N00204.AR.002550
NAS PENSACOLA
5090.3a

RECORD OF DECISION SITE 38 OPERABLE UNIT 11 NAS PENSACOLA FL
6/1/2006
TETRA TECH NUS

Comprehensive Long-term Environmental Action Navy

CONTRACT NUMBER N62467-04-D-0055

Rev. 2
06/23/06

Record of Decision
for
Operable Unit 11
(Sites 38)

Naval Air Station Pensacola
Pensacola, Florida

Contract Task Order 0030

June 2006

NAVFAC Naval Facilities Engineering Command
Southern Division
Naval Facilities Engineering Command
2155 Eagle Drive
North Charleston, South Carolina 29406

TETRA TECH NUS, Inc.

RECORD OF DECISION
FOR
OPERABLE UNIT 11
(SITE 38)

NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

Submitted to:
Southern Division
Naval Facilities Engineering Command
2155 Eagle Drive
North Charleston, South Carolina 29406

Submitted by:
Tetra Tech NUS, Inc.
661 Andersen Drive
Foster Plaza 7
Pittsburgh, Pennsylvania 15220

CONTRACT NO. N62467-04-D-0055
CONTRACT TASK ORDER 0030

JUNE 2006

PREPARED UNDER THE SUPERVISION OF:

Gerald A Walker

GERALD A. WALKER, P.G.
TASK ORDER MANAGER
TETRA TECH NUS, INC.
TALLAHASSEE, FLORIDA

APPROVED FOR SUBMITTAL BY:

Debra M Humbert

DEBRA M. HUMBERT
PROGRAM MANAGER
TETRA TECH NUS, INC.
PITTSBURGH, PENNSYLVANIA

Table of Contents

List of Figures

List of Tables

List of Appendices

1.0 DECLARATION OF THE RECORD OF DECISION

1.1 Site Name and Location

At the Naval Air Station (NAS) Pensacola, Pensacola, Florida, United States Environmental Protection Agency (USEPA) ID FL9170024567, Operable Unit (OU) 11, Site 38 includes Buildings 71 and 604, surrounding areas, and the associated industrial wastewater treatment plant (IWTP) sewer line. The southern boundary of the site borders Pensacola Bay.

1.2 Statement of Basis and Purpose

This Record of Decision (ROD) presents the selected remedy for contaminated soil and groundwater at OU 11, Site 38 at NAS Pensacola. The remedial actions were selected in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, 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) [40 Code of Federal Regulations (CFR) 300]. This decision document was prepared in accordance with USEPA decision document guidance (1999). This decision is based on the Administrative Record for the site. The United States Department of the Navy (Navy) and USEPA Region 4 issue this ROD (jointly). The Florida Department of Environmental Protection (FDEP) concurs with the selected remedy.

1.3 Assessment of the Site

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 that may present an imminent and substantial endangerment to public health or welfare.

1.4 Description of the Selected Remedy

OU 11, Site 38 is part of a comprehensive environmental investigation and cleanup currently being performed at NAS Pensacola under the CERCLA program. This ROD addresses only OU 11, Site 38. The selected remedy eliminates unacceptable exposures to contaminants in soil and in groundwater. The selected remedy for OU 11, Site 38 includes monitored natural attenuation for groundwater and land use controls (LUCs) that will limit exposure to soil, prevent any residential use activities, and restrict extraction and prohibit consumption of groundwater from taking place at this location. The selected remedy was chosen based upon evaluation of site conditions, site-related risks, future land use, applicable or relevant and appropriate requirements (ARARs), and Remedial Action Objectives (RAOs).

The major components of the selected remedy for Site 38 are as follows:

- LUCs will be implemented to prevent residential use at Site 38 and to restrict future uses of the surficial aquifer until the levels of contamination in the groundwater meet the State of Florida's Groundwater Cleanup Target Levels (GCTLs) in 62-777.

- Groundwater monitoring will be performed by collecting and analyzing groundwater samples to verify that no unacceptable contaminant migration is occurring and to evaluate reductions in contaminant concentrations through dilution and naturally occurring processes such as biodegradation, dispersion, advection, and adsorption.

The Navy shall prepare, in accordance with USEPA guidance and submit to the USEPA and FDEP, a LUC Remedial Design (RD) as well as all other post-ROD documents as specified in the Federal Facility Agreement (FFA) for NAS Pensacola dated October 23, 1990.

1.5 Statutory Determinations

The selected remedy is protective of human health and the environment, is cost effective, and complies with federal and state requirements that are legally applicable or relevant and appropriate to remedial action. The nature of the selected remedy for OU 11, Site 38 is such that ARARs will eventually be met through monitored natural attenuation of groundwater. The selected remedy represents the maximum extent to which permanent solutions and treatment technologies can be used in a practicable manner at this site. Of those alternatives that are protective of human health and the environment and that comply with ARARs, the selected remedy provides the best balance of trade-offs in terms of the five balancing criteria, while also considering the statutory preference for treatment. The selected remedy does not provide for treatment as a principal element; however, no source materials constituting principal threats are present at the site, and reductions in soil and groundwater contaminant concentrations are expected over time due to dilution and biological, dispersion, advection, and adsorption processes. Because this remedy would result in soil and groundwater with contaminant concentrations greater than health-based levels remaining on site, CERCLA Five-Year Reviews will be conducted to verify that the cleanup goals and RAOs are being achieved.

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: Decision Summary of this ROD. Additional information, if required, can be found in the Administrative Record for OU 11, Site 38.

1.7 Authorizing Signatures

Captain Peter S. Frano — Date
Commanding Officer
NAS Pensacola

Beverly H. Banister, Acting Division Director — Date
Acting Director, Waste Management Division
USEPA, Region 4

Table 1-1
Data Certification Checklist
Operable Unit 11, Site 38 Record of Decision

ROD Criteria	ROD Reference
Chemicals of concern and their respective concentrations	Tables 2-1, 2-2, and 2-3
Baseline risk represented by the chemicals of concern	Summary of Site Risks, Pages 2-9 to 2-11
Cleanup levels established for chemicals of concern and the basis for these levels	Tables 2-1, 2-2, and 2-3
How source materials constituting principal threats are addressed	N/A
Current and reasonably anticipated future land use assumptions and current and potential future beneficial uses of groundwater used in the baseline risk assessment and ROD	Page 2-9
Potential land and groundwater use that will be available at the site as a result of the Selected Remedy	Page 2-9
Estimated capital, annual operation and maintenance (O&M), and total present worth costs, discount rate, and the number of years over which the remedy cost estimated are projected.	Pages 2-20 and 2-21
Key factor(s) that led to selecting the remedy (i.e., describe how the Selected Remedy provides the best balance of tradeoffs with respect to the balancing and modifying criteria)	Tables 2-4 and 2-5

2.0 DECISION SUMMARY

2.1 SITE NAME, LOCATION, AND DESCRIPTION

OU 11 (Site 38) is within the boundaries of NAS Pensacola (USEPA ID FL9170024567), in Pensacola, Florida (Figure 2-1). NAS Pensacola is in Escambia County. The Navy has maintained a presence in the Pensacola area since 1825, when a Navy Yard was established on Pensacola Bay. Between 1828 and 1835, the Navy acquired approximately 2,300 acres as operations expanded. Several natural disasters in the early 1900s destroyed the yard and forced it into maintenance status in 1911. Three years later, the Navy's first permanent air station was established on the site of the old Navy yard. The air station has been the primary training base for naval aviators since that time and continues to expand.

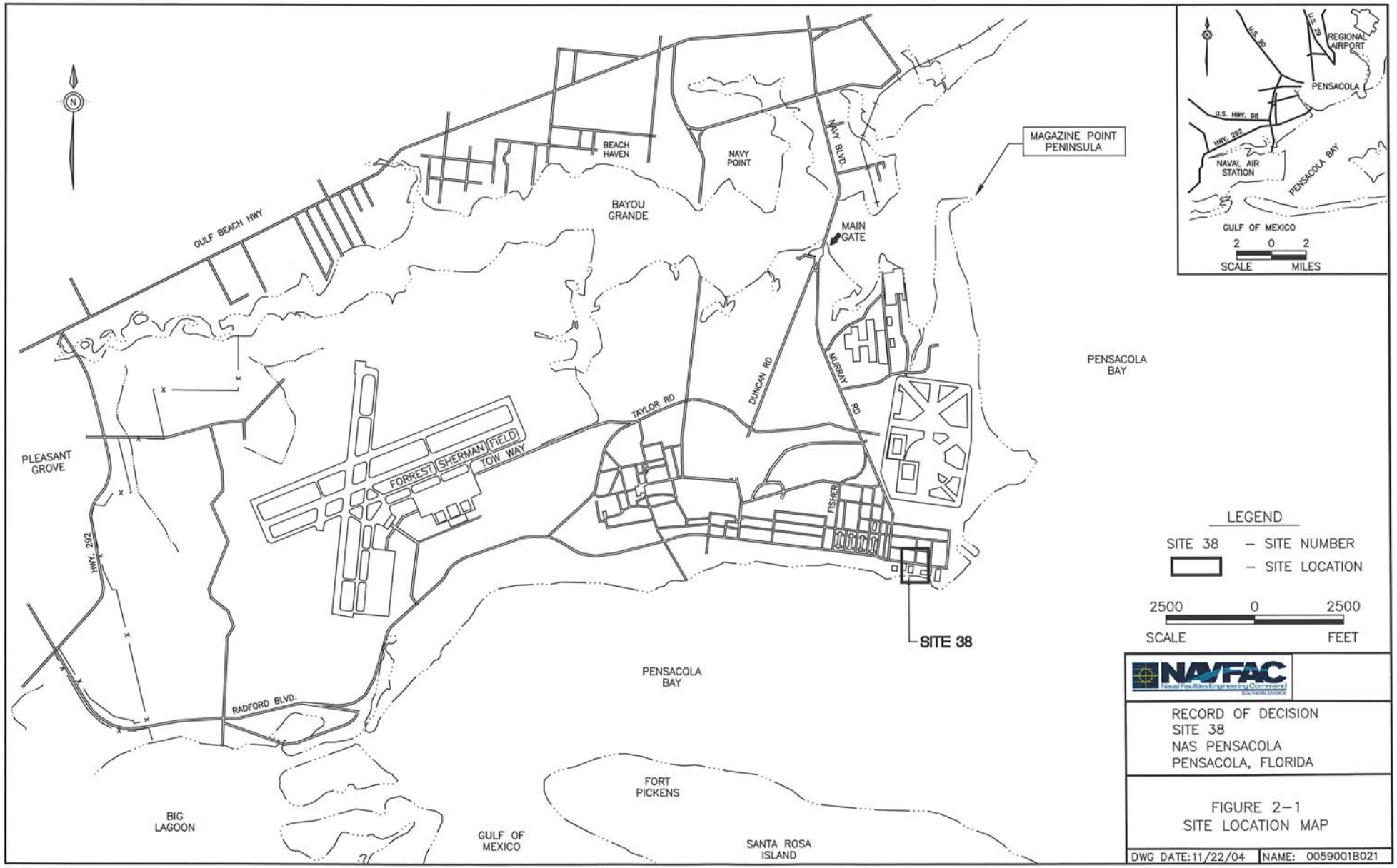
OU 11, Site 38 consists of the contaminated soil and groundwater identified at Buildings 71 and 604 and associated IWTP sewer line area of NAS Pensacola (see Figure 2-2). As shown on Figure 2-2, Site 38 is in the southeastern portion of the facility along Radford Boulevard.

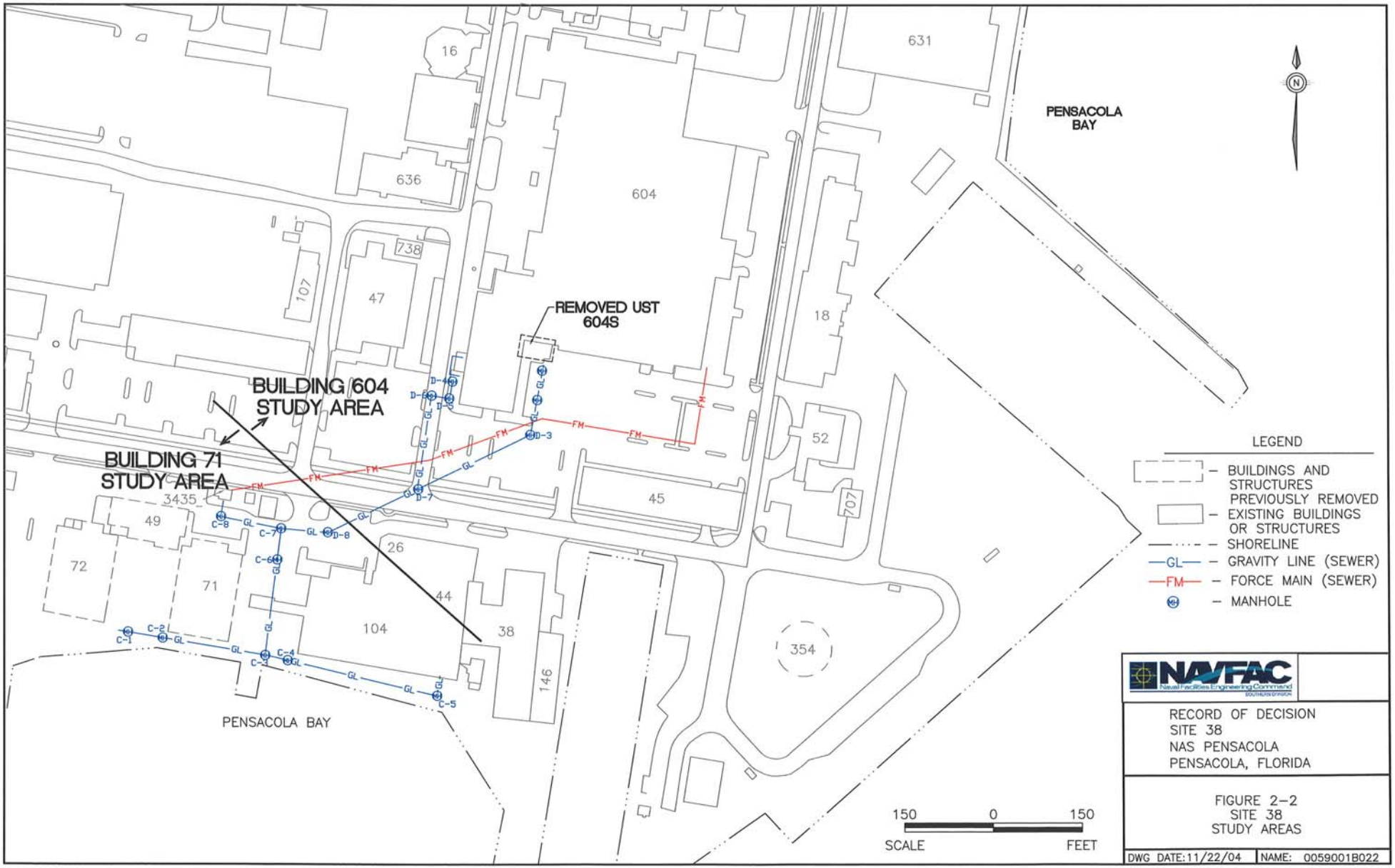
The site is primarily paved or covered by buildings and is approximately 12 acres in size. Pensacola Bay is south of Site 38.

