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FINAL WORK PLAN FOR GROUNDWATER SAMPLING REVISION 6 AT STUDY AREA 52
WITH TRANSMITTAL LETTER NTC ORLANDO FL
4/23/2004
TETRA TECH

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0404-A008

April 23, 2004

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. 0332

Subject: Work Plan for Groundwater Sampling, Rev. 6
Naval Training Center, Orlando, Florida

Dear Ms. Nwokike:

Enclosed is the Final Work Plan for groundwater sampling at OU3 (treatability study wells) and SA 52 in hardcopy and CD formats.

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

Sincerely,

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

SBM:ckf

Enclosure

c: Ms. Barbara Nwokike, Southern Division (Orlando Office)
Ms. Hope Wilson, 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. 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 (hardcopy and CD)
Ms. Debbie Wroblewski, Tetra Tech NUS (cover letter only)
File/db

Rev. 6
04/23/04

Work Plan
for
Groundwater Sampling

Naval Training Center
Orlando, Florida

Southern Division
Naval Facilities Engineering Command
Contract Number N62467-94-D-0888
Contract Task Orders 0281 and 0332

April 2004

WORK PLAN
FOR
GROUNDWATER SAMPLING

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

Submitted to:

Department of the Navy, Southern Division
Naval Facilities Engineering Command
2155 Eagle Drive
North Charleston, South Carolina 29406

Submitted by:

Tetra Tech NUS
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CONTRACT NO. N62467-94-D-0888
CONTRACT TASK ORDERS 0281 and 0332

APRIL 2004

PREPARED UNDER THE SUPERVISION OF:

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PROFESSIONAL GEOLOGIST CERTIFICATION

I hereby certify that this document, *Work Plan for Groundwater Sampling, Naval Training Center, Orlando, Florida,* was prepared under my direct supervision in accordance with acceptable standards of geological practice.

Allan T. Jenkins 4/21/04

Allan T. Jenkins, P.G. / Date
License No. PG-0000663

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FIGURES

ACRONYMS

ABB-ES	ABB Environmental Services, Inc.
AMSL	above mean sea level
bgs	below ground surface
BGSV	Background Screening Value
BRAC	Base Realignment and Closure
CLEAN	Comprehensive Long-Term Environmental Action Navy
CLP	Contract Laboratory Program
DO	dissolved oxygen
DOC	dissolved organic carbon
DQO	Data Quality Objective
FDEP	Florida Department of Environmental Protection
GCTL	Groundwater Cleanup Target Level
HLA	Harding Lawson Associates
IDW	investigation-derived waste
IRA	Interim Removal Action
MCL	Maximum Contaminant Level
MS	matrix spike
MSD	matrix spike duplicate
NA	natural attenuation
NFESC	Naval Facilities Engineering Service Center
NTC	Naval Training Center
NTU	Nephelometric Turbidity Unit
OPT	Orlando Partnering Team
OU	Operable Unit
PAB	Permeable Adsorptive Barrier
PAH	polynuclear aromatic hydrocarbon
PE	polyethylene
PID	photoionization detector
POP	Project Operations Plan
PP	polypropylene
QA	quality assurance
QC	quality control
SA	Study Area
SCTL	Soil Cleanup Target Level
SOP	Standard Operating Procedure
SS	stainless steel
SVOC	semivolatile organic compound
TAL	Target Analyte List
TCL	Target Compound List
TOC	top of casing
USEPA	U. S. Environmental Protection Agency
VOC	volatile organic compound

1.0 INTRODUCTION

1.1 PURPOSE

The Naval Training Center (NTC) located in Orlando, Florida, consists of four areas (the Main Base, Area C, Herndon Annex, and McCoy Annex) as shown in Figure 1-1. The NTC ceased operations in April 1999 as prescribed by the Defense Base Realignment and Closure (BRAC) Act of 1990. As part of the closure process, the Navy initiated a program to identify and remediate environmental contamination at NTC. To ensure that all consultants planned and executed their field activities in a manner consistent with Southern Division, Naval Facilities Engineering Command, and regulatory requirements, the *Project Operations Plan for Site Investigations and Remedial Investigations* [POP] (ABB-ES, 1997) was prepared and implemented.

In the environmental program, certain Study Areas (SAs) and Operable Units (OUs) may require periodic sampling of groundwater until contaminant concentrations decrease below specified levels. This document presents the technical approach for performing the sampling with general requirements and procedures specified in the body of the plan. Site-specific information (site background, wells to be sampled, well construction details, sampling frequency, etc.) is provided in the Appendices. Unless otherwise specified herein, all work will be performed in accordance with the requirements and guidance of the POP.

1.2 HEALTH AND SAFETY

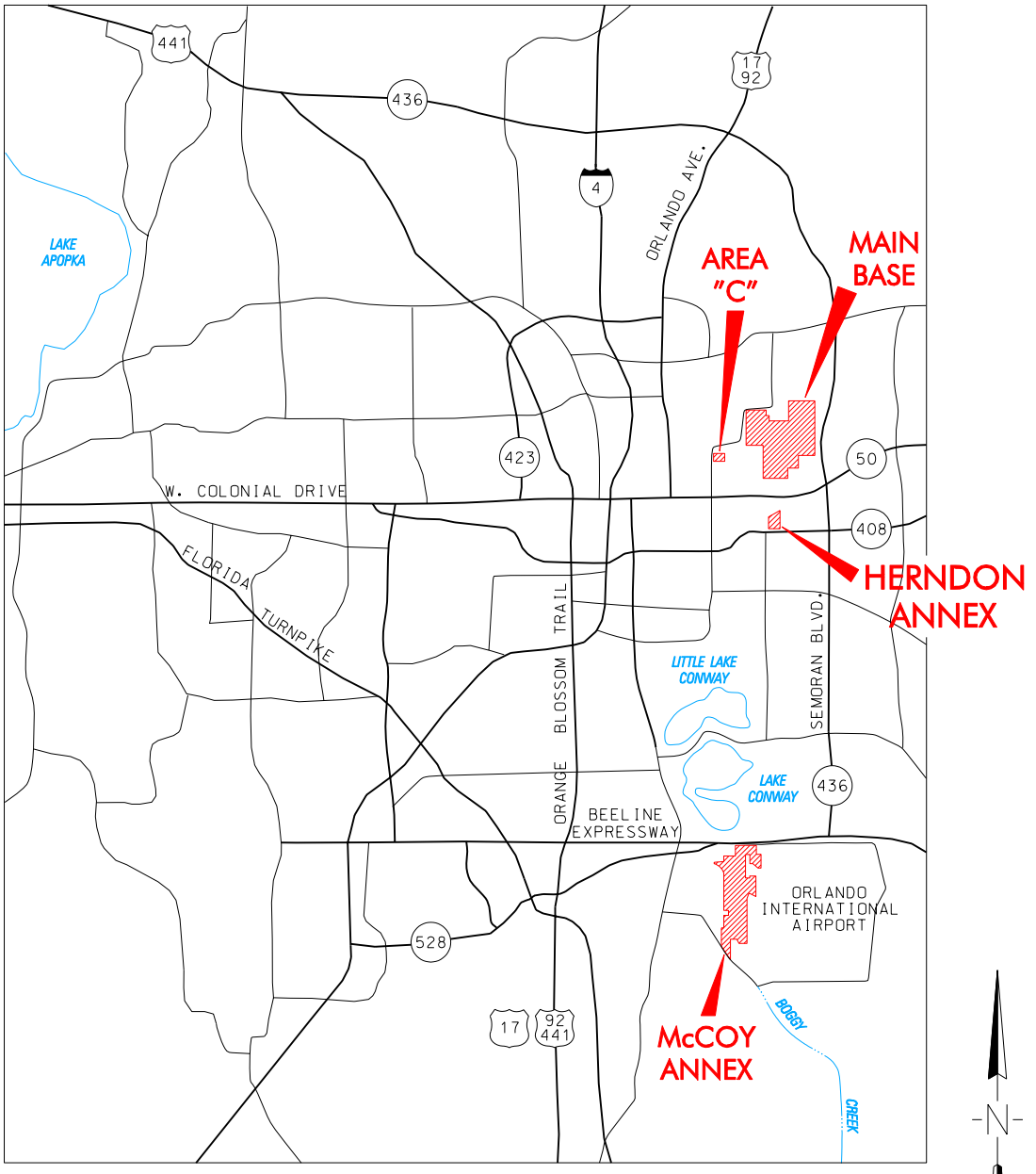
Health and safety aspects of Tetra Tech NUS' work at NTC, Orlando are controlled in accordance with the *Health and Safety Plan for Performing Investigative Work and Sampling, Rev. 5* (Tetra Tech NUS, Inc., 2004).

