FINAL RECORD OF DECISION FOR SITE 33 NAS WHITING FIELD FL
9/23/2004
TETRA TECH NUS

RECORD OF DECISION
FOR
SURFACE AND SUBSURFACE SOILS AT
SITE 33, MIDFIELD MAINTENANCE HANGAR

NAVAL AIR STATION
WHITING FIELD
MILTON, FLORIDA
USEPA ID No. FL2170023244

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

Submitted to:

Southern Division
Naval Facilities Engineering Command
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North Charleston, South Carolina 29406

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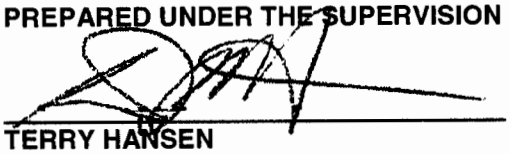

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CERTIFICATION OF TECHNICAL DATA CONFORMITY

The Contractor, Tetra Tech NUS, Inc., hereby certifies, to the best of its knowledge and belief, the technical data delivered herewith under Contract No. N62467-94-D-0888 are complete, accurate, and comply with all requirements of this contract. The work and professional opinions rendered in this report were conducted or developed in accordance with commonly accepted procedures consistent with applicable standards of practice.

DATE: 23 September 2004

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ACRONYMS

ARAR	applicable or relevant and applicable requirement
bls	below land surface
CCI	CH2M Hill Constructors, Inc.
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CG	Cleanup Goal
COC	constituent of concern
COPC	constituent of potential concern
CSF	cancer slope factor
ECs	engineering controls
ELCR	excess lifetime cancer risk
ERA	ecological risk assessment
F.A.C.	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
FSA	Feasibility Study Addendum
FS	Feasibility Study
GIR	General Information Report
HHRA	human health risk assessment
HI	Hazard Index
HQ	Hazard Quotient
IR	Installation Restoration
IRIS	Integrated Risk Information System
LUCs	Land Use Controls
MEK	methyl ethyl ketone
MIBK	methyl isobutyl ketone
mg/kg	milligrams per kilogram
mg/kg/day	milligrams per kilogram per day
NAS	Naval Air Station
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
NPW	net present worth
O&M	operation and maintenance
OSHA	Occupational Safety and Health Administration
PCB	polychlorinated biphenyl
PPE	personal protective equipment
PRG(s)	Preliminary Remediation Goal(s)
RA	Remedial Action
RAB	Restoration Advisory Board
RAO	Remedial Action Objective
RBC	Risk-Based Concentration
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RfD	reference dose

RI	Remedial Investigation
RME	reasonable maximum exposure
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act
SCTL	Soil Cleanup Target Level
SVOC	semivolatile organic compound
TBC	to be considered
TRPH	total recoverable petroleum hydrocarbons
TSDF	treatment, storage, and disposal facility
TtNUS	Tetra Tech, NUS, Inc.
USEPA	United States Environmental Protection Agency
UST	underground storage tank
VOC	volatile organic compound

1.0 DECLARATION OF THE RECORD OF DECISION

1.1 SITE NAME AND LOCATION

Naval Air Station (NAS) Whiting Field is located approximately 5.5 miles north of the town of Milton, Florida in Santa Rosa County, about 25 miles northeast of Pensacola (Figure 1-1). Site 33 is a parcel of land approximately 2.5 acres in size and located at the Midfield Maintenance Hangar, Building 1454, at NAS Whiting Field. The site includes Building 1454 and the location of a former waste oil underground storage tank (UST) north of Building 1454.

1.2 STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected Remedial Action (RA) for surface and subsurface soils at Site 33, NAS Whiting Field. Groundwater at NAS Whiting Field has been identified as a separate site (Site 40, Basewide Groundwater) and will be addressed in a future decision document. The selected action was chosen by the Navy and the United States Environmental Protection Agency (USEPA) in accordance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986 and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). Information supporting the selection of this RA is contained in the Administrative Record for this site. The NAS Whiting Field Information Repository, including the Administrative Record, is located at the West Florida Regional Library, Milton Branch, 805 Alabama Street, Milton, Florida, 32570, (850) 623-5565.

The Florida Department of Environmental Protection (FDEP) concurs with the selected remedy.

1.3 ASSESSMENT OF THE SITE

Prior to the removal of the UST from the site in August 2000 [CH2M Hill Constructors, Inc. (CCI), 2001], investigation and evaluation of constituents present in the surface and subsurface soils at Site 33 identified four inorganic analytes and total recoverable petroleum hydrocarbons (TRPH) exceeding State of Florida (FDEP, 1999) or USEPA (USEPA, 1999) risk-based screening values for residential land-use. Approximately 80 cubic yards of TRPH-contaminated soil was excavated and disposed of off-site during the UST removal project. Post-removal soil sampling results, changed status of selected inorganic analytes, and changed USEPA screening criteria were evaluated in a Feasibility Study (FS) Addendum (FSA) [Tetra Tech NUS, Inc. (TtNUS), 2004]. The FSA identified TRPH as the only constituent exceeding the FDEP (FDEP, 1999) or USEPA (USEPA, 2002) risk-based screening values for residential land-use. Based on the anticipated future commercial/industrial use of the site the only constituent of concern (COC) identified for surface and subsurface soils in the FSA was TRPH.

Human health risks for exposure to surface and subsurface soils at Site 33 were evaluated in a revised Human Health Risk Assessment (HHRA) presented in the FSA. A summary of human health risks is provided in Section 2.6.1 of this Record of Decision (ROD). The results of the ecological risk assessment (ERA) presented in the Remedial Investigation (RI) indicate potential ecological risks at the site are acceptable, and further ecological study is unwarranted because the site is heavily industrialized and severely limited in the quantity and quality of habitat. Site 33 is characterized by mowed turfgrass surfaces, heavy human activity, and high vehicle/aircraft traffic. As a result of the heavy human activity and vehicle and aircraft noise, terrestrial wildlife is deterred from using the site. Most importantly, the site comprises only a small portion of the home ranges of most of the terrestrial wildlife species found on the base. A discussion of the potential ecological risk is presented in Section 2.6.2 of this ROD.

The response actions selected in this ROD are necessary to protect the public health, welfare, or the environment from actual or threatened releases of hazardous substances into the environment or of pollutants or contaminants from this site presenting a possible imminent and substantial endangerment to public health or welfare.

1.4 DESCRIPTION OF THE SELECTED REMEDY

This ROD presents the final action for surface and subsurface soils at Site 33 and is based on results of the following site-related documents: the RI (TtNUS, 1999); the FS (TtNUS, 2001a); the Proposed Plan (TtNUS, 2001b); and the FSA (TtNUS, 2004). This ROD only addresses surface and subsurface soil at Site 33. Consequently, this ROD does not address actual or potential groundwater contamination at the site. Groundwater at NAS Whiting Field has been identified as a separate site (Site 40, Basewide Groundwater) and will be addressed in a future decision document. Sediment and surface water are not present at Site 33. The selected remedy for Site 33 is Alternative 2, Engineering Controls (ECs) and Land Use Controls (LUCs). The purpose of such controls is to prevent future exposures to both surface and subsurface soils posing possible unacceptable human health risks. The selected remedy was determined based on an evaluation of site conditions, site-related risks, reasonably anticipated future land use(s), applicable or relevant and appropriate requirements (ARARs), and remedial action objectives (RAOs).

The major components of the selected remedy are as follows:

- ECs in the form of existing concrete and asphalt cover areas on the site.
- LUCs prohibiting the digging into or disturbing of existing concrete or asphalt cover areas on the site.
- LUCs prohibiting future residential development of the site.

If the selected ECs and LUCs are shown to be ineffective in preventing unacceptable exposures to contaminated surface or subsurface soils, then other remedial approaches will be evaluated and may be implemented. Specific implementation and maintenance actions to ensure the viability of the selected remedy will be described in a Remedial Design (RD) document to be prepared in accordance with USEPA guidance. The document will be submitted to USEPA and FDEP for review and comment along with all other required post-ROD documents.

The Navy estimates the present worth cost of the selected remedy to be $82,000 over a 30 year period. The selected remedy must remain in place indefinitely, unless all contaminated surface and subsurface soils are removed or subsequent sampling demonstrates they meet then applicable criteria for unrestricted use of the site.

1.5 STATUTORY DETERMINATIONS

The remedy selected for surface and subsurface soils at Site 33 is protective of human health and the environment, complies with federal and state requirements legally applicable or relevant and appropriate to the RA, is cost effective, and utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable.

This remedy does not satisfy the statutory preference for treatment as a principal element of the remedy (i.e., reduction in the toxicity, mobility, or volume of hazardous substances, pollutants, or contaminants through treatment as a principal element) because contaminated soils will remain in place. Because this remedy will result in hazardous substances, pollutants, or contaminants remaining on site above residential health-based levels, a statutory review will be conducted every five years after initiation of the RA to ensure the remedy continues to be protective of human health and the environment.

1.6 DATA CERTIFICATION CHECKLIST

The information required to be included in the ROD is summarized on Table 1-1. These data are presented in Section 2.0, Decision Summary, of this ROD. Additional information, if required, can be found in the NAS Whiting Field Administrative Record for Site 33.

1.7 AUTHORIZING SIGNATURES

Joan Platz — 25 Sep 2004

Joan Platz
Captain, United States Navy
Commanding Officer, NAS Whiting Field

Date

Winston A. Smith — 9-30-04

Winston A. Smith
Director, Waste Management Division
USEPA, Region IV

Date

TABLE 1-1

DATA CERTIFICATION CHECKLIST
SITE 33 RECORD OF DECISION
NAVAL AIR STATION WHITING FIELD
MILTON, FLORIDA

Information	ROD Reference
COCs and their concentrations.	Sections 2.5.1.2 – Page 2-8 Figure 2-2- Page 2-17
Baseline risk represented by the COCs	Section 2.6.3- Page 2-13
Cleanup Goals (CGs) established for the COCs.	Sections 2.7.1- Page 2-14
Disposition of source materials constituting principal threat.	Section 2.2- Page 2-1
Current and reasonably anticipated future land and groundwater use scenarios used for risk assessment	Section 2.6.1- Page 2-10
Potential land and groundwater uses available at the site as a result of the selected remedy.	Section 2.10.4- Page 2-25
Estimated capital, operation and maintenance (O&M), and net present worth (NPW) costs, discount rate used, and timeframe these costs are projected for the selected remedy.	Section 2.10.3- Page 2-25 Table 2-5- Page 2-27
Key factors leading to the selection of the remedy.	Section 2.10.1- Page 2-19

2.0 DECISION SUMMARY

2.1 SITE NAME, LOCATION, AND DESCRIPTION

Site 33 is a parcel of land approximately 2.5 acres in size and located at the Midfield Maintenance Hangar, Building 1454 at NAS Whiting Field (Figure 1-1). The site includes Building 1454 and the location of the former waste oil UST north of Building 1454 (Figure 2-1).