Building 71 was used from 1935 to the late 1970s for aircraft paint stripping and painting operations. Wastes from various operations, including paint stripping, were discharged to Pensacola Bay until the IWTP was built in 1973. Wastes previously entered the IWTP sewer line without any pretreatment or segregation. Currently, the vacant lot is being used by Morale, Welfare, and Recreation (MWR) for parking large trucks. Building 604 housed the Naval Aviation Depot (NADEP) metal plating operations until it was closed in May 1996. This two-story, irregularly shaped, brick/masonry structure was built in 1937 as a hangar on the west side of East Avenue in the old Navy yard.

2.2 Site History and Enforcement Activities

The Navy has conducted environmental studies at NAS Pensacola under the Navy Assessment and Control of Industrial Pollutants (NACIP) program, which was incorporated into the Installation Restoration Program (IRP) in 1986. This study consisted of an Initial Assessment Study (IAS), followed by a two-part Confirmation/Verification Study.


N
GULF BEACH HWY
BEACH HAVEN
NAVY POINT
NAVY BLVD.
BAYOU GRANDE
MAIN GATE
MAGAZINE POINT PENINSULA
PENSACOLA BAY
DUNCAN RD
MURRAY RD
TAYLOR RD
FISHER
FORREST SHERMAN FIELD
TOW WAY
PLEASANT GROVE
HWY. 292
RADFORD BLVD.
SITE 38
PENSACOLA BAY
FORT PICKENS
BIG LAGOON
GULF OF MEXICO
SANTA ROSA ISLAND
U.S. 90
U.S. 29
REGIONAL AIRPORT
PENSACOLA
U.S. HWY. 98
HWY. 292
NAVAL AIR STATION
PENSACOLA BAY
GULF OF MEXICO
2 0 2
SCALE MILES
LEGEND
SITE 38 – SITE NUMBER
– SITE LOCATION
2500 0 2500
SCALE FEET
NAVFAC
Naval Facilities Engineering Command
SOUTHERN DIVISION
RECORD OF DECISION
SITE 38
NAS PENSACOLA
PENSACOLA, FLORIDA
FIGURE 2-1
SITE LOCATION MAP
DWG DATE: 11/22/04
NAME: 0059001B021


16
631
PENSACOLA BAY
636
604
738
107
47
REMOVED UST 604S
18
BUILDING 604 STUDY AREA
BUILDING 71 STUDY AREA
52
45
707
3435
49
26
72
71
44
104
38
354
146
PENSACOLA BAY
LEGEND
– BUILDINGS AND STRUCTURES PREVIOUSLY REMOVED
– EXISTING BUILDINGS OR STRUCTURES
– SHORELINE
GL – GRAVITY LINE (SEWER)
FM – FORCE MAIN (SEWER)
– MANHOLE
150 0 150
SCALE FEET
NAVFAC
Naval Facilities Engineering Command
SOUTHERN DIVISION
RECORD OF DECISION
SITE 38
NAS PENSACOLA
PENSACOLA, FLORIDA
FIGURE 2–2
SITE 38
STUDY AREAS
DWG DATE:11/22/04
NAME: 0059001B022

The following box summarizes previous site investigations and other environmental actions that took place at NAS Pensacola before its placement on the National Priorities List (NPL) in December 1989.

Environmental Actions

IAS onsite survey, 1982	Characterization Study, March 1986
IAS final report, June 1983	Resource Conservation and Recovery Act (RCRA) Facility Assessment, 1988
Confirmation Study, 1984	RCRA/HSWA Permit, August 1988
Verification Study, July 1984	RCRA Closure Permits

Placed on NPL, December 1989

A FFA for NAS Pensacola was signed by FDEP, USEPA, and the Navy in October 1990. Following the listing of NAS Pensacola on the NPL and the signing of the FFA, remedial response activities at the facility have been completed under CERCLA authority. OU 11 is one of 13 OUs that have been identified. A RCRA Hazardous and Solid Waste Amendments (HSWA) permit was issued on August 26, 1988. The HSWA permit (0154498-004-HF) was last renewed on January 16, 2002 and is still in effect.

2.2.1 Site 38 History

Building 71 was a steel-framed structure with metal siding on a 10- to 14-inch-thick concrete slab. It was approximately 100 feet wide by 160 feet long and approximately 35 feet high. An interior concrete block wall divided it into a northern half, curbed with concrete in several places, and a southern half enclosing 10 dip tanks. The building was demolished in 1993. Building 71 was used from 1935 to the late 1970s for aircraft paint stripping and painting operations. Wastes from various operations, including paint stripping, were discharged to Pensacola Bay until the IWTP was built in 1973. Wastes previously entered the IWTP sewer line without any pretreatment or segregation.

From 1980 to 1989, hazardous waste was stored on the north side of Building 71, which was permitted for hazardous waste storage in January 1985 by the Florida Department of Environmental Regulation (FDER) which was later renamed FDEP (Kriegel, 1985; Naval Energy and Environmental Support Activity [NEESA], 1983). Eighty to several hundred 55-gallon drums were reported to have been stored in Building 71; the maximum permitted storage capacity was 15,950 gallons (i.e., 290 55-gallon drums). Waste stored during this period reportedly consisted of solvents, acids, caustics, oxidizers, and liquid and nonliquid toxic materials (E&E, 1992a). The

building has been demolished and the vacant lot is currently being used by the Navy for parking large truck trailers.

The associated IWTP sewer line includes gravity lines as well as a force main. Except for one 18-foot section constructed of 8-inch diameter polyvinyl chloride (PVC) pipe, the lines in this area are constructed of 8- to 12-inch diameter vitrified clay with hub and spigot joints. Building 3435, north of the Building 71 area, houses the lift station for the force main. The interconnected gravity lines, which serve operations at Buildings 604 and 104, and previously served operations at Building 71, flow to the lift station at Building 3435. The force main extends northeast from the lift station between Buildings 604 and 45 and continues north (east of Building 604) beyond the study area, where it eventually discharges to the IWTP north of the former Chevalier Field area.

Building 604 housed the NADEP metal plating operations until it was closed in May 1996. This two-story, irregularly shaped, brick/masonry structure was built in 1937 as a hangar on the west side of East Avenue in the old Navy yard. The building is not listed in the National Register of Historic Places; however, it was identified as possibly being eligible for listing. Plating operations were conducted in Buildings 29/604a, the western portion of Building 604, from approximately 1960 until the shop was demolished around 1970 (NEESA, 1983). The rubber shop, which made plastic items for aircraft, was also housed in Building 29 until 1961. This shop reportedly only used small amounts of solvents. Three cadmium plating lines and a magnesium treatment line were in the plating shop. Chromium was used in the magnesium treatment process. NEESA (1983) reports that 50-gallon tanks containing chromium solutions were drained approximately once a month; larger tanks were present but were drained less frequently. Reportedly, these tanks were emptied into sewer lines that discharged into Pensacola Bay (NEESA, 1983). Cyanide solutions were also used in the plating process. Before 1962, cyanide waste was disposed in the sanitary sewer. Cyanide and chromium wastes that were dumped into the sewer system were routed to bypass the treatment plant and flowed untreated into Pensacola Bay because plating wastes could upset the operation at the sewage treatment plant.

In approximately 1970, a much larger plating shop, the southwest portion of Building 604, was constructed at the site of Building 29/604a. Hazardous materials have been stored on the second floor of Building 604 since the early 1970s. Chemicals designated for separate storage on the Consolidated Hazardous Item List (CHIL) were consolidated into one segregated storage area.

Reportedly, the storage area was reorganized and cleaned up in 1981. Before that time, spills and leaks frequently occurred (NEESA, 1983).

2.2.2 Site Investigations

The following investigations and studies have been conducted in and around Site 38:

- **1987:** The IWTP sewer line was telespected by the Public Works Center (PWC) in July 1987. The sewer line associated with Building 71 was in generally good condition. However, several cracks were noted, and groundwater was observed to be infiltrating the line.

- **1989 and 1990:** The hazardous waste storage facility was closed under RCRA in 1989 (EnSafe, 1989). The closure permit was received in August 1989. The closure activities were outlined in a standard operating procedure (SOP) document prepared by EnSafe (1989), including decontamination of the walls and floors in the main storage area (north side of the building). Analytical results indicated contaminants remained on the walls of Building 71. In December 1990, the Navy authorized EnSafe to prepare an addendum to the SOP document to continue closure of the walls of Building 71. As agreed by the FDER, closure was not continued on the underlying slab and soil because they would be addressed under CERCLA. The subsequent decontamination was performed on December 19, 1990, in accordance with the SOP addendum (EnSafe, 1990b). Analytical results indicated the wall decontamination was successful for the hazardous waste constituents (EnSafe, 1991). A clean-closure certificate dated October 24, 1994, was issued by FDEP. Until the remedial investigation/feasibility study (RI/FS), no other investigations were conducted in the Building 71 area.

- **1991:** This Phase I investigation conducted by Ecology & Environment, Inc. (E&E), included the Site 38 associated sewer line (TL 073/C southwest to the end) and was completed in 1991. Soil samples, which were composited over 5-foot sample intervals (i.e., 0 to 5 feet below land surface [bls], 5 to 10 feet bls, etc.), had concentrations of metals, total recoverable petroleum hydrocarbons (TRPHs), total polyaromatic hydrocarbons (PAHs) as benzo(a)pyrene, and phenol as trichlorophenol at or above the instrument detection limit. Concentrations of metals, total PAHs as benzo(a)pyrene and phenols as trichlorophenol were present in groundwater samples.

- **1992:** ABB Environmental Services investigated an underground storage tank (UST) next to Building 604 in 1992. Twelve soil borings were advanced and completed as monitoring wells. Groundwater samples were collected and submitted for laboratory analysis. Detected parameters include cadmium, lead, TRPH, naphthalene, and volatile organic compounds (VOCs) including vinyl chloride, trichloroethene (TCE), and tetrachloroethylene (PCE [ABB, 1992]). The area was subsequently transferred to the IRP.

  1993: EnSafe/Allen & Hoshall (E/A&H) investigated the nature and magnitude of contamination at two sections of the IWTP sewer line in February 1993; one section was the Site 38 — associated IWTP sewer line. The data are included in the Site 38 RI report.

- **1994 – 2004:** Surface and subsurface soil samples were collected and analyzed for target compound list (TCL) VOCs, semivolatile organic compounds (SVOCs), pesticides, and polychlorinated biphenyls (PCBs), and target analyte list (TAL) inorganics. Shallow and intermediate depth monitoring wells were installed and the groundwater samples were analyzed for TCL VOCs, SVOCs, pesticides, and PCBs and TAL inorganics. Contamination was detected in surface soil, subsurface soil and shallow groundwater. Additional groundwater sampling events were conducted to assess the effectiveness of monitored natural attenuation in groundwater. Based upon the results of the previous investigations, groundwater and soil chemicals of concern (COCs) were identified and remedial goals established. Groundwater and soil remedial technologies were screened, and remedial alternatives were assembled, analyzed, and compared.

2.3 Highlights of Community Participation

Public notices of the availability of the Proposed Plan (EnSafe, 2005) were placed in the *Pensacola News Journal* on July 3, 2005. A 45-day comment period was held from July 1 to August 14, 2005. Public comments and the responses to these comments are presented in the Responsiveness Summary provided in Appendix A.

Documents pertaining to OU 11 (Site 38) are available to the public at the Information Repository located at the NAS Pensacola Library, Building 634 or at the John C. Pace Library at the University of West Florida. This ROD will become part of the Administrative Record File [NCP §300.825(a)(2)].

2.4 Scope and Role of Operable Unit

As with many NPL sites, the problems at NAS Pensacola are complex. As a result, NAS Pensacola was organized into 14 separate OUs. The purpose of each OU is defined in the FY 2005 Site Management Plan (SOUTHNAVFACENGCOM, 2004) for NAS Pensacola, which is in the Administrative Record. Remedies have already been selected and implemented for nine OUs. A ROD for OU 13 is being completed concurrently with this OU 11 ROD. An RI/FS is in progress at OU 2 (Sites 11, 12, 25, 26, 27, and 30), OU 16 (Site 41) and OU 18 (Site 44). This is the only ROD contemplated for Site 38 — OU 11.

Investigations at OU 11, Site 38 indicated the presence of soil and groundwater contamination from past operating practices. This contamination could pose an unacceptable human health risk if residential development occurred at the site or if the groundwater was used as a potable water source.

The following RAOs were established for soil and groundwater at OU 11, Site 38:

- Prevent unacceptable risk from exposure to surface soil.
- Prevent unacceptable risk from ingestion of groundwater with concentrations greater than the FDEP GCTL (Chapter 62-777 Florida Administrative Code [F.A.C.]) and the federal Maximum Contaminant Level (MCL).
- Reduce detected concentrations in groundwater to less than the FDEP GCTL (Chapter 62-777 F.A.C.) and federal MCL.
- Reduce detected concentrations in groundwater next to the surface water body to below surface water CTLs (Chapter 62-777 F.A.C.) and federal water criteria.

The remedy documented in this ROD is expected to achieve these RAOs.

2.5 Summary of Site Characteristics

Contaminant sources, detected concentrations, fate and transport, contaminated media, and geologic and hydrogeologic conditions of OU 11, Site 38 are discussed in Sections 6, 7, and 9 of the OU 11, Site 38 RI Report (EnSafe, 1998) and two RI Report Addendums (EnSafe, 1999 and 2002). These site characteristics are summarized in the following paragraphs.

2.5.1 Geology and Hydrogeology

Site 38 lies within a developed area of the base. The site, in particular the Building 71 area, borders the Pensacola Bay. The entire site area is generally flat with land surface elevations approximately 3 to 8 feet above mean sea level (msl). The extensive pavement at Site 38 generally inhibits percolation of direct rainfall through site soil, however, infiltration does occur in some exposed areas. Rainwater from Site 38 tends to flow over paved and unpaved surfaces into the existing storm water sewer system.

