TETRA TECH NUS, INC.
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1203-E488

December 16, 2003

Commander, Southern Division
Naval Facilities Engineering Command
ATTN: Ms. Barbara Nwokike, Code ES33
P.O. Box 190010
2155 Eagle Drive
North Charleston, SC 29419-9010

Reference: CLEAN Contract No. N62467-94-D-0888
Contract Task Order No. 0024

Subject: Final 5-Year Review, Operable Unit 1
Naval Training Center, Orlando, Florida

Dear Ms. Nwokike:

Enclosed is the final 5-Year Review for Operable Unit 1. The report includes revisions based on comments received from the Orlando Partnering Team on the draft-final report dated November 20, 2003. Please sign the summary form on page SF-2 and return to me for transmittal to the partnering team.

If you have any questions, please contact me at (865) 220-4730.

Sincerely,

Steven B. McCoy, P.E.
Task Order Manager

SBM:tko

Enclosure

c: Ms. Barbara Nwokike, Southern Division (Orlando Office) (hardcopy and CD)
Ms. Hope Oaks, Southern Division (hardcopy and CD)
Mr. David Grabka, FDEP (hardcopy and CD)
Mr. Gregory Fraley, USEPA Region 4 (hardcopy and CD)
Mr. Steve Tsangaris, CH2M Hill (CD)
Mr. Mark Salvetti, MACTEC Engineering (CD)
Mr. James Young, Terraine (hardcopy and CD)
Mr. Allan Jenkins, Tetra Tech NUS (hardcopy)
Ms. Teresa Grayson, Tetra Tech NUS (hardcopy)
Mr. J.E. Bentkowski, Gannett Fleming (hardcopy and CD)
Mr. Mark Perry, Tetra Tech NUS (unbound hardcopy)
Ms. Debbie Wroblewski, Tetra Tech NUS (cover letter only)
File/db

Rev. 2
12/16/03

FIVE-YEAR REVIEW
for
OPERABLE UNIT 1

Naval Training Center
Orlando, Florida

Southern Division
Naval Facilities Engineering Command

Contract Number N62467-94-D-0888

Contract Task Order 0024

December 2003

FIVE-YEAR REVIEW
FOR
OPERABLE UNIT 1

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

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 NUMBER N62467-94-D-0888
CONTRACT TASK ORDER 0024

DECEMBER 2003

PREPARED UNDER THE SUPERVISION OF:

STEVEN B. McCOY
TASK ORDER MANAGER
TETRA TECH NUS, INC.
OAK RIDGE, TENNESSEE

APPROVED FOR SUBMITTAL BY:

DEBBIE WROBLEWSKI
PROGRAM MANAGER
TETRA TECH NUS, INC.
PITTSBURGH, PENNSYLVANIA

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TABLES

FIGURES

ACRONYMS

ABB-ES	ABB Environmental Services, Inc.
ARAR	applicable or relevant and appropriate requirement
bls	below land surface
BRAC	Base Realignment and Closure
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CLEAN	Comprehensive Long-term Environmental Action Navy
CTL	Cleanup Target Level
DET	Environmental Detachment Charleston
DPT	direct push technology
EBST	Environmental Baseline Survey for Transfer
FDEP	Florida Department of Environmental Protection
FOSET	Finding of Suitability for Early Transfer
FOST	Finding of Suitability to Transfer
GCTL	Groundwater Cleanup Target Level
GOAA	Greater Orlando Aviation Authority
HEAST	Health Effects Assessment Summary Tables
HHRA	Human Health Risk Assessment
IAS	Initial Assessment Study
IR	Installation Restoration
IRA	Interim Remedial Action
IRIS	Integrated Risk Information System
MCL	maximum contaminant level
MCPA	methyl(1,4-chlorophenoxy) propionic acid
OSHA	Occupational Safety and Health Administration
ug/L	micrograms per liter (parts per billion)
msl	mean sea level
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NTC	Naval Training Center
NTU	nephelometric turbidity unit
OPT	Orlando Partnering Team
OU	Operable Unit
PAH	polynuclear aromatic hydrocarbon
PCB	polychlorinated biphenyl
PCE	tetrachloroethylene or perchloroethylene
pCi/L	picocuries per liter
RAB	Restoration Advisory Board
RBC	Risk-Based Concentration
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
RPM	Remedial Project Manager
ROD	Record of Decision
SA	Study Area
SACM	Superfund Accelerated Cleanup Model
SARA	Superfund Amendments and Reauthorization Act of 1986
SCG	Soil Cleanup Goals
SCTL	Soil Cleanup Target Levels
TBC	To Be Considered
TCE	trichloroethene
TtNUS	Tetra Tech NUS
USEPA	U. S. Environmental Protection Agency
VC	vinyl chloride

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site name: (Former) Naval Training Center, Orlando		
EPA ID: FL6170023711		
Region: 4	**State**: FL	**City/County**: Orlando/Orange
SITE STATUS		
NPL status: Not an NPL site; BRAC site (former) NTC Orlando transferred to City of Orlando.		
Remediation status(choose all that apply): **G** Under Construction **O** Operating **G** Complete		
Multiple Operable Units (OUs)*? O Yes **G** No **(Ous 1,2,3 and 4)**		
Construction completion date: November 10, 1997		
Fund/PRP/Federal Facility Lead: Federal Facility		**Lead Agency:** Department of the Navy, Southern Division Naval Facilities Engineering Command
Has site been put into reuse? O Yes **G** No		
REVIEW STATUS		
Lead agency: G EPA **G** State **G** Tribe **O** Other Federal Agency: Southern Division, Naval Facilities Engineering Command		
Author name: Richard P. Allen		
Author title: Senior Environmental Project Manager		Author Affiliation: Tetra Tech NUS, CLEAN III Contractor for Department of the Navy, Southern Division Naval Facilities Engineering Command
Review period: November 1997 to November 2002		
Date(s) of site inspection: September 2002		
Type of review: By agreement between USEPA, FDEP, and U. S. Navy; Statutory	Policy Type (name): **G** Pre-SARA **G** Ongoing **G** Removal Only **G** Regional Discretion	**Review number (1,2, etc.)**: 1
Triggering action: Approval of Record of Decision		
Triggering action date: November 10, 1997		
Due date (five years after triggering action date): November 10, 1997		

Issues:

Issues identified during the five-year review were as follows: (1) Recent groundwater sampling results indicate the presence of arsenic, MCPA, and antimony at concentrations exceeding the Florida Groundwater Cleanup Target Levels; arsenic and antimony also exceeded the Federal maximum contaminant levels for drinking water. These contaminants had not been previously identified during nine previous sampling episodes at two well clusters in downgradient locations near the northern site boundary, although turbidity in at least three of the six cluster wells could have been a contributing factor. (2) The developer plans to install a dry stormwater retention pond in the northwest portion of the subject parcel. The retention pond may necessitate the relocation of some of the wells in the long-term monitoring well network, because groundwater flow velocities and directions may be altered. (3) During the site inspection, several erosion channels up to VA feet deep in surface cover over the landfill footprint were noted, although no landfill debris was observed at the base of these channels. It should be noted that the final grade for surface cover in some areas will be at least three times the thickness required for protectiveness by the Florida Department of Environmental Protection.

Recommendation and Required Actions:

Continue the groundwater monitoring, landfill inspection program, and institutional controls as specified in the Record of Decision. All monitoring wells should be properly developed to minimize the effects of turbidity on analytical results. If necessary, replace wells where previous development and low flow sampling procedures have not reduced or eliminated turbidity. Maintain the network of monitoring wells with locations that reflect the most recent site plans for drainage and stormwater control. Repair any erosion channels in the landfill cover and take measures to prevent future erosion. The landfill cover must be maintained to ensure it is at least two feet thick in accordance with Florida Department of Environmental Protection requirements.

Protectiveness Statement(s):

The remedial actions at OU 1 at the former NTC Orlando remain protective of human health and the environment. The implementation of the groundwater monitoring program (sampling, analysis, and evaluation), periodic visual inspections, and institutional controls (disallow the use of the surficial aquifer groundwater in the vicinity of the landfill for drinking or irrigation; limit intrusive activities within the landfill boundary; and restrict use of the land within the landfill boundary to non-residential uses) provide protection for human health and the environment.

This five-year review shows that the Navy is meeting the requirements of the Record of Decision for OU 1 at the former NTC Orlando.

Signature of U. S. Department of the Navy and Date:

_____ _____

Barbara Nwokike
Remedial Project Manager
for Naval Training Center, Orlando, Florida
Southern Division
Naval Facilities Engineering Command
North Charleston, South Carolina

Date

1.0 INTRODUCTION

A five-year review for the North Grinder Landfill, Operable Unit (OU) 1 of the (former) Naval Training Center (NTC), Orlando has been conducted by the U. S. Navy in accordance with an agreement made between the Navy, the U. S. Environmental Protection Agency (USEPA), and the Florida Department of Environmental Protection (FDEP). Vicinity and site maps for OU 1 are provided as Figures 1-1 and 1-2. This review is not required by statute, as (former) NTC Orlando is a Base Realignment and Closure (BRAC) base. However, since the BRAC program embraces the principles of the Navy's Installation Restoration (IR) program and is designed primarily as a vehicle for the transfer of former Navy property into the private sector in an environmentally responsible manner, the Navy is following the principles contained in the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

Statutory reviews are required for sites where, after remedial actions are complete, hazardous substances, pollutants, or contaminants will remain onsite at levels that will not allow for unrestricted use or unrestricted exposure. This requirement is set forth by the CERCLA and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). Statutory reviews are required only if the Record of Decision (ROD) was signed on or after the effective date of the Superfund Amendments and Reauthorization Act of 1986 (SARA). CERCLA § 121(c), as amended by SARA, states:

> *If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented.*

Under the NCP, the Code of Federal Regulations (CFR) states, in 40 CFR 300.430(f)(4)(ii):

> *If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.*

This is the first five-year review for OU 1, the North Grinder Landfill site. The triggering action for this review is the approval of the final ROD on November 10, 1997. This review was conducted because hazardous substances, pollutants, or contaminants were left onsite above levels that allow for unlimited use and unrestricted exposure. The review was conducted principally by Richard Allen of Tetra Tech NUS (TtNUS), with assistance from TtNUS personnel and members of the Orlando Partnering Team (OPT). The review commenced on September 4, 2002, and was completed on
September 30, 2002.

In addition to the 5-year review for OU 1, this document summarizes the status of the remaining OUs at NTC Orlando, specifically OU 2 at the McCoy Annex, OU 3 at the Main Base, and OU 4 at Area C. The final RODs have not been issued for these sites and the initial 5-year remedial periods have not begun. The current status of these OUs is addressed in an appendix to this report.

CAD FILE NO./DATE: k:\dgn\navy\sites\ou1\OU1-004.dgn/11-20-03 OU1 5 YEAR REVIEW

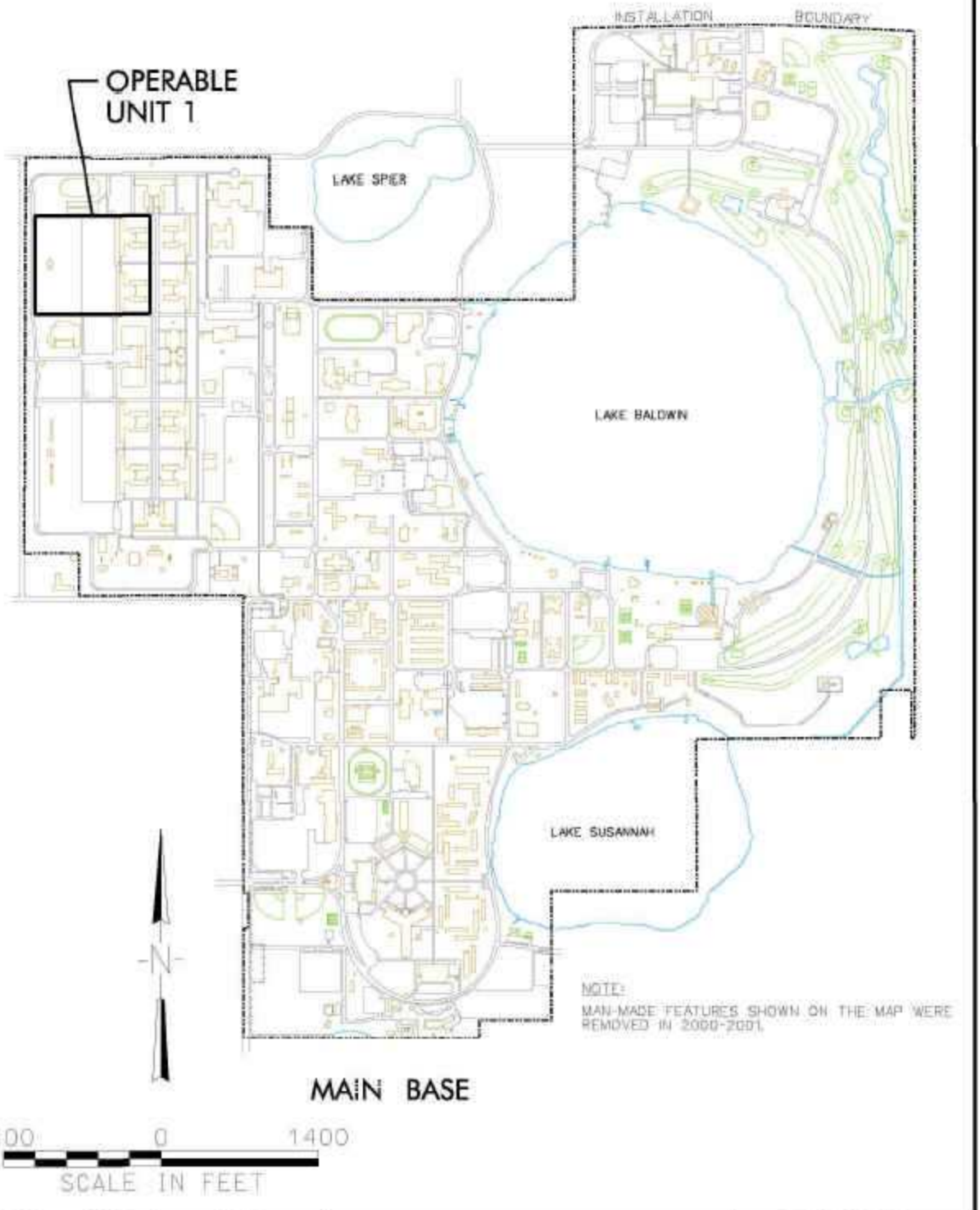
DRAWN BY JAW	DATE 11-06-03		CONTRACT NO. N62467-94-0888
CHECKED BY ATJ	DATE 11-19-03		OWNER NO. N7457
REVISED BY	DATE		APPROVED BY SBM DATE 11-20-03
SCALE AS NOTED			DRAWING NO. 1-1 REV. 0

FIGURE 1-1
VICINITY MAP
OPERABLE UNIT 1

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

FORM CADD NO. SDIV-AV.DGN - REV 2 - 10/23/03

CAD FILE NO./DATE: R:\dgn\ntnrp\orlando\sites\ou1\ou1-001.dgn/11-20-03 OU 5 YEAR REVIEW



DRAWN BY: JAW — DATE: 11-20-03	DEPARTMENT OF THE NAVY — SOUTHERN DIV. FACILITIES ENGINEERING COMMAND	FIGURE 1-2 SITE LOCATION MAP OPERABLE UNIT 1 NAVAL TRAINING CENTER ORLANDO, FLORIDA	CONTRACT NO.: N62467-94-D-0888
CHECKED BY: ATJ — DATE: 11-19-03			OWNER NO.: N7457
REVISED BY — DATE			APPROVED BY: SBM — DATE: 11-20-03
SCALE: AS NOTED			DRAWING NO.: 1-2 — REV.: 0

FORM CADD NO. SDIV-AY.DGN - REV 3 - 10/23/03

2.0 BACKGROUND

2.1 SITE BACKGROUND

OU 1, the North Grinder Landfill, is located in the northwest corner of the former Main Base of the NTC and was operated as a landfill from its inception (possibly as early as 1939) until it was closed in 1967. The locations of the site buildings and other features present while the NTC was operating are shown in Figure 2-1. At the time of the ROD approval in November 1997, the landfill was located under both lawn and the asphalt paved area shown in the figure. The NTC was closed in April 1999 and most of the Main Base including OU 1 were subsequently transferred to the City of Orlando for redevelopment. Figure 2-2 is an aerial photograph of the site taken in August 2002. As shown in the photo, most of the anthropogenic features at the former NTC had been removed by this time as part of the redevelopment effort.

2.2 SITE CHRONOLOGY

A chronology of significant events at NTC Orlando and OU 1 is presented in Table 2-1. Sources of this information are listed in the References.

2.3 PHYSICAL CHARACTERISTICS

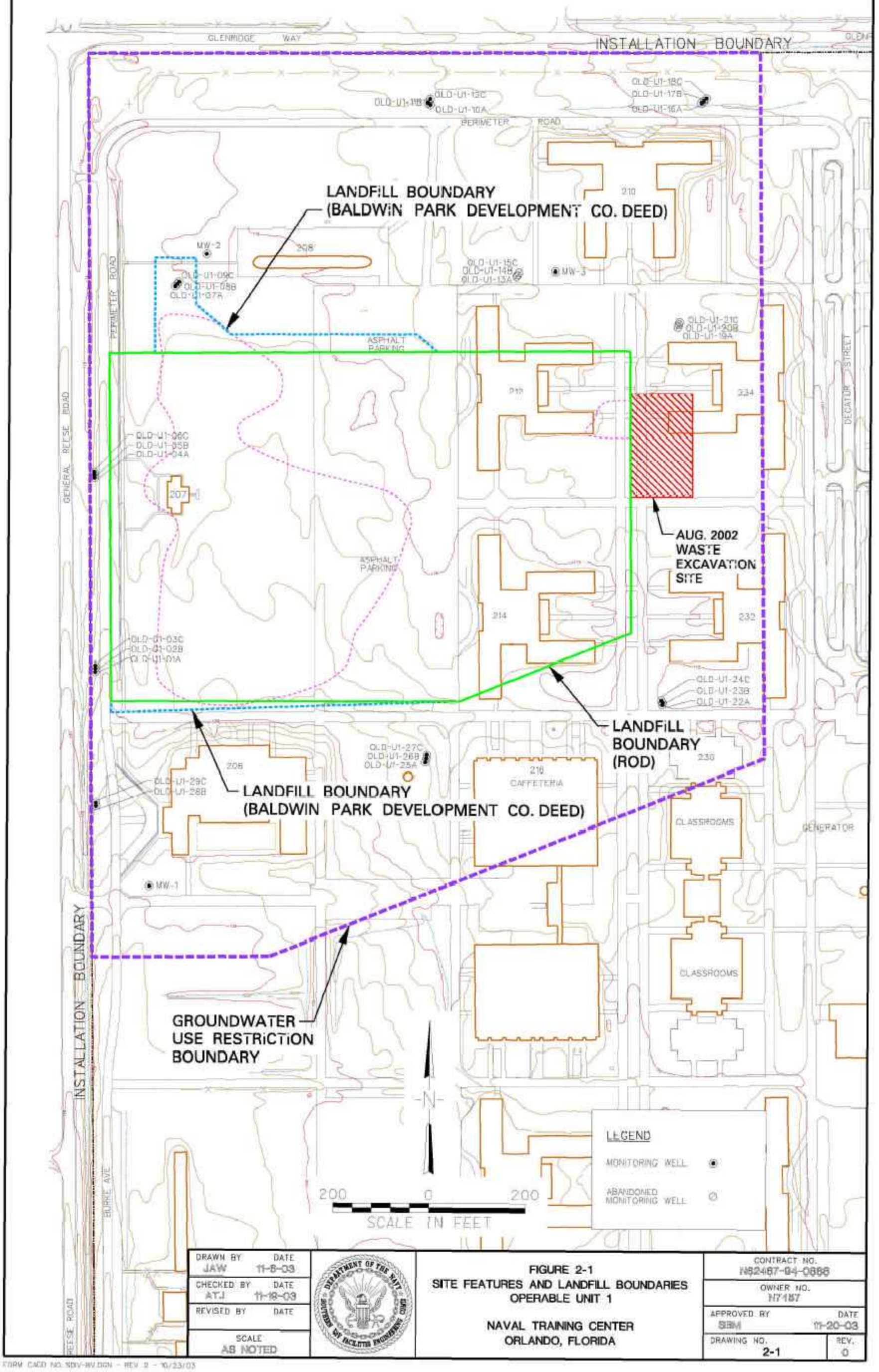
OU 1 is located in Orange County, Florida, which is situated within the Atlantic Coastal Plain physiographic province as defined by Brooks (1971). Most of the City of Orlando, and all of the Main Base facilities at NTC Orlando, are contained within the highland topographic region, where elevations are generally greater than 105 feet above mean sea level (msl). The land surface across most of the area is generally flat, but the higher ground elevations exist in the west side of the county and decrease gradually eastward. The elevation ranges from near 175 feet above msl in the western part of the county to approximately 100 feet above msl in the east.

The physiographic foundation of central Florida is the Florida Structural Platform, upon which Cretaceous, Tertiary, and Quaternary-aged carbonates have been deposited. The carbonates are overlain by unconsolidated clastic sediments composed primarily of clay to sand-sized grains and organic material. Dissolution along the upper surface of the underlying carbonates has resulted in the present landform, which is characterized by closed surface depressions and, if the water table is of sufficient elevation, shallow sinkhole lakes.

At the Main Base, the surface elevation decreases from approximately 125 feet above msl in the northwest corner to approximately 91 feet above msl at Lake Baldwin. The ground surface in the OU 1 area gently slopes from the southwest to the northeast. Prior to the addition of soil cover and site redevelopment, the elevation ranged from approximately 120 feet above msl in the southwest corner to 110 feet above msl in the northeast corner (Figure 2-3). There are no natural surface features of significance within the study area.