2.2 SITE HISTORY AND ENFORCEMENT ACTIVITIES

2.2.1 NAS Whiting Field History

NAS Whiting Field was placed on the National Priorities List (NPL) by the USEPA in June 1994. Following the listing of NAS Whiting Field on the NPL, remedial response activities have been conducted pursuant to CERCLA.

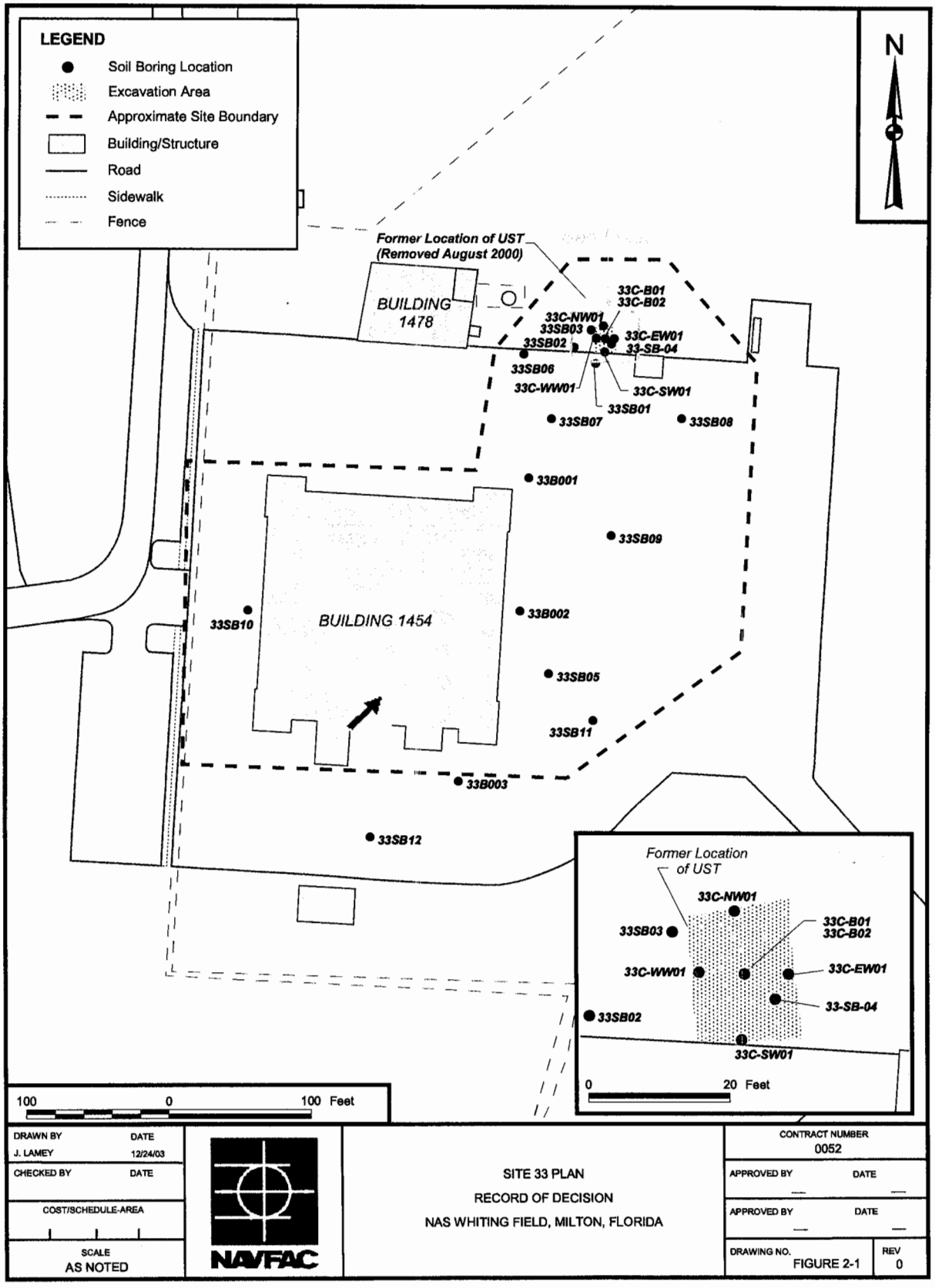
The first environmental studies for the investigations of waste handling and/or disposal sites at NAS Whiting Field were conducted during the Initial Assessment Study (Envirodyne Engineers, Inc., 1985). The record search indicated, throughout its years of operation, NAS Whiting Field generated a variety of wastes related to pilot training, operation and maintenance (O&M) of aircraft and ground support equipment, and facility maintenance programs.

2.2.2 Site 33 History

The Midfield Maintenance Hangar was constructed in the mid-1940s to support maintenance service of assigned aircraft and line maintenance on transient aircraft. Activities at this site included engine maintenance, corrosion control, and aircraft cleaning. Maintenance activities typically generated less than 5 gallons per month of mixed waste paint and stripper, methyl isobutyl ketone (MIBK), methyl ethyl ketone (MEK), toluene, and naphtha.

In the early 1970s, the Ground Support Equipment shop moved from Hangar Building 2941 to the Midfield Maintenance Hangar. This shop was responsible for the maintenance on all ground support equipment (e.g., tow tractors, aircraft jacks, and maintenance stands). The shop routinely generated an estimated 30 gallons of waste PD-680 cleaning solvent per month and about 15 gallons of waste aircraft cleaning compound per month. Other wastes generated included lubricating oil (20 gallons per month), antifreeze (9 gallons per month), hydraulic fluid (25 gallons per month), and transmission fluid (6 gallons per month). All these wastes were disposed of either in a bowser (mobile storage tank) or in the former waste oil UST.

Oil changes were routinely performed on aircraft as part of the normal maintenance activities. The waste oil from aircraft maintenance was reportedly poured into bowsers or the former 846-gallon UST north of Building 1454. The waste oil was periodically removed from the tank by a contractor for off-base



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disposal. In 1986, the contents of the UST were removed for off-base disposal and the UST was abandoned in place by filling the tank with sand and the apertures with concrete. The UST was removed in August 2000 (CCI, 2001).

2.2.3 Site Investigations

Site 33 has undergone several phases of investigations since 1985. Elevated concentrations of both organic and inorganic constituents were identified at Site 33 during various investigations. Table 2-1 presents a summary of investigation activities at the site.

An FS (TtNUS, 2001a) was conducted to identify the best approach to address soil contamination identified in the RI. The FS identified estimated areas impacted by COCs and evaluated four remedial alternatives. Three of the four alternatives included the UST removal as a component. The Navy scope of work for CCI identified Sites 30, 32, and 33 as having abandoned in place USTs requiring remedial action/removal. The UST, its contents, and approximately 80 cubic yards of adjacent petroleum-contaminated soil were removed in August 2000, as a potential source of contamination.

An FSA was conducted to address the following activities undertaken and determinations made since the original FS was submitted:

- UST Removal – The Project Completion Report, UST removal at Sites 30, 32, and 33 (CCI, 2001), documenting the UST removal conducted in August 2000, was submitted in August 2001.

- Arsenic, originally identified as a COC, was determined to be naturally occurring at Site 33. Based on additional review of inorganic data from the facility and area soil geology, observed arsenic values were determined to represent naturally occurring levels (FDEP, 2001). Because the identified human health risks associated with arsenic are now considered to be due to naturally occurring levels, arsenic has not been retained as a COC and remediation of arsenic in surface and subsurface soils is not required at Site 33.

- USEPA Region IX Preliminary Remediation Goals (PRGs) used as Screening Criteria - Over the course of the investigations at this site, USEPA Region IV changed its screening criteria for evaluation of hazardous waste-related sites from USEPA Region III Risk-Based Concentrations (RBCs) (USEPA, 1999) to USEPA Region IX PRGs (USEPA, 2002). Therefore, analytical results are now compared to the USEPA Region IX PRGs and FDEP soil cleanup target levels (SCTLs) for commercial/industrial exposure (FDEP, 1999).