Surface soil at NAS Pensacola consists primarily of highly permeable sands, which limit stream formation. Several naturally occurring intermittent streams and numerous man-made drainage ditches flow south into Pensacola Bay, which has a mean depth of 10 feet in the NAS Pensacola area.

Three main hydrogeologic units underlie the site. These units, in ascending order, are the Floridan aquifer system, the intermediate aquifer system or confining unit, and the surficial/sand-and-gravel aquifer.

The depth to groundwater at Site 38 ranges from approximately 2.5 feet to approximately 8 feet below land surface (bls). Groundwater flow at Site 38 is generally southerly toward Pensacola Bay. Groundwater is not currently used as a potable water source at NAS Pensacola, which receives its potable water from Corry Station, approximately four miles north. Wells at Site 38 monitor both the shallow and intermediate zones.

Based on the water level measurements taken during the RI, groundwater flows to the south across the site. The groundwater gradient at the site is approximately 0.0006 to 0.0027 feet/foot.

The velocity of groundwater flow was calculated using Darcy's Law. The estimated velocity of the shallow groundwater ranges from 1.38 to 3.18 feet/day. Estimated velocity of intermediate groundwater ranges from 0.10 to 0.61 feet/day.

2.5.2 Nature and Extent of Contamination

2.5.2.1 Soil

Three soil sampling events, IWTP, RI, and USEPA, were performed at Site 38 and are summarized in the RI report. Soil data identified constituents above applicable criteria identified as the FDEP Residential Soil Cleanup Target Levels (RSCTLs), Industrial Soil Cleanup Target Levels

(ISCTLs), and Leachability Criteria in surface and subsurface soil. The CTLs are in Chapter 62-777 F.A.C.

Building 71

Surface soil: Inorganics, SVOCs, pesticides, and PCBs exceeded applicable criteria for the Building 71 study area. Inorganic contamination beneath Building 71 diminished with distance from the building. Organic exceedances in Building 71 surface soil were very limited. Pesticide and PCB exceedances were limited to two locations.

Subsurface soil: Inorganics, SVOCs, pesticides, and VOCs exceeded their criteria. Again, much of the contamination appeared to be beneath Building 71. Inorganic and pesticide exceedances were consistent with those in surface soil. SVOC and VOC exceedances were extensive in subsurface soil beneath Building 71. In general, the contaminants included heavy metals, chlorinated solvents, and petroleum solvents potentially related to past paint stripping and metal refinishing activities at Building 71. Soil in the Building 71 study area is completely covered with concrete or asphalt.

Building 604

Surface soil: Inorganics, SVOCs, pesticides, and PCBs exceeded their criteria in surface soil. Many of the inorganic parameters, including aluminum, arsenic, and iron were fairly ubiquitous across the site and may reflect, in part, local ambient concentrations. Heavy metals related to past plating activities exceeded applicable criteria in the surface soil surrounding the former plating facility at the southwest portion of Building 604. SVOC contaminant exceedances were primarily associated with the IWTP line, except for one location beneath the southern part of Building 604. Parts cleaning took place in the general vicinity of this sample. Pesticides and PCBs exceeded their criteria in samples from grassy areas onsite. Pesticide detections in these areas are likely the result of residuals remaining from routine spraying.

Subsurface soil: Contaminants detected at Building 604 above applicable criteria included inorganics, SVOCs, pesticides, and VOCs. Heavy metals, including chromium and cadmium, were detected above reference concentrations (RCs) and applicable criteria near the former plating facility. SVOC exceedances included polyaromatic hydrocarbons (PAHs) at one location along the IWTP line. Dieldrin was the only pesticide detected. Its presence is likely a result of routine application of pesticides in the area. Two VOCs exceeded applicable criteria: TCE and PCE. In summary, chemicals of potential concern (COPCs) and areas that exceeded applicable criteria were identified.

A statistical evaluation was conducted to determine the areas of soil requiring removal so that the site-wide 95% upper confidence limit (UCL) of the remaining concentrations of each contaminant was equal to or less than the SCTL for direct residential (unrestricted) or industrial (restricted) exposure. The results of this statistical evaluation are presented in the Feasibility Study report for Site 38 (EnSafe, 2004) and are summarized in the risk assessment section.

2.5.2.2 Groundwater

The 2000 groundwater sampling data were compared with Chapter 62-777, F.A.C. GCTLs, Surface Water Cleanup Target Levels (Marine Surface Water Quality Criteria (MSWQ), RCs, and Natural Attenuation Default Source concentrations (NADS) to evaluate the nature and extent of contamination. This rule incorporates all primary and secondary Florida groundwater standards as provided in Chapters 62-520 and 62-550 and all surface water standards as provided in Chapter 62-302. Inorganics were also compared with their RCs. RCs for aluminum, antimony, iron, and thallium exceeded their associated GCTLs, indicating that these metals naturally occur at relatively high concentrations at NAS Pensacola. These RCs are also consistent with Florida Geological Survey's regional reference data for Escambia County (EnSafe, 1996).

2.5.3 Current and Potential Future Site Uses

The Building 71 area is currently used for parking and the Building 604 area is used for MWR storage. Site RAOs support restricted risk exposure; therefore, potential future uses for Site 38 are limited to commercial/industrial and recreational land use. Because of damage caused by Hurricane Ivan, many of the buildings in the Site 38 area, will be demolished and the projected future land use for the site area is designated as "green space area" (recreational) including a walking trail along the Pensacola Bay waterfront. Surface soil areas identified as exceeding SCTLs will be removed and replaced by clean fill.

2.6 Summary of Site Risks

2.6.1 Human Health Risk Assessment

To determine potential risks to human health from exposure to contaminants in soil and groundwater, the baseline risk assessment (BRA) was presented in Section 10 of the RI Report. Human health risk associated with exposure to contaminants in soil and groundwater was assessed for two potential scenarios:

- future site residents (under a residential/unrestricted use scenario), and
- current and future site workers and maintenance personnel (under an industrial/restricted use scenario).

The full study can be found in the RI Report, which is in the Administrative Record. Additional evaluation to account for FDEP Preliminary Risk Evaluation (PRE) requirements (i.e., comparison to 3 times SCTL, acute toxicity evaluation, 95% UCL calculations) was presented in the Focused Feasibility Study (FFS) Report. The PRE is a screening level evaluation of potential risks from site constituents to human receptors at the site. The risks calculated in a PRE are derived by a comparison of exposure concentrations to CTLs. These CTLs are derived using default exposure assumptions established by FDEP. There are no deviations between the Navy and the regulatory agencies regarding those exposure assumptions or pathways defined by the regulatory agencies for residential and industrial exposures. Florida's acceptable risk is 1.0E-6 (1 in 1,000,000) and it is that risk level on which CTLs are based. The USEPA's acceptable target risk range is 1.0E-4 to 1.0E-6 (1 in 10,000 to 1 in 1,000,000). The PRE results are the risk evaluation on which remedial decision will be based, therefore the PRE is summarized in this section of the ROD. Because of the geographic separation of the sites, the Building 71 and 604 areas are discussed separately.

The PRE was conducted to refine the list of *potential* contaminants to *actual* COCs using tools recommended by FDEP:

- COPCs were compared to three times the SCTL (3X SCTL) for both residential/unrestricted and industrial/restricted scenarios to determine whether the location was a "hot spot." If a contaminant concentration exceeded 3X SCTL, it was considered a COC.
- In addition, for each COPC, the 95% UCL was calculated to determine the average contaminant concentration over an entire area or "site-wide," because the location of an individual's exposure is likely to be over an entire area. Each 95% UCL was then compared to its respective SCTL. If the 95% UCL exceeded its respective SCTL then it was considered a COC.
- All soil detections were also compared to FDEP's Leachability SCTL to determine the likelihood of contaminants leaching into the groundwater. Contaminant concentrations exceeding their respective leachability SCTLs are also COCs.

COCs were identified for the two scenarios — residential/unrestricted and industrial/restricted — for both surface and subsurface soil intervals.

- Under the residential/unrestricted scenario, all the COCs were identified as described above.
- Under the industrial/restricted scenario, all the COCs were identified as described above with the exception that only locations with a "grassy" surface were included. Locations

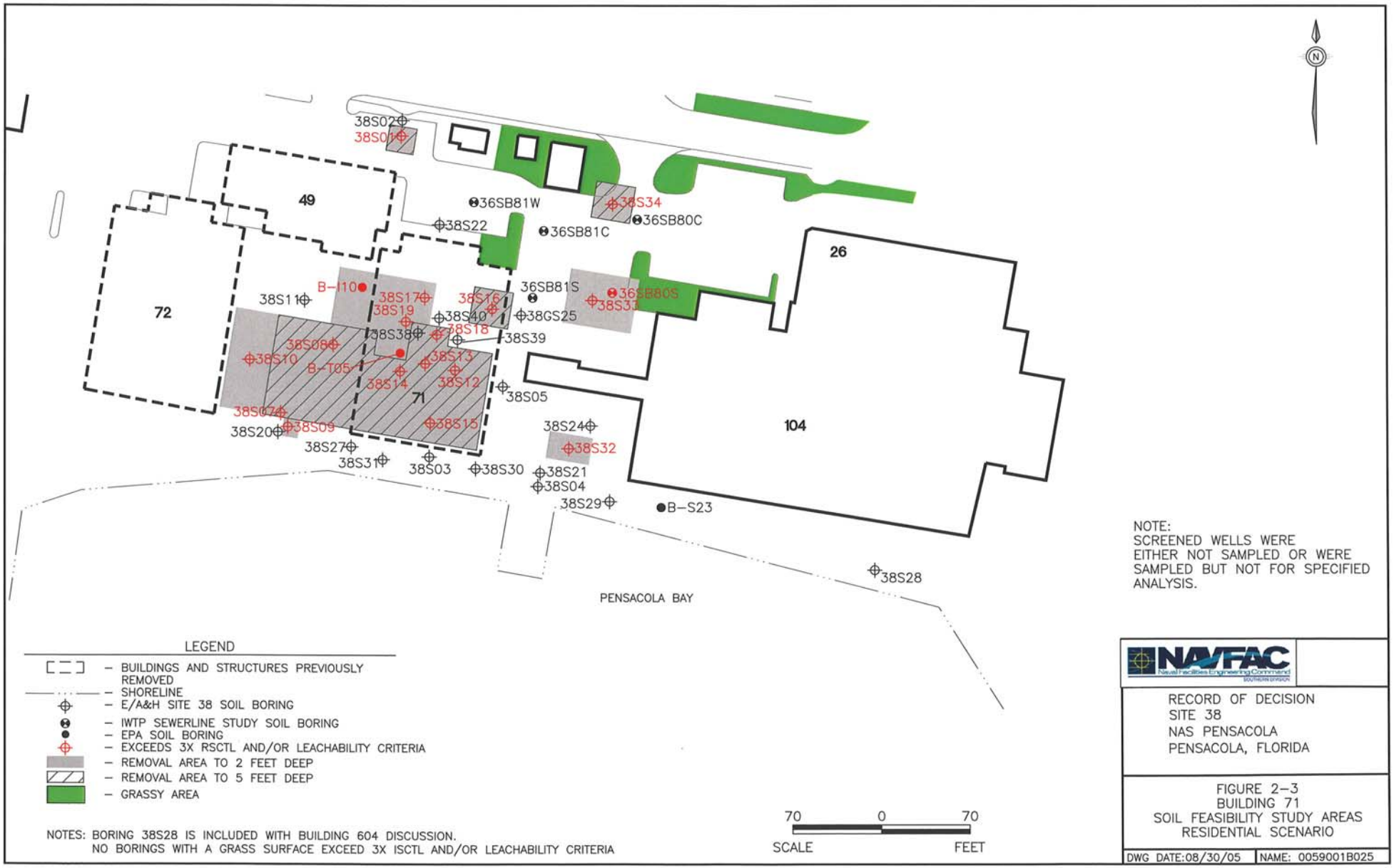
under concrete or asphalt pavement were not included because the exposure pathway is incomplete (i.e., surface soil is not exposed and rain water will not infiltrate).

Table 2-1 lists the soil COCs retained in the Building 71 area and Table 2-2 lists the soil COCs retained in the Building 604 area. Figures 2-3 and 2-4 present the soil requiring action in the Building 71 and 604 areas respectively under an unrestricted (residential) use scenario. Figures 2-5 and 2-6 present the soil requiring action in the Building 71 and 604 areas under a restricted (industrial) use scenario.