Climate

The climate of the Orlando area is characterized as humid and semitropical. According to the U. S. Department of Commerce (Local Climatological Data Survey, 1994), the average annual temperature is approximately 71.5NF. The range in daily average temperatures varies from approximately 50NF in January to 80NF in July. The prevailing winds blow from the west and south. The average annual rainfall in Orange County is 51.4 inches. Most of the rainfall occurs during afternoon thundershowers from June through September. During the summer months, thunderstorms occur at a frequency of every other day and may yield several inches of rainfall. Rainfall amounts from thunderstorms vary widely. Winters typically are mild and dry. Potential evaporation for the area is estimated at a maximum value of 46 inches per year based on meteorological factors such as solar radiation, wind movement, air temperature, and humidity.



DRAWN BY JAW	DATE 11-6-03	FIGURE 2-1 SITE FEATURES AND LANDFILL BOUNDARIES OPERABLE UNIT 1 NAVAL TRAINING CENTER ORLANDO, FLORIDA	CONTRACT NO. N62467-94-D-0666
CHECKED BY ATJ	DATE 11-18-03		OWNER NO. N7157
REVISED BY	DATE		APPROVED BY SBM / DATE 11-20-03
SCALE AS NOTED			DRAWING NO. 2-1 / REV. 0

FORM CADD NO. SDIV-BV.DGN - REV. 2 - 10/23/03

CAD FILE NO./DATE: k:\dgn\navy\orlando\sites\ou1\oul-003.dgn/11-20-03 OPERABLE UNIT 1 5 YEAR REVIEW

AERIAL PHOTOGRAPH TAKEN 8-16-2002

DRAWN BY: JAW — DATE: 11-20-03		FIGURE 2-2 PHOTO OF OPERABLE UNIT 1 LOOKING FROM THE NORTHWEST NAVAL TRAINING CENTER ORLANDO, FLORIDA	CONTRACT NO.: N62467-94-0888
CHECKED BY: ATJ — DATE: 11-19-03			OWNER NO.: N7467
REVISED BY — DATE			APPROVED BY: SBM — DATE: 11-20-03
SCALE: AS NOTED			DRAWING NO.: 2-2 — REV.: 0

FORM CADD NO. SOIV-AV.DGN - REV 2 - 10/23/03

TABLE 2-1
CHRONOLOGICAL SUMMARY OF ACTIVITIES
OPERABLE UNIT 1

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

Event	Date
U. S. Army Air Corps conducts operations at Orlando Air Base, including parcel that became the Main Base, which includes site of future North Grinder Landfill; landfill operations started prior to 1947.	1940-1947
U. S. Air Force assumes command of all former U. S. Army Air Corps facilities (called Orlando Air Force Base).	1947
Base decommissioned and on standby status.	1949-1950
Reactivated as Air Force Aviation Engineers training site.	1951
Military Airlift Command assumed full jurisdiction.	1953
U. S. Navy moved its Training Device Center to Orlando Air Force Base from Port Washington, New York.	1965 to mid-1967
North Grinder Landfill closed prior to construction of two dormitories, Buildings 212 and 214.	1967
Navy took over base, commissioned as Naval Training Center, Orlando.	1968
Initial Assessment Study (IAS) of NTC Orlando facilities by C. C. Johnson & Associates.	1985
Verification Study at NTC Orlando facilities by Geraghty & Miller.	1986
Environmental Baseline Survey submitted to Navy by ABB Environmental Services.	1994
RI Report submitted to U. S. Navy by ABB Environmental Services.	December 1996
Proposed Plan submitted to U. S. Navy by ABB Environmental Services.	May 16, 1997
Public Comment Period for Proposed Plan.	May 16 to June 16, 1997
ROD approved by U. S. Navy, FDEP, and USEPA.	Nov. 12, 1997
Environmental Detachment Charleston (DET) conducts quarterly or semiannual groundwater monitoring and site inspections as required by ROD.	March 1998 to June 1999
Navy signs transfer documents transferring Main Base to City of Orlando.	Oct. 28, 1999
CCI conducts semiannual groundwater monitoring and site inspections as required by ROD.	December 1999 to January 2002
Groundwater monitoring wells abandoned by Nodarse for property redevelopment.	February 2002
CCI initiated test pit investigation to map previously unidentified landfill "stringers"; landfill materials included medical waste. 5,900 tons of nonhazardous waste and 20 pounds of regulated medical waste were subsequently excavated and disposed.	August 2002

Geology

The upper 2,000 feet or so of the subsurface in central Florida is divided into three separate lithologic units:

- The surficial deposits are a thin (generally less than 100 feet) sequence of undifferentiated terrace deposits of Recent and Pleistocene age.

- The underlying Hawthorn Group is a thin (generally less than 100 feet) sequence of mixed unconsolidated clastic material and carbonates of Miocene age.

- The Hawthorn overlies a thick (more than 1,200 feet) sequence of Eocene-age marine carbonates, consisting of three units: the Ocala Group, the Avon Park Limestone, and the Lake City Limestone.

Subsurface exploration activities during the remedial investigation (RI) were limited to the undifferentiated surface deposits and the upper 20 to 30 feet of the Hawthorn Group. Undifferentiated surficial deposits consist of light gray to dark brown silty fine sand with intermingled layers of gray silty clay. Occasionally, cemented stringers up to 2 feet thick were encountered.

The upper part of the Hawthorn Group is generally divided into two units. The first unit is a greenish-gray silty fine to coarse sand with phosphate nodules and shell fragments. This unit occupies the upper 10 to 15 feet of the Hawthorn Group in the study area. The second unit is greenish-gray silty clayey sand with intermingled layers of pure clay.

2.4 LAND USE

The (former) Main Base occupied approximately 1,095 acres within the Orlando city limits and was composed mainly of operational and training facilities. These facilities were used for training new and recently graduated recruits, as well as enlisted and officer personnel in the nuclear engineering program. Land use at the Main Base was dominated by barracks, training facilities, administrative buildings, drill fields, and recreational areas. OU 1 is located in the northwest corner of the former NTC.

OU 1 lies under a former parade field (the North Grinder Parade Field) that occupied approximately 15 acres in the northwest corner of the Main Base. Buildings 212 and 214, two troop dormitories constructed in the late 1960s, occupied an additional 7.5 acres and were situated east of the former parade field. The parade field was used for the physical training, assembly, marching, and graduation ceremonies of the recruits. Prior to 1967, a sanitary landfill was operated at the site. Landfilling operations began sometime between 1939 and 1947 and continued until 1967. Other operations at OU 1 included a firefighter training area that was operated between 1961 and 1965. Training fires were set using gasoline, diesel fuel, or oil on a weekly basis while the firefighter training area was in use (ABB-ES, 1995).

Following transfer of the property to the City of Orlando, and shortly thereafter to Orlando Partners, the demolition of all structures began so that construction of Baldwin Park, a planned single and multi-family residential and mixed retail community, could begin. Building demolition began in March 2000, and infrastructure construction (roads, utilities, retention ponds, stormwater control) was started in October 2001.

To the west of OU 1 across General Rees Road, the land use is single family residences. At the time of this review, the new Glenridge Middle School was under construction on the land east of OU 1. The area over the landfill will be utilized for recreational areas including tennis courts, baseball and soccer fields, and a track and field facility. Landfill cover materials have been amended to thicknesses of up to 6 feet, in excess of that which the FDEP deems protective.

LEGEND

— 100 — Surface elevation contour (feet, mean sea level)
Contour interval = 5 feet

0 1000 2000
SCALE: 1 INCH = 2000 FEET

FIGURE 2-3

TOPOGRAPHIC MAP

REMEDIAL INVESTIGATION
OPERABLE UNIT 1

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

H:\8595\175001\DLC-DSK-NPV.04-10-96

NTC-OU1.RIR
PMW.12.96

2.5 HISTORY OF CONTAMINATION

Contamination at OU 1 was first documented during the IAS (C. C. Johnson, 1985). During the IAS, nine potentially contaminated sites at NTC Orlando were identified, including OU 1. The Verification Study (Geraghty & Miller, 1986) documented groundwater contamination near the landfill boundary. Contamination included arsenic and gross alpha radionuclides and resulted in the recommendation for an RI to further characterize the groundwater contamination.

The types of documented wastes deposited in the landfill include film and photographic chemicals, paint thinner, garbage and trash, medical waste, yard and construction debris, and tetrachloroethylene or perchloroethylene (PCE) stillbottoms. The petroleum products typically used by the military fire department for firefighting drills included diesel fuel and aviation fuel; thus, byproducts of combustion and residues would be expected in and around the former firefighter training area.

2.6 SUMMARY OF BASIS FOR TAKING ACTION

During the RI that began in March 1995, groundwater samples indicated that contamination was present at OU 1 at concentrations exceeding Florida's Groundwater Cleanup Target Levels (GCTLs). Surface soil contamination included arsenic, polynuclear aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), and pesticides (Table 2-2). However, the contaminant concentrations in soil did not require further delineation or cleanup under a non- residential reuse scenario based on the human health risk assessment (HHRA) presented in the RI Report (ABB-ES, 1996). In addition, six to eight inches of soil containing arsenic and PAHs (Table 2-2), excavated and transported from NTC Orlando Study Area (SA) 39 and SA 40, was used as the initial soil cap layer over the former landfill. A minimum of 24 inches of certified clean soil was used as the final soil cap (Nodarse, 2001). Groundwater contamination, principally in wells nearest the margins of the former landfill, consisted of exceedances of gross alpha and gross beta radionuclides above established background concentrations for NTC Orlando (Figure 2-4). Some inorganic compounds were also present at concentrations exceeding background, secondary drinking water standards, or GCTLs. Because of these exceedances, the groundwater under and near the former landfill is unsuitable for drinking or irrigation and requires institutional controls to prevent exposure, either through dermal contact, inhalation, or ingestion.

TABLE 2-2
SURFACE SOIL CONTAMINANT CONCENTRATIONS
OPERABLE UNIT 1

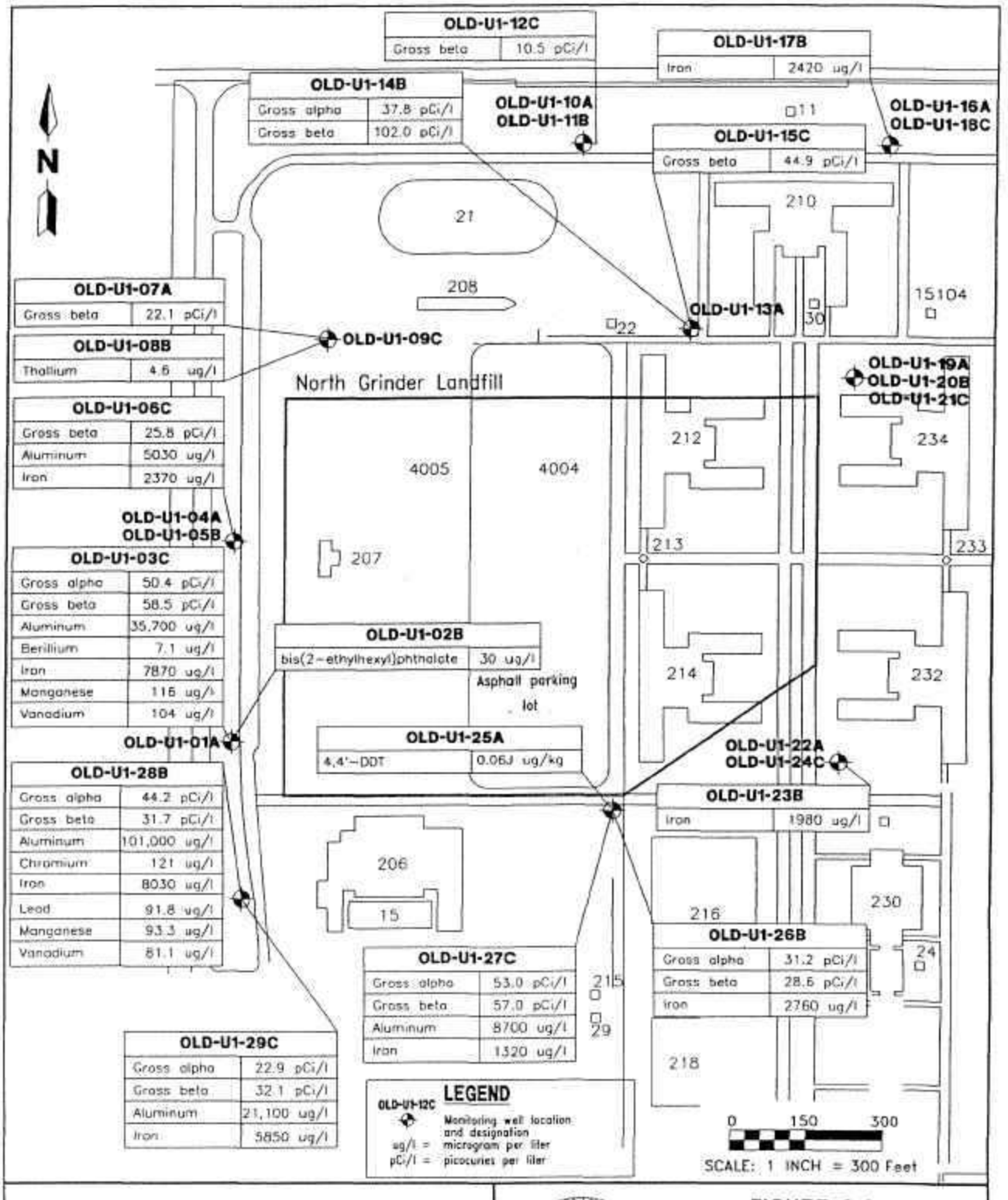
NAVAL TRAINING CENTER
ORLANDO, FLORIDA

Contaminant a	Concentration Range b	Soil Screening Criteria c
Surface Soil at OU 1		
Arsenic	0.42-3.5	0.851/0.7/3.1
Benzo(a) pyrene	0.2-1.2	0.1/0.5
Dibenzo(a,h) anthracene	0.12-0.76	0.1/0.5
Indeno(1,2,3-cd) pyrene	0.16-2.3	1.4/5.0
Aroclor-1260(PCB)	0.035-0.15	0.9/3.5
Dieldrin	0.038-0.175	0.07/0.3
Surface Soil From SA 39		
Arsenic	1.2-6.7	1.0/0.8/3.7
Benzo(a) pyrene	157-1,440	0.1/0.5
Dibenzo(a,h) anthracene	101-354	0.1/0.5
Surface Soil From SA 40		
Arsenic	1.2J-13.5J	1.0/0.8/3.7

a Only contaminants that exceeded the residential or industrial Soil Cleanup Goals [(SCGs) FDEP, 1995] are shown for OU 1; contaminants that exceed the FDEP residential or industrial SCTLs (FDEP, 1999) are shown for SA 39 and SA 40.

b All units are milligrams per kilogram (mg/kg), except Aroclor and Dieldrin are micrograms per kilogram (ug/kg).

c NTC Background/residential SCGs/industrial SCGs shown for OU 1; NTC background/ residential SCTLs/industrial SCTLs shown for SA 39 and SA 40. Note that background is not applicable to organic contaminants.



SOURCE: ABB-ES, 1996

FIGURE 2-4

GROUNDWATER EXCEEDANCES AT OPERABLE UNIT 1 (1995 – 1996)

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

3.0 REMEDIAL ACTIONS

3.1 REMEDY SELECTION

To identify remedial actions for OU 1, applicable regulations and guidance documents were reviewed. The regulations for closure of federal Resource Conservation and Recovery Act (RCRA) hazardous waste, federal solid waste landfills, and state solid waste disposal facilities were not considered directly applicable to OU 1 because the landfill did not receive waste material after the effective dates of the regulations. Portions of the regulations, however, were relevant and appropriate and were considered in the remedial decision.

NTC Orlando is not a CERCLA site, but guidance published for CERCLA sites was reviewed and considered in identifying components of the remedial action for OU 1. Specifically, the NCP states that closure of CERCLA landfills not subject to specific closure regulations can be achieved by hybrid-landfill closure. Hybrid-landfill closure is further described in the USEPA guidance document, Design and Construction of RCRA/CERCLA Final Covers (USEPA, 1991). This guidance suggests the following items be considered for hybrid- landfill closures:

- Covers, which may be permeable, to prevent a direct contact threat.
- Limited long-term cover maintenance.
- Groundwater monitoring.
- Institutional controls, as necessary.

Based on consideration of these items, the recommendations of the RI, and the remedial actions selected in the ROD, the final remedy selected for OU 1 consists of:

- The implementation of the groundwater monitoring program (sampling, analysis, and evaluation).

- Periodic visual inspections (conducted during scheduled monitoring events).

- Institutional controls (disallow the use of the surficial aquifer groundwater in the vicinity of the landfill for drinking or irrigation, limit intrusive activities within the landfill boundary, and restrict use of the land within the landfill boundary to non-residential uses).

- Maintain 2 feet of soil cover over the former landfill area.

3.2 REMEDY IMPLEMENTATION

3.2.1 Groundwater Monitoring

The groundwater monitoring program includes six clusters of three wells each (shallow, intermediate, and deep). The shallow wells were generally screened at the water table with a screened depth of 12 to 24 feet below land surface (bls); the intermediate wells were installed with a 5-foot screened interval starting from 35 to 50 feet bls; and deep wells were installed with a 5-foot screened interval starting from 50 to 70 feet bls.

After completion of the ROD in November 1997, quarterly groundwater sampling was performed in 1998, as required for Year 1. Although the ROD specified annual monitoring after Year 1, the OPT decided to sample more frequently to better evaluate contaminant trends in implementing the final remedy. Sampling was performed in June and December 1999, June 2000, February and July 2001, and January 2002.

The last sampling event at OU 1 through the initial five-year review period was performed in January and February 2002. In February 2002, the monitoring wells were abandoned to allow redevelopment of the property. The wells were abandoned by the developer's environmental

consultant, Nodarse and Associates, Inc. (Nodarse) in accordance with the requirements of the FDEP and the St. Johns River Water Management District, before beginning construction activities. Replacement wells were subsequently installed by Nodarse in May 2003, and monitoring is scheduled to resume on an annual frequency in December 2003. The locations of the replacement wells along with redevelopment site features are shown in Figure 3-1.

3.2.2 Landfill Inspections

Site inspections were completed during each groundwater monitoring event on the dates listed in Section 3.2.1. The former landfill was inspected for signs of settling, unnatural ground depressions (e.g., sinkholes), disturbance of the soil cover, and the presence of exposed waste material.

Soil Cover Depressions

During several inspections, small depressions were noted in the soil cover. The depressions were attributed to isolated ground settling due to either landfill consolidation or small sinkholes. Two larger depressions, one measuring approximately 10 feet by 10 feet by 1 foot deep west of Building 214 and another measuring approximately 40 feet by 60 feet by 1 to 2 feet deep north of Building 214, were noted in the asphalt parking lot in June 2000. Even with all of the small and large depressions, landfill waste was not visible at the surface and the soil cover was intact. As a result, repair of the soil cover was not deemed to be necessary. By the February 2001 inspection, however, the buildings in the area and the asphalt parking lot had been demolished by the developer and the ground surface cleared and graded.

Excavation of Waste Material

Utility trenching by the Orange County School Board in the summer of 2002 during construction of the new Glenridge Middle School unearthed buried debris outside of the recognized boundary of the OU 1 landfill. The debris included a small amount of medical waste material. The discovery was reported to the Navy, which initiated an accelerated cleanup resulting in the excavation and off-site disposal of approximately 5,900 tons of soil and waste material. The location of the excavation area is shown in Figure 2-1. As a result of the August 2002 excavation, the area outside the recognized OU 1 boundary will not be subjected to the restrictions imposed upon the landfill area to the west. The groundwater use restrictions, however, remain in effect for the larger area identified in Figure 2-1.

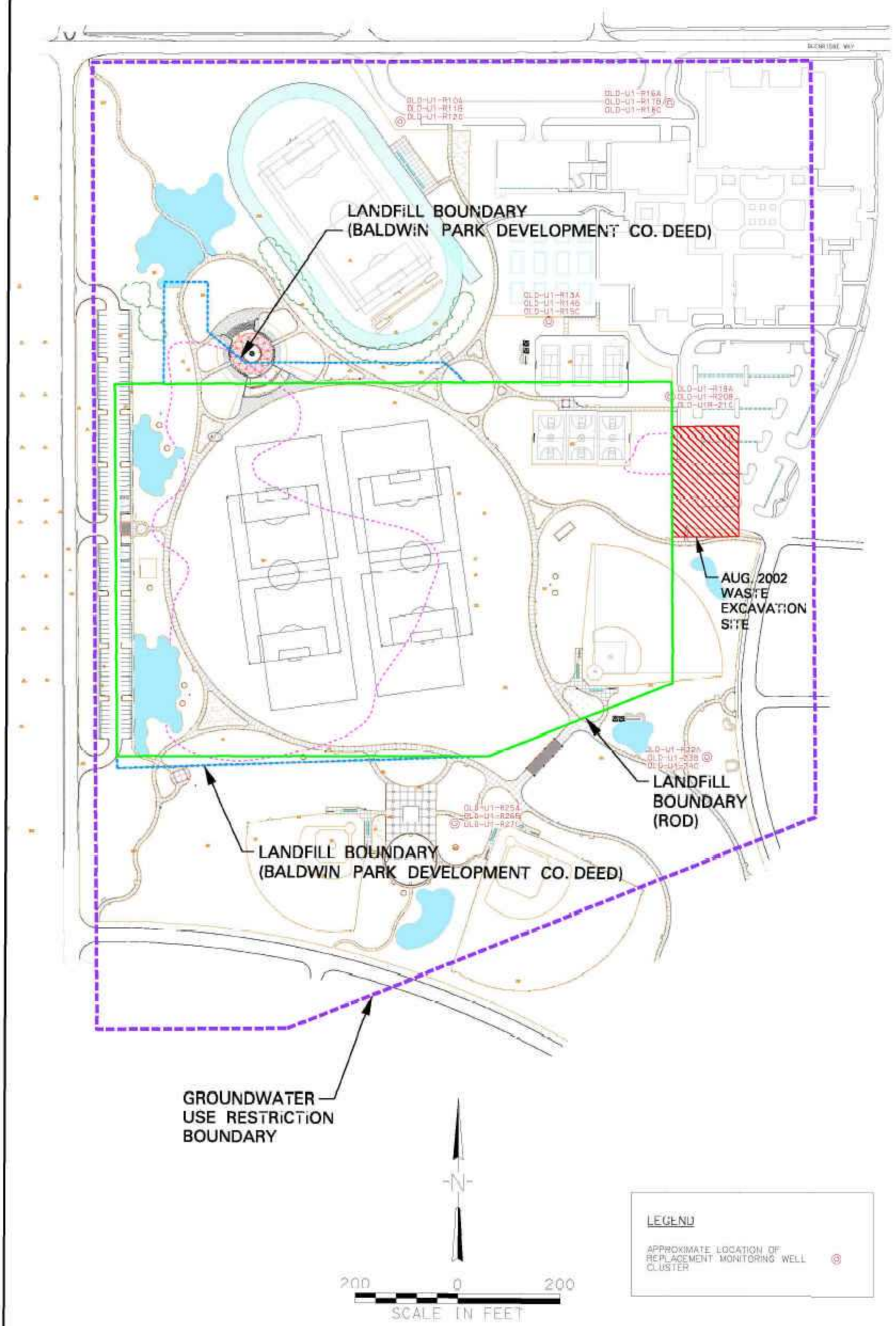
3.2.3 Institutional Controls

Deed restrictions containing land-use controls and groundwater use restrictions were developed to limit human activity at OU 1, thereby protecting human health and the environment, and ensuring the continued effectiveness of the remedy. The deed restrictions were transferred by the Navy in a Finding of Suitability to Transfer (FOST) with the Main Base property to the City of Orlando in October 1999. The City of Orlando subsequently passed along the deed restrictions to the developer with some additional area included in the landfill boundary as shown in Figure 2-1. The developer's environmental consultant, Nodarse, had performed additional delineation of landfill material and the locations of the material are outlined in Figure 3-1. As a result the City expanded the landfill restrictions to include the additional areas (as shown in Figures 2-1 and 3-1).