- The individual metal constituents, aluminum, iron, manganese and vanadium, have no direct evidence of site-related use at Site 33 and the process and procedures at this site did not likely contribute to the presence of these inorganic analytes in surface or subsurface soil. Additionally,

TABLE 2-1

INVESTIGATIVE HISTORY
RECORD OF DECISION
SITE 33, MIDFIELD MAINTENANCE HANGAR
NAVAL AIR STATION WHITING FIELD
MILTON, FLORIDA
PAGE 1 OF 2

Date	Investigation Title	Activities	Findings
1985	*Initial Assessment Study NAS Whiting Field, Milton, Florida, Final Report* (Envirodyne Engineers, Inc., 1985)	• Site 33 was not designated; however, the Midfield Maintenance Hangar was discussed in a review of waste disposal practices at the facility.	• The Midfield Maintenance Hangar was constructed in the mid-1940s to support maintenance service of assigned aircraft and line maintenance on transient aircraft. • Maintenance activities at the Midfield Maintenance Hangar typically generated less than 5 gallons/month of mixed waste paint and stripper, MIBK, MEK, toluene, and naphtha. • Oil changes were routinely performed on aircraft as part of the normal maintenance activities. The waste oil from aircraft maintenance was reportedly poured into bowsers (mobile storage tanks) or the waste oil UST located north of Building 1454 until the tank was abandoned in the 1980s. The waste oil was removed from the tank by a contractor for off-base disposal. • The Ground Support Equipment shop, which moved to the Midfield Maintenance Hanger in the early 1970s, routinely generated an estimated 30 gallons of waste PD-680 cleaning solvent per month and about 15 gallons of waste aircraft cleaning compound per month. Other wastes generated included lubricating oil (20 gallons/month), antifreeze (9 gallons/month), hydraulic fluid (25 gallons/month), and transmission fluid (6 gallons/month). All these wastes were disposed of either in a bowser or in the waste oil UST.
1990 - 1998	*Remedial Investigation Report for Surface and Subsurface Soil, Sites 3, 4, 6, 30, 32, and 33, NAS Whiting Field, Milton, Florida* (TtNUS, 1999)	• Review of historical records and aerial photographs • Field inspections and personal interviews • Soil gas survey • Installation of 15 soil borings • Collection and analysis of surface soil samples • Collection and analysis of subsurface soil samples • HHRA and ERA	• The concentrations of TRPH, aluminum, arsenic, iron, and vanadium in soil were found to exceed site-specific background concentrations and either USEPA Region III RBCs or Florida SCTLs. • The HHRA determined the carcinogenic risk from exposure to surface soil was within USEPA's acceptable risk range for current and future receptors at Site 33. • The total ELCR associated with exposure to surface soil by a hypothetical future resident (7.8E-05), older child/adult trespasser (7.9E-06), maintenance worker (2.1E-06), and occupational worker (1.4E-05) exceeded FDEP's threshold of 1.0E-06, due primarily to the presence of arsenic. • The non-carcinogenic HIs associated with ingestion and direct contact of surface soil under current and hypothetical future land uses are below the USEPA and FDEP threshold of 1.0, except for the hypothetical on-site child resident with an HI of 1.27. • The ERA does not predict unacceptable risks to plants or animals from chemicals present in surface soil at Site 33, due to the limited quantity and quality of habitat present at the site.
2001	*Feasibility Study for Surface and Subsurface Soil at Sites 3, 4, 6, 30, 32, and 33, NAS Whiting Field, Milton, Florida* (TtNUS, 2001a).	• Determined COCs and area and volume of contaminated soil. • Evaluated remedial alternatives for site cleanup of COCs.	• Based on commercial/industrial land use, arsenic and TRPH identified as subsurface COCs. No surface soil COCs identified.

TABLE 2-1

INVESTIGATIVE HISTORY
RECORD OF DECISION
SITE 33, MIDFIELD MAINTENANCE HANGAR
NAVAL AIR STATION WHITING FIELD
MILTON, FLORIDA
PAGE 2 OF 2

Date	Investigation Title	Activities	Findings
2001	*Project Completion Report, UST Removal at Sites 30, 32, and 33, NAS Whiting Field, Milton, Florida (CCI, 2001).*	• Excavated an area approximately 17 by 20 feet to an average depth of 10 feet bls. • Remove UST. • Collected and analyzed soil samples from bottom and sidewalls of excavation.	• No soil concentrations were above FDEP SCTLs except arsenic. Arsenic has been determined to be naturally occurring at NAS Whiting Field and does not appear to be site related. • Approximately 80 cubic yards of contaminated soil removed as nonhazardous waste and shipped to the Waste Management lined, Subtitle D Springhill Landfill facility in Campbellton, Florida.
2001	*Proposed Plan, Site 33, Midfield Maintenance Hangar, NAS Whiting Field, Milton, Florida* (TtNUS, 2001b)	• Established public comment period from 12 July through 11 August 2001.	• LUCs proposed for soil remedial action. • No comments received.
2004	*Feasibility Study Addendum, Site 33, Midfield Maintenance Hangar, Surface and Subsurface Soil, NAS Whiting Field,* (TtNUS, 2004)	• Revised COPCs based on USEPA Region IX PRGs • Revised HHRA	• Based on FDEP SCTLs for commercial/industrial land use, the only COC is TRPH. • Based on hypothetical future scenario of concrete removal at the site, the HI for the child receptor is 1.1. • The remedial alternatives and their comparative evaluation as presented in the FSA are not significantly different from those presented in the FS.

Notes:
COC = constituent of concern
bls = below land surface
COPC = Constituent of Potential Concern
ECs = Engineering Controls
ELCR = excess lifetime cancer risk
ERA = Ecological Risk Assessment
FDEP = Florida Department of Environmental Protection
HHRA= Human Health Risk Assessment
HI = Hazard Index
LUCs = Land Use Controls
MEK= Methyl Ethyl Ketone
MIBK = Methyl isobutyl Ketone
PRG = Preliminary Remedial Goal
SCTL = Soil Cleanup Target Levels
TRPH = total recoverable petroleum hydrocarbons
TtNUS = Tetra Tech NUS, Inc.
USEPA = United States Environmental Protection Agency
UST = underground storage tank

the site-specific values for these inorganics are within the range of levels found at NAS Whiting Field and of naturally occurring levels throughout the southeastern United States. The RI for NAS Whiting Field Site 40, Basewide Groundwater, contains the appendix "Inorganics in Soil at NAS Whiting Field" presenting the technical basis for this determination. Considering the information presented above, aluminum, iron, manganese and vanadium are not considered constituents of potential concern (COPCs) for Site 33 surface and subsurface soils.

A Proposed Plan was published in June 2001 based on the findings of the RI and FS. This Proposed Plan for surface and subsurface soils proposed LUCs, an alternative evaluated in the FS and modified to eliminate arsenic remediation (surface soil removal) and the UST removal. Because conditions changed, risk screening criteria changed, and other determinations were made since the original FS was prepared, the Navy and USEPA determined a revised HHRA was necessary. The results of the revised HHRA were presented in the FSA (TtNUS, 2004). Additionally, the FSA evaluated the impact of these changes on the remedial alternatives for surface and subsurface soils identified in the original FS. In summary, there were no significant changes to the CERCLA evaluation of remedial alternatives for Site 33.

NAS Whiting Field presently consists of two air fields (North and South Fields) and serves as a naval aviation training facility providing support facilities for flight and academic training. No change is anticipated in the future land use for Site 33.

2.3 HIGHLIGHTS OF COMMUNITY PARTICIPATION

The RI Report (TtNUS, 1999), the FS (TtNUS, 2001a), the Proposed Plan (TtNUS, 2001b) for Site 33 were made available to the public for review in July 2001. These documents, the FSA (TtNUS, 2004), and other Installation Restoration (IR) program information are contained within the Administrative Record in the Information Repository located at the West Florida Regional Library, Milton, Florida.

Publication of the notice of availability of site-related documents (RI, FS, and Proposed Plan) in the *Pensacola News Journal* and the *Santa Rosa Press Gazette* on 1 July 2001 and 30 June 2001, respectively, targeted the communities closest to NAS Whiting Field. The availability notice presented information on the site-related documents (RI, FS, and Proposed Plan for Site 33) and invited community members to submit written comments on the Proposed Plan.

A public comment period was held from 12 July 2001 through 11 August 2001, to solicit comments on the Proposed Plan (TtNUS, 2001b). The comment period included an opportunity for the public to request a public meeting. The RI, FS and Proposed Plan were placed in the Information Repository and were

made available to the public for review. The Responsiveness Summary in Appendix A indicates no comments were received during the public comment period and no public meeting was requested.

2.4 SCOPE AND ROLE OF REMEDIAL ACTION SELECTED FOR SITE 33

As with many Superfund sites, the problems are complex at NAS Whiting Field. Site 33, the subject of this ROD, addresses surface and subsurface soil contamination and presents the final response action as ECs and LUCs. The groundwater at NAS Whiting Field has been designated as a separate site (Site 40, Basewide Groundwater) and is not addressed in this ROD.

2.5 SITE CHARACTERISTICS

Site 33 is approximately 2.5 acres in size and is characterized by a large building, concrete and asphalt surfaces, small areas of mowed turfgrass surfaces, and heavy human and aircraft activity. The site is flat, with very little topographical relief.

As part of the RI conducted for Site 33, data were collected to determine the nature and extent of releases of site-specific contaminants in surface and subsurface soil, to identify potential pathways of migration in surface and subsurface soil, and to evaluate risks to human and ecological receptors. The receptors evaluated in the HHRA and ERA are discussed in the RI.

Based on site activities undertaken and determinations made since the original FS was prepared as discussed in Section 2.2, a revised HHRA was conducted. The results are presented in the FSA and are summarized in Section 2.6.1 of this ROD.

2.5.1 Nature and Extent of Contamination

Historical aerial photographs and engineering drawings, provided by the Navy, were evaluated during the planning phases of the RI. The objective of the evaluation was to determine the operational history of Site 33 and to verify earlier historical accounts.

Investigations prior to March 2001 at Site 33 indicated contamination at the site posed unacceptable risks to human receptors from exposure to surface and subsurface soil for a potential future residential land-use scenario. The original FS identified arsenic and TRPH in subsurface soil as COCs. Based on changed conditions, changed risk screening criteria and other determinations made since the original FS was submitted, an FSA (TtNUS, 2004) was conducted. As discussed in Section 2.2 above, those changes include:

- The abandoned UST and a small amount of soil at Site 33 were removed in August 2000.
- Observed arsenic values were determined to represent naturally occurring levels; remediation of arsenic is not required.
- USEPA Region IX PRGs were used as screening criteria.
- Observed values for aluminum, iron, manganese and vanadium were determined to represent naturally occurring levels; these selected inorganic analytes are not considered COPCs for Site 33 surface and subsurface soils.

2.5.1.1 Surface Soil

Surface soil sampling was conducted at Site 33 to determine the nature and extent of contamination at the site and to assess whether or not surface soil could potentially serve as an exposure pathway to human or ecological receptors. Constituents detected in surface soil at Site 33 include volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), TRPH, pesticides, polychlorinated biphenyls (PCBs), and inorganic analytes. A complete list of all constituents sampled and their detected concentration in surface soil is available in the RI Report (TtNUS, 1999).

