

**EPA Superfund
Record of Decision:**

**USN ORLANDO TRAINING CTR
EPA ID: FL6170023711
OU 01
ORLANDO, FL
11/10/1997**



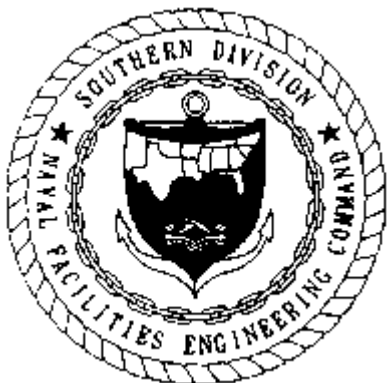
RECORD OF DECISION

OPERABLE UNIT 1

**NAVAL TRAINING CENTER
ORLANDO, FLORIDA**

**UNIT IDENTIFICATION CODE: N65928
CONTRACT NO.: N62467-89-D-0317/107**

**JULY 1997
(Revised: November 1997)**



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

RECORD OF DECISION

OPERABLE UNIT 1

**NAVAL TRAINING CENTER
ORLANDO, FLORIDA**

Unit Identification Code: N65928

Contract No.: N62467-89-D-0317/107

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July 1997

(Revised: November 1997)



CERTIFICATION OF TECHNICAL
DATA CONFORMITY (MAY 1987)

The Contractor, ABB Environmental Services, Inc., hereby certifies that, to the best of its knowledge and belief, the technical data delivered herewith under Contract No. N62467-89-D-0317/107 are complete and accurate and comply with all requirements of this contract.

DATE: July 28, 1997

(Revised: November 1997)

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(DFAR 252.227-7036)

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Naval Training Center
Orlando, Florida

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GLOSSARY

ABB-ES	ABB Environmental Services, Inc.
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CPC	chemicals of potential concern
CPT	cone penetrometer testing
DPT	Direct Push Technology
ERA	ecological risk assessment
FDEP	Florida Department of Environmental Protection
GC	gas chromatograph
HHRA	human health risk assessment
HI	hazard index
IR	Installation Restoration
NCP	National Oil and Hazardous Substances Contingency Plan
NTC	Naval Training Center
OU	Operable Unit
PAH	polynuclear aromatic hydrocarbon
PCB	polychlorinated biphenyl
PCE	tetrachloroethene
RAB	Restoration Advisory Board
RCRA	Resource Conservation and Recovery Act
RfD	reference dose
RI	Remedial Investigation
ROD	Record of Decision
SCG	Soil Cleanup Goal
SVOC	semivolatile organic compound
TAL	Target Analyte List
USEPA	U. S. Environmental Protection Agency
VOC	volatile organic compound

1.0 DECLARATION OF THE RECORD OF DECISION

1.1 SITE NAME AND LOCATION. The site name is Operable Unit (OU) 1, the North Grinder Landfill, and it is located on the Main Base of the Naval Training Center (NTC), in Orlando, Florida.

1.2 STATEMENT OF BASIS AND PURPOSE. This Record of Decision (ROD) presents the selected remedial actions for OU 1, NTC, Orlando. The selected actions were chosen in accordance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as amended by the Superfund Amendments and Reauthorization Act of 1986, and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). The remedial actions were chosen based on the administrative record for the site. The information supporting the remedial action decision for OU 1 is contained in the Information Repository for this site. Both the Administrative Record and the Information Repository are located at the Orlando Public Library.

The purpose of remedial action at OU 1 is to monitor contamination at the site via a groundwater monitoring program and site inspections, and evaluate whether or not additional remedial actions are necessary. Remedial action at the OU also includes institutional controls, which consist of deed restrictions and surficial aquifer water use prohibitions. These controls restrict the residential use of the land within the landfill boundary, limit intrusive activities within the landfill boundary, and restrict consumption of surficial aquifer groundwater. Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment. The U. S. Environmental Protection Agency (USEPA) and the State of Florida's Department of Environmental Protection (FDEP) concur with the remedial actions selected for OU 1.

1.3 DESCRIPTION OF THE SELECTED REMEDY. The proposed remedial actions addressing contamination at OU 1 include groundwater monitoring, landfill cover inspections, and institutional controls. The Remedial Investigation (RI) for OU 1 recommended that these actions be implemented, and the USEPA and FDEP concurred that these actions were acceptable to address contamination at the OU. Furthermore, the USEPA and FDEP have concurred that more active site remediation actions are not necessary at OU 1.

The remedial actions selected for OU 1 are intended to address the principal threats and risks for OU 1, and are the chosen final remedy for OU 1. Each remedial action is summarized below.

Groundwater Monitoring

- sample groundwater from 19 monitoring wells in the vicinity of OU 1;
- analyze samples for full suite Contract Laboratory Procedure Target Compound List and Target Analyte List (TAL) analytical parameters, radionuclide parameters (gross alpha and beta), and total dissolved solids;
- analyze samples with gross alpha and/ or beta greater than regulatory standards for gross gamma;
- perform sampling and analysis four times in the first year (i.e., quarterly), and one time per year for the following 2 years; and
- evaluate data collected during each sampling period and recommend, based on this evaluation, no further action, continued monitoring, or implementation of other remedial actions.

Landfill Inspections

- conduct visual inspections of the site, or landfill surface, during groundwater monitoring episodes.

Institutional Controls

- disallow the use of surficial aquifer groundwater in the vicinity of the landfill for drinking or irrigation,
- limit intrusive activities within the landfill boundary, and
- residential use of the land within the landfill boundary to nonresidential uses (e.g., industrial or recreational uses are acceptable).

Implementing this remedial action will control current and future risks associated with contaminants present at OU 1.

1.4 DECLARATION STATEMENT. The remedial action selected for OU 1 is protective of human health and the environment, complies with Federal and State regulatory requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost effective. However, because treatment of the groundwater was not found to be practicable, this remedy does not satisfy the statutory preference for treatment as a principal element.

Because this remedy will result in hazardous substances remaining onsite above health-based levels, a review will be conducted within 5 years after commencement of the remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

1.5 SIGNATURE AND SUPPORT AGENCY ACCEPTANCE OF THE REMEDY.


Wayne Hansel, P.E.

11/10/97
Date

Base Realignment and Closure Environmental Coordinator

2.0 DECISION SUMMARY

2.1 SITE NAME, LOCATION, AND DESCRIPTION. OU 1, also known as the North Grinder Landfill, is located at the northwest corner of the Main Base at NTC, Orlando within the Recruit Training Command Area (Figure 2-1). The Main Base is located approximately 3 miles east of Interstate 4 and north of State Road 50, within the Orlando, Florida, city limits (Figure 2-2).

The stated mission of NTC, Orlando was historically to exercise command over, and coordinate the efforts of, the assigned subordinate activities in recruit training of enlisted personnel; provide initial skill, advanced, and/or specialized training for officer and enlisted personnel of the regular Navy and Naval Reserve; and to support other activities as directed by a higher authority (ABB Environmental Services, Inc. [ABB-ES], 1996).

The North Grinder Landfill is located under both lawn and an asphalt paved area known as the "grinder" parade area. The topography is flat, although elevation decreases to the north, east, and west of the site (Figure 2-3).

2.2 SITE HISTORY AND ENFORCEMENT ACTIVITIES. Landfill operations at OU 1 reportedly began between 1939 and 1947, when the property was owned by the Air Force, and were ceased when the property was transferred to the Navy in 1968. Wastes were disposed of in trenches dug at the site and were then assumed to have been burned and covered over with soil. Wastes reportedly included such materials as film, photographic chemicals, paint thinner, mess hall garbage, medical waste, yard and construction debris, and perchloroethylene (PCE) stillbottoms from the laundry facility.

OU 1 has undergone several phases of investigations. Summaries of these activities are presented in Table 2-1.

2.3 HIGHLIGHTS OF COMMUNITY PARTICIPATION. The RI Report for OU 1 was completed and placed in the Information Repository in December 1996. The Proposed Plan for OU 1 was made available to the public on May 15, 1997. These documents, and other IR program information, are available for public review in the Information Repository, which is located at the Orlando Public Library. The notice of availability of these documents was published in the Orlando Sentinel. A public comment period to solicit comments on the Proposed Plan occurred from May 15 through June 16, 1997. A public meeting was also held on May 22, 1997, at the city hall in downtown Orlando. A response to comments received at the public meeting or during the public comment period is included in the Responsiveness Summary, which is the Appendix to this ROD.

2.4 SCOPE AND ROLE OF REMEDIAL ACTIONS SELECTED FOR OU 1. Investigations at OU 1 have indicated that contamination at the site does not pose unacceptable risk to human and ecological receptors given a nonresidential land-use scenario and the implementation of land and groundwater use restrictions. Therefore, the purpose of the selected remedial actions for OU 1 is to monitor and evaluate contamination at the site to assess whether or not monitoring beyond the 3-year monitoring period is necessary, and to implement institutional controls restricting the use of surficial aquifer groundwater and the landfill property.

The monitoring program is proposed for a period of three years, and the institutional controls will remain in place for an indefinite period of time.

2.5 THE PRESUMPTIVE REMEDY FOR LANDFILLS. The intent of the presumptive remedy for landfills, discussed in Presumptive Remedy for CERCLA Municipal Landfill Sites and Application of CERCLA Municipal Landfill Presumptive Remedy to Military Landfills (Interim Guidance) (USEPA, 1993; 1996), was integrated into the RI process for OU 1. For CERCLA landfills that contain heterogeneous mixtures of municipal and industrial or hazardous waste, the presumptive remedy is containment, including a cover system. Although not