The City has developed the area for recreational use (Figure 3-1). Major features of the new land use include the soccer and baseball fields, tennis courts, and the track and pedestrian walkways. This is consistent with the institutional controls specified in the ROD.

SOURCE:

SITE DEVELOPMENT FEATURES ARE TAKEN FROM DRAWING W00 C 011.dwg
BY NORDARSE & ASSOCIATES, INC. DATED 6-10-03.



DRAWN BY JAW	DATE 11-8-03	FIGURE 3-1 SITE REDEVELOPMENT MAP OPERABLE UNIT 1 NAVAL TRAINING CENTER ORLANDO, FLORIDA	CONTRACT NO. N62467-94-D-0888
CHECKED BY ATJ	DATE 11-18-03		OWNER NO. N7457
REVISED BY	DATE		APPROVED BY STM / DATE 11-20-03
SCALE AS NOTED			DRAWING NO. 3-1 / REV. 0

FORM CADD NO. SDIV-BY.DGN - REV 3 - 10/23/02

4.0 FIVE-YEAR REVIEW

4.1 ADMINISTRATIVE COMPONENTS

The OPT includes representatives from the Navy, FDEP, the USEPA, the CLEAN I and CLEAN III contractors, and the Remedial Action Contractor. The timing of the five-year review was discussed during regularly scheduled OPT meetings that occurred in early June 2002, late July 2002, and early September 2002. The review team was led by Richard Allen of TtNUS, the CLEAN III contractor. He was assisted by TtNUS personnel with expertise in hydrology, risk assessment, and regulatory specialists, as appropriate. David Grabka of FDEP and Gregory Fraley of USEPA Region 4 assisted in the review as representatives of the regulatory community. The review began officially on September 5, 2002, after authorization from the Navy in late August 2002.

4.2 COMMUNITY INVOLVEMENT

Activities to involve the community in the five-year review were initiated with a Restoration Advisory Board (RAB) meeting in June 2002. As there have been no voiced community concerns in recent years, no formal notice has been sent to local newspapers, but such notice will be made when the Five-Year Review report has been completed. At that time, an informational flyer will be produced summarizing the results of the review process and inviting comments from the public at large during a 30-day comment period.

4.3 DOCUMENT REVIEW

This five-year review consisted of a review of relevant documents including: the RI Report; the Proposed Plan; the ROD; 10 episodes of quarterly or semiannual groundwater sampling and site inspections by the DET and CCI; a Nodarse & Associates report on hand-augering results during waste delineation prior to installation of infrastructure for Baldwin Park; and a memorandum from CCI documenting the delineation, excavation, and removal of a previously unidentified portion of the landfill located on the eastern boundary of the landfill exclusion zone. Applicable groundwater cleanup standards, as listed in Table 2-5 of the ROD (ABB-ES, 1997a), were also reviewed. The References include a list of these documents.

4.4 DATA REVIEW - GROUNDWATER MONITORING

The exceedances of State and Federal criteria are listed in Table 4-1 for contaminants of concern at OU 1. These exceedances were identified during the RI and subsequent groundwater monitoring.

4.4.1 Remedial Investigation Summary

Elevated gross alpha and gross beta radiation, exceeding either the Florida GCTL for gross alpha [15 picocuries per liter (pCi/L)] or the established site background value for gross beta (9.5 pCi/L), were the most persistent contaminants identified in the 27 monitoring wells (nine clusters of three each - shallow "A," intermediate "B," and deep "C") during the RI (Figure 2-4). Exceedances of gross alpha and/or gross beta were detected in at least one well in seven of the nine cluster locations, or, alternatively, in nine of the 27 individual wells. Only one of the two sentinel well clusters had a detection of gross beta radiation, slightly exceeding the background value (9.5 pCi/L). ABB-ES concluded that the radiological activity was likely due to natural sources that are being mobilized by altered groundwater chemistry under the landfill and at its fringes and not a landfill source (ABB-ES, 1996).

TABLE 4-1

CONTAMINANTS OF CONCERN IN GROUNDWATER
NAVAL TRAINING CENTER
ORLANDO, FLORIDA

Contaminant	Background Concentration a	Florida GCTL a	Federal MCL a
Inorganics			
Antimony	4.1	6	6
Arsenic	5	50	50 (10 b)
Beryllium	--	4	4
Chromium	7.8	100	5
Iron	1227	300	300 c
Thallium	3.8	2	2
Vanadium	20.6	49	--
Gross alpha d	13.0	15	15
Gross beta e	9.5	4	4
Organics			
4-4'DDT	--	0.1	--
PCBs (Aroclor 1242 and 1254)	--	0.5	0.5
bis(2-ethylhexyl) phthalate	--	6	--
MCPA	--	.5	--

Note: Refer to Figure 2-4 for locations and contaminant levels.

GCTL - Groundwater cleanup target level.
MCL - Maximum contaminant level.
DDT - 1,1'-(2,2,2-Trichloroethylidene)bis[4-chlorobenzene]
PCB - Polychlorinated biphenyl
MCPA - Methyl-4-chlorophenoxy acetic acid, 2-

a all units ug/L except as noted.
b Federal MCL for arsenic scheduled for reduction to 10 ug/L in January 2006.
c Secondary drinking water standard
d Units are pCi/L.
e Units are millirems per year.

Other inorganic compounds exceeding Florida GCTLs during the RI were beryllium (one well), chromium (one well), lead (one well), thallium (one well), and vanadium (two wells) (Figure 2-4). These inorganic exceedances were located near the landfill boundary in downgradient or sidegradient locations. There was one detection of an organic compound at a concentration exceeding the GCTL: bis(2-ethylhexyl) phthalate, a semivolatile compound considered to be a common laboratory artifact. There were also secondary standards exceedances in several samples for aluminum, iron, and manganese. The wells with these exceedances are adjacent to the mapped perimeter of the landfill with one exception. There was one iron detection in a sentinel well (two well clusters were installed near the northern site boundary to monitor whether or not contamination was potentially flowing offsite). The iron concentration in well OLD-U1-17B was approximately two times the established background concentration for iron of 1,227 ug/L.

4.4.2 Long-Term Groundwater Monitoring - March 1998 to February 2002

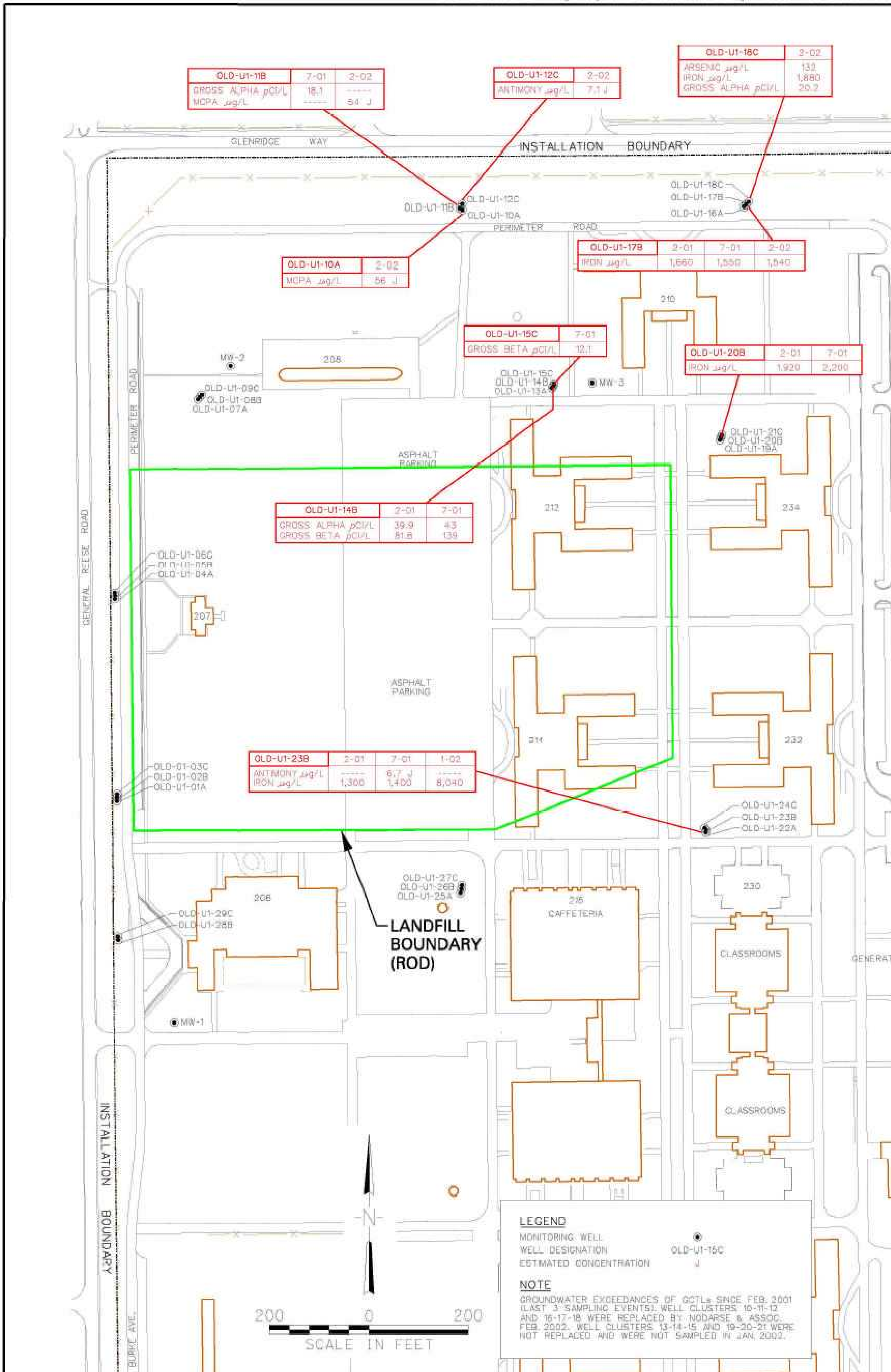
There have been 10 sampling events since the conclusion of the RI and the signing of the ROD. Six of the cluster wells installed during the RI were selected for long-term monitoring. The six clusters consist of one upgradient cluster (OLD-U1-25A, -26B, and -27C); one sidegradient cluster (OLD-U1-22A, -23B, and -24C); two downgradient clusters near the northern boundary of the landfill (OLD-U1-13A, -14B, and -15C and OLD-U1-19A, -20B, and -21C); and two downgradient clusters that serve as sentinel wells to determine if contamination is present near the site boundary (OLD-U1-10A, -11B, and -12C and OLD-U1-16A, -17B, and-18C). Table A-1 (Appendix A), Historical Summary of Positive Detections of Analytes/Compounds in Groundwater by Well, presents the detections for the sampling episodes, including the RI. Figure 4-1 shows the locations of groundwater exceedances identified at OU 1 in the last three sampling events, performed in 2001-2002.

Gross Alpha and Gross Beta Radiation. During the ten sampling episodes following the RI (starting on a quarterly basis in March 1998, and semiannually thereafter), alpha and beta radiation detections have decreased somewhat with time (Tables 4-2 and 4-3). However, since July 2001 gross alpha radiation has been detected in two sentinel wells, OLD-U1-11B and OLD-U1-18C at 18.1 pCi/L (July 2001) and 20.2 pCi/L (February 2002), respectively, versus the GCTL of 15 pCi/L (Figure 4-1). Gross alpha in OLD-U1-11B in the most recent sampling episode was 2.2 pCi/L. The turbidity of well OLD-U1-18C at the time of sampling was 241 NTUs (CCI, 2002a) and may explain why there was elevated gross alpha (and arsenic, below).

Iron. The average iron concentration has not decreased with time (Table 4-4), but average values for all but three wells (OLD-U1-17B, -20B, and -23B) are below background. The reason for the spike in iron concentration in well -23B in the most recent sampling episode (8,040 ug/L versus an average concentration of 1,900 ug/L in 10 previous sampling events) is not known. Iron is a naturally occurring constituent of Florida groundwater, and somewhat elevated concentrations of iron at OU 1 may be due to natural sources that are mobilized by changes in groundwater chemistry near the fringes of the former landfill (Figure 4-1).

Antimony. Antimony was detected in two wells at concentrations exceeding the GCTL. In February 2001, antimony was detected in well OLD-U1-23B at a concentration of 6.7 J ug/L (the GCTL is 6 ug/L) (Table A-1, Figure 4-1). Antimony was detected at this location in the shallow well (OLD-U1-22A) and the deep well (OLD-U1-24C) in June 1998, but not at concentrations that exceed the GCTL. Antimony was not detected in well OLD-U1-23B during the most recent sampling episode. Antimony was also detected during the last sampling event in well OLD-U1-12C at a concentration of 7.1 J ug/L. The turbidity of the sample was 31.6 nephelometric turbidity units (NTUs), possibly contributing to the exceedance.

Arsenic. Arsenic was detected a number of times in several wells, but in only five samples did it exceed the background screening value (5 ug/L). In one instance the concentration of arsenic exceeded the GCTL (50 ug/L). In well OLD-U1-18C, arsenic was detected at a concentration of 132 ug/L in February 2002 (Table A-1). The turbidity of the sample was 241 NTUs (CCI, 2002a) (see discussion for gross alpha and gross beta, above) and may explain why the arsenic concentration was elevated.


OLD-U1-11B 7-01 2-02
GROSS ALPHA pCi/L 18.1 -----
MCPA µg/L ----- 54 J
OLD-U1-12C 2-02
ANTIMONY µg/L 7.1 J
OLD-U1-18C 2-02
ARSENIC µg/L 132
IRON µg/L 1,880
GROSS ALPHA pCi/L 20.2
GLENRIDGE WAY
INSTALLATION BOUNDARY
OLD-U1-11B
OLD-U1-12C
OLD-U1-10A
OLD-U1-18C
OLD-U1-17B
OLD-U1-16A
PERIMETER ROAD
OLD-U1-10A 2-02
MCPA µg/L 56 J
OLD-U1-17B 2-01 7-01 2-02
IRON µg/L 1,660 1,550 1,540
210
OLD-U1-15C 7-01
GROSS BETA pCi/L 12.1
OLD-U1-20B 2-01 7-01
IRON µg/L 1,920 2,200
MW-2
208
OLD-U1-15C
OLD-U1-14B
OLD-U1-13A
MW-3
OLD-U1-09C
OLD-U1-08B
OLD-U1-07A
PERIMETER ROAD
OLD-U1-21C
OLD-U1-20B
OLD-U1-19A
ASPHALT PARKING
OLD-U1-14B 2-01 7-01
GROSS ALPHA pCi/L 39.9 43
GROSS BETA pCi/L 81.8 139
212
234
DECATUR STREET
GENERAL REESE ROAD
OLD-U1-06C
OLD-U1-05B
OLD-U1-04A
207
ASPHALT PARKING
211
232
OLD-U1-23B 2-01 7-01 1-02
ANTIMONY µg/L ----- 6.7 J -----
IRON µg/L 1,300 1,400 8,040
OLD-01-03C
OLD-01-02B
OLD-U1-01A
OLD-U1-24C
OLD-U1-23B
OLD-U1-22A
OLD-U1-27C
OLD-U1-26B
OLD-U1-25A
230
206
216
CAFFETERIA
OLD-U1-29C
OLD-U1-28B
LANDFILL BOUNDARY (ROD)
CLASSROOMS
GENERATO
MW-1
CLASSROOMS
INSTALLATION BOUNDARY
N
200 0 200
SCALE IN FEET
BURKE AVE.
LEGEND
MONITORING WELL
WELL DESIGNATION OLD-U1-15C
ESTIMATED CONCENTRATION J
NOTE
GROUNDWATER EXCEEDANCES OF GCTLs SINCE FEB. 2001 (LAST 3 SAMPLING EVENTS). WELL CLUSTERS 10-11-12 AND 16-17-18 WERE REPLACED BY NODARSE & ASSOC. FEB. 2002. WELL CLUSTERS 13-14-15 AND 19-20-21 WERE NOT REPLACED AND WERE NOT SAMPLED IN JAN. 2002.

DRAWN BY JAW	DATE 11-6-03	FIGURE 4-1 GROUNDWATER EXCEEDANCES (2001-2002) OPERABLE UNIT 1 NAVAL TRAIING CENTER ORLANDO, FLORIDA	CONTRACT NO. N62467-94-0888	
CHECKED BY ATJ	DATE 11-18-03		OWNER NO. N7457	
REVISED BY	DATE		APPROVED BY SBM	DATE 11-20-03
SCALE AS NOTED			DRAWING NO. 4-1	REV. 0

TABLE 4-2

GROSS ALPHA CONCENTRATIONS IN GROUNDWATER
OPERABLE UNIT 1 - NORTH GRINDER LANDFILL

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

Well	Aug-95	Mar-98	Jun-98	Sep-98	Dec-98	Jun-99	Dec-99	Jun-00	Feb-01	Jul-01	Jan-02	Average
OLD-U1-10A	1.9	2.2	2.8	5.8	3.2	9.7	4.6	6.3	0	13.8	14	5.8
OLD-U1-11B	4.7	0	2.4	1.7	0	39.3	1.6	2.8	1.4	18.1	2.2	6.7
OLD-U1-12C	4.4	4.9	4.4	4.3	4.6	11	8.2	4.8	4.3	4.9	6.1	5.6
OLD-U1-13A	0	12	0.9	1.7	2.1	0	2.6	2	NDA	4.6	NDA	2.9
OLD-U1-14B	28.9	41.4	34.3	28.8	30	20.2	28.6	39.9	43	NDA	0	29.5
OLD-U1-15C	11.6	24.2	11.2	7.1	7.9	3.1	3.5	2.9	2.9	4.6	NDA	7.9
OLD-U1-16A	0	2.5	0.9	1.6	1.1	2.1	0.4	2.7	NDA	0.9	1.1	1.3
OLD-U1-17B	3	1.2	2	0	0	1.7	1.5	1.4	1.8	0.8	1.4	1.3
OLD-U1-18C	3.5	2.6	1	0	1	4.8	1.2	1.2	1.6	1.4	20.2	3.5
OLD-U1-19A	0	2.6	1.5	3.7	1	4.7	0	4.5	NDA	0.6	NDA	2.1
OLD-U1-20B	2.6	1.1	0	0	0	1.4	0	0	0.7	0.7	NDA	0.7
OLD-U1-21C	2.6	1.5	1.8	0	1.4	1.8	1.3	1.6	1	11.3	NDA	2.4
OLD-U1-22A	0	2.9	1.4	0	0	1.5	0	2.6	NDA	2.3	0	1.1
OLD-U1-23B	1.6	2.8	1.6	4.6	2.5	6.5	3.4	2.6	5.9	3	3.2	3.4
OLD-U1-24C	6	1.8	2.1	1.9	2.1	2.8	0.9	5.1	1.2	3.2	10.7	3.4
OLD-U1-25A	4.1	1.1	5.8	6.1	2.3	6.3	2.9	3.5	NDA	2.8	3.9	3.9
OLD-U1-26B	25.9	5.7	3.7	2.2	2.1	3.3	2	2.5	1.1	2.8	1.2	4.8
OLD-U1-27C	47.6	12.9	10.4	6.1	4.8	6.2	2.8	4.9	1.7	4.2	2.8	9.5
Average	8.2	6.9	4.9	4.2	3.7	7.0	3.6	5.1	5.1	4.7	5.1	

Notes:
Shaded rows indicate well clusters.
Concentrations are in units of picocuries per liter.
NDA - No Data Available (drought conditions, well abandoned).
N/A - Not Analyzed.