The FSA presented a revised COPC list based on historical data, soil confirmation data from the UST removal project, and the USEPA Region IX PRGs. Post-removal evaluation of the constituents present in surface soil at Site 33 identified TRPH as the only constituent exceeding FDEP SCTLs for direct residential exposure. TRPH was detected in 4 out of 6 surface soil samples at concentrations ranging from 10.7 milligrams per kilogram (mg/kg) to 2,340 mg/kg. Two samples from one location, 33SB05 and its duplicate, had concentrations of 2,340 mg/kg and 2,260 mg/kg respectively. These concentrations exceed the FDEP SCTL for direct residential exposure.

No constituents in surface soil were identified in the FSA as COCs exceeding chemical-specific criteria for the current and anticipated future commercial/industrial use of the site.

2.5.1.2 Subsurface Soil

Subsurface soil sampling was conducted at Site 33 to determine the vertical extent of contamination and to assess whether or not subsurface soil could potentially serve as an exposure pathway to human or ecological receptors. Constituents detected in subsurface soil at Site 33 include VOCs, SVOCs, TRPH, pesticides, PCBs, and inorganic analytes. A complete list of all constituents sampled and their detected concentration in subsurface soil is available in the RI Report (TtNUS, 1999).

The FSA presented a revised COPC list based on historical data, soil confirmation data from the UST removal project, and the USEPA Region IX PRGs. Post-removal evaluation of the constituents present in subsurface soil at Site 33 identified TRPH as the only constituent exceeding FDEP or USEPA commercial/industrial land use criteria. Within the 2 to 15 foot bls interval, TRPH was detected in 14 out of 23 subsurface soil samples at concentrations ranging from 3.5 mg/kg to 7,790 mg/kg. This concentration exceeds the FDEP SCTL for both the residential and commercial/industrial exposure criteria. The FSA identified TRPH as the only constituent in subsurface soil exceeding screening levels for residential site use.

2.5.2 Ecological Habitat

Site 33 is severely limited in the quantity and quality of habitat for ecological succession or ecological receptors because it is heavily industrialized and characterized by concrete, asphalt, buildings, small areas of mowed turfgrass, and heavy human activity deterring terrestrial wildlife from using the site. Most importantly, the site comprises only a small portion of the home ranges of most of the terrestrial wildlife species found on the base.

2.5.3 Migration Pathways

As a result of the revised HHRA, TRPH is the only COC at Site 33. Migration pathways presented in the baseline risk assessment conducted in the RI are summarized below for information purposes.

The RI identified the following primary agents of migration acting on the soil: wind, water, and human and ecological receptor activity. Soil can also act as a source medium, allowing the COCs to be transported to other media.

Transport of the COCs from soil via wind was not a major transport mechanism, due to the presence of vegetation and concrete/asphalt pavement at Site 33. Vegetation is an effective means of limiting wind erosion of soil. Contaminated fugitive dust generated by construction activities is, however, of potential concern.

Soil erosion, the physical transport of soil via surface water runoff, is not considered a major mechanism for transport of COCs in soil at the site because (1) the low grade of the land surface at the site, (2) the turfgrass vegetation, and (3) the nature of the constituents remaining in the soil at the site.

Humans and, to a lesser extent, ecological receptors are effective at moving soil and can greatly affect the transport of soil-bound chemicals at hazardous waste sites. Under the past use of Site 33, human activity was not a major transport mechanism for the COCs in soils.

Leaching of constituents from soil to groundwater will be evaluated as part of the RI/FS for Site 40, Basewide Groundwater.

2.6 SUMMARY OF SITE RISKS

Both an HHRA and an ERA were completed for Site 33 to predict whether the site would pose current or future threats to human health or the environment. These risk assessments evaluated the contaminants detected in site media during the RI and provided the basics for selecting the RA. An FSA was conducted to evaluate the changed conditions at the site, the changes in risk screening criteria, and determinations made since the original FS was submitted. The FSA presented a revised version of the baseline risk assessment focusing on the revised COPC list identified for Site 33. This revised HHRA presented the risks previously calculated for TRPH, the only constituent identified as a COPC.

The ERA and the revised HHRA provided the basis for selecting the RA. This section of the ROD summarizes the results of the ERA and the revised HHRA.

2.6.1 HHRA

An HHRA was conducted at Site 33 to characterize the risks associated with potential exposures to site-related contaminants for human receptors. Details of the HHRA are provided in Chapter 6.0 of the RI Report (TtNUS, 1999). Due to changes discussed above, a revised HHRA was conducted. Details of the revised HHRA are provided in Chapter 2.0 of the FSA (TtNUS, 2004).

The revised HHRA conservatively estimates the potential risk to human health considering historical data, soil confirmation data from the UST removal, and selected inorganic analytes (arsenic, aluminum, iron, manganese and vanadium) present at naturally occurring concentrations at Site 33. The major sections of the revised HHRA included the following: (1) identification of revised COCs; (2) exposure assessment; (3) toxicity assessment; and (4) risk characterization.

2.6.1.1 Human Health COCs

The human health COC selected for surface and subsurface soils at Site 33 was TRPH. TRPH was the focus of the revised risk assessment.

2.6.1.2 Exposure Assessment

In the baseline HHRA, Site 33 was evaluated to identify the populations potentially coming into contact with site-related constituents and the pathways where exposure might occur. Two potential media may be sources of human exposure: surface soil and subsurface soil. Groundwater has been identified as a separate site (Site 40) and will be evaluated separately from Site 33. Exposure assessments for surface and subsurface soils are described below.

Surface Soil

Concrete and asphalt paving cover most of the ground surface at Site 33 (Figure 2-1). The only location where TRPH concentrations exceed the FDEP SCTL for direct exposure (residential) in surface soil is at boring location 33SB05 and this area is covered with concrete. TRPH concentrations exceeding the CG were detected in subsurface soil (greater than 5 feet bls). Therefore, there is no complete exposure pathway for surface soil. However, for purposes of completeness, a hypothetical future use assuming the concrete is removed was evaluated. Receptor exposure to surface soil contaminants through ingestion and dermal contact were evaluated.

No humans currently reside at Site 33 and there are no plans for residential development of the site. However, Site 33 may eventually be developed for residential land use; therefore, the residential receptor was evaluated as part of the potential future land-use scenario. Because Building 1454 is located at the site and is currently being used for industrial purposes, exposure of occupational workers was considered for the current and future land-use scenarios. Site maintenance workers mowing the grass, trespassers, and construction workers were also evaluated for the current and future land-use scenarios.

Subsurface Soil

Exposure to subsurface soil (incidental ingestion and dermal contact) was evaluated for current and future construction workers performing excavation activities.

2.6.1.3 Toxicity Assessment

The toxicity assessment is a two-step process where potential hazards associated with the route-specific exposure to a given constituent are (1) identified by reviewing relevant human and animal studies, and (2) quantified through analysis of dose-response relationships. USEPA has calculated numerous toxicity values having undergone extensive review within the scientific community. These values [published in

the Integrated Risk Information System (IRIS) (USEPA, 2000) and other journals] are used in the baseline evaluation to calculate both carcinogenic and non-carcinogenic risks associated with each COPC and rate of exposure. The toxicity assessment methodology used in the baseline HHRA is described in Subsection 2.5.4 of the General Information Report (GIR) [ABB Environmental Services, Inc. (ABB-ES), 1998].

2.6.1.4 Risk Characterization

In the final step of the risk assessment, results of the exposure and toxicity assessments are combined to estimate the overall risk from reasonable maximum exposure to site contamination. For carcinogens, risks are generally expressed as the incremental probability of an individual's developing cancer over a lifetime as a result of exposure to the carcinogen. ELCR is calculated from the following equation:

$$risk = CDI \times SF$$

where: risk = a unitless probability (e.g., 2.0×10^{-5}) of an individual's developing cancer

CDI = chronic daily intake averaged over 70 years expressed as milligrams per kilogram per day (mg/kg/day)

SF = slope factor, expressed as $(mg/kg/day)^{-1}$

These risks are probabilities usually expressed in scientific notation (e.g., 1.0×10^{-6}). An ELCR of 1.0×10^{-6} indicates an individual experiencing the reasonable maximum exposure estimate has a 1 in 1,000,000 chance of developing cancer as a result of site-related exposure. This is referred to as an "excess lifetime cancer risk" because it would be in addition to the risk of cancer individuals face from other causes such as smoking or exposure to too much sun. The chance of an individual's developing cancer from all other causes has been estimated to be as high as one in three. USEPA's acceptable risk range for site-related exposures is 1.0×10^{-4} to 1.0×10^{-6}.

The potential for non-carcinogenic effects is evaluated by comparing an exposure level over a specified time period (e.g., lifetime) with a reference dose (RfD) derived for a similar exposure period. An RfD represents a level an individual may be exposed to and is not expected to cause any deleterious effect. This ration of exposure to toxicity is called a hazard quotient (HQ). An HQ less than 1.0 indicates a receptor's dose of a single contaminant is less than the RfD, and toxic non-carcinogenic effects from the constituent are unlikely. The HI is generated by adding the HQs for all COCs affecting the same target organ (e.g., liver) or acting through the same mechanism of action within a medium or across all media a given individual may reasonably be exposed. An HI less than 1.0 indicates, based on the sum of all HQ's

from different contaminants and exposure routes, toxic non-carcinogenic effects from all contaminants are unlikely. An HI greater than 1.0 indicates site-related exposures may present a risk to human health. The HQ is calculated as follows:

Non-cancer HQ = CDI/RfD

where: CDI = chronic daily intake
RfD = reference dose

CDI and RfD are expressed in the same units and represent the same exposure period (i.e., chronic, subchronic, or short-term).

2.6.1.5 Revised HHRA Results

There were no carcinogenic COPCs identified in surface or subsurface soil at Site 33. Therefore, there is no cancer risk associated with exposure to surface or subsurface soils. For the current land use condition, HIs for TRPH in subsurface soil are less than the USEPA and FDEP target benchmark of 1.0 for all receptors.