1.3 PROJECT GUIDANCE

The investigation methods and procedures used to complete the scope of work proposed in this work plan will follow the POP (ABB-ES, 1997). Where appropriate, methods and procedures specified in the POP will be superceded by the more recently published guidance documents listed below:

- Florida Department of Environmental Protection, *DEP Standard Operating Procedures for Laboratory Operations and Sample Collection Activities, DEP QA-001/01*, January 2002.
- U.S. Environmental Protection Agency, Region IV, *Environmental Investigations, Standard Operating Procedures and Quality Assurance Manual*, November 2001.

CAD FILE NO./DATE: P:\Oak Ridge Drafting\NTC Orlando\sa2-053.dgn 02-23-04 JFF



DRAWN BY JFF DATE 02-23-04		SITE VICINITY MAP MAIN BASE, McCOY ANNEX, HERNDON ANNEX AND AREA C NAVAL TRAINING CENTER ORLANDO, FLORIDA	CONTRACT NO. N62467-94-D-0888
CHECKED BY TKG DATE 02-23-04			OWNER NO. N4443
REVISED BY --- DATE ---			APPROVED BY --- DATE ---
SCALE AS NOTED			DRAWING NO. FIGURE 1-1 REV. 0

2.0 PURGING AND SAMPLING

The following describes the purging and sampling procedures typically implemented for groundwater sampling at NTC Orlando. Any alternative procedures will be in accordance with the most recent Florida Department of Environmental Protection (FDEP) and United States Environmental Protection (USEPA) Standard Operating Procedures.

2.1 WATER LEVEL MEASUREMENTS

Prior to groundwater sampling a comprehensive synoptic round of water levels will be collected at each site. Well caps will be removed at least one half-hour before the first round of water levels are measured. A photoionization detector (PID) will be used to screen for volatile organic compounds (VOCs) immediately after well cap removal. A second round of water levels will be collected approximately one half-hour after the initial round. If the difference in water levels is greater than 0.05 foot, measurements will continue to be made every half-hour until the water level stabilizes, or for a maximum of four consecutive measurements.

2.2 TUBING REQUIREMENTS

The monitoring wells at NTC will be purged and sampled using micro-flow techniques to minimize the volume of groundwater that must be containerized, managed, and disposed. In-line flow-through cells and portable field meters will be used for real-time parameter monitoring during purging. Typically, tubing will be used with peristaltic pumps to withdraw water from the well. All tubing will be new and dedicated to one sample location. The tubing will be pre-cut to the appropriate length at an off-site location in a clean, controlled environment. The tubing will be transported to the site in new, untreated plastic bags. If the tubing is not certified clean by the supplier/vendor, then an equipment rinseate blank will be collected for each batch of tubing and submitted for analytes of interest analysis. Tubing will disposed after each use.

Polyethylene (PE), polypropylene (PP), Teflon®, or Teflon®-lined tubing can be used to purge and to collect samples for volatile and extractable organics, metals, and all other water chemistry analyses. These tubing types may also be used in the peristaltic pump head if flexible-wall varieties are available. The exceptions listed below must be followed:

Flexible, medical-grade silicon tubing may be used in a peristaltic pump head only for the collection of samples for metals and non-metallic inorganics [e.g., ions and dissolved organic carbon (DOC)] analyses.

If PE, PP, Teflon®, or Teflon®-lined tubing is not used in the peristaltic pump head, then samples for extractable organic analyses must be collected using a vacuum trap method (see FDEP SOP FS 2221 and Figure FS 2200-1). All equipment that contacts the groundwater before the sample container must be constructed of Teflon®, PE, PP, stainless steel (SS), or glass, including the interior of the container cap and all fittings. (Rubber cannot be used).

2.3 PURGING PROCEDURES

Prior to the initiation of purging, the following tasks will be completed:

- All down-hole equipment will be properly decontaminated.
- An equipment blank will be collected for each lot of new tubing (if it is not certified clean) used during the purging/sampling event.
- Purge/sample tubing will be precut at an off-site clean location, bagged, and transported to the sample location.
- New, clean, plastic sheeting will be placed on the ground surface around the well head to help prevent contamination of the well or sampling equipment.
- The water level in the well will be measured and recorded.
- If undocumented, the total well depth will be measured and recorded.
- The well volume will be calculated and recorded.
- The combined volume of the tubing, pump, and flow-through cell (if used) will be calculated and recorded.

The steps listed below are to be followed for the purging procedure.

1. The discharge tubing will be lowered into the well as slowly as possible to minimize disturbance to the water in the well.
2. The end of the tubing will be positioned at the midpoint of the saturated screen length. The end of the tubing will be kept at least 2 feet above the bottom of the well to minimize mobilization of any particulates present (where practical).
3. The water level will be measured and recorded before starting the pump.

4. Purging will begin with the pump at the lowest setting and will slowly increase until discharge occurs.

5. The water level will be checked again and the pump speed adjusted to balance the pump rate with the well yield to prevent drawdown. Drawdown should be less than 0.3 foot unless site conditions warrant a change. The water level and pumping rate will be monitored, adjusted (if needed), and recorded every 3 to 5 minutes (or as appropriate) during purging.

   Note: Adjustments are best made during the first 15 minutes of pumping to minimize purging time. During pump start-up, drawdown in excess of 0.3 foot may occur, but then the well may recover as pump rate adjustments are made. Unless site conditions warrant a change, purging will proceed at a rate of approximately 100 mL/min. Note that during the early phase of purging, emphasis will be placed on minimizing and stabilizing pumping stress and recording those adjustments.

6. After water level stabilization: for submerged well screens, purge one combined volume of the tubing/pump/flow cell prior to recording field parameters; for partially submerged well screens, purge one well volume prior to recording field parameters. Subsequently, field parameters will be monitored and recorded every 3 to 5 minutes (or longer if appropriate) until stabilization.

7. Purging will be considered complete when three consecutive measurements meet all criteria in the following table.

Parameter	**Unit**	**Limit**
Temperature	Degrees Celsius (°C)	± 0.2 °C
Specific Conductance	Micro-siemens/centimeter (μs/cm)	± 5%
pH	Standard Unit (SU)	± 0.2
Dissolved Oxygen (DO)	Milligrams per liter (mg/L)	≤ 20% of saturation at field temp. (FDEP Table FS2200-2)[a]
Turbidity	Nephelometric Turbidity Unit (NTU)	≤ 20 NTU[b]

[a] Alternatively (when DO is > 20% of saturation), if DO ≤ 2 mg/L, then ± 0.2 mg/L; if DO > 2 mg/L, then ± 10%

[b] Alternatively (when turbidity is > 20 NTUs), if turbidity ≤ 50 NTUs, then ± 5 NTUs; if turbidity > 50 NTUs, then ± 10%

8. If any of the purging completion criteria in the above table are not met, but have become asymptotic for 60 minutes, consult with project leader to determine when/if sample should be collected.

9. For a well with a submerged well screen, purge at least three volumes of the combined tubing/pump/flow cell volume prior to sample collection.

