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NAS CECIL FIELD
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RECORD OF DECISION SITE 8 OPERABLE UNIT 3 NAS CECIL FIELD FL
3/1/1998
ABB ENVIRONMENTAL SERVICES, INC.

RECORD OF DECISION
SITE 8, OPERABLE UNIT 3

NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

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

MARCH 1998

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
NORTH CHARLESTON, SOUTH CAROLINA
29419-9010

043-60

PRINTED ON RECYCLED PAPER

ABB

2523-3250

April 29, 1998

Ms. Debbie Vaughn-Wright
Remedial Project Manager
Federal Facilities Section
Waste Management Division
USEPA Region IV
61 Forsyth Street.
Atlanta, Georgia 30303

Subject: **Final Record of Decision Errata Page**
Site 8, Operable Unit 3
Naval Air Station Cecil Field, Jacksonville, Florida
Contract No. N62467-89D-0317/090

Dear Ms. Vaughn-Wright:

Incorrect dates for the public comment period were identified on page 2-6 in the Final Site 8 ROD. Enclosed is an errata page to replace pages 2-5 and 2-6 of the final Site 8 ROD.

Comments or questions you may have concerning this submittal should be directed to Mr. Mark Davidson at (843) 820-5526.

Sincerely,

ABB ENVIRONMENTAL SERVICES, INC.

FOR

Rao Angara
Installation Manager

enclosure

cc: Mr. Mike Deliz, FDEP (1 copy)
Mr. David Kruzicki, NASCF (1 copy)
Mr. Dale Obenauer, BEI (1 copy)
Mr. Mark Davidson, SDIV (1 copy)
Mr. David Porter, SDIV (1 copy)
Mr. Mark Speranza, Tetra Tech NUS (1 copy)
Mr. Sam Pratt, Tetra Tech NUS (3 copies)
Mr. Lewis Shields, City of Jacksonville (1 copy)
File

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ABB Environmental Services Inc.

Berkeley Building
2590 Executive Center Circle East
Tallahassee, Florida 32301

Telephone (904) 656-1293
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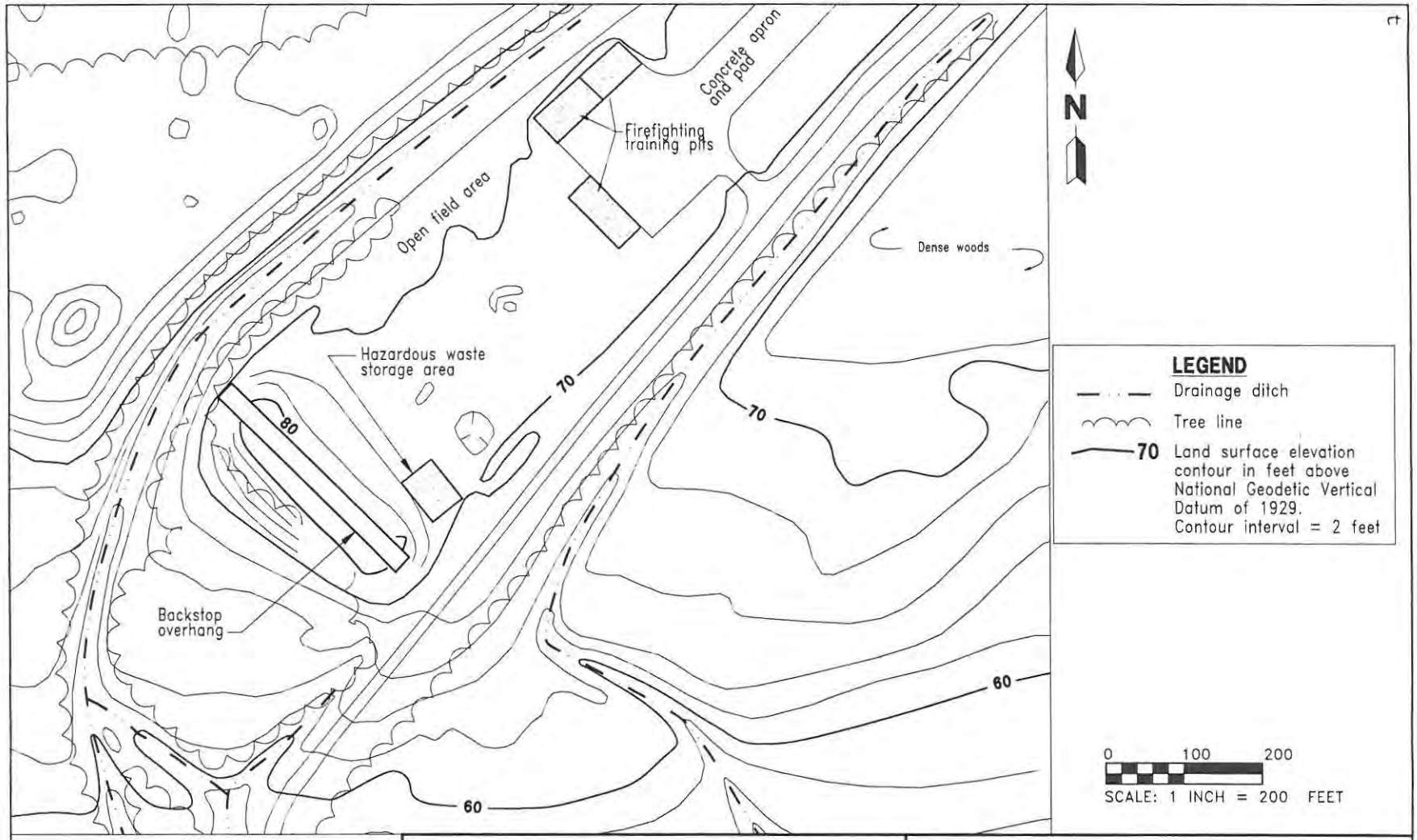

FIGURE 2-3
GENERAL FEATURES

RECORD OF DECISION
SITE 8, OPERABLE UNIT 3

NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

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- RI, Operable Unit 3, Sites 7 and 8, Naval Air Station Cecil Field, ABB-ES, 1997b (this document includes the BRA).

- FS, Operable Unit 3, Naval Air Station Cecil Field, ABB-ES, 1997a.

- Proposed Plan for Remedial Action, Operable Unit 3, Site 8, Boresite Range, Hazardous Waste Storage Area, and Firefighting Training Area, ABB-ES, 1997c.

2.3 HIGHLIGHTS OF COMMUNITY PARTICIPATION. The results of the RI and the BRA, the remedial alternatives of the FS, and the preferred alternative given in the Proposed Plan were presented to the NAS Cecil Field Restoration Advisory Board (RAB) (composed of community members as well as representatives from the Navy and State and Federal regulatory agencies).

The RI and BRA results and the remedial alternatives of the FS were presented at RAB meetings held on August 19, 1997, and September 16, 1997, respectively. The preferred alternative was presented at the November 18, 1997 RAB meeting. A 30-day public comment period was held from November 28 through December 28, 1997.

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Final RODs have been approved for OUs 1, 2, 4, and 7. RIs, BRAs, and FSs have been completed for OUs 3, 5, 6, and 8.

Assessment of environmental data collected from OU 3, Site 8, indicates groundwater contamination could pose a human health risk if the groundwater was used as a potable water source. The purpose of this remedial action is to monitor and remediate the groundwater contamination that pose human health risk. Ingestion of groundwater extracted from the surficial aquifer poses a human health risk that exceeds the State of Florida threshold of 1 in 1,000,000 or 1×10^{-6}.

The following remedial action objective (RAO) was established for Site 8:

- Prevent exposure to groundwater at Site 8 that contains 1,1-DCE at concentrations greater than the State of Florida guidance criteria and that causes unacceptable risk to human health.

The remedial action documented in this ROD will achieve this RAO.

ABB

2523-3243

March 31, 1998

Ms. Debbie Vaughn-Wright
Remedial Project Manager
Federal Facilities Section
Waste Management Division
USEPA Region IV
61 Forsyth Street.
Atlanta, Georgia 30303

Subject: **Final Record of Decision**
Site 8, Operable Unit 3
Naval Air Station Cecil Field, Jacksonville, Florida
Contract No. N62467-89D-0317/090

Dear Ms. Vaughn-Wright:

On behalf of Southern Division, Naval Facilities Engineering Command (SOUTHNAVFACENGCOM), ABB Environmental Services, Inc. is pleased to forward five copies of the subject document for your review and files.

Comments or questions you may have concerning this report should be directed to Mr. Mark Davidson at (843) 820-5526.

Sincerely,

ABB ENVIRONMENTAL SERVICES, INC.

Rao Angara
Installation Manager

enclosure

cc: Mr. Mike Deliz, FDEP (1 copy)
Mr. David Kruzicki, NASCF (1 copy)
Mr. Dale Obenauer, BEI (1 copy)
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ABB Environmental Services Inc.

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RECORD OF DECISION
SITE 8, OPERABLE UNIT 3

NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Unit Identification Code: N60200

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

Prepared by:

ABB Environmental Services, Inc.
2590 Executive Center Circle, East
Tallahassee, Florida 32301

Prepared for:

Department of the Navy, Southern Division
Naval Facilities Engineering Command
2155 Eagle Drive
North Charleston, South Carolina 29418

Mark Davidson, Code 1879, Engineer-in-Charge

March 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: March 30, 1998

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

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

(DFAR 252.227-7036)

Cec-S8.ROD
PMW.03.98

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Site 8, Operable Unit 3
Naval Air Station Cecil Field
Jacksonville, Florida

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Naval Air Station Cecil Field
Jacksonville, Florida

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GLOSSARY

ABB-ES	ABB Environmental Services, Inc.
ARAR	applicable or relevant and appropriate requirement
bls	below land surface
BRA	baseline risk assessment
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
DCE	dichloroethene
DDD	dichlorodiphenyldichloroethane
DDT	dichlorodiphenyltrichloroethane
ELCR	excess lifetime cancer risk
FS	feasibility study
HI	hazard index
HHRA	human health risk assessment
mg/kg	milligrams per kilogram
$\mu g/\ell$	micrograms per liter
NAS	Naval Air Station
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
OU	operable unit
PEL	probable effect level
RAB	Restoration Advisory Board
RAO	remedial action objective
RI	remedial investigation
ROD	Record of Decision
SVOC	semivolatile organic compound
TRPH	total recoverable petroleum hydrocarbons
USEPA	U.S. Environmental Protection Agency
VOC	volatile organic compound

1.0 DECLARATION FOR THE RECORD OF DECISION

1.1 SITE NAME AND LOCATION. Site 8, Boresite Range, Hazardous Waste Storage Area, and Firefighting Training Area, Operable Unit (OU) 3, is situated in the southern part of the main base of Naval Air Station (NAS) Cecil Field, Jacksonville, Florida. The site is located approximately 1,600 feet south of the east-and-west flightline and approximately 3,500 feet west of the north-and-south flightline.

1.2 STATEMENT OF BASIS AND PURPOSE. This decision document presents the selected remedial action for Site 8, located at NAS Cecil Field, Jacksonville, Florida, which was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986, and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (40 Code of Federal Regulations 300). This decision document was prepared in accordance with the U.S. Environmental Protection Agency (USEPA) decision document guidance (USEPA, 1992). This decision is based on the Administrative Record for Site 8, OU 3.

The USEPA and the State of Florida concur with the selected remedy.

1.3 ASSESSMENT OF THE SITE. Releases of hazardous substances from this site, if not addressed by implementing the response actions selected in this Record of Decision (ROD), may present an imminent and substantial endangerment to public health, welfare, or the environment. Human health risks are posed if the groundwater from the surficial aquifer is used as a potable water source. Human health and possibly wildlife may be at risk if exposed to Site 8 groundwater.

1.4 DESCRIPTION OF THE SELECTED REMEDY. This ROD is the final action for Site 8, OU 3. Final RODs have been approved for OUs 1, 2, 4, and 7. Remedial investigations (RIs), baseline risk assessments (BRAs), and feasibility studies (FSs) have been completed for OUs 3, 5, 6, and 8.

The potential sources of contamination stem from shooting-range activities, firefighting training activities, and hazardous waste storage activities. Firefighting training activities utilized waste solvents, paints and paint thinners, and fuel to ignite aircraft frames for firefighting training exercises. Hazardous waste storage drums at Site 8 were reported to have been shot through, spilling drummed contents onto the ground. Lastly, gun sighting activities have left spent bullets in the soil in front of the firing-range backstop. Training activities have ceased at Site 8 and liquid wastes are no longer used at the site. Hazardous materials are no longer stored at the site. Spent bullets remain in the backstop soil, but RI data show that potential contaminants from the bullets, such as lead, have not been detected at concentrations greater than FDEP guidance values. Because liquid waste sources have been removed, there is no source for continued contamination at the training or storage areas. Remedial action for source control, therefore, is not required.

The feasibility study for Site 8 considered two media for remedial action, groundwater and sediment. Upon further review it was assessed that sediment did

not require remedial action; therefore, the No Action alternative was selected for Site 8 sediment.

The selected remedy addresses risk reduction of groundwater contamination. The alternative selected for Site 8 is natural attenuation and long-term monitoring. The estimated present worth of this alternative is approximately $465,000 over a 30-year period. Cost would be less if the goals of the selected alternative were met before 30 years. The selected alternative includes the following:

- restrict use of the surficial aquifer groundwater at Site 8;
- monitor groundwater for the presence of volatile organic compounds (VOCs), particularly 1,1-dichloroethene (1,1-DCE), and semivolatile organic compounds (SVOCs);
- monitor groundwater for parameters that indicate the presence of naturally occurring biological, physical, and chemical processes that reduce VOC and SVOC concentrations;
- monitor the groundwater for a period for 30 years (or less if 1,1-DCE concentrations meet State of Florida drinking water standards);
- model contaminant plume movement and contaminant degradation rates; and
- review the status of the groundwater quality every 5 years for 30 years (or less if 1,1-DCE concentrations are below State of Florida drinking water standards).

