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NAS CECIL FIELD
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PROPOSED PLAN FOR REMEDIAL ACTION SITE 5 OPERABLE UNIT 2 (OU2) OIL DISPOSAL AREA NORTHWEST AND SLUDGE DISPOSAL PIT SOUTHWEST SITE 17 NAS CECIL FIELD FL

7/18/1995

ABB ENVIRONMENTAL

ABB

July 19
June 18, 1995

Mr. Bart Reedy
Remedial Project Manager
Federal Facilities Section
Waste Management Division
USEPA Region IV
245 Courtland Street, N.E.
Atlanta, Georgia 30365

Subject: Final Proposed Plan for Operable Unit (OU) 2, Sites 5 and 17, Naval Air Station Cecil Field, Florida

Dear Mr. Reedy,

To expedite distribution of this document, ABB Environmental Services, Inc., on behalf of Southern Division, Naval Facilities Engineering Command (SOUTHNAVFACENGCOM), is pleased to forward five copies of the Final Proposed Plan for OU 2, Sites 5 and 17 at NAS Cecil Field, Florida.

A SOUTHNAVFACENGCOM transmittal letter for this document will be forwarded to you separately.

Sincerely,

ABB ENVIRONMENTAL SERVICES, INC.

Rac Angard
NAS Cecil Field
Installation Manager

cf: Mr. Eric Nuzie, Florida Department of Environmental Protection (4 copies)
Mr. Dave Kruzicki, NAS Cecil Field (2 copies)
Mr. Alan Shoultz, SOUTHNAVFACENGCOM (2 copies)
File

ABB Environmental Services Inc.

Berkeley Building
2590 Executive Center Circle East
Tallahassee, Florida 32301

Telephone (904) 656-1293
Fax (904) 877-0742

Proposed Plan for Remedial Action
Naval Air Station Cecil Field
Operable Unit 2, Oil Disposal Area Northwest (Site 5) and Oil and Sludge Disposal Pit Southwest (Site 17)

Jacksonville, Florida

July 1995

Contents

Terms that appear in *italics* within the text are defined in the glossary.

1.0 INTRODUCTION

This document is the *Proposed Plan* for an environmental cleanup action at NAS Cecil Field. This Proposed Plan provides:

- background information on *Operable Unit* (OU) 2 at Naval Air Station (NAS) Cecil Field as developed through records and *field investigations* (Section 2);
- a discussion of feasible cleanup methods, or *alternatives*, as developed in the *Feasibility Study* (FS) (Sections 3 and 4); and
- rationale for recommending the proposed alternatives (Section 5).

Operable Unit 2

OU 2 is composed of Site 5, the Oil Disposal Area Northwest, and Site 17, the Oil and Sludge Disposal Area Southwest. The location of OU 2 is shown in Figure 1. OU 2 is further described in Section 2.

Interim Remedial Action

Soil contamination at both sites is currently being addressed by ongoing interim remedial actions. At each site soil is being removed from the former disposal area and treated in order to reduce or eliminate sources of contamination leaching to the groundwater. Site 5 soil is being bioremediated (*biological treatment*) onsite and Site 17 soil is being thermally treated onsite. Interim records of decision were approved in September 1994.

Proposed Sediment and Groundwater Alternatives

The Navy completed field investigations and the FS to develop the best cleanup alternatives for OU 2. Alternatives were developed for managing sediment at Site 5 and groundwater contamination at both sites.

Alternatives will be selected at OU 2 for contaminants in *sediment* at Site 5 and *groundwater* at both sites. This Proposed Plan evaluates the alternatives and then makes a recommendation for each.

Public Availability Session

Date:	July 25, 1995
Time:	7:00 to 9:00 p.m.
Place:	Chimney Lakes Elementary School

The sediment and groundwater alternatives discussed in this plan were developed by the Navy, the *U.S. Environmental Protection Agency* (USEPA), and the *Florida Department of Environmental Protection* (FDEP), in consultation with the NAS Cecil Field *Restoration Advisory Board*, or RAB. The Navy, USEPA, and FDEP will finalize the recommended alternatives after evaluating comments received from the community.

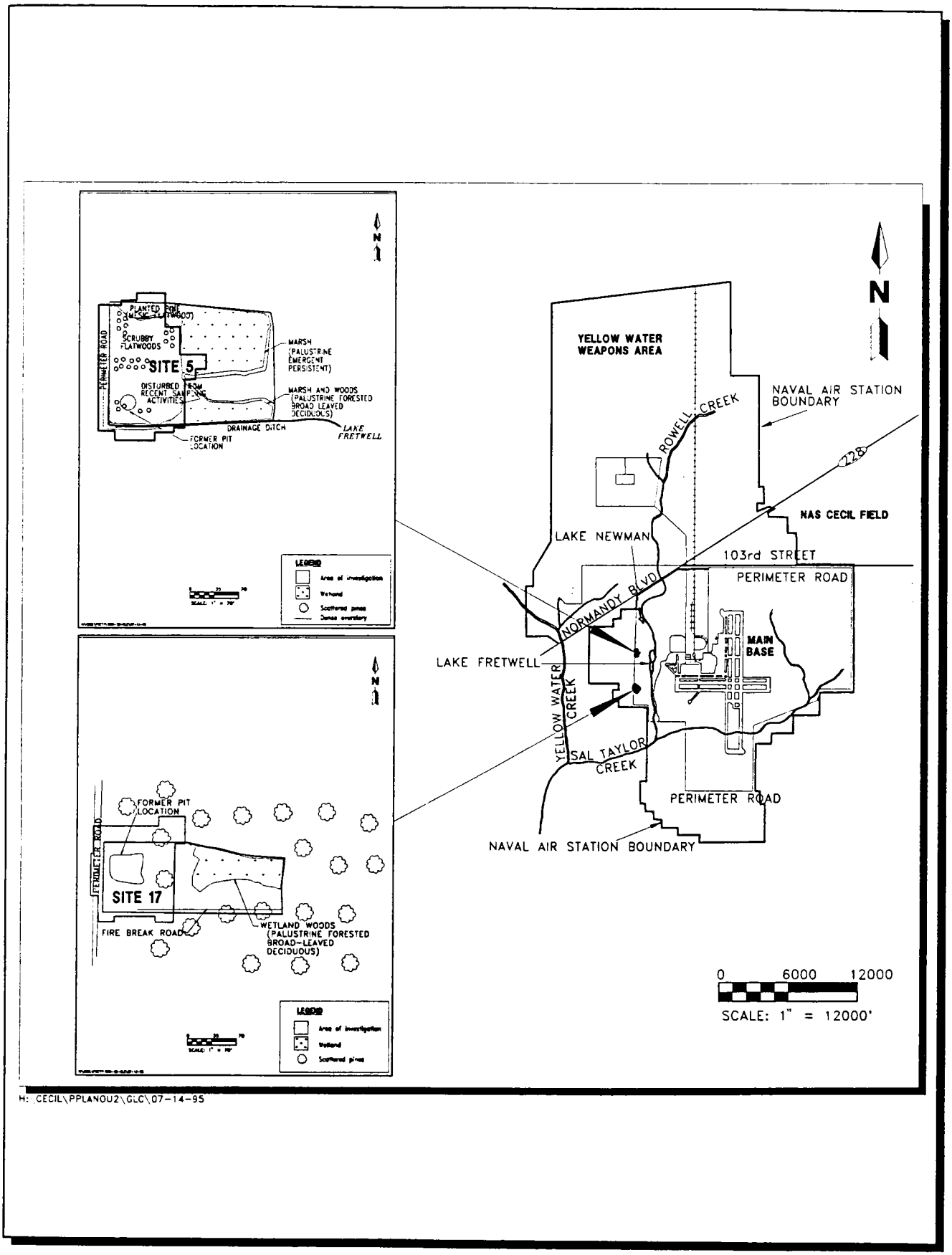


Figure 1. Location of Operable Unit 2.

Public Participation

Public input is a key element in the decision-making process. Community members are encouraged to submit their comments on all of the alternatives developed in the FS and the preferred alternative presented in the Proposed Plan during a *public comment period* from July 17 through August 17, 1995. In addition, a public meeting will be held on July 25, 1995 at 7:00 p.m. at Chimney Lakes Elementary School to further explain the Proposed Plan and to accept public comments. (See Upcoming Site-Related Community Participation Activities [Section 6].)

Nearby residents and other interested parties are strongly encouraged to use the comment period to raise questions and concerns they may have on the Proposed Plan. When this period ends, the Navy will summarize and respond to comments in a *Responsiveness Summary*, which will become a part of the *Record of Decision (ROD)*.

This document fulfills the public participation requirements of the *Comprehensive Environmental Response, Compensation, and Liability Act* section 117(a), which specifies that the lead agency (the Navy) must publish a Proposed Plan outlining remedial alternatives evaluated for the site and identifying the preferred alternative. The remedial alternatives are detailed in the FS report.

These documents, including the currently available FS, this Proposed Plan, and the forthcoming Responsiveness Summary and ROD, will become a part of the public record and will be placed in the *Information Repository* located at the Charles D. Webb Wesconnett Public Library.

2.0 SITE BACKGROUND

OU 2 consists of Site 5, the Oil Disposal Area Northwest (Figure 2), and Site 17, the Oil and Sludge Disposal Area Southwest (Figure 3). During operation, both sites were open, unlined pits, approximately 0.5 acre or less in size and 4 to 5 feet deep. Although not clearly documented, waste liquids consisting of waste fuel mixed with solvents, and probably paint and paint thinners, were dumped into the open pits and allowed to evaporate or drain into the ground. The exact volume of waste materials disposed at either site is unknown. Probable sources of the waste are the facility's fuel farm, the Aircraft Intermediate Maintenance Department, air squadron operation, and Public Works Department.

NAS Cecil Field is scheduled to cease operations in 1998 when the entire facility will be transferred in separate parcels to other Federal, State, or local agencies, nonprofit organizations, or to the public. Current plans are to maintain the industrial complex and airfields. Depending on the success of these plans, future use of OU 2 would remain undeveloped for recreation.

Summary of Previous Investigations

Five investigations were conducted for Sites 5 and 17 between 1983 and 1994. Each of these investigations is summarized in the following paragraphs.

1. ***Hydrogeologic Assessment and Groundwater Monitoring Plan***. During this 1983 study, Geraghty & Miller, Inc., summarized the *hydrology* and *hydrogeologic* conditions, determined locations and construction details for proposed groundwater *monitoring wells*, and proposed a water quality sampling and analysis plan. Sites 5 and 17 were not identified at this time, but the vicinity of the current Site 17 was proposed as the location for an upgradient monitoring well.