2.4 MONITORING WELL SAMPLING PROCEDURES

When purging is complete, sample collection will be conducted using the same tubing and peristaltic pump that was used to purge the well. The flow-through cell will be disconnected, and sample bottles will be filled. The following tasks will be performed when collecting groundwater samples from all wells.

- Fresh gloves will be worn for each sample collected.
- A fresh, clean plastic sheet will be placed on the ground around the well head.
- All samples will be immediately preserved as necessary according to the analytical method requirements.
- Sample containers will be immediately labeled and placed on wet ice in a cooler that has been thoroughly washed prior to use; a clean, untreated plastic bag will be used to line the cooler.
- The sample log form will be completed, and the event will be recorded in the field logbook.

Samples for TCL VOCs will be collected using the tube evacuation method (ABB-ES, 1997). SVOC, PAH, pesticide, and herbicide samples will be collected using the vacuum jug assembly method (ABB-ES, 1997). Samples for TAL metals will be collected from the pump discharge tubing. Detailed analyte-specific instructions follow.

Target Compound List (TCL) VOCs

When purging is complete, the samples will be collected using the tube evacuation method (ABB-ES, 1997), as follows:

- Fresh gloves will be donned by the sampler.
- The peristaltic pump will be stopped, the tubing will be disconnected prior to the pump head, and a gloved finger will be placed over the end of the tubing to trap the water.
- The tubing will be gently lifted out of the well ensuring that the open, bottom end of the tubing does not become contaminated outside the well.
- The water trapped in the tubing will be released and allowed to slowly flow into the clean, preserved sample container provided by the laboratory.

Extractable Organics [Semivolatile Organic Compounds (SVOCs), Polynuclear Aromatic Hydrocarbons (PAHs), Herbicides, And Pesticides]

Sampling will be conducted when purging is complete using the same tubing and peristaltic pump used during purging. If flexible-wall PE, PP, Teflon®, or Teflon®-lined tubing is used in the pump head, the samples will be collected as follows:

- Fresh gloves will be donned by the sampler.
- The sample containers will be filled directly from the pump discharge tubing.

If Silicone® or silastic tubing is used in the pump head, the samples will be collected using the vacuum trap method (FDEP, 2002), as follows:

- Fresh gloves will be donned by the sampler.
- The peristaltic pump will be stopped and a 1-liter amber glass sample bottle equipped with a Teflon® transfer assembly will be connected to the inflow tubing between the well and the pump.
- When sufficient vacuum is generated in the bottle, the bottle will fill.
- A new transfer assembly will be used at each well.

Dissolved Metals and DOC

Sampling will be conducted using the same tubing and peristaltic pump that was used to purge the well. The samples will be collected as follows:

- Fresh gloves will be donned by the sampler.
- The samples will be filtered using a new, disposable 45-μm, in-line filter. The filter will be attached to the pump discharge line and the sample container filled directly from the filtered discharge.

Target Analyte List (TAL) Metals and Ions

Sampling will be conducted using the same tubing and peristaltic pump that was used to purge the well. The samples will be collected as follows:

- Fresh gloves will be donned by the sampler.
- The sample container will be filled directly from the pump discharge tubing.

The analytical laboratory, specific analyses, methods, bottle requirements, and preservatives for groundwater sampling will be provided in the Field Instruction to be prepared for each field event.

2.4.1 Sample Numbering

The monitoring well samples will be numbered as follows:

NTC52*TWWWRR*

where: NTC = Naval Training Center
52 = two-digit SA designation (52); for OUs the designation will be “U” plus the OU number (e.g., U3 for OU3)
T = sample type (“G” for groundwater, “D” for duplicate)
WWW = well location and screen depth designation (e.g., 17C) (Note: screen depth indicator may not be applicable at some sites)
RR = sampling round number (e.g., 10)

For example, the groundwater sample collected from well OLD-52-13 at SA 52 during sampling round 10 will be designated NTC52G1310. Samples for field duplicates will be identified with a "blind" number (e.g., NTC52D1000). The corresponding environmental sample will be noted in the field logbook. The Task Order Manager will identify the appropriate round number.

2.4.2 Quality Control (QC) Samples

QC samples will be collected at the frequencies listed below.

- One field duplicate per 10 environmental samples.
- One trip blank per cooler containing samples for VOC analysis.
- One matrix spike/matrix spike duplicate (MS/MSD) per 20 environmental samples.
- One equipment blank per lot of new, disposable tubing.

"MS/MSD" will be added to the sample number for the selected location on the labels and the chain of custody. New sample numbers will not be created for these samples. MS/MSD samples will be collected in the field by the Field Operations Leader and will require 3X sample volume for each set (1X for environmental sample, 1X for MS sample, and 1X for MSD sample).

If any nondisposable sampling equipment is used and decontaminated, the additional QC samples listed below will be collected.

- One rinseate blank per 10 environmental samples.
- One field blank from each water source used for decontamination.

2.4.3 Sample Shipping

Environmental samples (and associated QC samples) will be shipped via overnight courier on a daily basis to the subcontract fixed-base laboratory. The shipping address and contact information will be provided in the Field Instruction to be prepared for each field event. A label identifying the contents as "environmental samples" will be affixed to each cooler prior to reception by the courier.

3.0 DECONTAMINATION

Decontamination of any nondedicated sampling equipment used will be performed in accordance with procedures specified in FDEP SOP 001-02 (January 2002) unless otherwise specified herein. Cleaning will be performed under controlled conditions (i.e., cleaning on site is not recommended, but may follow criteria specified in the FDEP SOPs). Because dedicated PE, PP, Teflon®, or Teflon®-lined tubing will be used for purging and sampling the wells, little or no routine decontamination is anticipated.

If redevelopment is required for problematic monitoring wells, or if deep or large capacity wells are purged and sampled, centrifugal pumps may be used downhole. The pump body and internal mechanisms, including seals and connections, must comply with FDEP SOPs (January 2002) Tables FS 1000-1, 1000-2, and 1000-3 (i.e., must be Teflon® and/or SS construction). All downhole pumps used for development, purging, or sampling will be decontaminated using the following steps:

1. Rinse pump in hot tap water.
2. Soak pump in hot, sudsy water solution (Liqui-Nox® or equivalent).
3. Scrub exterior to remove particulate matter or surface film.
4. Rinse thoroughly with hot tap water.
5. Rinse with isopropanol.
6. Rinse with analyte-free water.
7. Allow to completely air dry; wrap in aluminum foil and seal until used.

Note: Ambient temperature water may be substituted for hot water if unavailable.

All other sampling tools and miscellaneous sampling equipment will be decontaminated using the following steps:

1. Wash with potable water and Alconox®.
2. Rinse thoroughly with potable water.
3. Rinse with deionized water or analyte-free water.
4. Rinse with isopropanol.
5. Rinse with analyte-free water and air dry.
6. Wrap with aluminum foil.

Note: The isoproponal rinse may be omitted for delicate equipment such as meter bodies, probes, or cables. If plastic sampling equipment is to be cleaned, substitute appropriate acid solution for isopropanol (see FDEP SOP FC1001).

4.0 DATA QUALITY

4.1 DATA QUALITY OBJECTIVES (DQOs)

DQOs are qualitative or quantitative statements developed by the data user to specify the quality of data needed from a particular data activity to support specific decisions. The DQOs are the starting point in the design of an investigation. The DQO development process matches sampling and analytical capabilities to the data targeted for specific uses and ensures that the quality of the data satisfies project requirements.

The DQOs for laboratory analyses will be characterized by rigorous quality assurance (QA)/QC protocols and documentation, providing technically defensible analytical data. The intended uses of the data are to monitor the concentrations of contaminants and to evaluate general water quality.

Field test kits will be used to generate qualitative data for the evaluation of the aquifer. Analyses for dissolved oxygen, carbon dioxide, ferrous iron, and sulfides will typically be conducted in the field using one of several commercially available test kits. The results from the field test kits are semi-quantitative and are not considered definitive. These data are not used for defining plumes or for risk assessment. The field test kit data are supportive in nature and are used to demonstrate trends and spatial variation of the geochemical environment in the area of the plume.