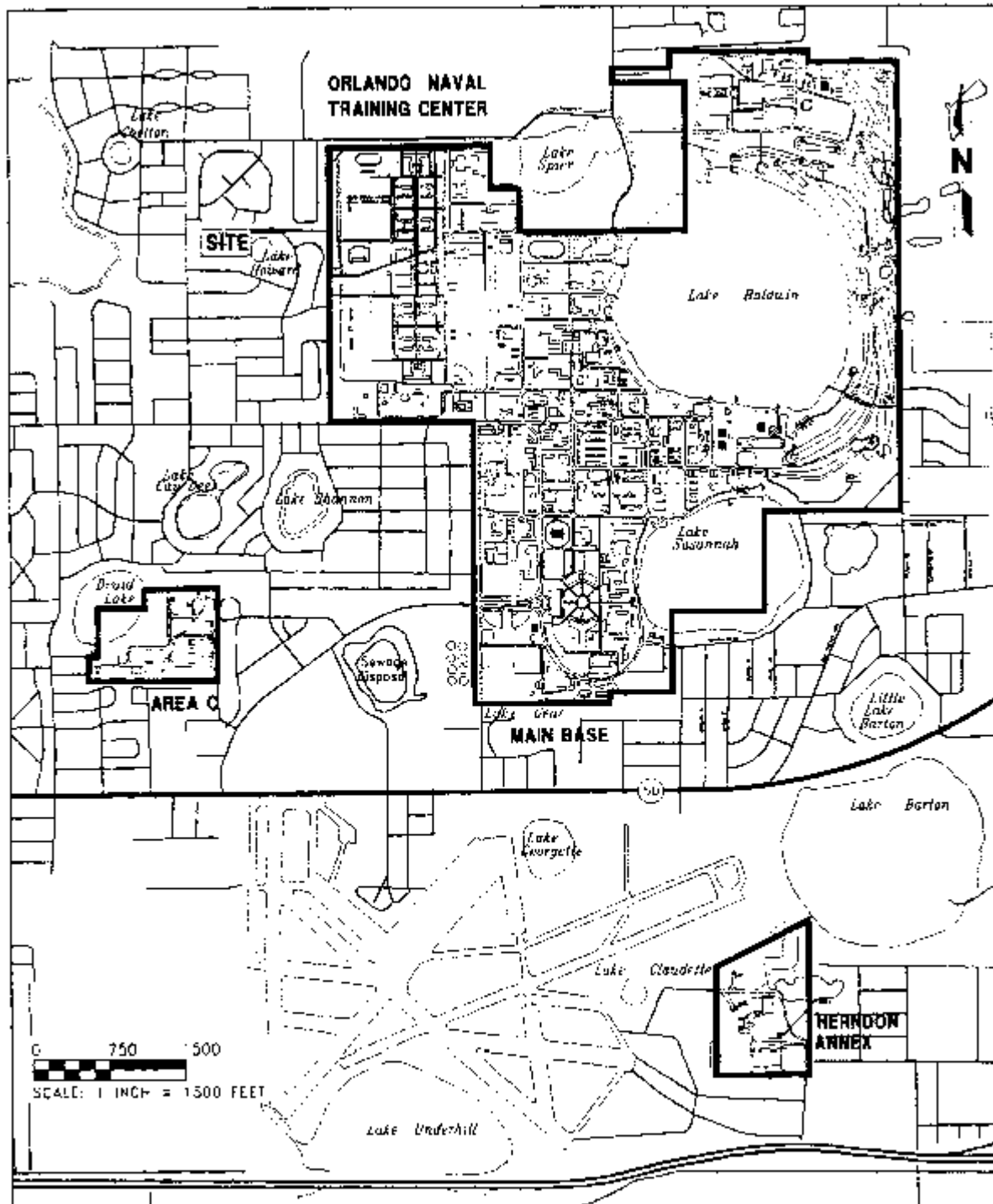
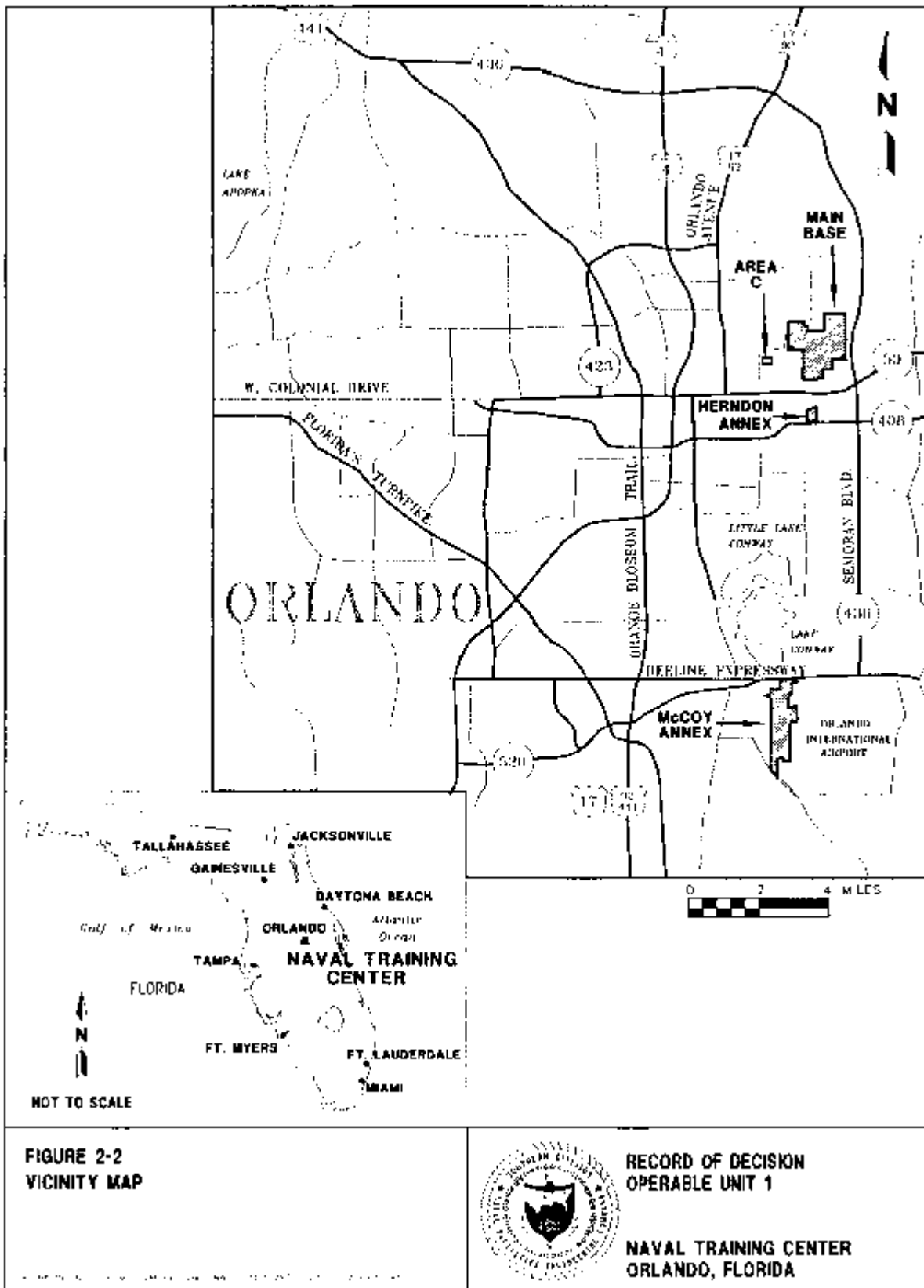


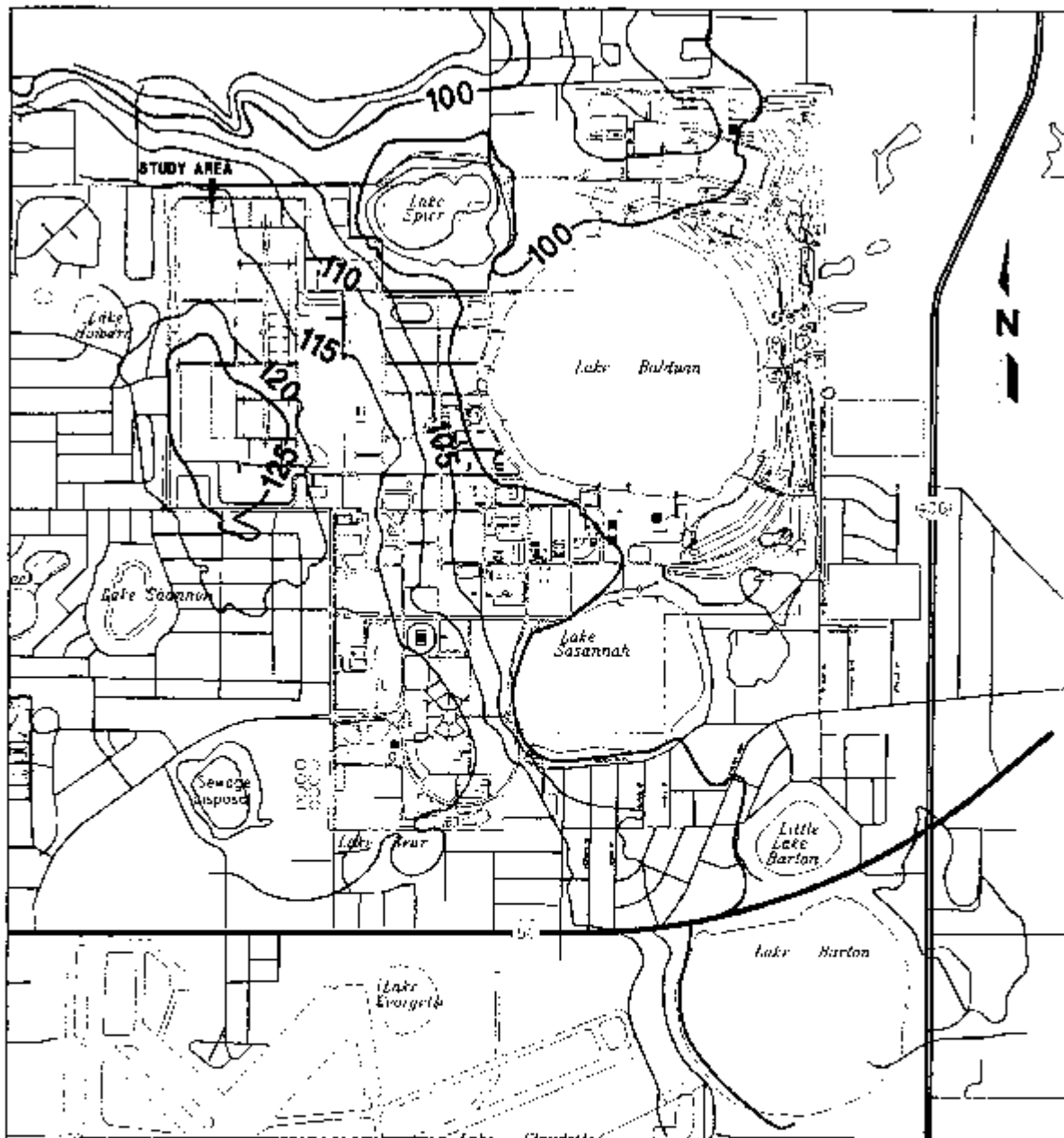
FIGURE 2-1
FACILITY MAP AND LOCATION OF OPERABLE UNIT 1



RECORD OF DECISION
OPERABLE UNIT 1

NAVAL TRAINING CENTER
ORLANDO, FLORIDA





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

0 700 1400
 SCALE: 1" = 1400 FEET

**FIGURE 2-3
 TOPOGRAPHIC MAP**



**RECORD OF DECISION
 OPERABLE UNIT 1
 NAVAL TRAINING CENTER
 ORLANDO, FLORIDA**

**Table 2-1
Operable Unit 1 Investigative History**

Record of Decision
Operable Unit 1
Naval Training Center
Orlando, Florida

Date	Investigation Title	Activities	Findings
1985	Initial Assessment Study (IAS) of NTC, Orlando Facilities (C.C. Johnson and Associates, 1985)	<ul style="list-style-type: none"> • Archival search and site walkovers. 	<ul style="list-style-type: none"> • Nine potentially contaminated sites identified, of which OU 1 was one. • Volume of waste landfilled at OU 1 was estimated to be 194,000 cubic yards. • One-third of volume of landfill believed to have been excavated in 1967 for construction of Buildings 212 and 214. • Landfill materials reported to have included film, photographic chemicals, paint thinner, garbage from mess halls, cardboard boxes, paper, plastic, biological wastes, and syringes from hospital, tree limbs, construction materials, and PCE stillbottoms from the laundry.
1986	Verification Study at NTC, Orlando Facilities (Geraghty & Miller, 1986)	<ul style="list-style-type: none"> • Installation and sampling of four wells around the perimeter of the North Grinder Landfill. • Groundwater samples and analyzed for VOCs, SVOCs, pesticides, PCBs, metals, cyanide, and total radiological activity (gross alpha and gross beta). 	<ul style="list-style-type: none"> • Exceedences of Florida's MCLs for arsenic, and gross alpha radionuclides. • Shallow wells believed not deep enough to detect PCE contamination. • OU 1 recommended for remedial investigation.