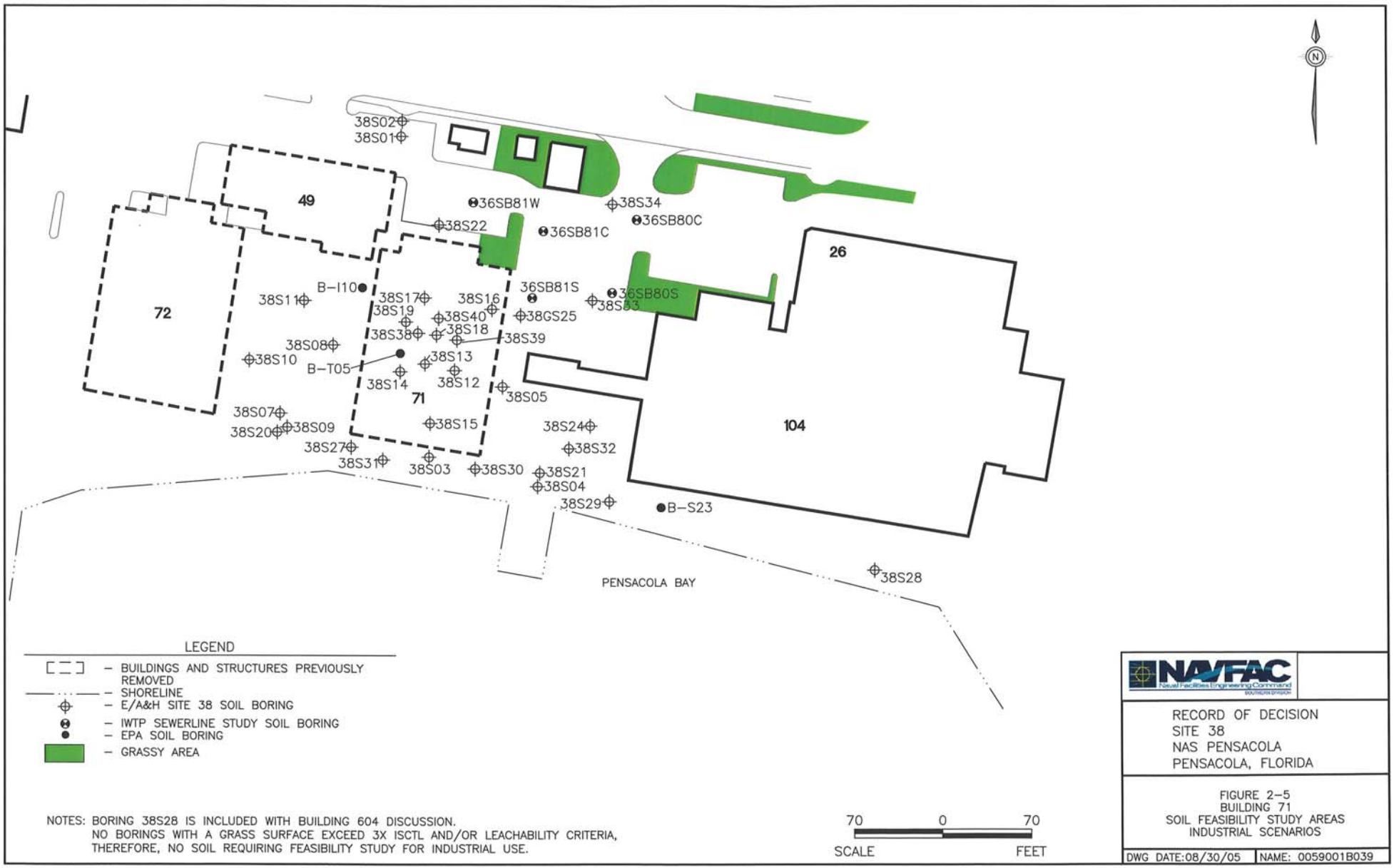
Site 38 groundwater has been sampled four times: 1993/1994 (original RI), 1995 (USEPA), 1998/1999, and 2000. Groundwater concentrations decreased over these sampling events. Data from the 2000 sampling event represent the current conditions of the groundwater contaminant plume; therefore, the 2000 sampling event data were used to define the nature and extent of contamination and delineate areas requiring further assessment. Analytical data collected from groundwater sampling are compared with RC and GCTLs. As with the soil, the larger value (GCTL or RC) was used as the screening criterion. Also, the three most downgradient wells at each study area were compared with MSWQ criteria to evaluate concentrations at a representative point of discharge into Pensacola Bay. For the Building 71 study area, wells 38GS02, 38GS03, and 38GS13 were used in this comparison. These wells are approximately 32 feet from the sea wall. For the Building 604 study area, wells 38GS07, 38GS18, and 38GS32 were used; these wells are approximately 130 feet from Pensacola Bay. Lastly, groundwater concentrations were compared against NADS concentrations in Chapter 62-777 F.A.C. to evaluate natural attenuation. Contaminants exceeding any of these criteria were listed as COCs. Frequency of detection, range of detected concentrations, GCTLs/RCs, and MSWCTLs for Building 71 and 604 areas are presented in Table 2-3. The groundwater contaminant plumes for Building 71 and 604 are shown on Figures 2-7 and 2-8.

2.6.2 Ecological Risk Assessment

There are no risks to environmental receptors associated with surface soil contamination. This is primarily because there are no natural terrestrial habitat features (e.g., open space or trees) in or around Site 38. The only terrestrial receptors are shorebirds that periodically visit the area. Additionally, most of the site is covered by asphalt, concrete, and buildings preventing exposure to soil. Contamination in the small grassy areas is minimal. Removal of the top 2 feet of soil across Site 38 will make this pathway incomplete.


38S02
38S01
49
36SB81W
38S34
36SB80C
38S22
36SB81C
26
72
B-I10
38S11
38S17
38S19
36SB81S
38S16
36SB80S
38S33
38S40
38GS25
38S38
38S18
38S39
38S08
38S10
B-T05
38S13
38S14
38S12
71
38S05
104
38S07
38S20
38S09
38S15
38S24
38S32
38S27
38S31
38S03
38S30
38S21
38S04
38S29
B-S23
38S28
PENSACOLA BAY
LEGEND
– BUILDINGS AND STRUCTURES PREVIOUSLY REMOVED
– SHORELINE
– E/A&H SITE 38 SOIL BORING
– IWTP SEWERLINE STUDY SOIL BORING
– EPA SOIL BORING
– EXCEEDS 3X RSCTL AND/OR LEACHABILITY CRITERIA
– REMOVAL AREA TO 2 FEET DEEP
– REMOVAL AREA TO 5 FEET DEEP
– GRASSY AREA
NOTES: BORING 38S28 IS INCLUDED WITH BUILDING 604 DISCUSSION.
NO BORINGS WITH A GRASS SURFACE EXCEED 3X ISCTL AND/OR LEACHABILITY CRITERIA
70 0 70
SCALE FEET
NOTE:
SCREENED WELLS WERE EITHER NOT SAMPLED OR WERE SAMPLED BUT NOT FOR SPECIFIED ANALYSIS.
NAVFAC
Naval Facilities Engineering Command
SOUTHERN DIVISION
RECORD OF DECISION
SITE 38
NAS PENSACOLA
PENSACOLA, FLORIDA
FIGURE 2-3
BUILDING 71
SOIL FEASIBILITY STUDY AREAS
RESIDENTIAL SCENARIO
DWG DATE:08/30/05
NAME: 0059001B025


16
B-T37
B-T36
636
B-T34
604
B-T33
B-T32
B-T31
B-T29
B-T35
47
B-T30
B-T27
B-T26
B-T28
38S48
18
B-T09
38S49
B-T22
B-T01
B-T42
B-T08
36SB77N
B-T41
B-T23
B-T40
38S37
B-T17
36SB77W
B-T39
36SB75G
36SB77C
B-T10
36SB75E
B-T02
B-T38
36SB76W
36SB74N
38SB76C
36SB76E
B-T04
36SB77S
38S36
52
38S41
38S35
38S26
B-T16
36SB78W
38S42
B-T14
36SB74W
36SB74C
36SB78C
38S43
36SB76S
36SB73C
B-T20
36SB78E
B-T19
B-T06
36SB79C
45
B-T07
B-T03
B-T11
36SB78S
B-T12
B-T18
B-T25
26
44
B-T13
38
B-T15
LEGEND
– BUILDINGS AND STRUCTURES PREVIOUSLY REMOVED
– SHORELINE
– E/A&H SITE 38 SOIL BORING
– IWTP SEWERLINE STUDY SOIL BORING
– EPA SOIL BORING
– EXCEEDS 3X RSCTL AND/OR LEACHABILITY CRITERIA
– REMOVAL AREA TO 2 FEET DEEP
– REMOVAL AREA TO 5 FEET DEEP
– GRASSY AREA
NOTES: BORING 38S28 IS SHOWN ON FIGURES FOR BUILDING 71.
100 0 100
SCALE FEET
NAVFAC
Naval Facilities Engineering Command
SOUTHERN DIVISION
RECORD OF DECISION
SITE 38
NAS PENSACOLA
PENSACOLA, FLORIDA
FIGURE 2-4
BUILDING 604
SOIL FEASIBILITY STUDY AREAS
RESIDENTIAL SCENARIOS
DWG DATE:08/30/05
NAME: 0059001B028

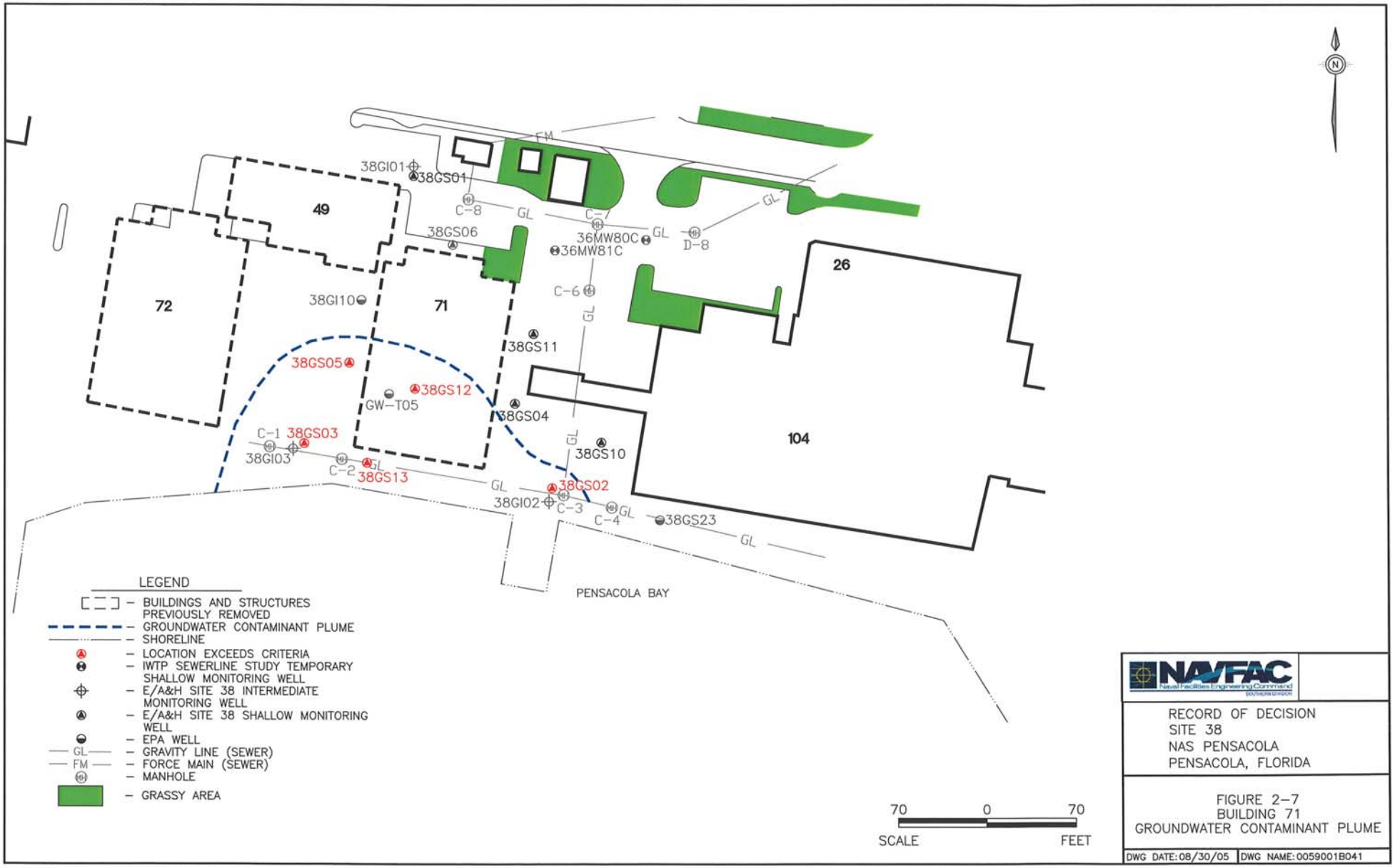

38S02
38S01
49
36SB81W
38S34
36SB80C
38S22
36SB81C
26
72
B–I10
36SB81S
36SB80S
38S11
38S17
38S16
38S33
38S19
38S40
38GS25
38S38
38S18
38S39
38S08
38S10
B–T05
38S13
38S14
38S12
38S05
71
104
38S07
38S20
38S09
38S15
38S24
38S27
38S32
38S31
38S03
38S30
38S21
38S04
38S29
B–S23
PENSACOLA BAY
38S28
LEGEND
– BUILDINGS AND STRUCTURES PREVIOUSLY REMOVED
– SHORELINE
– E/A&H SITE 38 SOIL BORING
– IWTP SEWERLINE STUDY SOIL BORING
– EPA SOIL BORING
– GRASSY AREA
NOTES: BORING 38S28 IS INCLUDED WITH BUILDING 604 DISCUSSION.
NO BORINGS WITH A GRASS SURFACE EXCEED 3X ISCTL AND/OR LEACHABILITY CRITERIA, THEREFORE, NO SOIL REQUIRING FEASIBILITY STUDY FOR INDUSTRIAL USE.
70 0 70
SCALE FEET
NAVFAC
Naval Facilities Engineering Command
SOUTHERN DIVISION
RECORD OF DECISION
SITE 38
NAS PENSACOLA
PENSACOLA, FLORIDA
FIGURE 2–5
BUILDING 71
SOIL FEASIBILITY STUDY AREAS
INDUSTRIAL SCENARIOS
DWG DATE:08/30/05
NAME: 0059001B039

NAVFAC Naval Facilities Engineering Command SOUTHERN DIVISION

RECORD OF DECISION
SITE 38
NAS PENSACOLA
PENSACOLA, FLORIDA

FIGURE 2-6
BUILDING 604
SOIL FEASIBILITY STUDY AREAS
INDUSTRIAL SCENARIOS

DWG DATE:08/30/05 | NAME: 0059001B026



NAVFAC Naval Facilities Engineering Command Southern Division

RECORD OF DECISION
SITE 38
NAS PENSACOLA
PENSACOLA, FLORIDA

FIGURE 2-7
BUILDING 71
GROUNDWATER CONTAMINANT PLUME

DWG DATE: 08/30/05 | DWG NAME: 0059001B041


16
38GS28
38GS31
636
18GS02
604
38GS25
38GR52
38GS27
38GS30
47
18
38GS22
38GS21
38GS19
38GS20
38GS17
38GS14
38GS24
36MW75C
38GS15
38GR54
38GS08
36MW76C
38GS26
52
38GI08
38GS18
38GS16
38GI07
38GS07
38GS09
38GS29
38GI09
36MW74C
36MW73C
36MW79C
45
26
38GS32
44
38
LEGEND
– BUILDINGS AND STRUCTURES PREVIOUSLY REMOVED
– GROUNDWATER CONTAMINANT PLUME
– SHORELINE
– SAMPLED 2000
– LOCATION EXCEEDS CRITERIA
– IWTP SEWERLINE STUDY TEMPORARY SHALLOW MONITORING WELL
– E/A&H SITE 38 INTERMEDIATE MONITORING WELL
– E/A&H SITE 38 SHALLOW MONITORING WELL
– EPA WELL
– GRASSY AREA
100 0 100
SCALE FEET
NAVFAC
Naval Facilities Engineering Command
SOUTHERN DIVISION
RECORD OF DECISION
SITE 38
NAS PENSACOLA
PENSACOLA, FLORIDA
FIGURE 2-8
BUILDING 604
GROUNDWATER CONTAMINANT PLUME
DWG DATE: 08/30/05
DWG NAME: 0059001B040