There are no current complete exposure pathways for surface soil at Site 33 since the area of the site with surface soil exceedances of the FDEP SCTL for direct exposure (residential soil) is covered with concrete and asphalt pavement. Although it is unlikely the concrete will be removed from Site 33 in the future, exposure to surface soils under this scenario was evaluated. Based on this scenario, TRPH is a reasonable maximum exposure (RME) HI risk driver for the child resident at Site 33. The RME HI for the child receptor is 1.1 at Site 33. For all other receptors at Site 33, the TRPH HI is less than unity. However, due to the uncertainty associated with the TRPH RfD, the calculated HI is likely to be overestimated.

2.6.2 ERA

The purpose of the ERA for Site 33 was to evaluate the potential for adverse effects to ecological receptors at the Midfield Maintenance Hangar. A conservative screening level ERA was performed according to USEPA guidance. Components of the screening level ERA included (1) preliminary problem formulation; (2) preliminary ecological effects evaluation; (3) preliminary exposure estimate; and (4) preliminary risk calculation. In addition, Step 3A (Refinement of COPCs) was also performed in accordance with USEPA and Navy ERA guidance. The ERA completed for Site 33 considered exposure of terrestrial plants, terrestrial invertebrates, and wildlife receptors to chemicals in surface soil at the site. All constituents detected in surface soil at Site 33, including VOCs, SVOCs, TRPH, pesticides, and

inorganic analytes were evaluated during the screening level assessment. A complete list of all constituents sampled and their detected concentrations in surface soil is available in the RI Report (TtNUS, 1999).

The site is severely limited in the quality of habitat for ecological succession or ecological receptors because the site is heavily industrialized and characterized by concrete, asphalt, buildings, small areas of mowed turfgrass, and heavy human activity deterring terrestrial wildlife from the site. Most importantly, the site comprises only a small portion of the home ranges of most of the terrestrial wildlife species found on the base. Therefore, reduction in growth, survival, and reproduction of small mammal and bird populations at and near the site due to chromium or other constituents evaluated in the ERA is unlikely. For these reasons, potential risks are acceptable and further ecological study at Site 33 is unwarranted.

2.6.3 Risk Summary

Actual or threatened releases of hazardous substances from this site present a current or future potential threat to public health and welfare.

There is no cancer risk associated with exposure to surface and subsurface soils at Site 33. The non-carcinogenic risks were below the USEPA and FDEP target HI for all receptors except the hypothetical child resident (HI=1.1).

Potential risks evaluated in the ERA are acceptable and further ecological study at Site 33 is unwarranted.

2.7 REMEDIAL ACTION OBJECTIVES

The RAOs for Site 33 are:

- To prevent residential development on the site.
- To protect the industrial worker from carcinogenic and non-carcinogenic risks associated with incidental ingestion of, inhalation of, and dermal contact with contaminated soils.
- To comply with federal and state ARARs and to be considered (TBC) guidance in accordance with accepted USEPA and FDEP guidelines.

The RAOs for this site are formulated based on the following criteria:

- Although there are no human health risks associated with the current and anticipated future commercial/industrial use of this site, unacceptable human health risk exists for direct exposure to surface or subsurface soil based on the current and anticipated future commercial/industrial use of the site.
- FDEP SCTLs (commercial/industrial land use).
- USEPA Region IX PRG values (commercial/industrial land use).

The current and future use of the property at this site remains industrial, and the current and future receptors are occupational and construction workers in direct contact with the soil.

2.7.1 Cleanup Goals

Cleanup Goals (CGs) establish acceptable exposure levels protective of human health and the environment. The following soil CG was established for the Site 33 COC:

COC	CG
TRPH	2,500 mg/kg[1]

[1] FDEP SCTL for direct exposure, industrial

The CGs were used to determine the areas and volumes of surface and subsurface soil with the potential to impact human health under a commercial/industrial land-use scenario (Figure 2-2). The estimated area of TRPH contaminated subsurface soil exceeding the CG is 310 square feet with an estimated volume of 560 cubic yards. A small amount (80 cubic yards) of TRPH-contaminated soil was removed during the UST removal project in August 2000 (CCI, 2001).

2.8 DESCRIPTION OF ALTERNATIVES

As stated in the Proposed Plan (TtNUS, 2001b) and in previous sections of this document, no action will be taken to remediate the naturally occurring levels of arsenic in surface or subsurface soils at Site 33. Also, the abandoned UST and a small amount of TRPH-contaminated soil at Site 33 were removed in August 2000 as stated in Section 2.2. Therefore, the four remedial alternatives evaluated in the FS (TtNUS, 2001a) for Site 33 were re-evaluated in the FSA (TtNUS, 2004). The FSA modified the original alternatives presented in the FS by deleting the UST removal from Alternatives 2, 3, and 4. The term ECs was not specifically used in the FS; however, this concept was presented in the description of alternatives as maintenance of the existing soil cover (e.g., soil, concrete, or asphalt horizontal barrier). The FSA identifies the term ECs and is used in the description of the proposed RA.

Cleanup alternatives were developed by the Navy, the USEPA, and the FDEP. The four remedial alternatives are listed below and summarized in Table 2-2.

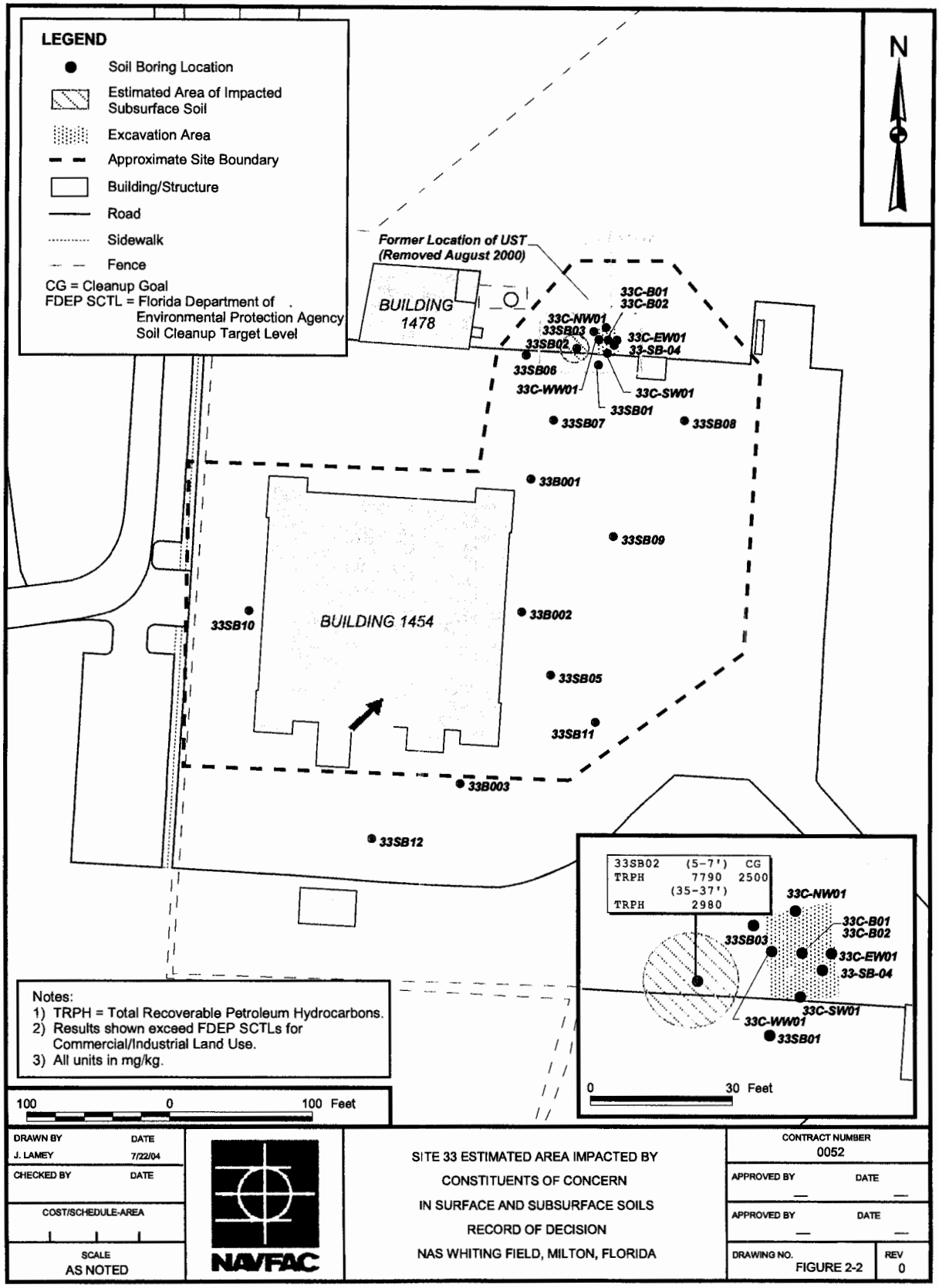
Alternative 1: No Action
Alternative 2: ECs and LUCs
Alternative 3: Soil Venting and LUCs
Alternative 4: Subsurface Soil Removal and LUCs

These alternatives were developed in consideration of site risks, the anticipated future commercial/industrial land use, federal and state ARARs and guidance (see Section 2.11 for discussion of ARARs), and the very limited ecological habitat at Site 33. These alternatives primarily address protection of human health because, as discussed previously, potential risks to ecological receptors are acceptable. A detailed description of the four alternatives is provided below.

Alternative 1: No Action. This alternative [estimated net present worth (NPW) cost of $0] is required by CERCLA as a baseline for comparison with the other alternatives. The No Action alternative assumes no remedial action would occur and establishes a basis for comparison with the other alternatives. No remedial action, treatment, LUCs, or monitoring of site conditions would be implemented under the No Action alternative. Alternative 1 does not meet chemical-specific ARARs, and there are no action-specific ARARs for this alternative.

Alternative 2: ECs and LUCs. (estimated total NPW cost $82,000): ECs are to prohibit the disturbance of existing soil covers and LUCs are to prohibit future use of the site for residential purposes precluding full-time human contact with contaminated surface or subsurface soil. Contaminated soil (contaminants exceeding commercial/industrial soil CGs) covered with concrete or asphalt would not require soil removal because the existing cover material is a barrier and is considered an EC preventing exposure to the contaminated soil, as long as the concrete/asphalt remains in place and is properly maintained. Future and current land-use concerns are addressed by the LUCs. Alternative 2 achieves compliance with chemical-specific ARARs by implementing ECs and LUCs to prevent exposure to surface and subsurface soil exceeding CGs. Compliance with action-specific ARARs would be achieved by proper selection, implementation, and maintenance of LUCs. Alternative 2 includes an estimated present worth cost of $60,000 for O&M (over a 30-year monitoring period) and an estimated capital cost of $22,000.