The hydrogeologic and analytical data collected will be used to evaluate groundwater migration, flow gradients, and geochemistry to determine if exposure potential from contaminant plumes exists and to predict if contaminant migration will occur in the future.

4.2 DATA VALIDATION

The approach to providing reliable data that meet the DQOs will include QA/QC requirements for each of the VOC and inorganic analytical data types generated during the field investigation. The QA/QC efforts for laboratory analyses will include collection and submittal of QC samples and the assessment and validation of data from the subcontract laboratory.

Data quality indicators include the precision, accuracy, representativeness, comparability, and completeness parameters. These parameters will be used within the data validation process to evaluate data quality. The data will be validated in accordance with the USEPA Contract Laboratory Program (CLP) guidelines for inorganic and organic data review (USEPA, 2002 and 1999) and the Naval Facilities

Engineering Service Center (NFESC) guidelines contained in *Navy Installation Restoration Chemical Data Quality Manual* (NFESC, 1999).

Limited data validation will be performed on all laboratory data and will evaluate data completeness, holding time compliance, calibration compliance, laboratory blank contamination, and detection limits. This type of validation will be performed primarily to eliminate false positives and false negatives. No validation will be performed for field test kit data.

5.0 INVESTIGATION-DERIVED WASTE (IDW) MANAGEMENT

Decontamination fluids, well development water, and purge water will be temporarily stored in a tank or drums. Fluids will be sampled, analyzed, and disposed of by a licensed waste hauler following completion of monitoring well sampling at the site. Each drum will be clearly marked with the following information or as otherwise directed by the base contact:

- Company name (Tetra Tech NUS).
- Base contact (Barbara Nwokike) and phone number (843-820-5566 or 407-895-6714).
- Identification number (TtNUS-SSS-XXX), where SSS is the site identifier (e.g., SA 52 or OU 3) and XXX is the well number (e.g., 13C).
- Material contained in the drum (e.g., purge water).
- Date the IDW was produced.
- Site.

Miscellaneous sampling material (e.g., gloves, tubing, and plastic) will be disposed of in approved dumpsters located in Area C near Building 1056 on Seabee Street.

6.0 LOGBOOKS AND FORMS

The site logbook is a hard-bound, with pre-printed pages, controlled-distribution record book in which all major on-site activities are documented. The following information will be recorded in the site logbook in real time on a daily basis:

- Study Area, Operable Unit, or tank site.
- All field personnel present.
- Arrival/departure of site visitors.
- Arrival/departure of major equipment.
- Start/completion of sampling event.
- Weather conditions.
- Health and safety issues including daily safety meetings.
- Problems encountered.
- Deviations from standard operating procedures and documentation explaining rationale.
- Record of pertinent phone calls.
- Sampling information including sample number, date and time of collection, analyses to be performed, and the chain-of-custody number.
- Documentation of decontamination activities.
- Documentation of sample storage and shipping information, including all sample numbers and the shipper's airbill number used for each shipment.
- IDW information (location where IDW originated, material in the drums, date produced, and location where drums were left).
- Signature and date at the completion of daily entries.

All pertinent information gathered during the sampling activities -- including water level surveys, purging, and sampling -- will be written in detail on water level survey logs and purging/sampling logs. In addition

to the general entries placed into the logbook, detailed entries will be made on the sampling forms and will include (at a minimum) those items listed below:

Groundwater

- Date of purging/sampling.
- Personnel performing the purging/sampling.
- PID reading at top of casing (TOC).
- Groundwater elevation measurements (depths below TOC) prior to placing the tubing in the well and again prior to pump startup.
- Time, water level, and flow rate during purging (at 3- to 5-minute intervals, or as appropriate).
- Time and values of field parameters during purging (at 3- to 5-minute intervals after drawdown stabilization, or as appropriate).
- Estimated volume of purge water, time, sample number, and all analytical parameters during sampling.
- Duplicate sample number.

7.0 CONTACTS

The following personnel are approved contacts for their respective project areas.

Project Area	Responsible Personnel	Phone Number
Base Contact	Barbara Nwokike	843-820-5566 or 407-895-6714
Task Order Management	Steven McCoy	865-220-4730
Technical Issues	Allan Jenkins	865-220-4724
Health & Safety	Matt Soltis	412-921-8912
Procurement	Sandy D'Alessandris	412-921-8435
Laboratory Services	(a)	(a)
Analytical Issues	Joe Samchuck	412-921-8510

(a) To be provided in the Field Instruction for each field event.

REFERENCES

ABB-ES (ABB Environmental Services, Inc.), 1997. *Project Operations Plan for Site Investigations and Remedial Investigations.* Naval Training Center, Orlando, Florida, August.

FDEP (Florida Department of Environmental Protection), 2002. *FDEP Standard Operating Procedures for Laboratory Operations and Sample Collection Activities*, January.

NFESC (Naval Facilities Engineering Service Center), 1999. *Navy Installation Restoration Chemical Data Quality Manual*, September.

Tetra Tech NUS, Inc., 2004. *Health and Safety Plan for Performing Investigative Work and Sampling*, Rev. 5, March.

USEPA (U.S. Environmental Protection Agency), 1999. *USEPA Contract Laboratory Program: National Functional Guidelines for Organic Data Review.* EPA/540/R-99/008, Office of Solid Waste and Emergency Response, Washington, D.C., October.

USEPA, 2001. *Environmental Investigations, Standard Operating Procedures and Quality Assurance Manual* including 1997 revisions. Region IV. November.

USEPA, 2002. *USEPA Contract Laboratory Program: National Functional Guidelines for Inorganic Data Review.* EPA 540-R-01-008, Office of Emergency and Remedial Response, Washington, D.C., July.

APPENDIX A

OPERABLE UNIT 3
MAIN BASE

OPERABLE UNIT 3

MAIN BASE, NTC, ORLANDO

1.0 INTRODUCTION

1.1 SITE DESCRIPTION

Operable Unit (OU) 3 consists of Study Areas (SAs) 8 and 9, which are both former pesticide handling areas. These areas are located in the southeast corner of the Naval Training Center (NTC) Main Base, between Lake Baldwin and the former golf course (Figure A-1). SA 8, the former Golf Course Greens Keeper's Storage Area, has not been used for chemical storage since June 1998. It is located at the end of Trident Lane, and until recently consisted of several small storage buildings within a fenced area. Pesticides and herbicides, along with equipment used to maintain the golf course, were stored in this area for 20 to 30 years (HLA, 2000).

SA 9, the former Pesticide Handling and Storage Area, was the primary pesticide handling facility for the Main Base in the late 1960s and early 1970s. Pesticide mixing reportedly did not occur at this location after 1972, although chemicals may have been stored there up until the buildings were demolished in 1981. This area is located adjacent to Trident Lane, south and west of SA 8. All structures have been removed from both SAs 8 and 9.

1.2 BACKGROUND

Arsenic-contaminated soil has been excavated and replaced with clean fill. No further action is anticipated for soil. A treatability study was performed for OU3 to investigate the use of activated alumina to remove arsenic from groundwater in situ through Permeable Adsorptive Barriers (PABs). Installation of the PABs took place during the week of April 1, 2002.

Figures A-2 and A-3 show the potentiometric surface contours during the March 2003 sampling event. Figures A-4 and A-5 show arsenic concentrations in groundwater in March 2003.

1.3 OBJECTIVES

The objective of this groundwater monitoring only event is to:

- Sample selected monitoring wells based on proximity to the Permeable Adsorptive Barriers to evaluate the effectiveness of the treatability study.

