16-JUL-97				16-JUL-97			
	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL
CLP VOLATILES 90-SOW								
Chloromethane	10	U	ug/l	10	10	U	ug/l	10
Bromomethane	10	U	ug/l	10	10	U	ug/l	10
Vinyl chloride	10	U	ug/l	10	10	U	ug/l	10
Chloroethane	10	U	ug/l	10	10	U	ug/l	10
Methylene chloride	10	U	ug/l	10	10	U	ug/l	10
Acetone	10	U	ug/l	10	10	U	ug/l	10
Carbon disulfide	10	U	ug/l	10	10	U	ug/l	10
1,1-Dichloroethene	10	U	ug/l	10	10	U	ug/l	10
1,1-Dichloroethane	10	U	ug/l	10	10	U	ug/l	10
1,2-Dichloroethene (total)	10	U	ug/l	10	10	U	ug/l	10
Chloroform	10	U	ug/l	10	10	U	ug/l	10
1,2-Dichloroethane	10	U	ug/l	10	10	U	ug/l	10
2-Butanone	10	U	ug/l	10	10	U	ug/l	10
1,1,1-Trichloroethane	10	U	ug/l	10	10	U	ug/l	10
Carbon tetrachloride	10	U	ug/l	10	10	U	ug/l	10
Bromodichloromethane	10	U	ug/l	10	10	U	ug/l	10
1,2-Dichloropropane	10	U	ug/l	10	10	U	ug/l	10
cis-1,3-Dichloropropene	10	U	ug/l	10	10	U	ug/l	10
Trichloroethene	10	U	ug/l	10	10	U	ug/l	10
Dibromochloromethane	10	U	ug/l	10	10	U	ug/l	10
1,1,2-Trichloroethane	10	U	ug/l	10	10	U	ug/l	10
Benzene	10	U	ug/l	10	10	U	ug/l	10
trans-1,3-Dichloropropene	10	U	ug/l	10	10	U	ug/l	10
Bromoform	10	U	ug/l	10	10	U	ug/l	10
4-Methyl-2-pentanone	10		ug/l	10	10	U	ug/l	10
2-Hexanone	10	U	ug/l	10	10	U	ug/l	10
Tetrachloroethene	10	U	ug/l	10	10	U	ug/l	10
Toluene	10	U	ug/l	10	10	U	ug/l	10
1,1,2,2-Tetrachloroethane	10	U	ug/l	10	10	U	ug/l	10
Chlorobenzene	10	U	ug/l	10	10	U	ug/l	10
Ethylbenzene	10	U	ug/l	10	10	U	ug/l	10
Styrene	10	U	ug/l	10	10	U	ug/l	10
Xylenes (total)	10	U	ug/l	10	10	U	ug/l	10

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R = RESULT IS REJECTED AND UNUSABLE

NAS CECIL FIELD -- POTENTIAL SOURCE OF CONTAMINATION 9
GROUNDWATER -- SEMIVOLATILES -- REPORT NO. 9472

	CAPKT				CAPL3			
Lab Sample Number:								
Site	PSC9				PSC9			
Locator	CF9MW1S				CF9MW2S			
Collect Date:	16-JUL-97				16-JUL-97			
	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL
CLP SEMIVOLATILES 90-SOW								
Phenol	10	U	ug/l	10	10	U	ug/l	10
bis(2-Chloroethyl) ether	10	U	ug/l	10	10	U	ug/l	10
2-Chlorophenol	10	U	ug/l	10	10	U	ug/l	10
1,3-Dichlorobenzene	10	U	ug/l	10	10	U	ug/l	10
1,4-Dichlorobenzene	10	U	ug/l	10	10	U	ug/l	10
1,2-Dichlorobenzene	10	U	ug/l	10	10	U	ug/l	10
2-Methylphenol	10	U	ug/l	10	10	U	ug/l	10
2,2-oxybis(1-Chloropropane)	10	U	ug/l	10	10	U	ug/l	10
4-Methylphenol	10	U	ug/l	10	10	U	ug/l	10
N-Nitroso-di-n-propylamine	10	U	ug/l	10	10	U	ug/l	10
Hexachloroethane	10	U	ug/l	10	10	U	ug/l	10
Nitrobenzene	10	U	ug/l	10	10	U	ug/l	10
Isophorone	10	U	ug/l	10	10	U	ug/l	10
2-Nitrophenol	10	U	ug/l	10	10	U	ug/l	10
2,4-Dimethylphenol	10	U	ug/l	10	10	U	ug/l	10
bis(2-Chloroethoxy) methane	10	U	ug/l	10	10	U	ug/l	10
2,4-Dichlorophenol	10	U	ug/l	10	10	U	ug/l	10
1,2,4-Trichlorobenzene	10	U	ug/l	10	10	U	ug/l	10
Naphthalene	10	U	ug/l	10	10	U	ug/l	10
4-Chloroaniline	10	U	ug/l	10	10	U	ug/l	10
Hexachlorobutadiene	10	U	ug/l	10	10	U	ug/l	10
4-Chloro-3-methylphenol	10	U	ug/l	10	10	U	ug/l	10
2-Methylnaphthalene	10	U	ug/l	10	10	U	ug/l	10
Hexachlorocyclopentadiene	10	U	ug/l	10	10	U	ug/l	10
2,4,6-Trichlorophenol	10	U	ug/l	10	10	U	ug/l	10
2,4,5-Trichlorophenol	25	U	ug/l	25	25	U	ug/l	25
2-Chloronaphthalene	10	U	ug/l	10	10	U	ug/l	10
2-Nitroaniline	25	U	ug/l	25	25	U	ug/l	25
Dimethylphthalate	10	U	ug/l	10	10	U	ug/l	10
Acenaphthylene	10	U	ug/l	10	10	U	ug/l	10
2,6-Dinitrotoluene	10	U	ug/l	10	10	U	ug/l	10
3-Nitroaniline	25	U	ug/l	25	25	U	ug/l	25
Acenaphthene	10	U	ug/l	10	10	U	ug/l	10
2,4-Dinitrophenol	25	U	ug/l	25	25	U	ug/l	25
4-Nitrophenol	25	U	ug/l	25	25	U	ug/l	25
Dibenzofuran	10	U	ug/l	10	10	U	ug/l	10
2,4-Dinitrotoluene	10	U	ug/l	10	10	U	ug/l	10
Diethylphthalate	10	U	ug/l	10	10	U	ug/l	10
4-Chlorophenyl-phenylether	10	U	ug/l	10	10	U	ug/l	10
Fluorene	10	U	ug/l	10	10	U	ug/l	10
4-Nitroaniline	25	U	ug/l	25	25	U	ug/l	25
4,6-Dinitro-2-methylphenol	25	U	ug/l	25	25	U	ug/l	25
N-Nitrosodiphenylamine	10	U	ug/l	10	10	U	ug/l	10
4-Bromophenyl-phenylether	10	U	ug/l	10	10	U	ug/l	10
Hexachlorobenzene	10	U	ug/l	10	10	U	ug/l	10
Pentachlorophenol	25	U	ug/l	25	25	U	ug/l	25
Phenanthrene	10	U	ug/l	10	10	U	ug/l	10
Anthracene	10	U	ug/l	10	10	U	ug/l	10
Carbazole	10	U	ug/l	10	10	U	ug/l	10
Di-n-butylphthalate	10	U	ug/l	10	10	U	ug/l	10

NAS CECIL FIELD -- POTENTIAL SOURCE OF CONTAMINATION 9
GROUNDWATER -- SEMIVOLATILES -- REPORT NO. 9472

Lab Sample Number:	CAPKT				CAPL3			
Site	PSC9				PSC9			
Locator	CF9MW1S				CF9MW2S			
Collect Date:	16-JUL-97				16-JUL-97			
	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL
Fluoranthene	10	U	ug/l	10	10	U	ug/l	10
Pyrene	10	U	ug/l	10	10	U	ug/l	10
Butylbenzylphthalate	10	U	ug/l	10	10	U	ug/l	10
3,3-Dichlorobenzidine	10	U	ug/l	10	10	U	ug/l	10
Benzo (a) anthracene	10	U	ug/l	10	10	U	ug/l	10
Chrysene	10	U	ug/l	10	10	U	ug/l	10
bis(2-Ethylhexyl) phthalate	10	U	ug/l	10	10	U	ug/l	10
Di-n-octylphthalate	10	U	ug/l	10	10	U	ug/l	10
Benzo (b) fluoranthene	10	U	ug/l	10	10	U	ug/l	10
Benzo (k) fluoranthene	10	U	ug/l	10	10	U	ug/l	10
Benzo (a) pyrene	10	U	ug/l	10	10	U	ug/l	10
Indeno (1,2,3-cd) pyrene	10	U	ug/l	10	10	U	ug/l	10
Dibenzo (a,h) anthracene	10	U	ug/l	10	10	U	ug/l	10
Benzo (g,h,i) perylene	10	U	ug/l	10	10	U	ug/l	10

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NAS CECIL FIELD -- POTENTIAL SOURCE OF CONTAMINATION 9
GROUNDWATER -- PESTICIDES AND PCBs -- REPORT NO. 9474

Lab Sample Number:	CAPKT				CAPL3			
Site	PSC9				PSC9			
Locator	CF9MW1S				CF9MW2S			
Collect Date:	16-JUL-97				16-JUL-97			
	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL
CLP PESTICIDES/PCBS 90-SOW								
alpha-BHC	.05	U	ug/l	.05	.05	U	ug/l	.05
beta-BHC	.05	U	ug/l	.05	.05	U	ug/l	.05
delta-BHC	.05	U	ug/l	.05	.05	U	ug/l	.05
gamma-BHC (Lindane)	.05	U	ug/l	.05	.05	U	ug/l	.05
Heptachlor	.05	U	ug/l	.05	.05	U	ug/l	.05
Aldrin	.05	U	ug/l	.05	.05	U	ug/l	.05
Heptachlor epoxide	.05	U	ug/l	.05	.05	U	ug/l	.05
Endosulfan I	.05	U	ug/l	.05	.05	U	ug/l	.05
Dieldrin	.1	U	ug/l	.1	.1	U	ug/l	.1
4,4-DDE	.1	U	ug/l	.1	.1	U	ug/l	.1
Endrin	.1	U	ug/l	.1	.1	U	ug/l	.1
Endosulfan II	.1	U	ug/l	.1	.1	U	ug/l	.1
4,4-DDD	.1	U	ug/l	.1	.1	U	ug/l	.1
Endosulfan sulfate	.1	U	ug/l	.1	.1	U	ug/l	.1
4,4-DDT	.1	U	ug/l	.1	.1	U	ug/l	.1
Methoxychlor	.5	U	ug/l	.5	.5	U	ug/l	.5
Endrin ketone	.1	U	ug/l	.1	.1	U	ug/l	.1
Endrin aldehyde	.1	U	ug/l	.1	.1	U	ug/l	.1
alpha-Chlordane	.05	U	ug/l	.05	.05	U	ug/l	.05
gamma-Chlordane	.05	U	ug/l	.05	.05	U	ug/l	.05
Toxaphene	5	U	ug/l	5	5	U	ug/l	5
Aroclor-1016	1	U	ug/l	1	1	U	ug/l	1
Aroclor-1221	2	U	ug/l	2	2	U	ug/l	2
Aroclor-1232	1	U	ug/l	1	1	U	ug/l	1
Aroclor-1242	1	U	ug/l	1	1	U	ug/l	1
Aroclor-1248	1	U	ug/l	1	1	U	ug/l	1
Aroclor-1254	1	U	ug/l	1	1	U	ug/l	1
Aroclor-1260	1	U	ug/l	1	1	U	ug/l	1

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NAS CECIL FIELD -- POTENTIAL SOURCE OF CONTAMINATION 9
GROUNDWATER -- UNFILTERED METALS -- REPORT NO. 9473

	CAPKT				CAPL3			
Lab Sample Number:								
Site	PSC9				PSC9			
Locator	CF9MW1S				CF9MW2S			
Collect Date:	16-JUL-97				16-JUL-97			
	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL
CLP METALS AND CYANIDE								
Aluminum	131	J	ug/l	200	234		ug/l	200
Antimony	23.8	U	ug/l	60	23.8	U	ug/l	60
Arsenic	4.4	U	ug/l	10	4.4	U	ug/l	10
Barium	7.4	J	ug/l	200	5.8	J	ug/l	200
Beryllium	.4	U	ug/l	5	.4	U	ug/l	5
Cadmium	.3	U	ug/l	5	.3	U	ug/l	5
Calcium	3060	J	ug/l	5000	1690	J	ug/l	5000
Chromium	1.8	U	ug/l	10	1.8	U	ug/l	10
Cobalt	1.2	U	ug/l	50	1.2	U	ug/l	50
Copper	3.9	U	ug/l	25	3.9	U	ug/l	25
Iron	514		ug/l	100	92.2	J	ug/l	100
Lead	2.2	U	ug/l	3	2.2	U	ug/l	3
Magnesium	852	J	ug/l	5000	255	J	ug/l	5000
Manganese	6.6	J	ug/l	15	1.1	J	ug/l	15
Mercury	.11	J	ug/l	.2	.1	J	ug/l	.2
Nickel	2.8	U	ug/l	40	2.8	U	ug/l	40
Potassium	66.1	U	ug/l	5000	66.1	U	ug/l	5000
Selenium	4.1	U	ug/l	5	4.1	U	ug/l	5
Silver	1	U	ug/l	10	1	U	ug/l	10
Sodium	3940	J	ug/l	5000	1690	J	ug/l	5000
Thallium	5.9	U	ug/l	10	5.9	U	ug/l	10
Vanadium	1	U	ug/l	50	1.6	J	ug/l	50
Zinc	30.7		ug/l	20	19.3	J	ug/l	20
Cyanide	1.5	U	ug/l	10	1.5	U	ug/l	10

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UJ = REPORTED QUANTITATION LIMIT IS QUALIFIED AS ESTIMATED
R = RESULT IS REJECTED AND UNUSABLE

APPENDIX B

BORING LOGS AND WATER-LEVEL MEASUREMENTS

TITLE: NAS Cecil Field	**LOG of WELL:** CEF-9-1S		**BORING NO.** CEF-9-1S
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 08544-78
CONTRACTOR: Alliance Environmental, Inc.		**DATE STARTED:** 4-10-97	**COMPLTD:** 4-10-97
METHOD: Auger	**CASE SIZE:** 2 in.	**SCREEN INT.:** 4 - 14 ft.	**PROTECTION LEVEL:** D
TOC ELEV.: FEET.	**MONITOR INST.:** PID	**TOT DPTH:** 15 FEET.	**DPTH TO ▽** 2.43 FEET.
LOGGED BY: J. Koch	**WELL DEVELOPMENT DATE:** 5-8-97		**SITE:** PSC 9

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
				0	SILTY SAND (SM): light brown to light gray, fine grained.		SM	posthole	
				0	SAND (SP): light brown, fine grained.		SP	posthole	
5			1.5/2	0	CLAYEY SAND (SC): light gray, fine grained, 40% clay.		SC		
			1.5/2	10					
10									
15									
20									

TITLE: NAS Cecil Field	**LOG of WELL:** CEF-9-2S		**BORING NO.** CEF-9-2S
CLIENT: SOUTHDIVNAVFACENGCOM			**PROJECT NO:** 08544-78
CONTRACTOR: Alliance Environmental, Inc.		**DATE STARTED:** 4-10-97	**COMPLTD:** 4-10-97
METHOD: Auger	**CASE SIZE:** 2 in.	**SCREEN INT.:** 3 - 13 ft.	**PROTECTION LEVEL:** D
TOC ELEV.: FEET.	**MONITOR INST.:** PID	**TOT DPTH:** 14 FEET.	**DPTH TO ▽** 2.26 FEET.
LOGGED BY: J. Koch	**WELL DEVELOPMENT DATE:** 5-8-97		**SITE:** PSC 9

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
				0	SILTY SAND (SM): light gray to medium gray, fine grained.		SM	posthole	
				3	CLAYEY SAND (SC): light gray, fine grained, 30% clay.		SC	posthole	
5			1.4/2	3	CLAYEY SAND (SC): light gray to brown, fine grained, 40% clay.				
10									
15									
20									

ABB ENVIRONMENTAL SERVICES, INC.

Monitoring Well Water Levels

Technical Memorandum for No Further Action
Potential Source of Contamination 9
Naval Air Station Cecil Field
Jacksonville, Florida

Date	Time	PSC Monitoring Well	TOC Elevation (ft, msl)	Depth to Water (ft, btoc)	Groundwater Elevation (ft, msl)	Total Depth (ft)
05/07/97	1050	CF9MW1S	73.84	2.37	71.47	14.24
	1055	CF9MW2S	73.12	2.21	70.91	13.33
06/26/97	1027	CF9MW1S	73.84	2.20	71.64	14.24
	1019	CF9MW2S	73.12	2.11	71.01	13.33
07/25/97	1155	CF9MW1S	73.84	2.19	71.65	14.24
	1159	CF9MW2S	73.12	2.10	71.02	13.33
08/21/97	0830	CF9MW1S	73.84	1.79	72.05	14.24
	0835	CF9MW2S	73.12	1.79	71.33	13.33
09/12/97	1030	CF9MW1S	73.84	3.26	70.58	14.24
	1035	CF9MW2S	73.12	2.85	70.27	13.33

Notes: TOC = top of casing.
ft = feet.
msl = mean sea level.
btoc = below top of casing.

APPENDIX C

PRELIMINARY RISK EVALUATION METHODOLOGY

C.1 Human Health Preliminary Risk Evaluation (PRE) Methodology. The human health PRE is a screening-level evaluation of potential risks from environmental contaminants to human receptors at a site. While a site may have numerous actual or future hypothetical receptors, as a site-screening tool, it is common to use the most sensitive human for risk calculations. Therefore, for surface soil, groundwater, sediment, and surface water, the residential receptor will be used to evaluate potential risks at the site. For subsurface soil, the industrial worker will be used to evaluate potential risks at the site.

Naval Air Station (NAS) Cecil Field Screening Criteria. The NAS Cecil Field Base Realignment and Closure (BRAC) cleanup team (BCT) has established screening criteria to be used for screening inorganics. These screening criteria have only been developed for inorganics.