Alternative 3: Soil venting and LUCs. This alternative (estimated total NPW cost $190,000) includes installation of an in situ soil venting system to treat organic constituents (TRPH) in subsurface soil, and places restrictions on the use of the site to nonresidential activities involving less than full-time human



P:\GIS\WHITINGFIELD_NAS\APR\SITE33.APR ESTIMATED AREAS IMPACTED BY CONSTITUENTS OF CONCERN V.2 9/14/04 KMP

TABLE 2-2

SUMMARY OF REMEDIAL ALTERNATIVES EVALUATED
RECORD OF DECISION
SITE 33, MIDFIELD MAINTENANCE HANGAR
NAVAL AIR STATION WHITING FIELD
MILTON, FLORIDA

Alternative	Description of Key Components	Cost[1]	Duration[2]
Alternative 1: No Action	No remedial actions are performed at Site 33	$0	30 Years
Alternative 2: ECs and LUCs	Post warning signs. Implementation of ECs and LUCs will address contaminants in soil above residential standards. An RD will be submitted to USEPA and FDEP and will detail the implementation plans to maintain current soil cover and to prohibit residential use of the property.	$82,000	30 Years
Alternative 3: Soil Venting and LUCs	Develop project plans for in situ soil venting to include delineation/confirmatory sampling. Install, operate, and maintain an in situ soil venting system. Post warning signs. Implementation of LUCs will address contaminants in soil above residential standards. An RD will be submitted to USEPA and FDEP and will detail the implementation plans to maintain the site for nonresidential purposes.	$190,000	30 years
Alternative 4: Subsurface Soil Removal (exceeding CGs) and LUCs	Develop project plans for excavation to include delineation/confirmatory sampling. Demolition and removal/disposal of asphalt and concrete pavement covering areas of soil exceeding CGs. Excavate subsurface soils exceeding commercial/industrial land use CGs (including areas covered with concrete/asphalt). Backfill excavated areas with clean soil. Replace concrete or asphalt pavement removed to perform the soil excavation and provide a vegetative cover for nonpaved areas. Post warning signs. Implementation of LUCs will address contaminants in soil above residential standards. An RD will be submitted to USEPA and FDEP and will detail the implementation plans to maintain the site for nonresidential purposes.	$384,000	30 Years

(1) Net present worth costs rounded to the nearest thousand dollars.

(2) A period of 30 years was chosen for present worth costing purposes only. Under CERCLA, remedial actions must continue as long as hazardous substances, pollutants, or contaminants remain at a site.

Notes: CG(s) = Cleanup goal(s)
ECs = Engineering controls to prohibit digging into or disturbing existing concrete or asphalt covered areas on the site
FDEP = Florida Department of Environmental Protection
LUC(s) = land use control(s)
RD = Remedial Design
USEPA = United States Environmental Protection Agency

contact with the soil. Current and future land use concerns are addressed by LUCs. Alternative 3 achieves compliance with chemical-specific ARARs by treating organic constituents in subsurface soil and implementing LUCs to prevent exposure to remaining surface and subsurface soil exceeding CGs. Compliance with action-specific ARARs would be achieved by proper design and execution of RA activities and by proper selection, implementation, and maintenance of LUCs. Alternative 3 includes an estimated present worth cost of $123,000 for O&M (over a 30-year monitoring period) and an estimated capital cost of $67,000.

Alternative 4: Subsurface soil removal and LUCs. This alternative (estimated total NPW cost $384,000) involves removal and off-site disposal of subsurface soil exceeding CGs and LUCs as described above. The estimated volume of contaminated soil to be excavated for disposal in a secure regulated landfill is 560 cubic yards. The estimated volume of contaminated soil to be excavated for disposal in a secure regulated landfill is 560 cubic yards. Alternative 4 meets chemical-specific ARARs for surface and subsurface soil. Compliance with action-specific ARARs would be achieved by proper design and execution of contaminated soil removal and off-site disposal activities and by proper selection, implementation, and maintenance of LUCs. Alternative 4 includes an estimated present worth cost of $58,000 for O&M (over a 30-year monitoring period) and an estimated capital cost of $326,000.

2.9 SUMMARY OF THE COMPARATIVE ANALYSIS OF ALTERNATIVES

This section evaluates and compares each of the soil remedial alternatives with respect to the nine criteria outlined in Section 300.430(e) of the NCP. These criteria are categorized as threshold, primary balancing, and modifying and are further explained in Table 2-3. A detailed analysis was performed for each alternative using the nine criteria to select a remedy. Table 2-4 presents a summary comparison of these analyses.

2.10 SELECTED ALTERNATIVE

2.10.1 Summary of Rationale for Remedy

The goals of the selected RA are to protect human health and the environment by eliminating, reducing or controlling hazards posed by the site and to meet ARARs. Based upon the consideration of the requirements of CERCLA, the NCP, the detailed analysis of alternatives, FDEP comments, and public comments, Alternative 2 was selected to address surface and subsurface soil contamination at Site 33. This remedy was selected for the following reasons:

- Although concentrations of the COC TRPH remaining in subsurface soil exceed the CG, these concentrations do not present an unacceptable threat to human health or the environment assuming only future commercial/industrial uses are permitted at Site 33 and the existing asphalt/concrete cover is properly maintained.
- Potential ecological risks are acceptable. The site is very limited in quantity and quality of ecological habitat because the site is heavily industrialized.
- The current and future use of the property at this site remains industrial, and the current and future receptors are occupational and construction workers in direct contact with the soil.
- Areas of surface soil contamination are covered with concrete or asphalt, preventing exposure as long as this barrier remains in place.

2.10.2 Remedy Description

The selected RA consists of two major components: (1) ECs and (2) LUCs.

2.10.2.1 Component 1: ECs

Contaminated surface soil (TRPH concentrations exceeding the FDEP SCTL for residential land use) covered with concrete or asphalt will not require soil removal because the implementation of this EC will prevent exposure to the contaminated soil. Five-year site reviews will verify the selected alternative continues to be protective of human health and the environment.

The performance objectives of the ECs are:

- To prohibit digging into or disturbing existing concrete or asphalt cover areas on the site.
- To prevent the disturbance of the concrete/asphalt barriers in areas with contaminated surface and subsurface soils.

2.10.2.2 Component 2: LUCs

Soil contamination remains at Site 33 at concentrations precluding unrestricted reuse; therefore, the remedy includes LUCs to address unacceptable risk. These LUCs will be implemented to prohibit residential development and use, precluding unacceptable risks from exposure to contaminated soil. The area of Site 33 to be covered by the LUCs is shown in Figure 2-3. The LUCs cover only surface and subsurface soil. The LUC performance objective for Site 33 is to prohibit residential use of the site. The LUCs will restrict future use of the site to nonresidential activities involving less than full-time human contact with surface and subsurface soils. The LUC performance objectives for Site 33 are:

TABLE 2-3

EXPLANATION OF DETAILED ANALYSIS CRITERIA
RECORD OF DECISION
SITE 33, MIDFIELD MAINTENANCE HANGAR
NAVAL AIR STATION WHITING FIELD
MILTON, FLORIDA

Criterion	Description
Threshold	**Overall Protection of Human Health and the Environment.** This criterion evaluates the degree 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 and Permanence.** 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 Through Treatment.** 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 potential risks to workers and nearby residents posed by implementation of a particular remedy (e.g., whether or not contaminated dust will be produced during excavation), as well as the reduction in risks resulting from 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 weighted against the cost of implementation.
Modifying	**USEPA and FDEP Acceptance.** The final Feasibility Study and the Proposed Plan are placed in the Administrative Record, and represent a consensus by the Navy, USEPA, and FDEP. **Community Acceptance.** The Navy assesses community acceptance of the selected alternative by giving the public an opportunity to comment on the remedy selection process and the selected alternative and then responds to those comments.

TABLE 2-4

SUMMARY OF COMPARATIVE ANALYSIS OF SOIL REMEDIAL ALTERNATIVES
RECORD OF DECISION
SITE 33, MIDFIELD MAINTENANCE HANGAR
NAVAL AIR STATION WHITING FIELD
MILTON, FLORIDA
PAGE 1 OF 2