See notes at end of table.

**Table 2-1 (Continued)
Operable Unit 1 Investigative History**

Record of Decision
Operable Unit 1
Naval Training Center
Orlando, Florida

Date	Investigation Title	Activities	Findings
1995 - 1996	Remedial Investigation, North Grinder Landfill, Operable Unit 1, Navy Installation Restoration Program, Naval Training Center, Orlando, Florida (ABB Environmental Services, Inc., 1996)	<ul style="list-style-type: none"> • Aerial photography evaluation. • Geophysical surveys. • DPT surveys. • Soil gas surveys. • Ten monitoring well clusters installed (29 wells total). • Hydraulic conductivity tests performed on all wells. • Surface soil sampling conducted for CLP TAL metals and TCL organics. • Groundwater sampling conducted for metals, VOCs, SVOC, pesticides, PCBs, herbicides, gross alpha and beta radionuclides, TOC, TPH, and wet chemistry parameters.* • HHRA conducted. • ERA conducted. 	<ul style="list-style-type: none"> • Perimeter of landfill more accurately defined. • Landfill cover determined to be in good condition. • Pesticides, a PCB compound, inorganics, and PAHs detected in surface soil. • Inorganics and gross radioactivity detected in groundwater. • Groundwater contaminant concentrations were above regulatory standards. • Human health risks for exposure to surface soil were within the USEPA allowable risk range for both current land-use trespassers, future recreational users, and site workers. • Risks associated with groundwater exposure not evaluated because no pathways for exposure are present at OU 1. • Human health risks for exposure to surface soil were slightly greater than the FDEP risk threshold for both current and future site users. • Ecological receptors not at risk. • Landfill cap not recommended because surface soil contamination is at lower levels. • Groundwater monitoring of downgradient wells recommended to observe changes in contamination over time. • Implementation of institutional controls to restrict residential use of land and potable and nonpotable groundwater.

See notes at end of table.

Table 2-1 (Continued)
Operable Unit 1 Investigative History

Record of Decision
Operable Unit 1
Naval Training Center
Orlando, Florida

Notes: *Wet chemistry parameters includes alkalinity, hardness, nitrate, nitrate / nitrite, pH, sulfate, sulfide, total phosphorus, total dissolved solids, and total suspended solids.

NTC = Naval Training Center.

OU = operable unit.

PCE = tetrachloroethene.

MCL = maximum contaminant level.

VOC = volatile organic compound.

SVOC = semivolatile organic compound.

PCB = polychlorinated biphenyl.

DPT = direct push technology.

PAH = polynuclear aromatic hydrocarbons.

CLP = contract laboratory program.

TAL = target analyte list.

TCL = target compound list.

USEPA = U.S. Environmental Protection Agency.

TOC = total organic carbon.

TPH = total petroleum hydrocarbons.

HHRA = human health risk assessment.

ERA = ecological risk assessment.

FDEP = Florida Department of Environmental Protection (formerly the Florida Department of Environmental Regulation).

classified as a CERCLA site, OU 1 has been investigated as such under the Navy's IR program. The implementation of a containment technology, including a landfill cover, source control, and institutional controls, was determined to be a minimum acceptable action for the site. Thus, a full characterization of the media and exposure pathways addressed by the presumptive remedy (i.e., the landfill soil and debris) was not necessary. The presumptive remedy was not intended to address exposure pathways for media outside the landfill.

2.6 SITE CHARACTERISTICS. The goal of the RI conducted for OU 1 was to collect data to determine the nature and extent of releases of site-derived contaminants; identify potential pathways of migration via the vadose zone, soil, or groundwater; and evaluate risks to human and ecological receptors.

2.6.1 Aerial Photography Evaluation Historical aerial photographs, provided by the Navy at the Public Works Office, were evaluated during the planning phases of the RI. The objective of the evaluation was to determine the operational history of the landfill and to verify earlier historical accounts. The most useful photographs indicated that the landfill was most likely operated as a trench-and-fill landfill operation, consisting of several long northeast-southwest trenches.

2.6.2 Background A background sampling program was completed for the Main Base of NTC, Orlando to establish concentrations of inorganics naturally present in surface soil, subsurface soil, and groundwater. Background conditions for radiological activity in groundwater was also assessed. Organic compounds present in these media as a result of human activity (not related to a particular site) were also identified.

The results of this background sampling program indicated detectable concentrations of various inorganic analytes in the aforementioned media. Detectable concentrations of semivolatile organic compounds (SVOCs) and pesticides were found in the surface soil. Concentrations of SVOCs were also detected in the subsurface soil. Background groundwater samples had detectable concentrations of radiological activity. These statements are based upon the surface soil, subsurface soil, and groundwater analytical data for the background monitoring well location OLD-OR-01.

2.6.3 Geophysical Surveys A geophysical survey was conducted at OU 1 with the following objectives:

- determine the "footprint" of the North Grinder Landfill,
- locate areas that indicate concentrations of buried conductive and/or ferrous material warranting further evaluation and potential source removal, and
- characterize the landfill cover thickness and continuity to determine if its effectiveness is preventing exposure to landfill materials.

Magnetometry, terrain conductivity, time domain metal detection, and ground penetrating radar were the geophysical survey techniques applied at the site. The "footprint" or boundary of the landfill was mapped, but no locations were determined to warrant excavation and source removal. Evaluation of the landfill cover with geophysics was marginally successful, but was supported by a hand augering program conducted during the passive soil gas program (see Subsection 2.6.7 for more detailed information).

2.6.4 Direct Push Technology (DPT) Surveys The objectives of the DPT investigation were to define the contaminant plume or plumes that might have been present in the surficial aquifer and assist in optimizing the placement of permanent monitoring wells at the OU. A TerraProbeK investigation followed by cone penetrometer testing (CPT) was conducted. CPT soundings and groundwater samples were collected and analyzed.

Low-level concentrations of benzene and PCE were detected at several groundwater locations when analyzed on a field gas chromatograph (GC). Permanent monitoring wells were situated

near locations where benzene and PCE were detected, when possible.

2.6.5 Passive Soil Gas Survey A passive soil gas survey was completed over the landfill footprint to:

- characterize chemicals present in the soil cover so that a proper soil gas collection system could be designed (if necessary), and
- characterize volatile organic compounds (VOCs) and SVOCs that could have migrated to the landfill soil cover to locate potential "hot spots" that may need to be evaluated with regard to source removals to support remedial alternatives.

The results indicated that low to very low levels of petroleum hydrocarbons were present at scattered locations across the site, but did not suggest the presence of a significant petroleum hydrocarbon contamination problem in the shallow subsurface of OU 1. Additionally, there was no evidence of chlorinated hydrocarbon contamination at the site.

2.6.6 Active Soil Gas Survey The objective of the active soil gas survey was to evaluate the presence and potential lateral migration of methane and other landfill gases released by landfilled materials. Several soil gas samples had low-level detections of organic chemicals when analyzed on a field GC, and no methane detections were recorded. The age of the landfill (more than 28 years) is believed to be the reason that methane generation was not observed.

2.6.7 Surface Soil In order to assess the quality of the landfill cover, surface soil sampling was conducted. Sample results showed concentrations of polynuclear aromatic hydrocarbons (PAHs), pesticides, polychlorinated biphenyls (PCBs), and inorganics. Statistically, all these contaminants are site related, with at least one concentration occurring as an outside value.

2.6.8 Groundwater Groundwater was initially screened with a field GC using DPT methods. Nine monitoring well clusters (27 monitoring wells) were strategically placed based on these data, and were installed, sampled, and analyzed. One additional well cluster at an upgradient location was installed (a total of two monitoring wells) based on analytical results from the nine clusters. Positive detections in the analytical results for 32 groundwater samples were recorded.

Various levels of VOC, SVOC, pesticide, inorganic, and radionuclide concentrations were detected, but the only contaminants that exceeded background and/or regulatory standards consisted of gross radioactivity (gross alpha and gross beta) and some inorganics (beryllium, vanadium, manganese, and thallium).

It is theorized that the mobilization of the naturally occurring radionuclides is due to a change in the groundwater chemistry brought on by the enhancement of microbial activity by the landfill leachate. The leachate is transported downward by a steep downward hydraulic head differential in the southwest corner of the landfill, thereby enhancing the activity and density of the indigenous bacteria in the basal zone of the surficial aquifer (ABB-ES, 1996).

2.6.9 Migration Pathways The leaching of contaminants from the surface soil into OU 1 soils and groundwater is the primary potential migration mechanism for the transport of identified soil contaminants. For groundwater, the primary potential migration mechanism is groundwater flow that serves to transport contaminants away from the source areas at OU 1. Groundwater flow at OU 1 is generally in a northeast direction, and site contaminants do not appear to have been transported beyond the fringes of the landfill at concentrations exceeding levels of concern.

2.7 SUMMARY OF SITE RISKS. A risk assessment was completed for OU 1 to predict whether or not the site would pose current or future threats to human health or the environment, given the implementation of the presumptive remedy for landfills. Both a human health risk

assessment (HHRA) and an ecological risk assessment (ERA) were performed for OU 1. The risk assessments evaluated the contaminants detected in site media during the RI and provided the basis for selecting the remedial actions.

2.7.1 HHRA An HHRA was conducted to characterize the risks associated with potential exposures to site-related contaminants at OU 1 for human receptors. The HHRA is provided as Chapter 6.0 of the RI report (ABB-ES, 1996), and supporting documentation is provided in Appendix J of that report.

Five components of the HHRA were completed, including (1) data evaluation, (2) selection of human health chemicals of potential concern (CPCs), (3) exposure assessment, (4) toxicity assessment, and (5) risk characterization.