Table 2-1
COCs and Medium Specific EPCs
Building 71 Area – Site 38
NAS Pensacola

Chemical	Frequency of Detection	Range of Detection	Units	95% UCL	SCTL Direct Exposure Residential	SCTL Direct Exposure Industrial	SCTL Leachability to Groundwater	RC
Surface Soil								
Arsenic	20/37	0.28 - 3.9	ppm	1.6	2.1	12	NA	1.56
Chromium	38/40	0.99 - 713	ppm	119.69	210	470	38	6.17
Copper	35/37	1.7 - 5,340	ppm	790	150	89,000	NA	5.72
Lead	37/37	7.6 - 273	ppm	NC	400	1400	NA	7.35
Vanadium	18/37	1 - 33.4	ppm	10.7	67	10,000	980	5.83
Aroclor 1254	3/34	81 - 16,000	ppb	16,000	500	2,600	17,000	NA
Benzo(a)pyrene	8/34	41 - 690	ppb	NC	100	700	8,000	NA
Phenol	7/37	39 - 990	ppb	NC	500,000	220,000,000	50	NA
1,2-Dichloroethane	2/37	5 - 27	ppb	NC	500	700	10	NA
2-Methylphenol	2/37	42 - 340	ppb	NC	2,900,000	31,000,000	300	NA
4-Methylphenol	1/31	740	ppb	NC	300,000	3,400,000	30	NA
Tetrachloroethene	15/37	1 - 1,100	ppb	NC	8,800	18,000	30	NA
Trichloroethene	15/37	1 - 390	ppb	NC	6,400	9,300	30	NA
Subsurface Soil								
Arsenic	16/42	0.3 - 15.6	ppm	2.6	2.1	12	NA	1.56
Chromium	38/42	1.1 - 553	ppm	69	210	470	38	6.17
Copper	38/42	0.46 - 390	ppm	46	150	89,000	NA	5.72
Lead	42/42	1.3 - 491	ppm	151	400	1,400	NA	7.35
Vanadium	9/42	1.5 - 15	ppm	NC	67	10,000	980	5.83
Aroclor 1254	4/42	72 - 11,000	ppb	11,000	500	2,600	17,000	NA
BEQ	6/42	40 - 440	ppb	410	100	700	8,000	NA
Phenol	5/42	46 - 830	ppb	NC	500,000	220,000,000	50	NA
1,2-Dichloroethane	2/42	2 - 22	ppb	NC	500	700	10	NA
4-Methylphenol	2/42	190 - 580	ppb	NC	300,000	3,400,000	30	NA
Tetrachloroethene	20/42	1 - 410	ppb	NC	8,800	18,000	30	NA
Trichloroethene	20/42	1 - 400	ppb	NC	6,400	9,300	30	NA

Notes:
Because of an increase in the vanadium SCTLs, vanadium is no longer considered a COC.
Although the 95% UCL does not exceed its RSCTL, copper is retained as a COC because the maximum detected concentration exceeds the RSCTL. Copper poses an acute toxicity risk under an unrestricted use scenario and therefore, cannot exceed its RSCTL at any location. Copper is not considered a COC under an industrial scenario.
Lead is retained as a COC based on the results of the Integrated Exposure Uptake Biokinetic model under an unrestricted use scenario. Lead is not retained under an industrial scenario.
Because of an increase in the acetone leachability SCTL, acetone is no longer considered a COC.
ppm = parts per million or milligrams per kilogram
ppb = parts per billion or micrograms per kilogram

Table 2-2
COCs and Medium Specific EPCs
Building 604 Area – Site 38
NAS Pensacola

Chemical	Frequency of Detection	Range of Detection	Units	95% UCL	SCTL Direct Exposure Residential	SCTL Direct Exposure Industrial	SCTL Leachability to Groundwater	RC
Surface Soil								
Antimony	2/102	1.8 - 2.6	ppm	NC	27	370	5.4	9.48
Arsenic	33/102	1.8 - 21.1	ppm	3.3	2.1	12	NA	1.56
Cadmium	30/102	0.5 - 21	ppm	NC	82	1,700	7.5	1
Chromium	68/102	1 - 48	ppm	NC	210	470	38	6.17
Copper	87/102	0.79 - 607	ppm	74	150	89,000	NA	5.72
Lead	90/102	0.8 - 146	ppm	139	400	1400	NA	7.35
Vanadium	61/102	0.51 - 55	ppm	12	67	10,000	980	5.83
beta-BHC	1/51	56 - 56	ppb	NC	500	2,400	1	NA
delta-BHC	1/51	300 - 300	ppb	NC	24,000	490,000	200	NA
Dieldrin	10/51	0.94 - 84	ppb	23	60	300	2	NA
Benzo(a)pyrene	10/100	160 - 2200	ppb	1960	100	700	8,000	NA
Acetone	6/100	13 - 1,300	ppb	NC	11,000,000	68,000,000	25,000	NA
Methylene Chloride	9/100	4 - 820	ppb	NC	17,000	26,000	20	NA
Tetrachloroethene	6/100	10 - 1300	ppb	NC	8,800	18,000	30	NA
Subsurface Soil								
Antimony	2/27	2.2 - 6.1	ppm	NC	27	370	5.4	9.48
Arsenic	18/27	0.16 - 8.2	ppm	3	2.1	12	NA	1.56
Cadmium	7/27	0.3 - 4.9	ppm	NC	82	1,700	7.5	1
Chromium	22/27	0.76 - 11.1	ppm	NC	210	470	38	6.17
Copper	27/27	0.44 - 177	ppm	67	150	89,000	NA	5.72
Lead	27/27	0.24 - 11.1	ppm	242	400	1,400	NA	7.35
Vanadium	15/27	0.3 - 21.5	ppm	6.2	67	10,000	980	5.83
Dieldrin	2/27	1.6 - 4.4	ppb	NC	60	300	2	NA
Benzo(a)anthracene	3/27	220 - 4,500	ppb	4,500	#	#	800	NA
Benzo(a)pyrene	4/27	190 - 4,500	ppb	4,500	100	700	8,000	NA
Benzo(b)fluoranthene	5/27	48 - 8,300	ppb	8,300	#	#	2,400	NA
Dibenz(a,h)anthracene	1/27	800 - 800	ppb	800	#	#	700	NA
Acetone	9/27	11 - 230	ppb	NC	11,000,000	68,000,000	25,000	NA
Methylene Chloride	6/27	3 - 7	ppb	NC	17,000	26,000	20	NA
PCE	2/27	4 - 19	ppb	NC	8,800	18,000	30	NA

Notes:

Because of an increase in the vanadium SCTLs, vanadium is no longer considered a COC.

Although the 95% UCL does not exceed its RSCTL, copper is retained as a COC because the maximum detected concentration exceeds the RSCTL. Copper poses an acute toxicity risk under an unrestricted use scenario and therefore, cannot exceed its RSCTL at any location. Copper is not considered a COC under an industrial scenario.

Lead is retained as a COC based on the results of the Integrated Exposure Uptake Biokinetic model under an unrestricted use scenario. Lead is not retained under an industrial scenario.

Because of an increase in the acetone leachability SCTL, acetone is no longer considered a COC.

ppm = parts per million or milligrams per kilogram

ppb = parts per billion or micrograms per kilogram

Table 2-3
Groundwater COCs and Remedial Goals

			Building 71 Area					Building 604 Area				
Parameter	**GCTL/RC**	**MSWCTL**	**Number Detected**	**Number Analyzed**	**Minimum Detect (µg/L)**	**Maximum Detect (µg/L)**	**Average Detect (µg/L)**	**Number Detected**	**Number Analyzed**	**Minimum Detect (µg/L)**	**Maximum Detect (µg/L)**	**Average Detect (µg/L)**
Acenaphthene	20	3	1	2	1	1	1	1	2	**79**	**79**	79
Anthracene	2100	0.3	0	2	NA	NA	NA	1	2	11	11	11
Dibenzofuran	28	67	1	2	1	1	1	1	2	**91**	**91**	91
Fluoranthene	280	0.3	0	2	NA	NA	NA	1	2	24	24	24
Fluorene	280	30	2	2	0.7	1	0.85	0	2	NA	NA	NA
Naphthalene	14	26	1	2	4	4	4	1	2	**170**	**170**	170
Phenanthrene	210	0.3	0	2	NA	NA	NA	1	2	190	190	190
Pyrene	210	0.3	0	2	NA	NA	NA	1	2	11	11	11
1,2-Dibromo-3-Chloropropar	0.2	NA	0	8	NA	NA	NA	1	17	**1**	**1**	1
Ethylbenzene	30	610	1	8	20	20	20	3	17	0.8	**53**	19.9
Tetrachloroethene	3	8.85	3	8	0.5	**11**	4.83	8	17	1	**27**	10.9
Trichloroethene	3	80.7	4	8	**3**	**6**	4.5	10	17	0.5	**20**	9.51
Vinyl chloride	1	2.4	4	8	**1**	**7**	3.75	12	17	0.7	**22**	7.78
Barium	2000	NA	8	8	21	68	44.4	17	17	0.67	110	63.3
Cadmium	5	9.3	4	8	0.41	**5.9**	2.71	7	17	0.67	**150**	38
Copper	1000	2.9	7	8	2.8	17	8.39	8	17	2.9	40	13.9
Iron	1707.83*	300	7	8	55	230	137	15	17	18	**6100**	642
Lead	15	8.5	5	8	2.4	14	5.02	9	17	1.8	**59**	11.9
Manganese	50	NA	8	8	8.9	33	18.8	13	17	1.4	**190**	37.1
Mercury	2	0.025	0	8	NA	NA	NA	1	17	0.46	0.46	0.46
Zinc	5000	86	5	8	21	500	173	10	17	13	370	84.6

Notes:
* = reference concentration
µg/L = micrograms per liter or parts per billion

2.7 Remedial Goals

A RG is the target concentration to which a COC must be reduced within a particular medium of concern to achieve one or more of the established RAOs. RGs are developed to ensure that contaminant concentration levels left onsite are protective of human and ecological receptors. For Site 38, RGs were established based on the following criteria:

- Protection of human health from direct exposure to contaminated soil and groundwater
- Compliance with ARARs, and to the extent practicable, To Be Considered (TBC) criteria

2.7.1 Soil RG

The soil RGs are listed in Tables 2-1 and 2-2. Under the industrial/restricted use scenario, the RGs are the ISCTLs or the RCs whichever is higher.

2.7.2 Groundwater RG

The groundwater RGs are listed in Table 2-3 and are the GCTLs or RCs for groundwater. Monitoring wells closest to Pensacola Bay must also meet the MSWCTLs.

2.8 Description of Remedial Alternatives

This section provides a narrative of each alternative evaluated for the remediation of soil and groundwater at OU 11, Site 38. For further information on the remedial alternatives, refer to the FFS (EnSafe, 2004) and the proposed plan (EnSafe, 2005). The remedy selected for this ROD is presented in Section 2.10. As part of the FFS, each of the following alternatives was evaluated for compliance with related ARARs; Appendix A of the FFS presents a complete list of ARARs. The ARARs presented in Section 2.11 of this ROD are specific to the selected remedy.

2.8.1 Soil Remedial Alternatives

Five remedial alternatives were analyzed for OU 11, Site 38 soil. This ROD has selected Soil Alternative S4: Excavation of Industrial Hot Spots and Leachability Criteria Exceedances with Offsite Disposal. This alternative includes a LUC to prevent residential use. These alternatives are summarized in Table 2-4 and in this section.

2.8.1.1 Soil Alternative S1: No Action

This alternative is required by the NCP as a baseline for comparison with other alternatives. Under this alternative, no response action would be conducted to reduce volume, mobility, or toxicity of

Table 2-4
Evaluation of Soil Alternatives at Site 38 – NAS Pensacola

Criteria	Alternative S1: No Action	Alternative S2: Existing Site Caps with LUCs	Alternative S3: Excavation for Unrestricted Use with Offsite Disposal	Alternative S4: Excavation for Industrial Use with Offsite Disposal	Alternative S5: Capping
THRESHOLD CRITERIA					
Overall Protection of Human Health and the Environment	No reduction in risk. No additional protection to human health.	Reduces potential for uncontrolled site access and restricting use. Existing cap remains to prevent exposure, and fencing placed around several grassy areas with 3X industrial SCTL exceedances.	Soil posing risk removed and replaced with clean backfill.	Soil posing risk that is not under the existing cap removed and replaced with clean backfill.	Soil posing risk capped and maintained to reduce risk.
	Soils exceeding leachability criteria remain; however, natural attenuation prevents offsite migration to Pensacola Bay.	Soils exceeding leachability criteria remain; however, natural attenuation prevents offsite migration to Pensacola Bay.	Soils exceeding leachability criteria removed.	Soils exceeding leachability criteria that are not under the existing cap removed. LUCs implemented.	Soil exceeding leachability capped and maintained to prevent infiltration. LUCs implemented.
Compliance with ARARs	Does not comply with Remedial Goals (RGs). Risk remains under uncontrolled future use.	Does not comply with RGs. Six locations have viable exposure pathway.	Complies with residential RGs by removing locations exceeding leachability.	Complies with industrial RGs by removing locations exceeding leachability that are not under the existing cap. Migration from surface water to groundwater prevented with existing cap.	Potential for contact with contaminants eliminated by removing the primary pathways.
BALANCING CRITERIA					
Long-term Effectiveness and Permanence	No means to prevent exposure. Long-term effectiveness is minimal. Soil concentrations remain with the exception of natural attenuation.	Limits exposure to soil contamination.	Provides permanent exposure reduction.	Provides long-term effectiveness by removing soil posing an industrial risk.	Provides long-term effectiveness by limiting exposure to soil contamination and management of the cap.
		Maintenance and inspection program required for cap. Site access and control remain limited.		Removes soil with potential for contaminant leaching.	Maintenance and inspection program required for cap. Site access and control remains limited.
Reduction of Toxicity, Mobility, or Volume through Treatment	Contaminants remain untreated and in place. However, natural attenuation reduces toxicity, mobility, and volume.	Contaminants remain untreated and in place. However, natural attenuation reduces toxicity, mobility, and volume.	Contamination is not reduced but removed and disposed of at secure sanitary landfill.	Contamination is not reduced but removed and disposed of at secure sanitary landfill.	Contaminants remain untreated and in place. However, natural attenuation reduces toxicity, mobility, and volume.