Soil Human Health Screening Values. The NAS Cecil Field BCT has agreed that soil human health screening values for this PRE are to be taken from Florida Department of Environmental Protection (FDEP) soil cleanup goals for Florida (FDEP, 1995). This document provides over 200 health-based cleanup goals, both residential and industrial, based on generalized exposure assumptions and, mostly, on U.S. Environmental Protection Agency (USEPA) risk assessment toxicity factors. The soil cleanup goals are based on direct exposure to the media (intake from incidental ingestion, dermal contact, and inhalation of soil particulates) using exposure assumptions consistent with both residential and commercial or industrial land use.

The target risk for each soil cleanup goal and the health risk associated with the cleanup goal is 1×10^{-6} for those analytes recognized by the USEPA as carcinogens and a hazard quotient of 1 for noncarcinogens. Other specific variables and exposure assumptions used in calculating the soil cleanup goals are provided in the document.

Groundwater Human Health Screening Values. Groundwater screening values are taken from USEPA and Florida Drinking Water Standards (USEPA, 1996; FDEP, 1996). These documents contain both primary drinking water standards that are mostly human health based and secondary standards that are established for potability or aesthetic reasons. Both types of values are presented in the human health PRE; however, the ratios calculated using these two different groundwater standards are not comparable.

Ratios calculated using primary drinking water standards, designated "PD" in the groundwater PRE table, are human health-based risk ratios roughly comparable to cancer risks of 1×10^{-6} for those analytes recognized by the USEPA as carcinogens and a hazard quotient of 1 for noncarcinogens. The ratios calculated using the secondary drinking water standards, designated "SD" in the groundwater PRE table, are not health based. Rather, they provide the risk manager with the magnitude of the exceedance over the secondary drinking water standard.

Human Health Surface Water Screening Values. Surface water screening values are taken from Chapter 62-302.530, Florida Administrative Code, "Florida Surface Water and Drinking Water Standards Class III, Mostly Fresh" (FDEP, 1995). The ratios calculated using these standards, are not health based. Rather, they provide the risk manager with the magnitude of the exceedance over the surface water standard.

Human Health Sediment Screening Values. There are no specific sediment screening values for human health. As a very conservative screen, the NAS Cecil Field BCT has agreed that sediment analytes are to be compared with FDEP soil cleanup goals for Florida (FDEP, 1995). These comparisons are health based but are highly conservative due to the exposure assumptions used to calculate the cleanup values.

Human Health PRE Methodology. The human health PRE is conducted in two steps. First, all analytes detected in at least one sample in a medium are compared to the medium-specific screening values described above and, for inorganics, the NAS Cecil Field screening values. All analytes detected at concentrations below these screening values are dropped from further evaluation.

Those analytes detected in at least one sample at concentrations above the media-specific screening values and the NAS Cecil Field screening values are further evaluated in the human health PRE.

C.2 Ecological Preliminary Risk Evaluation Process. The ecological PRE is a screening-level evaluation of potential risks from environmental contaminants to ecological receptors at a site. The methodology is in accordance with USEPA draft supplemental guidance for ecological preliminary risk evaluation (USEPA, 1995a; 1995b; 1995c). The ecological PRE consists of ecological characterization, identification of potential exposure pathways, and an estimation of toxicity and risks potentially associated with each exposure pathway by comparison of maximum medium-specific analyte concentrations to ecological screening values.

The ecological characterization of NAS Cecil Field identifies terrestrial, wetland, and aquatic habitats. The field program includes a walkover survey to confirm ecological habitat types, flora, and fauna in the vicinity of each study area. Ecological receptors in each study area are identified. Major site-specific exposure pathways (consisting of a source of contamination, potentially contaminated media, and an exposure route) are evaluated, and possible signs of stress on biological receptors at the site are observed.

Particular emphasis is placed on identifying sensitive ecological receptors and assessing the potential occurrence of rare, threatened, or endangered species at the installation. The U.S. Fish and Wildlife Service, Florida Natural Heritage Program, and regional authorities were contacted regarding the presence of State or federally listed threatened and/or endangered species at NAS Cecil Field. Table C-1 identifies the protected species known or expected to occur at NAS Cecil Field.

Steps in the PRE screening process include reviewing the site history and plans for future use, identifying the ecological habitat, and making an initial evaluation.

- If no habitat is present, current and future exposure pathways are incomplete. No further screening is done, and a statement of explanation is provided.

Table C-1
Rare, Endangered, and Threatened Flora and Fauna at or in the Vicinity of NAS Cecil Field

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Naval Air Station Cecil Field
Jacksonville, Florida

Common Name	FGFWFC[1]	USFWS[2]	FDA[3]	Comments
Florida gopher frog (*Rana capito*)	SSC	C2		Possible resident at NAS Cecil Field (Envirodyne Engineers, 1985).
American alligator (*Alligator mississippiensis*)	SSC	T(S/A)		Confirmed resident in Lake Fretwell (Envirodyne Engineers, 1985).
Eastern indigo snake (*Drymarchon corais couperi*)	T	T		Possible resident at NAS Cecil Field (Envirodyne Engineers, 1985) but its presence has not been confirmed (Cochran, 1995).
Gopher tortoise (*Gopherus polyphemus*)	SSC	C2		Confirmed resident at NAS Cecil Field; observed in association with Sites 2, 4, and 5; a possible resident at Site 1 (Envirodyne Engineers, 1985; ABB-ES, 1994a; ABB-ES, 1994b). Also observed in several outlying areas of NAS Cecil Field and the Yellow Water Weapons Area (CZR, 1994).
Wood stork (*Mycteria americana*)	E	E		Confirmed migrant, observed feeding at Lake Fretwell (Cochran, 1995). Suitable habitat for feeding may be present in additional shallow water areas at NAS Cecil Field (Envirodyne Engineers, 1985).
Southeastern kestrel (*Falco sparverius paulus*)	T	C2		Either this, or the closely related subspecies, *F. sparverius sparverius*, has been observed in the Yellow Water Weapons Area by ABB-ES biologists and others (Cochran, 1995).
Bald eagle (*Haliaeetus leucocephalus*)	T	T		Confirmed migrant (Envirodyne Engineers, 1985).
Bachman's sparrow (*Aimophila aestivalis*)		C2		Observed in Yellow Water Weapons Area (CZR, 1994).
Loggerhead shrike (*Lanius lucovicianus*)		C2		Observed at Yellow Water Weapons Area near the weapons compound by ABB-ES biologist, and near runways at the facility (Cochran, 1995)
Sherman's fox squirrel (*Sciurus niger shermani*)	SSC	C2		Possible resident near Site 18 (ABB-ES biologist) and confirmed at NAS Cecil Field (Cochran, 1995).
Florida black bear (*Ursus americanus floridanus*)	T	C2		Evidence of black bears reported in outlying areas in 1982 (Envirodyne Engineers, 1985).
Florida mouse (*Podomys floridanus*)	SSC	C2		Known from Clay County, may range into habitats (sand pine scrub and longleaf pine-turkey oak communities) present at NAS Cecil. Not known to be a resident at NAS Cecil Field (Envirodyne Engineers, 1985; Cochran, 1995).

See notes at end of table.

Table C-1 (Continued)
Rare, Endangered, and Threatened Flora and Fauna at or in the Vicinity of NAS Cecil Field

Technical Memorandum for No Further Action
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Naval Air Station Cecil Field
Jacksonville, Florida

Common Name	FGFWFC[1]	USFWS[2]	FDA[3]	Comments
Hooded pitcher plant (*Sarracenia minor*)			T	Observed in wetlands associated with Sites 3 and 17 (ABB-ES), and Sites 4 and 5 (CDM, 1994).
Spoon-leaved sundew (*Drosera intermedia*)			T	Observed at one location at Yellow Water Weapons Area in drainage ditch (ESP, 1990).
Cinnamon fern (*Osmunda cinnamomea*)			CE	Observed at Sites 1 (ABB-ES ecologist), 2, 3, 4, 5, and 17 (CDM, 1994) and the Yellow Water Weapons Area (CZR, 1994).
Royal fern (*Osmunda regalis*)			CE	Observed at Sites 1 (ABB-ES ecologist), 2, 4, 5, and 17 (CDM, 1994) and the Yellow Water Weapons Area (CZR, 1994).
Southern shield fern (*Thelypteris kunthii*)			T	Not observed at NAS Cecil Field, but appropriate habitat exists at Sites 11 and 18.
Comb fern (*Polypodium plumula*)			T	Not observed at NAS Cecil Field, but appropriate habitat exists within mesophytic hardwood communities.
Bartram's ixia (*Salpingostylis coelestina*)			E	Confirmed by Navy personnel in the southwest quadrant of NAS Cecil Field (Burst, 1995; Cochran, 1995).
Variable-leaf crown beard (*Verbesina heterophylla*)		C2		Observed at one location at NAS Cecil Field in sandhill habitat (ESP, 1990).
Netted chain fern (*Woodwardia areolata*)			T	Observed at Sites 3 and 5 (CDM, 1994), 1 and 17 (ABB-ES ecologist).
Grass pink (*Calopogon tuberosus*)			T	Observed at Site 17 by ABB-ES ecologist.
Ladies' tresses (*Spiranthes vernalis*)			T	Confirmed at NAS Cecil Field (Cochran, 1995).
Rose pogonia (*Pogonia ophioglossoides*)			T	Confirmed at NAS Cecil Field (Cochran, 1995).
Foxtail Clubmoss (*Lycopodium alopeuroides*)			T	Observed at Site 4 (CDM, 1994) and OU 2 (ABB-ES ecologist).
Wild azalea (*Rhododendron canescens*)			CE	Observed at NAS Cecil Field (CZR, 1994).
Swamp honeysuckle (*Rhododendron viscosum*)			T	Observed at NAS Cecil Field (CZR, 1994).
Dahoon holly (*Ilex cassine*)			CE	Observed at NAS Cecil Field (CZR, 1994).

See notes at end of table.

Table C-1 (Continued)
Rare, Endangered, and Threatened Flora and Fauna at or in the Vicinity of NAS Cecil Field

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Common Name	FGFWFC[1]	USFWS[2]	FDA[3]	Comments
American holly (*Ilex opaca*)			CE	Observed at NAS Cecil Field (CZR, 1994).
Dwarf palmetto (*Sabal minor*)			T	Observed in disturbed upland areas of OU 1 and OU 2 (ABB-ES ecologists).

[1] Florida Game and Fresh Water Fish Commission (FGFWFC) (list published in Sections 39-27.003-005, Florida Administrative Code) (Wood, 1994).
[2] U.S. Fish and Wildlife Service (USFWS) (list published in List of Endangered and Threatened Wildlife and Plants, 50 Code of Federal Regulations 17.11-12) (Wood, 1994).
[3] Florida Department of Agriculture and Consumer Services (FDA) (list is statutorily designated by the Preservation of Native Flora of Florida Act (581.185-187, Florida Statutes) (Wood, 1994).

Notes: NAS = Naval Air Station.
SSC = species of special concern.
C2 = a candidate for Federal listing with some evidence of vulnerability, but for which not enough information exists to justify listing.
T(S/A) = threatened due to similarity of appearance.
T = threatened.
ABB-ES = ABB Environmental Services, Inc.
CZR = CZR, Incorporated.
E = endangered.
CDM = Camp, Dresser & McKee.
ESP = Environmental Services & Permitting.
CE = commercially exploited.
OU = operable unit.

- If a habitat is present, and current and future exposure pathways are incomplete, then further screening is done, and a statement of explanation is provided.

- If a habitat is present and/or plans for future use suggest the site will provide a habitat for ecological receptors, analytical results from appropriate media samples are subjected to Tier I Screening.

Tier I Screening. Maximum organic and inorganic analyte concentrations are compared to preliminary screening values (presented in *Soil Criteria for Evaluating the Severity of Contamination Under the Dutch Soil Cleanup Act*, (Richardson, 1987), and the Region III Biological Technical Assistance Group (BTAG) screening levels) for each analyte. Inorganics are also compared with background concentrations established by the NAS Cecil Field BCT.

If the maximum site concentration of an analyte is less than the Dutch or BTAG screening value, or for inorganics, BCT background, the analyte is not assumed to represent an unacceptable site-related risk and is not further evaluated. If all analytes for a site are eliminated by this level of screening, results are presented in tabular form, accompanied by a brief explanation stating that minimal to no adverse effects are expected. Any analytes that exceed the Tier I screening procedure are evaluated in the Tier II screening process described below.

Tier II Screening. This evaluation is performed if any organic or inorganic concentration exceeds the Tier I screening procedure or if any screening value is unavailable.

For surface soil analytes, a screening table containing the information below is presented.

- Frequency of detection of each analyte that failed the Tier I screening.

- Maximum concentration of each analyte that failed the Tier I screening.

- Reference toxicity values (RTVs) for plants (see Table C-2).

- RTVs for soil invertebrates (see Table C-2).

- Protective contaminant levels (PCLs) for wildlife receptors (see Table C-2 for PCL values). The lowest PCL for wildlife receptors is presented and used for screening purposes.

- Risk ratios calculated by dividing the maximum detected concentration by each Tier II screening value.

For surface water and sediment analytes, screening tables containing the information below will be used (see Tables C-3 and C-4, respectively):

- Frequency of detection of each analyte that failed the Tier I screening.

- Maximum concentration of each analyte that failed the Tier I screening.
- Available Federal and State criteria for each medium, including
  - Region IV surface water and sediment values

Table C-2
Terrestrial Plant, Invertebrate and Wildlife Toxicity Screening Values

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Analyte	Phytotoxicity Screening Value[1]	Invertebrate Screening Value[2]	Wildlife Protective Contaminant Levels[3]
Volatile Organic Compounds (mg/kg)			
2-Butanone	NA	NA	22,000
Acetone	[4]200	NA	35,000,000
Benzene	[4]200	NA	NA
Carbon disulfide	NA	NA	1,400
Chloroform	NA	NA	33,000
Ethylbenzene	[4]200	NA	NA
Methylene chloride	[5]>1,000	150	6,800
Tetrachloroethylene	>1,000	150	13,000
Trichloroethene	[5]>1,000	NA	96,000
Toluene	200	21	9,700
Xylene (total)	>1,000	NA	64,000
Semivolatile Organic Compounds (mg/kg)			
2-Methylnaphthalene	[6]25	34	4,600
2-Methylphenol	[7]>100	8	6,400
4-Chloroaniline	[8]15	NA	1,600
4-Methylphenol	[9]96	8	6,400
1,2-Dichlorobenzene	[10]248	NA	510
1,3-Dichlorobenzene	[10]248	NA	510
1,4-Dichlorobenzene	248	NA	510
2,4-Dinitrophenol	20	NA	NA
Acenaphthene	25	34	910
Acenaphthylene	[6]25	34	910
Anthracene	[6]25	34	910
Benzo(a)anthracene	[6]25	34	910
Benzo(a)pyrene	[6]25	34	910
Benzo(b)fluoranthene	[6]25	34	910
Benzo(g,h,i)perylene	[6]25	34	910
Benzo(k)fluoranthene	[6]25	34	910
bis(2-Ethylhexyl)phthalate	[7]>1,000	478	1,700
Butylbenzylphthalate	[11]200	478	500,000

See notes at end of table.

Table C-2 (Continued)
Terrestrial Plant, Invertebrate and Wildlife Toxicity Screening Values

Technical Memorandum for No Further Action
Potential Source of Contamination 9
Naval Air Station Cecil Field
Jacksonville, Florida

Analyte	Phototoxicity Screening Value[1]	Invertebrate Screening Value[2]	Wildlife Protective Contaminant Levels[3]
Semivolatile Organic Compounds (mg/kg) (continued)			
Carbazole	NA	34	880
Chrysene	[6]25	34	910
Dibenzofuran	[12]617	NA	11,000
Dibenz(a,h)anthracene	[6]25	34	910
Diethylphthalate	[7]134	478	94,000
Dimethyl phthalate	[11]200	478	NA
Di-*n*-butyl phthalate	200	478	16,000
Di-*n*-octyl phthalate	[11]200	478	16,000
Fluoranthene	[6]125	34	910
Fluorene	[6]25	34	910
Indeno(1,2,3-cd)pyrene	[6]25	34	910
Naphthalene	[7]100	34	3,300
n-Nitrosodiphenylamine	NA	NA	1,300
Phenanthrene	[6]25	34	910
Phenol	[7]79	8	1,200
Pentachlorophenol	[7]8	NA	380
Pyrene	[6]25	34	910
Pesticides and PCBs (mg/kg)			
4,4'-DDD	[13]12.5	12	0.79
4,4'-DDE	[13]12.5	12	1.5
4,4'-DDT	[14]12.5	12	3.9
Aldrin	NA	2.2	83
Aroclor-1016	40	NA	4.2
Aroclor-1242	40	NA	4.2
Aroclor-1248	40	NA	4.2
Aroclor-1254	40	NA	4.2
Aroclor-1260	40	NA	18
BHC-alpha	[15]>1,000	8	16
BHC-beta	[7]>1,000	8	640
BHC-delta	[15]<1,000	8	640

See notes at end of table.

Table C-2 (Continued)
Terrestrial Plant, Invertebrate and Wildlife Toxicity Screening Values

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Potential Source of Contamination 9
Naval Air Station Cecil Field
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Analyte	Phototoxicity Screening Value[1]	Invertebrate Screening Value[2]	Wildlife Protective Contaminant Levels[3]
Pesticides and PCBs (mg/kg) (continued)			
BHC-gamma (lindane)	[15] > 1,000	NA	640
Chlordane-alpha	[13] 12.5	NA	0.35
Chlordane-gamma	[13] 12.5	NA	0.35
Dieldrin	[13] 12.5	30	1.9
Endosulfan I	[7] > 1,000	1	23
Endosulfan II	[16] > 1,000	1	25
Endosulfan sulfate	[16] > 1,000	1	25
Endrin	[13] 12.5	NA	8.3
Endrin aldehyde	[13] 12.5	NA	8.3
Endrin ketone	[13] 12.5	NA	8.3
Heptachlor	[13] 12.5	6.4	5.1
Heptachlor epoxide	[13] 12.5	6.4	5.1
Methoxychlor	[13] 12.5	NA	1,300
Toxaphene	[13] 12.5	NA	NA
Silvex	[13] 12.5	NA	NA
Inorganic Analytes (mg/kg)			
Aluminum	50	NA	54,000
Antimony	5	NA	5,100
Arsenic	10	100	15
Barium	500	NA	23,000
Beryllium	10	NA	110
Boron	0.5	NA	NA
Cadmium	3	50	5.3
Calcium	NA	NA	NA
Chromium	1	50	14,000
Cobalt	20	NA	1,600
Copper	100	30	1,000
Cyanide	NA	NA	1,500
Iron	NA	NA	NA
Lead	50	1,190	260

See notes at end of table.