Data Evaluation The data evaluation involved numerous activities, including sorting data by medium, evaluating analytical methods, evaluating quantitation limits, evaluating quality of data with respect to qualifiers and codes, evaluating tentatively identified compounds, comparing potentially site-related contamination with background, developing a data set for use in risk assessment, and identifying CPCs.

Human Health CPCs Table 2-2 summarizes the human health CPCs selected for surface soil at OU 1. These chemicals are the focus of the baseline risk assessment. As previously noted, an evaluation of exposure to groundwater was not completed for OU 1.

Exposure Assessment OU 1 was evaluated to identify the populations that might come into contact with site-related chemicals and the pathways through which exposure might occur. OU 1 was investigated and will be remediated in a manner consistent with a presumptive remedy for landfills. Under a presumptive remedy scenario, it is not necessary to conduct a risk assessment for potential exposure to soils that will be covered by a cap. However, if risks associated with surface soil exposures are insignificant and there are no concerns about leaching of contaminants from the landfill into groundwater, a cap may not be necessary as part of the presumptive remedy. A risk assessment on surface soil was conducted at OU 1 to determine if a cap was necessary.

Surface soil was the only medium assessed in the HHRA, as there is no surface water or sediment at OU 1, and there are no complete exposure pathways for groundwater. Presently, groundwater is not used for any potable or nonpotable purpose at the site, and since the North Grinder Landfill area will not be developed for residential use, and a deed restriction will prevent the use of groundwater for drinking or irrigation, there will be no future exposure pathways for groundwater.

Under current land use, adult and adolescent trespassers could be exposed to contaminants in surface soil; therefore, exposure of these receptors (ingestion of and direct contact with surface soil and inhalation of particulates from surface soil) was evaluated in the HHRA. There are no current residents at the North Grinder Landfill, and a deed restriction will prevent conversion of OU 1 to residential use. If OU 1 was developed for industrial use in the future, occupational workers and excavation workers could be exposed to contaminants in surface soil. The potential exposure of these receptors to contaminants in surface soil was also evaluated in the HHRA. In addition, the HHRA also evaluated the OU 1 area being converted to recreational use, where older child and adult receptors could be exposed to contaminants in surface soil or existing landfill cover.

Toxicity Assessment The toxicity assessment is a two-step process whereby the potential hazards associated with the route-specific exposure to a given chemical are (1) identified by reviewing relevant human and animal studies, and (2) quantified through analysis of dose-response relationships. USEPA has calculated numerous toxicity values that have undergone extensive review within the scientific community. These values (published in the Integrated Risk Information System and other journals) are used in the baseline evaluation to calculate both carcinogenic and non-carcinogenic risks associated with each CPC and rate of exposure.

Table 2-2
Summary of Human Health Chemicals of Potential Concern (HHPCs)

Record of Decision
 Operable Unit 1
 Naval Training Center
 Orlando, Florida

Environmental Medium	HHPCs
Surface Soil	<p>volatile organics: none</p> <p>semivolatile organics: benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene</p> <p>pesticides and PCBs: Aroclor-1260, Dieldrin, gamma-BHC</p> <p>inorganics: arsenic</p>
<p>Notes: PCBs = polychlorinated biphenyls. BHC = benzene hexachloride.</p>	

Risk Characterization In the final step of the risk assessment, the results of the exposure and toxicity assessments are combined to estimate the overall risk from exposure to site contamination. For cancer-causing chemicals, risk is estimated to be a probability. For example, a particular exposure to chemicals at a site may present a 1 in 10,000 (or 1×10^{-4}) chance of developing cancer over an estimated lifetime of 70 years. For noncancer-causing chemicals, the dose of a chemical for which a receptor may be exposed is estimated and compared to the reference dose (RfD). The RfD is developed by USEPA scientists and represents an estimate of the amount of a chemical a person (including the most sensitive persons) could be exposed to over a lifetime, without developing adverse effects. The measure of the likelihood of adverse effects other than cancer occurring in humans is called the hazard index (HI). An HI greater than 1 suggests that adverse effects are possible.

For OU 1, potential risks were identified for some exposure scenarios. Table 2-3 provides a summary of the predicted risks for the various exposure scenarios.

Site-related cancer and noncancer risks for current land use are consistent with USEPA guidelines and indicate that the excess lifetime cancer risk due to exposure to CPCs at the site, by each complete exposure pathway, should not exceed a range of 1×10^{-4} to 1×10^{-6} or an HI of 1. However, when considering FDEP risk criteria, the concentration of Dieldrin in surface soil is associated with a cancer risk greater than 1×10^{-6} . This is calculated using the maximum concentration of Dieldrin at any sample location. When using the average concentration of Dieldrin across the site, risk associated with surface soil exposure under current land use is within acceptable limits.

For potential future land uses, estimated cancer and noncancer risks for the recreational user (child and adult), onsite worker, and an excavation worker are within acceptable USEPA risk ranges. For the recreational user, only Dieldrin has an estimated cancer risk greater than 1×10^{-6} , exceeding the FDEP threshold value. The estimated risk of 2×10^{-6} is associated with dermal soil contact (1.2×10^{-6}) and incidental ingestion (6×10^{-7}). The risk estimate is based on the maximum reported concentration of Dieldrin (175 $\mu\text{g}/\text{kg}$). The average Dieldrin concentration is below the FDEP's Soil Cleanup Goal (SCG) (FDEP, 1995) for non-residential land use, and given that a deed restriction would be in place to prohibit residential use of the land, the concentrations of Dieldrin detected at the site are considered consistent with the FDEP SCGs.

For the potential future site worker, cancer risks associated with exposure to PAHs, Dieldrin, and arsenic are within the acceptable USEPA risk range but slightly exceed the FDEP acceptable risk threshold of 1×10^{-6} . Again, deed restrictions to restrict intrusive activities (e.g., excavation or drilling) within the boundary of the landfill would be implemented, and contaminant concentrations are consistent with industrial SCGs for Florida (FDEP, 1995).

2.7.2 ERA The purpose of the ERA for OU 1 was to evaluate the potential for adverse effects to ecological receptors at the North Grinder Landfill and to ensure that the remedy selected for the site addresses ecological exposure pathways and contaminants of concern. The main objective was to determine whether or not the landfill soil cover poses a risk to ecological receptors. Potential risks from exposure to leachate and landfill gas were also addressed. Components of the ERA include (1) site characterization, (2) hazard assessment and contaminants of potential concern, (3) exposure assessment, (4) effects assessment, and (5) risk characterization. Table 2-4 provides a summary of the CPCs selected for OU 1 to be evaluated for each medium.

Findings of the ERA indicate that soil invertebrate and small mammalian and avian receptors are unlikely to be at risk from exposure to analytes detected in OU 1 surface soil. It is anticipated that no predatory mammals or birds, or rare and endangered species, would inhabit the site. Concentrations of chromium in surface soil, particularly in the northwestern portion of the site, exceeded the terrestrial plant screening value for this analyte. However, based on the nature of vegetation present at the site (planted grass and ornamental shrubs), risks to terrestrial plant populations are unlikely.

**Table 2-3
Human Risk Summary for Operable Unit 1**

Record of Decision
Operable Unit 1
Naval Training Center
Orlando, Florida

Land Use	Exposure Route	Hazard Index	Excess Lifetime Cancer Risk
Current Land Use			
Surface Soil			
Adolescent trespasser	Incidental ingestion	0.01	1 x 10 ⁻⁶
	Dermal contact	0.003	4 x 10 ⁻⁷
	Inhalation of particulates	¹ NC	5 x 10 ⁻¹⁰
Total adolescent trespasser:		0.01	1 x 10 ⁻⁶
Adult trespasser	Incidental ingestion	0.001	1 x 10 ⁻⁶
	Dermal contact	0.006	1 x 10 ⁻⁶
	Inhalation of particulates	¹ NC	2 x 10 ⁻⁸
Total adult trespasser:		0.002	2 x 10 ⁻⁶
Total trespasser:		¹ NC	3 x 10 ⁻⁶
Future Land Use			
Surface Soil			
Recreational Child	Incidental ingestion	0.01	1 x 10 ⁻⁶
	Dermal contact	0.003	4 x 10 ⁻⁷
	Inhalation of particulates	¹ NC	5 x 10 ⁻¹⁰
Total recreational child:		0.01	1 x 10 ⁻⁶
Recreational Adult	Incidental ingestion	0.006	1 x 10 ⁻⁶
	Dermal contact	0.002	6 x 10 ⁻⁷
	Inhalation of particulates	¹ NC	2 x 10 ⁻⁸
Total recreational adult:		0.02	2 x 10 ⁻⁶
Total recreational receptor:			3 x 10 ⁻⁶
Surface Soil			
Site worker	Incidental ingestion	0.01	4 x 10 ⁻⁶
	Dermal contact	0.005	2 x 10 ⁻⁶
	Inhalation of particulates	¹ NC	5 x 10 ⁻⁸
Total site worker:		0.02	6 x 10 ⁻⁶
Future Land Use			
Surface Soil			
Excavation Worker	Incidental ingestion	0.008	9 x 10 ⁻⁸
	Dermal contact	0.0006	1 x 10 ⁻⁸
	Inhalation of particulates	¹ NC	7 x 10 ⁻⁸
Total excavation worker:		0.009	1 x 10 ⁻⁷
¹ A hazard index could not be calculated for inhalation exposure because inhalation reference doses were not available for the HHCPs.			
Notes: NC = not calculated. HHCP = human health chemical of potential concern.			

Table 2-4
Summary of Ecological Chemicals of Potential Concern (ECPCs)

Record of Decision
 Operable Unit 1
 Naval Training Center
 Orlando, Florida

Environmental Medium	ECPCs
Surface soil	<p>volatile organics: acetone</p> <p>semivolatile organics: acenaphthene, anthracene, benzo(a)-anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo-(g,h,i)perylene, benzo(k)fluroanthene, carbazole, chrysene, dibenz(a,h)anthracene, bis(2-ethylhexyl)phthalate, fluoranthene, indeno(1,2,3,-cd)pyrene, phenanthrene, pyrene</p> <p>pesticides and PCBs: 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, Aroclor-1260, alpha-BHC, alpha-chlordane, gamma-chlordane, Dieldrin, heptachlor epoxide</p> <p>inorganics: arsenic, barium, cadmium, chromium, copper, lead, manganese, mercury, silver, vanadium, zinc</p>
<p>Notes: DDD = dichlorodiphenyldichloroethane. DDE = dichlorodiphenyldichloroethene. DDT = dichlorodiphenyltrichloroethane. BHC = benzene hexachloride.</p>	

2.8 DESCRIPTION OF REMEDIAL ACTIONS. To identify remedial actions for OU 1, applicable regulations were reviewed, as were available guidance documents.