Table 2-4
Evaluation of Soil Alternatives at Site 38 – NAS Pensacola

Criteria	Alternative S1: No Action	Alternative S2: Existing Site Caps with LUCs	Alternative S3: Excavation for Unrestricted Use with Offsite Disposal	Alternative S4: Excavation for Industrial Use with Offsite Disposal	Alternative S5: Capping
Short-Term Effectiveness	No short-term risks.	No short-term risks.	Construction workers at risk for dermal contact or ingestion; however, personal protective equipment (PPE) reduces exposure. Community exposed to soils during transportation; however, controls used as required by DOT to minimize risks. Includes extensive shoring, structural controls, and building demolition.	Construction workers at risk for dermal contact or ingestion; however, PPE reduces exposure. Community exposed to soils during transportation; however, controls used as required by DOT to minimize risks.	Will not cause adverse impacts to the surrounding environment. Engineering controls used to manage storm water runoff. Construction workers at risk for dermal contact or ingestion; however, PPE will reduce exposure.
Implementability	Feasible and easily implemented. Requires re-evaluation every 5 years.	Feasible and easily implemented. LUCs implemented through administrative coordination. Site formally documented as industrial/ commercial use. Re-evaluation required for any significant changes to the base.	Easily implemented. Shoring and structural specialists might be required.	Easily implemented. LUCs implemented through administrative coordination. Site formally documented as industrial/ commercial use.	Easily implemented. LUCs implemented through administrative coordination. Site formally documented as industrial/ commercial use. Requires re-evaluation every 5 years.

Table 2-4
Evaluation of Soil Alternatives at Site 38 – NAS Pensacola

Criteria	Alternative S1: No Action	Alternative S2: Existing Site Caps with LUCs	Alternative S3: Excavation for Unrestricted Use with Offsite Disposal	Alternative S4: Excavation for Industrial Use with Offsite Disposal	Alternative S5: Capping
BALANCING CRITERIA (CONTINUED)					
Cost					
Capital	$0	$50,000	$4,455,300	$365,200	$232,700
O&M	$24,400	$85,400	0	$85,500	$80,600
NPW	$24,400	$135,400	$4,455,300	$450,700	$313,300
Discount	6%	6%	0	6%	6%
Duration	30 years	30 years	1 year	30 years	30 years
MODIFYING CRITERIA					
Support Agency Acceptance	FDEP involved in process with opportunity to comment on FFS.	FDEP involved in process with opportunity to comment on FFS.	FDEP involved in process with opportunity to comment on FFS.	FDEP involved in process with opportunity to comment on FFS.	FDEP involved in process with opportunity to comment on FFS.
Community Acceptance	No comments were received during public comment period	No comments were received during public comment period	No comments were received during public comment period	No comments were received during public comment period	No comments were received during public comment period

contaminated surface soil, and no controls would be initiated to restrict future use or exposure to contaminated media. Soil with the potential to leach to groundwater would be left onsite.

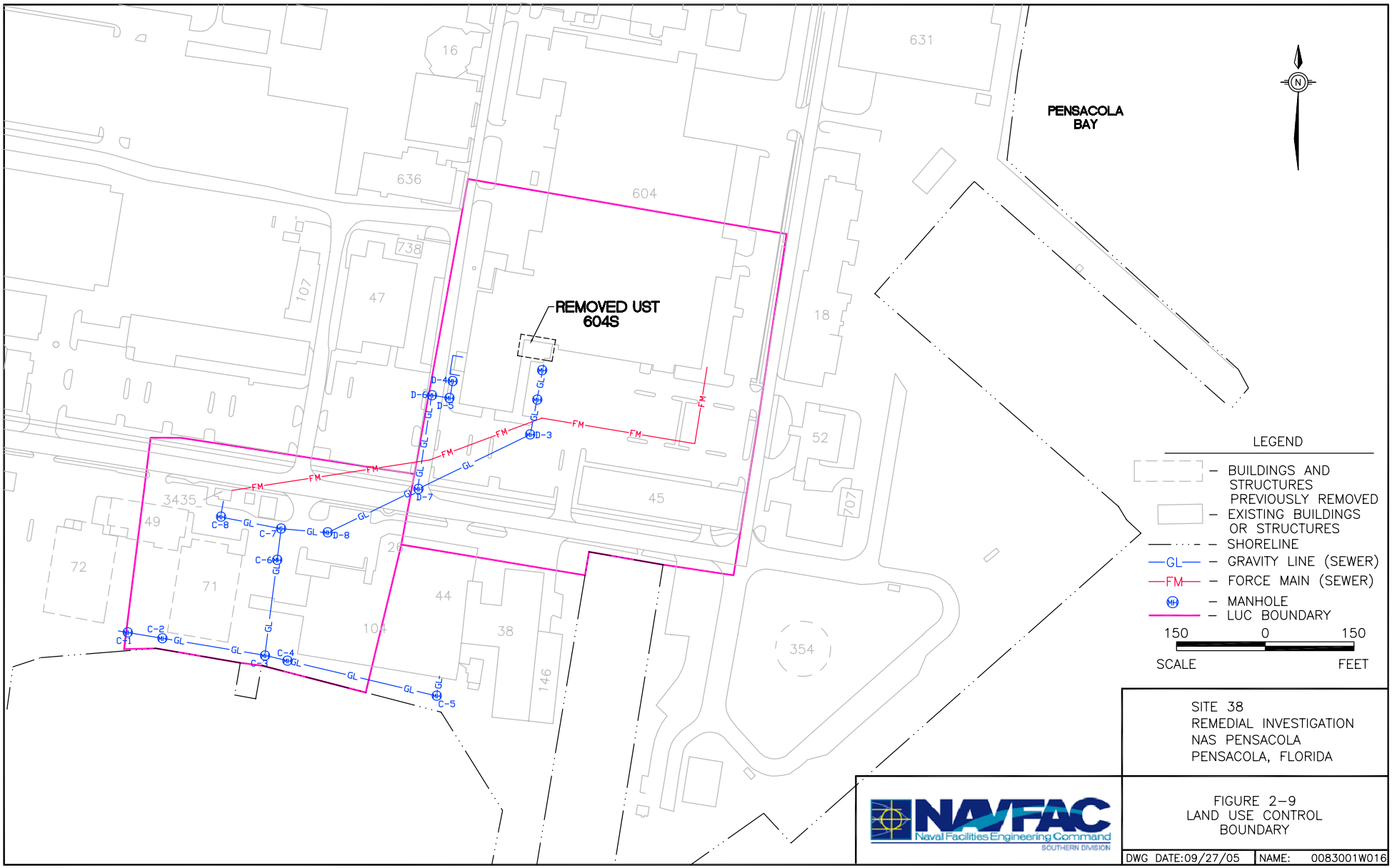
This alternative would not protect human health because risks from exposure to contaminated soil would continue to exist. This alternative would not achieve the soil RAO or comply with ARARs. There would be no reduction of contaminant mobility, and reduction in toxicity and volume would occur only through long-term natural attenuation and would not be monitored. Because no remedial action would take place, this alternative would not result in any short-term risks and would be very easy to implement. Because contaminants would remain onsite, this alternative would require a 5-year review. Costs associated with the 5-year review are $24,400 over a 30-year period assuming a 6% discount factor.

2.8.1.2 Soil Alternative S2: Existing Surface Caps with LUCs

Under this alternative, no direct response action would be taken to reduce, treat, or decrease the mobility or toxicity of onsite contamination. The existing asphalt and concrete covering at the site would be designated as a cap and maintained as necessary. LUCs would be implemented to ensure the existing asphalt, concrete and building caps remain in place unless appropriately protective measures are undertaken to ensure protection of site workers and future protection of the environment, as well as to limit land use to industrial/commercial. Prohibited residential uses include but shall not be limited to residential or residential-like uses such as any form of housing, child preschool, day care, or nurseries, and adult convalescent or nursing home facilities. How the LUC would be maintained would be addressed in a LUC RD to be submitted to USEPA and FDEP for review and comment. The LUCs will be maintained until concentrations in soil are at such levels to allow for unrestricted use and exposure. The LUC boundary is shown on Figure 2-9.

A LUC RD work plan would be prepared as the land use component of the RD. The LUC RD shall contain implementation and maintenance actions, including periodic inspections in accordance with the enforceable schedule contained in the approved *Site Management Plan*. The Navy would be responsible for implementing, maintaining, reporting on, and enforcing the LUCs. If site-specific conditions warrant, the LUC may be modified to include another party.

This alternative protects human health by ensuring that existing surface caps are maintained preventing direct exposure across the majority of the site. However, direct exposure to soil would result in risk that exceeds Florida's carcinogenic target risk level of $1.0E^{-06}$ in areas not covered by a cap and exceeding 3 times the SCTL. There would be no reduction of contaminant toxicity,


PENSACOLA BAY
REMOVED UST 604S
LEGEND
– BUILDINGS AND STRUCTURES PREVIOUSLY REMOVED
– EXISTING BUILDINGS OR STRUCTURES
– SHORELINE
GL – GRAVITY LINE (SEWER)
FM – FORCE MAIN (SEWER)
MH – MANHOLE
– LUC BOUNDARY
150 0 150
SCALE FEET
SITE 38
REMEDIAL INVESTIGATION
NAS PENSACOLA
PENSACOLA, FLORIDA
NAVFAC
Naval Facilities Engineering Command
SOUTHERN DIVISION
FIGURE 2-9
LAND USE CONTROL BOUNDARY
DWG DATE:09/27/05
NAME: 0083001W016

mobility, or volume through active treatment. There would be minimal short-term risks associated with the performance of inspection activities that could easily be addressed through appropriate onsite worker health and safety procedures. The activities for this alternative would be easy to implement. The capital cost, 5-year review and net present worth (NPW) costs are $50,000, $61,000 and $135,400 respectively.

2.8.1.3 Alternative S3: Excavation of Hot Spots/Acute Toxicity and Leachability Criteria Exceedances for Unrestricted Use with Offsite Disposal

Under this alternative, soil would be excavated in areas where contaminants exceed 3X the residential RSCTLs and leachability criteria, and disposed of in an appropriate off-site landfill. Contaminated material would be excavated/removed and transported to permitted offsite disposal facilities. The sub-components of this remedy alternative would include: (1) delineation sampling, (2) excavation, (3) confirmation sampling, (4) waste characterization, (5) transportation of excavated material offsite, (6) disposal at a Subtitle D facility, (7) backfilling, and (8) general site restoration. Under this alternative, Building 604 would be demolished and rebuilt.

The estimated capital cost is $28,095,300. No monitoring or LUCs are included with this alternative because an unrestricted use scenario would be achieved.

2.8.1.4 Alternative S4: Excavation of Industrial Hot Spots and Leachability Criteria Exceedances with Offsite Disposal

Under this alternative, exposed surface soils exceeding 3X industrial SCTLs and leachability criteria would be excavated and disposed of in an appropriate off-site landfill. Soil exceedances under the existing surface cap would not be removed, because the asphalt and concrete limit the risk of exposure and leachability to groundwater.

The existing asphalt and concrete covering soil exceeding 3X industrial SCTLs and leachability criteria would be designated as a cap and maintained. Under this alternative, Building 604 does not require demolition. Under this alternative all locations with industrial SCTL and/or leachability criteria exceedances in the Building 71 area that are not under existing asphalt/pavement surface will be removed. The estimated volume of surface and subsurface soil to be removed in the Building 604 area is approximately 1,100 cubic yards. The Building 604 volume includes all soil that exceeds industrial SCTLs. The contaminated soil will be excavated and disposed of properly and the area will be covered with two feet of clean fill. Excavation depth may vary from 2 to 5 feet below land surface.

LUCs would be implemented to limit property uses, minimizing potential exposure to contamination left in place. In addition, the LUC would ensure that existing covers remain in place unless additional action is taken to protect human health. The LUCs will be maintained until concentrations in soil are at such levels to allow for unrestricted use and exposure. The LUC boundary is shown on Figure 2-9. A LUC RD work plan will be prepared as the land use component of the RD. The Navy shall prepare and submit for review and approval a LUC RD that shall contain implementation and maintenance actions, including periodic inspections in accordance with the enforceable schedule contained in the approved *Site Management Plan*. The Navy will be responsible for implementing, maintaining, reporting on, and enforcing the LUCs. If site-specific conditions warrant, the LUC may be modified to include another party. The estimated capital cost and NPW cost of Alternative S4 are $365,200 and $450,700, respectively.

2.8.1.5 Alternative S5: Capping

Under this alternative, uncovered soil areas with 3X industrial SCTLs and leachability criteria exceedances at the site would be covered with a cap, creating a system that functions as a continuous cap over the contaminated area. The primary purpose of a cap is to prevent direct contact with, and ingestion of, contaminated materials. The secondary purpose would be to prevent precipitation infiltration, thus minimizing the potential for contaminant leaching from soil to groundwater. Under this alternative, a non-cap removal and industrial-use only LUCs would also be imposed to limit site use. The LUC boundary is shown on Figure 2-9.

LUCs would be implemented to limit property uses, minimizing potential exposure to contamination left in place and to ensure integrity of the cap to limit human contact. The LUCs will be maintained until concentrations in soil are at such levels to allow for unrestricted use and exposure. A LUC RD work plan will be prepared as the land use component of the RD. The Navy shall prepare and submit for review and approval a LUC RD that shall contain implementation and maintenance actions, including periodic inspections in accordance with the enforceable schedule contained in the approved *Site Management Plan*. The Navy will be responsible for implementing, maintaining, reporting on, and enforcing the LUCs. If site-specific conditions warrant, the LUC may be modified to include another party. The estimated capital cost and NPW cost for Alternative S5 is $232,700 and $313,300, respectively.

2.8.2 Groundwater Remedial Alternatives

Three remedial alternatives were analyzed for OU 11, Site 38 groundwater. This ROD has selected Groundwater Alternative 2: Natural Attenuation, LUCs, and Groundwater Monitoring to address

contaminants in groundwater. The alternatives evaluated are described in the FFS and summarized in Table 2-5 and in this section.

2.8.2.1 Groundwater Alternative G1: No Action

This alternative is required by the NCP as a baseline for comparison with other alternatives. Under this alternative, no action is taken to treat or prevent potential exposure to contaminated groundwater, or reduce volume, toxicity, or mobility of contaminants. This action would not include any LUCs. Thus, future site use would be uncontrolled and the site could be used for residential purposes.

This alternative would not protect human health because risks from direct exposure to contaminated groundwater would continue to exist. This alternative would not achieve the groundwater RAO or comply with ARARs. There would be no reduction of contaminant mobility, and reduction in toxicity and volume would occur only through long-term natural attenuation and would not be monitored. Because no remedial action would take place, this alternative would not result in any short-term risks and would be very easy to implement. Because contaminants remain onsite, a 5- year review will be required. The NPW of this alternative is $99,600.

2.8.2.2 Alternative G2: Monitored Natural Attenuation with LUCs

This alternative would consist of a monitored natural attenuation (MNA) response action combined with LUCs. MNA relies on the natural attenuation processes to control plume migration and reduce contaminant mass to achieve remedial objectives within a reasonable time frame. It applies to organic contamination such as chlorinated solvents, as well as inorganic materials. LUCs would be used to prevent access or use of the groundwater until cleanup goals are met. LUCs would be maintained until the groundwater concentrations are at such levels to allow for unrestricted use and exposure. The LUC boundary is shown on Figure 2-9.