Table C-2 (Continued)
Terrestrial Plant, Invertebrate and Wildlife Toxicity Screening Values

Technical Memorandum for No Further Action
Potential Source of Contamination 9
Naval Air Station Cecil Field
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Analyte	Phototoxicity Screening Value[1]	Invertebrate Screening Value[2]	Wildlife Protective Contaminant Levels[3]
Inorganic Analytes (mg/kg) (continued)			
Magnesium	NA	NA	NA
Manganese	500	NA	5,800
Mercury	0.3	36	3.9
Nickel	30	400	550
Potassium	NA	NA	NA
Selenium	1	NA	7.3
Silver	2	NA	500
Sodium	NA	NA	NA
Thallium	1	NA	89
Tin	50	NA	2,500
Vanadium	2	NA	1,100
Zinc	50	130	1,600

[1] Phytotoxicity Screening Values from Suter et al. (1993b) or Will and Suter (1994), unless otherwise noted. The screening value is the lowest observed effects level from among plant growth studies conducted in solid media.
[2] Invertebrate Screening Values from Neuhauser et al. (1985a); Neuhauser et al. (1985b); Bousche (1987); Malecki et al. (1982); Molnar et al. (1989); and van Gestel and Dis (1988). For organic compounds, the screening value is the lowest LC_{50} (14-day soil test on *Eisenia foetida*) from among chemicals in the same chemical class; a conservative factor of 0.2 was applied and the resultant value should be protective of 99.9 percent of the population from acute effects (U.S. Environmental Protection Agency, 1986).
[3] The wildlife screening values represent the lowest protective contaminant level for the cotton mouse, short-tailed shrew, red fox, red-tailed hawk, and robin.
[4] Value for toluene used as a surrogate.
[5] Value for tetrachloroethylene used as a surrogate.
[6] Value for acenaphthene used as a surrogate.
[7] Value from Hulzebos et. al. (1993); values represent 14-day growth EC_{50} for *Lactuca sativa* in soil.
[8] Value for 3-chloroaniline used as a surrogate.
[9] Value for 3-methylphenol used as a surrogate.
[10] Value for 1,4-dichlorobenzene used as a surrogate.
[11] Value for di-*n*-butylphthalate used as a surrogate.
[12] Value for furan used as a surrogate.
[13] Value for 4,4-DDT used as a surrogate.
[14] Value from Eno and Everett (1958).
[15] Value for beta-BHC used as a surrogate.
[16] Value for endosulfan I used as a surrogate.

Notes: mg/kg = milligrams per kilogram.
NA = not applicable.
> = greater than.
PCB = polychlorinated biphenyl.
DDD = dichlorodiphenyldichloroethane.
DDE = dichlorodiphenyldichloroethene.
DDT = dichlorodiphenyltrichloroethane.
BHC = benzene hexachloride.
< = less than.

Table C-3
Surface Water Screening Values

Technical Memorandum for No Further Action
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Naval Air Station Cecil Field
Jacksonville, Florida

Analyte	Region IV Chronic Water Quality Screening Value[1]	Ambient Water Quality Criteria[2]	Florida Class III Surface Water Quality Standards[3]	AQUIRE Lowest Reported Adverse Effect Concentration/Test Species[4]
Volatile Organic Compounds (µg/ℓ)				
Acetone	NA	NA	NA	550,000/chronic mortality in water flea
Benzene	53	NA	[5,7]71.28	3,660/leopard from LC_{50}
Bromoform	293	NA	[5]360	
2-Butanone	NA	NA	NA	520,000/5% of LC_{50} in water flea
Carbon tetrachloride	352	NA	[5]4.42	
Chlorobenzene	195	[6]50	NA	
Chloroform	289	[6]1,240	[5]470.8	
1,2-Dichloroethane	2,000	[6]20,000	NA	
1,1-Dichloroethene	303	NA	[7]3.2	
1,2-Dichloroethene	1,350	NA	[7,16]3.2	[16]2,400/water flea lethality
1,2-Dichloromethane	NA	NA	NA	
1,1-Dichloromethene	NA	NA	NA	
1,2-Dichloropropane	525	[6]5,700	NA	
1,3-Dichloropropylene (*cis* and *trans*)	24.4	[6]244	NA	
Ethylbenzene	453	NA	NA	
4-Methyl-2-pentanone	NA	NA	NA	7,800/reproduction in water flea
Methyl bromide	110	NA	NA	
Methyl chloride	5,500	NA	[5]470.8	
Methylene chloride	1,930	NA	[5]1,580	
1,1,2,2-Tetrachloroethane	240	[6]2,400	[5]10.8	

See notes at end of table.

Table C-3 (Continued)
Surface Water Screening Values

Technical Memorandum for No Further Action
Potential Source of Contamination 9
Naval Air Station Cecil Field
Jacksonville, Florida

Analyte	Region IV Chronic Water Quality Screening Value[1]	Ambient Water Quality Criteria[2]	Florida Class III Surface Water Quality Standards[3]	AQUIRE Lowest Reported Adverse Effect Concentration/Test Species[4]
Volatile Organic Compounds (µg/ℓ) (continued)				
Tetrachloroethylene	84	[6]840	[5]8.85	
Toluene	175	NA	NA	
1,1,1-Trichloroethane	528	NA	NA	
1,1,2-Trichloroethane	940	[6]9,400	NA	
Trichloroethylene	NA	[6]21,900	[7]80.7	
1,1,1-Trichloromethane	NA	NA	NA	
Vinyl chloride	NA	NA	NA	
Xylenes (total)	NA	NA	NA	
Semivolatile Organic Compounds (µg/ℓ)				
Acenaphthene	17	[6]520	[7]2,700	
Acenaphthylene	NA	NA	NA	
Acrolein	2.1	[6]21	NA	
Acrylonitrile	75.5	[6]2,600	NA	
Anthracene	NA	NA	[7]110,000	
bis(2-Ethylhexyl)phthalate	0.3	[8]160	3	0.89/moor frog hatchability
Butylbenzylphthalate	22	[6]3	3	
2-Chlorophenol	43.8	[6]2,000	[7]400	
1,2-Dichlorobenzene	15.8	[6]763	NA	
1,3-Dichlorobenzene	50.2	[6]763	NA	
1,4-Dichlorobenzene	11.2	[6]763	NA	

See notes at end of table.

Table C-3 (Continued)
Surface Water Screening Values

Technical Memorandum for No Further Action
Potential Source of Contamination 9
Naval Air Station Cecil Field
Jacksonville, Florida

Analyte	Region IV Chronic Water Quality Screening Value[1]	Ambient Water Quality Criteria[2]	Florida Class III Surface Water Quality Standards[3]	AQUIRE Lowest Reported Adverse Effect Concentration/Test Species[4]
Semivolatile Organic Compounds (µg/ℓ) (continued)				
2,4-Dichlorophenol	36.5	[6]365	[7]790	
Diethylphthalate	521	[6]3	3	
Dimethylphthalate	330	[6]3	3	
2,4-Dimethylphenol	21.2	NA	NA	
Di-n-butylphthalate	9.4	[6]3	3	
2,4-Dinitrophenol	6.2	NA	[7]14,260	
2,4-Dinitrotoluene	310	[6]230	[5]9.1	
Fluoranthene	39.8	NA	[7]370	
Fluorene	NA	NA	[7]14,000	
Isophorone	1,170	NA	NA	
2-Methylnaphthalene	NA	NA	NA	2,000,000/growth effects in green algae
Naphthalene	62	[6]620	NA	
Nitrobenzene	270	NA	NA	
2-Nitrophenol	3,500	[6]150	NA	
4-Nitrophenol	82.8	[6]150	NA	
Phenol	256	[6]2,560	300	
Pyrene	NA	NA	[7]11,000	
2,4,6-Trichlorophenol	3.2	[6]970	[5]6.5	
Pesticides and PCBs (µg/ℓ)				
Aldrin	0.3	NA	3.0	

See notes at end of table.

Table C-3 (Continued)
Surface Water Screening Values

Technical Memorandum for No Further Action
Potential Source of Contamination 9
Naval Air Station Cecil Field
Jacksonville, Florida

Analyte	Region IV Chronic Water Quality Screening Value[1]	Ambient Water Quality Criteria[2]	Florida Class III Surface Water Quality Standards[3]	AQUIRE Lowest Reported Adverse Effect Concentration/Test Species[4]
Pesticides and PCBs (µg/ℓ) (continued)				
Aroclor-1248	0.014	0.014	0.014	
Aroclor-1254	0.014	0.014	0.014	
Aroclor-1260	0.014	0.014	0.014	
alpha-BHC	[9]500	NA	NA	
beta-BHC	[9]5,000	NA	[5]0.046	
gamma-BHC (Lindane)	0.08	0.08	0.08	
Chlordane	0.0043	0.0043	0.0043	
4,4'-DDD	0.0064	0.001	NA	
4,4'-DDE	10.5	0.001	NA	
4,4'-DDT	0.001	0.001	0.001	
Dieldrin	0.0019	0.0019	0.0019	
Endosulfan (I and II)	0.056	0.056	0.056	
Endrin	0.0023	0.0023	0.0023	
Heptachlor (and heptachlor epoxide)	0.0038	0.0038	0.0038	
Malathion	0.1	0.1	0.1	
Parathion	0.013	0.013	0.04	
Toxaphene	0.0002	0.0002	0.0002	
Inorganic Analytes (µg/ℓ)				
Aluminum	[10]87	[10]87	NA	50/narrow-mouthed frog LC_{50} and acute minnow mortality
Antimony	160	[8]30	4,300	

See notes at end of table.

Table C-3 (Continued)
Surface Water Screening Values

Technical Memorandum for No Further Action
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Analyte	Region IV Chronic Water Quality Screening Value[1]	Ambient Water Quality Criteria[2]	Florida Class III Surface Water Quality Standards[3]	AQUIRE Lowest Reported Adverse Effect Concentration/Test Species[4]
Inorganic Analytes ($\mu g/\ell$) (continued)				
Arsenic	[11]190	[11]190	50	1,700/water flea LC_{50}
Barium	NA	NA	NA	8,900/water flea reproduction
Beryllium	0.53	[6]5.3	[5]0.13	
Cadmium	[12]0.7	[12]0.7	[12]0.7	
Calcium	[13]NA	[13]NA	[13]NA	
Chromium	[14]11	[14]11	[14]11	5/water flea mortality, growth and reproduction
Cobalt	NA	NA	NA	8,000/scud lethality
Copper	[12]7	[12]7	[12]7	1.5/water flea reproduction and chronic mortality
Cyanide	5.2	5.2	5.2	432/snail LC_{50} or 180/bluegill LC_{50}
Iron	1,000	1,000	1,000	3,700/duckweed growth
Lead	[12]1.3	[12]1.3	[12]1.3	
Magnesium	[13]NA	[13]NA	[13]NA	
Manganese	NA	NA	NA	280/EC_{50} for growth in algae
Mercury	0.012	0.012	0.012	
Nickel	[12]88	[12]88	[12]88	50/chronic water flea mortality
Potassium	[13]NA	[13]NA	[13]NA	
Selenium	5	5	5	
Silver	0.012	0.12	0.07	
Sodium	[13]NA	[13]NA	[13]NA	
Thallium	4	[6]40	[7]6.3	82/green algae growth
Tributyltin	0.026	NA	NA	

See notes at end of table.

Table C-3 (Continued)
Surface Water Screening Values

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Naval Air Station Cecil Field
Jacksonville, Florida

Analyte	Region IV Chronic Water Quality Screening Value[1]	Ambient Water Quality Criteria[2]	Florida Class III Surface Water Quality Standards[3]	AQUIRE Lowest Reported Adverse Effect Concentration/Test Species[4]
Inorganic Analytes ($\mu g/\ell$) (continued)				
Vanadium	NA	NA	NA	[15] 128/LC_{50} in guppy
Zinc	[12]59	[12]59	[12]59	17.1/invertebrate population endpoints
TPH	NA	NA	NA	

[1] U.S. Environmental Protection Agency (USEPA) Region IV Waste Management Division Chronic Freshwater Surface Water Screening Values for Hazardous Waste Sites, November (USEPA, 1995b).
[2] Federal Ambient Water Criteria (USEPA, 1988a; 1991).
[3] Chapter 62-302, Florida Administrative Code, Surface Water Quality Standards, 1995.
[4] Reported toxicity values are from the USEPA AQUIRE database.
[5] Value equals maximum concentration at average annual flow conditions.
[6] Value represents the lowest effect concentration as presented in USEPA, 1986, for the chemical or its class; insufficient information is available to develop criteria.
[7] Criteria are protective of human health, not aquatic health; therefore, this screening concentration was not used in the evaluation.
[8] Proposed criterion.
[9] Based on the lowest plant value reported, as cited in USEPA, 1995a (see footnote 1).
[10] Criterion is based on a pH of 6.5 to 9 (USEPA, 1988d).
[11] Screening value for trivalent species of arsenic.
[12] Hardness dependent criterion based on a standard default hardness concentration of 50 milligrams per liter calcium carbonate. Site-specific criteria should be calculated using measured hardness concentrations or hardness concentrations calculated using site-specific calcium and magnesium concentrations.
[13] Analyte is an essential nutrient, and is not considered toxic except at high concentrations.
[14] Screening value for hexavalent species of chromium.
[15] Value for vanadium oxide sulfate used as a surrogate.
[16] Value for 1,1-dichloroethylene used as a surrogate.

Notes: AQUIRE = Aquatic Information Retrieval.
$\mu g/\ell$ = micrograms per liter.
NA = not available.
LC_{50} = lethal concentration to 50 percent of test population.
% = percent.
PCB = polychlorinated biphenyl.
BHC = benzene hexachloride.
DDD = dichlorodiphenyldichloroethane.
DDE = dichlorodiphenyldichloroethene.
DDT = dichlorodiphenyltrichloroethane.
TPH = total petroleum hydrocarbons.

Table C-4
Sediment Screening Values

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Jacksonville, Florida

Analyte	Region IV Sediment Screening Value[1]	NOAA[2]		OME LEL[3]	USEPA SQGs[4]	MacDonald SQAGs[5]	
		ER-L	ER-M			TEL	PEL
Volatile Organic Compounds (µg/kg)							
2-Butanone	NA	NA	NA	NA	NA	NA	NA
Acetone	NA	NA	NA	NA	NA	NA	NA
Methylene chloride	NA	NA	NA	NA	NA	NA	NA
Semivolatile Organic Compounds (µg/kg)							
Acenaphthene	330	16	500	NA	1,300	6.71	88.9
Acenaphthylene	330	44	640	NA	NA	5.87	128
Anthracene	330	85.3	1,100	220	NA	46.9	245
Benzo(a)anthracene	330	261	1,600	320	NA	74.8	693
Benzo(a)pyrene	330	430	1,600	370	NA	88.8	763
Benzo(b)fluoranthene	655	NA	NA	[14] 240	NA	NA	NA
Benzo(g,h,i)perylene	655	NA	NA	170	NA	NA	NA
Benzo(k)fluoranthene	655	NA	NA	240	NA	NA	NA
Butylbenzylphthalate	NA	NA	NA	NA	NA	NA	NA
Carbazole	NA	NA	NA	NA	NA	NA	NA
Chrysene	330	384	2,800	340	NA	108	846
Di-*n*-butylphthalate	NA	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	330	63.4	260	60	NA	6.22	135
Dibenzofuran	NA	NA	NA	NA	NA	NA	NA
***bis*(2-Ethylhexyl)phthalate**	**182**	**NA**	**NA**	**NA**	**NA**	**182**	**2647**
Fluoranthene	**330**	**600**	**5,100**	**750**	**6,200**	**113**	**1494**
Fluorene	**330**	**19**	**540**	**190**	**NA**	**21.2**	**144**
Indeno(1,2,3-cd)pyrene	**655**	**NA**	**NA**	**200**	**NA**	**NA**	**NA**

See notes at end of table.

Table C-4 (Continued)
Sediment Screening Values

Technical Memorandum for No Further Action
Potential Source of Contamination 9
Naval Air Station Cecil Field
Jacksonville, Florida

Analyte	Region IV Sediment Screening Value[1]	NOAA[2]		OME LEL[3]	USEPA SQGs[4]	MacDonald SQAGs[5]	
		ER-L	ER-M			TEL	PEL
Semivolatile Organic Compounds (µg/kg) (continued)							
2-Methylnaphthalene	330	70	670	NA	NA	20.2	201
Naphthalene	330	160	2,100	NA	NA	34.6	391
Phenanthrene	330	240	1,500	560	1,800	86.7	544
Pyrene	330	665	2,600	490	NA	153	1398
Pesticides and PCBs (µg/kg)							
Aldrin	NA	NA	NA	2	NA	NA	NA
Aroclor-1248	33	[6]22.7	[6]180	30	[7]195	[6]21.6	[6]189
Aroclor-1254	33	[6]22.7	[6]180	60	195	[6]21.6	[6]189
Aroclor-1260	33	[6]22.7	[6]180	5	[7]195	[6]21.6	[6]189
alpha-BHC	[12]3.3	NA	NA	6	NA	NA	NA
beta-BHC	[12]3.3	NA	NA	5	NA	NA	NA
gamma-BHC	3.3	NA	NA	3	NA	0.32	0.99
alpha-Chlordane	1.7	0.5	6	7	NA	2.26	4.79
gamma-Chlordane	1.7	0.5	6	7	NA	2.26	4.79
4,4'-DDD	3.3	[8]1.58	[8]46.1	8	[9]8.28	1.22	7.81
4,4'-DDE	3.3	2.2	27	5	[9]8.28	2.07	374
4,4'-DDT	3.3	[8]1.58	[8]46.1	8	8.28	1.19	4.77
Dieldrin	3.3	0.02	8	2	0.1	0.715	4.3
Endosulfan I	NA	NA	NA	NA	NA	NA	NA
Endosulfan II	NA	NA	NA	NA	NA	NA	NA
Endrin	3.3	0.02	45	3	42	NA	NA
Endrin ketone	[13]3.3	[13]0.02	[13]45	[13]3	[13]42	NA	NA

See notes at end of table.