2a. ***As-Built Groundwater Monitoring Plan***. In 1984, Geraghty & Miller, Inc., installed one groundwater monitoring well at what would later become Site 17. The well was sampled and a quarterly well sampling plan was implemented for 1 year.

2b. ***Year-end Report of Groundwater Monitoring***. In 1985, Geraghty & Miller, Inc., presented the results of the 1-year sampling plan. The sampling program found metal concentrations in groundwater samples at levels below *primary and secondary drinking water standards*.

3. ***Initial Assessment Study (IAS)***. The IAS was completed in 1985 by Envirodyne Engineers to identify waste sites at NAS Cecil Field warranting further investigation. The study included a review of historical data, as well as site visits and personnel

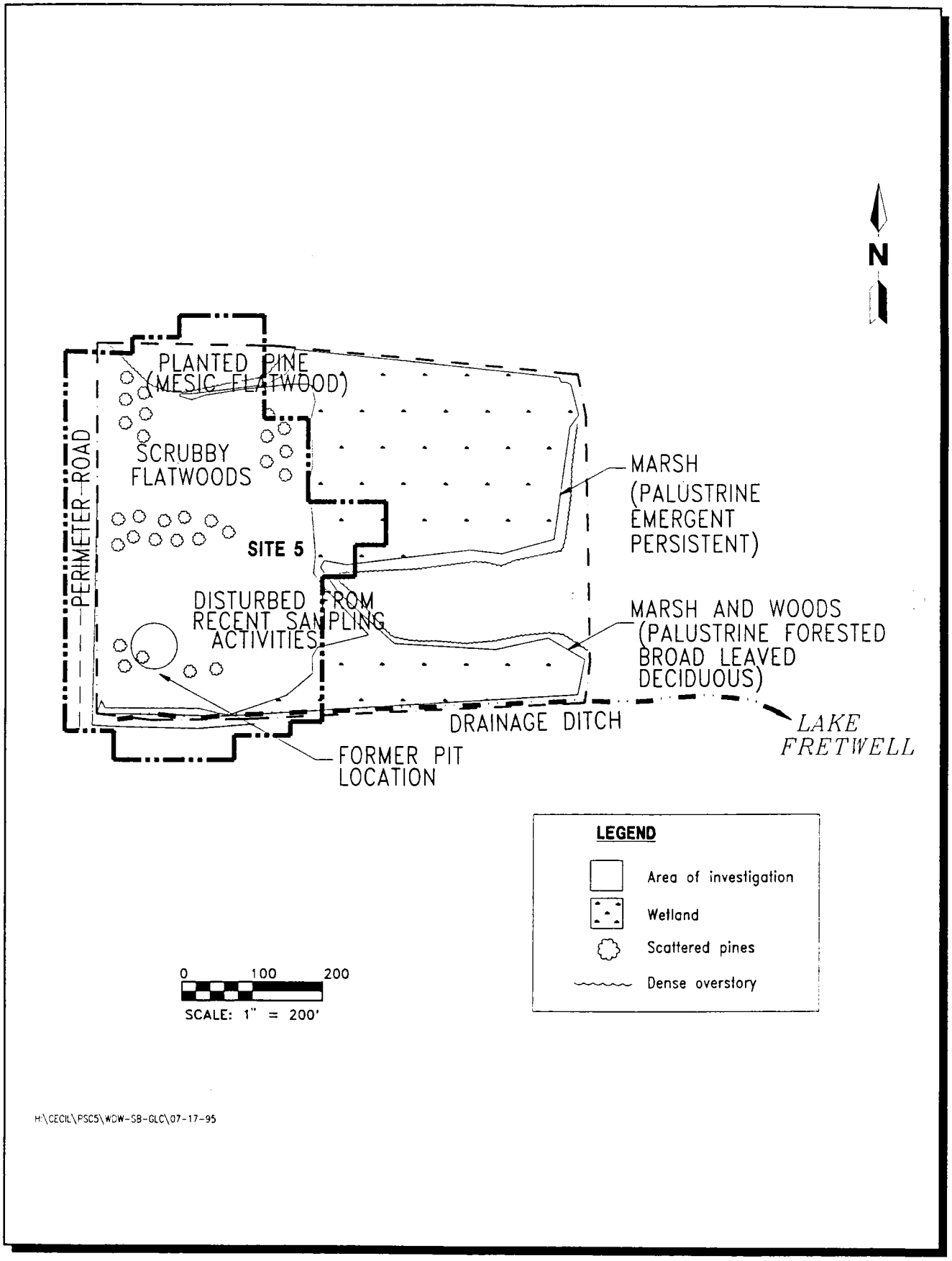


Figure 2. Site 5 Study Area.

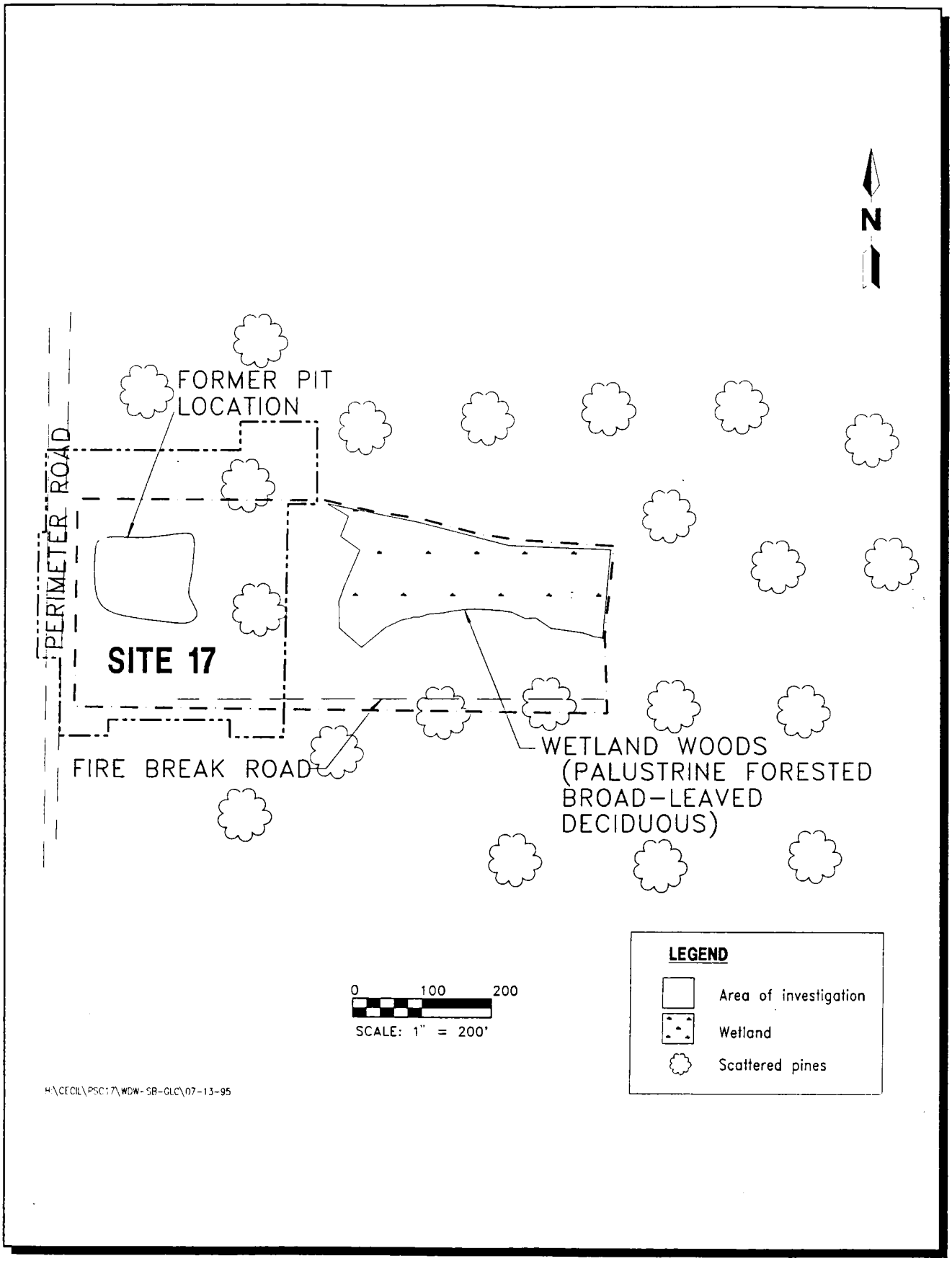


Figure 3. Site 17 Study Area.

interviews. Eighteen sites, including Sites 5 and 17, were identified in the IAS as requiring further study.

4. ***Resource Conservation and Recovery Act Facility Investigation (RFI)***. The RFI was completed in 1988 by Harding Lawson Associates. Field investigations completed for Sites 5 and 17 included a *geophysical survey*, the installation of four new groundwater monitoring wells (two wells for each site), collection and analysis of groundwater samples, and collection and analysis of a *surface water*, sediment and two composite soil samples at Site 5.

Site 5 findings included *volatile organic compounds* and *polychlorinated biphenyls (PCBs)* in the soil. The sediment samples contained volatile organic compounds. Groundwater samples contained *semivolatile organic compounds*. No harmful constituents were found at Site 17. The RFI report recommended further investigations at Site 5 and no further action at Site 17. To complete investigation of Site 5 and to collect the quality of data required for USEPA and FDEP decision making at Site 17, the Navy undertook a remedial investigation of OU 2.

5a. ***Remedial Investigation (RI)*** The RI was completed in December 1994 by ABB Environmental Services, Inc., to characterize the nature and extent of contamination at OU 2. The remedial investigation included:

- investigating surface features such as topography and plant and animal habitats;
- investigating biological populations to support the *ecological risk assessment*;
- sampling and analyzing *surface soil*, *subsurface soil*, Surface water, and sediment;
- installing monitoring wells and subsequently sampling and analyzing groundwater;
- testing the *aquifer* to determine depth, flow direction, and flow rate of groundwater; and
- *free product* investigation at Site 5.

Approximately 300 gallons of free product, consisting of either weathered jet fuel or kerosene that contains PCBs, were found in the northeastern part of the Site 5 pit.