A LUC RD work plan will be prepared as the land use component of the RD. The Navy shall prepare and submit for review and approval a LUC RD that shall contain implementation and maintenance actions, including periodic inspections in accordance with the enforceable schedule contained in the approved *Site Management Plan*. The Navy will be responsible for implementing, maintaining, reporting on, and enforcing the LUCs. If site-specific conditions warrant, the LUC may be modified to include another party.

Table 2-5

Evaluation of Groundwater Alternatives at Site 38 – NAS Pensacola

	Alternative G1: No Action	Alternative G2: Monitored Natural Attenuation with LUCs	Alternative G3: Enhanced Bioremediation	Alternative G4: Groundwater Extraction and Discharge to FOTW
THRESHOLD CRITERIA				
Overall Protection of Human Health and the Environment	Provides no additional protection under the current scenario or for future use prior to natural attenuation achieving RGs.	Groundwater use and site access restricted through LUCs, thereby, providing long-term effectiveness and permanence.	Actively enhances biological degradation. Groundwater use and site access restricted through LUCs.	Recovers and contains groundwater exceeding RGs. Also removes mass in contaminated zones. Human health and environmental protected through FOTW's treatment processes.
Compliance with ARARs	Does not comply with ARARs because groundwater could be consumed or used in an uncontrolled use scenario. However, concentrations are decreasing and are not discharging into the Pensacola Bay.	Modeling of current groundwater data predicts concentrations degrading to below RGs in the next 5 years.	Monitoring required to ensure compliance with Marine Surface Water Quality Criteria (MSWQ) criteria.	Complies with ARARs. Contaminated groundwater removed using extraction wells. Subject to NPDES requirements and FOTW effluent discharges must meet the NPDES permit requirements.
BALANCING CRITERIA				
Long-term Effectiveness and Permanence	Does not provide long-term effectiveness and permanence. Contaminants are decreasing but no action does not reduce the magnitude of risk and does not provide a means for monitoring.	Overwhelming evidence that MNA is feasible and effective which provides a long-term, permanent aquifer remediation.	Eliminates risk by enhancing degradation process.	Contains and reduces contamination. Monitoring required to ensure contaminant removal.
Reduction of Toxicity, Mobility, or Volume through Treatment	Does not reduce toxicity, mobility, or volume with the exception of natural attenuation.	Natural attenuation continues to reduce contaminants over time.	Directly reduces the volume and toxicity of contaminants. Migration towards current transport dynamics.	Reduces toxicity and volume of contaminated groundwater. Eliminates migration. Removal is expected to be permanent.
Short-Term Effectiveness	No risk would be posed to community, workers, or the environment during implementation.	No risks are associated with implementation of MNA. Restrictions will be implemented to protect community and workers from groundwater. Some short-term risk during sampling, however, PPE will be used to minimize exposure.	Restrictions implemented to protect community from groundwater. Some short-term risk during implementation and sampling; however, PPE used to minimize exposure.	Impacts to surrounding environment during construction are not anticipated. Approval to FOTW required. Some short-term risk during implementation and sampling; however, PPE used to minimize exposure.
Implementability	Feasible and readily implemented. Groundwater monitoring and report preparation required every 5 years for 30 years.	Feasible and readily implemented. Remedial design phase required.	Feasible and readily implemented. Pilot study and remedial design phase required.	Feasible; construction is minimal in difficulty.
Cost				
Capital	0	$310,900	$580,500	$261,000
O&M	$99,600	$229,200	$518,100	$399,500
NPW	$99,600	$625,900	$1,098,600	$943,700
Discount	6%	6%	6%	6%
Duration	30 years	5 years	10 years	5 years
MODIFYING CRITERIA				
Support Agency Acceptance	FDEP involved in process with opportunity to comment on FFS.	FDEP involved in process with opportunity to comment on FFS.	FDEP involved in process with opportunity to comment on FFS.	FDEP involved in process with opportunity to comment on FFS.
Community Acceptance	No comments were received during public comment period.	No comments were received during public comment period.	No comments were received during public comment period.	No comments were received during public comment period.

This alternative would protect human health because it would reduce the risk from direct exposure to contaminated groundwater. This alternative would achieve the groundwater RAO, and monitoring would establish eventual compliance with ARARs through natural attenuation. There would be no reduction of contaminant toxicity, mobility, or volume through active treatment, but contaminant toxicity and volume would be reduced through long-term natural attenuation. There would be minimal short-term risks associated with the performance of groundwater monitoring activities that could easily be addressed through appropriate onsite worker health and safety procedures. Based on modeling results, it is anticipated that CTLs would be attained within 5 years. The activities for this alternative would be easy to implement. The estimated capital cost, annual monitoring and NPW cost of Alternative G2 are $310,900, $54,400, and $625,900.

2.8.2.3 Alternative G3: Enhanced Bioremediation with HRC

This alternative would include actions to enhance subsurface conditions to maximize the expected natural rate and efficiency of contaminant biodegradation or transformation. The efficiency by which contaminants are affected depends on site-specific factors such as electron acceptors, electron donors, nutrients, bioavailability, competing substances, population of microorganisms, pH, temperature, and contaminant concentrations.

Numerous technologies and products are currently available to promote desirable aquifer conditions for enhancement, including oxidizing and reducing agents, supplemental nutrients, engineered microbial populations, etc. The product selection depends on the type of contaminant(s) (i.e., inorganic, VOCs, SVOCs) and site-specific conditions. Chlorinated VOCs were identified as the primary COC in groundwater and are the main focus of this alternative. These would be bioremediated using technologies that promote anaerobic reductive dechlorination. The estimated capital cost, present worth O&M costs, and NPW of Alternative G3 are $580,500, $332,700, and $1,098,600 respectively.

2.8.2.4 Alternative G4: Groundwater Extraction and Discharge to the Federally Owned Treatment Works (FOTW)

In this alternative, groundwater would be extracted and discharged to the FOTW through the sanitary sewer system. The overall objective of the groundwater recovery system would be containment of groundwater in which contaminants exceed RGs to prevent offsite migration. The capital cost, present worth O&M costs, and estimated NPW cost of Alternative G4 are $261,000, $1,682,700, and $1,943,700, respectively.

2.9 Summary of Comparative Analysis of Alternatives

Each of the soil and groundwater 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 2-6. A detailed analysis was performed for each alternative using the nine criteria to select a site remedy. Tables 2-4 and 2-5 summarize the comparison of these analyses for soil and groundwater, respectively.

2.10 Selected Remedy

2.10.1 Summary of Rationale for Remedy Selection

The goals of the selected soil and groundwater remedies are to protect human health and the environment by eliminating, reducing, or controlling hazards posed by the site and to meet ARARs. Based on consideration of the requirements of CERCLA, the NCP, the detailed analysis of alternatives, and any comments received from USEPA, FDEP, and the public, Soil Alternative S4, Excavation of Industrial Hot Spots and Leachability Criteria Exceedances with Offsite Disposal and Groundwater Alternative G2, Monitored Natural Attenuation with LUCs, were selected to address contamination at OU 11, Site 38.

This remedy was selected for the following reasons:

- Except for the areas identified for removal, detected concentrations remaining in soil do not present an unacceptable threat to human health or the environment assuming that only industrial and/or commercial uses are permitted at Site 38 and the existing caps are maintained. Because of Hurricane Ivan damage, the Navy has elected to remove the buildings and associated parking lots. Surface soil areas identified as exceeding SCTLs will be removed and replaced with clean fill to prevent unacceptable exposure.

- Although contamination is present in groundwater at concentrations greater than FDEP GCTLs, detected concentrations are relatively low and do not present an unacceptable threat to human health or the environment under the groundwater use restrictions to be implemented as part of the selected remedy.

- The contaminant plume is small and stable and confined to the shallow aquifer, and there is no evidence of ongoing contaminant migration.

Table 2-6
Explanation of Detailed Analysis Criteria
Operable Unit 11, Site 38
Record of Decision
Naval Air Station Pensacola
Pensacola, Florida

Criterion	*Evaluation Criteria for Superfund Remedial Alternatives*
Threshold	**Overall Protection of Human Health and the Environment** determines whether an alternative eliminates, reduces, or controls threats to public health and the environment through institutional controls, engineering controls, or treatment. **Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)** evaluates whether the alternative meets federal and state environmental statutes, regulations, and other requirements that pertain to the site, or whether a waiver is justified.
Primary Balancing	**Long-term Effectiveness and Permanence** considers the ability of an alternative to maintain protection of human health and the environment over time. **Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment** evaluates an alternative's use of treatment to reduce harmful effects of principal contaminants, their ability to move in the environment, and the amount of contamination present. **Short-Term Effectiveness** considers the length of time needed to implement an alternative and the risks the alternative poses to workers, residents, and the environment during implementation. **Implementability** considers the technical and administrative feasibility of implementing the alternative, including factors such as the relative availability of goods and services. **Cost** includes estimated capital and annual operations and maintenance costs, as well as present worth cost. Present worth cost is the total cost of an alternative over time in terms of today's dollar value. Cost estimates are expected to be accurate within a range of +50 to -30%.
Modifying	**State/Support Agency Acceptance** considers whether the state agrees with the Navy's analyses and recommendations, as described in the RI/FFS and the Proposed Plan. **Community Acceptance** considers whether the local community agrees with the Navy's analyses and preferred alternative. Comments received on the Proposed Plan are an important indicator of community acceptance.

Therefore, as long as exposure to contaminated soil and groundwater is prohibited, the selected remedy is considered to be adequately protective at a much more reasonable cost than active treatment.

2.10.2 Remedy Description

The remedy is illustrated on Figure 2-9 and consists of four major components: (1) natural attenuation of contaminated groundwater, (2) removal of selected soil areas, (3) LUCs, and (4) groundwater monitoring.

2.10.2.1 Component 1: Natural Attenuation of Contaminated Groundwater

Natural attenuation will rely on naturally occurring processes within the surficial aquifer to reduce the contaminant concentrations in groundwater. Dispersion and dilution through aquifer movement, adsorption on soil particles, and biodegradation will be the main attenuation processes. Surficial aquifer conditions will be periodically monitored to ensure that contaminant concentrations are being adequately reduced through natural processes.

2.10.2.2 Component 2: Land Use Controls

Soil and groundwater contamination remains at Site 38 at concentrations that preclude unrestricted reuse; therefore, the remedy includes LUCs to prevent unacceptable risk. These LUCs will be implemented to prohibit both residential development at Site 38 and usage of the surficial aquifer beneath the site and thereby preclude unacceptable risks from exposure to contaminated soil and groundwater. The boundaries of OU 11, Site 38 and the area to be covered by the LUCs are shown in Figure 2-9. The LUCs cover both soil and groundwater. The following are the LUC performance objectives for OU 11, Site 38:

- Prohibit reuse of the site for residential or residential-like (e.g., elementary or secondary schools, child care facilities, and playgrounds) uses.

- Prohibit the excavation and removal subsurface soil unless prior written approval is obtained from the Navy, USEPA, and FDEP.

- Prohibit all uses of groundwater from the surficial aquifer underlying the site (including, but not limited to, human consumption, dewatering, irrigation, heating/cooling purposes, and industrial processes) without prior written approval from the Navy, USEPA, and FDEP.

- Maintain the integrity of any existing or future monitoring or remediation system(s).

LUCs will be implemented through administrative coordination to provide protection to human health. The site area will be formally documented as industrial/commercial use in the Base Master Plan. At any time that a property is considered for an alternative use or any intrusive activities are planned, a site approval or dig permit process is initiated. The restricted area will be delineated and the restriction will be described in the Base Master Plan. Enforcement will be achieved through the Activity's site approval and Dig Permit processes. The site use and Dig Permits must be approved by the Activity Environmental Office before any intrusive or construction activities are performed. Re-evaluation will be required for any significant land use changes. The Remedial Design work plan will outline implementation actions for the LUCs.

The LUCs shall be implemented and maintained for as long as they are required to prevent unacceptable exposures to contaminated soil and groundwater or to preserve the integrity of the remedy. The Navy or any subsequent owners shall not modify, delete, or terminate any LUC without USEPA and FDEP concurrence. The LUCs shall be maintained until the concentrations of hazardous substances in the soils and groundwater are at such levels to allow unrestricted use and exposure.

The Navy is responsible for implementing, inspecting, reporting, and enforcing the LUCs described in this ROD in accordance with the 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.

In accordance with the Site Management Plan, the Navy shall prepare and submit the LUC RD to USEPA and FDEP for review and comment.

2.10.2.3 Component 3: Long-Term Monitoring

Long-term monitoring will consist of the periodic collection and analysis of groundwater samples to verify that no contaminant migration is occurring within the surficial aquifer, as determined by sentinel well sample results. Long-term monitoring will also be used to assess natural attenuation of groundwater contamination.

Groundwater samples will be collected from existing monitoring wells and analyzed for VOCs, SVOCs, and metals. Sampling frequency will be semi-annually for the first 3 years and annually thereafter. The number of wells to be sampled, the parameters to be analyzed, and the sampling frequency may change over time depending on sample results and with approval by the Navy, USEPA, and FDEP.

If the results of two consecutive groundwater sampling events indicate that the RGs have been met, the site will be considered remediated for groundwater.

2.10.2.4 Contingency Remedy

If results show that (1) the implemented LUCs have failed to prevent unacceptable risks from exposure to onsite soil and/or groundwater contamination; (2) contaminated groundwater has migrated to an unacceptable degree as determined by sentinel well sampling results; or (3) the groundwater contamination in groundwater is not attenuating as expected, then additional active remedial measures would need to be evaluated and possibly implemented. Potential contingency remedial measures could include additional excavation and off-base disposal of contaminated soil and the extraction, onsite treatment, and surface discharge of contaminated groundwater.

2.10.3 Summary of Estimated Remedy Costs

The estimated capital cost and 30-year NPW of the capital, LUC, and operations and maintenance (O&M) costs of the selected remedy are as follows:

Soil Alternative S4: Excavation of Industrial Hot Spots and Leachability Criteria Exceedances with Offsite Disposal

- Capital cost: $365,200
- 30-year NPW of capital, LUC, and O&M costs: $450,700

Groundwater Alternative G2: Monitored Natural Attenuation with LUCs

- Capital cost: $310,900
- 30-year NPW of capital, LUC, and O&M costs: $625,900

The NPW is based upon an annual discount rate of 6%. The above estimates exclude duplicated cost items (such as LUC preparation) included in both the soil and groundwater alternatives estimates.