1.5 STATUTORY DETERMINATIONS. The selected remedy is protective of human health and is cost effective. The nature of the selected remedy for Site 8 is such that 1,1-DCE concentrations in groundwater may remain above regulatory standards during the remedial action. As a result, applicable or relevant and appropriate requirements (ARARs) will not be met as a near-term goal, but will be met as a long-term goal. The remedy utilizes permanent solutions and satisfies the statutory preference for remedies that reduce toxicity, mobility, or volume as a principal element. Because this remedy would result in hazardous substances remaining onsite above heath-based levels, a review will be conducted within 5 years of the commencement of remedial actions to ensure that the remedy continues to provide adequate protection of human health.

1.6 SIGNATURE AND SUPPORT AGENCY ACCEPTANCE OF THE REMEDY.

David Porter, P.E.
Base Realignment and Closure
Environmental Coordinator

31 March 1998
Date

2.0 DECISION SUMMARY

2.1 SITE NAME, LOCATION, AND DESCRIPTION. NAS Cecil Field is located 14 miles southwest of Jacksonville, Florida. The majority of Cecil Field is located with Duval County; the southernmost part of the facility is located in northern Clay County (Figure 2-1).

Land surrounding NAS Cecil Field is used primarily for forestry with some agriculture and ranching use. Small communities and individual dwellings are in the vicinity of NAS Cecil Field. The closest community, located on Nathan Hale Road, abuts the western edge of the facility. The nearest incorporated municipality, Baldwin, is approximately 6 miles northwest of the main facility entrance.

To the east of NAS Cecil Field, the rural surroundings grade into a suburban fringe bordering the major east-and-west roadways. Commercial properties, such as convenience stores, and low density residential areas characterize the land use (ABB Environmental Services, Inc. [ABB-ES], 1992). A development called Villages of Argyle, when complete, is planned to consist of seven separate villages that will ultimately abut NAS Cecil Field to the south and southeast. A golf course and residential area also border NAS Cecil Field to the east (Southern Division, Naval Facilities Engineering Command, 1989).

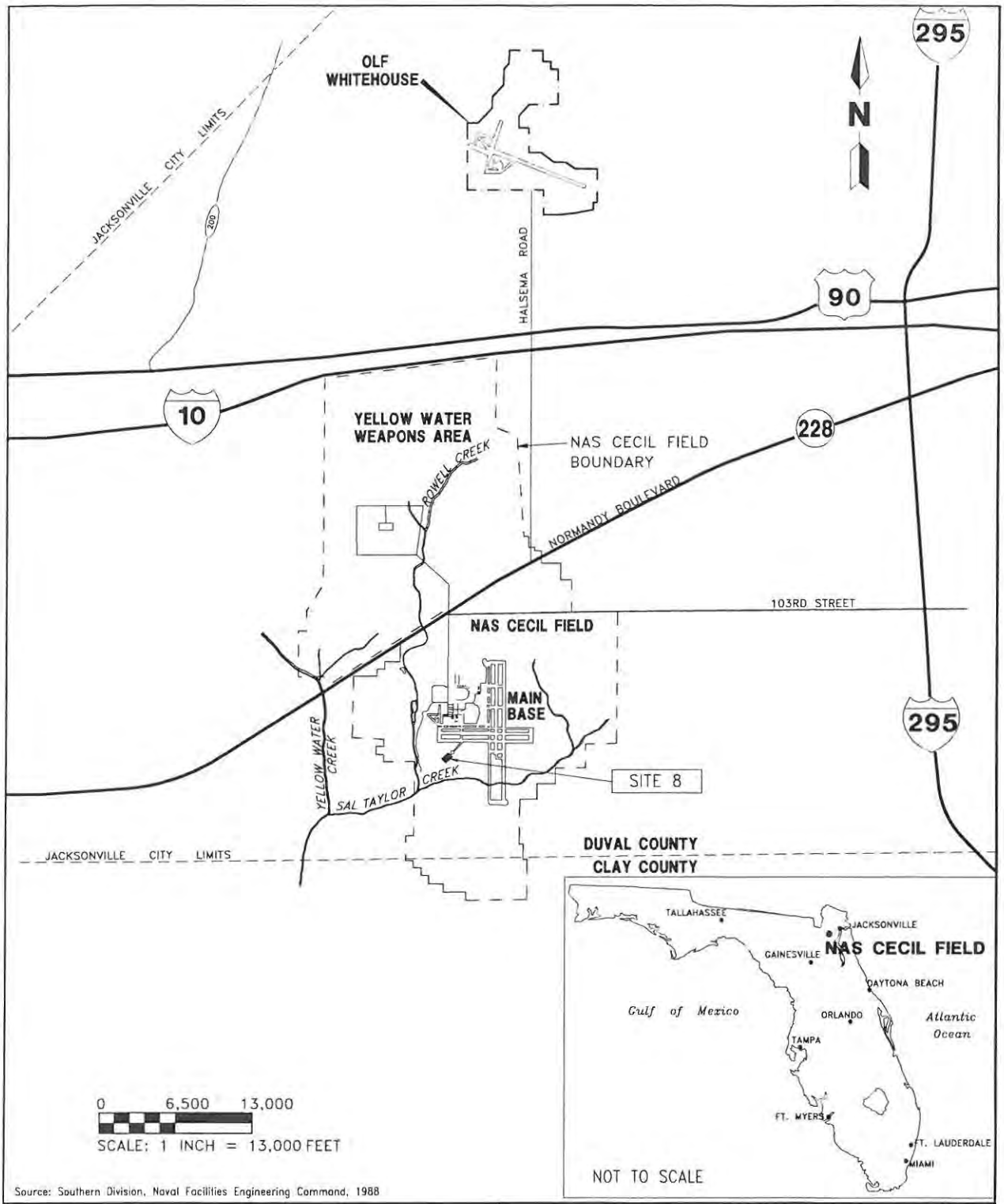
Site 8 is located south of the east-and-west flightline, in an area that, except for Site 8, lacks development. As a result, there is no housing in the immediate vicinity of Site 8. The nearest housing, the bachelor officer quarters, is located approximately 1 mile north of the site. The nearest building, Building 352, a weather shelter, is located approximately 700 feet northeast of Site 8.

NAS Cecil Field was established in 1941 and provides facilities, services, and material support for the operation and maintenance of naval weapons, aircraft, and other units of the operation forces as designated by the Chief of Naval Operations. Some of the tasks required to accomplish this mission over past years included operation of fuel storage facilities, performance of aircraft maintenance, maintenance and operation of engine repair facilities and test cells for turbo-jet engines, and support of special weapons systems.

NAS Cecil Field is scheduled for closure in 1999. Much of the facility will be transferred to the Jacksonville Port Authority. The facility will have multiple uses, but will be used primarily for aviation-related activities. Planned future use of Site 8 is aviation-related activity.

Site 8, Boresite Range, Hazardous Waste Storage Area, and Firefighting Training Area, is located approximately 1,600 feet south of the east-and-west flightline and approximately 3,500 feet west of the north-and-south flightline (Figure 2-2). Perimeter Road and Sal Taylor Creek are approximately 700 feet and 1,000 feet south of the Site 8 backstop, respectively.

Most of Site 8 is located on a broad slope, which gently dips to the south and southwest. The grade of the slope increases in the southern part of the site, from south of the backstop to Perimeter Road, where the topographic relief is nearly flat (Figure 2-2). The dominant features at Site 8 are a taxiway from the east-and-west flightline, a concrete pad at the end of the taxiway, the boresite



Source: Southern Division, Naval Facilities Engineering Command, 1988

FIGURE 2-1
GENERAL LOCATION MAP

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RECORD OF DECISION
SITE 8, OPERABLE UNIT 3

NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

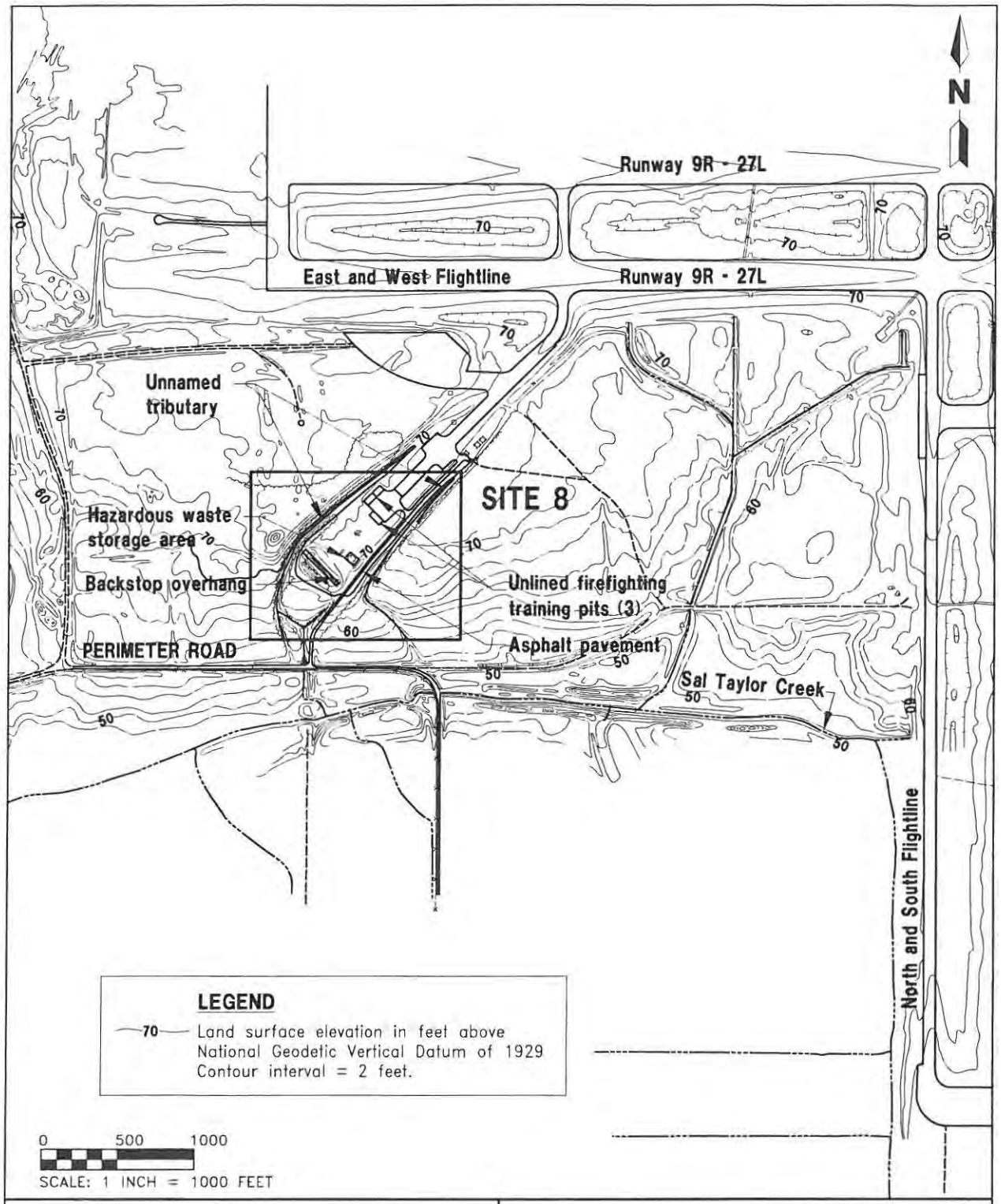

FIGURE 2-2
LOCATION MAP

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RECORD OF DECISION
SITE 8, OPERABLE UNIT 3

NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

backstop, the open field between the concrete pad and the backstop, and an access road (Figure 2-3). The areas north and northwest of the site are open, grassy fields. Areas southwest, south, and east of the site are planted with pine trees. On either side of the boresite range are drainage ditches. Both ditches begin north of Site 8 and drain in a southward direction, toward Perimeter Road. Currently, Site 8 is used for loading ordnance onto aircraft. Loading activities take place on the taxiway, topographically upgradient of the boresite range and the former hazardous waste storage and firefighting training areas.

2.2 SITE HISTORY AND ENFORCEMENT ACTIVITIES. Site 8 was originally used as a sighting range. Aircraft would taxi to the concrete pad and sight in aircraft guns, using targets located immediately in front of backstop. The range was used from 1970 to 1988.

Upon closure of Site 7, the firefighting training area located on the old 310 flightline, Site 8 was used as a firefighting training area. Training activities took place in three bermed pits, two located adjacent to and northwest of the concrete pad, one adjacent to and southwest of the pad (Figure 2-3). Training activities included placing aircraft frames in the pits and dousing the frames with flammable liquids. The aircraft frames were ignited, and firefighting personnel practiced fire containment and extinguishing techniques on the burning frames. Flammable liquids used in the training activities included waste paints and paint thinners, spent chlorinated and nonchlorinated solvents, and petroleum, oil, and lubricant wastes. Extinguishing materials consisted of water and nontoxic proteinaceous materials such as fish, feather, horn, or hoof meal. Extinguishing materials and unburned wastes were left on the site, where they evaporated, infiltrated into the soil, or migrated from the site via surface water runoff. Site 8 was used as a firefighting training area from 1975 to 1988.

From the late 1970s to 1980, Site 8 was also used for the storage of drummed hazardous waste. Drums were stored in the southern part of the open field between the concrete pad and the backstop (Figure 2-3). Reportedly, some of the drums were shot through and their content spilled upon the ground.

NAS Cecil Field was placed on the National Priority List (NPL) by the USEPA and the Office of Management and Budget in December 1989. A Federal Facility Agreement for NAS Cecil Field was signed by the Florida Department of Environmental Protection (FDEP) (formerly the Florida Department of Environmental Regulation), the USEPA, and the Navy in 1990. Following the listing of NAS Cecil Field on the NPL and the signing of the site management plan, remedial response activities at the facility were conducted under CERCLA authority.

Investigations at Site 8 began in 1985. The following reports describe the results of investigations at Site 8 to date:

- Initial Assessment Study of Naval Air Station Cecil Field, Envirodyne Engineers, 1985.
- Resource Conservation and Recovery Act Facility Investigation Naval Air Station Cecil Field, Harding Lawson Associates, 1988.
- RI/FS Workplan, Operable Units 3, 4, 5, and 6, Naval Air Station Cecil Field, ABB-ES, 1994.