With regard to applicable regulations, Federal and State landfill closure regulations are not directly applicable to OU 1 for the following reasons:

- Federal regulations for closure of Resource Conservation and Recovery Act (RCRA) hazardous waste landfills (40 Code of Federal Regulations [CFR] Part 264) are not applicable because the landfill did not receive waste after the effective date of RCRA, November 19, 1980;
- Federal regulations for the closure of solid waste landfills (40 CFR Part 258) are not applicable because the landfill did not receive waste after the effective date of the regulation, October 9, 1993; and
- Florida Solid Waste Disposal Facilities Regulations (Florida Administrative Code, Chapter 62-701) are not applicable because the landfill did not receive waste after the effective date of the regulation, July 1, 1983.

Although the above-referenced regulations are not applicable to remedial action at OU 1, portions of the regulations may be relevant. For example, the *Draft Technical Manual for Solid Waste Disposal Criteria* (USEPA, 1992) (guidance document for implementation of Federal Solid Waste Disposal criteria) provides information regarding statistical evaluation of groundwater monitoring data. Portions of the listed regulations and applicable guidance were used as a template for the various components of the selected remedial actions for OU 1, when appropriate.

In addition, guidance published for CERCLA sites provides information regarding closure of CERCLA landfills. Although NTC, Orlando is not a CERCLA site, this guidance was reviewed and considered in identifying components of the remedial action for OU 1. Specifically, the NCP states that closure of CERCLA landfills that are not subject to specific closure regulations (see previous paragraphs) 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; and
- institutional controls, as necessary.

Based on consideration of these items and the recommendations of the RI (including the risk assessment), a combined remedial approach to monitoring the North Grinder Landfill has been selected for OU 1. This plan was presented in the Proposed Plan for the OU (ABB-ES, 1997), and consists of groundwater monitoring, landfill inspections, and institutional controls.

2.8.1 Groundwater Monitoring A groundwater monitoring program for OU 1 was proposed in the RI report, and the USEPA guidance document, *Design and Construction of RCRA/CERCLA Final Covers*, suggests that a groundwater monitoring program be established to evaluate whether or not groundwater quality remains within established acceptance criteria and the trend of the potentiometric surface is consistent over time. Based on these recommendations and guidance, the key monitoring components of the program for OU 1 will include the following:

- establishing background for chemical quality;
- evaluating changes in the potentiometric surface; and
- evaluating the ongoing chemical quality of groundwater through a monitoring program, which may be an indicator of leachate release.

The analytical suite for the groundwater monitoring program will consist of organic, inorganic, and radionuclide parameters, in addition to total dissolved solids, for the following reasons:

- Chemicals detected in groundwater at concentrations exceeding regulatory groundwater criteria included several TAL inorganics and radiological parameters (gross alpha and beta).
- VOCs, SVOCs, pesticides, and PCBs were not identified as contaminants of concern for OU 1, as their concentrations did not exceed the respective risk screening values (refer to Chapter 7.0 of the RI Report, ABB-ES, 1996); however, because these chemicals could have potentially been disposed of in the landfill and could be a source for leaching, they will be monitored.

Radionuclide parameters will consist of gross alpha and beta analyses for each groundwater sample. If analytical data show exceedances of maximum contaminant levels for either gross alpha or beta, then a groundwater sample from that well will be analyzed for gross gamma.

The wells selected for sampling are displayed on Figure 2-4. They consist of four downgradient monitoring well clusters, two of which are near the Main Base property line (OLD-U1-10A, -11B, -12C and OLD-U1-16A, -17B, -18C), and two that are close to the edge of the landfill (OLD-U1-13A, -14B, -15C and OLD-U1-19A, -20B, -21C) and two monitoring wells clusters situated in close proximity of the landfill (OLD-U1-25A, -26B, -27C and OLD-U1-22A, -23B, -24C). Also, one background well will be sampled (OLD-OR-01) to simulate true background groundwater conditions.

Guidance also indicates that sampling frequency is typically defined by the level of anticipated contamination and site conditions, and the actual monitoring period will be influenced by the stability of the waste and cover system.

Furthermore, it is suggested that groundwater sampling frequency be conducted quarterly, unless consistency of measurements justify sampling less frequently. However, it should be noted that the guidance also indicates that it is common for solid waste landfills to be monitored annually. The following sampling frequency is planned for OU 1:

Year 1 Quarterly sampling

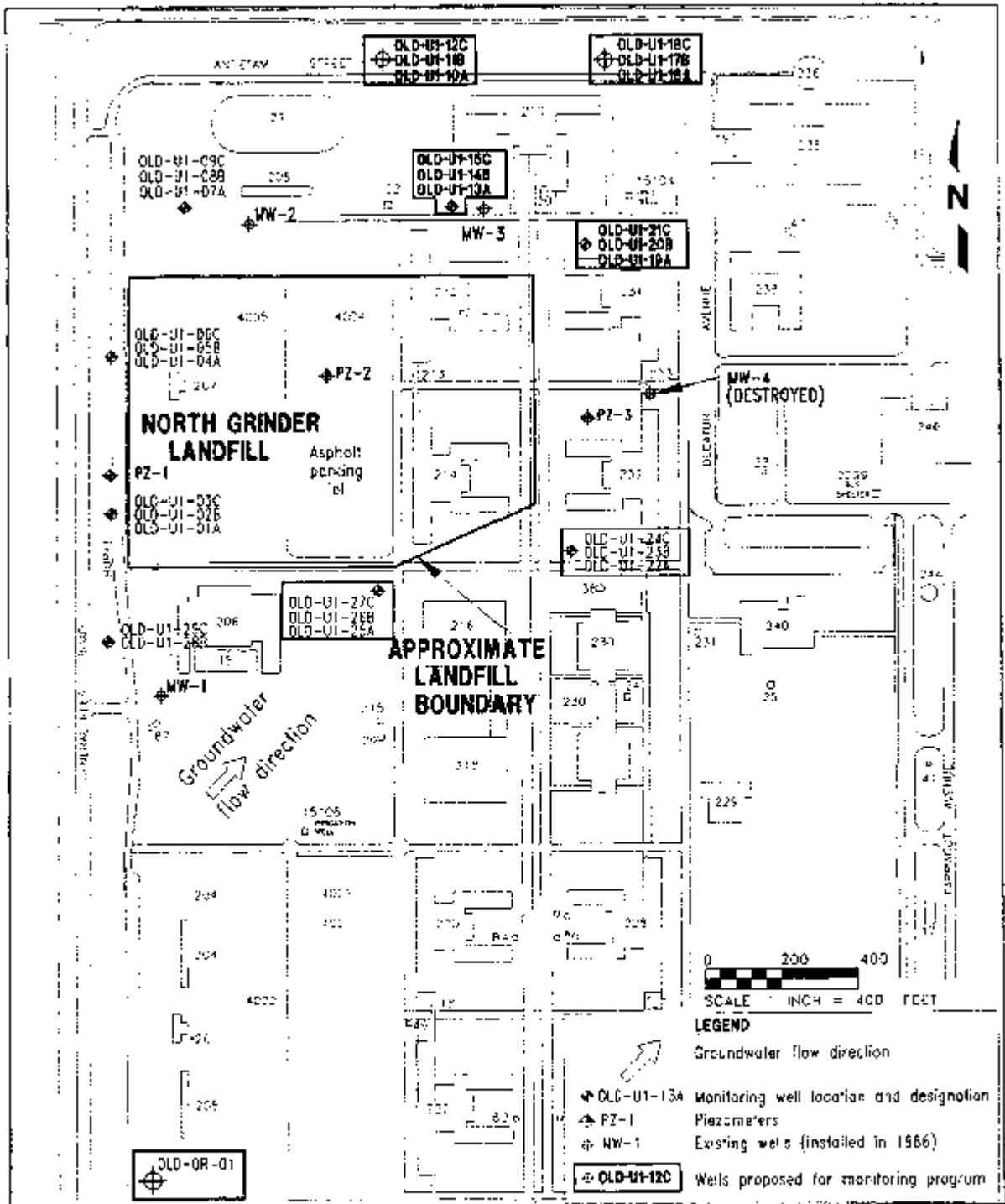
If no increases in the groundwater chemical concentrations occur, the sampling frequency will be adjusted as is stated below for year 2. If concentrations increase, then additional wells may be sampled and more analyses conducted.

Year 2 Annual sampling

Sampling will occur once during this year, assuming no increases in groundwater chemical concentrations occur in year 1.

Year 3 Annual sampling

Sampling will occur once during this year, assuming no increases in groundwater chemical concentrations occur in year 2. If no increases are detected in year 3, then groundwater monitoring would be discontinued.



**FIGURE 2-4
MONITORING WELLS FOR GROUNDWATER
MONITORING PROGRAM**



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At the end of each year, a report will be prepared to summarize the analytical data acquired and will recommend further monitoring or no further action. If no further action is recommended, then the monitoring wells will be properly abandoned.