2.0 GROUNDWATER SAMPLING

Field measurements and laboratory analyses will be conducted to evaluate groundwater flow through the permeable adsorptive barrier and the removal of arsenic from the groundwater. Groundwater samples will be obtained from the 10 wells at SA 8 and 11 wells at SA 9 that are associated with the PAB treatability study for four quarterly events. These samples will be analyzed for arsenic and common anions that may interfere with barrier performance.

The ongoing quarterly monitoring for OU 3 (being sampled by a separate contractor) will coincide with the treatability study sampling. The samples will be collected and analyzed in accordance with USEPA Level IV Data Quality Objectives (DQOs).

The wells to be sampled and analyses to be performed are presented in Table A-1. Table A-2 provides information on the well installation. The well locations are shown on Figures A-2 and A-3, and the contaminants of concern and cleanup criteria are listed below.

Contaminant of Concern	Cleanup Target Level	Criteria Type
2,4-Dichlorophenol	0.5 µg/L	GCTL
Aldrin	0.005 µg/L	GCTL
alpha-Hexachlorocyclohexane (a-BHC)	0.006 µg/L	GCTL
Arsenic	50 µg/L	GCTL
beta-Hexachlorocyclohexane (b-BHC)	0.02 µg/L	GCTL
gamma-Hexachlorocyclohexane (Lindane)	0.2 µg/L	GCTL
Iron	1227 µg/L	BGSV
Manganese	50 µg/L	GCTL
Naphthalene	20 µg/L	GCTL

BGSV – Background Screening Value
GCTL - Groundwater Cleanup Target Level

3.0 REFERENCES

FDEP (Florida Department of Environmental Protection), 1999. *Development of Soil Cleanup Target Levels* for Chapter 62-777, F.A.C., May.

HLA (Harding Lawson Associates), 1999. *Remedial Investigation and Feasibility Study, Operable Unit 3*, Naval Training Center, Orlando, Florida, Unit Identification Code N65928, Contract No. N62467-89-D-0317/136, June.

HLA, 2000. *Interim Record of Decision, Operable Unit 3*, Naval Training Center, Orlando, Florida, April.

TABLE A-1

**SELECTION OF WELLS AND ANALYTICAL PARAMETERS
OPERABLE UNIT 3, STUDY AREA 8 AND STUDY AREA 9**

**NAVAL TRAINING CENTER
ORLANDO, FLORIDA**

Well	Analytical Parameters	Rationale
OLD-08-22	arsenic, anions [(a)]	lateral extent well
OLD-08-23	arsenic, anions [(a)]	lateral extent well
OLD-08-24	arsenic, anions [(a)]	downgradient deep well
OLD-08-25	arsenic, anions [(a)]	upgradient deep well
OLD-08-26	arsenic, anions [(a)]	downgradient well
OLD-08-27	arsenic, anions [(a)]	within PAB
OLD-08-28	arsenic, anions [(a)]	upgradient well
OLD-08-29	arsenic, anions [(a)]	downgradient well
OLD-08-30	arsenic, anions [(a)]	within PAB
OLD-08-31	arsenic, anions [(a)]	upgradient well
OLD-09-20	arsenic, anions [(a)]	lateral extent well
OLD-09-21	arsenic, anions [(a)]	downgradient well
OLD-09-22	arsenic, anions [(a)]	within PAB
OLD-09-23	arsenic, anions [(a)]	upgradient well
OLD-09-24	arsenic, anions [(a)]	downgradient well
OLD-09-25	arsenic, anions [(a)]	downgradient deep well
OLD-09-26	arsenic, anions [(a)]	within PAB
OLD-09-27	arsenic, anions [(a)]	upgradient deep well
OLD-09-28	arsenic, anions [(a)]	upgradient well
OLD-09-29	arsenic, anions [(a)]	lateral extent well
OLD-09-30	arsenic, anions [(a)]	lateral extent well

[(a)] anions include chloride, sulfate, nitrate, and phosphate
PAB - Permeable Adsorptive Barrier