Table C-4 (Continued)
Sediment Screening Values

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Jacksonville, Florida

Analyte	Region IV Sediment Screening Value[1]	NOAA[2]		OME LEL[3]	USEPA SQGs[4]	MacDonald SQAGs[5]	
		ER-L	ER-M			TEL	PEL
Pesticides and PCBs (µg/kg) (continued)							
Heptachlor	NA	NA	NA	[10]51	1.10	NA	NA
Heptachlor epoxide	NA	NA	NA	5	[11]1.10	NA	NA
Methoxychlor	NA	NA	NA	NA	NA	NA	NA
Inorganic Analytes (mg/kg)							
Aluminum	NA	NA	NA	NA	NA	NA	NA
Antimony	12	2	25	NA	NA	NA	NA
Arsenic	7.24	8.2	70	6	NA	7.24	41.6
Barium	NA	NA	NA	NA	NA	NA	NA
Beryllium	NA	NA	NA	NA	NA	NA	NA
Cadmium	1	1.2	9.6	0.6	NA	0.676	4.21
Calcium	NA	NA	NA	NA	NA	NA	NA
Chromium	52.3	81	370	26	NA	52.3	160
Cobalt	NA	NA	NA	50	NA	NA	NA
Copper	18.7	34	270	16	NA	18.7	108
Cyanide	NA	NA	NA	0.1	NA	NA	NA
Iron	NA	NA	NA	20,000	NA	NA	NA
Lead	30.2	46.7	218	31	NA	30.2	112
Magnesium	NA	NA	NA	NA	NA	NA	NA
Manganese	NA	NA	NA	460	NA	NA	NA
Mercury	0.13	0.15	0.71	0.2	NA	0.13	0.696
Nickel	15.9	20.9	51.6	16	NA	15.9	42.8
Potassium	NA	NA	NA	NA	NA	NA	NA

See notes at end of table.

Table C-4 (Continued)
Sediment Screening Values

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Naval Air Station Cecil Field
Jacksonville, Florida

Analyte	Region IV Sediment Screening Value[1]	NOAA[2]		OME LEL[3]	USEPA SQGs[4]	MacDonald SQAGs[5]	
		ER-L	ER-M			TEL	PEL
Inorganic Analytes (mg/kg) (continued)							
Selenium	NA	NA	NA	NA	NA	NA	NA
Silver	2	1	3.7	0.5	NA	0.733	1.77
Sodium	NA	NA	NA	NA	NA	NA	NA
Thallium	NA	NA	NA	NA	NA	NA	NA
Vanadium	NA	NA	NA	NA	NA	NA	NA
Zinc	124	150	410	120	NA	124	271
TPH	NA	NA	NA	NA	NA	NA	NA

[1] Draft Region IV Waste Management Division Sediment Screening Values (U.S. Environmental Protection Agency [USEPA], 1995c).
[2] National Oceanic and Atmospheric Administration (NOAA) Effects Range-Low (ER-L) Sediment Guideline corresponds to the lower 10th percentile of effects data for each chemical, a range intended to estimate conditions in which effects would be rarely observed; Effects Range-Medium (ER-M) corresponds to the median, or 50th percentile, of the effects data, a concentration representing a possible-effects range within which effects would occasionally occur (Long et al., 1995). Values for antimony, and isomers of chlordane, dieldrin and endrin are from Long and Morgan, 1990.
[3] Ontario Ministry of the Environment (OME) Low Effects Level (LEL) Provincial Sediment Quality Guidelines (Persaud et. al., 1996) corresponds to a concentration that can be tolerated by the majority of benthic organisms.
[4] USEPA (1988e; 1993c) mean Sediment Quality Criteria values (SQCs) at 1 percent total organic carbon. Values presented are from the 1993 documents, when available; otherwise the 1988 values are used. The lower of the available Final Residue Values and Final Chronic Values is presented.
[5] Values from MacDonald Environmental Sciences, Ltd., 1994, *Approach to the Assessment of Sediment Quality in Florida Coastal Waters*. Threshold effects level (TEL) corresponds to concentrations of contaminants in coastal and estuarine water below which biological effects are not expected, and probable effects level (PEL) corresponds to concentrations of analytes in coastal and estuarine water above which biological effects are likely.
[6] Value represents the total for PCBs.
[7] Value for Aroclor-1254 used as a surrogate.
[8] Value represents the total for DDT.
[9] Value for 4,4'-DDT used as a surrogate.
[10] Value for heptachlor epoxide used as a surrogate.
[11] Value for heptachlor used as a surrogate.
[12] Value for gamma-BHC used as a surrogate.
[13] Value for endrin used as a surrogate.
[14] Value for benzo(b)fluoranthene used as a surrogate.

Notes: SQAGs = sediment quality assessment guidelines.
µg/kg = micrograms per kilogram.
NA = not available.
PCB = polychlorinated biphenyl.
BHC = benzene hexachloride.
DDD = dichlorodiphenyldichloroethane.
DDE = dichlorodiphenyldichloroethene.
DDT = dichlorodiphenyltrichloroethane.
mg/kg = milligrams per kilogram.
TPH = total petroleum hydrocarbons.

- ambient water quality criteria (for water)
- Florida Class III surface water quality standards
- MacDonald sediment screening values
- National Oceanic and Atmospheric Administration screening values
- Ontario Ministry of the Environment Provincial sediment quality guidelines
- USEPA mean sediment quality criteria Values

- PCLs for wildlife receptors (See Table C-2 for PCL values). The lowest PCL for wildlife receptors is presented and used for screening purposes.

- Available reported toxicity values for aquatic receptors (for screening analytes for which there are no available Federal or State screening tools). Lowest adverse effect levels on reproduction, growth or survival in nonsalmonid species will be selected. When lethal concentration to 50 percent of test population (LC_{50}) values are selected, one-fifth of the value is used for screening.

- Risk ratios calculated by dividing the maximum detected concentration by each Tier II screening value.

Contaminant Evaluation. For those analytes that do not exceed screening values, it is concluded (provided sampling data are representative) that risks are negligible for current and future land uses. For those analytes that exceed a screening value, qualitative consideration is given as to how many analytes exceed the values, the extent to which they exceed the values, the toxicity of the analyte, frequency of detection, relationship to screening concentration, appropriateness of the screening tool for a given site, and other relevant site-specific uncertainties.

For those analytes that have insufficient data for screening, uncertainties regarding preliminary risk analysis are discussed.

Conclusions and Recommendations. A brief paragraph will be presented summarizing conclusions and recommendations supported by the preceding analyses.

Protective Contaminant Level. PCLs are defined as the soil concentration of an analyte that represents a Hazard Quotient of ≤ 1 for wildlife receptors. Wildlife receptors include members of terrestrial and wetland vertebrate classes (amphibians, reptiles, birds, and mammals).

PCLs are analyte-specific screening values derived for wildlife receptors appropriate to NAS Cecil Field. Surrogate species selected as representing wildlife groups likely to occur at terrestrial sites at NAS Cecil Field are listed in Table C-5. These representative wildlife receptors are considered on several trophic levels. This may result in overestimation of risk for industrial areas at the facility.

PCLs are developed for the most sensitive receptor at a site. RTVs are conservatively selected from available literature to represent the lowest available reported adverse effect threshold for reproduction, growth, or survival (see Table C-6).

Table C-5
Surrogate Species Selected to Represent Wildlife Receptor Groups at NAS Cecil Field

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Cotton mouse (*Peromyscus gossypinus*). The cotton mouse represents a small mammalian herbivore. This species could potentially be exposed to contamination in soil and surface water, and in plant tissue (accumulated from the soil). The cotton mouse represents the small mammal herbivore communities at NAS Cecil Field.
American robin (*Turdus migratorius*). The robin is often seen in developed areas, including maintained grassy lawns. This species represents avian receptors that may come into contact with contaminants in surface soil as a result of ingestion of earthworms and other soil invertebrates. The robin was selected to represent avian species that would receive the highest dose as a result of its small body size and feeding habits.
Short-tailed shrew (*Blarina brevicauda*). The short-tailed shrew finds suitable habitat in forests, fields, marshes, and brush. It primarily feeds on earthworms, snails, centipedes, insects, small vertebrates, and slugs (DeGraaf and Rudis, 1986). Relative to other small mammals, insectivorous species may receive high doses of contamination as a result of their voracious appetite relative to their small body size and the ability of their prey items to accumulate constituents. The shrew represents small mammal omnivores found in wooded sections of NAS Cecil Field.
Red fox (*Vulpes vulpes*). This omnivorous mammal prefers open woodlands and grassy fields, and is most active at dawn, dusk, and night. It is an opportunistic forager, feeding on small mammals, birds, amphibians, reptiles, and invertebrates, as well as berries and other fruits (Burt and Grossenheider, 1976). The red fox has an estimated home range of approximately 1,727 acres. The red fox represents predatory mammals at NAS Cecil Field.
Red-tailed hawk (*Buteo jamaicensis*). The red-tailed hawk forages in open country, frequently on woodland edges feeding primarily on small mammals. It will also consume invertebrates, reptiles, and small birds in its diet. Red-tailed hawks are year round residents in the southeastern United States, and are frequently seen perched adjacent to open fields (DeGraaf and Rudis, 1986). The red-tailed hawk has an estimated home range of 800 acres. The red-tailed hawk represents predatory birds at NAS Cecil Field.
Notes: NAS = Naval Air Station.

Table C-6
Ingestion Toxicity Information for Wildlife Receptors

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Naval Air Station Cecil Field
Jacksonville, Florida

Chemical	Test Species	Test Type	Duration	Effect	Result (mg/kg BW/day)		Reference
					Lethal	Sublethal	
Volatile Organic Compounds							
Acetone	Rat	Oral	NR	LD_{50}	5,800		RTECS, 1994
	Rat	Single Oral Dose		LD_{50}	9,750		Sax, 1984
	Rat	Oral	NR	LOAEL for reproductive effects		273,000	RTECS, 1994
	Mouse	Oral	NR	LD_{50}	3,000		RTECS, 1994
	Rabbit	Oral	NR	LD_{50}	5,340		RTECS, 1994
2-Butanone	Rat	Oral dose	NR	LD_{50}	2,737		RTECS, 1994
	Rat	Oral (subchronic)	13 weeks	NOAEL for neurological effects		173	ATSDR, 1991a
	Mouse	Oral dose	NR	LD_{50}	4,050		RTECS, 1994
Bromodichloromethane	Rat	Oral LD_{50}	1 dose	LD_{50}	470		ATSDR, 1988a
	Rat	Oral LD_{50}	1 dose	LD_{50}	943		ATSDR, 1988a
	Mouse	Oral LD_{50}	1 dose	LD_{50}	675		ATSDR, 1988a
	Rat	Oral (acute)	6 to 10 days of gestation	LOAEL for fetotoxicity		50	ATSDR, 1988a
Carbon disulfide	Rat	Oral	NR	LD_{50}	3,188		RTECS, 1994
	Rat	Oral	NR	LOAEL for reproductive effects		2,000	RTECS, 1994
	Mouse	Oral	NR	LD_{50}	2,780		RTECS, 1994
	Rabbit	Oral	NR	LD_{50}	2,550		RTECS, 1994
	Rabbit	Oral	NR	LOAEL for reproductive effects		350	RTECS, 1994
	Rabbit	Oral	NR	LOAEL for reproductive effects		2,100	RTECS, 1994
	Rabbit	Oral (subchronic)	3 months	Mortality, blood chemistry, histopathology		12.5	USEPA, 1984e

See notes at end of table.

Table C-6 (Continued)
Ingestion Toxicity Information for Wildlife Receptors

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Potential Source of Contamination 9
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Jacksonville, Florida

Chemical	Test Species	Test Type	Duration	Effect	Result (mg/kg BW/day)		Reference
					Lethal	Sublethal	
Volatile Organic Compounds (continued)							
Carbon disulfide (continued)	Rabbit	Converted inhalation	34 weeks	NOAEL for fetotoxicity and malformations		11	IRIS, 1991
	Guinea pig	Oral	NR	LD_{50}	2,125		RTECS, 1994
Chloroform	Dog (Beagle)	Oral (chronic)	7.5 years	Liver cyst formation		12.9	IRIS, 1991
	Rat	Oral	NR	Mortality	908		RTECS, 1994
	Rat	Oral	NR	Reproductive effects		1,260	RTECS, 1994
	Rat	Oral	NR	Reproductive effects		4,000	RTECS, 1994
	Mouse	Oral	NR	Reproductive effects		2,177	RTECS, 1994
	Mouse	Oral	NR	Reproductive effects		2,115	RTECS, 1994
	Guinea pig	Oral	NR	Mortality	820		RTECS, 1994
	Rabbit	Oral	NR	Reproductive effects		260	RTECS, 1994
Methylene chloride	Rat	Oral (chronic)	2 years	LOAEL for liver toxicity		52.6	IRIS, 1991
	Rat	Oral (subchronic)	3 months	NOAEL for mortality, blood chemistry, histopathology		125	USEPA, 1984a
	Rat	Oral LD_{50}	NR	Mortality	1,600		RTECS, 1994
	Dog	Oral LD_{50}	NR	Mortality	3,000		RTECS, 1994
	Rabbit	Single oral dose	1 dose	LD_{50}	1,900		Sax, 1984
Tetrachloroethene	Rat	Oral LD_{50}	1 dose	LD_{50}	8,850		NIOSH, 1985
	Mouse	Oral (subchronic)	13 weeks	LOAEL for hepatotoxicity		100	Buben and O'Flaherty, 1985

See notes at end of table.

Table C-6 (Continued)
Ingestion Toxicity Information for Wildlife Receptors

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Chemical	Test Species	Test Type	Duration	Effect	Result (mg/kg BW/day)		Reference
					Lethal	Sublethal	
Volatile Organic Compounds (continued)							
Toluene	Rat	Oral (subchronic)	13 weeks	LOAEL for increased liver and kidney weight		446	IRIS, 1991
	Rat	Oral dose	NR	LD_{50}	5,000		NIOSH, 1985
	Rat	Single oral dose	NR	LD_{50}	636		RTECS, 1994
	Mouse	Oral (subchronic)	76 days	LOAEL for decreased open field activity		76	ATSDR, 1992b
	Mouse	Oral	NR	LOAEL for reproductive effects		9,000	RTECS, 1994
	Mouse	Oral	NR	LOAEL for reproductive effects		15,000	RTECS, 1994
	Mouse	Oral	NR	LOAEL for reproductive effects		30,000	RTECS, 1994
Trichloroethene	Mouse	Single oral dose	1 dose	LD_{50}	2,402		NIOSH, 1985
	Rat	Single oral dose	1 dose	LD_{50}	7,193		NIOSH, 1985
	Mouse	Oral (multi-generational)	12 weeks	LOAEL for decreased dam and fetal weights		750	ATSDR, 1991d
Xylenes (total)	Rat	Oral (chronic)	103 weeks	LOAEL for hyperactivity, decreased BW, mortality		500	IRIS, 1991
	Rat	Oral dose	NR	LD_{50}	4,300		NIOSH, 1985
	Japanese quail	Oral (acute)	5 days	LOAEL for mortality	2,014		Hill and Camardese, 1986
Semivolatile Organic Compounds							
1,4-Dichlorobenzene (surrogate for 1,2-dichlorobenzene)	Mouse	Oral (chronic)	2 years	NOAEL for nephropathy; renal tubular degeneration		300	NTP, 1987
	Rat	Single oral dose	1 dose	LOAEL for mortality	4		NTP, 1987

See notes at end of table.

Table C-6 (Continued)
Ingestion Toxicity Information for Wildlife Receptors

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Naval Air Station Cecil Field
Jacksonville, Florida

Chemical	Test Species	Test Type	Duration	Effect	Result (mg/kg BW/day)		Reference
					Lethal	Sublethal	
Semivolatile Organic Compounds (continued)							
2,4-Dinitrotoluene (surrogate for 2,6-DNT)	Rat	Single oral dose	1 dose	LD_{50}	268		NIOSH, 1985
	Dog	Oral (subchronic)	13 weeks	LD_{50}	25		ATSDR, 1988
	Mouse	Single oral dose	1 dose	LD_{50}	790		NIOSH, 1985
4-Chloroaniline	Rat	Oral (chronic)	102 weeks	LOAEL for fibrosis of the splenic capsule		12.5	IRIS, 1993
4-Methylphenol (surrogate for 2-methylphenol)	Rat	Single oral dose	1 dose	LD_{50}	1,800		Verschueren, 1983
	Rabbit	Single oral dose	1 dose	LD_{50}	1,100		Verschueren, 1983
	Rat	Oral (subchronic)	13 weeks	LOAEL for CNS stimulation		50	ATSDR, 1990a
	Rat	Single oral dose	90 days	NOAEL for loss in body weight and neurotoxicity		50	IRIS, 1991
Acenaphthene	Mouse	Oral (chronic)	90 days	NOAEL for liver weight increase		175	IRIS, 1990
	Rat	Oral (chronic)	32 days	LOAEL for physiological changes		2,000	USEPA, 1984b
Anthracene	Mouse	Oral LD_{50}	NR	Mortality	17,000		RTECS, 1994
	Rodents	Oral (chronic)	NS	Carcinogenicity		3,300	Eisler, 1987a
	Mouse	Oral (chronic)	90 days	LOAEL for clinical and pathological effects		1,000	IRIS, 1990
Benzo(a)anthracene	Rodents	Oral (chronic)	NR	Carcinogenicity		2	Eisler, 1987a

See notes at end of table.