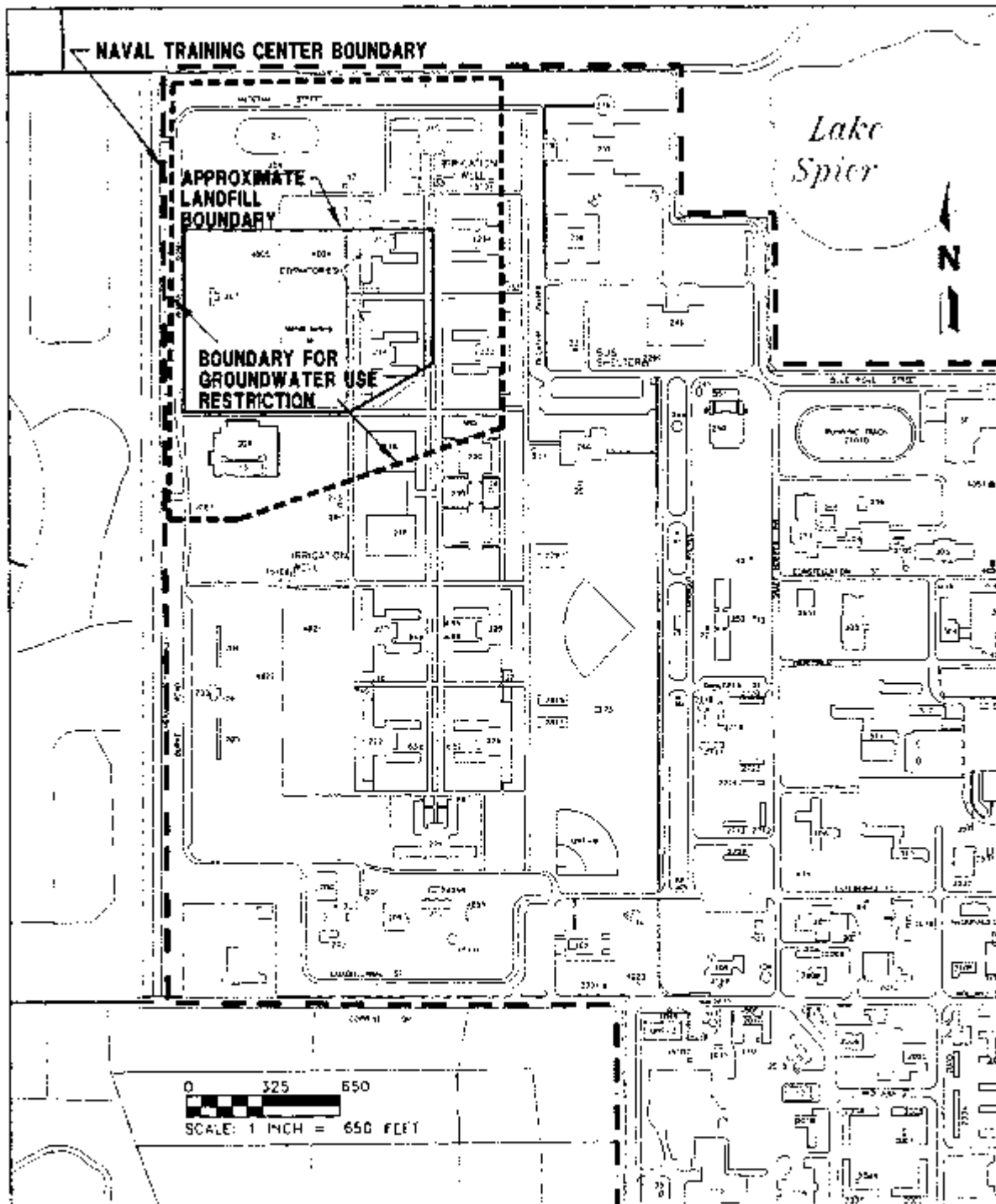
2.8.2 Landfill Inspection At this time, the OU 1 landfill is covered with soil to prevent direct contact with landfill materials. An inspection of the landfill is planned to evaluate the integrity of the cover, inspect the surface for signs of seeps, pits, cracks, or other imperfections, and inspect the integrity of monitoring wells at the site. The area of the inspection, which includes the area denoted as "Boundary for Groundwater Use Restriction", is shown on Figure 2-5. Inspections will be conducted during the groundwater monitoring events.

The approximate landfill boundaries are as follows: (1) Burke Road forms the western boundary; (2) an east-west line drawn approximately 130 feet south and parallel to the walkway between Buildings 210 and 212 forms the northern boundary; (3) a north-south line drawn between the two walkways between Buildings 212 and 234 forms the eastern boundary; and (4) a line starting at the western end of the walkway between Buildings 232 and 230, continuing to a point that is the southeast corner of the asphalt parking lot, and concluding at a point approximately 100 feet east and 60 feet north of the southeastern corner of Building 214 forms the southern boundary. This boundary is shown on Figure 2-5 and was defined based on numerous references, including historical aerial photographs, geophysical surveys (i.e., magnetics, time domain metal detector, and ground penetrating radar), soil boring and monitoring well installation, hand auger explorations, TerraProbeK and CPT surveys, and the installation of perimeter active soil gas implants. The footprint is believed to be conservative (i.e., it is somewhat larger than the actual zone underlain by buried materials), and has been generalized as can be seen from the geometrically straight boundaries on the figure.

2.8.3 Institutional Controls Institutional controls, in addition to engineering controls, are sometimes implemented at a site to limit human activity, thereby protecting human health and the environment and ensuring the continued effectiveness of a remedy. Examples of institutional controls include land and resource use and deed restrictions, well use advisories, and building permits. Institutional controls are particularly effective for sites in which waste is left in place upon completion of investigations. For the OU 1 landfill, the landfilled materials will be left in place upon implementation of the selected remedial actions.

Because these materials will be left onsite, it is important for future users of the site to be aware that within the landfill footprint (see Figure 2-5), site workers must adhere to regulations for Hazardous Waste Site Workers (29 CFR Part 1910) during all excavation activities below a depth of 12 inches. In addition, a clean soil cover of at least 2 feet must be maintained over the area once excavation activities have ceased. Also, construction activities on this property should take into account the potential presence of buried hazardous materials.

Additionally, surficial aquifer groundwater at the site contains some inorganic and radionuclide chemicals above regulatory standards. ABB-ES has hypothesized that altered groundwater chemistry under and adjacent to the former landfill has mobilized some of these naturally-occurring chemicals. Further downgradient from the landfill, the groundwater chemistry returns to background levels as do the concentrations of these parameters. Based on this information, a use restriction for this groundwater was recommended and selected for implementation at OU 1. The boundaries for the groundwater use restriction area, shown on Figure 2-5, are as follows: (1) the NTC, Orlando property line forms the west and north boundaries; (2) a north-south line drawn approximately 130 feet west of Decatur Avenue forms the eastern boundary; and (3) a line drawn from the western property boundary to a point approximately 200 feet south of the southwestern corner of Building 206 and continuing northeasterly to a point at the eastern end of the walkway between Buildings 232 and 230 forms the southern boundary.



**FIGURE 2-5
SUMMARY OF DEED RESTRICTIONS**



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Deed restrictions, containing land-use controls and groundwater use restrictions, will be developed for OU 1 to ensure that future purchasers and users of the property are provided with notice of the site conditions in and around the landfill. As such, the following restrictive covenants will be documented in the property transfer documents and the recorded deed for the property for the areas marked on Figure 2-5:

- The contents of the landfill have not been examined but are based on facility records and personnel interviews; the contents may include, but are not limited to, film and photographic chemicals, paint thinner, cardboard and paper, plastic, medical wastes, tree limbs, construction material, garbage from the mess hall, and PCE stillbottoms from the base laundry.
- The surface soil covering the landfill contains chemicals (e.g., arsenic and PAHs) that are believed to be related to past pesticide use at the site, the introduction of nonnative soil to the area, and the combustion of fuel products.
- The landfill is covered with a 2-foot soil layer; this soil cover must be maintained at all times within the landfill boundary notwithstanding when excavation is occurring.
- Surficial aquifer groundwater under the landfill and potentially throughout the area shown on Figure 2-5 (i.e., the area noted as "Boundary for Groundwater Use Restrictions") contains concentrations of radiological chemicals. Because of these concentrations, the surficial aquifer groundwater above the Hawthorne Formation within the boundary shown on Figure 2-5 must not be used for consumption or irrigation.
- The area within the landfill boundary shown on Figure 2-5 is restricted to nonresidential uses (e.g., industrial use or recreational use).
- Excavation and construction activities within the landfill boundary must be conducted in accordance with the constraints outlined in the deed notations mentioned above and with all applicable Federal and State regulatory requirements. Site workers must adhere to regulations for hazardous waste site workers (29 CFR Part 1910) during all excavation activities that would reach a depth below 12 inches.

2.9 ANALYSIS OF REMEDIAL ACTIONS. In evaluating the remedial actions for OU 1, nine criteria were used. The first seven are technical criteria based on the degree of protection of the environment, cost, and engineering feasibility issues, and the last two are acceptance criteria (acceptance by the USEPA and FDEP, and acceptance by the community).

The nine criteria can be categorized into three groups, including threshold criteria, primary balancing criteria, and modifying criteria. Remedial actions should satisfy the threshold criteria, achieve the primary balancing criteria, and consider the modifying criteria after the public comment period. The subsections that follow discuss the remedial actions proposed for OU 1 relative to the nine criteria.

2.9.1 Threshold Criteria

Overall Protection of Human Health and the Environment Implementation of the selected remedial actions for OU 1 would achieve protection of human health and the environment.

Groundwater use restrictions would prohibit the use of surficial aquifer water for consumption or irrigation. Notations in the deed to the property would restrict residential use of land, restrict intrusive activities within the landfill boundary, and notify future users of the land of the environmental condition of the site. These actions are deemed sufficiently protective of human health over baseline conditions at OU 1.

Risks to the environment based on exposure to OU 1 media are unlikely. Soil invertebrate, small mammalian, and avian receptors are unlikely to be at risk from exposure to chemicals detected in surface soil. Although concentrations of chromium in surface soil exceeded the terrestrial plant screening value, risks are unlikely given the nature of vegetation present at the site (i.e., planted grass and ornamental shrubs). Finally, it is not anticipated that predatory mammals or birds or rare and endangered species would inhabit the site.

Compliance with Regulatory Standards and Guidance As proposed, the selected remedial actions would comply with applicable regulatory requirements and available guidance material. Federal and State landfill closure regulations are not applicable because the landfill was not used after the effective dates of those regulations. Table 2- 5 provides a summary of regulatory requirements and guidance.

2.9.2 Primary Balancing Criteria

Long-Term Effectiveness and Permanence The remedial actions selected for OU 1 would be effective in managing the contamination present at the OU, and would remain in place for an indefinite period of time. Institutional controls would be mandated in property transfer documents and included in the deed to the property. The reliability of these controls is high, considering that the local governing body will be implementing and managing the controls.

A groundwater monitoring program will also be implemented to evaluate changes in chemical concentrations in groundwater over time. These data would support the continued designation of "no further action required" for groundwater at the site. At the end of the proposed monitoring period (3 years), the data will be evaluated to determine whether or not continued monitoring is necessary. This monitoring program is a reliable and effective method to evaluate chemical concentrations in groundwater over time.

Short-Term Effectiveness Short-term impacts to human health and the environment through implementation of the selected remedial actions are not predicted.

Intrusive methods, such as excavation of soil, are not proposed for OU 1; therefore, protection of workers or the community for such intrusive methods is not necessary.

Implementability Implementing the selected remedial actions for OU 1 is technically and administratively feasible. Equipment and resources to perform the groundwater monitoring program are readily available. Implementation of institutional controls would be handled by the Navy and managed through the local governing body.

Also, access to the OU 1 property upon transfer to the City of Orlando would need to be allowed for implementation of the groundwater monitoring and landfill inspection program.

Reduction of Toxicity, Mobility, or Volume of Contaminants The selected remedial actions do not include the implementation of treatment technologies for contaminants and do not physically or chemically alter contaminants contained in the landfill. Thus, these actions do not reduce the toxicity, mobility, or volume of contaminants through treatment. However, it should also be noted that such reductions have been deemed unnecessary for OU 1, as protection of human health and the environment can be achieved through implementation of institutional controls.

Also, concentrations of inorganics and radionuclides in groundwater at the site are expected to decrease over time. Inorganic chemicals may decrease over time due to sequestering or transformation by soil solids. Radionuclide chemicals may be naturally attenuated if, in the interaction between the radionuclide and the soil, the time for transport to receptors is greater than the respective half-life of the radionuclide.

Cost The relative cost for the implementation of the selected remedial actions is in the range of \$275,000 to \$500,000.