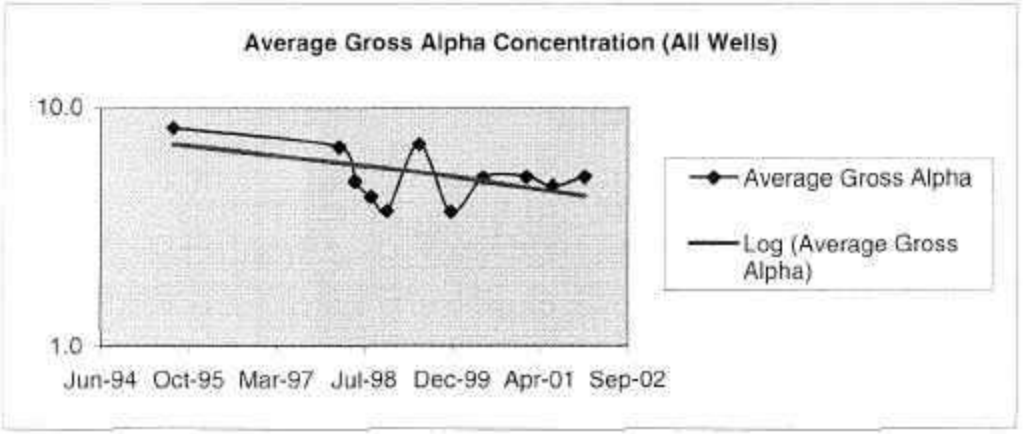


TABLE 4-3

GROSS BETA CONCENTRATIONS IN GROUNDWATER
OPERABLE UNIT 1 - NORTH GRINDER LANDFILL

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

Well	Aug-95	Mar-98	Jun-98	Sep-98	Dec-98	Jun-99	Dec-99	Jun-00	Feb-01	Jul-01	Jan-02	Average
OLD-U1-10A	6.2	10.8	13.3	5	3.7	3.6	6.8	4.6	0	7.5	9	6.4
OLD-U1-11B	4.3	0	2.1	0	2.5	3.6	3.2	3	3	5.7	4.4	2.9
OLD-U1-12C	10.5	6.7	9.9	6.9	7.5	8	7	7.8	8.7	9.5	8.6	8.3
OLD-U1-13A	3.9	11.8	0	47.6	4	3.2	3.6	4.7	NDA	9.5	NDA	9.8
OLD-U1-14B	90.8	63.4	81	58.2	59	30.6	63.7	81.8	139	NDA	0	68.8
OLD-U1-15C	0	35	25.6	12.6	18	4.6	6.2	7.5	6.8	12.1	0	11.7
OLD-U1-16A	3.8	3.7	1.8	0	2.2	2.9	1.8	3	NDA	1.6	2.4	2.3
OLD-U1-17B	9.1	0	2.2	0	0	3.3	2.3	2.1	2.4	1.7	1.6	2.2
OLD-U1-18C	6.2	8.8	3.5	2.4	4	5.9	4	4.2	3.9	4.4	9	5.1
OLD-U1-19A	0	4.5	2.2	2.7	2.8	3.9	2.1	5.1	NDA	2.1	NDA	2.8
OLD-U1-20B	4.2	2.1	3.1	2.5	2.6	3.4	2	2.5	1.7	2.1	NDA	2.6
OLD-U1-21C	3.4	3	3.4	2.2	2.4	3.7	2.3	3.7	2.6	4.6	NDA	3.1
OLD-U1-22A	3.4	2.7	1.4	69.8	0	3.1	1.4	11.1	NDA	3.1	0	9.6
OLD-U1-23B	5.3	4.3	5.3	4.9	4.9	6.7	3.4	5	6	4.8	4.8	5.0
OLD-U1-24C	6.8	3.6	2.9	70.8	3.9	4.4	2.5	4.8	2.6	4.4	5.2	10.2
OLD-U1-25A	7.4	0	4.7	4.3	3.3	6.2	2.9	3.6	NDA	6.1	3.4	4.2
OLD-U1-26B	31.1	11	4.6	5	4.9	5	4.9	4.4	4.7	4.5	5.6	7.8
OLD-U1-27C	69	15.9	13.4	10.8	7.6	14.6	7.9	9.7	5.9	6.1	4.4	15.0
Average	14.7	10.4	10.0	17.0	7.4	6.5	7.1	9.4	14.4	5.3	4.2	

Notes:
Shaded rows indicate well clusters.
Concentrations are in units of picocuries per liter.
NDA - No Data Available (drought conditions, well abandoned).
N/A - Not Analyzed.

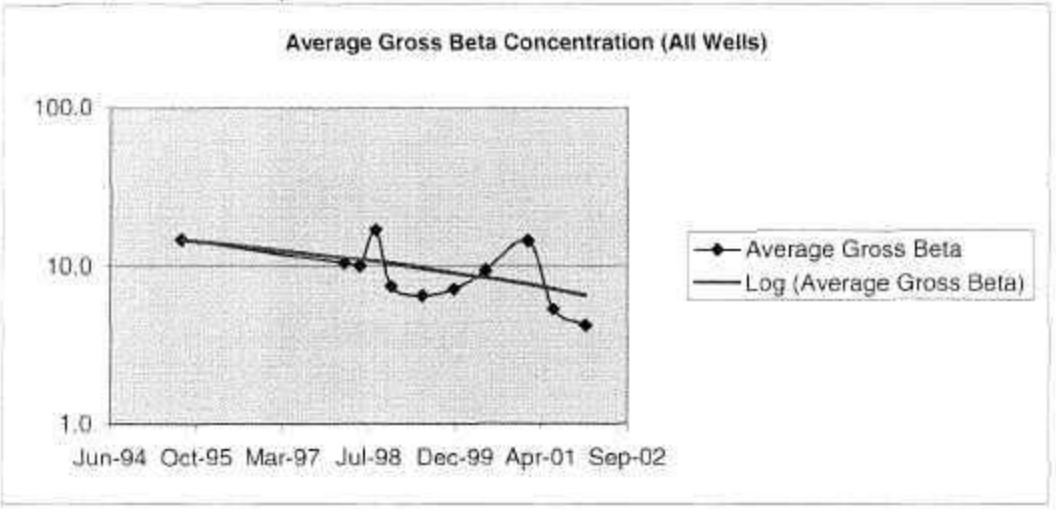


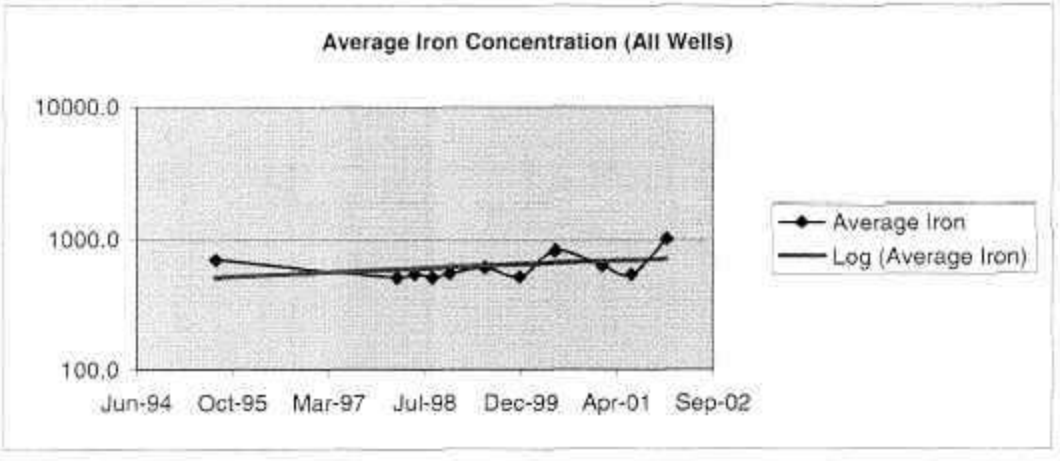
TABLE 4-4

IRON CONCENTRATIONS IN GROUNDWATER
OPERABLE UNIT 1 - NORTH GRINDER LANDFILL

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

Well	Aug-95	Mar-98	Jun-98	Sep-98	Dec-98	Jun-99	Dec-99	Jun-00	Feb-01	Jul-01	Jan-02	Average
OLD-U1-10A	0	40	11	106	0	0	0	0	0	0	0	14.2
OLD-U1-11B	330	47	53.7	0	0	0	53.2	0	0	0	160	58.5
OLD-U1-12C	642	611	591	632	609	669	652	659	700	627	441	621.2
OLD-U1-13A	0	135	0	0	0	0	65.9	0	NDA	50	NDA	27.9
OLD-U1-14B	123	102	45.5	93.3	89.4	0	127	52	0	NDA	0	63.2
OLD-U1-15C	687	342	271	477	248	531	645	618	569	564	NDA	495.2
OLD-U1-16A	75.1	114	28.1	0	322	223	276	681	NDA	365	0	208.4
OLD-U1-17B	2,420	2,180	2,300	2,000	1,950	2,150	1,650	1,690	1,660	1,550	1,540	1917.3
OLD-U1-18C	600	666	700	601	538	0	589	627	661	691	1880	686.6
OLD-U1-19A	10.2	61	47.2	0	0	0	78.8	0	NDA	0	NDA	21.9
OLD-U1-20B	414	982	2100	2590	2420	2370	1830	1850	1920	2200	NDA	1867.6
OLD-U1-21C	326	341	270	306	302	287	468	364	342	345	NDA	335.1
OLD-U1-22A	9.4	30	117	0	193	0	34	5174	NDA	70	52.2	568.0
OLD-U1-23B	1,980	2,160	1,880	1,130	1,900	3,730	1,800	1,730	1,300	1,400	8,040	2459.1
OLD-U1-24C	808	306	318	312	319	307	298	438	89	345	0	321.8
OLD-U1-25A	111	92	186	305	237	0	79.2	0	NDA	0	0	101.0
OLD-U1-26B	2,760	588	552	451	452	483	429	459	558	526	593	713.7
OLD-U1-27C	1,320	349	341	203	281	244	239	455	396	405	387	420.0
Average	700.9	508.1	545.1	511.5	547.8	610.8	517.5	822.1	630.4	537.5	1007.2	

Notes:
Shaded rows indicate well clusters.
Concentrations are in units of µg/L.
NDA - No Data Available (drought conditions, well abandoned).
N/A - Not Analyzed.



Chromium. Chromium was detected in the wells during one or more sampling episodes, but concentrations exceeded the background concentration (7.8 ug/L) in only five wells (OLD-U1-18C, -19A, -21C, -22A, and -27C) (Table A-1). In one instance chromium was detected at a concentration slightly exceeding the GCTL: in well -22A at a concentration of 127 ug/L (the GCTL is 100 ug/L). Chromium has not been detected in this well in the last two sampling episodes.

MCPA. There were two detections of the herbicide MCPA. They both occurred during the last sampling episode in wells OLD-U1-10A and OLD-U1-11B, two wells in one of the sentinel well clusters along the northern site boundary (Table A-1). The detections were 56 J and 54 J ug/L, respectively, versus the GCTL of 3.5 ug/L. One of the detections (56 J ug/L in well -10A) occurred in a turbid sample (257 NTUs).

PCBs. There were four detections of PCBs in three wells during the long-term monitoring. They occurred in well OLD-U1-11B (Aroclor 1242 at 0.54 J ug/L in September 1998 and Aroclor 1254 at 0.42 J ug/L in December 1998); well OLD-U1-14B (Aroclor 1254 at 2.3 ug/L in September 1998); and well OLD-U1-16A (Aroclor 1254 at 0.29 J ug/L in December 1998). The GCTL for PCBs (Aroclor 1242 and Aroclor 1254) is 0.5 ug/L. There have been no PCB detections in the wells during the last six successive sampling episodes.

4.5 DELINEATION OF LANDFILL WASTES ON EAST SIDE OF LANDFILL FOOTPRINT

During construction activities for installation of infrastructure for the new Glenridge Middle School, a pocket of landfill debris was discovered near the east boundary of the landfill exclusion zone. A test pit program to delineate the previously unidentified landfill wastes was initiated by CCI in July 2002. CCI completed the test pit investigation field activities on August 1 and 2, 2002. CCI excavated 56 test pits as part of the field investigation. The location of the investigation is shown in Figure 3-1.

Test pits were excavated at each location using a mini- excavator, to depths ranging between 5 and 7 feet bls. When observed, waste generally consisted of common municipal waste, including glass bottles, cans, and plastic items. At many locations, photographic waste (developed film negatives) was also observed. At some locations, medically related waste (tubing, latex gloves, small bandages, vials) was mixed with the soil. It is important to note that CCI did not observe waste inconsistent with the materials reported in historical documentation as being disposed of in the North Grinder Landfill at the former NTC Orlando. Waste characterization sampling indicated that the material was not a hazardous waste.

Waste removal began on August 12, 2002, and was completed on August 25, 2002 (CCI, 2003). Approximately 5,900 tons of material was excavated from the site. Of the 5,900 tons, less than 20 pounds was incinerated as a regulated medical waste. The remaining material was disposed of as nonhazardous solid waste at a lined Subtitle D landfill in Florida.

4.6 SITE INSPECTION

A site inspection was conducted by Richard Allen of TtNUS on September 5, 2002. The site inspection consisted of a site walkover during which photographs were taken from various vantage points around the site (Appendix B). The purpose of the inspection was to assess the protectiveness of the remedy, including the presence of fencing to restrict access, the integrity of the landfill cover, and the influences that site construction activities have had on surface water drainage. The site inspection also included a viewing of the area where CCI conducted the delineation and excavation of landfill materials along the east boundary of OU 1 (Section 4.5).

Examination of the landfill cover revealed that there had been some minor erosional channels cut into the cover materials during a storm event that occurred within the previous 24 hours (Appendix B, photographs 14, 15, and 18). The erosion occurred on the eastern boundary of the landfill where active construction activities were occurring. The depth of the observed channels was up to approximately 16 inches, but no landfill debris was observed at the base

of the channels. The landfill cover in this area was built up substantially higher than the required 2 feet, as the City developer had placed an additional 2 feet of soil above the 2 feet of soil cover in place when the landfill was closed. As a result there is approximately 4 feet of soil over the landfill waste in this area.

The eroded areas shown in the photographs (i.e., channels between the temporary waste containment area and the new school parking lot) were attributed to additional runoff from the temporary plastic cover over the waste containment area during the August 2002 removal along the eastern side of the site (Section 4.5). At the conclusion of the waste excavation and removal, CCI regraded the landfill soil cover to remove the erosion channels.

Other than the erosion channels, no other potentially significant issues were identified regarding the landfill cover, site drainage, or the fencing. The institutional controls that are in place include prohibiting the use of groundwater either as a potable water source or for irrigation until cleanup levels are achieved. Likewise, excavation activities into landfill materials or that affect the protectiveness of the landfill cover are closely monitored to prevent unauthorized site work. No activities were observed that would have violated the institutional controls. The landfill cover materials appeared to be in place, and no uses of groundwater were observed. Access was controlled by CCI on this active construction site.

4.7 INTERVIEWS

Interviews were conducted with various parties with intimate knowledge of the site. Interviewees were Barbara Nwokike, the RAB chairperson and BRAC Environmental Coordinator; Steve Tsangaris, the Remedial Action Contractor representative for CCI; Gregory Fraley, the Remedial Project Manager (RPM) for USEPA; and David Grabka, the RPM for FDEP. No significant problems regarding the site were identified during the interviews. The responses of those interviewed are included as Appendix C.

4.8 TECHNICAL ASSESSMENT

Question A: Is the remedy functioning as intended by the decision documents?

The review of documents, applicable or relevant and appropriate requirements (ARARs), risk assumptions, and the results of the site inspection indicate that the remedy is functioning as intended by the ROD. The placement of sufficient materials to make up a minimum of 2 feet of cover over landfill debris has minimized the opportunity for direct contact with, or ingestion of, contaminants in surface soil or landfill debris. The institutional controls to prevent the use of groundwater either as a potable water source or for irrigation have prevented exposure to, or ingestion of, contaminated groundwater.

The institutional controls that are in place prohibit the use of groundwater until cleanup levels are achieved, and also prohibit excavation activities, disturbance of cover materials, and other activities or actions that might interfere with the implemented remedy. No activities were observed that would have violated the institutional controls. The fence around the site is intact and in good repair, site access is being monitored carefully to prevent unauthorized entry, and the cover materials were undisturbed, except as where previously noted.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of the remedy selection still valid?

Changes in Standards and To Be Considered. A review of current standards has revealed that ARARs for groundwater contamination cited in the ROD have not changed substantively since the ROD was signed. There are still several contaminants that exceed Florida GCTLs, both along the fringes of the former landfill and in the sentinel well clusters along the northern boundary of OU 1, and these will be monitored to assure protectiveness of the selected remedy. A synopsis of ARARs and To Be Considereds (TBCs) is included in Appendix D. Some new

documents have been added to the ARARs and some of the documents cited in the ROD have been superceded by later regulations; however, the changes to the ARARs do not affect the remedial actions specified in the approved ROD and which have been implemented at OU 1.

The land use for OU 1 is unchanged (recreational).

Five contaminants were detected during the long-term groundwater monitoring that had not previously been detected at concentrations exceeding GCTLs. These contaminants are antimony, arsenic, chromium, MCPA, and PCBs. During the HHRA for OU 1, groundwater was not quantitatively evaluated because under the presumptive remedy, it was assumed that there would be no groundwater exposure. Future qualitative evaluations should consider these historical detections and monitor future trends, as appropriate.

Changes in Exposure Pathways, Toxicity, and Other Contaminant Characteristics. The exposure assumptions used to develop the HHRA included both current exposures (trespasser, both adolescent and adult), and potential future exposures (adolescent and adult recreational user, adult occupational worker, adult site maintenance worker, and adult excavation worker). There have been no changes in the toxicity factors for the contaminants of concern in soil that were used in the HHRA. These assumptions are considered to be conservative and reasonable in evaluating risk. No risk-based cleanup levels were established due to the assumption of the presumptive remedy. No change to these assumptions is warranted. There has been no change to the standardized risk assessment methodology that could affect the protectiveness of the remedy. The remedy is functioning as expected. It may be possible at some point in the future to decrease the groundwater restriction area to the current boundaries of the landfill footprint, but this will require additional groundwater monitoring and OPT concurrence.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

The findings of the Ecological Risk Assessment indicate that soil invertebrate and small mammalian and avian receptors are unlikely to be at risk from exposure to contaminants detected in OU 1 surface soil. It is anticipated that no predatory mammals or birds, or rare and endangered species, would inhabit the site. The addition of landfill cover mitigates risk attributable to surface soil prior to the addition of cover materials. Furthermore, risks to terrestrial plant populations are unlikely. No weather- related events have affected the protectiveness of the remedy. There is no other information, including the HHRA conducted during the RI, that calls into question the protectiveness of the remedy.

Technical Assessment Summary. According to the data reviewed, the site inspection, and information gathered during the interviews, the remedy is functioning as intended by the ROD. There have been no changes in the physical conditions of the site that would affect the protectiveness of the remedy. There have been no changes in the toxicity factors for the contaminants of concern that were used in the HHRA, and there have been no changes to the standardized risk assessment methodology that could affect the protectiveness of the remedy. There is no other information, including the HHRA conducted during the RI, that calls into question the protectiveness of the remedy.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 ISSUES

The only issues identified during the five-year review include the minor erosion channels observed in landfill cover materials, the identification of certain inorganic and semivolatile parameters above GCTLs in sentinel wells that warrant close scrutiny, and uncertainty as to how the installation of dry retention ponds in the northwest corner of the subject parcel may affect local groundwater flow following storm events.

5.2 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

The Navy, with oversight from USEPA and FDEP, should continue the groundwater monitoring and landfill inspection program and institutional controls as specified in the ROD. The Navy should assure that monitoring wells have been properly developed to minimize the effects of turbidity on analytical results. If necessary, new wells should be installed to replace existing wells where development and low flow sampling procedures do not reduce or eliminate turbidity. The network of monitoring wells, some of which were abandoned due to construction activities associated with the new Glenridge Middle School and Baldwin Park, should be reinstalled following careful evaluation of well placement to optimize future data needs. Monitoring well locations should reflect the most recent site plans for drainage and stormwater control. The Navy should assure that landfill cover during (to the extent possible) and following construction activities is at least 2 feet thick in accordance with FDEP requirements and that erosion prevention measures are implemented. The Navy should continue to monitor groundwater parameters that exceed GCTLs, paying particular attention to occurrences of gross alpha and beta, antimony, arsenic, and MCPA.

5.3 PROTECTIVENESS STATEMENTS

The remedy is expected to be protective of human health and the environment, regardless of whether GCTLs have been met through the natural attenuation of contaminants, as long as institutional controls remain in place. Institutional controls are preventing exposure to, or the ingestion of, contaminated groundwater. The threats at the site have been addressed through the control of access through fencing and warning signs, and the addition of cover materials over potentially contaminated surface soil and landfill materials. Institutional controls closely regulating the disturbance of cover materials over landfill materials will prevent exposure to site users and workers when the planned recreational facilities have been completed.

5.4 NEXT REVIEW

The next review for the OU 1 North Grinder Landfill Site is scheduled for November 2007.

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APPENDIX A

SUMMARY OF DETECTIONS IN GROUNDWATER

TABLE A-1

HISTORICAL SUMMARY OF DETECTIONS OF ANALYTES/COMPOUNDS IN GROUNDWATER
OPERABLE UNIT 1, NORTH GRINDER LANDFILL

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

Well/Analyte	Sample/Quarter											
OLD-U1-10A												
UNFILTERED SAMPLES:	8/16/1995	8/16/1995 (duplicate)	3/8/1998	6/19/1998	9/25/1998	12/5/1998	6/18/1999	12/28/1999	5/30/2000	2/14/2001	7/12/2001	2/14/2002
Volatile Organics (ug/L)												
Chloroform						2.06 J				NDA	0.18 J	
Semivolatile Organics (ug/L)												
Di-n-octyl phthalate										NDA	4 JB	
Herbicides (ug/L)												
MCPA												56 J
Inorganics (ug/L)												
Aluminum	139 J		760	143	131	233	573 J	366	1540	NDA	1,930	2,100
Arsenic												1.5 J
Barium	14.3		5.1 J	7.3	8.9		11.6			NDA	15 J	24.7 J
Calcium	12,700		5,610	5,330	4,960	9,380	5,070	4,180	3,440	NDA	4,300 J	17,400
Chromium	3.1		1.8		1.3					NDA	3.6 J	3.9 J
Cobalt						0.49				NDA		
Copper			3.9		1.8					NDA		2.7 J
Iron			40 J	10.6	106					NDA		
Lead			2.5		1.6					NDA		
Magnesuim	2,100		907 J	473	515	857	900 J			NDA	724 J	2160 J
Manganese	3.6		0.4	0.82	2.6					NDA		32.1
Potassium	2,880 J	444	12,500	723	482	386	474	5305		NDA	280 J	1,520 J
Selenium	2.9 J	3 J								NDA		4.2 J
Sodium	6,470		11,200	2,300	2,750 J	2,630	10,300	314J		NDA	6,980	7,460
Vanadium			4.5	0.91	1.2	0.8		3.2J		NDA		2 J
Zinc	1.2		6.4	7	6					NDA		6.2 J
General Chemistry												
TDS (mg/L)	N/A		99	44	27	41	60			NDA		
Miscellaneous												
Gross Alpha (pci/L)	1.9		2.2	2.8	5.8	3.2	9.7	4.6	6.3	NDA	13.8	14
Gross Beta (pci/L)	6.2		10.8	13.3	5	3.7	3.6	6.8	4.6	NDA	7.5	9

Notes:

"J" qualifier indicates an estimated value

NDA indicates No Data Available due to local drought conditions.