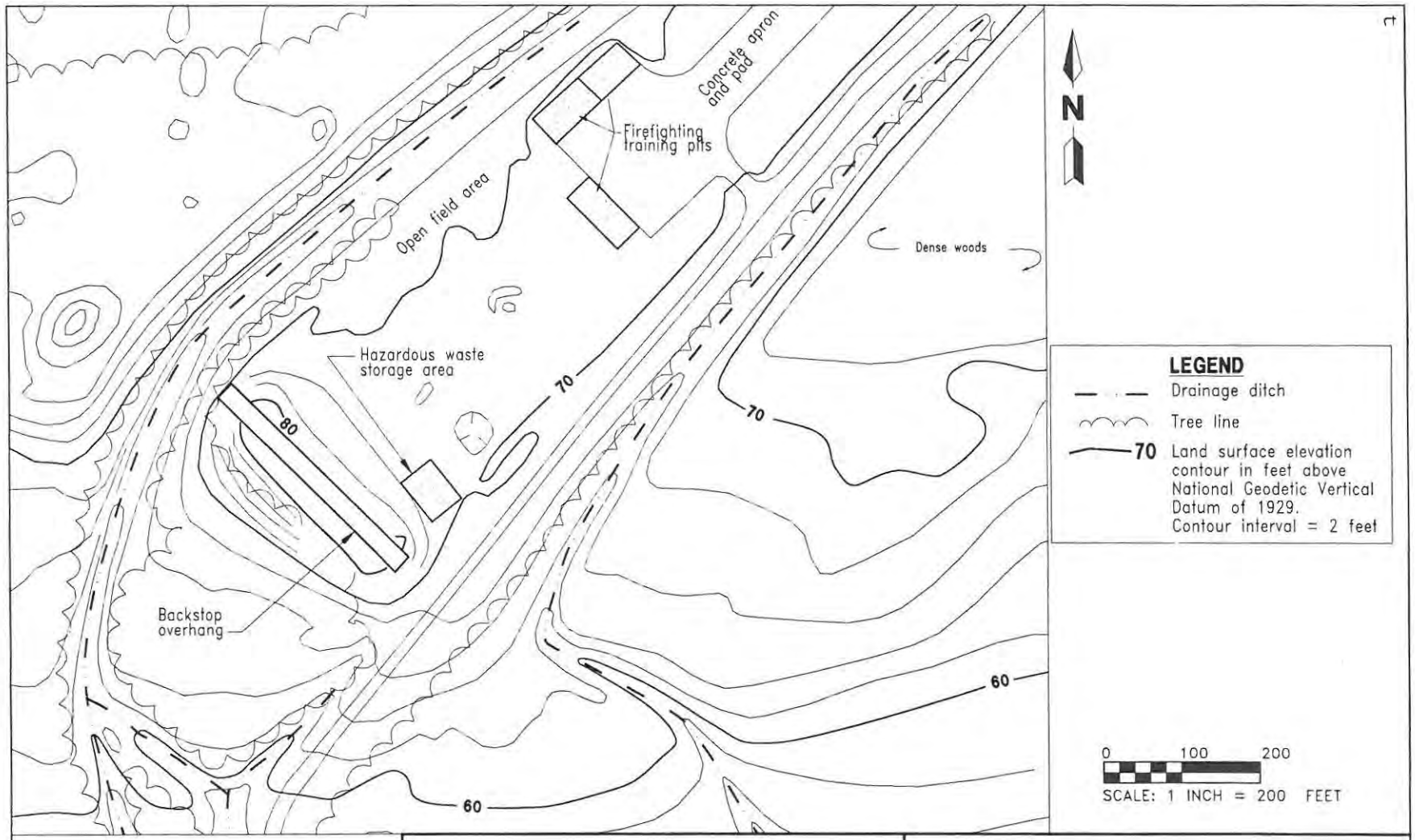

FIGURE 2-3
GENERAL FEATURES

RECORD OF DECISION
SITE 8, OPERABLE UNIT 3

NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

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Assessment of environmental data collected from OU 3, Site 8, indicates groundwater contamination could pose a human health risk if the groundwater was used as a potable water source. The purpose of this remedial action is to monitor and remediate the groundwater contamination that pose human health risk. Ingestion of groundwater extracted from the surficial aquifer poses a human health risk that exceeds the State of Florida threshold of 1 in 1,000,000 or 1×10^{-6}.

The following remedial action objective (RAO) was established for Site 8:

- Prevent exposure to groundwater at Site 8 that contains 1,1-DCE at concentrations greater than the State of Florida guidance criteria and that causes unacceptable risk to human health.

The remedial action documented in this ROD will achieve this RAO.

2.5 SUMMARY OF SITE CHARACTERISTICS.

Geology. Geologic materials recovered during drilling operations at Site 8 indicate that the site is underlain by approximately 80 feet fine- to medium-grained sand. In the northern part of the site, a clay to clayey sand layer occurs between 4 feet and 14 feet below land surface (bls). This clayey layer is not continuous across the site and was encountered in the vicinity of the training pits and in area northwest of the concrete pad and taxiway.

At approximately 80 feet bls is a sandy clay unit with dolomite pebbles and stringers. This clayey unit varies from 0 to 14 feet in thickness. Underlying this clayey unit is a dolomite layer that is at least 5 feet thick.

Hydrogeology. In the area of investigation, there are three water-bearing systems: (1) the surficial aquifer, (2) the intermediate aquifer, and (3) the Floridan aquifer system. Between each system is an aquitard (less permeable unit). Only the surficial aquifer was investigated at Site 8.

The surficial aquifer is unconfined and composed of fine- to medium-grained sand, with minor amounts of silt and clay stringers. These geologic deposits extend to approximately 80 feet bls and are underlain by sandy clay and dolomite. The surficial aquifer is considered to behave as one hydrological unit.

The water table in the surficial aquifer is typically between 2 and 6 feet bls. Seasonally, groundwater may discharge to the drainage ditch in the southeastern part of the site. Groundwater flow is to the south, toward Perimeter Road and Sal Taylor Creek, at an average rate of 55 feet per year. Water-elevation data indicate that the vertical groundwater flow direction is downward at Site 8. It is interpreted that seasonally (during wet periods of the year) the vertical flow direction is upward in the area of the lower parts of the eastern ditch.

Contaminant Sources. The primary source of contamination at Site 8 was the liquid wastes, i.e., waste solvents, paints and paint thinners, and fuel, used to ignite aircraft frames. Training activities have ceased and waste materials are no longer stored at Site 8; therefore, there is no source for continued contamination at the site.

RI Results. RI activities were conducted by ABB-ES during the fall of 1994, the spring of 1995, and the summer of 1997 to characterize the nature and extent of contamination at site 8. Environmental samples for laboratory analysis were collected from surface soil, subsurface soil, groundwater, surface water, and sediment. Analytical results indicated the presence of VOCs, SVOCs, pesticides, and the polychlorinated biphenyl Aroclor-1260 in the various media at Site 8. A summary of analytical results for each medium is presented below.

Surface Soil Analytical Results. The results of the confirmatory sampling program indicated the presence of VOCs, SVOCs, total recoverable petroleum hydrocarbons (TRPH) and inorganics in Site 8 surface soil. TRPH and the inorganic, beryllium, were detected at concentrations greater than State of Florida guidance values. All other constituents detected in surface soils were below their respective State of Florida guidance values. Seven of 35 surface soil samples had TRPH concentrations greater than the State of Florida residential goal of 350 milligrams per kilogram (mg/kg). Three of these samples had TRPH concentrations greater than

the industrial cleanup goal of 2,500 mg/kg. TRPH was detected in the vicinity of the training pits, in the open field, and behind the backstop (Figure 2-4).

Beryllium was detected in three samples at concentrations greater than the State of Florida guidance concentration of 0.2 mg/kg but was below the NAS Cecil Field background values. Beryllium concentrations in these three samples were very close to the guidance value, ranging from 0.23 to 0.27 mg/kg. Beryllium was detected in the open field and behind the backstop (Figure 2-4).

Subsurface Soil Analytical Results. Several VOCs, SVOCs, pesticides, and inorganics were detected in subsurface soil samples at concentrations below FDEP soil cleanup goals. TRPH, however, was detected at a concentration greater than State guidance value in one subsurface soil sample. This sample was collected from 2 to 4 feet bls in the southern training pit and had a concentration of 9,000 mg/kg (Figure 2-4).

Groundwater Analytical Results. VOCs, SVOCs, pesticides, and inorganics were detected in several groundwater samples. The pesticides dichlorodiphenyl-dichloroethane (4,4'-DDD) and dichlorodiphenyltrichloroethane (4,4'-DDT) were detected in a groundwater sample collected from a shallow monitoring well adjacent to the access road. Aldrin was detected in the sample collected from well CF8MW3D. Pesticide concentrations were below State and Federal guidance values.

Petroleum-related compounds (benzene, toluene, xylenes, and naphthalenes) and the chlorinated solvent, 1,1-DCE, were detected in groundwater at concentrations greater than State and Federal regulatory values. These compounds were detected in shallow monitoring well samples collected near and hydraulically downgradient of the training pits. These groundwater samples were collected from wells screened 3 to 14 feet bls. Those compounds with concentrations greater than drinking water standards are discussed below.

Three petroleum-related compounds (benzene, xylenes, and toluene) were detected above State primary or secondary drinking water standards (Figure 2-5). Benzene was detected in one sample from well CF8MW13S, located downgradient of the training pits, at 1 micrograms per liter ($\mu g/\ell$), which is the State primary drinking water standard for benzene. Total xylenes were detected in the sample from well CF8MW18S at 23 $\mu g/\ell$, which is above the State secondary drinking water standard of 20 $\mu g/\ell$. Well CF8MW18S is located adjacent to the western training pits. Toluene was detected at 48 $\mu g/\ell$ in the sample from well CF8MW10S; the State secondary standard is 40 $\mu g/\ell$.

1,1-DCE was detected in three groundwater samples at concentrations greater than State and Federal drinking water standard of 7 $\mu g/\ell$ (Figure 2-5). 1,1-DCE was detected at concentrations above the standard in samples collected from wells CF8MW10S, CF8MW7S, and CF8MW4S, each of which is located in the wooded area east of the access road and hydraulically downgradient of Site 8.

Concentrations ranged from a high of 95 $\mu g/\ell$ (CF8MW10S) to 14 $\mu g/\ell$ (CF7MW7S). 1,1-DCE concentrations in groundwater decrease with distance from CF8MW10S southward in the downgradient direction. At the most downgradient and perimeter monitoring wells, CF8MW1S and CF8MW9S, 1,1-DCE concentrations are below the drinking water standard.

The results of the RI are summarized, by medium, in the following paragraphs.

2.5.2.1 Soil

The results of the confirmatory soil sampling and analytical program indicate the presence of VOCs, semivolatile organic compounds (SVOCs), total recoverable petroleum hydrocarbons (TRPH), pesticides, polychlorinated biphenyls (PCBs), and inorganics in both surface and subsurface soil.

In the 1994 investigation, an extensive surface and subsurface soil sample screening program was undertaken (Figures 2-3 and 2-4); confirmatory soil sampling and chemical analysis followed the screening program (Figure 2-5). Between the 1991 and 1994 investigations, 37 subsurface soil samples were used to evaluate the nature and extent of contamination at OU8.

Surface Soil

The most frequent VOC detected in the 24 surface soil samples (0 to 1 foot bls) was xylene (12 of 24 samples), a common component of fuel, at concentrations ranging from 3 to 8 micrograms per kilogram (µg/kg). All other VOCs had a frequency of detection of 2 out of 24 samples or less and were detected at concentrations below 5 µg/kg. None of these detections exceeded the FDEP residential Soil Cleanup Goals (SCGs). VOC detected in both surface and subsurface soil is depicted on Figure 2-6.

Several SVOCs were detected in surface soil, although no single SVOC was detected in more than four of the 24 samples collected. Many of the detected SVOCs are commonly found in fuel and waste oil, both of which were reportedly disposed at OU8. The maximum concentration of benzo(a)pyrene (440 µg/kg) exceeded the FDEP residential SCG (100 µg/kg).

TRPH was detected in 6 of the 24 surface soil samples; detections were in both the disposal pit area and the helicopter crash area. The presence of TRPH at OU8 is likely attributable to historic activities at these areas.