Table C-6 (Continued)
Ingestion Toxicity Information for Wildlife Receptors

Technical Memorandum For No Further Action
Potential Source of Contamination 9
Naval Air Station Cecil Field
Jacksonville, Florida

Chemical	Test Species	Test Type	Duration	Effect	Result (mg/kg BW/day)		Reference
					Lethal	Sublethal	
Semivolatile Organic Compounds (continued)							
Benzo(a)pyrene (surrogate for other PAHs)	Rat	Oral (chronic)	Pregnancy	LOAEL for sterility in offspring		40	USEPA, 1984c
	Rat	Oral (chronic)	3.5 months	LOAEL for reproductive		50	USEPA, 1984c
	Mouse	Oral	Multigenerational	LOAEL for decreased fertility of F1 progeny, decreased F2 litter size		10	MacKenzie and Angevine, 1981
	Mouse	Oral (subchronic)	6 months	Mortality	120		ATSDR, 1993
Benzo(b)fluoranthene	Rodents	Oral (chronic)	NR	Carcinogenicity		40	Eisler, 1987a
Benzo(g,h,i)perylene	Rodents	Oral (chronic)	NR	Carcinogenicity		99	Eisler, 1987a
Benzo(k)fluoranthene	Rodents	Oral (chronic)	NR	Carcinogenicity		40	Eisler, 1987a
Butylbenzylphthalate	Rat	Oral	NR	LD_{50}	2,330		RTECS, 1994
	Rat	Oral	NR	LOAEL for reproductive effects		16,400	RTECS, 1994
	Rat	Oral	NR	LOAEL for reproductive effects		4,900	RTECS, 1994
	Rat	Oral	NR	LOAEL for reproductive effects		21,000	RTECS, 1994
	Mouse	Oral	NR	LD_{50}	4,170		RTECS, 1994
	Guinea Pig	Oral	NR	LD_{50}	13,750		RTECS, 1994
Carbazole	Rat	Oral LD_{50}	NR	Mortality		10	USEPA, 1986
Chrysene	Rodents	Oral (chronic)	NR	Carcinogenicity		99	Eisler, 1987a
Dibenzofuran	Rodents	Single oral dose	1 dose	LC^{20}	500		ATSDR, 1991g
	Rodents	Oral (chronic)	13 weeks	LC^{10}	125		ATSDR, 1991g
Diethylphthalate	Rat	Oral (subchronic)	16 weeks	NOAEL for decreased body weight gain; decreased food utilization		750	IRIS, 1993

See notes at end of table.

Table C-6 (Continued)
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Chemical	Test Species	Test Type	Duration	Effect	Result (mg/kg BW/day)		Reference
					Lethal	Sublethal	
Semivolatile Organic Compounds (continued)							
Di-*n*-butylphthalate (surrogate for di-*n*-octylphthalate)	Rat	Oral (subchronic)	48 days	LOAEL for reproductive effects		125	ATSDR, 1989a
	Rat	Oral (chronic)	1 year	LOAEL for mortality	600		IRIS, 1991
	Mouse	Single oral dose	1 dose	LD_{50}	6,513		Sax, 1984
Fluoranthene	Rat	Oral LD dose	NR	LD_{50}	2,000		RTECS, 1994
	Mouse	Oral (subchronic)	90 days	LOAEL for nephropathy, clinical and pathological effects		250	IRIS, 1990
Fluorene	Mouse	Oral (subchronic)	13 weeks	Loael for hematological changes		125	IRIS, 1990
Indeno(1,2,3-*cd*)pyrene	Rodents	Oral (chronic)	NR	Carcinogenicity		72	Eisler, 1987a
Isophorone	Rat	Oral (acute)	1 dose	LD_{50}	3,460		ATSDR, 1988e
Naphthalene (surrogate for 2-methylnaphthalene)	Rat	Oral (subchronic)	13 weeks	LOAEL for decreased body weight gain		35.7	USEPA, 1990
Nitrobenzene	Rat	Single oral dose	1 dose	LOAEL for mortality		13	Sax, 1984
N-Nitrosodiphenylamine	Rat	Single oral dose		LD_{50}	1,650		Sax, 1984
	Rat	Oral	NR	LD_{50}	1,825		RTECS, 1994
	Mouse	Oral	NR	LD_{50}	1,860		RTECS, 1994
Pentachlorophenol	Rat	Oral	1 dose	LD_{50}	27		Eisler, 1989
	Mouse	Oral	1 dose	LD_{50}	65		Eisler, 1989
	Rat	Oral (chronic)	2 years	NOAEL for effects on growth, survival, and reproduction		3	Eisler, 1989

See notes at end of table.

Table C-6 (Continued)
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Chemical	Test Species	Test Type	Duration	Effect	Result (mg/kg BW/day)		Reference
					Lethal	Sublethal	
Semivolatile Organic Compounds (continued)							
Phenanthrene	Mouse	Oral dose	NR	LD_{50}	700		RTECS, 1994
	Mouse	Oral (subchronic)	6 months	LOAEL for increased liver weight		120	ATSDR, 1989b
Phenol	Rat	Single oral dose	1 dose	LD_{50}	700		Eisler, 1987a
	Rat	Oral (subchronic)	Gestational	LOAEL for reduced fetal body weights		120	IRIS, 1993
	Rabbit	Single oral dose	1 dose	LD_{50}	600		USEPA, 1980a
	Dog	Single oral dose	1 dose	LD_{50}	500		USEPA, 1980
Pyrene	Rat	Oral dose	NR	LD_{50}	2,700		RTECS, 1993 and NIOSH, 1985
	Mouse	Oral dose	NR	LD_{50}	800		RTECS, 1993 and NIOSH, 1985
	Mouse	Oral (subchronic)	13 weeks	LOAEL for renal effects		125	IRIS, 1990
	Rat	Oral	NR	LD_{50}	30,600		RTECS, 1994
bis(2-Ethylhexyl)-phthalate							
	Rat	Single oral dose		LD_{50}	26,000		ATSDR, 1988f
	Rat	Single oral dose		LD_{50}	8,600		NIOSH, 1985
	Rat	Oral	NR	LOAEL for reproductive effects		7,140	RTECS, 1994
	Rat	Oral	NR	LOAEL for reproductive effects		35	RTECS, 1994
	Rat	Oral	NR	LOAEL for reproductive effects		6,000	RTECS, 1994
	Rat	Oral	NR	LOAEL for reproductive effects		17,200	RTECS, 1994
	Rat	Oral	NR	LOAEL for reproductive effects		10,000	RTECS, 1994
	Rat	Oral	NR	LOAEL for reproductive effects		9,766	RTECS, 1994

See notes at end of table.

Table C-6 (Continued)
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Chemical	Test Species	Test Type	Duration	Effect	Result (mg/kg BW/day)		Reference
					Lethal	Sublethal	
Semivolatile Organic Compounds (continued)							
bis(2-Ethylhexyl)-phthalate (continued)	Mouse	Oral	NR	LD_{50}	30,000		RTECS, 1994
	Mouse	Single oral dose		LD_{50}	800		RTECS, 1993 and NIOSH, 1985
	Mouse	Oral	NR	LOAEL for reproductive effects		78,880	RTECS, 1994
	Mouse	Oral	NR	LOAEL for reproductive effects		4,200	RTECS, 1994
	Mouse	Oral	NR	LOAEL for reproductive effects		50	RTECS, 1994
	Mouse	Oral	NR	LOAEL for reproductive effects		1,000	RTECS, 1994
	Mouse	Oral	NR	LOAEL for reproductive effects		2,040	RTECS, 1994
	Mouse	Oral (subchronic)	13 weeks	LOAEL for renal effects		125	RTECS, 1993
	Rabbit	Oral	NR	LD_{50}	34,000		RTECS, 1994
	Guinea pig	Oral	NR	LD_{50}	26,000		RTECS, 1994
	Guinea pig	Oral	NR	LOAEL for reproductive effects		20,000	RTECS, 1994
	Mammal	Oral	NR	LOAEL for reproductive effects		20,000	RTECS, 1993
	Mammal	Oral	NR	LOAEL for reproductive effects		500,000	RTECS, 1993
Pesticides and PCBs							
4,4'-DDD	Rat	Oral	NR	LD_{50}	113		RTECS, 1994
	Hamster	Oral	NR	LD_{50}	>5,000		RTECS, 1994
	Ring-necked pheasant	Oral dose	NR	LD_{50}	386		USFWS, 1984
	Mallard	Oral dose	NR	LD_{50}	2,000		USFWS, 1984

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Table C-6 (Continued)
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Chemical	Test Species	Test Type	Duration	Effect	Result (mg/kg BW/day)		Reference
					Lethal	Sublethal	
Pesticides and PCBs (continued)							
4,4'-DDE	Rat	Oral	NR	LD_{50}	800		RTECS, 1994
	Mouse	Oral	NR	LD_{50}	700		RTECS, 1994
	Hamster	Oral	NR	LD_{50}	>5,000		RTECS, 1994
	Mallard	Oral	NR	Eggshell thinning		2.91	IRIS, 1993
	Mallard	Oral	2 years	Embryo mortality, cracked eggs		0.58	IRIS, 1993
	Kestrel	Oral	NR	Eggshell thinning		0.39	IRIS, 1993
4,4'-DDT	Rat	Oral	NR	LD_{50}	87		RTECS, 1994
	Rat	Single oral dose		LD_{50}	100		USEPA, 1985b
	Rat	Oral	NR	LOAEL for reproductive effects		112	RTECS, 1994
	Rat	Oral	NR	LOAEL for reproductive effects		100	RTECS, 1994
	Rat	Oral	NR	LOAEL for reproductive effects		430	RTECS, 1994
	Rat	Oral	NR	LOAEL for reproductive effects		1,890	RTECS, 1994
	Rat	Oral	NR	LOAEL for reproductive effects		250	RTECS, 1994
	Rat	Oral	NR	LOAEL for reproductive effects		50	RTECS, 1994
	Rat	Oral	3 generations	LOAEL for reproductive effects		0.2	RTECS, 1994
	Rat	Oral	2 years	LOAEL for reproductive effects		2.5	RTECS, 1994
	Mouse	Oral	NR	LD_{50}	135		RTECS, 1994
	Mouse	Single oral dose		LD_{50}	200		USEPA, 1985b
	Mouse	Oral	NR	LOAEL for reproductive effects		504	RTECS, 1994
	Mouse	Oral	NR	LOAEL for reproductive effects		81	RTECS, 1994

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Table C-6 (Continued)
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Chemical	Test Species	Test Type	Duration	Effect	Result (mg/kg BW/day)		Reference
					Lethal	Sublethal	
Pesticides and PCBs (continued)							
4,4'-DDT (continued)	Mouse	Oral	NR	LOAEL for reproductive effects		124	RTECS, 1994
	Mouse	Oral	NR	LOAEL for reproductive effects		148	RTECS, 1994
	Rabbit	Oral	NR	LD_{50}	250		RTECS, 1994
	Rabbit	Oral	NR	LOAEL for reproductive effects		150	RTECS, 1994
	Guinea pig	Oral	NR	LD_{50}	150		RTECS, 1994
	Hamster	Oral	NR	LD_{50}	>5,000		RTECS, 1994
	Dog	Single oral dose		LD_{50}	150		RTECS, 1994
	Dog	Oral	NR	LD_{50}	60		USEPA, 1985b
	Dog	Oral	NR	LOAEL for reproductive effects		3,540	RTECS, 1994
	Monkey	Oral	NR	LD_{50}	200		RTECS, 1994
	Chicken	Oral	NR	Decreased reproductive success, toxic symptoms		[1]91.4	USEPA, 1985b
	Rock dove	Single oral dose		LD_{50}	4,000		USFWS, 1984
	Black duck	Oral	NR	Reduced eggshell thickness		[1]0.14	Longcore and Stendell, 1977
	Mallard	Single oral dose		LD_{50}	2,240		USFWS, 1984
	Mallard	Oral	NR	Reduced eggshell thickness		2.8	Longcore and Stendell, 1977
	Mallard	Oral	NR	Eggshell thinning		1.16	IRIS, 1993
	Mallard	Oral	NR	Eggshell thinning		2.91	IRIS, 1993
	Mallard	Oral	NR	LOAEL for reproductive effects		1.45	IRIS, 1993
	California quail	Single oral dose		LD_{50}	595		USFWS, 1984

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Chemical	Test Species	Test Type	Duration	Effect	Result (mg/kg BW/day)		Reference
					Lethal	Sublethal	
Pesticides and PCBs (continued)							
4,4'-DDT (continued)	Japanese quail	Single oral dose		LD_{50}	841		USFWS, 1984
	Pheasant	Single oral dose		LD_{50}	1,334		USFWS, 1984
	Sandhill crane	Single oral dose		LD_{50}	1,200		USFWS, 1984
	Kestrel	Oral	NR	Reduced eggshell thickness		[1]0.56	USEPA, 1985b
	Kestrel	Oral	NR	Reduced eggshell thickness		[1]0.16	Weimeyer, et al., 1986
	Barn owl	Oral	NR	Reduced eggshell thickness		[1]0.14	Longcore and Stendell, 1977
Aroclor-1254	Rat	Single oral dose	One time	LD_{50}	500		Eisler, 1986
	Rat	Oral	NR	LD_{50}	1,010		RTECS, 1994
	Rat	Oral	NR	LOAEL for reproductive effects		192	RTECS, 1994
	Rat	Oral	NR	LOAEL for reproductive effects		188	RTECS, 1994
	Rat	Oral	NR	LOAEL for reproductive effects		645	RTECS, 1994
	Rat	Oral	NR	LOAEL for reproductive effects		90	RTECS, 1994
	Rat	Oral	NR	LOAEL for reproductive effects		40	RTECS, 1994
	Rat	Oral	NR	LOAEL for reproductive effects		750	RTECS, 1994
	Rat	Oral	2 generations	Reduced litter size		7.6	USEPA, 1985c
	Rat	Oral	9 weeks	Fetal mortality/maternal toxicity		6.4	ATSDR, 1987a
	Mouse	Oral	NR	LOAEL for reproductive effects		59.4	RTECS, 1994
	Rabbit	Oral	NR	LOAEL for reproductive effects		350	RTECS, 1994
	Rabbit	Oral	NR	LOAEL for reproductive effects		280	RTECS, 1994

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Table C-6 (Continued)
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Chemical	Test Species	Test Type	Duration	Effect	Result (mg/kg BW/day)		Reference
					Lethal	Sublethal	
Pesticides and PCBs (continued)							
Aroclor-1254 (continued)	Mouse	Oral	NR	LOAEL for reproductive effects		1.53	IRIS, 1993
	Chicken	Oral (chronic)	NR	LOAEL for reproductive effects		0.9	USEPA, 1976
	Rock dove	Oral (chronic	NR	LOAEL for parental incubation behavior		0.9	Peakall and Peakall, 1973
	American kestrel	Oral (chronic)	69 days	LOAEL for reduced sperm concentration		9	Eisler, 1986
	Mink	Oral dose	160 days	LOAEL for reproduction		0.096	IRIS, 1993
	Mink	Oral	NR	LOAEL for kit growth		0.15	IRIS, 1993
	Mink	Oral	12.5 days	LOAEL for reproduction		0.375	IRIS, 1993
	Chicken	Oral	39 weeks	LOAEL for egg production and fertility		2.44	IRIS, 1993
	Chicken	Oral	NR	LOAEL for egg production and hatchability		9.8	IRIS, 1993
	Chicken	Maternal diet	NR	LOAEL for chick growth		0.98	IRIS, 1993
	Pheasant	Oral	16 weeks	LOAEL for egg hatchability		1.8	IRIS, 1993
Aroclor-1260	Rat	Oral LD_{50}	NR	LD_{50}	1,315		RTECS, 1993
	Rat	Oral LD_{50}	NR	LD_{50}	500		Eisler, 1986
	Rat	Oral LD_{50}	NR	LD_{50}	1,300		Eisler, 1986
	Rat	Oral	NR	LOAEL for reproductive effects		1,674	RTECS, 1993
	Rat	Oral (chronic)	2 generation	LOAEL for reduced litter size		7.6	USEPA, 1989
	Rat	Oral (subchronic)	9 weeks	LOAEL for fetal mortality, maternal toxicity		6.4	ATSDR, 1987a
	Mouse	Oral	NR	LOAEL for reproductive effects		74	RTECS, 1993

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Table C-6 (Continued)
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Chemical	Test Species	Test Type	Duration	Effect	Result (mg/kg BW/day)		Reference
					Lethal	Sublethal	
Pesticides and PCBs (continued)							
Aroclor-1260 (continued)	Mink	Oral LD_{50}		LD_{50}	4,000		Eisler, 1986
	Mink	Oral LD_{50}		LD_{50}	3,000		Eisler, 1986
	Mink	Oral LD_{50}		LD_{50}	750		Eisler, 1986
	Mink	Oral (subchronic)	4 months	LOAEL for impaired reproduction		0.0075	Newell et al., 1987
	Dog (Beagle)	Oral (chronic)	2 years	LOAEL		0.37	USEPA, 1976
	Bobwhite	Oral LD_{50}	8 days	LD_{50}	80 [b]		Eisler, 1986
	Mallard	Oral LD_{50}	8 days	LD_{50}	111		Eisler, 1986
	Chicken	Oral (chronic)	NR	LOAEL for embryonic mortality		0.9	USEPA, 1976
	American kestrel	Oral (chronic)	69 days	LOAEL for reduced sperm concentration		9	Eisler, 1986
alpha-BHC	Rat	Oral (chronic)	56 weeks	LOAEL for liver necrosis		2.5	ATSDR, 1988b
	Mouse	Oral (chronic)	50 weeks	LOAEL for hepatomegaly		65	ATSDR, 1988b
	Rat	Single oral dose	One time	LD_{50}	177		Sax, 1984
beta-BHC	Rat	Oral (acute)	2 to 14 days	LOAEL for renal hypertrophy		40	ATSDR, 1988b
	Rat	Single oral dose	One time	LD_{50}	6,000		Sax, 1984
delta-BHC	Rat	Oral (chronic)	24 or 48 weeks	NOAEL for hepatic necrosis		50	ATSDR, 1988b
	Rat	Single oral dose	One time	LD_{50}	1,000		Sax, 1984
gamma-BHC (and surrogate for other BHC isomers)	Rat	Oral (chronic)	15 weeks	NOAEL for reproductive effects		5	ATSDR, 1988b
	Mouse	Single oral dose	Gestation	LOAEL for increased resorptions		25	ATSDR, 1988b
	Bobwhite	Oral (acute)	5 days	LD_{50}	78		Hill et al., 1975