TABLE A-1

HISTORICAL SUMMARY OF DETECTIONS OF ANALYTES/COMPOUNDS IN GROUNDWATER
OPERABLE UNIT 1, NORTH GRINDER LANDFILL

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

Well/Analyte	Sample/Quarter											
OLD-U1-11B UNFILTERED SAMPLES:	8/16/1995	3/7/1998	6/19/1998	9/25/1998	12/5/1998	12/5/1998 (duplicate)	6/18/1999	12/28/1999	5/30/2000	2/14/2001	7/12/2001	2/14/2002
Volatile Organics (ug/L)												
Carbon Disulfide				3.22 J								
Chlorobenzene			0.638 J									
Semivolatile Organics (ug/L)												
1,4-Dichlorobenzene	1 J											
Di-n-octyl phthalate											12 B	
Pesticides/PCBs (ug/L)												
Heptachlor Epoxide						0.009 J						
Aroclor-1242				0.54 J								
Aroclor-1254					0.42 J							
Herbicides (ug/L)												
MCPA												54 J
Inorganics (ug/L)												
Aluminum	1,280	415	387	249	276	280	307 J	365	384	363	324	289
Barium	27.2	19 J	17.2	14.1	15.2		24.4	19.6J		25 J	21 J	12.9 J
Calcium	3,890	3,020 J	2,860	2,460	2,520	2,500	3,600	3,720		4,070 J	4,080 J	15,800
Chromium		1	0.88	1.3								
Cobalt												6.6 J
Copper		1.3	1.3	0.97	14.5		1.62 J					1.5 J
Iron	330	47 J	53.7					53.2J				160
Lead					2							
Magnesuim	1,500	1,160 J	1,090	1,050	1,050	1,040	1,090 J	1670J		1,770 J	1,200 J	1490 J
Manganese	11.4	5.3	6	4.6	10.7	9.7		7J		12 J	7.7 J	62.4
Nickel		1.4					2.44 J					
Potassium	2,430	1,630 J	1,520	1,240	1,430	1,430	1,420	1360J		2,180 J	2,220 J	2710 J
Selenium				3.3	3.2 J	2.9 J						
Sodium	11,800	7,650	7,260	4,130 J	6,690	6,600	4,360		5,380	10,500	13,200	13,500
Vanadium			1.2	1.3	1.7	1.7						
Zinc	2.9	5.8	16	4.4								10.2 J
General Chemistry												
Cyanide (ug/L)	N/A	1.25 J										
TDS (mg/L)	128	55	41	45	19	22	33					
Miscellaneous												
Gross Alpha (pci/L)	4.7		2.4	1.7		0.6	39.3	1.6	2.8	1.4	18.1	2.2
Gross Beta (pci/L)	4.3		2.1		2.5	2.2	3.6	3.2	3.0	3.0	5.7	4.4

Notes:

"J" qualifier indicates an estimated value

NDA indicates No Data Available due to local drought conditions.

TABLE A-1

HISTORICAL SUMMARY OF DETECTIONS OF ANALYTES/COMPOUNDS IN GROUNDWATER
OPERABLE UNIT 1, NORTH GRINDER LANDFILL

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

Well/Analyte	Sample/Quarter											
OLD-U1-12C UNFILTERED SAMPLES: *Volatile Organics (ug/L)*	8/17/1995	3/8/1998	6/19/1998	9/25/1998	12/5/1998	6/18/1999	6/18/1999 (duplicate)	12/28/1999	5/30/2000	2/15/2001	7/12/2001	2/14/2002
Chlorobenzene	4 J	2.8 J	2.48 J	2.45 J	2.17 J			0.72 J	2		1.1	1.6
Chloroform												0.49 J
n-Butylbenzene												0.25 J
1,4-Dichlorobenzene											5.6	4.4
sec-Butylbenzene											0.31 J	0.24 J
Semivolatile Organics (ug/L)												
1,4-Dichlorobenzene	8 J		8.5 J	6.7 J	7.4 J			4.8 J	3.6 J	2.6 J	2.2 J	3 J
Di-n-octyl phthalate											9.8 JB	
Naphthalene	3 J											
Pesticides/PCBs (ug/L)												
Heptachlor Epoxide					0.0092 NJ							
4,4-DDT					0.12 J		0.164 J					
Inorganics (ug/L)												
Aluminum	1,390	486	370	367	403	387 J	369 J	405	374	381	437	2,680
Antimony												7.1 J
Arsenic												6.4 J
Barium	30.8	23 J	21.6	21.6		23.6	22.1	22.3 J	23.8 J	23 J	21 J	51 J
Calcium	2,110	2,620 J	2,640	2,840	2,690	2,920	2,790	2,880	3,040	3,120 J	2,910 J	36,200
Chromium	2.5	0.7		1								2.7 J
Copper	3.4 J	1.7		1.6		1.18 J	3.15 J		4.3 J			1.6 J
Iron	642	611 J	591	632	609	669 J	636 J	652	659	700	627	441
Lead		1.4										
Magnesuim	876	2,020 J	1,980	2,000	1,950	2,290 J	2,190 J	2,470 J	2740	2,870 J	3,420 J	2,120 J
Manganese	2.8	3.2	3	4.6				2.5 J		2.9 J	2.3 J	40.5
Nickel		0.8					3.67 J					
Potassium	3,280	3,250 J	3,190	2,980	3,020	3,090	2,970	2,690 J	3,230	2,870 J	3,150 J	4,100 J
Selenium												3.3 J
Sodium	11,800	10,800	10,300	11,000 J	10,000	9,350	9,000	8,430	8,920	9,020	8,290	55,700
Vanadium	4.6	3.1	3.2	3.4	4.1			3 J		3.1 J	3.1 J	9.8 J
Zinc	2.1	12	4.1	7.3								8.4 J
General Chemistry												
Cyanide (ug/L)			2.77 J		2.67 J							
TDS (mg/L)	116	82	74	71	50	66	64					
Miscellaneous												
Gross Alpha (pci/L)	4.4	4.9	4.4	4.3	4.6	11	5.1	8.2	4.8	4.3	4.9	6.1
Gross Beta (pci/L)	10.5	6.7	9.9	6.9	7.5	8	7.1	7	7.8	8.7	9.5	8.6

Notes:

"J" qualifier indicates an estimated value

NDA indicates No Data Available due to local drought conditions.

TABLE A-1

HISTORICAL SUMMARY OF DETECTIONS OF ANALYTES/COMPOUNDS IN GROUNDWATER
OPERABLE UNIT 1, NORTH GRINDER LANDFILL

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

Well/Analyte	Sample/Quarter									
OLD-U1-13A										
UNFILTERED SAMPLES:	8/24/1995	3/7/1998	6/20/1998	9/26/1998	12/6/1998	6/19/1999	12/27/1999	6/1/2000	2/16/2001	7/11/2001
Volatile Organics (ug/L)										
1,4-Dichlorobenzene									NDA	0.37 J
Trichlorofluoromethane									NDA	0.88 J
Semivolatile Organics (ug/L)										
Di-n-octyl phthalate									NDA	4 JB
Bis(2-Ethylhexyl)phthalate									NDA	5.5 JB
Diethyl phthalate									NDA	1.9 J
Pesticides/PCBs (ug/L)										
4,4'-DDD				0.04 J					NDA	
4,4-DDT				0.034 J					NDA	
Inorganics (ug/L)										
Aluminum	181 J	4,340	274	216	323	238 J	352	221	NDA	232
Barium	29.4	29 J	10.2	10	25.4	20.0	17.7J		NDA	16 J
Calcium	18,200	8,140	6,600	6,190	11,700	7,490	6,150	5,030	NDA	4,570 J
Chromium		4.3					5.8 J		NDA	
Copper		1.7		2					NDA	
Iron		135					65.9 J		NDA	50 J
Lead		6.4							NDA	
Magnesium	937	265 J	355	272	1,470	610 J	533 J		NDA	676 J
Manganese	9.6	2.2		2.8			3.6 J		NDA	2.8 J
Mercury	0.04								NDA	
Nickel		1.1							NDA	
Potassium	3,340	7,360	1,230	1,150	2,730	2,480	1890 J		NDA	3,180 J
Selenium	3.5 J						2.8		NDA	
Sodium	10,500	10,400	4,320	3,500 J	12,700	18,400	9,800	10,800	NDA	13,400
Vanadium		7.2		1	1.8				NDA	
Zinc	2	6							NDA	
General Chemistry										
TDS (mg/L)	N/A	170	47	41	85	75			NDA	
Miscellaneous										
Gross Alpha (pci/L)		12	0.9	1.7	2.1		2.6	2	NDA	4.6
Gross Beta (pci/L)	3.9	11.8		47.6	4	3.2	3.6	4.7	NDA	9.5

Notes:

"J" qualifier indicates an estimated value

NDA indicates No Data Available due to local drought conditions.

TABLE A-1

HISTORICAL SUMMARY OF DETECTIONS OF ANALYTES/COMPOUNDS IN GROUNDWATER
OPERABLE UNIT 1, NORTH GRINDER LANDFILL

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

Well/Analyte	Sample/Quarter										
OLD-U1-14B											
UNFILTERED SAMPLES:	8/22/1995	3/6/1998	6/20/1998	6/20/1998 (duplicate)	9/26/1998	12/6/1998	6/19/1999	12/27/2000	6/1/2000	2/16/2001	7/11/2001
Volatile Organics (ug/L)											
Carbon disulfide	4 J										
Chlorobenzene	4 J	2.9	3.12 J	2.99 J	4.61 J	5.15 J	4.87 J				0.51 J
1,4-Dichlorobenzene											0.67 J
Methylene chloride										0.98 J	
Semivolatile Organics (ug/L)											
Butylenzylphthalate		101									
1,4-Dichlorobenzene	1 J										
Bis(2-Ethylhexyl)phthalate	3 J										2.8 JB
Di-n-octyl phthalate											7.1 JB
Diethyl phthalate											1.7 J
Pesticides/PCBs (ug/L)											
Aroclor-1254					2.3						
Inorganics (ug/L)											
Aluminum	2,110	1,820	1,420	1,460	1,210	1,120	1,350 J	1450	1490	1,850	1,610
Barium	28.4	24	22.2	22.8	22.3		24.9	26J		21 J	18 J
Calcium	19,100	14,100	14,700	15,100	15,200	14,800	17,300	18,800	17,200	18,200	19,800
Chromium	4.7	4.9			3.2					4.5 J	4.2 J
Copper					1.3	5.4					
Iron	123	102	45.5		93.3	89.4		127J		52 J	
Magnesium	3,870	3,150	3,380	3,480	3,770	3,420	4,430 J	4,010		3,170 J	2,890 J
Manganese		0.4			2.4						
Mercury	0.04										
Nickel		1.7			1.3						
Potassium	4,160	3,460	3,340	3,430	3,570	3,750	3,890	3,110J		3,200 J	2,710 J
Selenium	1.3							2.3J			6.2
Silver		1									
Sodium	5,890	6,740	6,850	6,980	7,410 J	7,780	8,870	6,560	6,410	6,450	6,300
Vanadium	13.9	12	11.3	11.4	10.9	12.6	12.9 J	11.6J		12 J	13 J
Zinc	1.6	4.1	3.4	5							
General Chemistry											
Cyanide (ug/L)			1.6 J								
TDS (mg/L)	N/A	168	180	167	170	143	166				
Miscellaneous											
Gross Alpha (pci/L)	28.9	41.4	34.3	30.4	28.8	30	20.2	28.6	41	39.9	43
Gross Beta (pci/L)	90.8	63	81	82.8	58.2	59	30.6	63.7	85	81.8	139

Notes:

"J" qualifier indicates an estimated value

NDA indicates No Data Available due to local drought conditions.

TABLE A-1

HISTORICAL SUMMARY OF DETECTIONS OF ANALYTES/COMPOUNDS IN GROUNDWATER
OPERABLE UNIT 1, NORTH GRINDER LANDFILL

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

Well/Analyte	Sample/Quarter										
OLD-U1-15C UNFILTERED SAMPLES: *Volatile Organics (ug/L)*	8/22/1995	3/7/1998	3/7/1998 (duplicate)	6/20/1998	9/26/1998	12/6/1998	6/19/1999	12/27/1999	6/1/2000	2/16/2001	7/11/2001
Chlorobenzene	5 J	5.4 J		3.95 J	3.95 J	3.33 J	3.68 J	1.3J	3.6	3.2	4
1,4-Dichlorobenzene											1.3
Semivolatile Organics (ug/L)											
Bis(2-Ethylhexyl)phthalate											1.9 JB
Diethyl phthalate											1.8 J
Inorganics (ug/L)											
Aluminum	1,010	823	988	464	754	442	338 J	380	346	330	403
Barium	32.4	26 J	32 J	23	28.5		22.0	22.4J		22 J	22 J
Beryllium	0.21 J		0.08								
Calcium	13,500	21,200	36,500	16,500	29,300	16,000	10,300	8,220	8,680	8,890	8,500
Chromium	3.1	3.5	3.2		1.7						
Copper					5.6						
Iron	687	342 J	354 J	271	477	248	531 J	645	618	569	564
Lead		1.3	2.1			2.6					
Magnesium	2,160	3,070 J	3,060 J	2,600	2,440	2,730	1,760 J	1,840J		1,840 J	1,770 J
Manganese	28.5	31	30	14.5	13.2	14		5.4J		3.8 J	3.6 J
Mercury	0.04										
Nickel					12.5						
Potassium	2,450	2,290 J	2,290 J	2,070	1,970	2,240	1,730	1,350J		1,810 J	1,580 J
Selenium						2.7 J		8.6J			
Silver			0.96								
Sodium	11,100	6,550	6,590	7,200	7,120 J	7,160	7,110	5,950	6,130	7,190	5,880
Vanadium	5.4	9	8.9	5.7	4.5	5.3		2J			2.4 J
Zinc	5.1	9.2	6.3	3.5	11.9						
General Chemistry											
Cyanide (ug/L)	N/A	4 J	5 J	5.64 J		6.86 J					
TDS (mg/L)	N/A	166	163	126	109	99	80				
Miscellaneous											
Gross Alpha (pci/L)	11.6	24.2	20.6	11.2	7.1	7.9	3.1	3.5	2.9	2.9	4.6
Gross Beta (pci/L)	45	35	37	26	12.6	18	4.6	6.2	7.5	6.8	12.1

Notes:

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TABLE A-1

HISTORICAL SUMMARY OF DETECTIONS OF ANALYTES/COMPOUNDS IN GROUNDWATER
OPERABLE UNIT 1, NORTH GRINDER LANDFILL

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

Well/Analyte	Sample/Quarter											
OLD-U1-16A												
UNFILTERED SAMPLES:	8/18/1995	3/6/1998	6/18/1998	9/24/1998	12/4/1998	12/4/1998 (split)	06/17/99	12/30/1999	6/2/2000	2/15/2001	7/19/2001	2/13/2002
Volatile Organics (ug/L)												
Chlorobenzene			2.15 J				0.634 J			NDA	0.88 J	
1,4-Dichlorobenzene										NDA	1.1	
Trichloroethene										NDA	0.56 J	
Semivolatile Organics (ug/L)												
ButylBenzylphthalate		60								NDA		
Di-n-octyl phthalate										NDA	4.4 JB	
Pesticides/PCBs (ug/L)												
Aroclor-1254					0.29 J					NDA		
Inorganics (ug/L)												
Aluminum	99.1 J	642	101		154		734 J		3,810	NDA		260
Antimony						2.5				NDA		
Barium	7.6 J	8.3 J	5.2	7.3	7.1 J		8.59 J	4.8J		NDA	5.2 J	7.8 J
Beryllium		0.1								NDA		
Calcium	5,440	4,360 J	5,290	6,330	6,320	6,340	6,680	5,080	6,460	NDA	4,840 J	14,800
Chromium		1.5								NDA		
Cobalt												1.6 J
Copper												3 J
Iron	75.1 J	114 J	28.1		322	204	223	276J	681	NDA	365	
Lead		1.2		2.1						NDA		
Magnesium	1,550	917 J	1,270	2,040	1,960	2,060	2,170	1,470J		NDA	1,670 J	2,160 J
Manganese	2.2	1.4	0.7					1.5J		NDA		17.9
Potassium	1,630	2,040 J	1,100	1,380	1,370	1,430	1,470	816J		NDA	1,320 J	1,580 J
Sodium	7,210	6,630	5,770	8,090 J	8,220 J	7,990	9,620		7,370	NDA	6,510	7,230
Vanadium		1.9	1.8	1.6	2.1					NDA		2.8 J
Zinc	1.5	7.3			7					NDA		6.9 J
General Chemistry												
Cyanide (ug/L)					1.44 J					NDA		
TDS (mg/L)	66	58	60	43	53	55	73			NDA		
Miscellaneous												
Gross Alpha (pci/L)		2.5	0.9	1.6	1.1	4.5	2.1	0.4	2.7	NDA	0.9	1.1
Gross Beta (pci/L)	3.8	3.7	1.8		2.2	4	2.9	1.8	3	NDA	1.6	2.4

Notes:

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TABLE A-1

HISTORICAL SUMMARY OF DETECTIONS OF ANALYTES/COMPOUNDS IN GROUNDWATER
OPERABLE UNIT 1, NORTH GRINDER LANDFILL

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

Well/Analyte	Sample/Quarter												
OLD-U1-17B													
UNFILTERED SAMPLES:	08/17/95	08/17/95 (duplicate)	03/06/98	06/18/98	09/24/98	09/24/98 (duplicate)	12/4/1998	6/17/1999	12/30/1999	6/2/2000	2/15/2001	7/19/2001	2/14/2002
Volatile Organics (ug/L)													
Benzene			0.3 J		0.285 J							0.22 J	0.2 J
Chlorobenzene			1.9 J	1.73 J	1.62 J	1.86 J	1.94 J	2.5J	2.2	2.2	1.5	1.6	1.7
Chloroform													1.5
1,4-Dichlorobenzene												1.6	1.4
Semivolatile Organics (ug/L)													
1,4-Dichlorobenzene	1 J	1 J											1.1 J
Di-n-octyl phthalate												5.8 JB	
Inorganics (ug/L)													
Aluminum	1,070	1,110	158 J	110			104				107 J		316
Barium	33.7	33.6	14 J	12.3	11.4	11.5	11.7 J	10.9J	11.7J		15 J	12 J	15.1 J
Calcium	7,400	7,470	4,480 J	3,610	3,700	3,680	3,660	3,150	3,730	3,580	3,710 J	3,870 J	8,640
Chromium			0.6										
Cobalt													0.95 J
Copper	5.6 J		1.3	0.94									
Iron	2,420	2,440	2,180 J	2,300	2,000	2,050	1,950	2,150	1,650	1,690	1,660	1,550	1,540
Lead			1.3		1.5		1.6						
Magnesium	2,230	2,200	1,710 J	1,340	1,380	1,390	1,340	1,120	1,700J		1,670 J	1,960 J	2200 J
Manganese	15.2	15.2	4.4	3.8					3.9J		3.4 J	3.4 J	21.8
Mercury	0.06	0.06											
Potassium	1,550	1,500	1,240 J	1,160	1,320	1,310	1,190	1,310	1,080J		1,260 J	1,460 J	1480 J
Sodium	19,700	19,400	11,600	11,100	11,300 J	9,880 J	10,200 J	9,950	8,160	7,780	9,200	8,440	8,330
Vanadium			0.8	1.3	1.5	1.3	1.6		.98J				1.6 J
Zinc	4.8	3.8	8	9.2									13.4 J
General Chemistry													
TDS (mg/L)	160		69	71	45	44	53.1						
Miscellaneous													
Gross Alpha (pci/L)	3	2.6	1.2	2				1.7	1.5	1.4	1.8	0.8	1.4
Gross Beta (pci/L)	9.1	3.9		2.2				3.3	2.3	2.1	2.4	1.7	1.6

Notes:

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TABLE A-1

HISTORICAL SUMMARY OF DETECTIONS OF ANALYTES/COMPOUNDS IN GROUNDWATER
OPERABLE UNIT 1, NORTH GRINDER LANDFILL

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

Well/Analyte	Sample/Quarter											
OLD-U1-18C UNFILTERED SAMPLES: *Volatile Organics (ug/L)*	8/25/1995	3/6/1998	6/18/1998	6/18/1998 (split)	9/24/1998	12/4/1998	6/17/1999	12/30/1999	6/2/2000	2/15/2001	7/19/2001	2/13/2002
Acetone			13.9									
Benzene											0.37 J	0.29 J
1,4-Dichlorobenzene											0.34 J	0.34 J
Chlorobenzene										0.46 J	0.65 J	0.56 J
Chloroform												2.5
Pesticides/PCBs (ug/L)												
4,4-DDT						0.031 J						
Inorganics (ug/L)												
Aluminum	1,030	133 J		130		113						15,400
Antimony												
Arsenic												132
Barium	19.7	15 J	15.2	16	16.3	14.6 J	15.9	14.5J		16 J	16 J	124 J
Beryllium												0.61 J
Calcium	8,200	9,070	8,510	8,190	8,760	7,710	10,200	10,500	11,000	9,360	12,300	19,400
Chromium		1.3										17
Cobalt												3.7 J
Copper		2.3					678					2 J
Iron	600	666 J	700	653	601	538		589	627	661	691	1,880
Lead		5.1										3.7
Magnesium	662	918 J	920	966	980	981	978	927J		956 J	1,080 J	2,220 J
Manganese	5.7	6.5 J	6.7					5.4J		5.2 J	5.9 J	20.1
Nickel												10.5 J
Potassium	917	1,210 J	1,140	1,660	1,130	992	1,730	777J		1,310 J	1,210 J	1,710 J
Sodium	4,400	6,760	6,660	6,690	7,240 J	6,810 J	7,580	5,740	6,240	7,500	6,220	8,010
Vanadium			1.1		0.81	1.2	25.8					14.6 J
Zinc		10										15.7 J
General Chemistry												
Cyanide (ug/L)						1.87 J						
TDS (mg/L)	72	68	79	62	44	66	85					
Miscellaneous												
Gross Alpha (pci/L)	3.5	2.6	1	1.7		1	4.8	1.2	1.2	1.6	1.4	20.2
Gross Beta (pci/L)	6.2	8.8	3.5	4.9	2.4	4	5.9	4	4.2	3.9	4.4	9

Notes:

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TABLE A-1

HISTORICAL SUMMARY OF DETECTIONS OF ANALYTES/COMPOUNDS IN GROUNDWATER
OPERABLE UNIT 1, NORTH GRINDER LANDFILL

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

Well/Analyte	Sample/Quarter										
OLD-U1-19A											
UNFILTERED SAMPLES:	8/23/1995	3/5/1998	6/17/1998	9/23/1998	12/3/1998	12/3/1998 (duplicate)	6/16/1999	12/28/1999	6/2/2000	2/16/2001	7/12/2001
Volatile Organics (ug/L)											
1,4-Dichlorobenzene										NDA	0.31 J
Semivolatile Organics (ug/L)											
Bis(2-Ethylhexyl)phthalate	2 J									NDA	
Di-n-octyl phthalate										NDA	1.5 JB
Pesticides/PCBs (ug/L)											
4,4-DDT				0.028 J	0.022 J	0.016 NJ				NDA	
Inorganics (ug/L)											
Aluminum	62.4 J	827	78.1		88.8				6,170	NDA	
Arsenic										NDA	6.6 J
Barium		11 J	8.5	8.3	7.7 J	7 J	9.28 J	6.3J		NDA	6.3 J
Calcium	13,900	18,200	27,900	24,500	24,600	22,900	36,200	20,800	35,500	NDA	29,200
Chromium		1.7							10.4	NDA	
Copper		1.8	10.3							NDA	
Iron	10.2 J	61 J	47.2					78.8J		NDA	
Lead		2.3			2.8				8.9	NDA	
Magnesium	3,750	4,070 J	6,170	5,210	5,350	4,980	7,540	4,210J	6,700	NDA	6,050
Manganese		4.2	4.9					3.6J		NDA	4.7 J
Nickel			2.8				1.56 J			NDA	
Potassium	1,300	2,370 J	1,810	1,840	1,890	1,750	2,480	1,480		NDA	2,110 J
Silver		2.5								NDA	
Sodium	5,590	7,610	12,900	15,800 J	15,400 J	15,000 J	23,600	14,700	14,400	NDA	11,400
Vanadium		1	0.89	0.9	1.1					NDA	
Zinc		6.3	11							NDA	
General Chemistry											
Cyanide (ug/L)					3.28 J	2.71 J				NDA	
TDS (mg/L)		135	185	2,710	141	135	224			NDA	
Miscellaneous											
Gross Alpha (pci/L)		2.6	1.5	3.7	1		4.7		4.5	NDA	0.6
Gross Beta (pci/L)		4.5	2.2	2.7	2.8	1.6	3.9	2.1	5.1	NDA	2.1

Notes:

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TABLE A-1

HISTORICAL SUMMARY OF DETECTIONS OF ANALYTES/COMPOUNDS IN GROUNDWATER
OPERABLE UNIT 1, NORTH GRINDER LANDFILL

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

Well/Analyte	Sample/Quarter											
OLD-U1-20B												
UNFILTERED SAMPLES:	8/23/1995	3/5/1998	3/5/1998 (split)	6/17/1998	6/17/1998 (duplicate)	9/23/1998	12/3/1998	6/16/1999	12/28/2000	6/1/2000	2/16/2001	7/12/2001
Volatile Organics (ug/L)												
Tetrachloroethene		1.3 J										
1,1,2,2-Tetrachloroethane		1.1 J										
1,4-Dichlorobenzene												0.42 J
Xylene (total)		0.6 J										
Methylene chloride											0.87 J	
Semivolatile Organics (ug/L)												
Bis(2-Ethylhexyl)phthalate	5 J											
Di-n-octyl phthalate												2.8 JB
Pesticides/PCBs (ug/L)												
gamma-HC (lindane)					0.017 J							
4,4'-DDE					0.036 JP							
4,4'-DDD		0.13 J			0.041 JP							
4,4'-DDT		0.15			0.015 JP							
Inorganics (ug/L)												
Aluminum	450	123 J		77.2			106		196J			
Arsenic			1.1				10J	7.81J				
Barium	8.3	8.4 J		10	10.2	10.8	30.6		8.5J		9 J	7.9 J
Calcium	18,700	20,700	21,700	19,600	19,900	18,000	20,000	12,200	14,600	19,300	20,700	15,500
Chromium				0.83								
Copper				3	4.9							
Iron	414	982	875	2,100	2,110	2,590	2,420	2,370	1,830	1,850	1,920	2,200
Lead		1.4										
Magnesium	3,220	4,540 J	4,840	3,900	3,950	3,400	3,780	2,500	2,990J		4,330 J	4,110 J
Manganese	8.8	13	10	14	14.4	13.1	11.8		10.9J	15.5	18	11 J
Nickel				1.2				177J				
Potassium	1,850	1,860 J	2,150	2,030	2,050	2,240	2,300	2,250	1,460J		2,120 J	1,910 J
Selenium			1.8									
Silver		2.3										
Sodium	12,200	23,600	24,100	30,300	30,900	34,000 J	36,000 J	30,100	20,800	24,400	17,300	17,900
Thallium				4.3								
Vanadium				1.1	1	1.1			0.87J			
Zinc		4.6	37	8.3								
General Chemistry							1.41J					
TDS (mg/L)		165	194	195	206	180	201	132				
Miscellaneous												
Gross Alpha (pci/L)	2.6	1.1	0.2					1.4			0.7	0.7
Gross Beta (pci/L)	4.2	2.1	2.5	3.1	2.2	2.5	2.6	3.4	2	2.5	1.7	2.1

Notes:

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TABLE A-1

HISTORICAL SUMMARY OF DETECTIONS OF ANALYTES/COMPOUNDS IN GROUNDWATER
OPERABLE UNIT 1, NORTH GRINDER LANDFILL

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

Well/Analyte	Sample/Quarter									
OLD-U1-21C										
UNFILTERED SAMPLES:	8/3/1995	3/5/1998	6/18/1998	9/24/1998	12/3/1998	6/16/1999	12/27/1999	6/1/2000	2/16/2001	7/12/2001
Volatile Organics (ug/L)										
Carbon disulfide										
Semivolatile Organics (ug/L)										
Chrysene				48.4						
Di-n-octyl phthalate										15 B
Inorganics (ug/L)										
Aluminum	475	255	221		1.53		277	219	109 J	140 J
Antimony			3.4							
Barium	12.7	12	9.9	11.5	11.5 J	9.82 J	11.5 J		9.7 J	8.6 J
Calcium	4,080	6,220	5,340	6,510	6,630	6,070	7,100	7,400	6,310	5,760
Chromium		0.6					14.7			
Cobalt					0.86					
Iron	326	341	270	306	302	287	468	364	342	345
Lead				1.6	1.7					
Magnesium	821	1,310	1,100	1,330	1,380	1,120	1,320 J		1,090 J	1,060 J
Manganese	11.2	16	13.5	17.2	13.4		17.9	16.2	17	15 J
Nickel							9.4 J			
Potassium	1,000	987	904	845	801	1,120	645 J		1,000 J	964 J
Silver		22			2.7					
Sodium	9,860	9,320	8,430	8,110 J	8,790 J	8,590	7,900	8,750	11,700	10,500
Vanadium			1.2	1.3	1.8		1 J			
Zinc	2.7	3.6	4.8							
General Chemistry										
Cyanide (ug/L)					1.59 J					
TDS (mg/L)	N/A	72	76	49	59	70				
Miscellaneous										
Gross Alpha (pci/L)	2.6	1.5	1.8		1.4	1.8	1.3	1.6	1.0	11.3
Gross Beta (pci/L)	3.4	3	3.4	2.2	2.4	3.7	2.3	3.7	2.6	4.6

Notes:

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NDA indicates No Data Available due to local drought conditions.

TABLE A-1

HISTORICAL SUMMARY OF DETECTIONS OF ANALYTES/COMPOUNDS IN GROUNDWATER
OPERABLE UNIT 1, NORTH GRINDER LANDFILL

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

Well/Analyte	Sample/Quarter												
OLD-U1-22A UNFILTERED SAMPLES: ***Semivolatile Organics (ug/L)***	8/3/1995	3/5/1998	3/5/1998 (duplicate)	6/17/1998	9/23/1998	9/23/1998 (duplicate)	12/3/1998	6/16/1999	12/29/1999	5/31/2000	2/14/2001	7/10/2001	1/30/2002
Bis(2-Ethylhexyl)phthalate											NDA	1.5 JB	
Di-n-octyl phthalate											NDA	20 B	
Pesticides/PCBs (ug/L)													
4,4'-DDD		0.008 J									NDA		
4,4'-DDT		0.012 J									NDA		
Inorganics (ug/L)													
Aluminum	78.5	209	221	63.1	196	204	630	142J	292	66,700	NDA	1,120	
Antimony				2.7							NDA	5.1 J	
Arsenic											NDA	5.5 J	
Barium	3.6	2.3 J	2.7 J	3.6	3.2	3.4	4.2 J	157J	1.2J		NDA	4.1 J	
Calcium	35,000	112,000	117,000	67,400	61,100	61,300	61,300	36,300	48,400	59,400	NDA	26,800	72,800
Chromium			0.6							127	NDA		
Copper	1.4			3.8							NDA		
Iron	9.4	30 J	47.3 J	117			193		34J	5,174	NDA	70 J	52.2 J
Magnesium	1,200	3,050 J	3,190 J	1,050	909	914	928		729J		NDA	671 J	1,090 J
Manganese	5.8	0.6	0.9	1.3						18.6	NDA		0.95 J
Nickel			0.8	2.7							NDA		
Potassium	888	1,230 J	1,290 J	249	340	347	402	608	957J		NDA	665 J	
Selenium		3.1	3.3						3.6J	19.3	NDA		
Silver		2.5	3.1				1.8				NDA		
Sodium	1,590	4,430 J	4,630 J	1,090	2,300 J	2,020 J	1,300J	1,120			NDA	5,970	3,280 J
Thallium		4.3					2.9		.086J		NDA		
Vanadium	5.5		0.6	1.7	1.3	1.6	6.8				NDA		
Zinc		3.7	4.1	11.3							NDA		
General Chemistry													
TDS (mg/L)	N/A	347	329	193	173	166	163	99			NDA		
Miscellaneous													
Gross Alpha (pci/L)		2.9	2.3	1.4		2.2		1.5		2.6	NDA	2.3	
Gross Beta (pci/L)	3.4	2.7	3.3	1.4	69.8			3.1	1.4	11.1	NDA	3.1	

Notes:

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TABLE A-1

HISTORICAL SUMMARY OF DETECTIONS OF ANALYTES/COMPOUNDS IN GROUNDWATER
OPERABLE UNIT 1, NORTH GRINDER LANDFILL

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

Well/Analyte	Sample/Quarter										
OLD-U1-23B											
UNFILTERED SAMPLES:	8/3/1995	3/4/1998	6/17/1998	9/23/1998	12/3/1998	6/16/1999	12/29/1999	5/31/2000	2/13/2001	7/10/2001	1/30/2002
Volatile Organics (ug/L)											
Acetone				10.7							
Tetrachloroethene		0.46 J	0.693 J								
Trichloroethene					2.73 J						
Xylene		0.67 J									
cis-1,2-Dichloroethene		0.46 J									
1,2-Dichloroethene (Total)		0.47 J	2.06 J	1.43 J	1.68 J	1.29 J					
Semivolatile Organics (ug/L)											
Bis(2-Ethylhexyl)phthalate										3 JB	
Di-n-octyl-phthalate									1.4 J	15 B	
Pesticides/PCBs (ug/L)											
Aldrin				0.003 NJ							
4,4'-DDE				0.0037 J							
4,4'-DDD		0.014 J		0.023 J							
4,4'-DDT		0.014			0.0087 NJ						
Gamma-Chlordane				0.19							
Alpha-Chlordane				0.18							
Inorganics (ug/L)											
Aluminum	621	391	397	375	450	451 J	371	334	222	230	360
Antimony										6.7 J	
Arsenic											1.7 J
Barium	25.8	24 J	23	21.5	27.1 J	25.2	19.1J		11 J	11 J	14.1 J
Calcium	9,510	9,390	8,930	7,570	10,200	10,200	8,090	7,850	6,790	6,140	3,410 J
Chromium		1.2	1.5								2.1 J
Cobalt											0.89 J
Copper	1.4		6.4								
Iron	1,980	2,160	1,880	1,130	1,900	3,730	1,800	1,730	1,300	1,400	8,040
Lead									2 J		
Magnesium	824	1,370 J	1,200	1,200	1,460	1,350 J	648J		1,070 J	1,080 J	1,090 J
Manganese	1.7	1.7	1.8				1.3J				1.1 J
Nickel			2								
Potassium	3,040	2,850 J	2,800	2,430	2,990	2,930	1,610J		1,500 J	1,470 J	
Selenium									5.4		
Silver		2.2									
Sodium	14,400	13,800	14,700	13,200 J	17,300 J	15,800	9,930	10,800	11,000	13,200	13,900
Vanadium	6.6	3.2	4.9	3.5	4.8	6.77 J	1.6J				
Zinc		4	15		3.8				11 J	10 J	
General Chemistry											
TDS (mg/L)	N/A	140	109	107	94	97					
Miscellaneous											
Gross Alpha (pci/L)	1.6	2.8	1.6	4.6	2.5	6.5	3.4	2.6	5.9	3	3.2
Gross Beta (pci/L)	5.3	4.3	5.3	4.9	4.9	6.7	3.4	5.0	6.0	4.8	4.8

Notes:

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TABLE A-1

HISTORICAL SUMMARY OF DETECTIONS OF ANALYTES/COMPOUNDS IN GROUNDWATER
OPERABLE UNIT 1, NORTH GRINDER LANDFILL

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

Well/Analyte	Sample/Quarter										
OLD-U1-24C											
UNFILTERED SAMPLES:	8/4/1995	3/4/1998	6/17/1998	9/23/1998	12/3/1998	6/16/1999	12/29/1999	5/31/2000	2/13/2001	7/10/2001	1/29/2002
Semivolatile Organics (ug/L)											
Di-n-octyl-phthalate										27 B	
Inorganics (ug/L)											
Aluminum	1,690	259	252	262	263	262 J	363	489		241	115 J
Antimony			4.4								
Barium	32.3	11 J	10.2	11.7	10.7 J	10.3	11.7J		2.4 J	11 J	10.4 J
Calcium	2,680	1,540 J	1,660	1,460	1,600	1,260		2,090	407 J	1,660 J	1,800 J
Chromium									2.4 J		
Copper	1.6		7.5								
Iron	808	306	318	312	319	307	298J	438	89 J	345	
Magnesium	664	614 J	647	695	727	656 J	698J		163 J	721 J	732 J
Manganese	3.1	1.2	1.7								1.2 J
Nickel			3						5.2 J		
Potassium	456	274 J	291	257	246	254				360 J	380 J
Silver		1.9			1.1						
Sodium	4,480	4,730	4,590	5,230 J	4,940 J	4,650			1,110 J	5,260	4,350 J
Vanadium	3.7		0.94	0.78							
Zinc		3.5	7.8		6.9						
General Chemistry											
TDS (mg/L)	N/A	33	43	29	62	33					
Miscellaneous											
Gross Alpha (pci/L)	6	1.8	2.1	1.9	2.1	2.8	0.9	5.1	1.2	3.2	10.7
Gross Beta (pci/L)	6.8	3.6	2.9	70.8	3.9	4.4	2.5	4.8	2.6	4.4	5.2

Notes:

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TABLE A-1

HISTORICAL SUMMARY OF DETECTIONS OF ANALYTES/COMPOUNDS IN GROUNDWATER
OPERABLE UNIT 1, NORTH GRINDER LANDFILL

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

Well/Analyte	Sample/Quarter										
OLD-U1-25A											
UNFILTERED SAMPLES:	8/8/1995	3/3/1998	6/16/1998	9/22/1998	12/2/1998	6/16/1999	12/29/1999	5/31/2000	2/14/2001	7/19/2001	1/31/2002
Semivolatile Organics (ug/L)											
Bis(2-Ethylhexyl)phthalate			192 J						NDA		3.8 J
di-n-Octylphthalate			10.2 J						NDA	7.8 JB	
Pesticides/PCBs (ug/L)											
4,4'-DDE				0.016 J					NDA		
4,4'-DDD				0.81					NDA		
4,4'-DDT	0.06 J			0.46	0.042 J				NDA		
Inorganics (ug/L)											
Aluminum	1,360	949	698	727	786	1,170 J	803	1,290	NDA	762	
Barium	9.2	3.7 J	18.9	20.4	14 J	22.5	14.8J		NDA	17 J	6.2 J
Beryllium											0.51 J
Calcium	5,280	8,710	8,930	9,280	6,200	6,500	8,370	7,080	NDA	22,400	8,120
Chromium		1.9	1.1						NDA		1.4 J
Copper	2	1.8	5.4			1.97 J			NDA		1.6 J
Iron	111	92 J	186	305	237		79.2J		NDA		
Lead	1.5	1.7							NDA		
Magnesium	1,700	1,300 J	5,800	4,370	3,310	4,040 J	3,400J		NDA	6,150	1,780 J
Manganese	2.3	0.6	1.1		3.3				NDA		0.61 J
Nickel		1.8					1J		NDA		
Potassium	2,000	304 J	1,010	741	380	757			NDA	1,560 J	1,350
Silver		1.6							NDA		
Sodium	5,170	4,070 J	14,800	14,500 J	11,700 J	18,400	9,340	10,000	NDA	11,700	
Thallium		3.6							NDA		
Vanadium	4.7	0.7	1.1	1.5	1.2				NDA		
Zinc		4.1	9.3		6.7				NDA		
General Chemistry											
TDS (mg/L)	86	112	155	139	100	124			NDA		
Miscellaneous											
Gross Alpha (pci/L)	4.1	1.1	5.8	6.1	2.3	6.3	2.9	3.5	NDA	2.8	3.9
Gross Beta (pci/L)	7.4		4.7	4.3	3.3	6.2	2.9	3.6	NDA	6.1	3.4

Notes:

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TABLE A-1

HISTORICAL SUMMARY OF DETECTIONS OF ANALYTES/COMPOUNDS IN GROUNDWATER
OPERABLE UNIT 1, NORTH GRINDER LANDFILL

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

Well/Analyte	Sample/Quarter										
OLD-U1-26B											
UNFILTERED SAMPLES:	8/7/1995	3/4/1998	6/16/1998	9/22/1998	12/2/1998	6/15/1999	12/30/1999	5/31/2000	2/14/2001	7/10/2001	1/30/2002
Volatile Organics (ug/L)											
Tetrachloroethene					0.917 J						
Xylene (total)					0.893 J						
Semivolatile Organics (ug/L)											
Bis(2-Ethylhexyl)phthalate										1.8 JB	
di-n-Octyl phthalate										11 B	
Pesticides/PCBs (ug/L)											
4,4'-DDD		0.012 J									
4,4'-DDT		0.02 J			0.052 J						
Inorganics (ug/L)											
Aluminum	1,180	1,610	739	530	370	421 J	519	359	191 J	247	369
Barium	105	78 J	42.3	33.8	31.9 J	38	43.1J		57 J	54 J	51 J
Beryllium	1.8		0.16								
Calcium	9,010	28,900	13,600	10,200	9,200	9,970	13,000	15,200	8,760	13,900	17,600
Chromium	4	1.5	1.2		8.3						
Copper			4.1								
Iron	2,760	588	552	451	452	483	429	459	558	526	593
Lead					1.9						
Magnesium	2,200	650 J	670	611	672	634 J	693J		864 J	954 J	1,110 J
Manganese	44.4	3.2	3.6				1.5J		2.1 J		6.7 J
Nickel		1	2.1								
Potassium	5,120	8,530	3,470	3,220	3,300	3,200	1,890J		3,590 J	2,410 J	
Silver		2.2		40.4	1.7						
Sodium	16,300	8,760	6,710	5,940 J	6,090 J	5,660		5,870	6,550	7,120	5,580
Thallium		4.4									
Vanadium	5.2	3	2.6	2.5	1.7				2.1 J	2.7 J	1.7 J
Zinc	23.9	7.8	8.3		4.9						
General Chemistry											
Cyanide (ug/L)				9.51 J							
TDS (mg/L)	92	136	79	65	44	49					
Miscellaneous											
Gross Alpha (pci/L)	25.9	5.7	3.7	2.2	2.1	3.3	2	2.5	1.1	2.8	1.2
Gross Beta (pci/L)	31.1	11	4.6	5	4.9	5	4.9	4.4	4.7	4.5	5.6

Notes:

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TABLE A-1

HISTORICAL SUMMARY OF DETECTIONS OF ANALYTES/COMPOUNDS IN GROUNDWATER
OPERABLE UNIT 1, NORTH GRINDER LANDFILL

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

Well/Analyte	Sample/Quarter											
OLD-U1-27C												
UNFILTERED SAMPLES:	8/7/1995	8/7/1995	3/4/1998	6/16/1998	9/22/1998	12/2/1998	6/15/1999	12/30/1999	5/31/2000	2/14/2001	7/10/2001	1/31/2002
Volatile Organics (ug/L)		(duplicate)										
Acetone	18	46										
Carbon Disulfide	4 J	7 J										
Semivolatile Organics (ug/L)												
Bis(2-Ethylhexyl)phthalate											2.4 JB	3.8 J
Di-n-octylphthalate			39									
Pesticides/PCBs (ug/L)												
4,4'-DDE					0.044 J							
4,4'-DDD					0.057 J	0.0099 J						
4,4'-DDT					0.049 J	0.014 NJ						
Inorganics (ug/L)												
Aluminum	8,700	8,250	3,360	2,800	1,450	1,500	1880J	1850	2,200	352	322	
Antimony				2.6								
Arsenic												1.5
Barium	145	138	67 J	59.4	41.2	45 J	54.1	56.9J		42 J	42 J	44.2 J
Beryllium	2.6	2.6	0.3	0.31	0.17							0.99
Calcium	47,800	43,700	34,900	30,200	26,700	28,400	39,600	48,400	41,100	27,200	28,000	
Chromium	12.8		3.5	3.2	1.6							1.8
Copper	1.8			5.6			2.22J					
Iron	1,320	1,290	349	341	203	281	244	239J	455	396	405	387
Lead			1.6			2.1		1.6J				
Magnesium	715	728	275 J	241	175	261	289J	284J		519 J	496 J	417 J
Manganese	24.1	22.8	4.5	4.6	3.1	4.2		4J		5.1 J	5.2 J	4.7 J
Nickel			1.4	3.9								
Potassium	28,100	25,700	9,040	9,050	7,130	7,780	10,200	5,170	6,640	4,390 J	4,010 J	3,260
Silver			2.1									
Sodium	24,600	23,100	9,490	8,590	6,730	7,000 J	8,110		5,100	4,120 J	4,900 J	
Vanadium	19.5	19.5	5.4	4.5	2.2	2.5		2.7J				2.1 J
Zinc			5.6	13.7	12.2	6				15 J		
General Chemistry												
TDS (mg/L)	876		170	157	157	113	179					
Miscellaneous												
Gross Alpha (pci/L)	47.6	46.2	12.9	10.4	6.1	4.8	6.2	2.8	4.9	1.7	4.2	2.8
Gross Beta (pci/L)	69	87.6	15.9	13.4	10.8	7.6	14.6	7.9	9.7	5.9	6.1	4.4

Notes:

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APPENDIX B

PHOTOS TAKEN DURING SITE INSPECTION

Photo No.	Description
#5	From NW corner of OU 1 looking SE
#10	From north-central portion of OU 1 looking north
#12	From north-central portion of OU 1 looking E
#14	From north-central portion of OU 1 looking NE
#15	From east-central portion of OU 1 looking W
#18	From east-central portion of OU 1 looking S
#19	From central portion of OU 1 looking NE
#28	From east-central portion of OU 1 looking SW (area of previously #28 unknown landfill wastes that were delineated and removed)
#34	From east-central portion of OU 1 looking NW
#37	From SE portion of OU 1 looking NW
#43	From SW portion of OU 1 looking N
#49	From SW portion of OU 1 looking NNE
#54	From south-central portion of OU 1 looking N
#55	From south-central portion of OU 1 looking NE

CAD FILE NO./DATE: u:\dgn\navy\orlando\sites\out\out-008.dgn/11-21-03 OPERABLE UNIT 1 5 YEAR REVIEW

AERIAL PHOTOGRAPH TAKEN 8-16-2002

DRAWN BY JAW DATE 11-20-03		PHOTO OF OPERABLE UNIT 1 LOOKING FROM THE NORTHWEST NAVAL TRAINING CENTER ORLANDO, FLORIDA	CONTRACT NO. N62467-94-0888
CHECKED BY ATJ DATE 11-19-03			OWNER NO. N7457
REVISED BY DATE			APPROVED BY SBM DATE 11-20-03
SCALE AS NOTED			DRAWING NO. REV. 0

FORM CADD NO. SOUV-AV.DGN - REV 2 - 10/23/03


Photo 5


Photo 10

Photo 12

Photo 14

Photo 15

Photo 18

Photo 19

Photo28

Photo 34

Photo 37

Photo 43

Photo 49

Photo 54

Photo 55

APPENDIX C

INTERVIEW FORMS

INTERVIEW RECORD

Site Name: Operable Unit 1, North Grinder Landfill, (former) Naval Training Center, Orlando, Florida		**EPA ID NO.:** FL6170023711
Subject: Five-Year Review Questions		**Time:** 1534 **Date:** 9/10/02
Type: ☐ Telephone ☐ Visit ☒ Email **Location of Visit:**		☒ Incoming ☐ Outgoing
Contact Made By:		
Name: Richard P. Allen	**Title:** Senior Environmental Project Manager	**Organization:** Tetra Tech NUS, Inc.
Individual Contacted:		
Name: Barbara Nwokike	**Title:** Remedial Project Manager	**Organization:** Southern Division Naval Facilities Engineering Command (SOUTHNAVFACENGCOM)
Telephone No.: (843) 820-5566 **Fax No.:** (843) 820-5563 **E-Mail Address:** nwokikebr@efdsouth.navfac.navy.mil		**Street Address:** 2155 Eagle Dr., P.O. 190010 **City, State, Zip:** N. Charleston, SC 29419-0068

Summary of Conversation

1. What is your overall impression of the project? (general sentiment)

   Answer: *As the Remedial Project Manager at the former NTC Orlando, I have a good impression of the work that went on at OU 1 Main Base Landfill during the last five years. My overall evaluation of this site is that groundwater concentrations never posed a major threat to the groundwater quality or the environment.*

2. What effects have site operations had on the surrounding community?

   Answer: *No negative effects. This site has been monitored during the last five years and found to be very stable.*

3. Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details.

   Answer: *As the current RAB chairperson for the Navy, I can say that there are no ongoing questions from the community regarding OU 1. The RAB is always given status updates regarding all remediation efforts and long-term monitoring at OU 1.*

4. Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.

   Answer: *There was medical waste found at the site east of OU 1 in early July 2002, where construction on the Glenridge Middle School just started. The Navy was called by the School Board to take action to remove the waste. All waste was removed by September 6, 2002 and the site will be backfilled by September 13.*

5. Do you feel well informed about the site's activities and progress?

   Answer: *As the RPM for this site, I have been informed regarding the site technical activities and progress.*

6. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?

   Answer: *No overall problems regarding site's management or operation at OU 1.*

INTERVIEW RECORD

Site Name: Operable Unit 1, North Grinder Landfill, (former) Naval Training Center, Orlando, Florida		**EPA ID NO.:** FL6170023711	
Subject: Five-Year Review Questions		**Time:** 1226	**Date:** 11/06/03
Type: ☐ Telephone ☐ Visit ☒ Email **Location of Visit:**		☒ Incoming ☐ Outgoing	
Contact Made By:			
Name: Steven B. McCoy	**Title:** Senior Environmental Project Manager	**Organization:** Tetra Tech NUS, Inc.	
Individual Contacted:			
Name: David Grabka	**Title:** Remedial Project Manager	**Organization:** Florida Department of Environmental Protection	
Telephone No.: (850) 921-9991 **Fax No.:** (843) 922-4939 **E-Mail Address:** David.grabka@dep.state.fl.us		**Street Address:** Twin Towers Bldg., 2600 Blair Stone Rd. **City, State, Zip:** Tallahassee, FL 32399-2400	

Summary of Conversation

1. What is your overall impression of the project? (general sentiment)

   Answer: *Good*

2. What effects have site operations had on the surrounding community?

   Answer: *The landfill site is elevated with respect to the surrounding land. This is because additional cover was required over the landfill so that an adequate thickness of clean cover is maintained between buried wastes and the ground surface.*

3. Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details.

   Answer: *The school board had some concerns with buried landfill wastes that were identified on their property. This landfill waste was located outside the previously identified landfill boundary. The waste on the school board's property was excavated and disposed, and the hole filled with clean fill. As far as I am aware, the school board has no further concerns regarding the site.*

4. Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.

   Answer: *No*

5. Do you feel well informed about the site's activities and progress?

   Answer: *Yes*

6. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?

   Answer: *The Navy needs to keep a vigilant eye on the landfill site to ensure that redevelopment of the site as part of a park does not compromise the landfill cover. I believe that problems with maintenance of the landfill cover will most likely occur during construction activities putting in park amenities such as utilities, lighting, etc.*

INTERVIEW RECORD

Site Name: Operable Unit 1, North Grinder Landfill, (former) Naval Training Center, Orlando, Florida		**EPA ID NO.:** FL6170023711
Subject: Five-Year Review Questions		**Time:** 1114 **Date:** 11/07/03
Type: ☐ Telephone ☐ Visit ☒ Email **Location of Visit:**		☒ Incoming ☐ Outgoing
Contact Made By:		
Name: Steven B. McCoy	**Title:** Senior Environmental Project Manager	**Organization:** Tetra Tech NUS, Inc.
Individual Contacted:		
Name: Gregory Fraley	**Title:** Regional Project Manager	**Organization:** Florida Department of Environmental Protection
Telephone No.: (404) 562-8544 **Fax No.:** (404) 562-8518 **E-Mail Address:** Fraley.Gregory@epamail.epa.gov	**Street Address:** Atlanta Federal Center 61 Forsythe Street **City, State, Zip:** Atlanta, GA 30303	

Summary of Conversation

1. What is your overall impression of the project? (general sentiment)
   Answer: *Good*

2. What effects have site operations had on the surrounding community?
   Answer: *None, that were negative.*

3. Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details.
   Answer: *No*

4. Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.
   Answer: *No*

5. Do you feel well informed about the site's activities and progress?
   Answer: *Yes, the Navy and its contractors keep everyone well informed about any and all site activities.*

6. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?
   Answer: *The cap must be maintained.*

INTERVIEW RECORD

Site Name: Operable Unit 1, North Grinder Landfill, (former) Naval Training Center, Orlando, Florida		**EPA ID NO.:** FL6170023711	
Subject: Five-Year Review Questions		**Time:** 0905	**Date:** 9/18/02
Type: ☐ Telephone ☐ Visit ☒ Email **Location of Visit:**		☒ Incoming ☐ Outgoing	
Contact Made By:			
Name: Richard P. Allen	**Title:** Senior Environmental Project Manager	**Organization:** Tetra Tech NUS, Inc.	
Individual Contacted:			
Name: Steve Tsangaris	**Title:** Senior Engineer, Remedial Action Contractor (RAC)	**Organization:** CCI, Inc.	
Telephone No.: (813) 874-6522 ext. 4305 **Fax No.:** (813) 874-3056 **E-Mail Address:** stsangar@ch2m.com		**Street Address:** 4350 West Cypress St., Suite 600 **City, State, Zip:** Tampa, FL 33607	

Summary of Conversation

1. What is your overall impression of the project? (general sentiment)
   Answer: *The site poses no threat to human health and the environment so long as the land restrictions that are in place are followed.*

2. Is the remedy functioning as expected? How well is the remedy performing?
   Answer: *The remedy is long-term monitoring. The remedy is performing as anticipated and is suitable given the site condtions and nature/extent of contamination.*

3. What does the monitoring data show? Are there any trends that show contaminant levels are decreasing?
   Answer: *Trends generally show concentrations remaining stable and/or decreasing.*

4. Is there a continuous on-site O&M presence? If so, please describe staff and activities. If there is not a continuous on-site presence, describe staff and frequency of site inspections and activities.
   Answer: *There is no continuous presence. The site is inspected (simple drive by windshield inspection) monthly for obvious activity inconsistent with use restrictions on the property.*

5. Have there been any significant changes in the O&M requirements, maintenance schedules, or sampling routines since start-up or in the last five years? If so, do they affect the protectiveness or effectiveness of the remedy? Please describe changes and impacts.
   Answer: *Monitoring wells were abandoned in Jan 2002 to allow for construction on the property. Wells will be reinstalled for resumption of sampling in Jan 2003. Location of wells may be different than previous locations due to construction.*

6. Have there been unexpected O&M difficulties or costs at the site since start-up or in the last five years? If so, please give details.
   Answer: *No.*

7. Have there been opportunities to optimize O&M, or sampling efforts? Please describe changes and resultant or desire cost savings or improved efficiency.
   Answer: *There will be an opportunity with new well installation to optimize groundwater sampling locations and/or decrease number of wells from the previous network of 18 wells. This will result in lower monitoring costs.*

8. Do you have any comments, suggestions, or recommendations regarding the project?
   Answer: *Recommend that the number of wells in the monitoring network be decreased from the previous 18.*

APPENDIX D

SYNOPSIS OF ARARs AND TBCs FOR OPERABLE UNIT 1

SYNOPSIS OF ARARs AND TBCs

INSTITUTIONAL CONTROLS, LANDFILL INSPECTIONS, AND GROUNDWATER MONITORING
OPERABLE UNIT 1 – REMEDIAL ACTION

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

FEDERAL REQUIREMENTS: CHEMICAL-SPECIFIC

REQUIREMENT AND CITATION	REQUIREMENT SYNOPSIS	CONSIDERATION IN THE RA PROCESS
USEPA Region IX Risk-Based Concentrations (November, 2000)	Risk Based Concentrations (RBCs) are human-health-based allowable exposure guidance levels developed for carcinogenic and non-carcinogenic compounds, using reference doses and carcinogenic potency slopes obtained from USEPA Integrated Risk Information System (IRIS) database, USEPA Health Effects Assessment Summary Tables (HEAST), and standard exposure scenarios. RBCs are chemical concentrations corresponding to a fixed level of risk in various media.	Contaminant-cleanup Target Levels from Chapter 62-777, F.A.C. are used (to compare with the monitoring well data) in lieu of RBCs as agreed upon by USEPA, Region-4 and FDEP.
Resource Conservation and Recovery Act (RCRA) Regulations, Identification and Listing of Hazardous Wastes (40 CFR Part 261, 2001)	Defines listed and characteristic hazardous wastes subjected to RCRA. Appendix II contains the toxicity characteristic leaching procedure.	Data from monitoring are compared with the state mandated benchmarks.

Notes:
Citations in Bold Italics were listed in the Record of Decision (ABB-ES, 1997a).
Regulations cited in the Record of Decision that have been superceded or are no longer applicable are shown by "~~strike through~~".

FEDERAL REQUIREMENTS: CHEMICAL-SPECIFIC (Continued)

REQUIREMENT AND CITATION		
Safe Drinking Water Act Regulations, Maximum Contaminant Levels (MCLs) (40 CFR Parts 141.11-141.16, 2001)	***These regulations set standards of protection drinking water sources serving at least 25 persons.***	***Institutional controls and monitoring will prevent potential use of groundwater as drinking water until the Remediation Goals are met.***
National Secondary Drinking Water Regulations (40 CFR 143, 2001)	Sets Secondary MCLs for contaminants in drinking water that primarily affect the aesthetic qualities relating to public acceptance of drinking water.	Institutional controls and monitoring will prevent potential use of groundwater as drinking water until the Remediation Goals are met.
Groundwater Protection Strategy	USEPA policy to protect groundwater for its highest present or potential future beneficial use.	Institutional controls and monitoring will prevent potential use of groundwater as drinking water until the Remediation Goals are met.
Groundwater Protection and Monitoring, Resource Conservation and Recovery Act (RCRA) Subpart F (40 CFR 264.90-264.109, 2001)	Establishes monitoring requirements for Solid Waste Management Unit (SWMUs) by specifying concentration standards and corrective action measures. Groundwater protection standards for 14 toxic compounds are equal to MCLs under Safe Drinking Water Act.	Requirements are met by complying with state requirements for groundwater monitoring.

STATE REQUIREMENTS: CHEMICAL-SPECIFIC

~~***FDEP, Florida Hazardous Waste Rules (F.A.C., 62-730)***~~	~~***Adopts by reference specific sections of the Federal hazardous waste regulations, including the section regulating hazardous waste landfills (40 CFR Part 264).***~~	~~***These regulations are not applicable to OU 1 since they apply only to landfills that received waste after 1983; however, the requirements may be used as guidance for developing a landfill inspection program.***~~
~~***FDEP, Florida Soil Cleanup Goals, September 1995***~~	~~***Provides guidance for soil cleanup levels that can be developed on a site-by-site basis.***~~	~~***The guidelines aid in determining health and leachability-based cleanup goals for soil.***~~

STATE REQUIREMENTS: CHEMICAL-SPECIFIC (Continued)

REQUIREMENT AND CITATION		
FDEP, Contaminant Cleanup Target Levels (CTLs) (Chapter 62-777, F.A.C., 1999)	Establishes cleanup target levels for groundwater, surface water, and soil.	The CTLS are used as Remediation Goals for remedial actions. Monitoring would ensure future compliance.
FDEP, Surface Water Quality Standards (Chapter 62-302, F.A.C.)	These regulations set the chemical concentration standards for discharges to surface water.	The standards will be used for future compliance. Monitoring would indicate such requirement.
FDEP, Groundwater Classes, Standards, and Exemptions (Chapter 62-520, F.A.C., 1998)	***These regulations define various groundwater classes in the state and corresponding restrictions/requirements.***	***Development of Remediation Goals considered such classification.***
FDEP, Hazardous Waste (Chapter 62-730, F.A.C., 2002)	***These regulations define chemical concentration limits that would classify solid waste as hazardous waste and set rules for the management of such waste.***	***Any waste generated during remediation is handled following regulations under Hazardous Waste Management.***

FEDERAL REQUIREMENTS: LOCATION-SPECIFIC

REQUIREMENT AND CITATION	REQUIREMENT SYNOPSIS	CONSIDERATION IN THE RA PROCESS
Conservation Programs on Military Reservations (Sikes Act) of 1960, as Amended	This act requires that military installations manage natural resources for multipurpose uses and public access appropriate for those uses consistent with the military department's mission.	NTC Orlando is an inactive military installation. The property is slated for transfer to the public. Requirements will be met as appropriate.

STATE REQUIREMENTS: LOCATION-SPECIFIC

REQUIREMENT	REQUIREMENT SYNOPSIS	CONSIDERATION IN THE RA PROCESS
Florida Game and Freshwater Fish Commission, Florida Natural Areas Inventory	Regulates activities affecting state-listed endangered or threatened species or their critical habitat.	A survey was conducted during the RI. The Remedial Action is not expected to affect any of the species. The state agencies will be consulted if deemed necessary.

FEDERAL REQUIREMENTS: ACTION-SPECIFIC

REQUIREMENT AND CITATION	REQUIREMENT SYNOPSIS	CONSIDERATION IN THE RA PROCESS
USEPA Region IX Risk-Based Concentrations (November, 2000)	Risk Based Concentrations (RBCs) are human-health-based allowable exposure guidance levels developed for carcinogenic and non-carcinogenic compounds, using reference doses and carcinogenic potency slopes obtained from USEPA Integrated Risk Information System (IRIS) database, USEPA Health Effects Assessment Summary Tables (HEAST), and standard exposure scenarios. RBCs are chemical concentrations corresponding to a fixed level of risk in various media.	Contaminant-cleanup Target Levels from Chapter 62-777, F.A.C. are used (to compare with the monitoring well data) in lieu of RBCs as agreed upon by USEPA, Region-4 and FDEP.
Resource Conservation and Recovery Act (RCRA) Regulations, Identification and Listing of Hazardous Wastes (40 CFR Part 261, 2001)	Defines listed and characteristic hazardous wastes subjected to RCRA. Appendix II contains the toxicity characteristic leaching procedure.	Data from monitoring are compared with the state mandated benchmarks.
RCRA Subtitle D, 40 U.S.C 6901	Establishes design and operating criteria for solid waste (nonhazardous) landfills.	Amended soil cover meets the final cover requirements. Monitoring would indicate potential releases.
~~***RCRA Regulations, Landfills (40 CFR Part 264,Subpart N, 2001)***~~	~~***Provides monitoring, inspection, closure and post-closure care requirements for landfills that contain hazardous waste.***~~	~~***These regulations are not applicable to OU 1 since they apply only to landfills that received wastes after 1980; however, the guidance is used to develop the landfill inspection / monitoring program.***~~
RCRA Regulations, Releases from SWMUs (40 CFR Part 264, Subpart F, 2001)	***Contains general groundwater monitoring requirements for SWMUs.***	***General guidance is used for establishing and conducting groundwater monitoring program.***
Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), and the National Hazardous Substance and Contingency Plan Regulations (40 CFR 300.430, 2001)	***Discusses the types of institutional controls to be established at CERCLA sites.***	***Although NTC Orlando is not listed on the National Priorities List, the guidance is used in establishing and monitoring appropriate institutional controls at OU 1.***

FEDERAL REQUIREMENTS: ACTION-SPECIFIC (Continued)

REQUIREMENT AND CITATION	REQUIREMENT SYNOPSIS	CONSIDERATION IN THE RA PROCESS
Occupational Safety and Health Act Requirements (20 CFR 1910, 1926, and 1904, 2001)	These regulations specify the requirements for safety and health applicable to workers engaged in on-site field activities.	OSHA regulations are followed for all on-site monitoring activities.
USEPA, Design and Construction of RCRA/CERCLA Final Covers, May 1991	***Provides guidance on components of landfill closure, including long-term maintenance and groundwater monitoring.***	***Guidance is used in establishing appropriate groundwater monitoring program.***
Presumptive Remedy for CERCLA Municipal Landfill Sites, USEPA 540-F-93-035, Sept. 1993	This directive establishes the procedures for containment as the remedy for CERCLA municipal landfills under Superfund Accelerated Cleanup Model (SACM).	Amended soil cover and groundwater monitoring fulfill some of the requirements of presumptive remedy.
Presumptive Remedies: Policy and Procedures, USEPA 540-F-93-047, Sept. 1993	Overall guide to the presumptive remedies initiative and its effect on site cleanup.	The guidance is used to upgrade the soil cover and prepare the groundwater monitoring plan.