Laboratory analysis of Site 5 samples showed volatile and semivolatile organic compounds, *total recoverable petroleum hydrocarbons (TRPH)* (a measure of petroleum products), pesticides, PCBs, and metals.

Laboratory analysis of Site 17 samples showed volatile and semivolatile organic compounds, TRPH, pesticides, and metals. PCBs were not detected at Site 17.

The objectives of the RI were met and sufficient data were gathered to complete the *Baseline Risk Assessment* (BRA) and the FS.

5b. ***Baseline Risk Assessment*** The BRA for OU 2 was completed by ABB Environmental Services, Inc., in December 1994. The BRA evaluated risks to human health and the environment based on information gained through the RI. The results of the risk assessment are summarized in Table 1.

Table 1
Risk Assessment Results

Media	Human Health Risks	Ecological Risks
Surface Soil†	None	Yes, at Site 5
Soil	None	None
Groundwater	Possible risks if used for drinking water.	None
Surface Water	None	None
Sediment	None	Possible risks for Site 5. None for Site 17.

† One surface soil location adjacent to the ditch at Site 5 poses an ecological risk. Surface soil at that location should pose no risk after soil remedial action.

The BRA conducted for OU 2 identified potential human health risks (carcinogenic risks greater than 1 in 1,000,000 or a systemic toxicant index greater than 1) if groundwater is used as a potable (e.g., drinking water) source. This conclusion is based on the presence of acetone, benzene, trichloroethene, bis(2-ethylhexyl)phthalate, 4-methylphenol, naphthalene, α-chlordane, beta-hexachlorocyclohexane (β-

HCH), antimony, beryllium, cadmium, chromium, manganese, and vanadium at Site 5. The conclusion that human health risks exist if the groundwater at Site 17 is used as a potable source is based on the presence of benzene, methylene chloride, trichloroethene, bis(2-ethylhexyl)phthalate, phenol, 2-methylphenol, 4-methylphenol, naphthalene, β-HCH, arsenic, chromium, manganese, and vanadium. Potential ecological risks at Site 5 are believed to be the result of elevated concentrations of *p,p'*-dichlorodiphenyltrichloroethane (DDT), petroleum products, and PCBs in the sediments.

While several inorganics were identified at Sites 5 and 17 as possibly posing a risk, it is expected that these naturally occurring soil components are not related to releases of wastes at these sites, but instead are the result of silt and clay particles that were inadvertently suspended in samples of groundwater collected from monitoring wells. Therefore, remedial action alternatives developed in the FS focused on controlling the organic contaminants. New samples of groundwater will be collected using specialized procedures, then analyzed and evaluated prior to preparing the ROD to confirm that these inorganics are not present in groundwater.

5c. **Feasibility Study** The FS for OU 2 was completed by ABB Environmental Services, Inc., in June 1995. During the FS, *remedial action objectives* are set and alternatives are developed to meet those objectives.

Remedial Action Objectives

Based on evaluation of site conditions, risks, and legal requirements that may be either *applicable or relevant and appropriate requirements* (ARARs), two remedial action objectives were identified to address potential human health and ecological risks at Sites 5 and 17:

- protect human health from potable water use of groundwater at Site 5 and Site 17 that contains concentrations of volatile organic compounds, semivolatile organic compounds, pesticides, and metals above drinking water-based ARARs or risk assessment remedial goal objectives; and
- protect ecological receptors from exposure to sediments at Site 5 that contain concentrations of PCBs above guidance concentrations and TRPH that has been demonstrated to pose a toxic effect at the site.

In summary, the purpose of the proposed *Remedial Action* is to reduce the potential for human health risks associated with chemicals in groundwater and to reduce the risk to the environment posed by chemicals in the sediment. To meet these remedial action objectives, three remedial alternatives were evaluated for sediment and six alternatives were evaluated for groundwater.

3.0 SEDIMENT AND GROUNDWATER ALTERNATIVES

This section presents a summary of the alternatives developed to meet the remedial action objectives discussed above. Section 4 presents an evaluation of those alternatives and Section 5 recommends the preferred sediment and groundwater alternatives.

Sediment Alternatives

Three sediment (SD) alternatives were developed as described below and summarized in Table 2:

SD-1 No Action. Evaluation of a No Action alternative is required by law. "No Action" means leaving the site the way it exists today. A 5-year monitoring plan would be established as part of this alternative. Figure 4 presents SD-1.

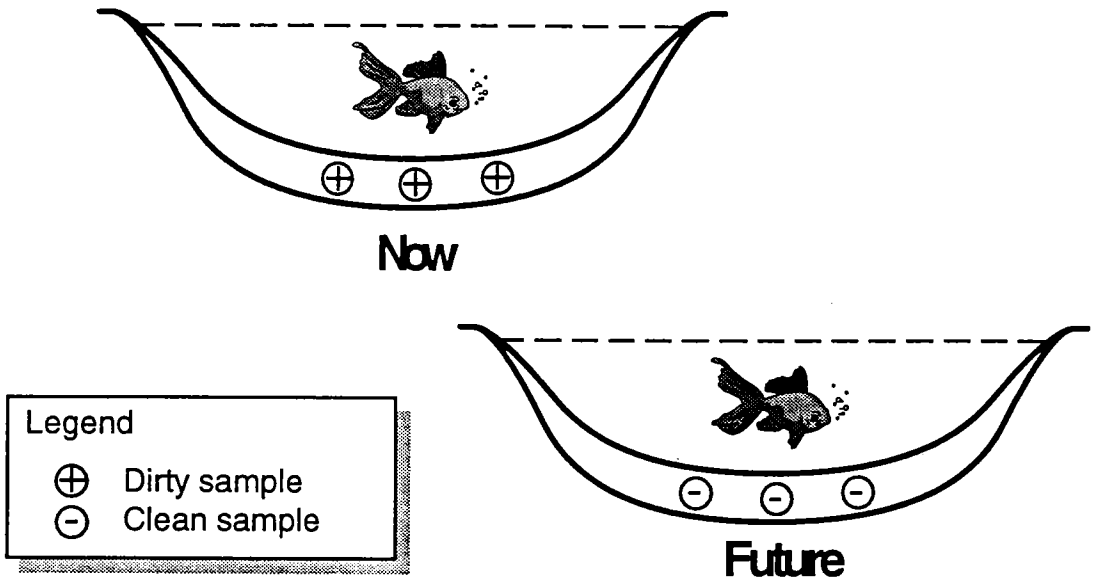
SD-2 Excavation and Biological Treatment. This alternative includes digging up approximately 300 cubic yards of sediment and treating it in the biological treatment facility constructed for the interim remedial action at Site 5. Figure 5 presents SD-2.

SD-3 Excavation and Off-Site Disposal of Sediment. This alternative includes digging up approximately 300 cubic yards of sediment and disposing of it in a *hazardous waste* landfill licensed to accept PCBs. Figure 6 presents SD-3.

Table 2
Remedial Alternatives for OU 2 Sediment

Alternative	SD-1 No Action	SD-2 Excavation and Biological Treatment	SD-3 Excavation and Offsite Disposal
Activities	· 5-year review	· Excavate sediment · Treat sediment in existing biological treatment cell · Sample to determine extent of excavation · Backfill with clean soil	· Excavate sediment · Dispose in Subtitle C (hazardous waste) landfill · Sample to determine extent of excavation · Backfill with clean soil
Cost	$154,000	$236,000	$327,000
Time	several decades	4 months (field)	1 month (field)

Notes: OU = operable unit.
SD = sediment alternative.



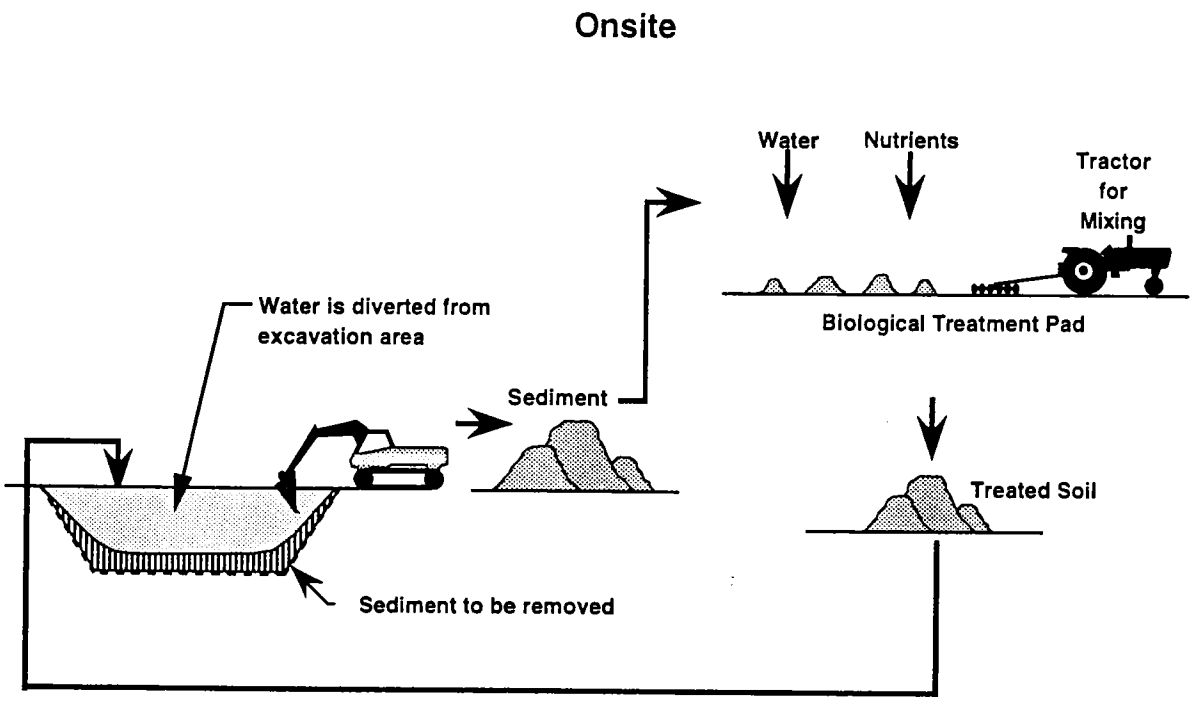
Description of SD-1

- Evaluation of no action required by regulation.
- Leaves site the way it exists today; relies on natural contaminant breakdown and dispersion processes.
- Site conditions reviewed once every 5 years.