A few pesticides and one PCB isomer (Aroclor-1254) were detected in surface soil. None of these detections exceed the FDEP residential SCGs. Because of wide distribution and low concentrations of the pesticides and PCB, the detections are interpreted to be the result of former basewide pesticide

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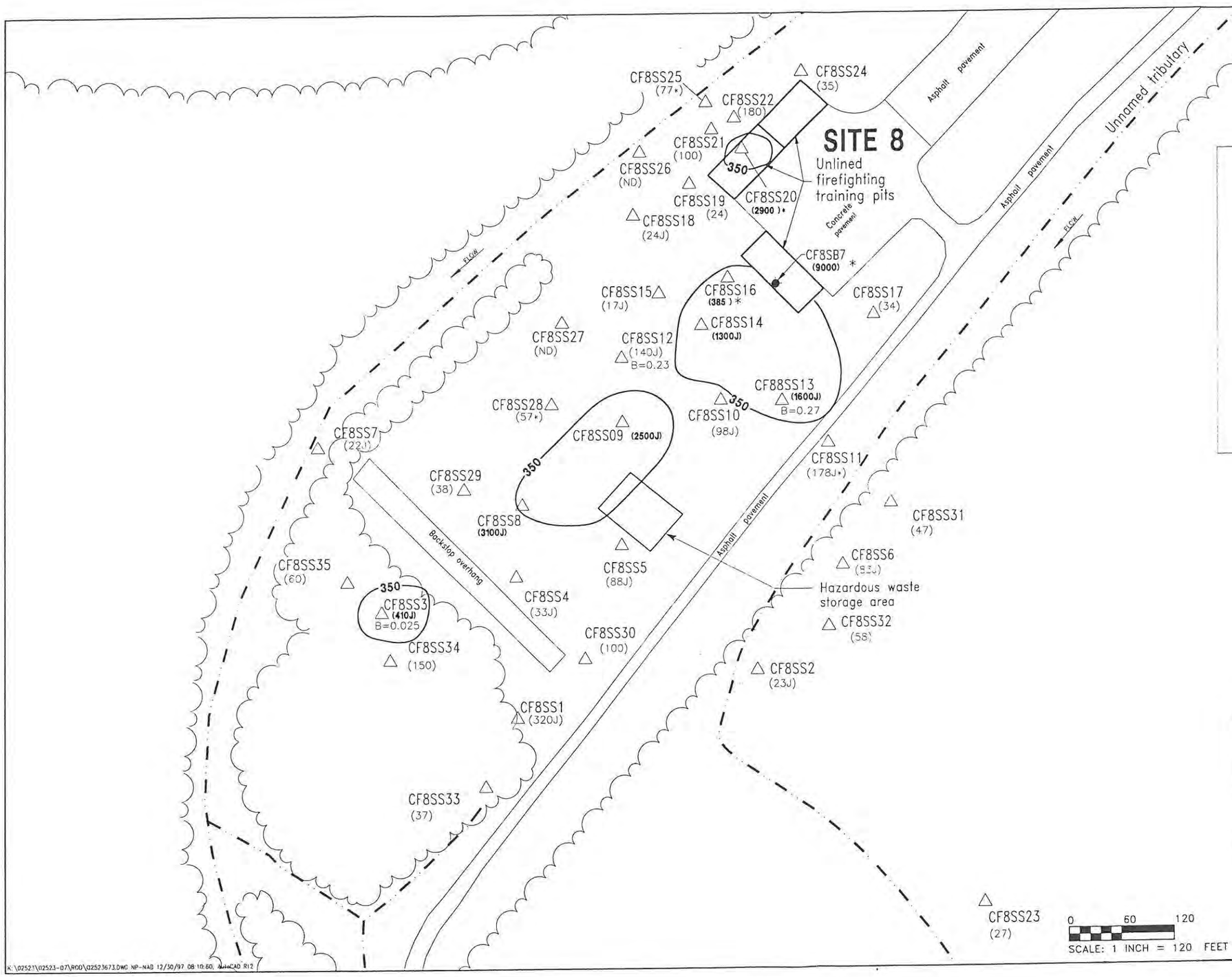

LEGEND

CF8SB7	Confirmatory subsurface soil sample location with designation
CF8SS1 (180)	Confirmatory surface soil sample location with designation with TRPH concentration (mg/kg)
B=0.23	Beryllium concentration (mg/kg)
(1600J)	Value indicates TRPH concentration greater than cleanup goal of 350
*	Average of sample and duplicate
mg/kg	Milligrams per kilogram
ND	Not detected
J	Estimated value
350	TRPH contour
	Drainage ditch
	Tree line

NOTE:
Concentrations are in milligrams per kilogram.
All concentrations are below detection limits unless otherwise labeled.

Sample interval, in feet below land surface, from which all samples were collected is 0–1 feet.

Sample CF8SB7 is the only subsurface sample with a TRPH concentration greater than 350, thus is the only subsurface soil sample shown.

Florida Department of Environmental Protection
Soil Cleanup Goal

Parameter	Residential
TRPH	350
B Beryllium	0.2

FIGURE 2-4
TOTAL RECOVERABLE PETROLEUM HYDROCARBON (TRPH) AND BERYLLIUM CONCENTRATIONS IN SOIL

RECORD OF DECISION
SITE 8, OPERABLE UNIT 3

NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

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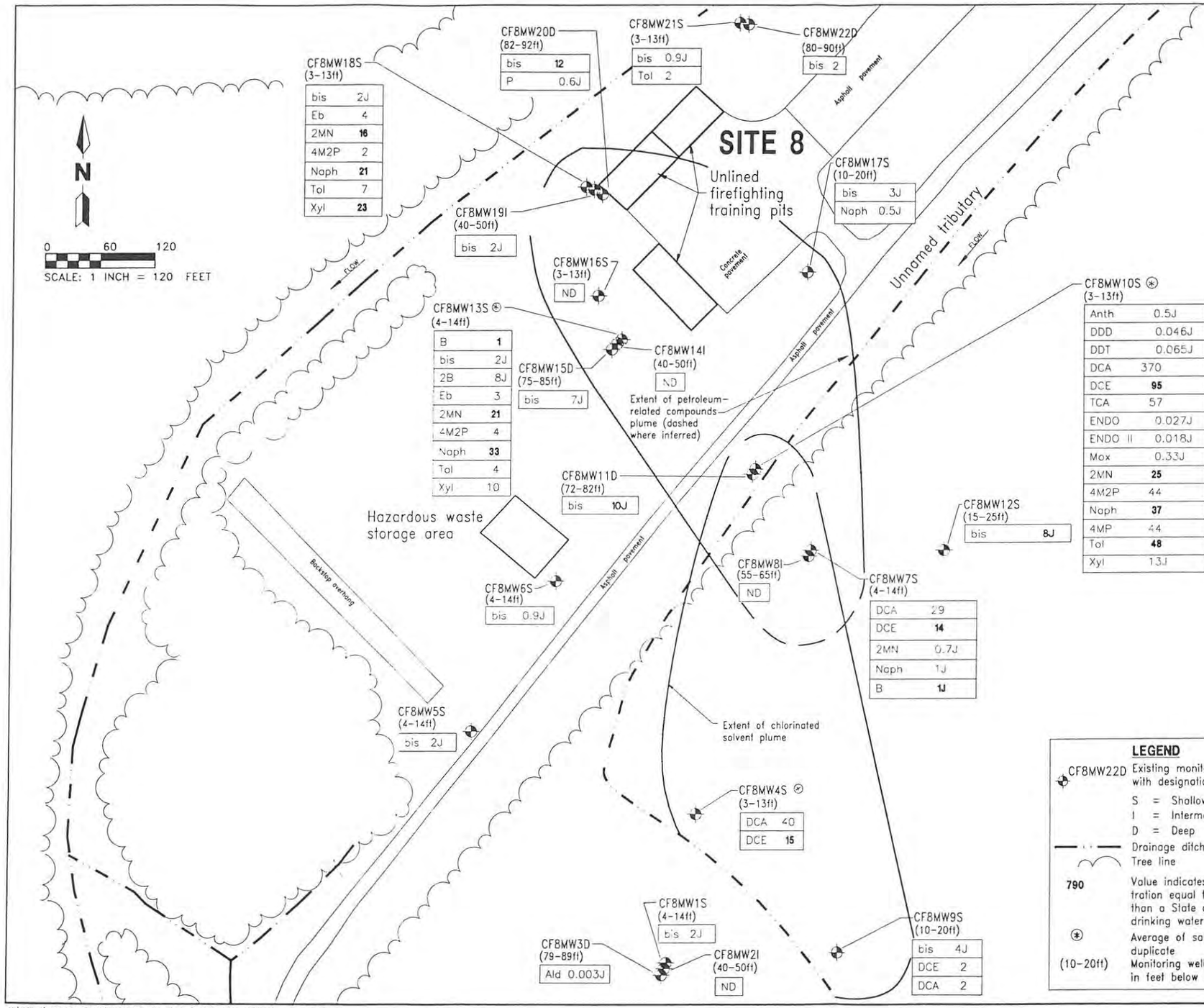

Florida Department of Environmental Protection
Groundwater Guidance Concentrations

Analytical Parameter		Regulatory value and type	
B	Benzene	1	PD
Eb	Ethylbenzene	700/30	PD/SD
Tol	Toluene	1,000/40	PD/SD
Xyl	Xylene	10,000/20	PD/SD
2B	2-Butanone	4,200	G
4M2P	4-Methyl-2-pentanone	350	G
DCA	1,1-Dichloroethane	700	G
DCE	1,1-Dichloroethene	7	PD
TCA	1,1,1-Trichloroethane	200	PD
Anth	Anthracene	2,100	G
2MN	2-methylnaphthalene	6.8 Total	G
Naph	Naphthalene	6.8 Total	G
bis	bis (2-Ethylhexyl) phthalate	6	PD
4MP	4 Methylphenol	35	G
P	Phenol	10	G
Ald	Aldrin	NG	
DDD	4,4'-Dichlorodiphenyldichloroethane	0.1	G
DDE	4,4'-Dichlorodiphenyldichloroethene	0.1	G
DDT	4,4-Dichlorodiphenyltrichloroethane	0.1	G
ENDO	Endosulfan sulfate	0.3	G
ENDO II	Endosulfan II	0.35	G
Mox	Methoxychlor	40	PD

NOTE:
All values reported in micrograms per liter.

PD Primary drinking water standard
SD Secondary drinking water standard
NG No regulatory value given
J Estimated value
G Guidance value
ND Not detected

LEGEND

CF8MW22D Existing monitoring well with designation
S = Shallow
I = Intermediate
D = Deep
Drainage ditch
Tree line
790 Value indicates a concentration equal to or greater than a State or Federal drinking water standard
⊛ Average of sample and duplicate
(10-20ft) Monitoring well screen interval in feet below land surface

FIGURE 2-5
ORGANICS DETECTED IN CONFIRMATORY GROUNDWATER SAMPLES

RECORD OF DECISION
SITE 8, OPERABLE UNIT 3

NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

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The phthalate ester *bis*(2-ethylhexyl)phthalate was detected in concentrations greater than the State regulatory value. These groundwater samples were collected from two deep wells, CF8MW20D and CF8MW11D (Figure 2-5). CF8MW20S is located near the western training pits; CF8MW11S is located east of the access road. Concentrations detected in these samples were 12 $\mu g/\ell$ (CF8MW20D) and 10 J $\mu g/\ell$ (CF8MW11D). The State primary drinking water standard is 6 $\mu g/\ell$.

The inorganics aluminum and iron were detected at concentrations above State regulatory values in most of the groundwater samples collected at Site 8 (Figure 2-6). Concentrations were greater than Secondary drinking water standards of 200 $\mu g/\ell$ for aluminum and 300 $\mu g/\ell$ for iron but were below the NAS Cecil Field background values. Aluminum concentrations ranged from 362 $\mu g/\ell$ to 15,300 J $\mu g/\ell$. Iron concentrations ranged from 222 J to 3,270 $\mu g/\ell$.

Sediment Analytical Results. VOCs, SVOCs, TRPH, pesticides, and Aroclor-1260 were detected in Site 8 sediment samples (Figure 2-7). Of these, only Aroclor-1260 was detected in concentrations above its State of Florida threshold effects level (TEL) guidance value of 0.022 mg/kg. The TEL is that concentration of a compound that might have an effect upon an organism in the media of concern. Aroclor-1260 concentrations, however, are less than its probable effect level (PEL) guidance value of 0.19 mg/kg. The PEL is that concentration of a compound that probably has an effect upon an organism in the media of concern. Aroclor-1260 was detected in both ditches at sampling locations downgradient of the training pit locations. Aroclor-1260 was detected in samples CF8SD3 (0.038 J mg/kg) and CF8SD4 (0.026 J mg/kg), located in the western ditch, and in CF8SD8 (0.037 J mg/kg), located in the eastern ditch.

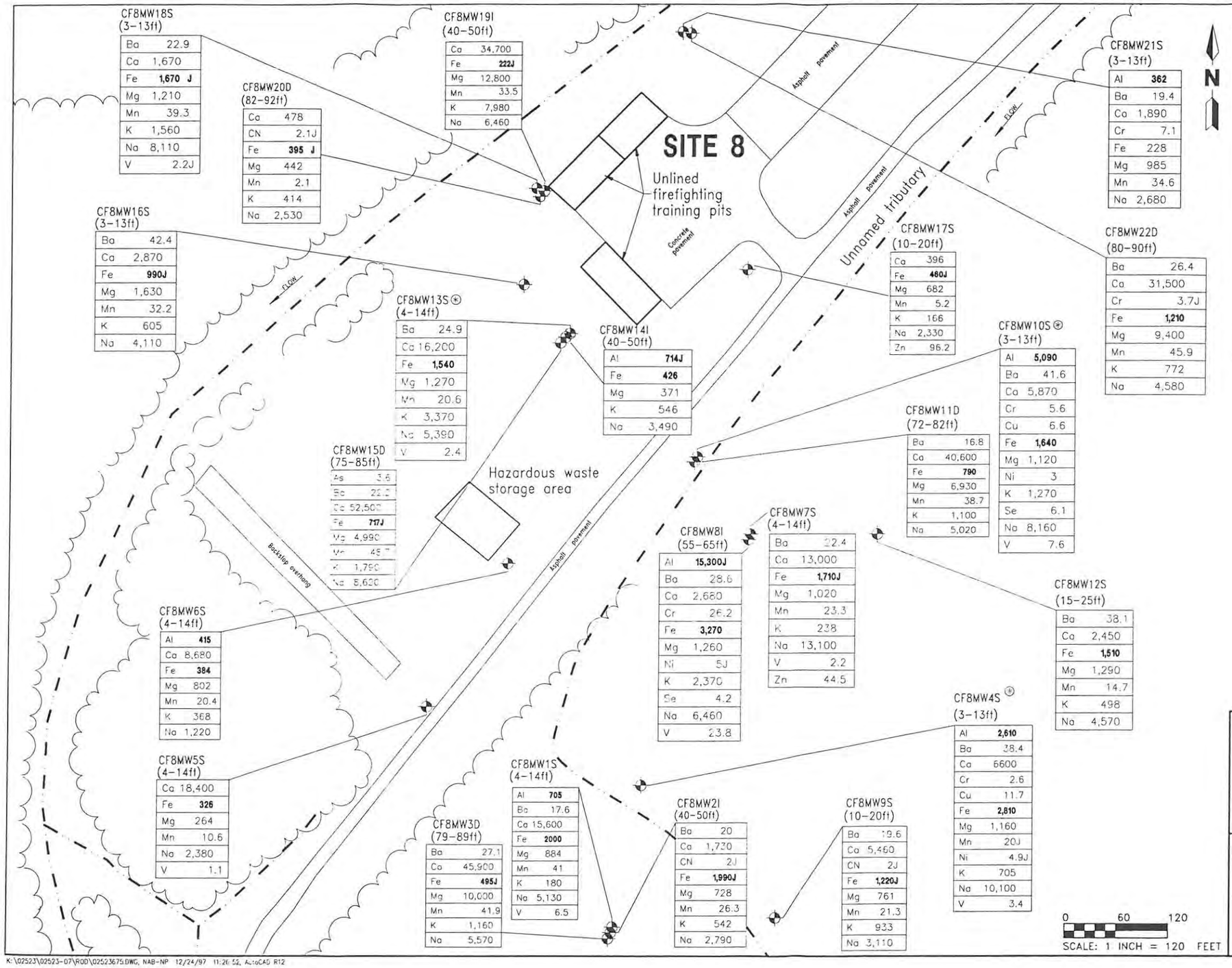
Surface Water Analytical Results. The inorganic cyanide was detected in surface water samples at concentrations greater than the State guidance value of 5.2 $\mu g/\ell$ (Figure 2-8). Cyanide was detected in two samples collected from the eastern ditch, CF8SW6 at 13.8 J $\mu g/\ell$ and CF8SW7 at 57.3 J $\mu g/\ell$.