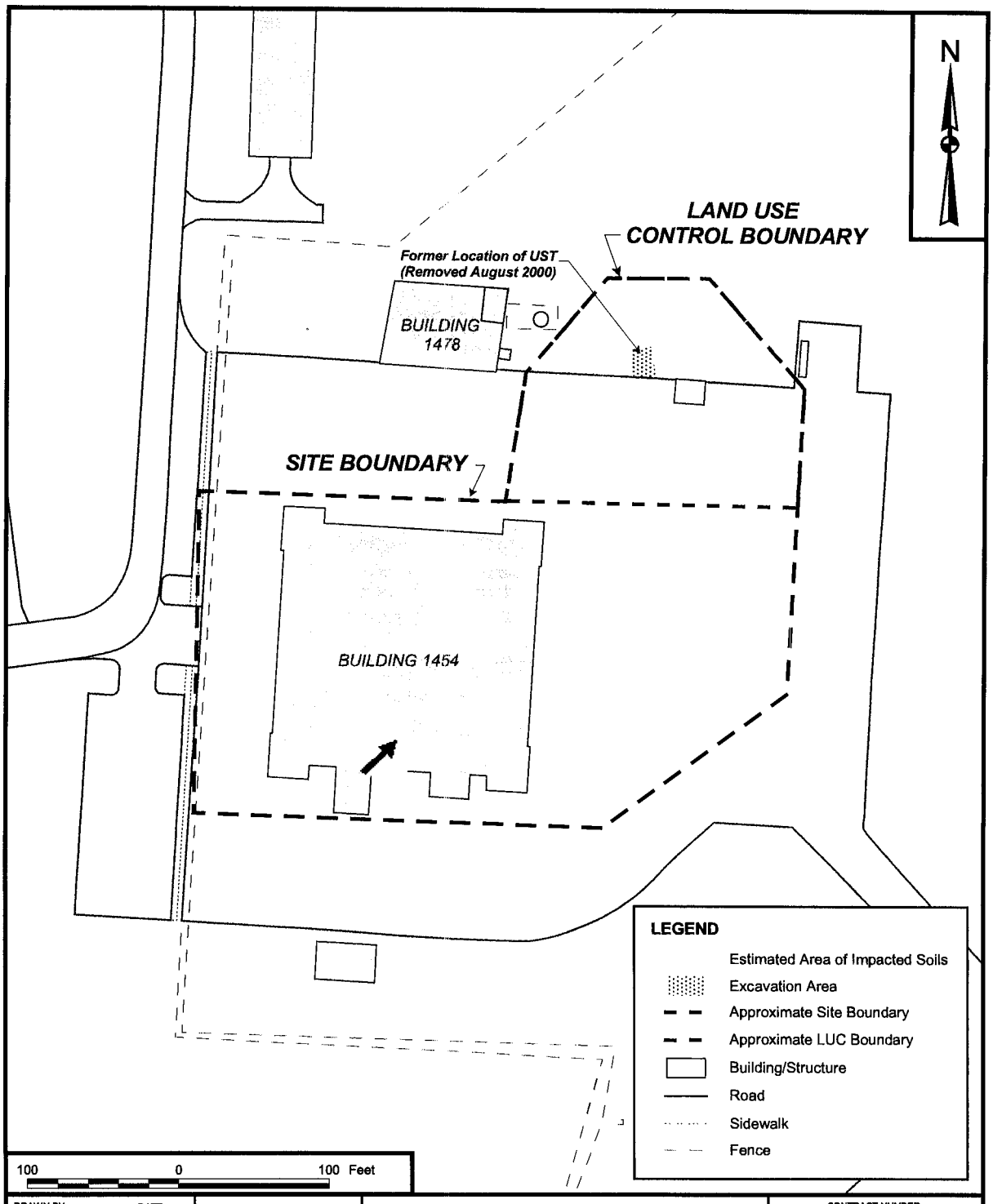
Evaluation Criteria	Soil Alternative 1: No Action	Soil Alternative 2: ECs and LUCs	Soil Alternative 3: Soil venting and LUCs	Soil Alternative 4: Subsurface Soil Removal and LUCs
Overall Protection of Human Health and Environment	Would not be protective to human receptors exposed to soils at the site.	Would be protective to human receptors. ECs and LUCs would prevent unacceptable potential exposure because of soil cover and residential use would be prohibited.	Would be protective to human receptors. LUCs would prevent potential future residents from exposure because residential use would be prohibited. In situ treatment of petroleum hydrocarbons in subsurface soil would increase the overall protectiveness of human health and the environment. LUCs would be required to prevent exposure to soils exceeding residential standards.	Would be most protective because all surface and subsurface soil exceeding CGs (commercial/industrial standards) would be removed, eliminating the risk of exposure. LUCs would prevent potential residents from coming into contact with soil exceeding residential standards at the site. Would also provide protection to ecological receptors however, may end up altering the ecological habitat at the site.
Compliance with ARARs and TBCs: Chemical-Specific Location-Specific Action-Specific	 Would not comply Not applicable Not applicable	 Would comply Not applicable Would comply	 Would comply Not applicable Would comply	 Would comply Not applicable Would comply
Long-Term Effectiveness and Permanence	Would not have long-term effectiveness and permanence because contaminants would remain on site. Any long-term effectiveness would not be known since monitoring would not occur.	Would provide long-term effectiveness and permanence through EC cap protections and LUCs preventing residential development. LUCs would preclude existing asphalt/concrete cover disturbance.	Would provide long-term effectiveness and permanence through in situ treatment of organic chemicals and LUCs preventing residential development.	Would provide highest level of long-term effectiveness and permanence by active removal of all impacted soil exceeding commercial/industrial cleanup levels, reducing residual risk from impacted soil left at the site and by implementing LUCs to prevent residential development.
Reduction of Contaminant Toxicity, Mobility, or Volume through Treatment	Would not achieve reduction of toxicity, mobility, or volume of contaminants through treatment but may achieve some reduction through natural processes.	Would not achieve reduction of toxicity, mobility, or volume of contaminants through treatment but may achieve some reduction through natural processes.	Reduces volume and toxicity of organics in subsurface soil by soil venting, promoting volatilization and biodegradation of organic chemicals. May produce residuals from soil venting off-gas treatment.	Would permanently and significantly reduce mobility of contaminants by excavation, transport, and disposal of impacted soil (estimated volume of 560 cubic yards) in a secure, regulated landfill. Provides the greatest reduction of risk through soil removal and off-base disposal. Toxicity of excavated soil may be reduced by treatment at a TSDF.

TABLE 2-4

SUMMARY OF COMPARATIVE ANALYSIS OF SOIL REMEDIAL ALTERNATIVES
RECORD OF DECISION
SITE 33, MIDFIELD MAINTENANCE HANGAR
NAVAL AIR STATION WHITING FIELD
MILTON, FLORIDA
PAGE 2 OF 2

Evaluation Criteria	Soil Alternative 1: No Action	Soil Alternative 2: ECs and LUCs	Soil Alternative 3: Soil venting and LUCs	Soil Alternative 4: Subsurface Soil Removal and LUCs
Short-Term Effectiveness	Would not result in short-term risks to site workers or adversely impact the surrounding community and would not achieve the soil RAOs and CGs.	Would not result in short term risks to site workers or adversely impact the surrounding community and would not achieve the soil CGs. Estimated time to reach RAOs is less than one year.	Would create potential short term risk to site workers during construction and operation of the in situ soil venting system. These risks are manageable by use of appropriate engineering and construction management controls (wearing of appropriate PPE and the compliance with site-specific health and safety procedures). Environmental impacts (fugitive dust and runoff) are expected to be minimal. Engineering controls would minimize any environmental impacts. The RAOs would be met within less than one year (as soon as the RD is implemented). The estimated time to reach CGs is three years.	Would create short-term risks of worker exposure and potential fugitive dust during excavation, transportation and/or soil cover construction. Would pose potential short-term risks to community members due to spills during transportation of contaminated soil to an off-site landfill. Environmental impacts (fugitive dust and runoff) are expected to be minimal. Engineering controls would minimize any environmental impacts. RAOs and CGs would be met within less than one year.
Implementability	Would be easiest alternative to implement because no action.	Would be easily implemented, but slightly more complex to implement than Alternative 1. Would require monitoring of the horizontal barriers for removal or other damage and potential exposure. Equipment, specialists, and materials for this alternative are readily available.	Would be easily implemented but more complex to implement than Alternatives 1 and 2. Would require monitoring of the horizontal barriers for removal or other damage and potential exposure. This remedial technology is proven and reliable. Equipment, specialists, and materials for this alternative are readily available.	Would be easily implemented, but much more complex than Alternatives 1, 2, and 3. This remedial technology is proven and reliable. Would require use of a TSDF, which are available and have sufficient capacity to meet the requirements of this alternative. Equipment, specialists, and materials for this alternative are readily available.
Cost: Capital NPW O&M (30 year) Total cost, NPW (30 year)	 $0 $0 $0	 $22,000 $60,000 $82,000	 $67,000 $123,000 $190,000	 $326,000 $58,000 $384,000

CG = Cleanup Goal
ECs = Engineering controls to prohibit digging into or disturbing existing concrete or asphalt covered areas on the site
LUC = Land Use Control
NPW = Net Present Worth
PPE = personal protection equipment
RAO = Remedial Action Objective
RD = Remedial Design
TSDF = Treatment, Storage, and Disposal Facility



P:\GIS\WHITINGFIELD_NAS\APR\SITE33.APR LUC BOUNDARY 8/25/04 JAL

- Maintain the integrity of any current or future remedial or monitoring system such as monitoring wells, impermeable reactive barriers, etc.
- Prohibit the development and use of the property for residential housing, elementary, secondary schools, child care facilities, and playgrounds.

The Navy or any subsequent owners shall not modify, delete, or terminate any LUC without USEPA or FDEP concurrence. The LUCs shall be maintained until the concentrations of hazardous substances in the soils have been reduced to levels that allow for unlimited exposure and unrestricted reuse.

The Navy will be responsible for implementing, inspecting, reporting, and enforcing the LUCs described in this ROD in accordance with the approved LUC RD. Although the Navy may later transfer these procedural responsibilities to another party by contract, property transfer agreement, or through other means, the Navy shall retain ultimate responsibility for remedy integrity. Should this LUC remedy fail, the Navy will ensure that appropriate actions are taken to re-establish its protectiveness and may initiate legal action to either compel action by a third party(ies) and/or to recover the Navy's costs for remedying any discovered LUC violation(s).

The LUC RD will be prepared as the LUC component of the selected RA. Within 90 days of ROD signature, the Navy shall prepare in accordance with USEPA guidance and submit to the USEPA and FDEP, an RD containing LUC implementation and maintenance actions, including periodic inspections. When the selected RA is implemented, predicted site risks will be minimized.

2.10.3 Summary of Estimated Remedy Costs

The total estimated NPW cost of Alternative 2 is $82,000 over a 30-year period, based upon an annual discount rate of 6 percent. Table 2-5 summarizes the cost estimate data for Alternative 2. The information in the table is based on the best available information regarding the anticipated scope of the remedial alternative. Changes in the cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative. Major changes may be documented in the form of a memorandum in the Administrative Record file, an explanation of significant differences, or a ROD amendment. The estimate is an order-of-magnitude engineering cost estimate expected to be within a range of +50 to –30 percent of the actual project cost.

2.10.4 Expected Outcome of the Selected Remedy

The expected outcome of the selected remedy is immediately upon implementation, Site 33 will be environmentally safe for its current and intended future use as a commercial/industrial facility, as long as the LUCs and ECs are in place and observed.