**Table 2-5
Synopsis of Federal and State Regulatory Requirements and Guidance for OU 1**

Record of Decision
Operable Unit 1
Naval Training Center
Orlando, Florida

Name and Regulatory Citation	Description	Consideration in the Remedial Action Process	Type
Resource Conservation and Recovery Act (RCRA) Regulations, Landfills [40 CFR Part 264, Subpart N]	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 waste after 1980; however, the requirements may be used as guidance for developing a landfill inspection program.	Action-specific
RCRA Regulations, Releases from Solid Waste Management Units [40 CFR Part 264, Subpart F]	Contains general groundwater monitoring requirements. Establishes detection and compliance monitoring programs that apply to owners and operators of solid waste units.	These regulations provide guidance for establishing and conducting a groundwater monitoring program at sites contaminated with RCRA wastes.	Action-specific
Safe Drinking Water Act Regulations, Maximum Contaminant Levels for Radioactive Pollutants [40 CFR Part 141, Subpart B]	Establishes maximum contaminant levels for radioactivity in community water systems.	These regulations may be relevant to potential drinking water sources, such as the surficial aquifer groundwater at OU 1 (as designated by the FDEP). These regulations may be used in evaluating data from the groundwater monitoring program.	Chemical-specific
Comprehensive Environmental Response, Compensation, and Liability Act, and the National Hazardous Substance and Contingency Plan Regulations [40 CFR § 300.430]	Discusses the types of institutional controls to be established at CERCLA sites.	Although NTC, Orlando is not listed on the National Priorities List, and is therefore not subject to CERCLA regulations, these regulations may be used as guidance in establishing appropriate institutional controls at OU 1.	Action-specific
USEPA, Design and Construction of RCRA/CERCLA Final Covers, May 1991	Provides guidance on components of landfill closure, including long-term maintenance, groundwater monitoring, and institutional controls. Recommends groundwater sampling frequency and strategy.	This guidance may be used for establishing and implementing groundwater monitoring program for OU 1.	Action-specific Guidance
Florida Groundwater Classes, Standards and Exemptions [FAC, 62-520]	Designates groundwaters of the State into 5 classes and establishes minimum "free from" criteria. The regulation also specifies that classes I & II must meet the primary and secondary drinking water standards listed in Chapter 62-550.	These regulations may be used to evaluate data from the groundwater monitoring program.	Chemical-specific
See notes at end of table.			

**Table 2-5 (Continued)
Synopsis of Federal and State Regulatory Requirements and Guidance for OU 1**

Record of Decision
Operable Unit 1
Naval Training Center
Orlando, Florida

Name and Regulatory Citation	Description	Consideration in the Remedial Action Process	Type
Florida Hazardous Waste Rules [FAC, 62-730]	Adopts by reference, specific sections of the Federal hazardous waste regulations, including the section regulating hazardous waste landfills (40 CFR Part 264, subpart N) and makes additions to these regulations.	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.	Chemical-specific Action-specific
Florida Soil Cleanup Goals, September 1995	Provides guidance for soil cleanup levels that can be developed on a site-by-site basis.	These guidelines aid in determining health and leachability-based cleanup goals for soil.	Guidance
Florida Groundwater Guidance, Bureau of Groundwater Protection, June 1994	Provides maximum concentration levels for contaminants, including radioactive contaminants, for groundwater in the State of Florida. Groundwater with concentrations less than the listed values are considered "free from" contamination.	The values in this guidance should be considered when evaluating data from the groundwater monitoring program.	Guidance
<p>Notes: OU = Operable Unit. CFR = Code of Federal Regulations. FDEP = Florida Department of Environmental Protection. CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act. NTC = Naval Training Center. USEPA = U.S. Environmental Protection Agency. FAC = Florida Administrative Code.</p>			

2.9.3 Modifying Criteria

State and Federal Acceptance The FDEP and USEPA have concurred with the remedial actions selected for OU 1.

Community Acceptance Community acceptance of the preferred alternative has been evaluated over the past 2 years through presentations to the facility's Restoration Advisory Board (RAB). This board is composed of a group of community citizens who participate in reviewing and evaluating environmental cleanup at the base. The RAB has been briefed on the investigative status of OU 1, and has agreed to the approach and recommendations made herein.

In addition to these RAB presentations, a public meeting and comment period will be held to solicit input on the selected remedial actions from other community citizens. Upon completion of the meeting and comment period, any comments received will be addressed in the Responsiveness Summary, which is included as the Appendix to this ROD.

2.10 STATUTORY DETERMINATIONS. The remedial action selected for implementation at OU 1 is consistent with the Navy's IR program, CERCLA, and the NCP. The remedial action selected for OU 1 is protective of human health and the environment, complies with Federal and State regulatory requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost effective. However, because treatment of the groundwater was not found to be practicable, this remedy does not satisfy the statutory preference for treatment as a principal element.

Because this remedy will result in hazardous substances remaining onsite above health-based levels, a review will be conducted within 5 years after commencement of the remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

2.11 DOCUMENTATION OF SIGNIFICANT CHANGES. There are no significant changes in the proposed remedial actions for OU 1 from those described in the Proposed Plan (ABB-ES, 1997).

REFERENCES

- ABB Environmental Services, Inc. (ABB-ES). 1996. *Remedial Investigation Report, North Grinder Landfill, Operable Unit 1, Naval Training Center, Orlando, Florida*. Prepared for Southern Division, Naval Facilities Engineering Command, North Charleston, South Carolina (December).
- ABB-ES. 1997. *Proposed Plan, North Grinder Landfill, Operable Unit 1, Naval Training Center, Orlando, Florida*. Prepared for Southern Division, Naval Facilities Engineering Command (SOUTHNAVFACENCOM), North Charleston, South Carolina (May).
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- USEPA. 1992. *Draft Technical Manual for Solid Waste Disposal Facility Criteria*. 40 CFR Part 258, Washington, D.C. (April).
- USEPA. 1993. *Presumptive Remedy for Comprehensive Environmental Response, Compensation, and Liability (CERCLA) Municipal Landfill Sites*. Office of Solid Waste and Emergency Response (OSWER) directive 9355.0-049FS, Washington, D. C.
- USEPA. 1996. *Application of CERCLA Municipal Landfill Presumptive Remedy to Military Landfills (Interim Guidance)*. OSWER directive 9355.0-62FS, Washington, D.C. (April).

APPENDIX A

RESPONSIVENESS SUMMARY

Appendix A: Responsiveness Summary

The Responsiveness Summary serves three purposes. First, it provides regulatory agencies with information about the community preferences regarding the remedial alternatives presented for Operable Unit (OU) 1, the North Grinder Landfill, at Naval Training Center (NTC), Orlando, Florida. Second, the Responsiveness Summary documents how public comments have been considered and integrated into the decision-making process. Third, it provides the Navy, U. S. Environmental Protection Agency, and Florida Department of Environmental Protection with the opportunity to respond to each comment submitted.

The Remedial Investigation and Proposed Plan for OU 1 were made available in an Information Repository maintained at the Orlando Public Library. Comments on these documents were solicited from the public during a public comment period held from May 20 through June 16, 1997, and at a Public Meeting that was held on May 22, 1997. Comments received at the public meeting and during the comment period are summarized in this appendix.

**Responsiveness Summary
Record of Decision
Operable Unit 1
Naval Training Center, Orlando, Florida**

WRITTEN COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD

1. Comments from Ms. Nancy Mellon, Orlando, Florida

Comment: Does the Navy's cleanup deal include asbestos and lead paint abatement?

The cleanup identified in the Proposed Plan for OU 1 at NTC, Orlando is intended for surface soil and groundwater in the vicinity of the landfill; these media do not contain asbestos or lead-based paint.

However, when the property is transferred from the Navy to the City of Orlando, in accordance with the Department of Defense's (DOD's) asbestos policy, the Navy will abate all friable, damaged, and accessible asbestos-containing material (ACM) that may pose a threat to human health or the environment. Also, the DOD policy on lead-based paint requires compliance with the Residential Lead-Based Paint Hazard Reduction Act of 1992 and all implementing Federal, State, and local regulations regarding lead-based paint hazards.

Comment: Proposed use of site (homes, park or active recreation yard) -- who pays in event of lawsuits? Local Redevelopment Authority (LRA), city taxpayers, Navy, who?

The proposed use of the OU 1 landfill site (refer to Figure 2-5 of this Record of Decision [ROD]) is nonresidential (e.g., recreational), thus precluding the building of homes. Under Section 330 of the National Defense Authorization Act (NDAA) of 1993 (Public Law 102-484), DOD will defend the deed transferees of Base Realignment and Closure (BRAC) property (i.e., the City of Orlando) against lawsuits claiming injury from a release or threatened release of any hazardous substance or pollutant that resulted from prior DOD activities (in this case, from prior landfilling activities).

Also, under Section 120(h) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the Navy must include specific covenants in the deed of any transferred property on which there has been a release of hazardous substances to the environment, indicating (1) that all remedial actions necessary to protect public health and the environment from exposure to hazardous substances remaining on the property have been taken before the date of transfer, and (2) that any remedial action found to be necessary after the date of transfer will be conducted by the U.S. government. The covenant would place the legal obligation upon the U.S. government to take all actions necessary to ensure that any hazardous substance released to the environment and posing a threat to public health or the environment, based on the planned reuse of the property, are fully remediated in accordance with Federal and State cleanup requirements.

Although the potential for a lawsuit always exists, it is important to remember that the reuse selected for the OU 1 landfill (recreational) was selected because recreational activities could be conducted without posing a risk to human health and the environment.

Comment: Are NTC, Orlando properties immune to lawsuits such as downtown property owners filing with regard to pollution and loss of property value?

There are no provisions in Federal or State law that would legally preclude someone from bringing suit against the Navy or a future owner of BRAC property for personal injuries or property damage allegedly caused by environmental contamination on or emanating from NTC, Orlando property. However, as mentioned in the previous response, under Section 330 of NDAA, any future owner or operator of BRAC property is provided certain protections from having to defend any suit brought against them if the basis for the suit is personal injury or property damage as a result of a release or threatened release of hazardous

substances that can be attributed to DOD's prior use and/ or occupancy of the property.

Comment: What institutional controls will force deed restrictions and keep them in effect with property transfers? In other words, who enforces deed restrictions, etc.

Institutional controls are those control measures put in place to ensure adequate protection of public health and the environment for sites where, after a cleanup has occurred, at least some amount of hazardous substances would remain. Deed restrictions, by themselves, are a recognized form of institutional controls. Deed restrictions may be used independently or in addition to engineering controls (e.g., fences to restrict access) to ensure appropriate long-term site management.

As a general rule, the grantor of a deed restriction has the legal right to enforce them against any subsequent purchaser of the property. Florida State law defines other parties who may enforce deed restrictions. In many states, the State and local government work together to monitor former hazardous waste sites to ensure that institutional controls remain in place.