2.6 SUMMARY OF SITE RISKS. The BRA (ABB-ES, 1997b) provides the basis for taking action and indicates the exposure pathways to be addressed by the remedial action. As a baseline, it indicates what risks could exist if no action were taken at the site. Both human health and ecological risks were identified at Site 8.

Human health risks are estimated for both cancer and noncancer risks in accordance with the NCP. The NCP establishes "acceptable" as the excess lifetime cancer risk (ELCR), due to exposure to the human health chemicals of potential concern at a site by each complete exposure pathway, of 1 in 1,000,000 (1×10^{-6}) to 1 in 10,000 (1×10^{-4}) (USEPA, 1990) or a noncancer hazard index (HI) of equal to or less than 1. The State of Florida establishes an acceptable lifetime cancer risk as equal to or less than 1×10^{-6} and an HI equal to or less than 1.

Human Health Risk Assessment (HHRA). The purpose of the HHRA was to characterize risk associated with possible exposure to site-related contaminants for human receptors. Potential health risks were evaluated under current and assumed future land-use conditions for a subset of contaminants detected in surface soil, subsurface soil, groundwater (surficial aquifer), and surface water.

Surface Soil. Risks from surface soil contaminants were not identified for any current-use scenario. In a future use scenario, beryllium in Site 8 surface soil



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LEGEND

CF8MW17S	Existing monitoring well with designation
⊛	Average of sample and duplicate
— · · — · · —	Drainage ditch
⌒⌒⌒	Tree line
PD	Primary drinking water standard
SD	Secondary drinking water standard
G	Guidance value
J	Estimated value
NG	No regulatory value given
.14J	Bold indicates a concentration equal to or greater than a State or Federal drinking water value.
(4-14ft)	Monitoring well screen interval in feet below land surface

NOTE:
All values reported in micrograms per liter

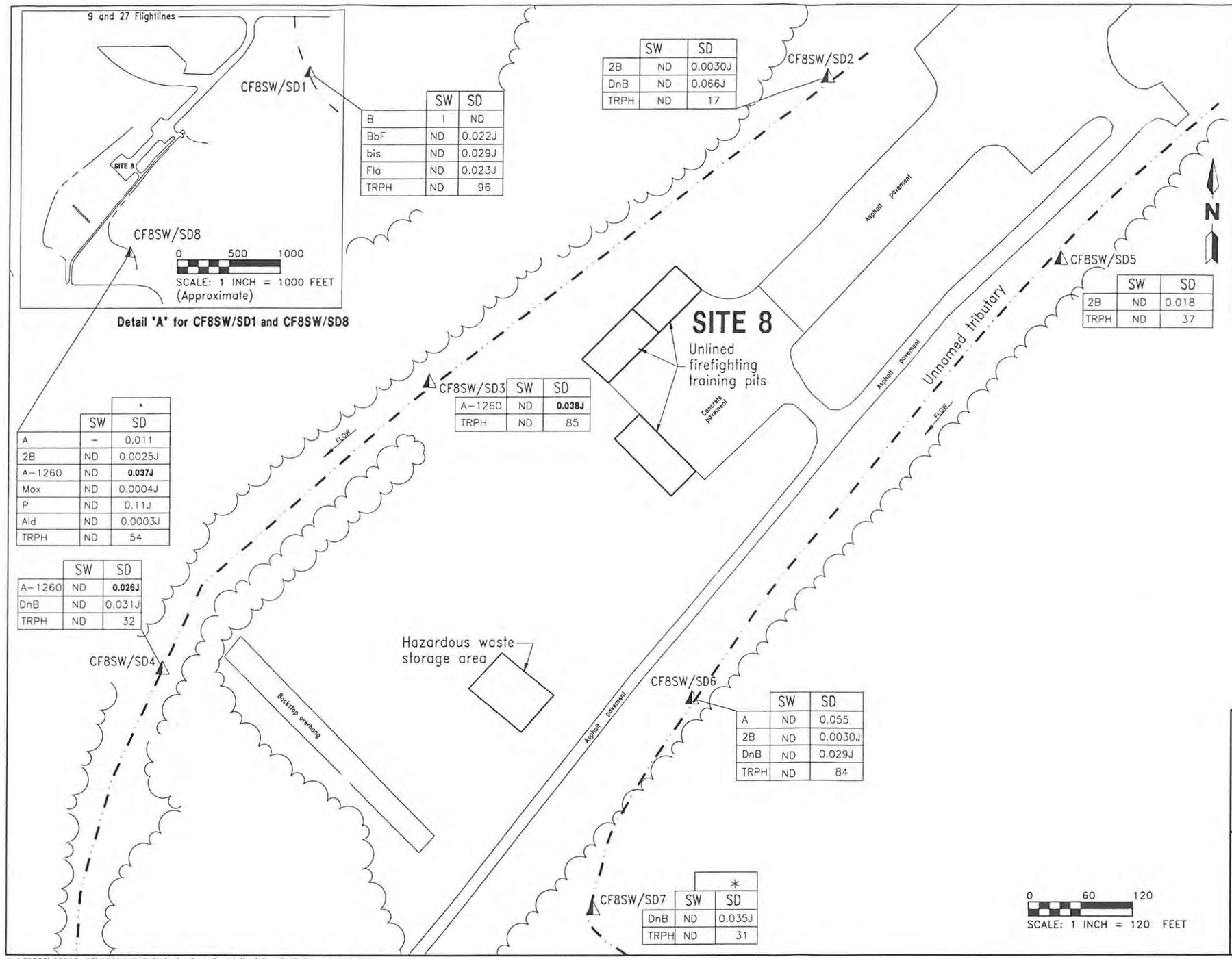
Florida Department of Environmental Protection
Groundwater Guidance Concentrations

	Analytical Parameter	Regulatory value and type	
Al	Aluminum	200	SD
Ba	Barium	2,000	PD
Ca	Calcium	NG	
Cr	Chromium	100	PD
Cu	Copper	1,000	SD
CN	Cyanide	200	PD
Fe	Iron	300	SD
Mg	Magnesium	NG	
Mn	Manganese	50	SD
Ni	Nickle	100	PD
K	Potassium	NG	
Se	Selenium	50	PD
Na	Sodium	160,000	PD
V	Vanadium	49	G
Zn	Zinc	5,000	SD

FIGURE 2-6
INORGANICS DETECTED IN CONFIRMATORY GROUNDWATER SAMPLES

RECORD OF DECISION
SITE 8, OPERABLE UNIT 3

NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA



	SW	SD
B	1	ND
BbF	ND	0.022J
bis	ND	0.029J
Fla	ND	0.023J
TRPH	ND	96

	SW	SD
2B	ND	0.0030J
DnB	ND	0.066J
TRPH	ND	17

	SW	SD
2B	ND	0.018
TRPH	ND	37

	SW	SD
A-1260	ND	**0.038J**
TRPH	ND	85

	SW	* SD
A	–	0.011
2B	ND	0.0025J
A-1260	ND	**0.037J**
Mox	ND	0.0004J
P	ND	0.11J
Ald	ND	0.0003J
TRPH	ND	54

	SW	SD
A-1260	ND	**0.026J**
DnB	ND	0.031J
TRPH	ND	32

	SW	SD
A	ND	0.055
2B	ND	0.0030J
DnB	ND	0.029J
TRPH	ND	84

	SW	* SD
DnB	ND	0.035J
TRPH	ND	31

LEGEND

CF8SW/SD4	Surface water/sediment sample location with designation
	Drainage ditch
	Tree line
TRPH	Total recoverable petroleum hydrocarbons
J	Estimated value
ND	Not detected
SW	Surface water
SD	Sediment
TEL	Threshold effect level
PEL	Probable effect level
NG	No value given
*	Average of sample and duplicate.
0.038	Bold indicates a concentration equal to or greater than FDEP Sediment Cleanup Goals

NOTE:

All sediment values reported in milligrams per kilogram. Surface water samples reported in micrograms per liter.

Sample interval, in feet below land surface, from which all samples were collected is 0-1 feet.

Florida Department of Environmental Protection (FDEP)

	Sediment Cleanup Goal	TEL	PEL
A	Acetone	NG	NG
A-1260	Aroclor 1260	0.022	0.19
B	Benzene	NG	NG
BbF	Benzo(b)fluoranthene	NG	NG
bis	bis (2Ethylhexyl) phthalate	0.18	2.6
2B	2-butanone	NG	NG
DnB	Di-n-butylphthalate	NG	NG
Fla	Fluoranthene	NG	NG
Mox	Methoxychlor	NG	NG
P	Phenol	NG	NG
*Ald	Aldrin	0.00072	0.0043

*Dieldrin used as a surrogate

FIGURE 2-7
ORGANICS DETECTED IN CONFIRMATORY SURFACE WATER AND SEDIMENT SAMPLES

RECORD OF DECISION
SITE 8, OPERABLE UNIT 3

NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

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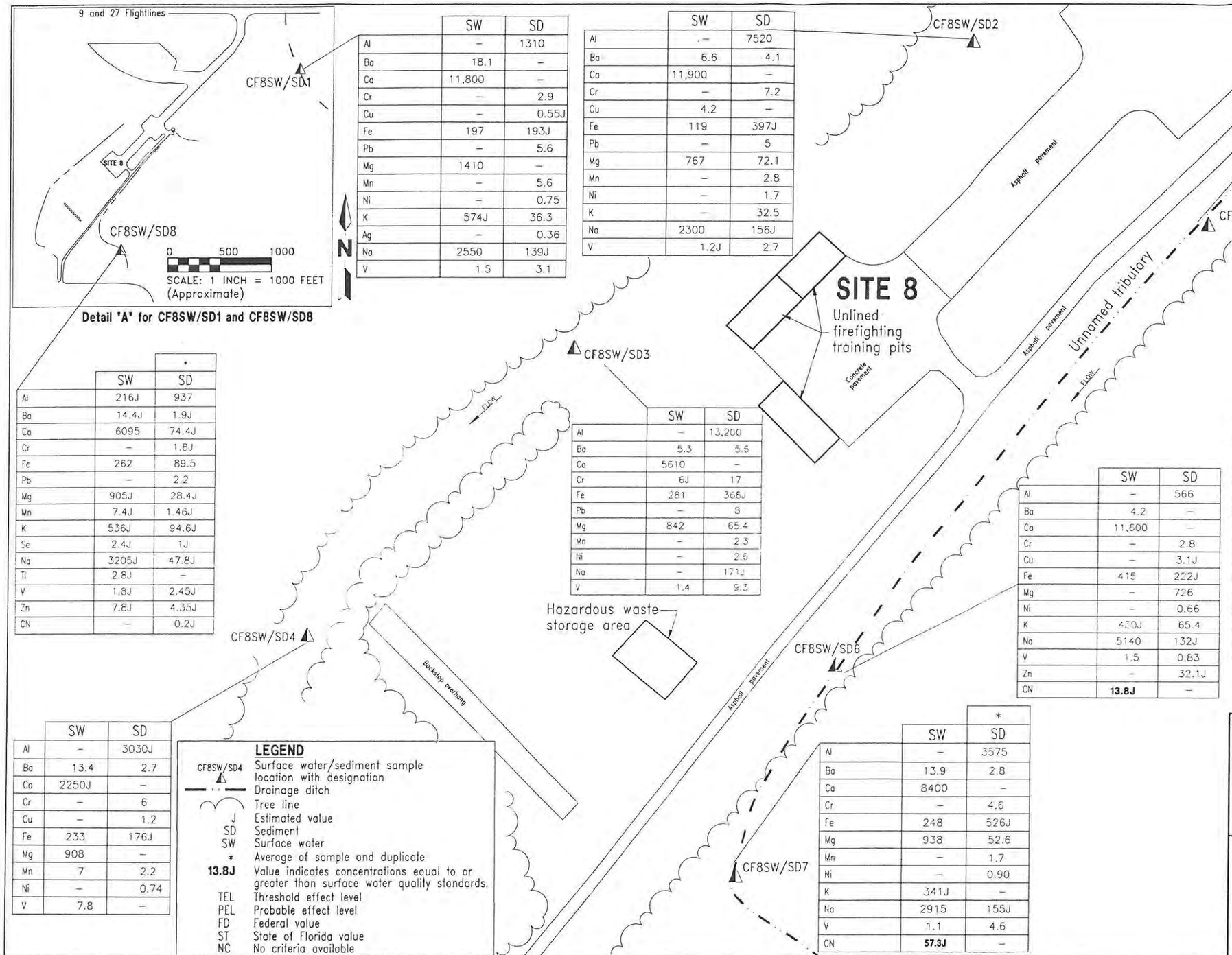