2.10.4 Expected Outcomes of the Selected Remedy

The expected outcomes of the selected remedy may be summarized as follows:

- Upon completion of the removal action, Site 38 will be environmentally safe for its intended reuse as long as the soil and groundwater LUCs are in place and observed.

- Eventually the groundwater RGs will be attained, and the surficial aquifer will become available for unrestricted use. It is expected that the cleanup goals will be attained within 5 years.

2.11 Statutory Determinations

Under CERCLA Section 121 and the NCP, the selected remedy must be protective of human health and the environment, comply with ARARs (unless a statutory waiver is justified), be cost effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. In addition, CERCLA includes a preference for remedies that employ treatment that permanently and significantly reduces volume, toxicity, or mobility of hazardous substances, pollutants, or contaminants as a principal element and a bias against off-site disposal of untreated hazardous substances, pollutants, or contaminants. The following sections discuss how the selected remedy meets these statutory requirements.

2.11.1 Protection of Human Health and the Environment

The selected remedy, Soil Alternative S4 and Groundwater Alternative G2, will protect human health and the environment. LUCs will prevent the future residential development of the site. Removal actions at selected areas will eliminate risk above industrial criteria. The reduced frequency of exposure and potential pathways associated with industrial land use results in a reduced potential intake of soil COCs and consequently, reduced risks to human health. LUCs will also prohibit use of groundwater from the surficial aquifer beneath the site. Consequently, there will continue to be no exposure to contaminated groundwater.

2.11.2 Compliance with Applicable or Relevant and Appropriate Requirements

The selected remedy, Soil Alternative S4 and Groundwater Alternative G2, will comply with all ARARs as presented below and in more detail in Table 2-7. There are no Location-Specific ARARs.

Table 2-7
Description of ARARs for Selected Remedy

Authority	Medium	Requirements	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Federal	Groundwater	Safe Drinking Water Act MCLs 40 CFR 141.11 - 141.16	Relevant and Appropriate	MCLs have been set for toxic compounds as enforceable standards for public drinking water systems. SMCLs are unenforceable goals regulating the aesthetic quality of drinking water.	The surficial zone of the Sand-and-Gravel-Aquifer is a potential, although unlikely, source of drinking water. Some contaminants in the plume below Site 38 are above MCLs and SMCLs. The selected remedy will comply with these regulations through monitored natural attenuation.
Federal	Groundwater	Safe Drinking Water Act MCLGs 40 CFR 141.50-141.51	Relevant and Appropriate	MCLGs are unenforceable goals under the SDWA.	The surficial zone of the Sand-and-Gravel-Aquifer is a potential, although unlikely, source of drinking water. Some contaminants in the plume below Site 38 are above MCLGs. The selected remedy will comply with these regulations through monitored natural attenuation.
State	Groundwater	Florida Drinking Water Standards, Monitoring, and Reporting Title 62 Chapter 62-550	Applicable	Establishes Primary and Secondary MCLs for drinking water.	The surficial zone of the Sand-and-Gravel-Aquifer is a potential, although unlikely, source of drinking water. Some contaminants in the plume below Site 38 are above the state MCLs and SMCLs. The selected remedy will comply with these regulations through monitored natural attenuation.
State	Groundwater	Florida Ground Water Guidance Concentrations (FGGC) Title 62 Chapter 62-777	Applicable	Establishes guidance concentrations for parameters lacking numerical standards.	The selected remedy will comply with these regulations through monitored natural attenuation.
State	Soil	Florida Soil Cleanup Goals Title 62 Chapter 62-777	Applicable	Establishes soil cleanup limits for Florida.	The selected remedy will comply with this requirement by removing soil exceeding 3 X the industrial SCTL and restricting land use.
State	Soil/Groundwater	Contaminated Site Cleanup Criteria Title 62 Chapter 62-780	Applicable	Establishes risk based corrective action provisions for contaminants that have been released or discharged to the environment.	The selected soil remedy will remove soil that are greater than 3 X industrial SCTL. Existing caps will be maintained and LUCs will be implemented.
Federal	Soil/Groundwater	Executive Order 11988 Floodplain Management Policy	To Be Considered	Establishes guidelines for activities conducted within a 100-year floodplan.	Site 38 is within a 100-year floodplain; however, executive order sets forth policy and is not enforceable. The removal action will comply with the intent of the policy.
Federal	Soil/Groundwater	National Environmental Policy Act 40 CFR Part 6, Appendix A	Applicable	Sets forth EPA policy carrying out the provisions of Executive Order 11988, Floodplain Management Policy, and Executive Order 11990, Wetlands Protection Policy.	Site 38 is located within a 100-year floodplain. Remediation activities may disturb these areas. The removal action will comply with the policy.
Federal	Soil/Groundwater	Fish and Wildlife Coordination Act (16 U.S.C. 661 et seq.) 40 CFR 6.302	Applicable	Requires actions to protect fish and wildlife from actions modifying streams or areas affecting streams including floodplain areas.	Site 38 is located within a 100-year floodplain. Remediation activities may disturb these areas. The removal action will be completed to protect fish and wildlife. The selected groundwater remedy will comply with these regulations through monitored natural attenuation.

Table 2-7
Description of ARARs for Selected Remedy

Authority	Medium	Requirements	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Federal	Soil	RCRA Location Requirements 40 CFR 264.18	Relevant and Appropriate	Sets forth minimum requirements for design, construction, and operation of a facility where treatment, storage, or disposal of hazardous waste will be within a 100-year floodplain.	Treatment, disposal, and storage of hazardous materials may take place during remediation of the site. Some wastes are within the 100-year floodplain. The selected soil remedy will remove contaminated soil that is exposed and cap remaining soil. Groundwater remedy will comply through monitored natural attenuation.
State	Soil	Florida Hazardous Waste Rules Title 62 Chapter 62-730	Relevant and Appropriate	Sets forth minimum requirements for design, construction, and operation of a facility where treatment, storage, or disposal of hazardous waste will be within a 100-year floodplain. Establishes standards for generators and transporters of hazardous wastes	Treatment, disposal, and storage of hazardous materials may take place during remediation of the site. Some wastes are within the 100-year floodplain. The selected soil remedy will remove contaminated soil that is exposed and cap remaining soil. Groundwater remedy will comply through monitored natural attenuation. Applicable if remedial actions generate and/or transport hazardous wastes. Soil will be assessed before removal to determine if it is considered hazardous waste.
Federal	Soil	RCRA Identification of Hazardous Waste 40 CFR 261	Applicable	Criteria for identifying solid wastes subject to regulation as hazardous waste under RCRA.	Suspected hazardous wastes at Site 38 should be identified as RCRA hazardous waste or non-hazardous waste prior to remedial activities. All soil removed from the site will be characterized before beginning the action.
Federal	Soil	RCRA Generator Standards 40 CFR 262	Applicable	Establishes standards for generators of RCRA hazardous waste(s).	Generation and storage of RCRA hazardous waste may occur at Site 38 during remediation. If hazardous waste is identified, the soil will be handled appropriately.
Federal	Soil	RCRA Facility Standards 40 CFR 265 Subparts C and D	Relevant and Appropriate	Establishes standards for the safe management of RCRA hazardous waste(s).	RCRA hazardous wastes may handled during remediation. If hazardous waste is identified, the soil will be handled appropriately.
Federal	Soil	RCRA Storage Requirements 40 CFR 265 Subparts I, J, and L	Relevant and Appropriate	Established requirements for hazardous wastes storage.	RCRA hazardous waste may be stored onsite prior to offsite disposal or onsite treatment. If hazardous waste is identified, the soil will be handled approriately.
Federal	Soil	RCRA Land Disposal Restrictions 40 CFR 268	Applicable	Certain classes of waste are restricted from land disposal without acceptable treatment.	Removal of soil from Site 38 for land disposal may trigger the regulation after its effective date for CERCLA wastes on 5/8/93. Soil to be removed from the site will be assessed to determine if land ban restrictions apply.
Federal	Soil	Department of Transportation Rules for the Transport of Hazardous Substances 9 CFR Parts 107 and 171-179	Applicable	Regulates the labeling, packaging, placarding, and transportation of solid and hazardous wastes offsite.	Remedial actions may include the offsite transport and disposal of solid and hazardous wastes. Only properly trained transportation companies will be used.
State	Soil	Florida Storm Water Discharge Regulations Title 62 Chapter 62-25	Applicable	Establishes design and performance standards and permit requirements for storm water discharge facilities.	Remedial actions may impact storm water discharge patterns at Site 38. Storm water issues will be addressed in the remedial design.

Table 2-7
Description of ARARs for Selected Remedy

Authority	Medium	Requirements	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
State	Groundwater	Florida Water Well Permitting and Construction Title 62 Chapter 62-532	Applicable	Establishes local criteria for design and installation of monitoring wells.	Installation of monitoring wells may be a necessary part of site remediation given any alternative. Any future monitoring wells will be installed by a licensed well driller and necessary permits obtained.
State	Soil	Florida Hazardous Substance Release Notification Rules Title 62 Chapter 62-150	Applicable	Establishes notification requirements in the event of a hazardous substance release.	May be applicable if a hazardous substance is released in conjunction with remedial activities. In the unlikely event of a release, the proper authorities will be notified.

The Chemical- and Action-Specific ARARs include the following:

- Safe Drinking Water Act (SDWA) MCLs (40 CFR Part 141), This is a Chemical-Specific ARAR that specifies acceptable concentration levels in groundwater that serves as a potential drinking water aquifer.

- Groundwater Classes, Standards, and Exemptions [Florida Administrative Code (FAC) Chapter 62-520]. This is a Chemical-Specific ARAR that designates the groundwater of the State into five classes and establishes minimum "free from" criteria (i.e., what contaminants are prohibited from being present in a particular class of aquifer).Florida Water Well Permitting and Construction Requirement — March 1992. This is an Action-Specific ARAR that establishes minimum standard for location, construction, repair, and abandonment of water wells.

- Florida Rules on Hazardous Waste Warning Signs — July 1991. This is an Action-Specific ARAR that requires appropriate warning signs for public protection at NPL and FDEP hazardous waste sites.

- Drinking Water Criteria (FAC Chapter 62-550). This chemical-specific ARAR provides primary and secondary drinking water quality criteria.

2.11.3 Other Criteria, Advisories, or Guidance to Be Considered for This Remedial Action

In implementing the selected remedy, the Navy, USEPA and the State have agreed to consider a number of non-binding criteria that are TBCs. These include:

- SDWA Regulations, National Secondary Drinking Water Standards [Secondary MCLs (SMCLs)], (40 CFR 143). This Chemical-Specific TBC establishes welfare-based standards for public water systems.

- Cancer Slope Factors (Integrated Risk Information System). This Chemical-Specific TBC provides guidance values used to evaluate the potential carcinogenic hazard caused by exposure to contaminants.

- Reference Dose Factors (Integrated Risk Information System). This Chemical-Specific TBC provides guidance values used to evaluate the potential noncarcinogenic hazard caused by exposure to contaminants.

- Contaminant Cleanup Target Levels Rule (Chapter 62-777 F.A.C.). This Chemical-Specific TBC provides values for soil, groundwater, and surface water cleanup.

- USEPA Monitored Natural Attenuation Guidance. This provides guidance on evaluation of monitored natural attenuation.

2.11.4 Cost-Effectiveness

The selected remedy is deemed to be cost-effective and represents a reasonable value for the money to be spent. In making this determination, the following definition was used: "A remedy shall be cost-effective if its costs are proportional to its overall effectiveness." [NCP §300.430(f)(1)(ii)(D)]. This was accomplished by evaluating the "overall effectiveness" of those alternatives that satisfied the threshold criteria (i.e., both were protective of human health and the environment and ARAR-compliant). Overall effectiveness was evaluated by assessing three of the five balancing criteria in combination (long-term effectiveness and permanence; reduction in toxicity, mobility, and volume through treatment; and short-term effectiveness). The relationship of the overall effectiveness of this remedial alternative was determined to be proportional to its costs, and hence this alternative represents a reasonable value for the money spent.

The estimated 30-year NPW of the selected soil and groundwater remedies is $1,076,600.

2.11.5 Utilization of Permanent Solutions and Alternative Treatment Technologies

The Navy and USEPA, in conjunction with FDEP, have determined that the selected remedy represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a practicable manner at Site 38. Of those alternatives that are protective of human health and the environment and comply with ARARs, the Navy and USEPA, in conjunction with FDEP, have determined that the selected remedy provides the best balance of trade-offs in terms of the five balancing criteria while also considering the statutory preference for treatment as a principal element and considering State and community acceptance.

2.11.6 Preference for Treatment as a Principal Element

The selected remedy does not provide for treatment as a principal element; however, no source materials constituting principal threats are present at the site, and reductions in soil and groundwater contaminant concentrations are expected over time due to dilution and biological, dispersion, advection, and adsorption processes.

2.11.7 5-Year Review Requirement

Because this remedy will result in hazardous substances, pollutants, or contaminants remaining onsite concentrations greater than levels that allow for unlimited use and unrestricted exposure, a statutory review will be conducted within 5 years after initiation of remedial action to ensure that the remedy is, or will be, protective of human health and the environment.

2.12 Documentation of Significant Changes

The Navy, USEPA and FDEP provided an opportunity for the public to review and comment on the Site 38 Proposed Plan. A Public Notice was published in the *Pensacola News Journal* on July 3, 2005 informing the public that the Proposed Plan was available for review at the NAS Pensacola Information Repositories and requested that all comments be submitted to the Navy by August 14, 2005. No comments were received from the public during the comment period; therefore no significant changes to the remedy, as originally identified in the Proposed Plan, were necessary or appropriate.

RESPONSIVENESS SUMMARY

Overview

At the time of the public comment period, the U.S. Navy and USEPA had selected a preferred remedy to address soil and groundwater at NAS Pensacola Site 38. This preferred remedy was selected in coordination with the FDEP. The NAS Pensacola Restoration Advisory Board, a group of community volunteers, reviewed the technical details of the selected remedy and raised no fundamental objections to its selection.

The sections below describe the background of community involvement in the project and comments received during the public-comment period.

Background of Community Involvement

Throughout the site's history, the community has been kept abreast of site activities through press releases to the local newspaper and television stations. Site-related documents were made available to the public in the Administrative Record stored at information repositories maintained at the NAS Pensacola Library and the John C. Pace Library of the University of West Florida.

Advertisements were placed in the *Pensacola News Journal* to announce the public-comment period from July 1, 2005 to August 14, 2005, in order to provide the opportunity for a public meeting and briefly summarize the Proposed Plan. In conjunction with the newspaper announcement, the proposed plan was sent to all addresses on the Site 38 mailing list.

Summary of Comments Received During the Public-Comment Period

No comments from the public were received during the public-comment period.