Factors to consider:

- Cost would be $154,000.
- Ecological conditions of the sediment would not be improved in the short-term.
- Future remedial actions would not be prevented.
- Contamination would be left in place with potential for movement to other surface water bodies such as Lake Fretwell.

Figure 4. Alternative SD-1: No Action.



Description of SD-2

- Sediment would be treated at existing Site 5 biological treatment facility.
- Approximately 300 cubic yards of sediment to be excavated for treatment.
- Sediment would be removed to a depth of approximately 2 feet.
- Sampling and analyses would be used to identify the extent of excavation needed.

Factors to consider:

- Cost of $236,000 over an estimated 4-month field implementation period.
- Meets all regulatory requirements, however, biological treatment may not meet cleanup criteria.
- Avoids offsite transportation, liability, and disposal of contaminated sediment.
- Provides improved environmental conditions.
- If biological treatment effectiveness is significantly less than anticipated, Florida standards for treatment of soil may not be met.
- Excavation of sediment would destroy some wetland habitat but cleanup would improve wetlands over the longterm.

Figure 5. Alternative SD-2: Excavation and Biological Treatment of Sediment.

ABB

July 17.
~~June~~ 18, 1995

Mr. Bart Reedy
Remedial Project Manager
Federal Facilities Section
Waste Management Division
USEPA Region IV
245 Courtland Street, N.E.
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Subject: Final Proposed Plan for Operable Unit (OU) 2, Sites 5 and 17, Naval Air Station Cecil Field, Florida

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Tallahassee, Florida 32301

Telephone (904) 656-1293
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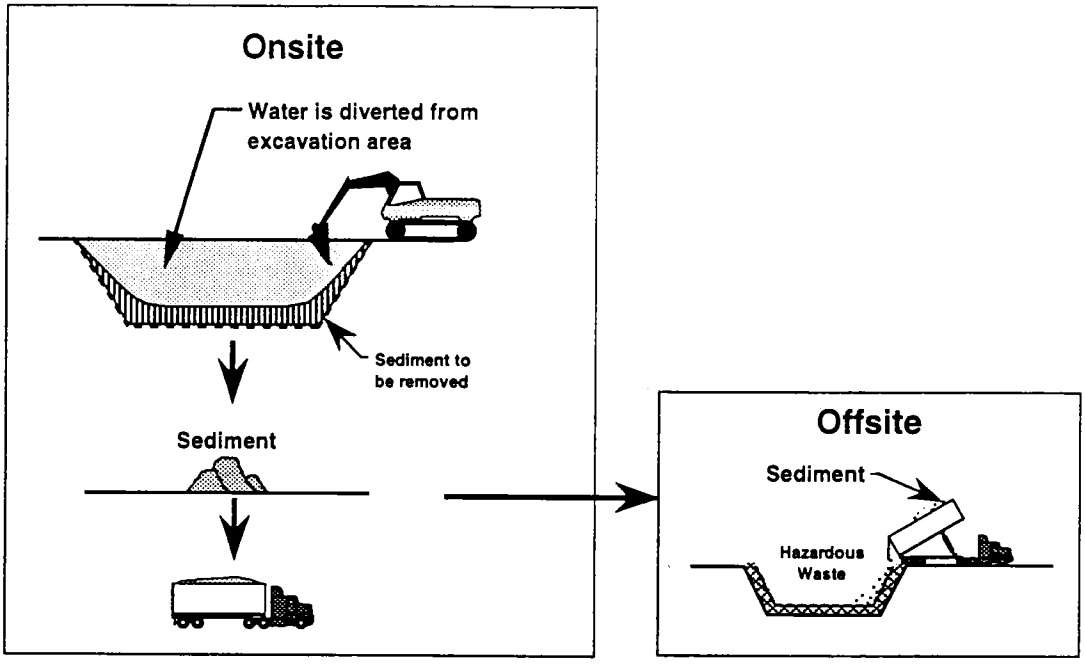


Description of SD-3

- Sediment would be disposed in a hazardous waste landfill licensed to receive polychlorinated biphenyl (PCB) contaminated soil.
- Approximately 300 cubic yards of sediment to be removed.
- Sampling and analyses would be used to identify the amount of excavation needed.

Factors to consider:

- Cost of $327,000 over a 1-month field implementation period.
- Provides improved environmental conditions.
- Meets all regulatory requirements.
- Excavation of sediment would destroy some wetland habitat, but cleanup would improve wetlands over time.
- Requires offsite transport and disposal of sediment, resulting in long-term liability.

Figure 6. Alternative SD-3: Excavation and Offsite Disposal of Sediment.

Groundwater Alternatives

Six groundwater (GW) alternatives have been developed to meet the remedial action objectives discussed in Section 3.0. The six alternatives are discussed below and summarized in Table 3.

GW-1 No Action. Evaluation of a No Action alternative is required by law. "No Action" means leaving the site the way it exists today. A 5-year monitoring plan would be established as part of this alternative. Figure 7 presents GW-1.

GW-2 Natural Attenuation This alternative consists of a monitoring and modeling program to determine the effectiveness of naturally occurring biodegradation. GW-2 would also include implementation of land use restrictions or other *institutional controls* to prevent exposure to and use of groundwater as a potable water supply. Figure 8 presents GW-2.

GW-3 Air Sparging This alternative would reduce risks by treating groundwater in place. Air sparging involves forcing air through wells into the groundwater. Organic compounds are removed by changing them into a gas (*volatilization*). The gas (or vapor) is then removed by pulling it through the drier soil above the water table. Contamination would also be reduced by the increased biological activity, as a result of introducing oxygen to the subsurface soils and groundwater. Figure 9 presents GW-3.

GW-4 Groundwater Extraction and Treatment by Air Stripping and Carbon Groundwater would be pumped from the shallow aquifer using three to five extraction wells. Extracted groundwater would be treated with an air stripper to remove volatile organic compounds. Semivolatile organic compounds and pesticides would be removed using a carbon adsorber. Treated groundwater would be discharged into a specially designed infiltration basin, which would allow the clean groundwater to eventually filter back into the aquifer. Figure 10 presents GW-4.

GW-5 Groundwater Extraction and Treatment by UV/OX Groundwater would be pumped from the shallow aquifer using three to five extraction wells. Extracted groundwater would be treated with ultraviolet light (UV) and an oxidant (OX) (e.g., hydrogen peroxide) to destroy contaminants. Treated groundwater would be discharged into a specially designed infiltration basin, which would allow the clean groundwater to filter back into the aquifer. Figure 11 presents GW-5.

GW-6 *In situ* Stripping/Biological Treatment Vertical wells would be installed that circulate groundwater through the well, and air would be introduced to strip volatile organic compounds and promote biological breakdown of other contaminants. Stripped volatile organics are collected from the upper portion of the well and treated as necessary prior to release to the atmosphere. Figure 12 presents GW-6.

4.0 ALTERNATIVES EVALUATION

The *National Oil and Hazardous Substances Contingency Plan* outlines the approach for performing the comparative analysis of remedial alternatives. Nine criteria are used to identify the preferred alternative. All alternatives are evaluated against the first seven criteria, which are technical criteria based on environmental protection, cost, and engineering feasibility. The preferred alternative is further evaluated against the last two criteria: acceptance by the USEPA and FDEP and acceptance by the community. Table 4 contains an explanation of the nine evaluation criteria.

This section is divided into two subsections. Evaluation of remedial alternatives for sediment are presented in Section 4.1 and for groundwater in Section 4.2. Section 5.0 presents the preferred sediment and groundwater alternatives which form the Proposed Plan.

4.1 Evaluation of Sediment Alternatives

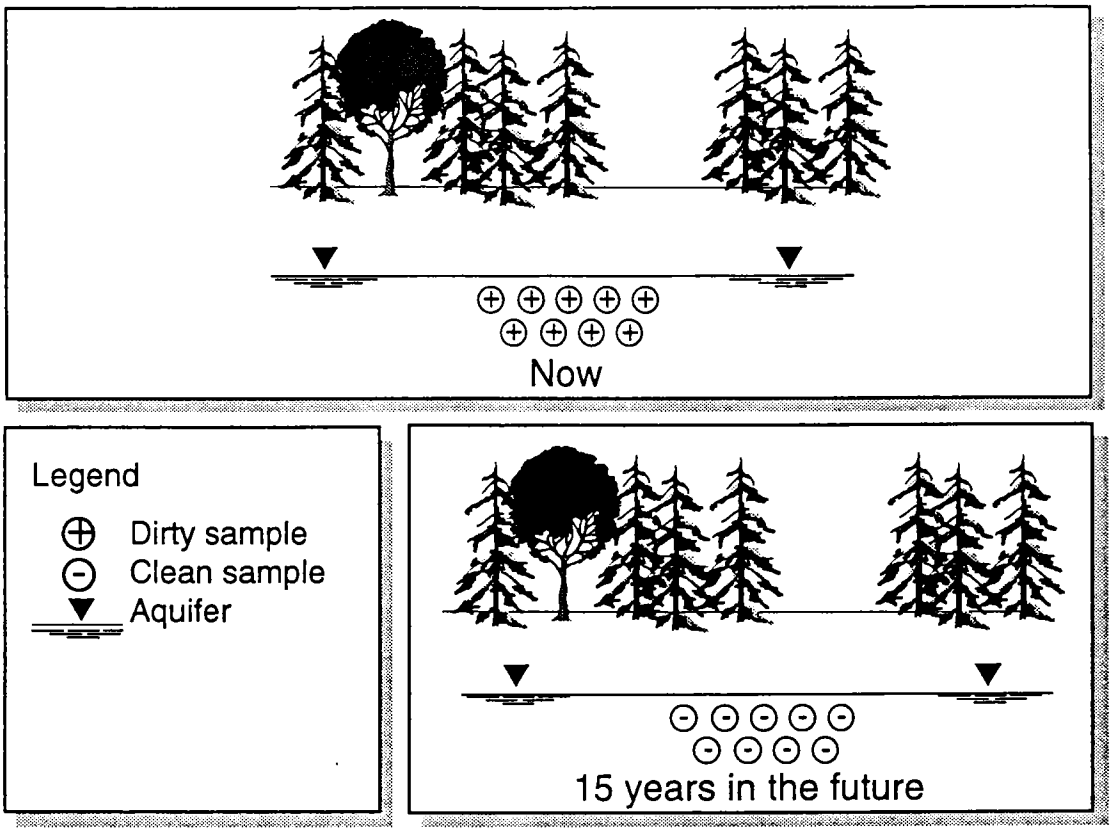
The nine criteria may be separated into three groups: threshold criteria, primary balancing criteria, and modifying criteria. The preferred alternative must satisfy the threshold criteria. Primary balancing criteria weigh the major tradeoffs among alternatives. Modifying criteria are considered after review of public comments on this Proposed Plan.