STATE OF FLORIDA REQUIREMENTS: ACTION-SPECIFIC

REQUIREMENT AND CITATION	REQUIREMENT SYNOPSIS	CONSIDERATION IN THE RA PROCESS
~~**FDEP, Florida Hazardous Waste Rules (F.A.C., 62-730)**~~	~~**Adopts by reference specific sections of the Federal hazardous waste regulations, including the section regulating hazardous waste landfills (40 CFR Part 264).**~~	~~**These regulations are not applicable to OU 1 since they apply only to landfills that received waste after 1983; however, the requirements may be used as guidance for developing a landfill inspection program.**~~
~~**FDEP, Florida Soil Cleanup Goals, September 1995**~~	~~**Provides guidance for soil cleanup levels that can be developed on a site-by-site basis.**~~	~~**The guidelines aid in determining health and leachability-based cleanup goals for soil.**~~
FDEP, Contaminant Cleanup Target Levels (CTLs) (Chapter 62-777, F.A.C. 1999)	Establishes cleanup target levels for groundwater, surface water, and soil.	The CTLS are used as Remediation Goals for remedial actions. Monitoring would ensure future compliance.
FDEP, Hazardous Waste (Chapter 62-730, F.A.C. 2002)	These regulations define hazardous waste and set rules for the management of such waste.	Any waste generated during remediation will be handled following regulations under Hazardous Waste Management.
FDEP, Solid Waste Management Facilities, Long-Term Care (Chapter 62-701.620, F.A.C. 1997)	Establishes standards for long-term care of landfill received wastes after 1993.	These regulations will not apply for OU 1 as no waste was received after 1993, however, the general guidance will be used for landfill inspection and groundwater monitoring.

STATE OF FLORIDA REQUIREMENTS: ACTION-SPECIFIC (Continued)

REQUIREMENT AND CITATION	REQUIREMENT SYNOPSIS	CONSIDERATION IN THE RA PROCESS
FDEP, Surface Water Quality Standards (Chapter 62-302, F.A.C. 1998)	These regulations set the standards for discharges to surface water.	The standards will be used for future compliance. Monitoring would indicate such requirement.
FDEP, Groundwater Classes, Standards, and Exemptions (Chapter 62-520, F.A.C. 1996)	These regulations define various groundwater classes in the state and corresponding restrictions/requirements.	Remedial Goal development considered such classification.

APPENDIX E

STATUS OF OPERABLE UNITS 2, 3, AND 4

E-1 STATUS OF OPERABLE UNIT 2

BACKGROUND

OU 2 is a 176.81 acre parcel located in the southern portion of McCoy Annex, NTC, Orlando, FL (Figure 1-1). The McCoy Annex is located approximately 8 miles south of the Main Base, west of Orlando International Airport. The area of concern at OU 2 consists of a former landfill (approximately 114 acres) that operated from 1960 to 1978; a large portion of the landfill underlies the McCoy Annex municipal golf course. The landfill was identified in the IAS in 1985 as being of environmental concern. Landfill wastes reportedly included paint and paint thinners, asbestos, transformers, hospital wastes, low level radiological waste, batteries, aircraft parts, yard waste, and possibly waste oil.

The eastern and western portions of the site were used for landfilling wastes by the U. S. Air Force from about 1960 to 1972, while the eastern portion was used as a landfill by the U. S. Navy from 1972 until about 1978. Landfill operations consisted of excavating ditches (100 to 200 feet long by 20 to 25 feet wide by 10 to 15 feet deep) into which trucks disposed of wastes. Occasional burning of the wastes took place in the ditches. It was estimated that the volume of waste was more than 1,000,000 cubic yards (C. C. Johnson, 1985).

An RI was performed at the McCoy Annex Landfill in accordance with the USEPA's interim guidance, Application of the CERCLA Municipal Landfill Presumptive Remedy to Military Landfills (USEPA, 1996a). The interim guidance states that containment is an appropriate presumptive remedy if the military landfill contains primarily "municipal-type wastes" (i.e., no high-hazard military specific wastes such as chemical warfare agents or military munitions). At the McCoy Annex Landfill, because the presumptive remedy was containment, the RI objectives were to (1) define the limits (extent) of the landfill, (2) characterize the existing landfill cover to determine the cover thickness and the nature and extent of contamination, (3) determine the nature and extent of impacted groundwater, (4) characterize the site-specific geology and hydrogeology, (5) determine whether other environmental media (such as sediment or surface water) have been impacted, and (6) determine the human health and ecological risks posed by all impacted media.

The RI field investigation at OU 2 was conducted from May 1997 through December 2001. The investigation identified the limits of landfill materials and the thickness of the soil cover; described the types, quantities, and location of contaminants in surface soil, sediment, surface water and groundwater; and evaluated risks to human health and the environment. The RI report identified arsenic and PAHs in surface soil as the primary contaminants that exceeded the FDEP SCTLs. It was also shown that some areas of the former landfill did not have 2 feet of soil cover. Organic chemicals, pesticides, gross alpha, and inorganics were identified in sediment and surface water that exceeded the FDEP CTLs for those media. Iron, manganese, trichloroethene (TCE), vinyl chloride (VC) and benzene were found to exceed FDEP GCTLs in groundwater of the surficial aquifer (i.e., 0-30 ft below ground surface). The risk assessment concluded that cancer risks to current and likely future users (site maintenance workers and recreators) were within the EPA acceptable range of 1.0E10-4 to 1.0E10-6. However, the cancer risks for these same receptors (1.8E10-6 and 6.9E10-6, respectively) did exceed the FDEP target cancer risk criteria of 1.0E10-6. Noncancer risks did not exceed a Hazard Index of 1.0 (except for hypothetical future residents).

SITE CHRONOLOGY

A chronology of significant site events and dates is included below. Sources of this information are listed in the References.

Event	Date
Initial Assessment Study (C. C. Johnson, 1985): identified the landfill in southern McCoy Annex as being of environmental concern	September 1985
RI field operations, Phase I (geophysics to define landfill boundaries; surface soil, sediment, surface water sampling; soil vapor investigations; Direct Push Technology (DPT), hand auger borings (TtNUS)	May 1997 to November 1997
RI field operations, Phase II (monitoring well installation, geophysics to refine west landfill boundary, aquifer testing, DPT groundwater sampling (TtNUS)	March 1998 to October 1998
RI field operations, Phase III (additional surface water and sediment sampling; monitoring well sampling; hand auger borings to refine cover thickness over landfill (TtNUS)	February 1999 to February 2001
Interim Remedial Action: soil removal of 2,000 yd3 of PAH-contaminated soil from two areas (Bechtel)	April 1999
Placement of 86,000 yd3 of cover materials from two local sources over 25-acre area of landfill with less than 2 feet of cover materials (EEG)	Summer 1999
RI report issued (TtNUS)	March 2001
(Draft) Proposed Plan issued for review (TtNUS)	December 2001
(Draft) ROD issued for review, (final) Monitoring Plan issued (TtNUS)	February 2002
Quarterly groundwater monitoring (note: currently ongoing)	March 2002 through September 2003
Draft final EBST/FOST for three small parcels adjacent to OU 2 issued	September 2002
Meeting with Greater Orlando Aviation Authority (GOAA) to discuss off-site groundwater contamination along west bank of canal.	April 2003
Final FS report issued	July 2003
(Draft) FOSET Phase 2 that includes early transfer of OU 2 published for Public Comment	July 2003
(Draft) EBST/FOST for early transfer of OU 2 published for Public Comment	August 2003
Navy awards contract for IRA groundwater system to prevent groundwater contamination on GOAA property	September 2003

REMEDIAL ACTIONS

As a result of the RI findings, two IRAs were performed in 1999; one to excavate localized PAH impacted soils (i.e., hot spots) and dispose of the material off site, and another to provide a minimum of two feet of cover over the landfill area south of the golf course. Natural attenuation of contaminants in groundwater along with long-term monitoring, the implementation of land use controls, and groundwater use restrictions were identified in the draft Proposed Plan as the preferred remedial actions to support the presumptive remedy of

containment. Quarterly groundwater monitoring was implemented in March 2002 to collect additional data to support the proposed groundwater remedy.

CURRENT STATUS

Quarterly groundwater and surface water monitoring is currently being performed by a Navy contractor (Terraine, Inc.) at OU 2 and reports are provided to the FDEP. The Navy's remedial action contractor has been tasked to develop a plan to address localized areas of thin cover over the former landfill that lie along several fairways of the active golf course.

In early 2003, the Greater Orlando Aviation Authority (GOAA) requested that the Navy clean up and prevent future migration of groundwater contaminants beneath a strip of GOAA property that lies adjacent to the southern perimeter of OU 2. In response, the Navy has awarded a contact to design and install a groundwater remedial system to address the plume in the southern portion of OU 2 and to prevent future plume migration onto GOAA property. The system is scheduled to begin operating in 2004.

A Finding of Suitability for Early Transfer (FOSET, Phase 2) that includes OU 2 was submitted for public comment in July 2003; comment resolution is currently in progress. The FOSET identifies the City of Orlando as the transferee (via the Department of Interior) for OU 2. The City's proposed use of OU 2 is continued operation of the municipal golf course and future development of recreational facilities (e.g., ball fields) in the southern portion of the site. An Environmental Baseline Survey for Transfer (EBST) and a FOST were submitted for public comment in August 2003. The Navy is waiting for final comments on these documents.

E-2 STATUS OF OPERABLE UNIT 3

BACKGROUND

OU 3 consists of 3.27 acres that are located on the former Main Base, NTC, Orlando, FL (Figure 1-1). OU 3 consists of Study Area (SA) 8 (former Greenskeeper's Storage Area, 1.88 acres) and SA 9 (former Pesticide Handling and Storage Area, 1.39 acres). The primary COCs at OU 3 are arsenic and pesticides in groundwater.

Study Area 8. Structures previously located at SA 8 were used for storage of pesticides, paint, equipment, and supplies. Site activities included routine maintenance and repair of golf course equipment. Building 2134 was the primary maintenance facility for the former Main Base Golf Course. All buildings have been removed from SA 8, and the property is now sparsely vegetated, with a strip of dense wooded wetlands along the shoreline of Lake Baldwin. The eastern side of the site is bordered by overgrown grassy fairways of the closed golf course. The topography is relatively flat, with a slight slope to the northwest, toward Lake Baldwin.

The RI field investigations conducted between August 1994 and March 1998 at SA 8 detected arsenic, benzo(a) pyrene, and lead in surface soil at concentrations that exceeded the residential and/or industrial SCTLs. Investigators recommended removing contaminated surface soil to prevent human exposure and minimize the likelihood of additional contaminants being washed downward in the surficial aquifer. Samples from the site monitoring wells revealed concentrations of arsenic and other inorganics at levels that exceeded FDEP GCTLs in the surficial aquifer. Arsenic was the only inorganic considered to pose a significant health risk at SA 8. Other chemicals detected included aluminum, antimony, iron, lead, manganese, dieldrin, (2-methyl-4-chlorophenoxy) acetic acid (MCPA), 2-(2-methyl-4-chlorophenoxy) propionic acid (MCPP), and naphthalene.

Study Area 9. Structures previously located at SA 9 were used for storing and mixing pesticides and herbicides for use at the NTC. Equipment cleaning water and container rinse water were discharged to a gravel sump. All buildings have been removed from SA 9, and the property is now largely a flat grass covered field with scattered, mature trees. Shallow drainage swales (several feet wide and approximately a foot deep) border the south, east, and part of the west sides of the site.

The RI field investigations at SA 9 conducted between August 1994 and March 1998 detected arsenic and organic compounds in surface soil at concentrations that exceeded regulatory criteria. Other chemicals detected included benzo(a) pyrene and 4,4'-DDD. The OPT decided to remove contaminated surface soil to prevent human exposure and minimize the likelihood of additional contaminants being washed downward into the surficial aquifer. Samples from the site monitoring wells revealed concentrations of inorganics and several pesticides and herbicides in groundwater in the surficial aquifer. Arsenic, MCPA, and MCPP were the principal contaminants of concern in groundwater at concentrations that exceeded the FDEP GCTLs in the surficial aquifer.

SITE CHRONOLOGY

A chronology of significant site events and dates is included below. Sources of this information are listed in the References.

Event	Date
Initial Assessment Study (C. C. Johnson, 1985): identified Study Area 9 in southern McCoy Annex as being of environmental concern	September 1985
Site screening investigations	August 1994 - March 1998
Environmental Site Screening Report for SA 9 issued	July 1996
Environmental Site Screening Report for SA 8 issued	April 1997
IRA Completion Report documented removal of 36 tons of contaminated soil at SA 8 and 946 tons at SA 9.	November 1997
Final Remedial Investigation/Feasibility Study Report issued	June 1999
IRA Completion Report documented removal of 95 tons of pesticide contaminated soil and 2,886 tons of arsenic-contaminated soil	August 18, 1999
Interim ROD stipulated institutional controls on groundwater use and other administrative remedies, groundwater monitoring, and evaluation of three groundwater treatment options	September 2000
Specifications for Site Monitoring issued	January 25, 2001
Bench-scale study report issued. Activated alumina was effective in removing arsenic from OU 3 groundwater	February 2, 2001
Borings confirmed lack of a confining layer in which to key a wall for a funnel and gate design.	August 2001
Fact Sheet issued	February 2002
Treatability Study: Permeable Adsorptive Barriers (PAB) composed of sand and activated alumina and microwells for monitoring were installed (baseline and performance sampling occurred in May, June, September, December 2002, and March 2003.	April 2002
Quarterly groundwater monitoring (Note: currently ongoing)	March 1999 through September 2003
(Draft) FOSET Phase 2 that includes early transfer of OU 3 published for Public Comment	July 2003
(Draft) EBST/FOST for early transfer of OU 3 published for Public Comment	August 2003
Final PAB Treatability Study report issued	October 2003

REMEDIAL ACTIONS

The DET completed an IRA for the removal of 36 tons of contaminated soil from SA 8 in September 1997 and backfilled the excavation with clean soil. An additional IRA removed 63 tons of pesticide-contaminated soil and 2,886 tons of arsenic-contaminated soil from SA 8 in May 1999 and backfilled the excavation with clean soil (HLA, 2000). The OPT changed the site classification from residential to recreational, and no further action is anticipated for soils.

The DET also completed an IRA for the removal of 946 tons of pesticide-contaminated soil from SA 9 in September 1997 and backfilled the excavation with clean soil. An additional IRA removed 32 tons of pesticide-contaminated soil from SA 9 in May 1999. The OPT changed the site classification from residential to recreational, and no further action is anticipated for soils.

A treatability study was performed for OU 3 to investigate the use of Permeable Adsorptive Barriers (PABs) for groundwater remediation at both SAs 8 and 9. The objectives of the treatability study were as follows:

- Demonstrate the feasibility of using activated alumina to remove arsenic from groundwater in situ.
- Demonstrate the capability of using activated alumina to reduce the arsenic concentration in groundwater to the expected future maximum contaminant level of 0.010 mg/L.
- Determine the sorption capacity of activated alumina to estimate replacement frequency.
- Prevent elevated concentrations of arsenic from entering Lake Baldwin.

Installation of the PABs took place during the week of April 1, 2002, using a continuous trenching machine at both SAs 8 and 9. At the time of PAB installation, the arsenic-contaminated groundwater plume at SA 8 was already too close to Lake Baldwin to install the PAB downgradient of the plume due to the marshy conditions near the shore. Therefore, the PAB at SA 8 was installed as near the lake as construction would allow, which was within the approximate 150 ug/L contour of the arsenic plume rather than at its leading edge. At SA 9, the PAB was installed downgradient of the leading edge of the arsenic-contaminated groundwater plume to be most protective of human health and the environment. The location of each PAB was selected balancing the objective of preventing elevated concentrations of arsenic from entering Lake Baldwin with the practical aspects of constructing the barriers near the lakeshore in marshy areas. PAB placement was determined partially by the desire to minimize destruction of vegetation and lake-shore ecology and partially by the need to avoid low bearing-capacity soil that would not support the construction equipment.

CURRENT STATUS

Quarterly groundwater monitoring is currently being performed by a Navy contractor at OU 3 and reports are provided to the FDEP. A final PAB Treatability Study Report for OU 3 was submitted in October 2003 to the Navy and the OPT. The OPT will subsequently make a determination on the efficacy of the PABs as the final groundwater remediation technology and/or the need to implement any additional remedial response for groundwater at OU 3.

A FOSET, Phase 2 that includes OU 3 was submitted for public comment in July 2003; comment resolution is currently in progress. The FOSET identifies the City of Orlando as the transferee for OU 3. The City's proposed use of OU 3 is development of recreational facilities associated with the Baldwin Park community. An EBST and a FOST were submitted for public comment in August 2003. The Navy is waiting for final comments on these documents.

E-3 STATUS OF OPERABLE UNIT 4

BACKGROUND

Operable Unit 4 is a 15.8 acre parcel that lies across the northern portion of Area C, NTC, Orlando, FL. Construction of Area C, which includes all of OU 4, began in 1942 to provide support services for the Army Air Corps Orlando Air Base. Prior to that time, the site was undeveloped. A railroad system was used for material transport within Area C until 1957. From 1957, salvageable materials were shipped by truck to the supply warehouses and salvage yard located on the site. Since the Navy acquired the property on July 1, 1968, the area continued to be used to provide support services and warehousing for NTC Orlando. It has most recently been used as office and storage space for base closure operations and for storage and vehicle maintenance by the Veteran's Administration.

OU 4 includes the former base laundry (Building 1100), the former Defense Reutilization and Marketing Office and a salvage yard. Hazardous materials including paints, solvents, insecticides, transformers (PCBs), and asbestos were stored at several locations within the site during its long history. PCE was used in the laundry as a dry cleaning agent, and there have been at least three documented spills of PCE at the facility. COCs include PAHs in soil (remediation has been completed), PCE, TCE, cis-DCE, and vinyl chloride in groundwater and surface water.

SITE CHRONOLOGY

A chronology of significant site events and dates is included below. Sources of this information are listed in the References.

Event	Date
Field investigations in Study Areas 12, 13, and 14	February-April 1995
Orlando Partnering Team elevated SAs 12, 13, and 14 to Operable Unit status	Fall 1995
Focused field investigation to determine if there are VOCs from the laundry in the groundwater, sediment, and surface water of Lake Druid, 400 feet west of the former laundry	May 1996
Site screening report issued	July 1996
Focused source characterization with DPT, concentrating on the surge tank on the west end of Building 1100; results permitted conceptual model that included the degradation of PCE to daughter products (TCE, cis-DCE, and vinyl chloride) as groundwater plume migrated west to Lake Druid	March-April 1997
IRA implemented: two recirculation wells were installed to intercept and treat contaminated groundwater before it could reach Lake Druid; the wells were plagued with O&M problems early on and had to be converted to traditional extraction wells (see March 2001 below) with a tray stripper system to maintain objectives of the IRA.	Fall 1997
Remedial Investigation field studies (install 11 additional monitoring wells, 5 microwells, collect 11 surface/20 subsurface soil samples, collect 11 surface water/sediment sample pairs).	September 1997 to March 1998
Soil remediation by DET in three areas of PAH-contaminated soil	May 1999
Startup of potassium permanganate injection pilot study, to determine effectiveness of this technology in treating contaminated groundwater near the contaminant source	February 2000
RI report issued	January 2001
Extraction wells (former recirculatiion wells) retrofit and begin operation as pump and treat groundwater system; discharge goes to city sanitary sewer.	March 2001
(Draft) Proposed Plan issued for review (TtNUS)	September 2001
(Draft) ROD issued for review (TtNUS)	December 2001
Remedial Design Report (90% Design) issued for review (TtNUS)	February 2002
Phytoremediation implemented: bio-engineered poplars and willows planted; vegetation with deep roots will "polish" shallow groundwater prior to entry into Lake Druid	March 2002
The full-scale, in situ chemical oxidation system to treat source area groundwater was completed and system operation began.	March 2003
Quarterly groundwater monitoring (Note: currently ongoing)	April 2002 through September 2003

Event	Date
FOSET Phase 2 that includes early transfer of the western portion of OU 4 published for Public Comment	July 2003
EBST/FOST for early transfer of the western portion of OU 4 published for Public Comment	August 2003

REMEDIAL ACTIONS

A focused field investigation was conducted in May 1996 and concluded that VOCs in groundwater were migrating into Lake Druid from the former laundry facility (Building 1100). Various remedial technologies were evaluated for intercepting the plume, and a recirculation well system was installed in December 1997 and began operation in January 1998. The two recirculation wells required frequent maintenance and repairs. In the spring of 2000 it was determined that the system was no longer efficient to operate and was no longer effectively controlling the migration of VOCs. As a result, in March 2001 the two wells were rehabilitated and retrofitted as a pump and treat groundwater extraction system; the system remains in operation. Groundwater is treated to remove VOCs using a tray stripper and is disposed via the City sanitary sewer.

In May 1999, based on the findings of the RI field investigation, approximately 32 tons of surface soil contaminated with PAHs and arsenic were removed from three locations across OU 4. The excavated soil was disposed off site and replaced with clean soil. Sampling of the sidewalls of the excavation confirmed the removal of the contaminants of concern.

CURRENT STATUS

Quarterly groundwater monitoring is currently being performed by a Navy contractor at OU 4 and reports are provided to the FDEP. The monitoring supports the ongoing phytoremediation, groundwater pump and treat, and in situ chemical oxidation (chem-ox) system for treating the plume source area. The initial six months of operation of the chem-ox system has indicated higher than expected oxidant usage rates and apparent fouling of the injection wells. The Navy contractor is currently evaluating potential adjustments or upgrades to improve the system performance.

A FOSET, Phase 2 that includes OU 4 was submitted for public comment in July 2003; comment resolution is currently in progress. The FOSET identifies the City of Orlando as the transferee for OU 4. The City's proposed use of OU 4 is development of a park around Lake Druid. An EBST and a FOST were submitted for public comment in August 2003. Then Navy is waiting for final comments on these documents.