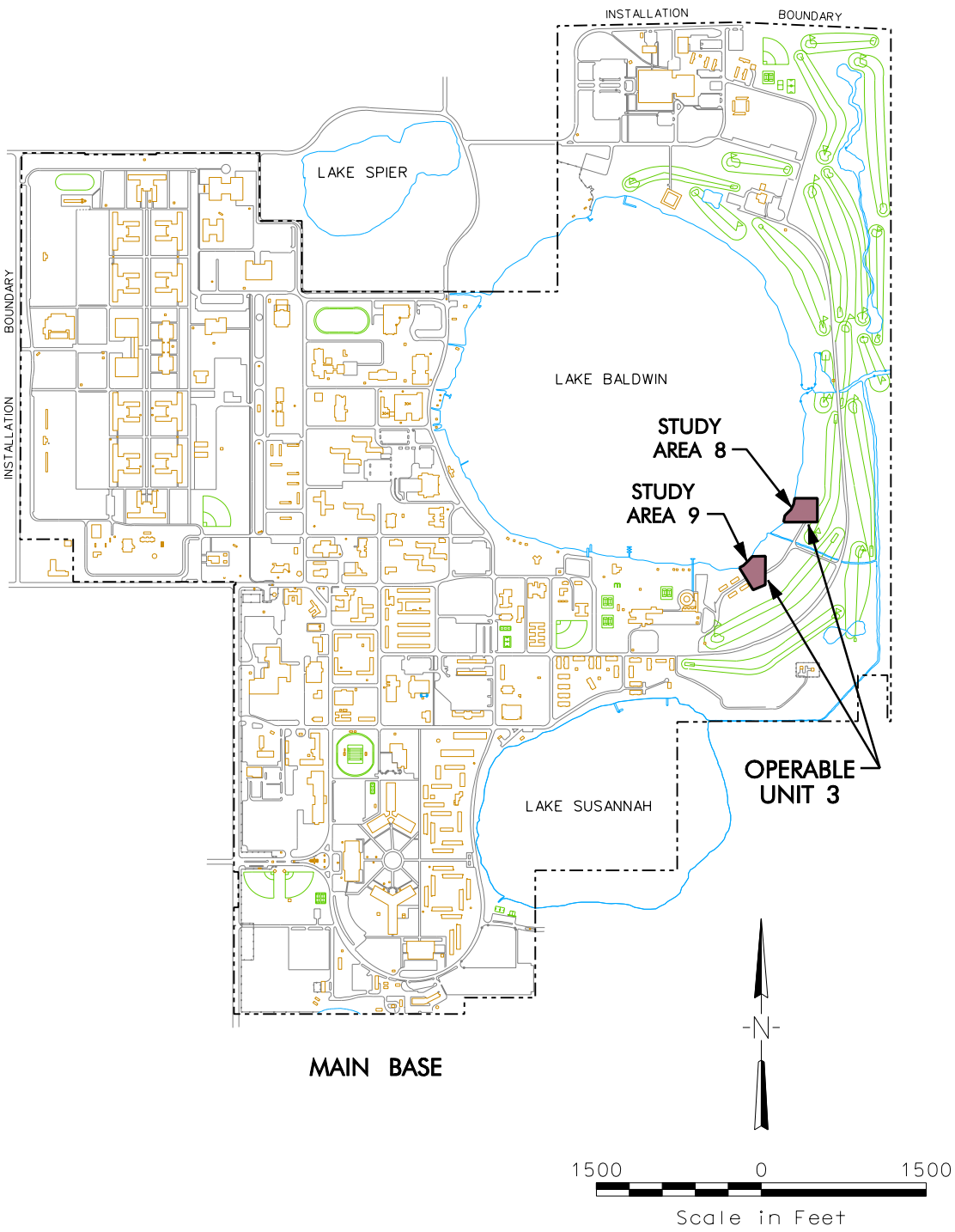
TABLE A-2

WELL CONSTRUCTION DETAILS
OPERABLE UNIT 3, STUDY AREA 8 AND STUDY AREA 9

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

Well	Well Diameter (inches)	Screen Interval (ft BGS)	Date Installed	TOC Elevation (ft AMSL)
OLD-08-22	1	7-12	04/08/02	93.61
OLD-08-23	1	7-12	04/08/02	91.88
OLD-08-24	1	26-31	04/09/02	92.80
OLD-08-25	1	26-31	04/09/02	92.92
OLD-08-26	1	8-13	04/09/02	92.93
OLD-08-27	2	8-13	04/09/02	92.84
OLD-08-28	1	8-13	04/09/02	92.91
OLD-08-29	1	8-13	04/09/02	92.73
OLD-08-30	2	8-13	04/09/02	92.68
OLD-08-31	1	8-13	04/09/02	92.70
OLD-09-20	1	7-12	04/08/02	92.88
OLD-09-21	1	8-13	04/08/02	93.03
OLD-09-22	2	8-13	04/08/02	93.08
OLD-09-23	1	8-13	04/08/02	92.95
OLD-09-24	1	8-13	04/08/02	92.86
OLD-09-25	1	26-31	04/08/02	93.32
OLD-09-26	2	8-13	04/08/02	93.08
OLD-09-27	1	26-31	04/08/02	93.22
OLD-09-28	1	8-13	04/08/02	93.08
OLD-09-29	1	7-12	04/08/02	93.42
OLD-09-30	1	7-12	04/09/02	93.08

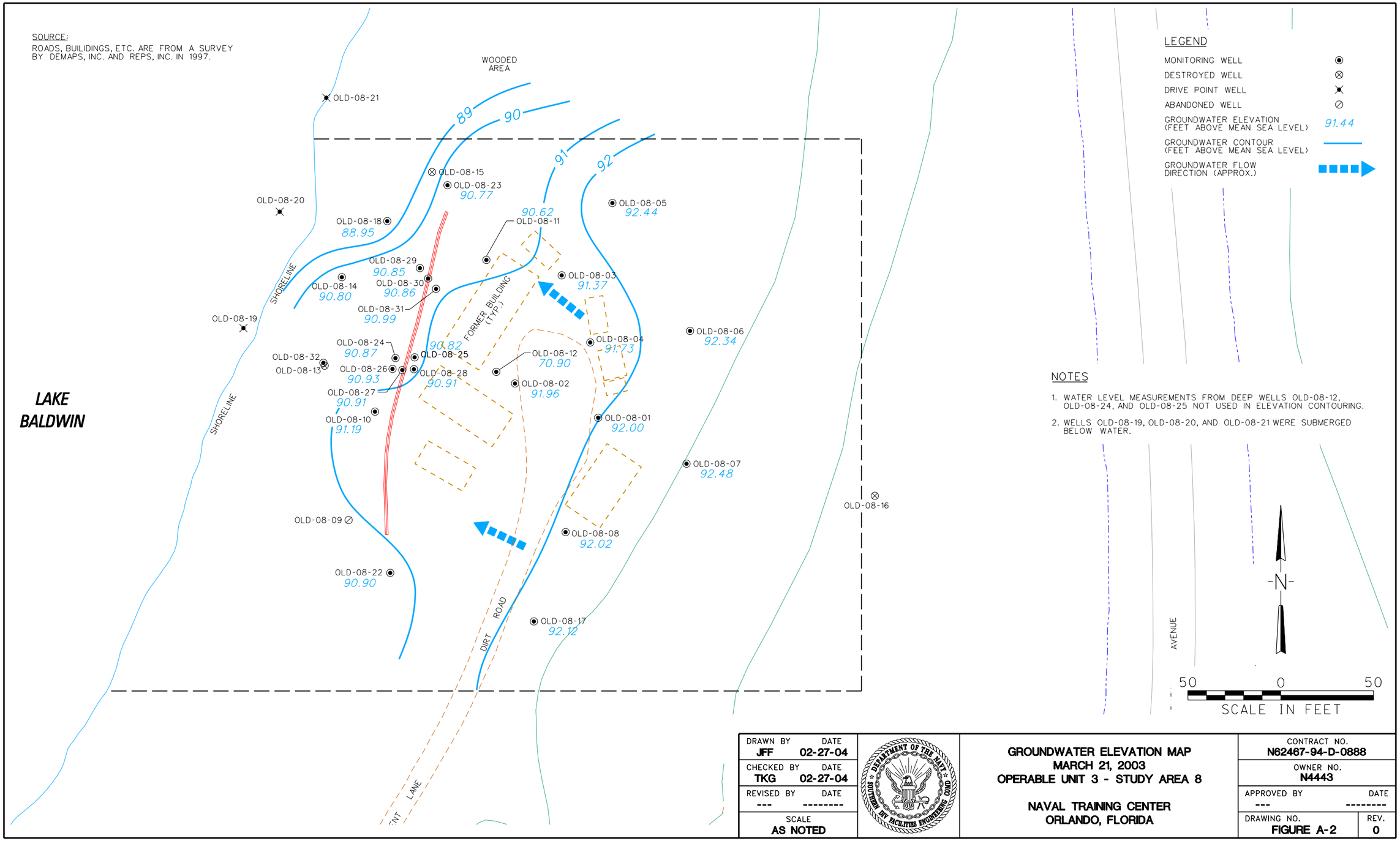
CAD FILE NO./DATE: P:\Oak Ridge Drafting\NTC Orlando\ou3-013.dgn 02-26-04 JFF



DRAWN BY: JFF — DATE: 02-26-04 CHECKED BY: TKG — DATE: 02-26-04 REVISED BY: --- — DATE: --- SCALE: AS NOTED	DEPARTMENT OF THE NAVY ☆ SOUTHERN DIV FACILITIES ENGINEERING COM ☆	**SITE LOCATION MAP** **STUDY AREAS 8 AND 9** **OPERABLE UNIT 3** **MAIN BASE** **NAVAL TRAINING CENTER** **ORLANDO, FLORIDA**	CONTRACT NO.: N62467-94-D-0888 OWNER NO.: N4443 APPROVED BY: --- — DATE: --- DRAWING NO.: FIGURE A-1 — REV.: 0

CAD FILE NO./DATE: P:\Ook Ridge Drafting\NTC Orlando\ou3-04.3.dgn 02-27-04 JFF

SOURCE:
ROADS, BUILIDINGS, ETC. ARE FROM A SURVEY BY DEMAPS, INC. AND REPS, INC. IN 1997.