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Chemical	Test Species	Test Type	Duration	Effect	Result (mg/kg BW/day)		Reference
					Lethal	Sublethal	
Pesticides and PCBs (continued)							
Chlordane (alpha and gamma)	Rat	Oral	NR	LD_{50}	283		RTECS, 1994
	Rat	Single oral dose		LD_{50}	430		Allen et al., 1979
	Rat	Single oral dose		LD_{50}	335		Allen et al., 1979
	Rat	Oral	NR	LD_{50}	200		RTECS, 1994
	Rat	Oral (chronic)	Multigenerational	LOAEL for decreased fertility		16	ATSDR, 1992c
	Mouse	Oral	NR	LD_{50}	145		RTECS, 1994
	Mouse	Oral	NR	LOAEL for reproductive effects		3.36	RTECS, 1994
	Mouse	Oral	NR	LOAEL for reproductive effects		152	RTECS, 1994
	Mouse	Oral	NR	LOAEL for reproductive effects		7	RTECS, 1994
	Mouse	Oral	NR	LOAEL for reproductive effects		3.04	RTECS, 1994
	Rabbit	Single oral dose		LD_{50}	300		Allen et al., 1979
	Rabbit	Single oral dose		LD_{50}	100		RTECS, 1994
	Hamster	Oral	NR	LD_{50}	1,720		RTECS, 1994
	Dog	Single oral dose		LD_{50}	200		Allen et al., 1979
	Domestic mammal	Oral	NR	LD_{50}	50		RTECS, 1994

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					Lethal	Sublethal	
Pesticides and PCBs (continued)							
Chlordane (alpha and gamma) (continued)	Goat	Single oral dose		LD_{50}	180		Allen et al., 1979
	Duck	Oral	NR	LD_{50}	1,200		RTECS, 1994
	Mallard	Oral	5 days	LD_{50}	[1]62		Hill et al., 1975
	Japanese quail	Oral	5 days	LD_{50}	[1]35		Hill et al., 1975
	Bobwhite	Oral	5 days	LD_{50}	[1]29		Hill et al., 1975
	Pheasant	Single oral dose	NR	LD_{50}	24		USFWS, 1984
	Young chicken	Chronic	4 week	NOAEL for egg hatchability and growth		[1]0.031	Eisler, 1990
	Chicken	Oral	NR	LD_{50}	220		RTECS, 1994
	Duck	Oral	NR	LD_{50}	1,200		RTECS, 1994
	Mallard	Oral	5 days	LD_{50}	[1]62		Hill et al., 1975
	Japanese quail	Oral	5 days	LD_{50}	[1]35		Hill et al., 1975
	Bobwhite	Oral	5 days	LD_{50}	[1]29		Hill et al., 1975
	Pheasant	Single oral dose	NR	LD_{50}	24		USFWS, 1984
Dieldrin (Surrogate for aldrin)	Mouse	Single oral dose		LD_{50}	38		Allen et al., 1979
	Mouse	Oral	NR	LD_{50}	38		RTECS, 1994
	Mouse	Oral	NR	LOAEL for reproductive effects		30.6	RTECS, 1994
	Mouse	Oral	NR	LOAEL for reproductive effects		15	RTECS, 1994
	Mouse	Oral	NR	LOAEL for reproductive effects		2.25	RTECS, 1994
	Mouse	Oral	NR	LOAEL for reproductive effects		12.5	RTECS, 1994

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Chemical	Test Species	Test Type	Duration	Effect	Result (mg/kg BW/day)		Reference
					Lethal	Sublethal	
Pesticides and PCBs (continued)							
Dieldrin (surrogate for aldrin) (continued)	Mouse	Oral	NR	LOAEL for reproductive effects		4.5	RTECS, 1994
	Mouse	Oral	NR	LOAEL for reproductive effects		6.25	RTECS, 1994
	Mouse	Oral (subchronic)	4 weeks	LOAEL for decreased pup survival		0.65	Virgo & Bellward, 1975
	Rat	Oral	NR	LOAEL for reproductive effects		0.014 [b]	RTECS, 1994
	Rat	Oral	NR	LOAEL for reproductive effects		0.336	RTECS, 1994
	Rat	Single oral dose		LD_{50}	46		Allen et al., 1979
	Rat	Oral	NR	LD_{50}	38.3		RTECS, 1994
	Dog	Oral	NR	LOAEL for reproductive effects		2.19	RTECS, 1994
	Hamster	Oral	NR	LOAEL for reproductive effects		30	RTECS, 1994
	Guinea pig	Single oral dose		LD_{50}	25		Allen et al., 1979
	Guinea pig	Oral	NR	LD_{50}	49		RTECS, 1994
	Rabbit	Single oral dose		LD_{50}	45		Allen et al., 1979
	Rabbit	Oral	NR	LD_{50}	45		RTECS, 1994
	Goat	Single oral dose		LD_{50}	100		Allen et al., 1979
	Sheep	Single oral dose		LD_{50}	50		Allen et al., 1979
	Cattle	Single oral dose		LD_{50}	60		Allen et al., 1979
	Mule deer	Single oral dose		LD_{50}	75		Allen et al., 1979
	Cat	Single oral dose		LD_{50}	300		Allen et al., 1979
	Cat	Oral	NR	LD_{50}	500		RTECS, 1994
	Dog	Single oral dose		LD_{50}	65		Allen et al., 1979

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Chemical	Test Species	Test Type	Duration	Effect	Result (mg/kg BW/day)		Reference
					Lethal	Sublethal	
Pesticides and PCBs (continued)							
Dieldrin (surrogate for aldrin) (continued)	Dog	Oral	NR	LD_{50}	65		RTECS, 1994
	Hamster	Oral	NR	LD_{50}	60		RTECS, 1994
	Pig	Oral	NR	LD_{50}	38		RTECS, 1994
	Monkey	Oral	NR	LD_{50}	3		RTECS, 1994
	House sparrow	Single oral dose		LD_{50}	48		USFWS, 1984
	Chicken	Single oral dose		LD_{50}	20		Allen et al., 1979
	Chicken	Oral	NR	LD_{50}	20		RTECS, 1994
	Rock dove	Single oral dose		LD_{50}	27		USFWS, 1984
	Rock dove	Single oral dose		LOAEL for mortality	5		USFWS, 1984
	Gray partridge	Single oral dose		LD_{50}	9		USFWS, 1984
	Chukar	Single oral dose		LD_{50}	25		USFWS, 1984
	Japanese quail	Oral	5 days	LD_{50}	[1]6		Hill et al., 1975
	Japanese quail	Single oral dose		LD_{50}	70		USFWS, 1984
	California quail	Single oral dose		LD_{50}	9		USFWS, 1984
	Quail	Oral	NR	LD_{50}	10.78		RTECS, 1994
	Bobwhite	Oral	5 days	LD_{50}	[1]3		Hill et al., 1975
	Pheasant	Single oral dose		LD_{50}	79		USFWS, 1984
	Mallard	Oral	5 days	LD_{50}	[1]12		Hill et al., 1975
	Mallard	Oral	5 days	LD_{50}	[1]11		Hill et al., 1975

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Ingestion Toxicity Information for Wildlife Receptors

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Potential Source of Contamination 9
Naval Air Station Cecil Field
Jacksonville, Florida

Chemical	Test Species	Test Type	Duration	Effect	Result (mg/kg BW/day)		Reference
					Lethal	Sublethal	
Pesticides and PCBs (continued)							
Dieldrin (surrogate for aldrin) (continued)	Mallard	Oral	NR	LD_{50}	381 [3]		RTECS, 1994
	Mallard	Single oral dose		LD_{50}	381		USFWS, 1984
Endosulfan I (and surrogate for endosulfan II and endosulfan sulfate)	Mouse	Oral (chronic)	76 weeks	LOAEL for mortality		0.9	ATSDR, 1991c
	Mouse	Oral (chronic)	78 weeks	LOAEL for ovarian cyst development		0.26	ATSDR, 1991c
	Rat	Single oral dose	1 dose	LD_{50}	24		ATSDR, 1991c
	Rat	Oral (chronic)	2 years	LOAEL for renal tubular damage		100	USEPA, 1980b
	Rat	Oral (chronic)	2 years	LOAEL for reduced testes weight		10	USEPA, 1980b
	Rat	Oral (chronic)	2 generations	LOAEL for kidney toxicity		0.15	IRIS, 1991
	Mallard	Single oral dose	1 dose	LD_{50}	33		USFWS, 1984
	Mallard	Single oral dose	1 dose	LD_{50}	31.2		USFWS, 1984
	Pheasant	Single oral dose	1 dose	LD_{50}	80		USFWS, 1984
Endrin (surrogate for endrin aldehyde and endrin ketone)	Mouse	Oral (chronic)	80 weeks	LOAEL for mortality	0.53		ATSDR, 1990e
	Dog	Oral (chronic)	19 months	LOAEL for decreased weight gain		0.1	USEPA, 1985c
	Rat	Single oral dose	1 dose	LD_{50}	3		Sax, 1984
	Bird	Single oral dose	1 dose	LD_{50}	1.8		Sax, 1984

See notes at end of table.

Table C-6 (Continued)
Ingestion Toxicity Information for Wildlife Receptors

Technical Memorandum For No Further Action
Potential Source of Contamination 9
Naval Air Station Cecil Field
Jacksonville, Florida

Chemical	Test Species	Test Type	Duration	Effect	Result (mg/kg BW/day)		Reference
					Lethal	Sublethal	
Pesticides and PCBs (continued)							
Heptachlor (surrogate for heptachlor epoxide)	Rat	Oral (chronic)	1 generation	LOAEL for increased pup death		0.35	IRIS, 1991
	Rat	Single oral dose	1 dose	LD_{50}	40		Sax, 1984
	Chicken	Single oral dose	1 dose	LD_{50}	62		Sax, 1984
Methoxychlor	Rat	Oral (chronic)	2 years	LOAEL for growth retardation		10	USEPA, 1985c
	Rat	Oral (chronic)	6 weeks	LOAEL for early onset of puberty and decreased litter size		60	Harris et al., 1975
	Rat	Oral (chronic)	6 to 20 days	LOAEL for increased percent off-spring dead and early onset of puberty		200	Khera et al., 1978
Inorganic Analytes							
Aluminum	Mouse	Oral (chronic)	2-3 generations	LOAEL for reduced body weight gain of newborns		425	NIOSH, 1985
	Rat	Oral (subchronic)	1-5 days	LOAEL for reduced growth		100	Bernuzzi, et al., 1989
	Rat	Oral LD_{50}	NR	Mortality	3,700		Sax, 1984
Antimony	Rat	Oral	NR	LD_{50}	7,000		RTECS, 1994
	Rat	Oral (subchronic)	24 weeks	Decreased RBC (swelling of hepatic cords)		41.8	ATSDR, 1991g
Arsenic	Rat	Oral	NR	LD_{50}	763		RTECS, 1994
	Rat	Oral	NR	Reproductive effects		0.58	RTECS, 1993
	Mouse	Oral	NR	LD_{50}	145		RTECS, 1994
	Hamster	Single oral dose	Gestation	7 to 36% fetal mortality		14	ATSDR, 1992a

See notes at end of table.

Table C-6 (Continued)
Ingestion Toxicity Information for Wildlife Receptors

Technical Memorandum For No Further Action
Potential Source of Contamination 9
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Chemical	Test Species	Test Type	Duration	Effect	Result (mg/kg BW/day)		Reference
					Lethal	Sublethal	
Inorganic Analytes (continued)							
Arsenic (continued)	Pheasant	Single oral dose		LD_{50}	386		Eisler, 1988a
	Mallard	Single oral dose		LD_{50}	323		Eisler, 1988a
	Young chicken	Oral	56 days	NOAEL for egg production		1	Hermeyer, 1977
Barium	Rat	Oral	13 weeks	20% population mortality	430		Dietz et al., 1979
	Rat	Oral	10 days	Decreased ovarian weight		198	ATSDR, 1990b
Beryllium	Rat	Single oral dose	NR	LD_{50}	10		USEPA, 1985d
	Rat	Oral (chronic)	3.2 years	NOAEL		0.85	ATSDR, 1987b
Cadmium	Rat	Oral	NR	LOAEL for reproductive effects		155	RTECS, 1993
	Rat	Oral	NR	LOAEL for reproductive effects		220	RTECS, 1993
	Rat	Oral	NR	LOAEL for reproductive effects		21.5	RTECS. 1993
	Rat	Oral	NR	LOAEL for reproductive effects		23	RTECS, 1993
	Rat	Single oral dose		LD_{50}	250		Eisler, 1985
	Rat	Single oral dose	NR	LD_{50}	225		RTECS, 1993
	Mouse	Single oral dose		LD_{50}	890		RTECS, 1993
	Mouse	Oral	NR	LOAEL for reproductive effects		448	RTECS, 1993
	Mouse	Oral	NR	LOAEL for reproductive effects		1,700	RTECS, 1993
	Guinea pig	Single oral dose		LD_{50}	150		Eisler, 1985
	Mallard	Oral (subchronic)	90 days	Egg production suppressed		10	Eisler, 1985
Chromium (Potassium dichromate)	Japanese quail	Oral	5 days	LD_{50}	126		Hill and Camardese, 1986

See notes at end of table.

Table C-6 (Continued)
Ingestion Toxicity Information for Wildlife Receptors

Technical Memorandum For No Further Action
Potential Source of Contamination 9
Naval Air Station Cecil Field
Jacksonville, Florida

Chemical	Test Species	Test Type	Duration	Effect	Result (mg/kg BW/day)		Reference
					Lethal	Sublethal	
Inorganic Analytes (continued)							
Chromium (III)	Rat	Oral	90 days	NOAEL for reproductive effects		1,400	Ivankovic and Preussman, 1975
	Black duck	Oral	5 months	NOAEL for reproductive effects		200	Outridge and Scheuhaemmer, 1993
Cobalt	Rat	Single oral dose		LD_{50}	91		ATSDR, 1991b
	Rat	Oral	NR	LD_{50}	6,171		RTECS, 1994
	Rabbit	Oral	NR	LD_{50}	750		RTECS, 1994
	Rat	Oral (chronic)	98 days	Testicular degeneration		13	ATSDR, 1991b
Copper	Rat	Single oral dose		LOAEL for reproductive effects		152	NIOSH, 1985 and RTECS, 1994
	Rat	Oral LD_{50}	NR	Mortality	940		Sax, 1984
	Mouse	Oral	30 days	Decreased litter sizes with teratogenic effects		100	Lecyk, 1980
	Mallard	Oral	NR	LOAEL		29	NRC, 1977
	Mallard	Oral (subchronic)	29 days	NOAEL for survivorship		2.1	Demayo et al., 1982
Cyanide	Mouse	Single oral dose		LD_{50}	8.5		Arthur D. Little, Inc., 1987
	Hamster	Oral	12 days	Decreased fetal weight		12	Frakes et al., 1986
	Pig	Oral	110 days	Thyroid hypofunction during pregnancy		11	Tewe and Maner, 1981

See notes at end of table.

Table C-6 (Continued)
Ingestion Toxicity Information for Wildlife Receptors

Technical Memorandum For No Further Action
Potential Source of Contamination 9
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Jacksonville, Florida

Chemical	Test Species	Test Type	Duration	Effect	Result (mg/kg BW/day)		Reference
					Lethal	Sublethal	
Inorganic Analytes (continued)							
Cyanide (continued)	Young chickens	Oral	20 days	Decreased growth and food intake		11	Elzubier and Davis, 1988
Iron	Rat	Oral	NR	LD_{50}	30,000		RTECS, 1994
	Guinea pig	Oral	NR	LD_{50}	20,000		RTECS, 1994
Lead	Guinea pig	Single oral dose		LD_{50}	300		Sax, 1984
	Rat	Oral	3 weeks	50% of progeny dead		200	
	Rat	Oral (subchronic)	12 to 14 days	Decreased fetal body weight		2.5	McClain and Becker, 1972
	Rat	Oral	NR	LOAEL for reproductive effects		790	RTECS, 1994
	Rat	Oral	NR	LOAEL for reproductive effects		1,140	RTECS, 1994
	Rat	Oral	NR	LOAEL for reproductive effects		520	RTECS, 1994
	Rat	Oral	NR	LOAEL for reproductive effects		1,100	RTECS, 1994
	Mouse	Oral	NR	LOAEL for reproductive effects		1,120	RTECS, 1994
	Mouse	Oral	NR	LOAEL for reproductive effects		6,300	RTECS, 1994
	Mouse	Oral	NR	LOAEL for reproductive effects		300	RTECS, 1994
	Mouse	Oral	NR	LOAEL for reproductive effects		4,800	RTECS, 1994
	Domestic animal	Oral	NR	LOAEL for reproductive effects		662	RTECS, 1994
	Japanese quail	Oral LD_{50}	5 days	Mortality	24,752		Hill and Camerdese, 1986
	Rock dove	Oral (chronic)	NR	Kidney pathology, learning deficiencies		6.25	Anders et al., 1982 and Dietz et al., 1979

See notes at end of table.

Table C-6 (Continued)
Ingestion Toxicity Information for Wildlife Receptors

Technical Memorandum For No Further Action
Potential Source of Contamination 9
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Chemical	Test Species	Test Type	Duration	Effect	Result (mg/kg BW/day)		Reference
					Lethal	Sublethal	
Inorganic Analytes (continued)							
Lead (continued)	Rock dove	Oral LD_{50}	NR	Mortality	375		Kendall and Scanlon, 1985
Lead acetate	Chicken	Oral	4 weeks	Growth rate suppressed, no mortality or hematological effects		169	Eisler, 1988b
Metallic lead powder	American kestrel nestlings	Oral	10 days	Reduced growth and brain weight, abnormal development		125	Eisler, 1988b
Tetraethyl lead	Rat	Single oral dose		LD_{50}	12		Eisler, 1988b
	Cattle	Oral	105 days	LOAEL for mortality	6		Eisler, 1988b
	Horse	Oral	NR	LOAEL for mortality	2.4		Eisler, 1988b
Triethyl lead chloride	Starling	Oral	11 days	Reduced food consumption, no mortality		2.8	Eisler, 1988b
Manganese	Mouse	Oral (subchronic)	6 months	NOAEL for mortality		2300	ATSDR, 1990c
	Mouse	Oral (subchronic)	90 days	LOAEL for delayed growth of testes		140	ATSDR, 1990c
	Mouse	Oral (chronic)	103 weeks	NOAEL for mortality		810	ATSDR, 1990c
	Rat	Single oral dose	1 dose	LD_{50}	410		ATSDR, 1990c
	Rat	Oral (acute)	20 days	LD_{50}	225		ATSDR, 1990c
	Rat	Oral (subchronic)	10 weeks	NOAEL for hepatic effects		12	ATSDR, 1990c
	Rat	Oral (subchronic)	20 days	NOAEL for decreased litter weight during gestation		620	ATSDR, 1990c
	Rat	Oral (subchronic)	103 weeks	LOAEL for mortality	930		ATSDR, 1990c
	Guinea pig	Single oral dose	1 dose	LD_{50}	400		USEPA, 1984d
	Monkey	Oral (chronic)	18 months	LOAEL for weakness, rigidity		25	ATSDR, 1990c

See notes at end of table.