Comparative analyses of the sediment alternatives with respect to the nine criteria are provided in the following paragraphs.

Table 3
Remedial Alternatives for OU 2 Groundwater

Alternatives	GW-1 No Action	GW-2 Natural Attenuation	GW-3 Air Sparging	GW-4 Groundwater Extraction and Treatment by Air Stripping and Carbon	GW-5 Groundwater Extraction and Treatment by UV/OX	GW-6 *In Situ* Air Stripping and Biological Treatment
Activities	· 5-year review.	· 5-year review. · Deed restrictions or other institutional control to prevent use of groundwater as a potable water supply. · Monitor to measure effectiveness of ongoing biodegradation. · Modeling.	· Install air injection wells. · Blow air into groundwater through well to vaporize *organics*. · Extract vaporized organics using a *vapor extraction trench*. · Treat extracted gases before release. · Monitor to measure effectiveness of treatment.	· Install groundwater extraction wells. · Extract groundwater. · Remove organics using air stripper. · Remove remaining organics using carbon adsorber. · Discharge clean water into infiltration basin.	· Install groundwater extraction wells. · Extract groundwater. · Oxidize contaminants using ultraviolet light and oxide. · Discharge clean water into infiltration basin.	· Install air stripping wells. · Blow air through wells and circulate groundwater. · Extract stripped gases from well head. · Treat extracted gases before release. · Monitor to measure effectiveness of treatment.
Cost	$104,000	$232,000	$1,633,000	$3,015,000	$2,879,000	$1,632,000
Time	15 Years	15 Years	4 Years	6 Years	6 Years	4 Years

Notes: OU = operable unit.
GW = groundwater alternative.
UV/OX = ultraviolet/oxidation.



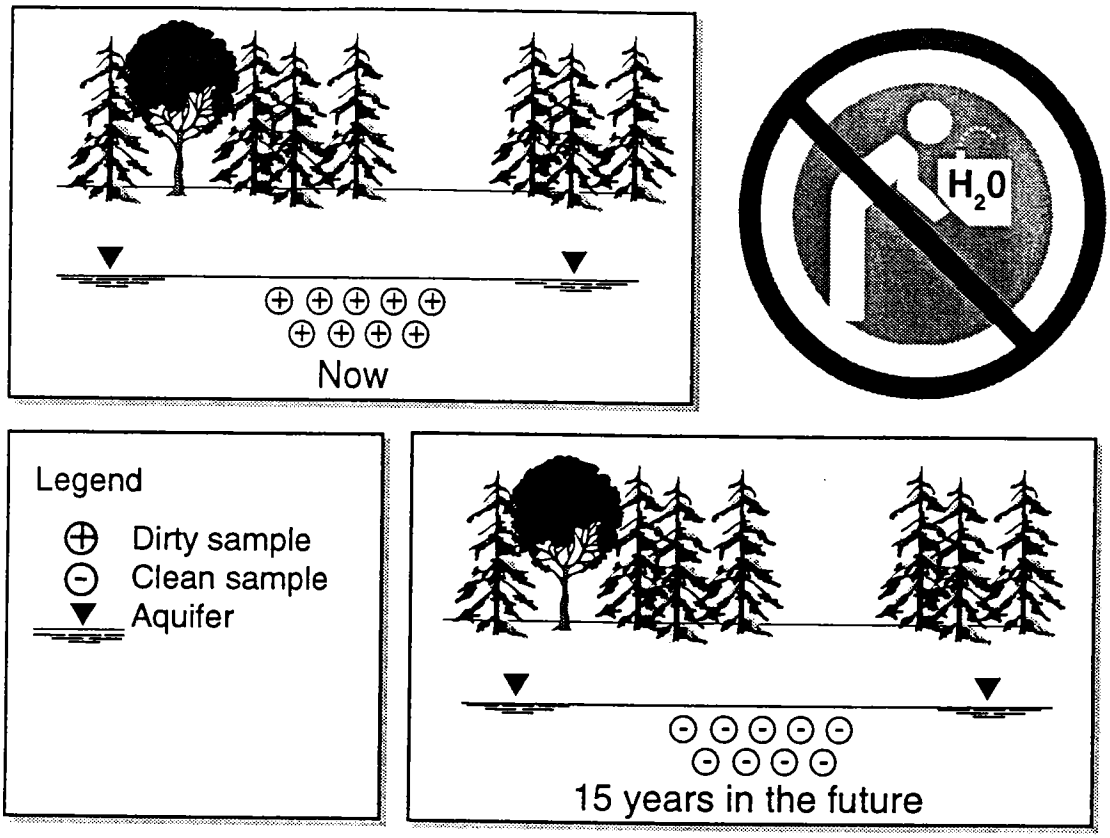
Description of GW-1

- Leaves contaminants in groundwater; relies on natural contaminant breakdown and dispersion processes.
- Includes no measures to prevent exposure to contaminants.
- Site conditions reviewed once every 5 years.

Factors to consider:

- Cost would be $104,000 over an estimated 15 years.
- Federal and State requirements which limit concentrations of chemicals in groundwater would be met only after the estimated 15 years.
- Would not be protective of human health because contaminated water would be left untreated and no controls would be established to prevent the use of the groundwater.

Figure 7. Alternative GW-1: No Action.



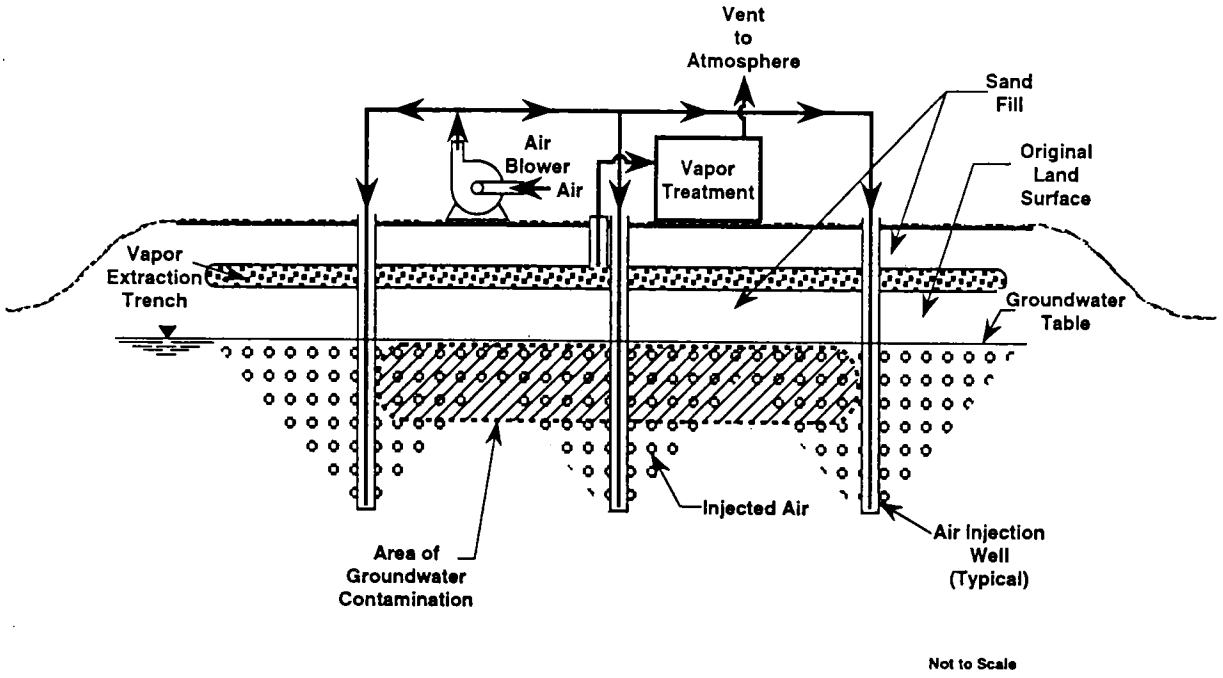
Description of GW-2

- Leaves contamination in groundwater; relies on natural contaminant breakdown and dispersion processes.
- Includes groundwater use restrictions and/or other institutional controls.
- Includes monitoring and modeling program.
- Site conditions reviewed once per year.

Factors to consider:

- Cost would be $232,000 over an estimated 15 years.
- Federal and State chemical concentrations limits currently exceeded in groundwater would be met only after the estimated 15 years.
- Preventing groundwater use would protect human health.
- Requires enforcement and maintenance of institutional controls.

Figure 8. Alternative GW-2: Natural Attenuation.