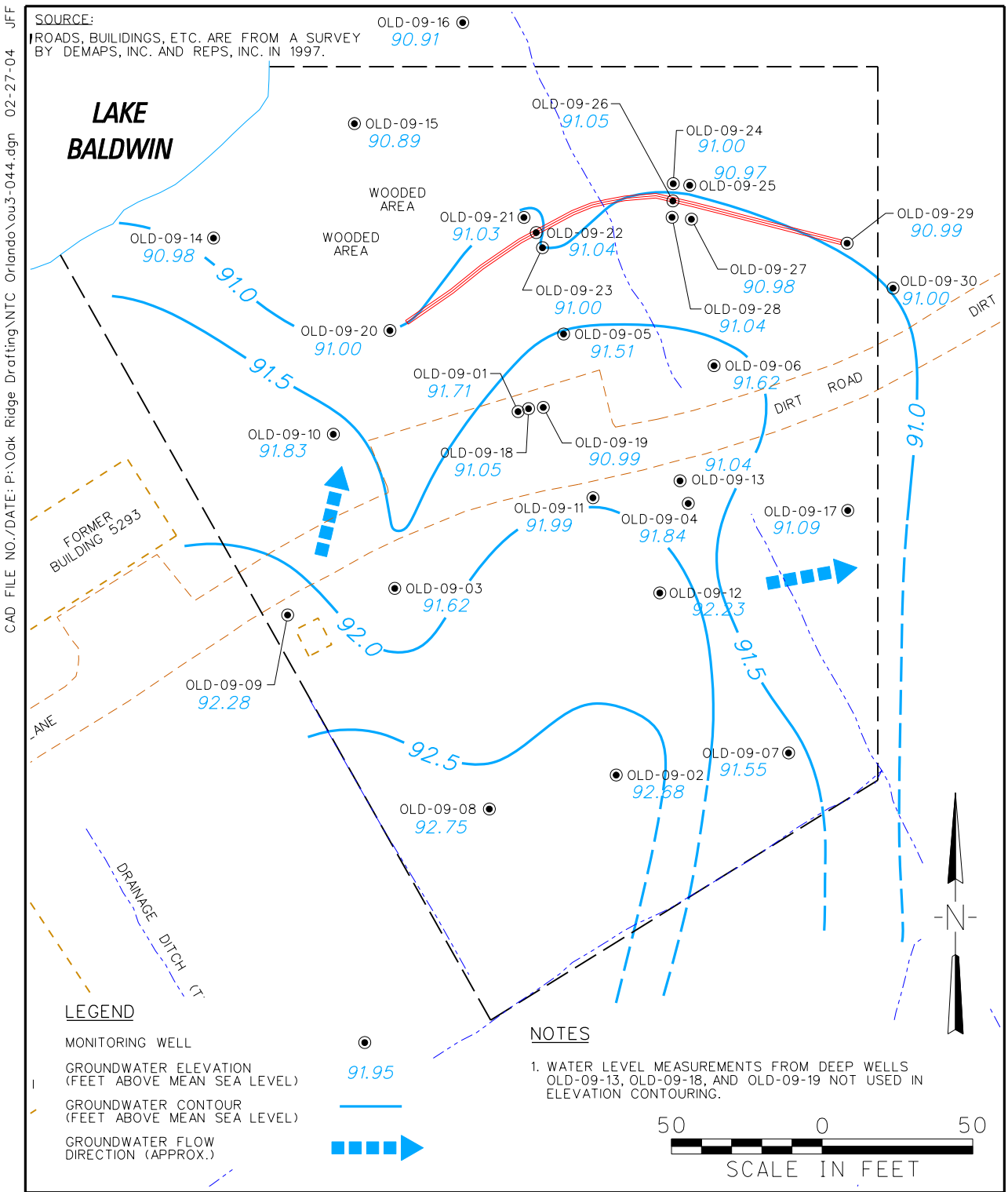
LEGEND

- MONITORING WELL
- DESTROYED WELL
- DRIVE POINT WELL
- ABANDONED WELL
- GROUNDWATER ELEVATION (FEET ABOVE MEAN SEA LEVEL) 91.44
- GROUNDWATER CONTOUR (FEET ABOVE MEAN SEA LEVEL)
- GROUNDWATER FLOW DIRECTION (APPROX.)

NOTES

1. WATER LEVEL MEASUREMENTS FROM DEEP WELLS OLD-08-12, OLD-08-24, AND OLD-08-25 NOT USED IN ELEVATION CONTOURING.
2. WELLS OLD-08-19, OLD-08-20, AND OLD-08-21 WERE SUBMERGED BELOW WATER.

DRAWN BY JFF	DATE 02-27-04	GROUNDWATER ELEVATION MAP MARCH 21, 2003 OPERABLE UNIT 3 - STUDY AREA 8 NAVAL TRAINING CENTER ORLANDO, FLORIDA	CONTRACT NO. N62467-94-D-0888
CHECKED BY TKG	DATE 02-27-04		OWNER NO. N4443
REVISED BY ---	DATE --------		APPROVED BY --- DATE --------
SCALE AS NOTED			DRAWING NO. FIGURE A-2 REV. 0



DRAWN BY JFF DATE 02-27-04		GROUNDWATER ELEVATION MAP MARCH 21, 2003 OPERABLE UNIT 3 - STUDY AREA 9 NAVAL TRAINING CENTER ORLANDO, FLORIDA	CONTRACT NO. N62467-94-D-0888
CHECKED BY TKG DATE 02-27-04			OWNER NO. N4443
REVISED BY --- DATE ---			APPROVED BY --- DATE ---
SCALE AS NOTED			DRAWING NO. FIGURE A-3 REV. 0

CAD FILE NO./DATE: P:\Oak Ridge Drafting\NTC Orlando\ou3-049.dgn 02-26-04 JFF

SOURCE:
ROADS, BUILIDINGS, ETC. ARE FROM A SURVEY BY DEMAPS, INC. AND REPS, INC. IN 1997.

LAKE BALDWIN

WOODED AREA

SHORELINE

FORMER BUILDING (TYP.)

PERMEABLE ADSORPTIVE BARRIER

DIRT ROAD

OLD-08-15			
1 TO 7	1/27/01	7/14/01	
As	1.6	1.4	

OLD-08-23					
7 TO 12	5/6/02	6/25/02	9/16/02	12/12/02	3/23/03
As	<2.08	<2.08	10.9	<3.8	<2.8

OLD-08-30					
8 TO 13	5/6/02	6/25/02	9/16/02	12/11/02	3/23/03
As	<2.08	<2.08	7.6	41	18.5

OLD-08-11					
1 TO 10	3/20/02	6/25/02	9/15/02	12/12/02	3/22/03
As	48.8/**51.8**	**195/201**	**64.9/67.2**	**92.6/94**	**70.7/69.6**