Table C-6 (Continued)
Ingestion Toxicity Information for Wildlife Receptors

Technical Memorandum For No Further Action
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Chemical	Test Species	Test Type	Duration	Effect	Result (mg/kg BW/day)		Reference
					Lethal	Sublethal	
Inorganic Analytes (continued)							
Manganese (continued)	Rodents/ livestock	Oral (subchronic)	10 days to 2 months	LOAEL for decreased growth rate		250	Cunningham et al., 1966
	Mouse	Oral (subchronic)	180 days	NOAEL for mortality		2,300	Gianutsos and Murray, 1982
Mercury	Mouse	Single oral dose		LD_{50}	22		NIOSH, 1985
	Mouse	Oral	50 days	Embryotoxicity		0.9	Suzuki, 1979
	Mouse	Oral	Day 0 to 18 (gest)	Embryolethality and teratogenicity		0.7	Suzuki, 1979
	Rat	Single oral dose		LD_{50}	18		NIOSH, 1985
	Rat	Oral	Day 6 to 14 (gest)	Retarded fetus growth		4	Suzuki, 1979
	Chicken	Single oral dose		LD_{50}	20		Fimreite, 1979
	Bantam chicken	Single oral dose		LD_{50}	190		Fimreite, 1979
	Japanese quail	Oral	NR	LOAEL for reproductive effects		5	Fimreite, 1979
	Bobwhite quail	Oral	5 days	LD_{50}	523		Hill et. al., 1975
Inorganic mercury	Mouse	Oral	18 days	LOAEL for mortality	6.3		Suzuki, 1979
	Mouse	Oral	38 days	LOAEL for mortality	5		Suzuki, 1979
	Mouse	Oral	Day 6 to 17 (gest)	Stillbirths and neonatal death		4	Suzuki, 1979
	Japanese quail	Diet	3 weeks	Depressed gonad weights		[1]0.81	Eisler, 1987b
	Japanese quail	NR	14d posttreatment	LD_{50}	31.1		Eisler, 1987b
	Coturnix	NR	14d posttreatment	LD_{50}	26 to 54		Eisler, 1987b
Ethylmercury	Rock dove	Single oral dose		LD_{50}	22.8		Eisler, 1987b
	Prairie chicken	Single oral dose		LD_{50}	11.5		Eisler, 1987b

See notes at end of table.

Table C-6 (Continued)
Ingestion Toxicity Information for Wildlife Receptors

Technical Memorandum For No Further Action
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Chemical	Test Species	Test Type	Duration	Effect	Result (mg/kg BW/day)		Reference
					Lethal	Sublethal	
Inorganic Analytes (continued)							
Ethylmercury (continued)	Chuckar	Single oral dose		LD_{50}	26.9		Eisler, 1987b
	Gray partridge	Single oral dose		LD_{50}	17.6		Eisler, 1987b
Methylmercury	Mink	Diet	2 months	Fatal to 100%	[1]0.048		Eisler, 1987b
	House sparrow	NR	14d posttreatment	LD_{50}	12.6 to 37.8		Eisler, 1987b
	Coturnix	NR	14d posttreatment	LD_{50}	11 to 27		Eisler, 1987b
	Fulvous whistling duck	NR	14d posttreatment	LD_{50}	37.8		Eisler, 1987b
	Black duck	Oral	28 weeks	Reproduction inhibited		[1]0.22	Eisler, 1987b
	Northern bobwhite	NR	14d posttreatment	LD_{50}	23.8		Eisler, 1987b
	Japanese quail	NR	14d posttreatment	LD_{50}	14.4 to 33.7		Eisler, 1987b
	Ring-necked pheasant	NR	14d posttreatment	LD_{50}	11.5 to 26.8		Eisler, 1987b
Organomercury	Mule deer	Single oral dose		LD_{50}	17.9		Eisler, 1987b
	River otter	Diet	NR	Fatal	[1]0.14		Eisler, 1987b
	Rat	Oral	NR	Reduced fertility		0.5	Eisler, 1987b
	Pig	Oral	Pregnancy	High incidence of stillbirths		0.5	Eisler, 1987b
	Monkey	Oral	Day 20 to 30 (gest)	Maternally toxic and abortient		0.5	Eisler, 1987b
	Cat	Oral	Day 10 to 58 (gest)	Increased incidence of anomalous fetuses		0.25	Eisler, 1987b
	Dog	Oral	Pregnancy	High incidence of stillbirths		0.1 to 0.25	Eisler, 1987b
	Mallard	Oral	NR	Reproduction, behavior		0.064	IRIS, 1993
	Gray pheasant	Oral	30 days	Reduced reproductive ability		0.64	Eisler, 1987b
	Japanese quail	NR	14d posttreatment	LD_{50}	14.4 to 33.7		Eisler, 1987b
	Ring-necked pheasant	NR	14d posttreatment	LD_{50}	11.5 to 26.8		Eisler, 1987b

See notes at end of table.

Table C-6 (Continued)
Ingestion Toxicity Information for Wildlife Receptors

Technical Memorandum For No Further Action
Potential Source of Contamination 9
Naval Air Station Cecil Field
Jacksonville, Florida

Chemical	Test Species	Test Type	Duration	Effect	Result (mg/kg BW/day)		Reference
					Lethal	Sublethal	
Inorganic Analytes (continued)							
Organomercury (continued)	Mallard	Oral	NR	Reproduction, behavior		0.064	IRIS, 1993
	Gray pheasant	Oral	30 days	Reduced reproductive ability		0.64	Eisler, 1987b
	Japanese quail	NR	14d posttreatment	LD_{50}	14.4 to 33.7		Eisler, 1987b
	Ring-necked pheasant	NR	14d posttreatment	LD_{50}	11.5 to 26.8		Eisler, 1987b
Nickel	Rat	Single oral dose	1 dose	LD_{50}	67		ATSDR, 1987c
	Rat	Oral	NR	LOAEL for reproductive effects		158	RTECS, 1994
	Rat	Oral	2 years	Decreased body weight gain		50	ATSDR, 1987c
	Japanese quail	Oral (acute)	5 days	NOAEL		10	Hill and Camardese, 1986
	Japanese quail	Oral (acute)	5 days	Mortality	304		Hill and Camardese, 1986
Selenium	Rat	Oral	NR	LD_{50}	6,700		RTECS, 1994
	Rat	Oral	2 years	Decrease in breeding		0.4	ATSDR, 1988b
	Mouse	Oral	NR	LOAEL for reproductive effects		134	RTECS, 1994
	Japanese quail	Oral	NR	Reduced egg hatching		0.6	Eisler, 1985b
	Mallard	Oral	3 months	Reduced hatchability		1.75	Eisler, 1985b
Silver	Mouse	Intraperitoneal (acute)		Mortality	34		NIOSH, 1985
	Mouse	Oral (chronic)	125 days	LOAEL for hypoactivity		18.1	ATSDR, 1990d
	Rat	Oral	2 week	NOAEL for mortality		181.2	ATSDR, 1990d
	Rat	Oral (chronic)	37 weeks	LOAEL for lack of weight gain		222.2	ATSDR, 1990d

See notes at end of table.

Table C-6 (Continued)
Ingestion Toxicity Information for Wildlife Receptors

Technical Memorandum For No Further Action
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Naval Air Station Cecil Field
Jacksonville, Florida

Chemical	Test Species	Test Type	Duration	Effect	Result (mg/kg BW/day)		Reference
					Lethal	Sublethal	
Inorganic Analytes (continued)							
Thallium	Rat	Single oral dose	NR	LD_{50}	35		Sax, 1984
	Rat	Oral (subchronic)	30 to 60 days	LOAEL for testicular effects		0.7	IRIS, 1993
Tin	Rat	Single oral dose		LD_{50}	188		Eisler, 1989
	Rat	Oral (chronic)	13 weeks	NOEL		20	Eisler, 1989
Vanadium	Rat	Oral (subchronic)	2 months	LOAEL for hypertension		15	Susic and Kentera, 1986
	Rat	Oral (subchronic)	35 days	NOAEL for developmental effects		8.4	Domingo et al., 1986
	Japanese quail	Oral dose	5 days	LD_{50}	96		Hill and Camardese, 1986
	Chicken	Oral (subchronic)	6 weeks	LOAEL for decreased egg-laying		11	Berg et al., 1963
Zinc	Rat	Single oral dose		LD_{50}	2,510		Sax, 1984
	Rat	Oral	Gestation	Fetal resorptions in 4 to 20% of population		200	Schlicker and Cox, 1968
	Ferret	Oral	3-13 days	LOAEL for mortality	390		Straube et. al., 1980
Zinc phosphide	Mallard	Diet	5 days	LC_{50}	[1]6,458		Hill et. al., 1975

See notes on following page.

Table C-6 (Continued)
Ingestion Toxicity Information for Wildlife Receptors

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Converted to dose per kilogram body weight by multiplying by food ingestion rate and dividing by body weight.

Notes: mg/kg BW/day = milligrams per kilogram body weight per day.
NR = not reported.
LD_{50} = dose resulting in 50 percent mortality in test population.
RTECS = Registry of Toxic Effects of Chemical Substances.
LOAEL = lowest observed adverse effect level.
NOAEL = no observed adverse effect level.
ATSDR = Agency for Toxic Substance and Disease Registry.
USEPA = U.S. Environmental Protection Agency.
IRIS = Integrated Risk Information System.
NIOSH = National Institute for Occupational Safety and Health.
BW = body weight.
NTP = National Toxicology Program.
DNT = dinitrotoluene.
CNS = central nervous system.
PAH = polynuclear aromatic hydrocarbon.
F1 = first generation.
F2 = second generation.
LC^{20} = lethal concentration, lethal to 20 percent.
LC^{10} = lethal concentration, lethal to 10 percent.
PCB = polychlorinated biphenyl.
DDD = dichlorodiphenyldichloroethane.
> = greater than.
USFWS = U.S. Fish and Wildlife Service.
DDE = dichlorodiphenyldichloroethene.
DDT = dichlorodiphenyltrichloroethane.
BHC = benzene hexachloride.
RBC = risk-based concentration.
gest. = gestation.
% = percent.
14d = 14 days.

The RTVs are incorporated into the food-web model described below. When an LD_{50} value is selected as the basis for the RTV, the LD_{50} value is divided by 5 to approximate an effect threshold. When no RTV value is available for birds, the most conservative value for mammals is used. These methods may underestimate or overestimate risk.

The food-web model is described below and shown in Table C-7. The food-web model incorporates the total body dose for the indicator species, including assumptions regarding study area foraging frequency and duration (Table C-8); percentage of diet consisting of prey items and soil (Table C-8); tissue concentrations for potential prey items, estimated using bioaccumulation factors (Table C-9); additional exposure parameters derived from *Wildlife Exposure Factors Handbook* (USEPA, 1993a) (see Table C-8); an assumed site acreage of 0.5; and RTVs for mortality, reproduction, and growth (Table C-6). The PCL for each analyte representing the most sensitive surrogate receptor species is presented in Table C-2.

Table C-7
Model for Estimation of Chemical Exposures for Representative Wildlife Species

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Estimation of Contaminant Exposures Related to Surface Soil

Description:	Estimates the amount (dose) of a contaminant ingested and accumulated by a species via incidental ingestion of contaminated surface soil and ingestion of contaminated food items.
Soil Contaminant Concentration:	Maximum: The maximum detected concentration of the ecological chemicals of potential concern (ECPCs) when the number of samples is ≤ 3, and the lesser of the maximum detected concentration or the 95th percent upper confidence limit (UCL) when the number of samples is ≥ 4. Average: Average of detected concentrations. If the average is greater than the maximum exposure point concentration (EPC), the maximum EPC was selected.
Concentration of a Contaminant in a Food Item (T_N):	$$\underset{(mg/kg)}{Food\ Contaminant\ Concentration} = BAF \times \underset{(mg/kg)}{Soil\ Contaminant\ or\ Prey\ Item\ Concentration}$$ where BAF = bioaccumulation factor or mg/kg fresh weight tissue over mg/kg dry weight soil for invertebrates and plants, and mg/kg fresh weight tissue over mg/kg fresh weight food for small mammals and small birds.
Potential Dietary Exposure (PDE):	$$PDE = \frac{[P_1 \times T_1 + P_2 \times T_2 + \ldots + P_N \times T_N + soil\ exposure] \times IR_{Diet} \times SFF \times ED}{BW}$$ where PDE = potential dietary exposure (mg/kg BW-day), P_N = percent of diet composed of food item N, T_N = tissue concentration in food item N (mg/kg), IR_{Diet} = food ingestion rate of receptor (kg of food or dietary item per day), BW = body weight (kg) of receptor, SFF = site foraging frequency (site area [acres] divided by home range [acres]). Assumed to be equal to 1 for lethal exposure scenario, and ED = exposure duration (fraction of year species is expected to occur on site).
Soil Exposure:	$$\underset{(mg/kg)}{Soil\ Exposure} = (\%\ of\ Diet\ as\ Soil) \times \underset{(mg/kg)}{Soil\ Contaminant\ Concentration}$$

See notes at end of table.

Table C-7 (Continued)
Model for Estimation of Chemical Exposures for Representative Wildlife Species

Technical Memorandum for No Further Action
Potential Source of Contamination 9
Naval Air Station Cecil Field
Jacksonville, Florida

Estimation of Contaminant Exposures Related to Surface Water and Sediment

Description: Estimates the amount of a contaminant ingested and accumulated by a species resulting from ingestion of surface water, incidental ingestion of sediment, and ingestion of contaminated aquatic food items.

Contaminant Concentration: Same as described above for soil.

where

BCF = bioconcentration factor (mg/kg of contaminant in food item per mg/ℓ of contaminant in water). Only BCFs greater than 300 were considered (USEPA, 1988c).

BAF = bioaccumulation factor (see note above).

Sediment Exposure:

$$\begin{matrix}\text{Sediment Contaminant Exposure} \\ (mg/day)\end{matrix} = \begin{matrix}\text{\% of Diet as Sediment}\end{matrix} \times IR_{diet}\ (kg/day) \times \begin{matrix}\text{Sediment Contaminant Concentration} \\ (mg/kg)\end{matrix}$$

Surface Water Exposure:

$$\begin{matrix}\text{Surface Water Contaminant Exposure} \\ (mg/day)\end{matrix} = \begin{matrix}\text{Surface Water Contaminant Concentration} \\ (mg/\ell)\end{matrix} \times \begin{matrix}\text{Water Ingestion Rate} \\ (\ell/day)\end{matrix}$$

Aquatic Prey Exposure:

$$\begin{matrix}\text{Aquatic Prey Exposure} \\ (mg/day)\end{matrix} = \begin{matrix}\text{\% Diet as Aquatic Prey}\end{matrix} \times IR_{diet}\ (kg/day) \times \begin{matrix}\text{Aquatic Prey Contaminant Concentration} \\ (mg/kg)\end{matrix}$$

where

IR_{diet} = food ingestion rate of receptor (kg of food per day).

Total Exposure Related to Surface Water and Sediment:

$$\begin{matrix}\text{Potential Dietary Exposure} \\ (mg/kg)\end{matrix} = \frac{\begin{matrix}\text{Aquatic Prey Exposure} \\ (mg/kg)\end{matrix} + \begin{matrix}\text{Surface Water Exposure} \\ (mg/kg)\end{matrix} + \begin{matrix}\text{Sediment Exposure} \\ (mg/kg)\end{matrix}}{BW}$$

where BW = body weight (kg) of receptor.

Notes:
≤ = less than or equal to.
≥ = greater than or equal to.
mg/kg = milligrams per kilogram.
mg/kg BW-day = milligrams per kilogram body weight per day.
kg = kilogram.
% = percent.
mg/ℓ = milligrams per liter.
USEPA = U.S. Environmental Protection Agency.
mg/day = milligrams per day.
kg/day = kilogram per day.
ℓ/day = liter per day.

Table C-8
Exposure Parameters for Surrogate Wildlife Species

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Representative Wildlife Species	Body Weight (kg)	Reported Diet	Soil and Sediment Ingestion (% of diet)	Assumed Diet for Exposure Assessment (% of diet)	Food Ingestion Rate (kg/day)	Water Intake Rate (ℓ/day)	Home Range (acres)
Cotton mouse [a] (*Peromyscus gossypinus*)	0.021 [b]	Seeds and some insects [c]	2% soil [d] 1% sediment [e]	88% Plants 10% Invertebrates	0.0029 [f]	0.0031 [g]	0.147 [h]
Short-tailed shrew (*Blarina brevicauda*)	0.017 [i]	Earthworms, slugs and snails, fungi, insects, and vegetation [c]	10% soil [d] 5% sediment [e]	78% Invertebrates 12% Plants	0.0024 [f]	0.0039 [g]	0.96 [c]
American robin (*Turdus migratorius*)	0.077 [j]	Mostly invertebrates and some fruits [c]	10% soil [d] 5% sediment [e]	83% invertebrates 7% plants 10% soil	0.011 [k]	0.01 [l]	1.04 [c]
Red fox (*Vulpes vulpes*)	4.69 [m]	Small mammals, birds, and invertebrates, as well as berries and other fruits [c]	2.8% soil [c]	57% Small mammals 20% Invertebrates 10% Birds 10% Plants	0.24 [f]	NE	1,727 [c]
Red-tailed hawk (*Buteo jamaicensis*)	1.02 [n]	Primarily small mammals; also birds, snakes, turtles, frogs, crickets, beetles, crayfishes, and carp [c]	3% soil [c]	70% small mammals 27% small birds	0.113 [k]		800 [c]

[a] Values for the deer mouse were used for the cotton mouse (U.S. Environmental Protection Agency [USEPA], 1993a).
[b] Average of adult male and female deer mice in North America (USEPA, 1993a).
[c] *Wildlife Exposure Factors Handbook* (USEPA, 1993a).
[d] Deer mouse value used for cotton mouse. Surrogates were chosen based on similarities in diet. Other values were based on diet composition (USEPA, 1993a).
[e] Sediment ingestion assumed to be 50% of soil ingestion, except for the raccoon and the heron.
[f] Calculated using the mammal equation based on body weight (Wt.) in kg. Food ingestion (kg/day) = $0.0687 \times Wt^{0.822}$ (USEPA, 1993a).
[g] Calculated using the mammal equation based on body weight (Wt.) in kg. Water ingestion (ℓ/day) = $0.099 \times Wt^{0.90}$ (USEPA, 1993a).
[h] Average for male and female deer mice, Virginia/mixed deciduous forest (USEPA, 1993a).
[i] Mean of means reported for male and female shrews in summer and fall (USEPA, 1993a).
[j] Dunning (1984), cited in *Wildlife Exposure Factors Handbook* (USEPA, 1993a).
[k] By bird equation based on body weight (Wt.) in kg. Food Ingestion (kg/day) = $0.0582 \times Wt.^{0.651}$ (USEPA, 1993a).
[l] By bird equation based on body weight (Wt.) in kg. Water ingestion (ℓ/day) = $0.059 \times Wt.^{0.67}$ (USEPA, 1993a).
[m] Average of adult male and female foxes in spring (USEPA, 1993a).
[n] Terres, 1990.