Detail "A" for CF8SW/SD1 and CF8SW/SD8

	SW	SD
Al	–	1310
Ba	18.1	–
Ca	11,800	–
Cr	–	2.9
Cu	–	0.55J
Fe	197	193J
Pb	–	5.6
Mg	1410	–
Mn	–	5.6
Ni	–	0.75
K	574J	36.3
Ag	–	0.36
Na	2550	139J
V	1.5	3.1

	SW	SD
Al	–	7520
Ba	6.6	4.1
Ca	11,900	–
Cr	–	7.2
Cu	4.2	–
Fe	119	397J
Pb	–	5
Mg	767	72.1
Mn	–	2.8
Ni	–	1.7
K	–	32.5
Na	2300	156J
V	1.2J	2.7

	SW	SD
Al	296J	12,200
Ba	6.7	7.9
Ca	5830	–
Cr	–	12.9
Co	–	0.33J
Cu	–	1.6J
Fe	542	1090J
Pb	–	8.6
Mg	854	104
Mn	8.5	2.9
Ni	–	3.5
K	345J	–
Na	3520	181J
V	–	6.9

	SW	* SD
Al	216J	937
Ba	14.4J	1.9J
Ca	6095	74.4J
Cr	–	1.8J
Fe	262	89.5
Pb	–	2.2
Mg	905J	28.4J
Mn	7.4J	1.46J
K	536J	94.6J
Se	2.4J	1J
Na	3205J	47.8J
Ti	2.8J	–
V	1.8J	2.45J
Zn	7.8J	4.35J
CN	–	0.2J

	SW	SD
Al	–	13,200
Ba	5.3	5.5
Ca	5610	–
Cr	6J	17
Fe	281	368J
Pb	–	3
Mg	842	65.4
Mn	–	2.3
Ni	–	2.5
Na	–	171J
V	1.4	9.3

	SW	SD
Al	–	566
Ba	4.2	–
Ca	11,600	–
Cr	–	2.8
Cu	–	3.1J
Fe	415	222J
Mg	–	726
Ni	–	0.66
K	430J	65.4
Na	5140	132J
V	1.5	0.83
Zn	–	32.1J
CN	**13.8J**	–

	SW	SD
Al	–	3030J
Ba	13.4	2.7
Ca	2250J	–
Cr	–	6
Cu	–	1.2
Fe	233	176J
Mg	908	–
Mn	7	2.2
Ni	–	0.74
V	7.8	–

	SW	* SD
Al	–	3575
Ba	13.9	2.8
Ca	8400	–
Cr	–	4.6
Fe	248	526J
Mg	938	52.6
Mn	–	1.7
Ni	–	0.90
K	341J	–
Na	2915	155J
V	1.1	4.6
CN	**57.3J**	–

LEGEND

CF8SW/SD4	Surface water/sediment sample location with designation
	Drainage ditch
	Tree line
J	Estimated value
SD	Sediment
SW	Surface water
*	Average of sample and duplicate
13.8J	Value indicates concentrations equal to or greater than surface water quality standards.
TEL	Threshold effect level
PEL	Probable effect level
FD	Federal value
ST	State of Florida value
NC	No criteria available

NOTES:

All sediment values reported in milligrams per kilogram. Surface water samples reported in micrograms per liter.

Sample interval, in feet below land surface, from which all samples were collected is 0–1 feet.

Regulatory Surface Water and Sediment Criteria

Parameter		Regulatory value and type: Surface Water		TEL (Sediment)	PEL (Sediment)
Al	Aluminum	87	FD	NC	NC
Ba	Barium	NC		NC	NC
Ca	Calcium	NC		NC	NC
Cr	Chromium	≤11	ST	52.3	100
Co	Cobalt	NC		NC	NC
Cu	Copper	3.6	ST	18.7	108
CN	Cyanide	≤5.2	ST	NC	NC
Fe	Iron	≤1,000	ST	NC	NC
Pb	Lead	0.54	ST	30	112
Mg	Magnesium	NC		NC	NC
Mn	Manganese	NC		NC	NC
Ni	Nickle	49.0	ST	15.9	42.8
K	Potassium	NC		NC	NC
Ag	Silver	≤0.07	ST	0.733	1.77
Na	Sodium	NC		NC	NC
Se	Selenium	≤5.0	ST	NC	NC
Tl	Thallium	≤6.3	ST	NC	NC
V	Vanadium	≤5.2	ST	NC	NC
Zn	Zinc	58.91	FD	124	271

0 60 120
SCALE: 1 INCH = 120 FEET

FIGURE 2-8
INORGANICS DETECTED IN CONFIRMATORY SURFACE WATER AND SEDIMENT SAMPLES

RECORD OF DECISION
SITE 8, OPERABLE UNIT 3

NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

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accounts for the ELCR due to exposure to the surface soil contaminant by an aggregate resident (adult and child) of 6×10^{-6} (Figure 2-9). This risk is within the USEPA acceptable risk range, but greater than the Florida Department of Environmental Protection threshold of 1×10^{-6}. The noncancer risk to a child has an HI of 1 (Figure 2-10). However, NAS Cecil Field background screening values were developed after the completion of the BRA and beryllium would have been screened out of the BRA. Therefore, no risk is posed for residents from exposure to beryllium in surface soil.

Subsurface Soil. The BRA indicates that the compounds detected in subsurface soil do not pose an unacceptable risk to human receptors.

Groundwater. The BRA indicates that compounds in groundwater pose no current human health risk exist at Site 8. Under a future land-use scenario, an ELCR would be posed if the groundwater were used as a potable water supply. Ingestion of surficial aquifer groundwater would pose an ELCR for an aggregate resident of 6×10^{-5} (Figure 2-9). Almost all the risk is due to the presence of 1,1-DCE. Minor contributors include 4,4'-DDD, 4,4'-DDT, benzene, and *bis*(2-ethylhexyl)phthalate.

Surface Water. A human health risk was assessed to exist for current and future adult and adolescent trespassers due to the presence of 4,4'-DDT in surface water. The ELCR was assessed to be 2×10^{-6} (Figure 2-9). The ELCR was assessed based upon a scenario in which a person could use the surface water for recreation purposes (wade in or fish from the ditch). Conditions of the ditch are such that recreational activities are not amenable or practicable. Surface water, under normal conditions, is only a few inches deep (generally less than 12 inches) and a few feet wide (generally less than 3 feet). The natural quality of the ditch is such it does not sustain sport fish (such as large-mouth bass or catfish).

Ecological Risk Assessment. Potential risks may exist for terrestrial plants and aquatic organisms. Risk data indicate that terrestrial plants and aquatic animals in the southeastern part of the site may be at risk due to aluminum concentrations in the surface water and potentially discharging groundwater. The ecological risk assessment indicates that no risk, however, exists for plants or animals downstream of Site 8. Site 8 risks are very conservative and may over estimate actual risk. More importantly, the drainage ditch provides a poor habitat for both plants and animals.

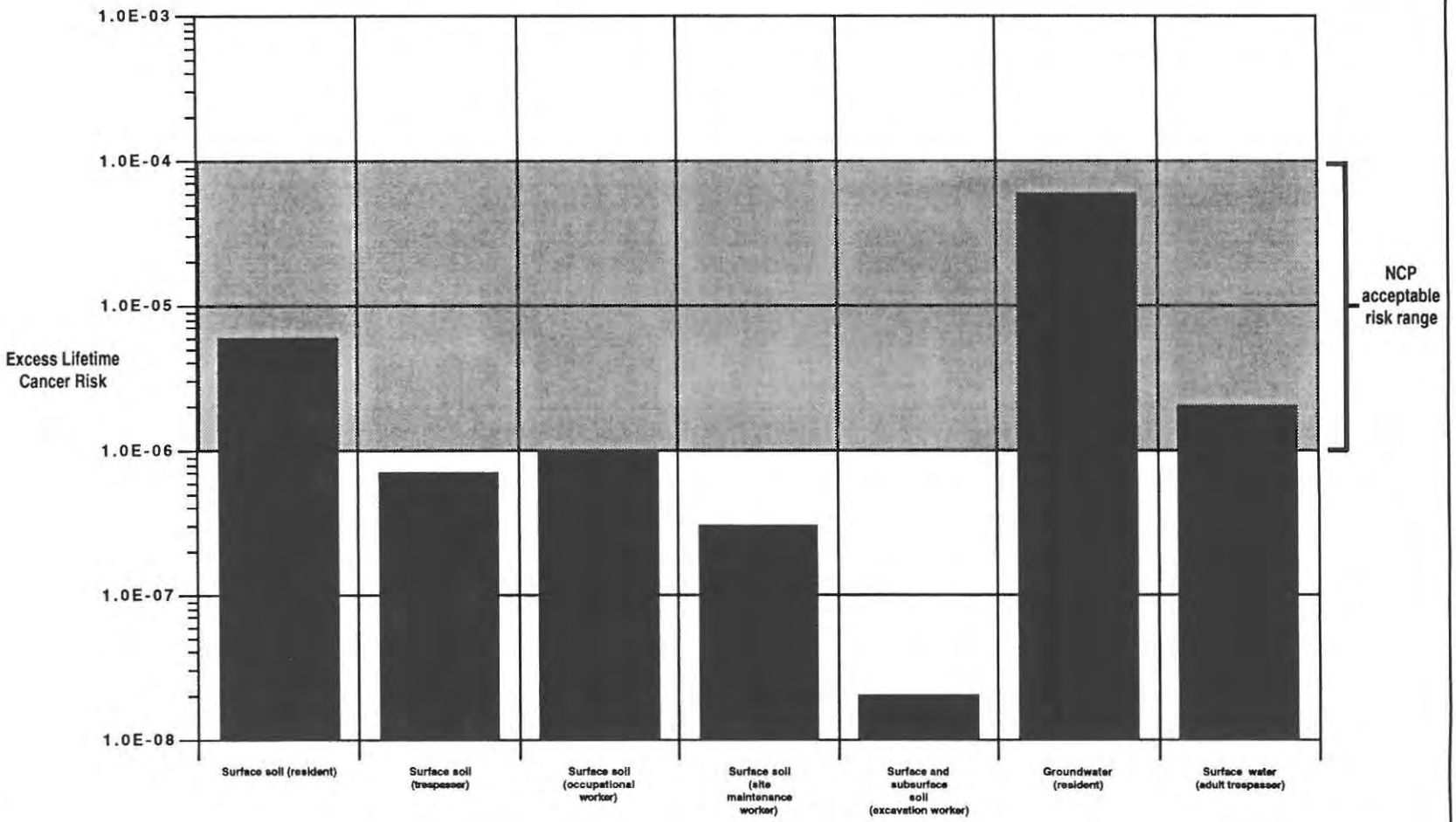
The ecological risk assessment also identified Aroclor-1260 and TRPH in sediment as posing potential risk to macroinvertebrates. Aroclor-1260 concentrations in sediment were an order of magnitude below the State PEL value and slightly greater than the TEL. There is no PEL value for TRPH, and the comparative benchmark in very conservative. Habitat quality the ditch for macroinvertebrates is very poor. It is probable that risk due to contaminants in sediment is overestimated.

2.7 DESCRIPTION OF ALTERNATIVES

This section provides a narrative of each alternative evaluated. Alternatives were developed for groundwater and sediment. The FS for OU 3 (ABB-ES, 1997a) gives further information on the remedial alternatives.

2.7.1 Groundwater Alternatives

Two alternatives were analyzed for Site 8. They include 8GW1, No Action, and 8GW2, Natural Attenuation.



NOTE:
NCP = National Contingency Plan

FIGURE 2-9
EXCESS LIFETIME CANCER RISK SUMMARY, FUTURE LAND USE

RECORD OF DECISION
SITE 8, OPERABLE UNIT 3

NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

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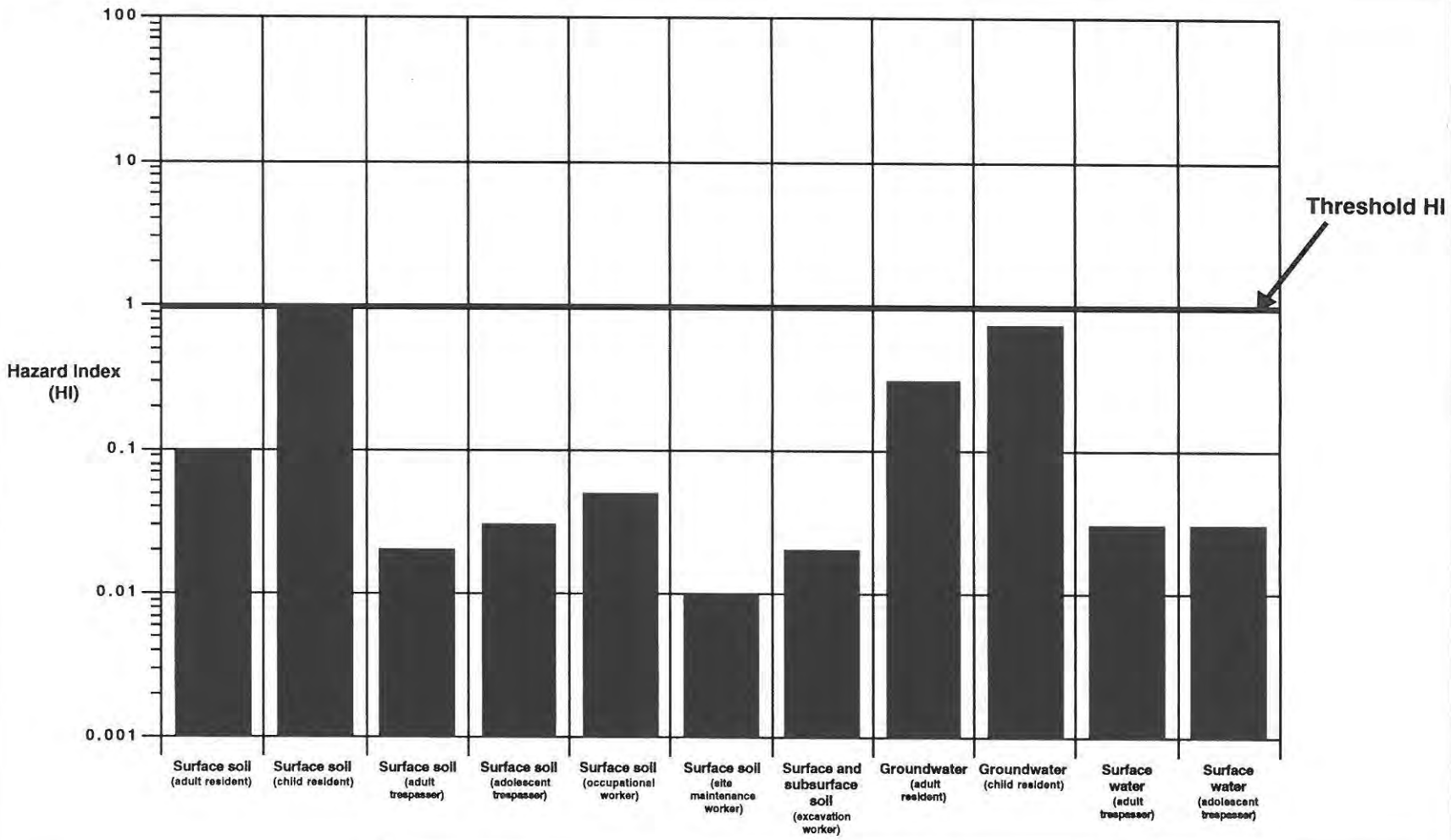