2.11 STATUTORY STATEMENT

The alternative selected for implementation at Site 33 is consistent with the Navy's IR program, CERCLA, and NCP. The selected remedy for surface and subsurface soil is protective of human health and the environment.

The selected remedy eliminates, reduces, or controls risks by implementing ECs/LUCs to (1) restrict future use of the site to nonresidential activities involving less than full-time human contact with surface and subsurface soil; and (2) maintain the existing concrete/asphalt barriers in areas with potentially contaminated surface soil. No unacceptable short-term risks or cross-media impacts will be caused by implementation of the remedy. Comparison of the selected remedy to the nine USEPA evaluation criteria is summarized in Table 2-6.

The selected remedy achieves compliance with chemical-specific ARARs by implementing LUCs to prevent exposure to surface and subsurface soil exceeding CGs. Compliance with action-specific ARARs will be achieved by the proper selection, implementation, and maintenance of LUCs. Table 2-7 provides a summary of ARARs and guidance documents specific to the selected remedy.

The selected remedy is cost effective and provides a balance between cost and overall effectiveness in the protection of human health and the environment. Permanent solutions and treatment are used to the maximum practicable extent; however, the selected remedy does not provide for on-site treatment of contaminated material due to the nature of the contaminants and their location in an industrial area with heavy human and aircraft activity. Although the statutory preference for treatment is not met by the selected remedy, the remedy provides the best trade-off among the evaluated alternatives, with respect to the balancing and modifying evaluation criteria listed in Table 2-3.

Because Alternative 2 would result in hazardous substances remaining on site, a review would be conducted within five years after commencement of the RA to ensure the remedy continues to provide adequate protection of human health and the environment.

2.12 DOCUMENTATION OF SIGNIFICANT CHANGES

There are no significant changes in the selected alternative described in the Proposed Plan (TtNUS, 2001b).

TABLE 2-5

SELECTED ALTERNATIVE COST ESTIMATE SUMMARY
RECORD OF DECISION
SITE 33, NORTH FIELD MAINTENANCE HANGAR
NAVAL AIR STATION WHITING FIELD
MILTON, FLORIDA

CAPITAL COSTS		
Description		**Cost**
1. Project Planning		$3,634
2. Mobilization/Demobilization		$0
3. Decontamination		$0
4. Site Preparation		$0
5. Excavation/Backfill		$0
6. Off-site Transportation and Disposal		$0
7. Site Restoration		$0
8. EC and LUC Implementation		$15,160
	Subtotal	$18,794
Contingency Allowance (10%)		$1,879
Engineering/Project Management (5%)		$940
	Total Capital Cost	**$21,613**

OPERATION AND MAINTENANCE COSTS	
Description	**Cost**
Total Operation and Maintenance Costs	**$60,573**
Total Net Present Worth Cost for Selected Alternative	**$82,186**

TABLE 2-6

SUMMARY EVALUATION OF SELECTED REMEDY
RECORD OF DECISION
SITE 33, NORTH FIELD MAINTENANCE HANGAR
NAVAL AIR STATION WHITING FIELD
MILTON, FLORIDA

Evaluation Criteria	Assessment
Overall Protection of Human Health and the Environment	Human receptors, namely residents, will be protected if this alternative is implemented. Regulatory controls (i.e., ECs and LUCs) will prohibit potential future residents from exposure to the site because residential use of the site will be restricted under the proposed LUCs. ECs and LUCs will also maintain the concrete/asphalt barriers in areas with contaminated surface soil exceeding commercial/industrial soil cleanup criteria.
Compliance with ARARs	This alternative achieves compliance with chemical-specific ARARs and TBC guidance by implementing ECs and LUCs to prevent exposure to surface and subsurface soil exceeding CGs. It meets action-specific ARARs by proper selection and maintenance of the LUCs. Meets all other NAS Whiting Field requirements.
Long-Term Effectiveness	The risks to future workers based on exposure to surface and subsurface soil at the site is addressed by ECs and LUCs. The long-term effectiveness and permanence of these controls will be controlled by the installation through the implementation of an approved RD. Administrative actions proposed in this alternative (e.g., 5-year site reviews) would provide a means of evaluating the effectiveness of the alternative. These administrative actions are considered to be reliable controls, as long as the facility implements the approved RD.
Reduction of Toxicity, Mobility, and Volume through Treatment	This alternative does not treat the soil contaminants and thus does not reduce the toxicity, mobility, or volume through treatment. A small amount (80 cubic yards) of TRPH-contaminated soil was removed from the site during the UST Removal Project. The soil was disposed of at approved landfills, thus removing a potential source of contamination.
Short-Term Effectiveness	The implementation of this alternative is estimated to take less than 1 year. No adverse impacts are expected as a result of implementing ECs and LUCs.
Implementability	Would be easily implemented. Would require monitoring of the horizontal barriers for removal or other damage and potential exposure. Equipment, specialists, and materials for this alternative are readily available.
Cost	The total present worth cost of Alternative 2 is $82,000.
Federal and State Acceptance	The USEPA and the FDEP have concurred with the selected remedy.
Community Acceptance	The community was given the opportunity to review and comment on the selected remedy. During the public comment period, no comments were received and no public meeting was requested (see Appendix A). Therefore, the selected RA proposed in the Proposed Plan was not altered.

Notes: ARAR = applicable or relevant and appropriate requirement
ECs = Engineering controls to prohibit digging into or disturbing existing concrete or asphalt covered areas on the site
FDEP = Florida Department of Environmental Protection
LUC = land use control
RA = remedial action
RD = remedial design
TBC = to be considered
TRPH = total recoverable petroleum hydrocarbons
USEPA = United States Environmental Protection Agency
UST = underground storage tank

TABLE 2-7

SUMMARY OF FEDERAL AND STATE ARARS AND GUIDANCE SPECIFIC TO ALTERNATIVE 2
RECORD OF DECISION
SITE 33, MIDFIELD MAINTENANCE HANGAR
NAVAL AIR STATION WHITING FIELD
MILTON, FLORIDA
PAGE 1 OF 2

Authority	Requirement	Citation	Status / Type	Synopsis	Evaluation/Action To Be Taken
Federal Regulatory Requirement	USEPA Region IX Preliminary Remedial Goals (PRGs)		Relevant and Appropriate / Chemical-Specific	These guidelines aid in the screening of constituents in soil. USEPA has requested use of these PRGs as ARARs at NAS Whiting Field.	Will be used to identify COCs and for the development of soil cleanup goals at this site.
Federal Regulatory Requirement	Cancer Slope Factors (CSFs)		TBC / Chemical-Specific	Guidance values used to evaluate the potential carcinogenic hazard caused by exposure to contaminants.	Were considered for development of human health protection PRGs for soil at this site.
Federal Regulatory Requirement	Reference Doses (RfDs)		TBC / Chemical-Specific	Guidance values used to evaluate the potential non-carcinogenic hazard caused by exposure to contaminants.	Were considered for development of human health protection PRGs for soil at this site.
State Regulatory Requirement	Contaminant Cleanup Target Levels Rule [Soil Cleanup Target Levels (SCTLs)]	F.A.C. Chapter 62-777	TBC / Chemical-Specific	This rule provides guidance for soil cleanup levels developed on a site-by-site basis.	Will be used to identify COCs and for the development of soil cleanup goals at this site.
Federal Regulatory Requirement	Occupational Safety and Health Administration (OSHA), General Industry Standards	29 CFR Part 1910	Applicable / Action Specific	Requires establishment of programs to assure worker health and safety at hazardous waste sites, including employee-training requirements.	These regulations will apply to all soil remedial activities at Site 33.
Federal Regulatory Requirement	OSHA, Occupational Health and Safety Regulations	29 CFR Part 1910, Subpart Z	Applicable / Action Specific	Establishes permissible exposure limits for workplace exposure to a specific listing of chemicals.	Will be applied to control worker exposure to OSHA hazardous chemicals during remedial activities.
Federal Regulatory Requirement	OSHA, Recordkeeping, Reporting, and Related Regulations	29 CFR Part 1904	Applicable / Action Specific	Provides recordkeeping and reporting requirements applicable to remedial activities.	These requirements will apply to all site contractors and subcontractors and will be followed during all site work.
Federal Regulatory Requirement	OSHA, Health and Safety Standards	29 CFR Part 1926	Applicable / Action Specific	Specifies the type of safety training, equipment, and procedures to be used during the site investigation and remediation.	All phases of the remedial response project will be executed in compliance with these standards.
Federal Regulatory Requirement	CERCLA and the NCP Regulations	40 CFR, Section 300.430	Applicable / Action Specific	Discusses the types of institutional controls to be established at CERCLA sites.	These regulations may be used as guidance in establishing appropriate institutional controls at Site 33.
State Regulatory Requirement	Florida Rules on Hazardous Waste Warning Signs	F.A.C. Chapter 62-730	Applicable / Action Specific	Requires warning signs at NPL and FDEP-identified hazardous waste sites to inform the public of the presence of potentially harmful conditions.	This requirement will be met.

TABLE 2-7

SUMMARY OF FEDERAL AND STATE ARARs AND GUIDANCE SPECIFIC TO ALTERNATIVE 2
RECORD OF DECISION
SITE 33, MIDFIELD MAINTENANCE HANGAR
NAVAL AIR STATION, WHITING FIELD
MILTON, FLORIDA

Authority	Requirement	Citation	Status	Synopsis	Evaluation/Action To Be Taken
Federal Regulatory Requirement	NA	NA	NA	NA	There are no federal location-specific ARARs specific to this site.
State Regulatory Requirement	NA	NA	NA	NA	There are no state location-specific ARARs specific to this site.

CFR – Code of Federal Regulations
CSF – Cancer Slope Factor
F.A.C. – Florida Administrative Code
OSHA – Occupational Safety and Health Administration
NA – Not Applicable

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APPENDIX A

COMMUNITY RELATIONS
RESPONSIVENESS SUMMARY

Responsiveness Summary
SITE 33, Midfield Maintenance Hangar
Naval Air Station Whiting Field
Milton, Florida

A public comment period on the Site 33 Proposed Plan was held from 12 July 2001 through 11 August 2001. No public comments were received, and because a public meeting was not requested, one was not held.