Notes: kg = kilogram.
% = percent.
kg/day = kilograms per day.
ℓ/day = liters per day.
NE = not evaluated.

Table C-9
Bioaccumulation Data

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Analyte	Bioaccumulation Factor [a]					
	log K_{ow}	[b]	Invertebrate [c]	Plant [d]	Mammal [e]	Bird [f]
Semivolatile Organic Compounds						
Acenaphthene	3.9	5.2	5.0E-02	7.6E-03	2.4E-01	NA
Acenaphthylene	4.1	5.2	5.0E-02	7.6E-03	2.4E-01	NA
Anthracene	4.5	5.2	5.0E-02	7.6E-03	2.4E-01	NA
Benzo(a)anthracene	5.7	5.2	5.0E-02	7.6E-03	2.4E-01	NA
Benzo(a)pyrene	6	5.2	5.0E-02	7.6E-03	2.4E-01	NA
Benzo(b)fluoranthene	6.1	5.2	5.0E-02	7.6E-03	2.4E-01	NA
Benzo(g,h,i)perylene	6.6	5.2	5.0E-02	7.6E-03	2.4E-01	NA
Benzo(k)fluoranthene	6.1	5.2	5.0E-02	7.6E-03	2.4E-01	NA
Butylbenzylphthalate	4.9	4.6	NA	1.7E-02	NA	NA
Carbazole	3.76 [g]	3.76	5.0E-02	5.2E-02	NA	NA
Chrysene	5.7	5.2	5.0E-02	7.6E-03	2.4E-01	NA
Dibenz(a,h)anthracene	6.5	5.2	5.0E-02	7.6E-03	2.4E-01	NA
Dibenzofuran	4.1	4.1	5.0E-02	3.3E-02	NA	NA
Di-*n*-butylphthalate	5.2	4.6	NA	1.7E-02	NA	NA
Diethylphthalate	3.2	4.6	NA	1.7E-02	NA	NA
bis(2-Ethylhexyl)phthalate	5.1	4.6	NA	1.7E-02	NA	NA
Fluoranthene	4.95 [h]	5.2	5.0E-02	7.6E-03	2.4E-01	NA
Fluorene	4.2	5.2	5.0E-02	7.6E-03	2.4E-01	NA
Indeno(1,2,3-c,d)pyrene	6.6	5.2	5.0E-02	7.6E-03	2.4E-01	NA
2-Methylnaphthalene	3.86 [i]	5.2	5.0E-02	7.6E-03	2.4E-01	NA
4-Methylphenol	1.9	1.7	NA	8.1E-01	NA	NA
Naphthalene	3.6	5.2	5.0E-02	7.6E-03	2.4E-01	NA
Phenanthrene	4.5	5.2	5.0E-02	7.6E-03	2.4E-01	NA
Phenol	1.5	1.7	NA	8.1E-01	NA	NA
Pyrene	5.3	5.2	5.0E-02	7.6E-03	2.4E-01	NA
Pesticides and PCBs						
Aroclor-1248	6 [j]		5.8E+00 [k]	1.2E-01 [l]	3.8E+00 [m]	3.2E-01 [n]
Aroclor-1254	6 [j]		5.8E+00 [k]	1.2E-01 [l]	3.8E+00 [m]	3.2E-01 [n]
Aroclor-1260	7.1 [j]		5.8E+00 [k]	1.2E-01 [l]	3.8E+00 [m]	3.2E-01 [n]
alpha-BHC	3.8		2.6E+00 [o]	4.9E-02	1.5E-06	2.1E-01 [p]
alpha-Chlordane	5.5		1.6E+00 [q]	5.1E-03	5.5E-01 [r]	1.8E+00 [s]
gamma-Chlordane	5.5		1.6E+00 [t]	5.1E-03	5.5E-01 [r]	1.8E+00 [s]
4,4'-DDD	6		3.3E+00 [u]	1.0E-02 [v]	1.2E+00 [w]	2.9E+00 [x]
4,4'-DDE	5.7		1.7E+00 [u]	1.0E-02 [v]	1.2E+00 [w]	2.9E+00 [x]

See notes at end of table.

Table C-9 (Continued)
Bioaccumulation Data

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Analyte	Bioaccumulation Factor [a]					
	log K_{ow}	[b]	Invertebrate [c]	Plant [d]	Mammal [e]	Bird [f]
Pesticides and PCBs (continued)						
4,4'-DDT	6.4		5.7E-01 [u]	1.0E-02 [v]	1.2E+00 [w]	2.9E+00 [x]
Dieldrin	4.6		5.5E+00 [o]	1.7E-02	1.5E+00 [y]	4.4E-01 [z]
Endosulfan I	3.6		NA	6.4E-02	1.1E-03 [p]	NA
Endosulfan II	3.6		NA	6.4E-02	1.1E-03 [p]	NA
Endosulfan sulfate	3.6		NA	6.4E-02	1.1E-03 [p]	NA
Endrin	5.6		7.2E-01 [ab]	4.5E-03	1.8E-03 [p]	5.9E-01 [p]
Endrin ketone	5.6		7.2E-01 [ab]	4.5E-03	1.8E-03 [p]	5.9E-01 [p]
Heptachlor	4.3		1.0E+00 [ac]	2.5E-02	4.7E-02 [p]	6.0E-01 [p]
Heptachlor epoxide	5.4		1.0E+00 [t]	5.9E-03	3.5E-01 [p]	1.4E+00 [p]
Inorganic Analytes						
Aluminum	NA		NA	8.0E-04 [ae]	7.5E-02 [af]	NA
Antimony	NA		NA	4.0E-02 [ae]	5.0E-02 [af]	NA
Arsenic	NA		6.6E-03 [ag]	3.0E-01 [ah]	1.0E-01 [af]	NA
Barium	NA		7.9E-02 [ad]	3.0E-02 [ae]	7.5E-03 [af]	NA
Beryllium	NA		NA	2.0E-03 [ae]	5.0E-02 [as]	NA
Cadmium	NA		1.4E+00 [aj]	3.3E+01 [ak]	2.1E+00 [af]	3.8E-01 [al]
Chromium	NA		1.6E-01 [k]	1.5E-03 [ae]	2.8E-01 [af]	NA
Cobalt	NA		NA	4.0E-03 [ae]	1.0E+00 [af]	NA
Copper	NA		1.6E-01 [k]	7.8E-01 [ar]	6.0E-01 [ak]	NA
Cyanide	NA		0.0E+00 [an]	0.0E+00 [an]	0.0E+00 [an]	0.0E+00 [an]
Lead	NA		2.8E-02 [ad]	0.0E+00 [ai]	1.5E-02 [af]	NA
Manganese	NA		2.6E-01 [ad]	5.0E-02 [ae]	2.0E-02 [af]	NA
Mercury	NA		6.8E-02 [ao]	1.8E-01 [ae]	1.0E-02 [ao]	2.3E+00 [ao]
Nickel	NA		2.3E-01 [ap]	1.2E-02 [ae]	3.0E-01 [af]	NA
Selenium	NA		7.6E-01 [af]	9.0E-03 [aq]	7.5E-01 [af]	5.1E-01 [ar]
Silver	NA		4.5E-01 [ad]	8.0E-02 [ae]	1.5E-01 [af]	NA
Thallium	NA		NA	8.0E-04 [ae]	2.0E+00 [af]	NA
Tin	NA		NA	6.0E-03 [ae]	1.5E+00 af]	NA
Vanadium	NA		NA	1.1E-03 [ae]	1.3E-01 [af]	NA
Zinc	NA		1.8E+00 [k]	6.1E-01 [am]	2.1E+00 [af]	NA

[a] Units for bioaccumulation factors (BAFs) are milligrams per kilogram (mg/kg) fresh weight tissue over mg/kg dry weight soil for invertebrates and plants, and mg/kg fresh weight tissue over mg/kg fresh weight food for small mammals and small birds. No BAFs were calculated for volatile organic compounds since available evidence suggests that these analytes do not bioaccumulate. Units for bioconcentration factors (BCFs) are μg/kg fresh weight tissue over μg/ℓ water.
[b] From Superfund Chemical Data Matrix (U.S. Environmental Protection Agency [USEPA], 1993b) unless otherwise noted. Log K_{ow}s for classes of semivolatile compounds were averaged to provide an average BAF value. Compounds were grouped accordingly: PAHs (5.2); phthalates (4.6); dibenzofuran (4.1), and carbazole (3.76).

Table C-9 (Continued)
Bioaccumulation Data

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[c] Average of earthworm BAFs (Beyer, 1990) converted from dry weight to wet weight assuming earthworm is 80% water, unless otherwise noted.
[d] Plant BAF calculated using the following equation presented by Travis and Arms (1988) unless otherwise noted: log (Plant Uptake Factor) = 1.588-0.578 (log K_{ow}). Converted from dry weight to wet weight plant concentration assuming 80% water content of earthworms.
[e] Calculated using the following equation in Travis and Arms (1988) for semivolatile organic analytes with log K_{ow}s >5: log BTF (biotransfer factor) = log K_{ow} - 7.6; result multiplied by average ingestion rates for nonlactating and lactating test animals to convert from BTFs to BAFs, and divided by a factor of 0.2 to convert from dry feed to fresh feed. There is an uncertainty factor involved in using this equation for PAHs because this study did not use any PAHs in the regression analysis. When no literature values were available, BAFs were calculated for pesticides and PCBs, regardless of the log K_{ow}, due to the tendency of these lipophilic compounds to bioaccumulate. With the exception of pesticides and PCBs, BAFs for analytes with log K_{ow}s < 5 are assumed to be 0.15 because they are unlikely to bioaccumulate in animal tissue (Maughan, 1993).
[f] Small mammal BAF used unless otherwise noted.
[g] Hansch and Leo (1979)
[h] USEPA (1992), *Dermal Exposure Assessment.*
[i] Agency for Toxic Substances and Disease Registry, 1993a (Toxicological Profile for Naphthalene).
[j] USEPA (1990a). "Basics of Pump-and-Treat Ground-Water Remediation Technology".
[k] BCF for earthworms from Diercxsens et al. (1985).
[l] Arithmetic mean BAF for corn, leaves, carrots, beets, sugarbeets, radishes, and soybeans (tops, roots, and whole plants) from USEPA (1985c) and Webber (1983).
[m] BAF calculated from discussion in Eisler (1986) stating that Aroclor-1254 residues in subcutaneous fat of adult minks were up to 38 times dietary levels. Converted to whole body concentrations assuming 10% lipid content.
[n] BAF calculated from data presented in Eisler (1986). Kestrels fed 33 mg PCB/kg diet for 62 to 69 days accumulated 107 mg PCB/kg lipid weight in muscle. Assuming muscle is 10% lipid content, the muscle concentration is about 10.7 mg/kg.
[o] Geometric mean of reported BAFs for earthworms (Edwards and Thompson, 1973). Values provided by Gish (1970) were converted from dry weight to wet weight by multiplying by a conversion factor of 0.2 assuming 80% water composition of earthworms.
[p] BAFs from Garten and Trabalka (1983) were converted from (mg/kg of fat)/(mg/kg of diet) to (mg/kg fresh wt.)/(mg/kg diet) by multiplying the value by an assumed fat content of 10%. Poultry and small bird values were used for bird BAFs, and rodent, dog, swine, and cow values were used for mammal BAFs. Dog values were used for endrin and its derivatives. Rodent values were used for endosulfan (and its derivatives) and gamma-BHC. Swine values were used for methoxychlor, aldrin, and heptachlor. Cow values were used for heptachlor epoxide. Small bird values were used for 4,4'-DDD, 4,4'-DDE, and 4,4'DDT. Poultry values were used for endrin, alpha-BHC, beta-BHC, gamma-BHC, aldrin, endrin, heptachlor, and heptachlor epoxide.
[q] Value for gamma-chlordane used as a surrogate.
[r] BAF calculated from data presented in Eisler (1990). Rats fed 20 mg/kg diet technical chlordane (equivalent to 3.6 mg/kg diet *cis*- and *trans*-chlordane) for 350 days accumulated 20 mg/kg in lipids. Assuming 10% lipid content, the whole body concentration is about 2 mg/kg.
[s] BAF calculated from data presented in Eisler (1990). Red-winged blackbirds fed 10 mg/kg diet technical chlordane (equivalent to 1.8 mg/kg diet *cis*- and *trans*- chlordane) for 84 days accumulated 1.8 mg/kg wet weight whole body residue.
[t] Geometric mean of reported BAFs for earthworms (Gish, 1970) converted from dry weight to wet weight assuming 80% water composition of earthworms.

Table C-9 (Continued)
Bioaccumulation Data

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[u] Geometric means of 4,4'-DDT [Davis (1968), Davis and Harrison (1966), Wheatley and Hardman (1968), Bailey et al. (1970), Cramp and Olney (1967), and Beyer and Gish (1980)], 4,4'-DDE [Davis (1968), Davis and Harrison (1966), Cramp and Olney (1967), Collett and Harrison (1968), Hunt and Sacho (1969), and Gish (1970)], and 4,4-DDD [Barker (1958), Davis (1968), Davis and Harrison (1966), Cramp and Olney (1967), Collett and Harrison (1968), Wheatley and Hardman (1968), Hunt and Sacho (1969), Bailey et al. (1970), Dimond et al. (1970), Gish (1970), and Beyer and Gish (1980)] reported for earthworms. Dry soil concentrations calculated assuming 10% moisture content in sandy-loam soils (Donahue et al., 1977).
[v] Geometric mean of 4,4'-DDT, 4,4'-DDD, and 4,4'-DDE BAFs (fresh weight over dry weight) reported for roots (carrot, potato, sugar beet), grains (corn, oats), and legumes (alfalfa) derived from USEPA (1985b) converted from dry weight to wet weight per values provided by Suter (1993).
[w] BAF for shrews and voles calculated using measured concentrations of DDT_R in stomach content and in whole body (Forsyth and Petrle, 1984).
[x] Whole-body pheasant BAF for 4,4'-DDT presented in USEPA (1985b); derived from Kenaga (1973).
[y] BAF calculated from data presented by Potter et al (1974). Based on an average dieldrin concentration in cow muscle and fat of 0.17 mg/kg (dry weight) and a dieldrin concentration of 0.11 mg/kg in the diet (dry weight).
[z] Jeffries and Davis (1968).
[aa] Assumed value based on average of BAFs for Aroclor 1260, alpha chlordane, 4-4'DDE, dieldrin, and endrin ketone.
[ab] Value reported for endrin from Gish (1970).
[ac] Value for heptachlor epoxide used as a surrogate.
[ad] Value is equal to value calculated for Cecil Field sites using site-specific earthworm and soil data.
[ae] Value from Baes et al. (1984) for leafy portions of plants multiplied by 0.2 to represent 80% water composition of plants.
[af] Value derived from BTFs presented in Baes et al. (1984) for uptake into cattle. BTF converted to BAF by multiplying by food ingestion rate of 50 kilograms per day wet weight.
[ag] Average of values for industrial soils from Beyer and Cromartie (1987) multiplied by 0.2 to represent 80% water composition in earthworms.
[ah] Average of BAF values reported from Wang et al. (1984), Sheppard et al. (1985), and Merry et al. (1986).
[ai] Lead does not accumulate in plant tissue; therefore, a BAF of zero was assigned.
[aj] Mean of values reported for soil invertebrates in MacFadyen (1980) converted from dry weight to wet weight.
[ak] Mammal value for copper and plant value for cadmium from Levine et al., (1989).
[al] Based on accumulation of cadmium in kidneys of European quail in Pimentel et al. (1984).
[am] Median of values reported from Levine et al. (1989).
[an] Cyanide has not been shown to bioaccumulate in any organisms.
[ao] Uptake value (fresh weight over dry weight) for earthworms from USEPA (1985c) sludge document. Fresh weight tissue concentrations calculated assuming 80% body water content.
[ap] Value from nickel sludge document (USEPA, 1985e) multiplied by 0.2 to represent 80% water composition of earthworms.
[aq] Based on reported ratio of selenium in plant tissue and iron fly ash amended soil (Stoewsand et al., 1978).
[ar] Based on average of reported ratio of selenium in diet to liver, kidney, and breast tissue of chickens (Eisler, 1985b).
[as] Mean of values reported for Sorex araneus in MacFadyen (1980).

Notes: NA = not available.
PCB = polychlorinated biphenyl.
BHC = benzene hexachloride.
DDD = dichlorodiphenyldichloroethane.
DDE = dichlorodiphenyldichloroethene.
DDT = dichlorodiphenyltrichloroethane.
µg/kg = micrograms per kilogram.
µg/ℓ = micrograms per liter.
Log K_{ow} = Logarithm transformation of the octanol/water partitioning coefficient.
PAH = polynuclear aromatic hydrocarbon.
% = percent.
> = greater than.
< = less than.
mg = milligram.

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