NOTE:
< = less than

FIGURE 2-10
HAZARD INDEX SUMMARY, FUTURE LAND USE

RECORD OF DECISION
SITE 8, OPERABLE UNIT 3

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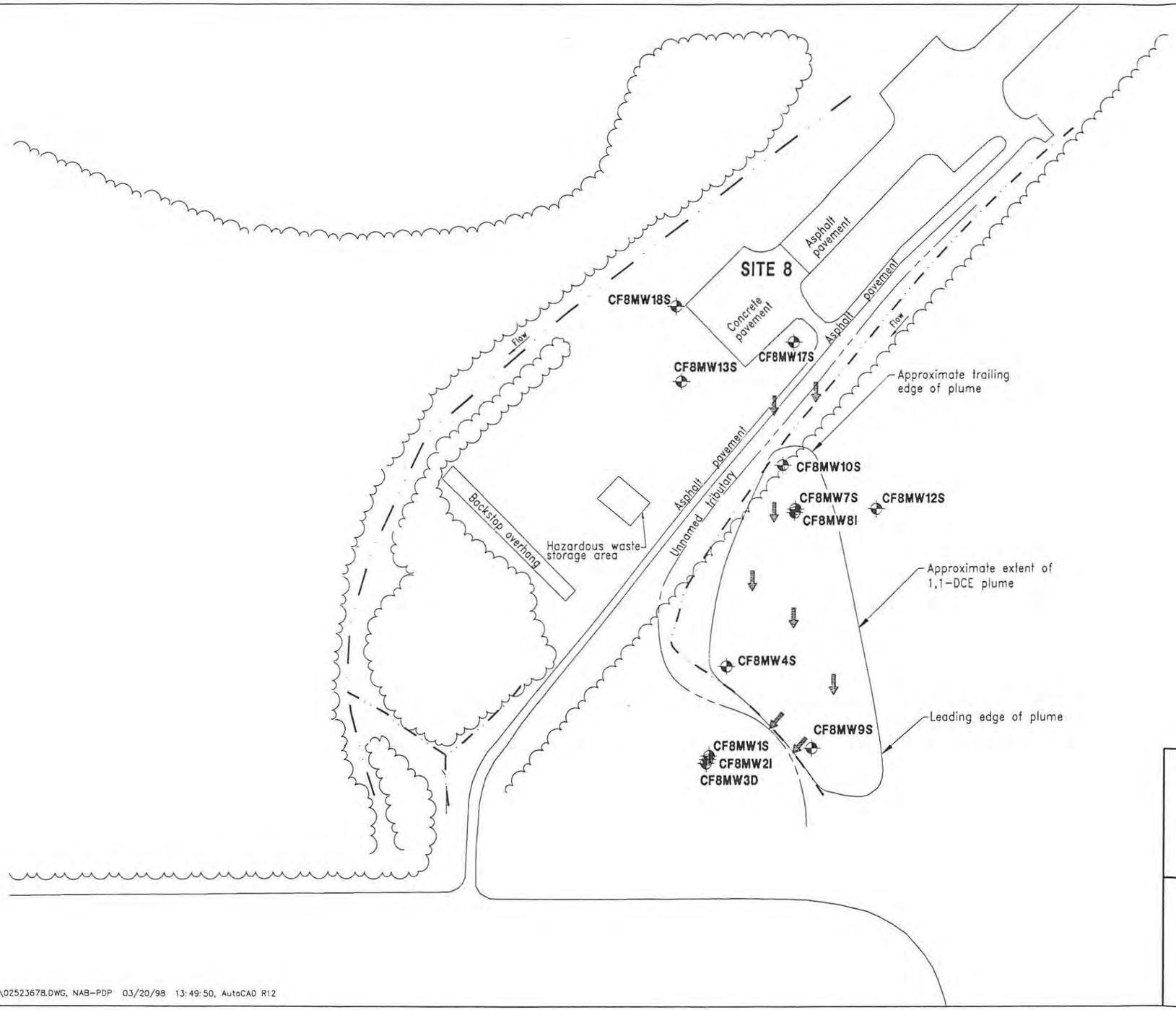
8GW1, No Action. Evaluation of the No Action alternative is required by law and provides a baseline against which other alternatives can be compared. This alternative will leave the site the way it exists today, relying on the organic contaminants to degrade over time. Chemical-specific ARARs will not be met in the short term. Human health risks would be immediately reduced by restriction of groundwater use. Groundwater-use restrictions would be imposed by deed restrictions or land-use plans and property deeds. A formal request would be made to agencies administering the well installation permit program in Duval County to not issue permits for installation of drinking water wells that would pump water from the shallow aquifer. Contaminant toxicity, mobility, and volume could be reduced only over time, but the processes will not be monitored. The effectiveness and permanence of this alternative, therefore, will be unknown. Because there is no action required, alternative 8SS1 is easily implemented. There are no capital costs associated with 8SS1.

8GW2, Natural Attenuation. Data collected from Site 8 groundwater indicate that natural attenuation is already occurring at the site. The distribution and concentrations of the contaminants of concern and natural attenuation parameters have been monitored in 1995, 1996, and 1997. Data indicate that chlorinated solvent concentrations are declining in the area of highest concentration. Natural attenuation parameters, such as changes in sulfate and sulfide concentrations; the increase of chloride concentrations; the presence of methane, ethane, and carbon dioxide; and the appropriate redox potential values indicate that methaneogenesis (a natural attenuation process) is occurring at the source area and sulfate reduction (another natural attenuation process) is occurring along the fringe of the chlorinated plume. The natural attenuation alternative will monitor contaminant concentrations and degradation processes as well as restrict groundwater use. Highlights of this alternative are listed below.

- Restrict use of the surficial aquifer groundwater at Site 8.
- Monitor groundwater (Figure 2-11) for the presence of VOCs, particularly 1,1-DCE, and SVOCs. Wells to be monitored will be selected during the preparation of the remedial design.
- Monitor groundwater for parameters that indicate the presence of naturally occurring biological, physical, and chemical processes which reduce VOC and SVOC concentrations.
- Monitor the groundwater for a period for 30 years (or less if 1,1-DCE concentrations meet State of Florida drinking water standards).
- Model contaminant plume movement and contaminant degradation rates.
- Review the status of the groundwater quality every 5 years for 30 years (or less if 1,1-DCE concentrations are below State of Florida drinking water standards).

Human health risk will be immediately reduced by groundwater-use restrictions (as described in the No Action alternative 8GW1) and eventually by the degradation processes. Chemical-specific ARARs will not be met in the short term. Over time the toxicity, mobility, and volume of the contaminants could be reduced. Site conditions will be reviewed to assess the progress of this remedial action. This



LEGEND

CF8MW10S	Monitoring well location and designation
S I D	Shallow Intermediate Deep
	Drainage ditch
	Tree line
	Direction of groundwater flow
DCE	1,1- Dichloroethene

0 100 200
SCALE: 1 INCH = 200 FEET

FIGURE 2-11
ALTERNATIVE 8GW2, PROPOSED NATURAL ATTENUATION GROUNDWATER MONITORING LOCATIONS

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alternative is relatively easy to implement, requiring sampling equipment and materials, an analytical laboratory, and containment of purge water and waste materials. Capital costs associated with this alternative are $465,000 over a 30-year period.

2.7.2 **Sediment Alternatives** Two alternatives were developed and analyzed for Site 8 sediment contamination. They include 8SD1, No Action, and 8SD2, Dredging of Sediment and Off-Site Disposal.

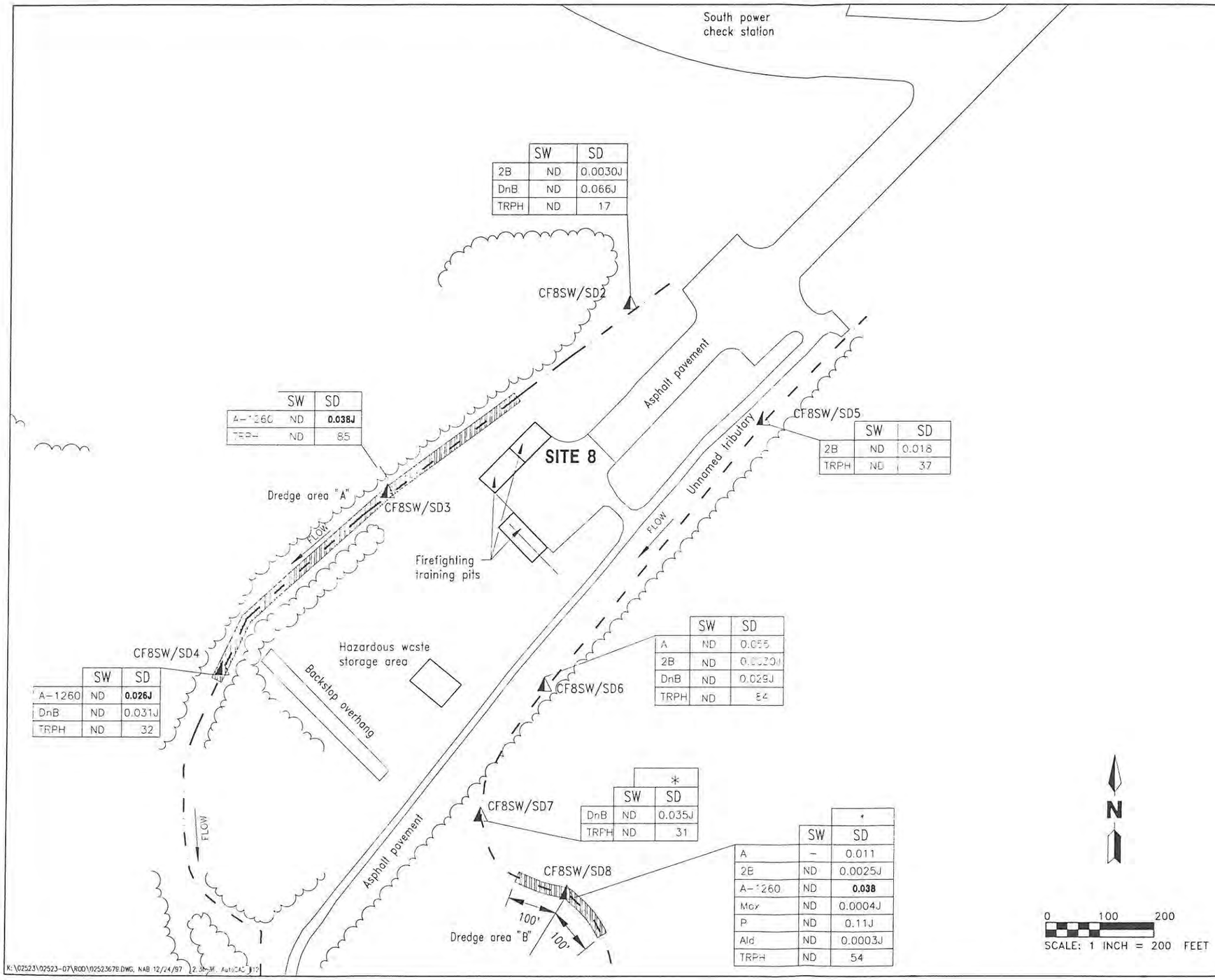
8SD1, No Action. Evaluation of the no action alternative is required by law and provides a baseline against which other alternatives can be compared. This alternative will leave the site the way it exists today, relying on the organic contaminants to degrade over time. Chemical-specific ARARs would not be met in the short term. Ecological and human health risks would not be immediately reduced. Contaminant toxicity, mobility, and volume would be reduced only over time. Because there is no action required, alternative 8SD1 is easily implemented. There are no capital costs associated with 8SD1.

8SD2, Dredging of Sediment and Off-Site Disposal. This alternative will involve dredging approximately 280 to 560 cubic yards of sediment from the ditch and disposing of the dredged sediment in a landfill (Figure 2-12). Highlights of this alternative are listed below.

- Define dredging boundaries based on additional sediment samples collected from the focus areas within the ditch.
- Prepare the site for dredging, including establishing an exclusion zone and decontamination area.
- Dredge the sediment to a depth of approximately 2 feet below the bottom of the ditch.
- Contain dredged sediment in Department of Transportation-approved 55-gallon drums.
- Characterize and dispose of sediment in a proper landfill.
- Place and grade clean soil in the dredged areas.
- Seed, fertilize, and cover with hay or straw in the disturbed areas along the ditches.

Chemical- and action-specific ARARs would be met and ecological risk will be immediately reduced. Dredging and sediment removal will provide long-term effectiveness, as well as reducing the toxicity and volume of contaminants. This alternative is relatively easy to implement, requiring a backhoe and transport equipment. It is estimated that it would take approximately 3 days to carry out this alternative. Capital costs associated with this alternative vary from $100,300 to $473,700, depending upon characterization and disposal of the dredged sediment.