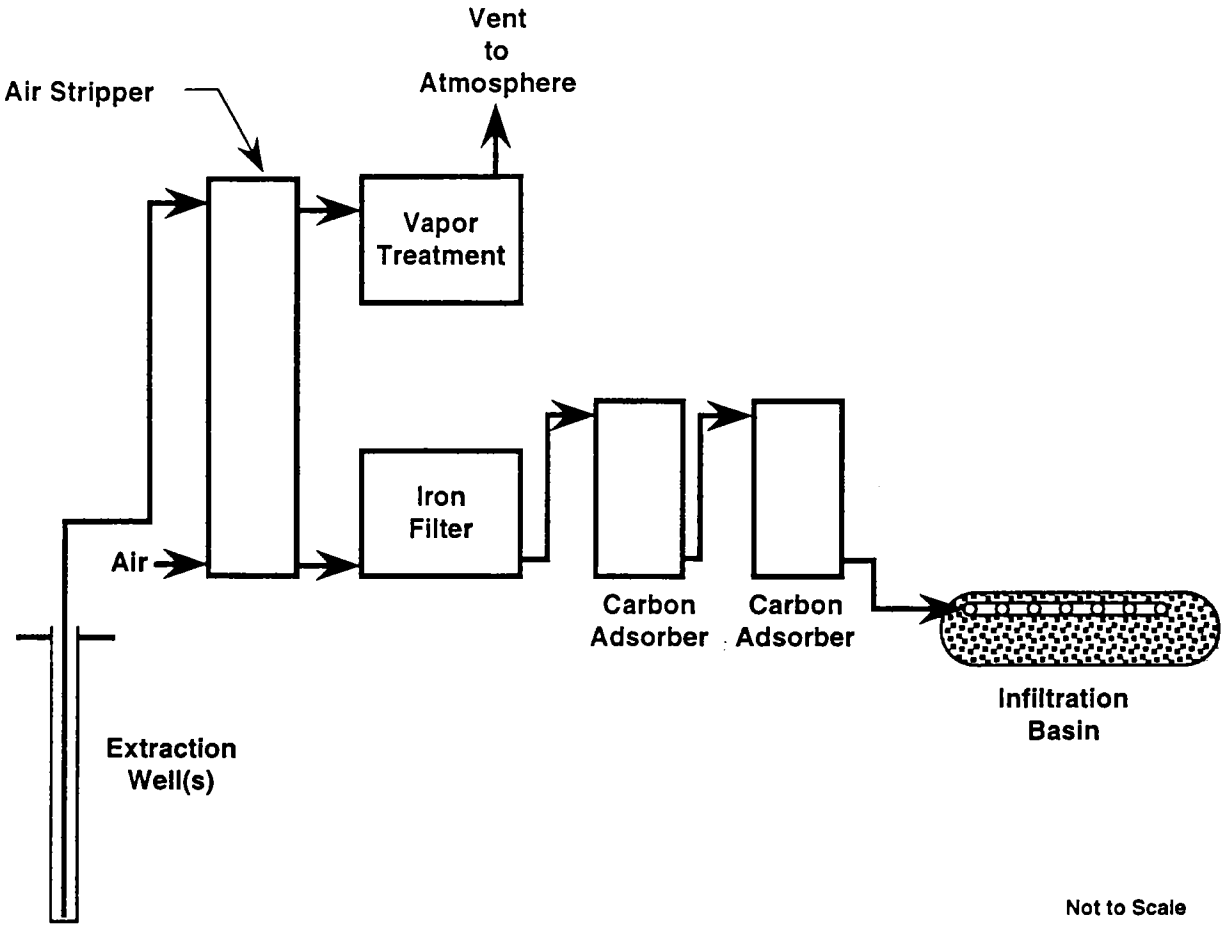
Description of GW-3

- Air forced through injection wells into groundwater.
- Reduces contamination by enhancing volatilization and biological breakdown of contaminants.
- The volatilized gas would be collected from soil and treated before release into the atmosphere.

Facts to consider:

- Cost would be $1,633,000 over an estimated 4 years.
- Protects human health and the environment by preventing use of groundwater and actively removing contamination.

Figure 9. Alternative GW-3: Air Sparging.



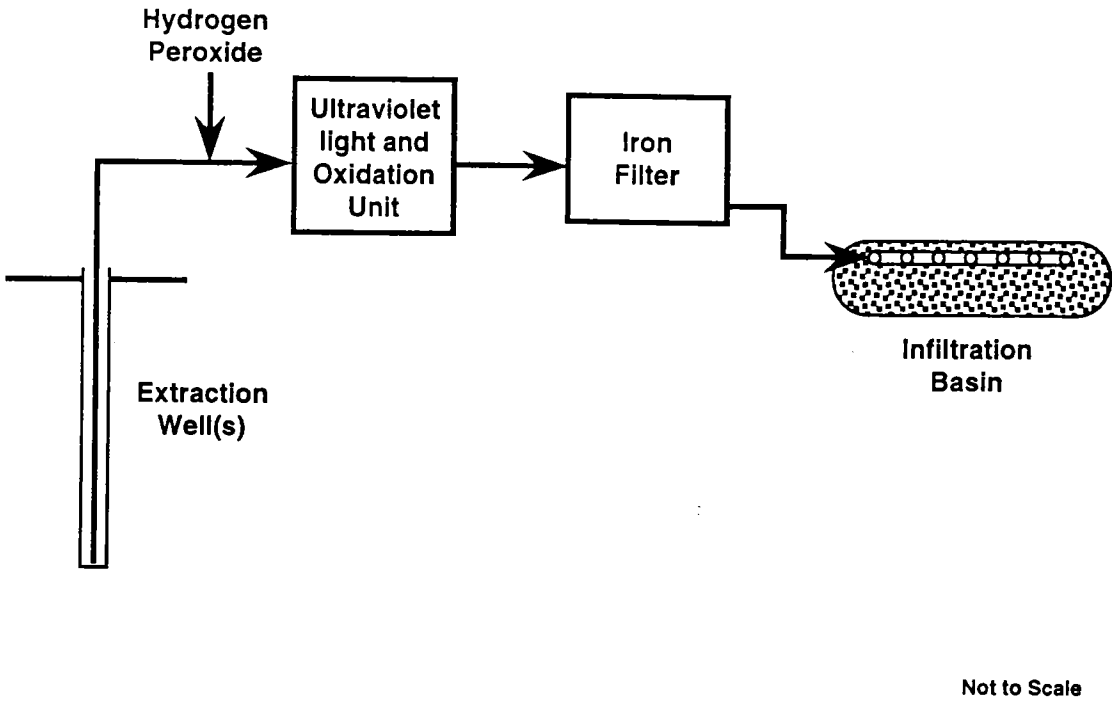
Description of GW-4

- Groundwater would be pumped from the shallow aquifer using three to five wells.
- Extracted groundwater would be treated to remove organic contaminants before the water is discharged.
- Treatment would include pumping through an air stripper to remove volatile organic compounds.
- Contaminants not removed by air stripping would be pumped through carbon adsorber to remove the remaining contaminants.
- Clean water would be allowed to filter back into the aquifer through an infiltration basin.

Factors to consider:

- Cost would be $3,015,000 over an estimated 6 years.
- Protects human health by preventing use of groundwater and actively removing contaminants.
- Demonstrated reliability.

Figure 10. Alternative GW-4: Groundwater Extraction and Treatment by Air Stripping and Carbon.



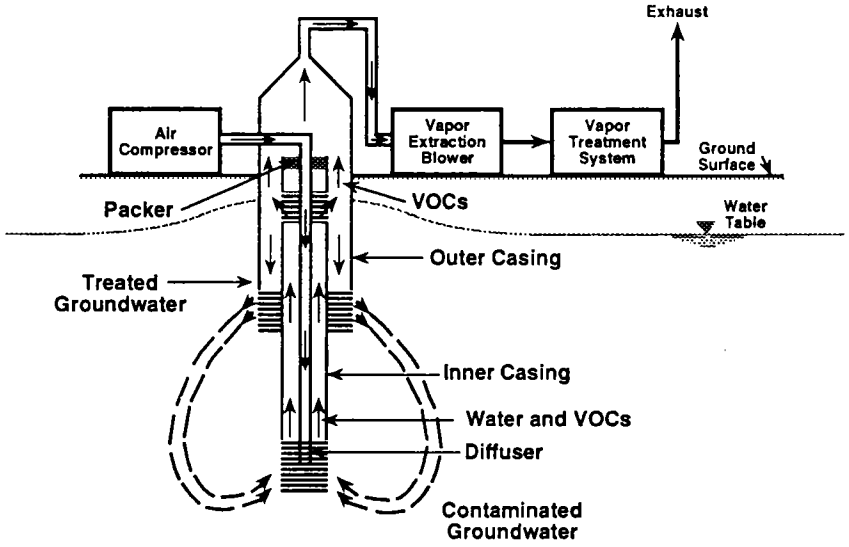
Description of GW-5

- Groundwater would be pumped from the shallow aquifer using three to five wells.
- Extracted groundwater would be treated to remove organic contaminants before the water is discharged.
- Treatment would include breakdown of contaminants with ultraviolet light and oxidizing chemicals.
- Clean water would be allowed to filter back into the aquifer through an infiltration basin.

Factors to consider:

- Cost would be $2,879,000 over an estimated 6 years.
- Protects human health by preventing use of groundwater and actively removing contaminants.
- Demonstrated reliability.

Figure 11. Alternative GW-5: Groundwater Extraction and Treatment by UV/OX.



***In situ* Air Stripping Well**
(Typical)

Description of GW-6

- Groundwater circulated in the ground and gases stripped in treatment wells.
- Extracted gases removed from the well head and treated before release to the atmosphere.
- Contamination would also be reduced by increased biological activity resulting from adding oxygen to the circulating groundwater.

Factors to be considered:

- Cost would be $1,632,000 over an estimated 4 years.
- Protects human health by preventing use of groundwater and actively removing contaminants.
- Innovative technology.

Figure 12. Alternative GW-6: *In Situ* Air Stripping and Biological Treatment.

Table 4
Explanation of Evaluation Criteria

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 contaminated dust will be produced during excavation), as well as the reduction in risks that results by controlling the contaminants, is assessed. The length of time needed to implement each alternative is also considered. **Implementability.** The technical feasibility and administrative ease (e.g., the amount of coordination with other government agencies that is needed) of a remedy, including availability of necessary goods and services, is 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 (FS) 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.

Threshold Criteria, Source Control

Overall Protection. Alternatives SD-2 and SD-3 would increase protection to the environment by removing contaminants from the sediment. Alternative SD-1 would not affect protectiveness.

Compliance with Applicable or Relevant and Appropriate Requirements (ARARs). Alternative SD-1 would comply with ARARs because there are no established cleanup criteria for sediments. Alternative SD-2 would comply with ARARs if petroleum product levels in the treated sediment can be reduced to regulatory standards and if impact on *wetlands* of proposed action are minimized. SD-3 would comply if impact to wetlands are minimized.

Primary Balancing Criteria, Source Control

Long-Term Effectiveness and Permanence. Alternatives SD-2 and SD-3 provide a permanent method of protecting human and ecological receptors. Alternative SD-3 would require perpetual landfill maintenance. Alternative SD-1 provides no additional protection of human health and the environment over current conditions.

Reduction in Toxicity, Mobility, and Volume. Alternative SD-2 provides for irreversible reduction in the harmful qualities of the contamination through biological treatment. SD-1 and SD-3 do not involve treatment of the sediment.

Short-Term Effectiveness. Alternatives SD-2 and SD-3 would require dust control to protect workers during cleanup. Alternatives SD-2 and SD-3 would also require care in minimizing impact to wetlands during construction. Alternative SD-1 would have no adverse impact on the community or environment during implementation. Alternative SD-3 would meet remedial action objectives most quickly (approximately 1 month), with SD-2 a close second (approximately 4 months). SD-1 could potentially take several decades to reach the remedial action objectives.