2. Comments from the City of Orlando, Naval Training Center, Community Redevelopment Agency, Ms. Debra A. Braga, Assistant Director/ Special Counsel, Orlando, Florida

Comment: The City of Orlando, as the Local Redevelopment Authority, is concerned about the institutional controls proposed as a part of the Record of Decision (ROD) for Operable Unit 1, the North Grinder Landfill. We are particularly concerned about the boundary for the proposed Groundwater Use Restriction Area. The boundary appears excessive, and not based on scientific data.

First, let me point out that the CRA is not opposed to the Groundwater Use Restriction Zone in concept. Since the inception of planning for NTC reuse, it has always been clear that in addition to use restrictions on the landfill itself, a buffer zone around the landfill would have to be established to ensure that any nearby residential development is at a safe distance. It is also clear that the scientific rationale for such a buffer zone rests in the potential for groundwater contamination from the landfill itself.

However, until the publication of the Proposed Plan for Operable Unit 1 on May 22, 1997, the true nature and extent of such a buffer zone were not known. Upon reviewing the Proposed Plan, it is our opinion that any Groundwater Use Restriction Area boundary included in the ROD will permanently establish the "safe distance" from the landfill required for residential development and many other potential uses of the site. The area will contain a deed restriction, which must be passed to any future home buyers, which will serve as a clear warning of the potential for landfill-related groundwater contamination. Such a deed restriction surely will render residential development infeasible within this area.

Because of the impact of this Groundwater Use Restriction Area, we believe it is critical that the boundary established in the ROD be based on clear scientific evidence of landfill-related groundwater contamination. Such evidence is not presented in the Proposed Plan for Operable Unit 1, and the Groundwater Use Restriction Area Boundary shown in Figure 2 of the plan appears to be an arbitrary rectangle. Furthermore, because the groundwater flow direction in the vicinity of the landfill is from the southwest, it seems unsupported for the boundary to extend as far south of the landfill as it does north and northeast of the landfill.

The CRA asks that the NTC environmental team re-evaluate the proposed Groundwater Use Restriction Area boundary, and present a revised boundary for public comment prior to the adoption of the ROD for Operable Unit 1. To assist in this re-evaluation, the CRA submits for your consideration Exhibit 1, which we recommend as an appropriate revised boundary. Please note that all existing and proposed monitoring wells and piezometers are included within our recommended boundary.

Thank you for this opportunity to comment on the Proposed Plan for Operable Unit 1. If I can be of any further assistance in this matter, please do not hesitate to call me at (407)246-3093.

The Proposed Plan for OU 1 indicates the necessity of implementing institutional controls at the site. Institutional controls are sometimes implemented at a site to limit human activity, thereby protecting human health and the environment and ensuring the continued effectiveness of a remedy. Examples of institutional controls include land and resource use and deed restrictions, well use advisories, and building permits. Institutional controls are particularly effective for sites in which waste is left in place upon completion of investigations. For the OU 1 landfill, the landfilled materials will be left in place upon implementation of the selected remedial actions; therefore, three institutional controls will be implemented for OU 1.

First, because landfilled materials will be left onsite at OU 1, future users of the site will be made aware that within the landfill footprint (refer to Figure 2-5) site workers must adhere to regulations for Hazardous Waste Site Workers (29 Code of Federal Regulations [CFR] Part 1910) during all excavation activities below a depth of 12 inches. In addition, a clean soil cover of at least 2 feet must be maintained over the area once excavation activities have ceased and construction activities within the landfill boundary must take into account the potential presence of buried hazardous materials.

Second, deed restrictions, containing land-use controls and groundwater use restrictions, have been developed for OU 1 to ensure that future purchasers and users of the property are provided with notice of the site conditions in and around the landfill. Several restrictive covenants will be documented for the OU 1 area in the transfer documents.

Finally, restrictions on the use of surficial aquifer groundwater at the site will be implemented because this groundwater contains some inorganic compounds and radionuclide activity levels above regulatory standards. ABB- ES has hypothesized that the mobilization of naturally occurring radionuclides is due to a change in the groundwater chemistry brought on by the enhancement of microbial activity by the landfill leachate. The leachate is transported downward by a steep downward hydraulic head differential in the southwest corner of the landfill, thereby enhancing the activity and density of the indigenous bacteria in the basal zone of the surficial aquifer. Further downgradient from the landfill, the groundwater chemistry returns to background levels as do the concentrations of groundwater parameters. Based on this information, a use restriction for this groundwater was recommended and selected for implementation at OU 1. The boundary for this area, which was depicted on Figure 2 of the Proposed Plan, was based on the following scientific evidence presented in the Remedial Investigation Report for OU 1:

- Both downgradient and upgradient groundwater samples collected in the vicinity of the OU 1 landfill contained concentrations of naturally occurring radionuclide parameters greater than regulatory standards. These radionuclides occur largely in the deep groundwater samples and are associated with the soils found there (natural conditions) and the increased biological activity in this area due to landfill leachate. It is important to note that the landfill leachate has influenced a portion of the area upgradient of the landfill, and that the groundwater use restriction boundary reflects this influence. The original groundwater use restriction boundary (depicted on Figure 2 of the Proposed Plan) was drawn to remain outside the areas influenced by landfill leachate (as can be seen from the elevated concentrations of radionuclide parameters).
- The northern groundwater use restriction boundary (downgradient of the landfill) was set at a distance further from the landfill than the southern boundary (upgradient edge) to incorporate a factor of safety for conservatism.
- The groundwater use restriction boundary was drawn so that enforcement of the restriction would be simplified. In other words, straight lines and easily assessable landmarks were used or evaluated when determining the boundary.

Upon receipt of this comment on the Proposed Plan from the City of Orlando, the Orlando Partnering Team (OPT), which includes representatives from the Navy, the U.S. Environmental Protection Agency (USEPA), and the Florida Department of Environmental Protection (FDEP), reviewed the boundary of the groundwater use restriction area. The OPT decided that the original boundary was protective of human health and the environment and was based on scientific evidence presented in the RI report for the site. However, the OPT, in considering the City's comment, developed another method to establish the groundwater use restriction boundary that would still be protective of human health and the environment.

This new method considered the radius of influence of a typical irrigation well installed in the surficial aquifer at OU 1. This radius of influence was established and multiplied by a factor of safety. Finally, the groundwater use restriction boundary was set as this distance from each monitoring well containing elevated radionuclide parameters. The one caveat to this method was that additional safety factors were used in establishing the northern boundary because this is the downgradient edge of the landfill site, and additional safety factors were considered prudent. This revised boundary is depicted on Figure 2-5 of this ROD.

VERBAL COMMENTS RECEIVED DURING THE PUBLIC MEETING

NOTE: These comments have been summarized from the record of the public meeting into concise sentences formatted as questions.

1. Comment from Mr. David Zusi, City of Winter Park, Florida

Comment: Has the Navy done an inventory of the potable public drinking water wells surrounding the site? Is there something that shows or identifies these wells?

The Navy has completed an inventory of potable water supply wells within a 4-mile radius of the Navy property. This survey was completed to conduct a Hazard Ranking System score for the base. This survey was also included in the Contamination Assessment Report for underground storage tanks located on the Main Base of NTC, Orlando.

2. Comment from Mr. Bruce Hossfield, City of Orlando, NTC Community Redevelopment Agency, Orlando, Florida

Comment: On page 8 of the Proposed Plan, the right column, third line from the bottom, should the word "parcel" read "landfill area?"

This question refers to a statement in the Proposed Plan reading: "The transfer documents for the parcel will also stipulate that future use of the land is restricted to industrial or recreational use."

The word "parcel" in this statement was not intended to indicate the entire land unit that the City of Orlando is purchasing from the Navy, but instead was used to refer to the landfill area, or OU 1, of which the landfill footprint is a smaller subset. It is important to note that the transfer documents for the purchased land unit (parcel) will include restrictions on the future use of the landfill area, referred to as OU 1.

In summary, the statement in the Proposed Plan should be interpreted to read as follows: "The transfer documents for the parcel will also stipulate that future use of the landfill area is restricted to industrial or recreational use."

Comment: Is the word "parcel," which is used in the Proposed Plan, meant to refer to the groundwater use restriction area?

The use of the word "parcel" in the Proposed Plan was not intended to indicate the entire land unit that the City of Orlando is purchasing from the Navy, but instead was used to refer to the landfill area or the groundwater use restriction area.

Institutional controls will be implemented for OU 1 at NTC, Orlando within the landfill boundary and within a groundwater use restriction area. The controls that will be implemented include the following:

- disallow the use of surficial aquifer groundwater in the landfill area for drinking or irrigation,
- limit intrusive activities under the landfill footprint, and
- restrict use of the land within the landfill boundary to nonresidential uses (e.g. , industrial or recreational uses are acceptable).

Figure 2-5 of the ROD depicts the boundaries of these areas.

In summary, it is important to note that the transfer documents for the purchased land unit will include restrictions on the future use of the landfill area and use of groundwater in the vicinity of the landfill.

Comment: Institutional controls were set to restrict the use of the land within the landfill boundary to "industrial" or "recreational" uses. What is the definition of "industrial use?"

A baseline risk assessment was completed for OU 1 and was conducted in accordance with USEPA and FDEP protocols. This assessment included an evaluation of risks based on exposure to OU 1 media by human and ecological receptors.

The human health assessment evaluated current and future uses of the landfill area, which included two exposure scenarios: residential and industrial. These exposure scenarios refer to a resident and an occupational worker, respectively, being exposed to site media. The difference between these exposure scenarios is mostly in the amount of time a receptor (i.e., either a resident or an occupational worker) is exposed to site media and other exposure related parameters (such as soil ingestion rates). Under the residential exposure scenario, a human is assumed to inhabit the site for 30 years at 350 days/year and 24 hours/ day. Under the industrial exposure scenario, an occupational worker is assumed to work at the site for 25 years at 250 days/year, and 8 hours/day. It is assumed that the risks predicted based on exposure via other uses of the OU 1 property, such as commercial or light industrial, are the same as those evaluated for the occupational worker.

For OU 1, risks predicted under the residential exposure scenario were found to be within the acceptable USEPA risk range, but exceeded the allowable FDEP risk threshold. Risk predicted under the industrial exposure scenario were acceptable to both the USEPA and FDEP. The risk associated with a recreational use scenario at OU 1 would be even lower than the occupational use scenario, as the exposure time for recreational receptors is less.

For these reasons, the Navy will be restricting residential use of the landfill area; thus, the use of the landfill area is limited to nonresidential purposes. In other words, any use other than residential would be acceptable.

Comment: The Community Redevelopment Agency of the City of Orlando would like information regarding the establishment of the groundwater use restriction boundary shown in the Proposed Plan. Was this boundary determined based on good, solid, scientific evidence? The boundary drawn seems to be arbitrary, and drawn on a map for no particular reason. The City would like the Navy to go back, look at real data, and determine a boundary that is based on good science; this boundary would be used to establish residential areas on this property.

Refer to response to written comments received from the City of Orlando.