2.8 SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES. This section evaluates and compares each of the alternatives with respect to the nine criteria outlined in



	SW	SD
2B	ND	0.0030J
DnB	ND	0.066J
TRPH	ND	17

	SW	SD
A-1260	ND	**0.038J**
TRPH	ND	85

	SW	SD
2B	ND	0.018
TRPH	ND	37

	SW	SD
A-1260	ND	**0.026J**
DnB	ND	0.031J
TRPH	ND	32

	SW	SD
A	ND	0.055
2B	ND	0.0030J
DnB	ND	0.029J
TRPH	ND	84

	*	
	SW	SD
DnB	ND	0.035J
TRPH	ND	31

	*	
	SW	SD
A	–	0.011
2B	ND	0.0025J
A-1260	ND	**0.038**
Mox	ND	0.0004J
P	ND	0.11J
Ald	ND	0.0003J
TRPH	ND	54

	SW	SD
B	1	ND
BbF	ND	0.022J
bis	ND	0.029J
Fla	ND	0.023J
TRPH	ND	96

LEGEND

CF8SW/SD4	Surface water/sediment sample location with designation
	Drainage ditch
	Tree line
	Area of dredging
TRPH	Total recoverable petroleum hydrocarbons
J	Estimated value
ND	Not detected
SW	Surface water
SD	Sediment
TEL	Threshold effect level
PEL	Probable effect level
NG	No value given
*	Average of sample and duplicate.
0.038	Bold indicates a concentration equal to or greater than FDEP Sediment Cleanup Goals

NOTE:

All sediment values reported in milligrams per kilogram. Surface water samples reported in micrograms per liter.

Florida Department of Environmental Protection (FDEP)

	Sediment Cleanup Goal	TEL	PEL
A	Acetone	NG	NG
A-1260	Aroclor 1260	0.022	0.19
B	Benzene	NG	NG
BbF	Benzo(b)fluoranthene	NG	NG
bis	bis (2Ethylhexyl) phthalate	0.18	2.6
2B	2-butanone	NG	NG
DnB	Di-n-butylphthalate	NG	NG
Fla	Fluoranthene	NG	NG
Mox	Methoxychlor	NG	NG
P	Phenol	NG	NG
*Ald	Aldrin	0.00072	0.0043

*Dieldrin used as a surrogate

FIGURE 2-12

ALTERNATIVE 8SD2, AREAL EXTENT OF SEDIMENT TO BE DREDGED

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Section 300.430(s) of the NCP. These criteria are categorized as threshold, primary balancing, or modifying. Table 2-1 gives an explanation of the evaluation criteria.

A detailed analysis was performed on the alternatives using the nine evaluation criteria in order to select a site remedy. The following is a summary of the comparison of each alternative's strength and weakness with respect to the nine criteria. Table 2-2 presents the evaluation of contaminated groundwater and sediment remedial alternatives.

2.9 SELECTED REMEDIES. Two remedies were selected to address the contaminants in the groundwater and sediment at Site 8. For groundwater, Alternative 8GW2, Natural Attenuation, was selected. For sediment, Alternative 8SD1, No Action, was selected.

2.9.1 Site 8 Groundwater Ninety-seven percent of the risk from groundwater is derived from presence of 1,1-DCE. The remaining 3 percent is derived from the combination of 4,4'-DDD,4,4'-DDT, benzene, and *bis*(2-ethylhexyl)phthalate, all of which had a combined risk of 1×10^{-6}, which was within the USEPA acceptable risk range and equal to the FDEP risk threshold. The chosen alternative, Natural Attenuation, will provide a method of observing the fate and any migration of 1,1-DCE and other contaminants over time. Processes which indicate that natural attenuation is occurring will also be monitored. Contaminant plume movement and behavior will be modeled and monitored. Groundwater use from the surficial aquifer at Site 8 will be restricted thereby, providing immediate protection to human health. This alternative provides monitoring over 30 years, with 5-year reviews. During each review site conditions will be reassessed and monitoring continued or other appropriate actions taken.

2.9.2 Site 8 Sediment The selected alternative, No Action, was selected because contaminant concentrations are below the State of Florida PEL criteria and remedial action is not required.

2.10 STATUTORY DETERMINATIONS. The remedial alternatives selected for Site 8 are consistent with CERCLA and the NCP. The selected remedy provides protection of human health and the environment, attains applicable or relevant and appropriate requirement (ARARs), and is cost-effective. Table 2-3 lists and describe Federal and State ARARs to which the selected remedy must comply. The selected remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable, and satisfies the statutory preference for remedies that reduce toxicity, mobility, or volume as a principal element. The selected remedy also provides flexibility to implement additional remedial measures, if necessary, to address RAOs or unforeseen issues.

2.11 DOCUMENTATION OF SIGNIFICANT CHANGES. The proposed plan for Site 8 was released for public comment in November 1997. The proposed plan identified Alternatives 8GW2, natural attenuation, and 8SD1, no action, as the preferred alternative for groundwater and sediment remediation. Public comments on the proposed plan are presented in Attachment A, Responsiveness Summary. No significant changes to the remedy, as originally identified in the proposed plan, were necessary.

Table 2-1
Explanation of Evaluation Criteria

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Criteria	Description
Threshold	**Overall Protection of Human Health and the Environment.** This criterion evaluates the degree to which each alternative eliminates, reduces, or controls threats to human health and the environment through treatment, engineering methods, or institutional controls (e.g., access restrictions). **Compliance with State and Federal Regulations.** The alternatives are evaluated for compliance with environmental protection regulations determined to be applicable or relevant and appropriate to the site conditions.
Primary Balancing	**Long-Term Effectiveness.** The alternatives are evaluated based on their ability to maintain reliable protection of human health and the environment after implementation. **Reduction of Contaminant Toxicity, Mobility, and Volume.** Each alternative is evaluated based on how it reduces the harmful nature of the contaminants, their ability to move through the environment, and the amount of contamination. **Short-Term Effectiveness.** The risks that implementation of a particular remedy may pose to workers and nearby residents (e.g., whether or not contaminated dust will be produced during excavation), as well as the reduction in risks that results by controlling the contaminants, are assessed. The length of time needed to implement each alternative is also considered. **Implementability.** Both the technical feasibility and administrative ease (e.g., the amount of coordination with other government agencies needed) of a remedy, including availability of necessary goods and services, are assessed. **Cost.** The benefits of implementing a particular alternative are weighed against the cost of implementation.
Modifying	**U.S. Environmental Protection Agency (USEPA) and Florida Department of Environmental Protection (FDEP) Acceptance.** The final Feasibility Study and the Proposed Plan, which are placed in the Information Repository, represent a consensus by the Navy, USEPA, and FDEP. **Community Acceptance.** The Navy assesses community acceptance of the preferred alternative by giving the public an opportunity to comment on the remedy selection process and the preferred alternative and then responds to those comments.

Table 2-2
Comparative Analyses of Remedial Alternatives

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Alternative	Threshold Criteria		Primary Balancing Criteria				
	Overall Protection to Human Health and Environment	Compliance with ARARs	Long-Term Effectiveness and Permanence	Reduction in Toxicity, Mobility, and Volume of Contaminants	Short-Term Effectiveness	Implementability	Cost
Alternative 8GW1 Site 8, Groundwater-No Action	Does not protect human health. No threat for the environment.	Eventually complies with the chemical-specific ARARs. Anticipated to take 20 to 30 years; however, may not be verified.	Anticipated to be effective over the long term; however, may not be verifiable.	Natural transformation processes (physical, chemical, and biological) are anticipated to reduce the toxicity, mobility, and volume of contaminants.	Contaminated groundwater is left on site. Not effective over the short term.	Easy to implement.	$ 0
Alternative 8GW2 Site 8, Groundwater-Natural Attenuation	Use of groundwater models to implement the groundwater-use restrictions and provide protection to human health.	Eventually complies with the chemical specific ARARs. Anticipated to take 20 to 30 years.	Anticipated to be effective over the long term.	Natural transformation processes (physical, chemical, and biological) are anticipated to reduce the toxicity, mobility, and volume of contaminants.	Contaminated groundwater is left on site. Not effective over the short term.	Easy to implement.	$465,000
Alternative 8SD1 Site 8, Sediment No Action	No threat to human health at Site 8 sediments. No protection to ecological receptors is provided.	Will meet chemical-specific ARARs.	Will be effective over the long term.	May reduce the toxicity, mobility, and volume of the contaminants.	Contaminated sediments are left on site. Not effective over the short term.	Does not require any resources to implement "no action."	$ 0
Alternative 8SD2 Site 8, Sediment-Dredging and Off-Site Disposal	Provides overall protection to human health and the environment.	Complies with all ARARs.	Provides long-term effectiveness.	Reduces the toxicity, mobility, and volume of contaminants.	Provides short-term effectiveness.	Dredging and off-site disposal are implementable.	$100,300 to $473,700

Note: ARAR = applicable or relevant and appropriate requirement.

Table 2-3
Synopsis of Federal and State Regulatory Requirements for Site 8

Record of Decision
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Name and Regulatory Citation	Description	Consideration in the Remedial Action Process	Type
Resource Conservation and Recovery Act (RCRA) Regulations, Identification and Listing of Hazardous Wastes (40 Code of Federal Regulations [CFR] Part 261)	Defines the listed and characteristic hazardous wastes subject to RCRA. Appendix II contains the Toxicity Characteristic Leaching Procedure (TCLP) used for testing contaminated sediments.	These regulations would apply when determining whether or not waste onsite is listed as hazardous, as defined in the regulations, or exhibits a hazardous characteristic based on the TCLP. Disposal option would also be determined based on the TCLP.	Chemical-specific Action-specific
RCRA, Regulations for Transporters of Hazardous Waste (40 CFR Part 263)	Establishes the responsibilities of transporters for handling, transporting, and managing hazardous wastes. To avoid duplicative regulation with Department of Transportation (DOT), U.S. Environmental Protection Agency (USEPA) has expressly adopted certain DOT regulations governing the transportation of hazardous materials (see entry directly below).	These regulations would apply if sediments from Site 8 needs to be deposited in an off-site hazardous waste disposal area.	Action-specific
Hazardous Materials Transportation Act Regulations (49 CFR Parts 171-179)	Establishes the procedures for packaging, labeling, and transporting of hazardous materials.	Same as above.	Action-specific
RCRA Regulations, Land Disposal Restrictions (40 CFR Part 268)	Identifies those wastes that are restricted from land disposal and defines those limited circumstances in which a prohibited waste may continue to be disposed of on land.	If a remedial action involves the thermal treatment of sediments, the treated sediments would have to meet the land disposal restriction for metals before being redeposited on the ground.	Action-specific
Florida Hazardous Waste Rules (Florida Administrative Code [FAC], 62-730)	Adopts by reference sections of the Federal hazardous waste regulations and establishes minor additions to these regulations concerning the generation, storage, treatment, transportation, and disposal of hazardous wastes.	These regulations would apply if sediments at Site 8 must be disposed of in a hazardous waste disposal area.	Action-specific Chemical-specific
Florida Petroleum Contaminated Site Cleanup Criteria (FAC, 62-770)	Establishes a cleanup process to be followed at all petroleum-contaminated sites.	Because this is a petroleum-contaminated site, the procedures for cleanup in this rule would apply.	Chemical-specific Action-specific
Florida Soil Thermal Treatment Facilities Regulations (FAC, 62-775)	Establishes criteria for the thermal treatment of petroleum or petroleum product-contaminated sediments. The rule outlines procedures for excavating, receiving, handling, and stockpiling contaminated sediments prior to thermal treatment in both stationary and mobile facilities.	If the contaminated sediment is sent to a thermal treatment facility, these regulations would apply.	Chemical-specific Action-specific

See notes at end of table.

Table 2-3 (Continued)
Synopsis of Federal and State Regulatory Requirements for Site 8

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Name and Regulatory Citation	Description	Consideration in the Remedial Action Process	Type
Soil Cleanup Standards for Florida, September 1995	The document provides guidance for determining sediment cleanup levels that can be developed on a site-by-site basis, using the calculations found in Table 1 of the document.	After thermal treatment is performed, the sediment would have to meet the goals in this guidance before it could be redeposited.	Chemical-specific Action-specific
Safe Drinking Water Act Regulations, Maximum Contaminant Levels (MCLs) (40 CFR Part 141)	Establishes enforceable standards for potable water for specific contaminants that have been determined to adversely affect human health.	MCLs can be used as protective levels for groundwaters or surface waters that are current or potential drinking water sources.	Chemical-specific
Florida Groundwater Classes, Standards and Exemptions (FAC, 62-520)	Rule designates the groundwaters of the State into five classes and establishes minimum "free from" criteria. Rule also specifies that Classes I & II must meet the primary and secondary drinking water standards listed in Chapter 62-550.	These regulations may be used to determine cleanup levels for groundwater that is a potential source of drinking water.	Chemical-specific
Florida Drinking Water Standards (FAC, 62-550)	Rule adopts Federal primary and secondary drinking water standards.	These regulations apply to remedial activities that involve discharges to potential sources of drinking water.	Chemical-specific
Petroleum-Contaminated Site Cleanup Criteria (FAC, 62-770)	Establishes a cleanup process to be followed at all petroleum-contaminated sites. Cleanup levels for the G-I and G-II groundwater are provided in the gasoline and kerosene/mixed product analytical groups.	Because groundwater at the site is Class II, these regulations would apply.	Chemical-specific Action-specific
Florida Groundwater Guidance, Bureau of Groundwater Protection, June 1994	The document provides maximum concentration levels of contaminants for groundwater in the State of Florida. Groundwater with concentrations less than the listed values are considered "free from" contamination.	The values in this guidance should be considered when determining cleanup levels for groundwater. Although some values are not promulgated, Florida Department of Environmental Protection considers them applicable or relevant and appropriate requirements for setting cleanup criteria.	To be considered

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