Implementability. SD-1 would be the easiest remedial alternative to implement. SD-2 would use the existing biological treatment unit at Site 5, and would be very easy to implement. Implementation of SD-3 would require availability of a permitted disposal facility. Availability of vendors who accept sediment with PCBs is limited in the state of Florida.

Cost. Estimated costs range from $154,000 to $327,000, with Alternative SD-3 being the most costly.

Modifying Criteria, Source Control

State and Federal Acceptance. The FDEP and USEPA have concurred that SD-2 or SD-3 would be preferable to SD-1.

Community Acceptance. Community acceptance of these alterations and the proposed sediment alternative presented in Section 5.0 will be evaluated after the public comment period ends. All public comments will be addressed in the Responsiveness Summary prepared for the ROD for OU 2.

4.2 Groundwater Alternatives

Comparative analyses of the groundwater alternatives with respect to the nine criteria are provided in the following paragraphs.

Threshold Criteria, Risk Reduction

Overall Protection. Alternatives GW-3, GW-4, GW-5, and GW-6, which actively reduces contaminants through treatment, would provide the greatest level of overall protection. Alternative GW-2 would provide a level of improved protection through institution controls coupled with naturally occurring treatment of groundwater. Alternative GW-1 would not affect the current level of protection, which is not controlled but is low due to the undeveloped land use.

Compliance with Applicable or Relevant and Appropriate Requirements (ARARs). Alternatives GW-3, GW-4, GW-5, and GW-6 would comply with all regulatory requirements within 4 to 6 years. Alternatives GW-1 and GW-2 would not meet ARARs until natural mechanisms reduced concentrations below regulatory standards (estimated to be 15 years) or groundwater is reclassified to allow current concentrations.

Primary Balancing Criteria, Risk Reduction

Long-Term Effectiveness and Permanence. Alternatives GW-3, GW-4, GW-5, and GW-6 would provide permanent, irreversible cleanup of the groundwater. However, Alternatives GW-3 and GW-6 are somewhat "unproven" technologies and groundwater extraction used in Alternative GW-4 sometimes fails to meet target cleanup levels. Alternative GW-2 also provides permanent, irreversible cleanup and would be effective as long as institutional controls are enforced and maintained. Alternative GW-1 would not improve the level of protection.

Reduction in Toxicity, Mobility, and Volume. Alternatives GW-3, GW-4, GW-5, and GW-6 are all effective in reducing the harmful qualities of groundwater contaminants. Alternatives GW-1 and GW-2 reduce the harmful qualities by natural breakdown.

Some Site 5 contaminants would continue to discharge to the drainage ditch under GW-1 and GW-2. At Site 17, the natural attenuation processes relied upon in GW-1 and GW-2 appear to have immobilized or greatly reduced the movement of contaminants in groundwater away from the site.

Short-Term Effectiveness. Some disturbances to existing vegetation would be necessary to implement Alternatives GW-3, GW-4, GW-5, and GW-6. Implementation of these alternatives would also require specialized protective clothing and other safety measures for workers. No other health or environmental effects are expected during construction. Alternative GW-2 would begin most quickly (approximately one month). Remedial action objectives would be met most quickly with Alternatives GW-3 and GW-6 (four years), followed by Alternatives GW-4 and GW-5 (six years).

Implementability. Alternatives GW-1 and GW-2 would be easy to implement because of the limited action proposed. The reliability of Alternatives GW-3 and GW-6 is not well established, and groundwater extraction used in GW-4, GW-5 does not always meet desired cleanup endpoints.

Cost. Estimated costs range from $104,000 to over $3,015,000, with Alternative GW-4 being the most costly.

Modifying Criteria, Risk Reduction

State and Federal Acceptance. The FDEP and USEPA have concurred with the Navy that Alternatives GW-2 through GW-6 would be preferable to GW-1.

Community Acceptance. Community acceptance of the preferred risk reduction alternative will be evaluated after the public comment period ends. All public comments will be addressed in the Responsiveness Summary prepared for the OU 2 ROD.

5.0 PREFERRED ALTERNATIVES

In addition to the ongoing interim remedial actions for source control, both sediment and groundwater alternatives have been proposed to meet the remedial action objectives set during the OU 2 Feasibility Study.

Site 5, Oil Disposal Area Northwest

IRA for Soil The ongoing interim remedial action for contaminated soil calls for the excavation and biological treatment of 16,300 cubic yards of contaminated soil in lifts of approximately 3,300 cubic yards each. Each lift will be treated in a biological treatment facility for approximately 100 days. A soil lift will be excavated, biologicaly treated on site, and then returned to the open excavation. The process will be repeated 5 times. Because of this excavation sequence, any groundwater remediation system will have to be installed in stages and the sediment alternative should follow completion of soil remediation.

Sediment The preferred alternative for sediment at Site 5 is SD-2, Excavation and Biological Treatment. The Navy estimates that the preferred alternative would cost $236,000 and would take 4 months to implement.

SD-2 was selected over SD-3 due to the ability to accomplish cleanup through treatment (i.e., contaminant breakdown) entirely onsite without having to transport untreated contaminants offsite. An added benefit is that a biological treatment facility is currently under construction at Site 5, thereby providing an opportunity for cost savings.

Groundwater The preferred alternative for groundwater is either alternative GW-3, Air Sparging, or GW-6, *In Situ* Air Stripping and Biological Treatment. Because the soil excavation sequence of the ongoing interim remedial action requires the groundwater remediation system be installed in stages, a combination of GW-3 and GW-6 provides an opportunity to evaluate the performance of two similar innovative technologies. Initially, an air sparging well and an *in situ* striping well will be installed. These wells will be monitored for performance and ease of operation and maintenance while the excavation proceeds. Whichever technology performs the best will be installed in later stages to remediate the entire groundwater plume. The Navy estimates that either of the preferred alternatives would cost $816,500 over 4 years.

The more aggressive alternatives GW-3 and GW-6 were selected for Site 5 to prevent the continued release of contaminants from groundwater to the nearby drainage ditch. GW-4 and GW-5 meet this objective, but require above ground facilities and associated financial, labor, and energy resources to treat both water and volatilized organics.

Site 17, Oil and Sludge Disposal Pit Southwest

IRA for Soil The ongoing interim remedial action for contaminated soil calls for the excavation and thermal treatment of 9,900 cubic yards of contaminated soil. Onsite thermal treatment will be provided by a mobile low temperature thermal disorption unit. Treated soil will be returned to the excavation.

Groundwater The preferred alternative for groundwater is a combination of onsite treatment of elevated containment concentrations and natural attenuation (alternative GW-2). Upon completion of the IRA additional monitoring wells will be installed. Groundwater will be sampled and the results analyzed for several parameters, including certain chemicals of concern, i.e. phenolic, chlorinated, and petroleum chemicals. If necessary groundwater will be treated onsite at those locations where these chemicals of concern exist at concentrations above the ambient levels of the plume. The exact alternative for onsite treatment will be selected after the groundwater has been resampled, analyzed, and the data evaluated. Natural attenuation (alternative GW 2) will be used for those locations where chemical concentrations are at or below ambient concentrations of the plume.

Natural attenuation (GW-2) was selected at Site 17 because evaluation of measurements made during the site investigations indicate that this process is currently active. The plume is not currently discharging to a surface water body, nor would it be expected to discharge in the near future. While the goal of cleanup is to reach drinking water criteria, it is noted that land at Site 17 is undeveloped with a shallow depth to groundwater (0 to 4 feet below land surface). The shallow depth to groundwater would inhibit future residential development and the associated possibility of using contaminated groundwater as a potable water supply. Additionally, the site's location, immediately west of the east-west runway, makes future residential use of the land a low probability. In the event the site would be developed for residential use, a community water distribution system is located within 6,000 feet of Site 17. This system draws water from a deep aquifer (approximately 400 feet below land surface) which is separated from the contaminated surficial aquifer groundwater.

The Navy estimates that the natural attenuation alternative would cost $232,000 over approximately 15 years. It is estimated that onsite treatment of elevated contaminant concentrations would costs $1,508,000.

6.0 UPCOMING SITE-RELATED COMMUNITY PARTICIPATION ACTIVITIES

Public Comment Period

The public comment period for the FS and Proposed Plan is the next step in selecting remedial action alternatives for OU 2. A public comment period will be held from July 17 through August 17, 1995 to accept comments on the Proposed Plan from NAS Cecil Field, the surrounding community, and other interested parties.

During the public comment period, interested parties may submit written comments to Mr. Bert Byers, the NAS Cecil Field Public Affairs Officer, at the address listed below. Comments must be postmarked no later than August 17, 1995. Based on public comments or new information, the Navy may

modify the preferred alternatives or choose another of the alternatives developed in the FS.

Public Meeting

All interested parties are encouraged to attend a public meeting to learn more about the alternatives developed for the site. The public meeting will also provide an additional opportunity to submit comments on the Proposed Plan to the Navy. The meeting will be held as follows.

Date:	July 25, 1995
Time:	7:00 P.M.
Location:	Chimney Lakes Elementary School 9335 Staples Mill Drive Jacksonville, Florida

Signing of the Record of Decision (ROD)

Following the public comment period, the USEPA, FDEP, and the Navy will sign an ROD for OU 2. The ROD will detail the remedial actions chosen for the site and will include the Navy's responses to comments received during the public comment period. Once the design is complete and a remedial action contractor is procured, the remedial actions will begin.

Ongoing Informational Updates

NAS Cecil Field will keep the local community informed about new developments at the site by preparing fact sheets and distributing them to individuals on the mailing list (see Mailing List Additions below).

Available Information

Copies of the documents prepared by the Navy during its investigation and study of OU 2, including the RI, BRA, FS, and Proposed Plan, are available for review at the following information repository.

Charles D. Webb Wesconnett Branch
Jacksonville Public Library
6887 103rd Street,
Jacksonville, FL 32210
(904) 778-7305

For further information on OU 2 or any other **Installation Restoration program** activities at NAS Cecil Field, please contact:

Bert Byers
Public Affairs Officer
NAS Cecil Field
P.O. Box 111, Jacksonville, FL 32215-0111
(904) 778-6055

Mailing List Additions

If you would like to be added to the NAS Cecil Field mailing list, please contact Bert Byers at the above address.

7.0 GLOSSARY

Acetone: A colorless liquid commonly used as a solvent.

Air sparging: Dissolved volatile (easily evaporated) organics are removed from groundwater by injecting air into the groundwater to cause turbulence, volatilization of dissolved organics, and enhance aerobic biological degradation of organic compounds. Volatile organics are collected from soil above the groundwater surface using a vapor extraction trench. The collected vapors are further treated before they are released into the atmosphere.

Alternative: A combination of technical and administrative methods, developed and evaluated in a feasibility study, that can be used to address contamination at a site.

Antimony: A silvery white element used to make alloys and for coating other metals.

Applicable or relevant and appropriate requirements (ARARs): The Federal and State requirements that a selected alternative must meet. These requirements may vary among sites, chemicals of concern, and remedial alternatives considered.

Aquifer: An underground layer of rock, sand, or gravel capable of storing and transmitting water within cracks and pore spaces, or between grains. The water contained in an aquifer is called groundwater.

Arsenic: A shiny gray element used for hardening metals and in making herbicides and rodenticides.

Attenuation: The naturally occurring process (physical, chemical, and/or biological) by which a compound in reduced in concentration over time.

Baseline Risk Assessment: The evaluation performed to estimate the risk posed to human health or the environment by specific contaminants at a specific site.

Beryllium: A naturally occurring element commonly found in soil. Beryllium is used in the manufacture of ceramics and other industrial products. Beryllium may also be alloyed with number of metals to increase hardness. The beryllium-copper alloy is the most common alloy and is used in parts subjected to abnormal wear or extreme vibration.

Benzene: A colorless liquid commonly found in gasoline and sometimes used as a solvent.

β (Beta)-hexachlorocyclohexane (β-HCH): Commonly referred to as BHC, β-hexachlorocyclohexane is a white-colored powder used as an insecticide. BHC is no longer sold or produced in the United States.

Biological treatment: The use of bacteria or other microscopic organisms to break down harmful or complex organic materials into less complex materials such as carbon dioxide and water.

Cadmium: A naturally occurring bluish-white, malleable metal used in electroplating, and nickel-chromium batteries.

Carbon adsorption: A treatment system in which contaminants are transferred from the gas or liquid phase to activated carbon by passing the gas or liquid through tanks containing activated carbon, a specially treated material that attracts and holds or retains contaminants.

alpha (α) chlordane: A colorless to amber, odorless liquid used as an insecticide.

Chromium: A naturally occurring grayish, lustrous element used in the manufacture of its alloys and chromeplating of other metals.

Comprehensive Environmental Response, Compensation, and Liability Act: An act of Congress that established Superfund and the laws that must be followed when cleaning up certain hazardous waste sites.

***p,p'*-Dichlorodiphenyltrichloroethane (DDT):** Colorless crystals or white powder; an insecticide whose use is now prohibited.

Ecological Risk Assessment: The part of a Baseline Risk Assessment that focuses on evaluating risks to land- and water-dwelling plants and animals.

***bis*(2-Ethylhexyl)phthalate:** A noncombustible liquid used as a solvent or plasticizer.

Extraction Trench: (see vapor extraction trench)

Feasibility Study (FS): A description of the remedial action objectives and an engineering analysis of the potential cleanup alternatives for a site.

Field Investigation: The component of the study of a waste site that includes sampling of environmental **media** and studies of the chemical, ecological, and physical characteristics of the site.

Florida Department of Environmental Protection (FDEP): The State agency that is involved in identifying and enforcing regulations and concurring with the preferred remedy at a site.

Free product: A liquid, usually commercially available, released to the subsurface environment that is not dissolved in groundwater is referred to as product. The portion that can be removed through pumping or skimming is referred to as free product. The portion remaining after free product is removed is usually tightly adhered to soil and is referred to as residual product. At Site 5, the free product is an "oily" liquid floating on the surface of the groundwater.

Geophysical survey: Field investigations using magnetics, sound, or radar to determine subsurface conditions.

Groundwater: Water found within an **aquifer**.

Hazardous waste: A waste defined by regulation 40CFR261 as harmful to human health or the environment .

Hydrogeologic: Of or pertaining to subsurface water and the related geologic aspects of surface water.

Hydrology: The study of properties, circulation, and distribution of water on or under the surface of the earth.

Infiltration basin: A sand and gravel structure specially designed to allow treated water to filter and drain from the land surface into the surficial aquifer.

Information Repository: A public file containing the administrative record, site information, documents on site activities, and general information about the site.

Initial Assessment Study (IAS): The process of collecting and reviewing information to identify solid waste management units and potential releases of contamination. The IAS determines the need for further investigation.

***In Situ* Air Stripping:** A process used to transfer volatile organics (easily evaporated) in a manner similar to that for air sparging except that groundwater is drawn into the bottom of a well and recirculated to the aquifer near the top of the well. This portion of the well also confines the volatilized organics which are released from the groundwater by the turbulent introduction of air. Since the volatilized organics are already confined, a vapor extraction trench is not needed to collect, treat, and release the vapors to the atmosphere. Biological activity within the aquifer is enhanced as the oxygen-rich water is recirculated from the well.

Installation Restoration program: The Department of Defense program to investigate, identify, evaluate, and, if necessary, clean up sites to protect human health and the environment.

Institutional controls: Measures taken through regulation, ordinance, policy, notices, deed restrictions, or physical barriers to minimize human exposure to contaminated media. Examples of institutional controls include land use restrictions, access restrictions, and prohibiting use of groundwater as a drinking water source.

Manganese: A steel gray lustrous element used in the manufacture of steels and alloys.

Maximum contaminant levels (MCLs): The highest concentration of a particular chemical allowed in drinking water according to State and Federal regulations. MCLs are often used to determine if cleanup of groundwater is warranted.

Media: Naturally occurring physical materials such as soil, groundwater, sediment, or surface water.

Methylene chloride: A colorless liquid widely used as a solvent, as a degreaser and a cleaning reagent, and as a paint and varnish remover.

Monitoring wells: Wells installed to monitor (through sampling and analysis) the quality of groundwater.

2-Methylphenol (*o*-Cresol): A colorless solid or liquid with a phenolic odor used as a disinfectant

4-Methylphenol (*p*-Cresol): A colorless solid with a phenolic odor, commonly used as a disinfectant.

Naphthalene: White crystalline flakes with a strong aromatic odor, commonly used as a moth repellent.

National Oil and Hazardous Substances Contingency Plan: The Federal regulation (40 Code of Federal Regulation Part 300) that guides the Superfund program. The Navy's Installation Restoration Program is patterned after the Superfund program.

Organics: Chemical compounds which contain hydrogen and carbon. Volatile and semivolatile organic compounds are sometimes grouped and referred to as "organics".

Operable unit (OU): Grouping of sites based on types of waste disposed of and/or the suspected contaminants of concern.

Oxidizing: A change in chemical form of a substance by exposing it to oxygen or other oxidizing agents such as hydrogen peroxide. Oxidation is used to make contaminants less harmful.

Polychlorinated biphenyls (PCBs): A group of chemicals used for a variety of purposes, including electrical applications, carbonless copy paper, adhesives, hydraulic fluids, and caulking compounds. The use and sale of PCBs was banned in 1979.

Primary drinking water standards: Regulations, also referred to as primary maximum contaminant levels (PMCLs) established under the authority of the Safe Drinking Water Act which limit the concentrations of named constituents in regulated community drinking water distribution systems.

Proposed Plan: A document that describes all the alternatives considered for addressing contamination at the site, including a description of the preferred alternative for remedial action at the site.

Public comment period: A specified period of time during which the public is encouraged to comment on a particular decision or document in the remedial process, such as the Proposed Plan and the FS.

Record of Decision (ROD): The document, signed by the Navy, FDEP, and USEPA, that records the rationale and ultimate cleanup decision for a given site or operable unit.

Remedial action: Steps that are taken to manage or remove contamination.

Remedial action objective: The cleanup goal that must be met by the selected alternative for a remedial action.

Remedial Investigation (RI): The first part of a two-part RI/FS. The RI involves collecting and analyzing information about a site to estimate the nature and extent of contamination that may be present. The investigation may also evaluate how conditions at the site may affect human health and the environment.

Resource Conservation and Recovery Act (RCRA): A Federal law that establishes requirements for the storage, treatment, and disposal of hazardous wastes and corrective action for hazardous waste released to the environment.

Restoration Advisory Board (RAB): An advisory board, composed mainly of concerned citizens and supported by representatives of the Navy, USEPA, and FDEP, tasked with advising NAS Cecil Field on activities associated with environmental restoration.

RCRA Facility Investigation (RFI): An investigation of sites at facilities holding an RCRA permit. The RFI estimates the nature and extent of contamination at the site.

Responsiveness summary: A section within the ROD that presents the Navy's responses to public comments on the FS and the Proposed Plan.

Secondary Drinking Water Standards: Levels developed to ensure that the taste, color, and odor of drinking water are acceptable. Secondary standards are not legally enforceable under Federal regulations.

Sediment: Topsoil, sand, organic material, and minerals washed from land into water, usually after rain.

Semivolatile organic compound (SVOCs): Compounds containing hydrogen and carbon that are slightly prone to evaporation into the atmosphere (but not as prone to evaporation as volatile organic compounds).

Surface Soil: Generally, soil from land surface to 2 feet below land surface.

Subsurface Soil: Soil from 2 feet below land surface to the top of the water table.

Surface water: All water naturally open to the atmosphere (such as rivers, lakes, and ponds).

Total recoverable petroleum hydrocarbons (TRPH): A measurement of petroleum product concentrations in the environment.

Toxicity: A measure of the ability of a substance to damage living tissue or impair normal biological functions.

Trichloroethene: A colorless liquid with a chloroform-like odor that is used as solvent, in dry cleaning, and as a degreaser.

U.S. Environmental Protection Agency (USEPA): The Federal agency responsible for identifying and enforcing regulations and concurring with the preferred remedy at a site.

UV/OX: A treatment method that uses a combination of ultraviolet (UV) and oxidation (OX) (described above). UV/OX is especially effective in treating some compounds that are difficult to break down into non-harmful products (such as polychlorinated biphenyls).

Vanadium: A natural element occurring as light gray or white crystals or powder. Vanadium is used in the manufacture of rust-resistant vanadium steel.

Vapor extraction trench: A piping network within a sand and gravel trench constructed in the porous, unsaturated layer of subsurface soils from which volatilized gases can be extracted.

Volatile organic compounds (VOCs): Any compound containing hydrogen and carbon that readily evaporates into the atmosphere.

Volatilization: The process of changing from the solid or liquid phases into a gaseous phase.

Wetlands: Areas that are soaked by surface water or groundwater frequently enough or for sufficient duration to support specific plants and animals, such as cattails.