OLD-08-29					
8 TO 13	5/6/02	6/25/02	9/16/02	12/11/02	3/23/03
As	**72.6**	**102**	19.9	41	20.3

OLD-08-25					
26 TO 31	5/6/02	6/25/02	9/16/02	12/11/02	3/22/03
As	24.9/30.1-F	**195**	**122**	**76.7**	**85.4**

OLD-08-18					
2 TO 11	3/20/02	6/25/02	9/15/02	12/13/02	3/22/03
As	<2.15	4.7	8.2	3.9	2.8

OLD-08-05					
1 TO 10	3/20/02	6/25/02	9/15/02	12/11/02	3/22/03
As	24.7	**121**	31.5	48.2	22.3

OLD-08-14					
1 TO 7	3/21/02	6/26/02	9/15/02	12/12/02	3/22/03
As	22.9	33	26	28.6	22.4

OLD-08-03						
3 TO 13	7/14/00	10/23/00	1/27/01	4/25/01	7/14/01	
As	**160**	**59.6**	**78.1**	**67.1**	**77.7**	

OLD-08-31						
8 TO 13	5/6/02	6/25/02	9/16/02	12/12/02	3/23/03	
As	**94.7**	**85.5**	**51.7**	**53.4**	42.1	

OLD-08-04						
3 TO 13	7/14/00	10/23/00	1/26/01	4/25/01	7/14/01	
As	**71.5**	**70.4**	36.1/38.5	42.2	**65.2**	

OLD-08-24					
26 TO 31	5/7/02	6/25/02	9/16/02	12/12/02	3/23/03
As	2.3/<2.08-F	3.8/<2.08-F	<2.08	<3.8	<2.8

OLD-08-06						
1 TO 10	3/20/02	6/25/02	9/15/02	12/11/02	3/21/03	
As	22.4	36.3	17	**222**	16/16.2	

OLD-08-02						
3 TO 13	3/20/02	6/25/02	9/15/02	12/11/02	3/22/03	
As	**162**	**93.1/96.1**	**118**	**181**	**52.4**	

OLD-08-32				
1 TO 11	6/26/02	9/15/02	12/12/02	3/22/03
As	12.8	5	10.1	10.2

OLD-08-01						
3 TO 13	7/14/00	10/23/00	1/26/01	4/25/01	7/14/01	
As	**92-J**	**51.9**	**70.6**	**59**	**69.2**	

OLD-08-13				
1 TO 7	1/27/01	4/25/01	7/14/01	3/20/02
As	13.3	15.6	28.9	35.8

OLD-08-07		
1 TO 10	10/23/97	3/15/99
As	**56.4**	47.9

OLD-08-26					
8 TO 13	5/6/02	6/26/02	9/16/02	12/12/02	3/22/03
As	**63**	**140**	35.6	**62.1**	**52.8**

OLD-08-28					
8 TO 13	5/6/02	6/26/02	9/16/02	12/11/02	3/22/03
As	**752**	**700**	**603/611**	**395/401**	**356/366**

OLD-08-10					
1 TO 10	3/20/02	6/26/02	9/15/02	12/12/02	3/21/03
As	**136**	**104**	**417**	**300**	**312**

OLD-08-09		
1 TO 10	10/22/97	
As	**96.4-F/117**	

OLD-08-08					
1 TO 10	7/14/00	10/23/00	1/27/01	4/25/01	7/14/01
As	**105**	**111**	**135/136**	**136**	**118**

OLD-08-22					
7 TO 12	5/7/02	6/26/02	9/16/02	12/13/02	3/23/03
As	**144/143**	**98**	37.6	<3.8	39.9

OLD-08-17					
1 TO 10	3/20/02	6/25/02	9/15/02	12/12/02	3/21/03
As	**67.5**	41.7	**120**	**144**	**52.1**

OLD-08-27					
8 TO 13	5/6/02	6/25/02	9/16/02	12/12/02	3/22/03
As	<2.08	2.3/<2.08-F	<2.08	<3.8	<2.8

OLD-08-21 OLD-08-15 OLD-08-23 OLD-08-20 OLD-08-18 OLD-08-11 OLD-08-05 OLD-08-29 OLD-08-14 OLD-08-30 OLD-08-03 OLD-08-31 OLD-08-19 OLD-08-04 OLD-08-06 OLD-08-24 OLD-08-13 OLD-08-32 OLD-08-25 OLD-08-12 OLD-08-26 OLD-08-28 OLD-08-04 OLD-08-02 OLD-08-27 OLD-08-10 OLD-08-01 OLD-08-07 OLD-08-16 OLD-08-09 OLD-08-08 OLD-08-22 OLD-08-17

LEGEND

MONITORING WELL ⊙
DRIVE POINT WELL ✕
DESTROYED WELL ⊗
ABANDONED WELL ⊘

SCREEN INTERVAL TO NEAREST FOOT		SAMPLE COLLECTION DATE	
1 TO 10	10/21/97	3/16/99	8/3/99
ANALYTE As	**93.9**	1.5	**180/180**

ANALYTE CONCENTRATION a,b — DUPLICATE OR FIELD-FILTERED (-F) SAMPLE

ESTIMATED CONCENTRATION J

SAMPLE FILTERED IN THE FIELD F

a-CONCENTRATION IN MICROGRAMS PER LITER (µg/L)
b-BOLD CONCENTRATION INDICATES EXCEEDANCE

SCREENING CRITERIA

ANALYTE	GCTL[a]	BGSV[a]
As	50	5

GCTL=GROUNDWATER CLEANUP TARGET LEVEL
BGSV=BACKGROUND SCREENING VALUE

N

50 0 50
SCALE IN FEET

DRAWN BY JFF	DATE 02-26-04	ARSENIC DISTRIBUTION MARCH 2003 OPERABLE UNIT 3 - STUDY AREA 8
CHECKED BY TKG	DATE 02-26-04	NAVAL TRAINING CENTER ORLANDO, FLORIDA
REVISED BY ---	DATE --------	
SCALE AS NOTED		

DEPARTMENT OF THE NAVY NAVFAC ENGINEERING COM NORTHERN DIV FACILITIES ENGINEERING

CONTRACT NO.	N62467-94-D-0888
OWNER NO.	N4443
APPROVED BY ---	DATE --------
DRAWING NO.	FIGURE A-4
REV.	0

CAD FILE NO./DATE: P:\Oak Ridge Drafting\NTC Orlando\ou3-050.dgn 02-27-04 JFF

SOURCE:
ROADS, BUILIDINGS, ETC. ARE FROM A SURVEY BY DEMAPS, INC. AND REPS, INC. IN 1997.

LAKE BALDWIN

OLD-09-26						
8 TO 13	5/2/02	6/25/02	9/16/02	12/12/02	3/23/03	
As	21.8	32.5	2.6/2.6	<3.8/<3.8	4.3/3.5	

OLD-09-15					
1 TO 7	3/20/02	6/25/02	9/15/02	12/13/02	3/23/03
As	<2.15	2.1	<2	<3.8	<2.8

OLD-09-21					
8 TO 13	5/2/02	6/24/02	9/16/02	12/13/02	3/23/03
As	<2.08	<2.08	2.2	<3.8	<2.8

OLD-09-22					
8 TO 13	5/3/02	6/24/02	9/16/02	12/13/02	3/23/03
As	<2.08/<2.08-F	<2.08	<2.08	34.3	<2.8

OLD-09-14					
1 TO 7	3/20/02	6/24/02	9/15/02	12/13/02	3/23/03
As	<2.15	<2.08	<2	<3.8	<2.8

OLD-09-23					
8 TO 13	5/3/02	6/24/02	9/16/02	12/13/02	3/23/03
As	<2.08/<2.08	<2.08	4.4	<3.8	9.8

OLD-09-20					
7 TO 12	5/2/02	6/24/02	9/16/02	12/13/02	3/23/03
As	<2.08	<2.08	<2.08	<3.8	<2.8

OLD-09-05					
1 TO 10	3/19/02	6/24/02	9/15/02	12/13/02	3/21/03
As	**65.5**	**210/211**	**51.2/56.3**	35.4/36.1	32.2

OLD-09-01					
3 TO 13	3/19/02	6/24/02	9/15/02	12/13/02	3/21/03
As	21.3	27.5	20.2	28.1	22.9

OLD-09-11					
1 TO 10	3/19/02	6/24/02	9/15/02	12/13/02	3/22/03
As	**58.8**	39.2	32.1	18.3	15.3

OLD-09-03					
7 TO 12	3/19/02	6/24/02	9/15/02	12/13/02	3/21/03
As	<2.15/<2.15	<2.08	<2.08	<3.8	<2.8

OLD-09-24					
8 TO 13	5/2/02	6/25/02	9/16/02	12/12/02	3/23/03
As	<2.08	<2.08	<2.08	<3.8	<2.8

OLD-09-25					
26 TO 31	5/2/02	6/25/02	9/16/02	12/12/02	3/22/03
As	<2.08	<2.08	7	4.2	11.7

OLD-09-28					
8 TO 13	5/3/02	6/25/02	9/16/02	12/12/02	3/22/03
As	<2.08	<2.08	<2.08	<3.8	<2.8

OLD-09-29					
7 TO 12	5/2/02	6/24/02	9/16/02	12/12/02	3/22/03
As	35.9	6	28	17.3	15.4

OLD-09-30					
7 TO 12	5/2/02	6/24/02	9/16/02	12/12/02	3/22/03
As	22	25.2	24.6	19.1	17.4

OLD-09-27					
26 TO 31	5/3/02	6/24/02	9/16/02	12/12/02	3/22/03
As	<2.08	<2.08	8.3	5.6	12.3

OLD-09-06					
1 TO 10	3/20/02	6/25/02	9/15/02	12/12/02	3/21/03
As	**64.5**	**67.9**	45	23.5	<11.3

OLD-09-17					
1 TO 10	5/2/02	6/24/02	9/15/02	12/13/02	3/23/03
As	6.8	4.1	40.1	8.4	24

OLD-09-04					
7 TO 12	3/20/02	6/24/02	9/15/02	12/12/02	3/22/03
As	**180**	**348**	**262**	**172**	**124/121**

OLD-09-12					
1 TO 10	3/20/02	6/25/02	9/15/02	12/13/02	3/22/03
As	**86.8**	22.1/21.8	41.1	16.5	19.5

OLD-09-07					
3 TO 12	3/19/02	6/24/02	9/15/02	12/13/02	3/22/03
As	<2.15	<2.08	<2	<3.8	<2.8

OLD-09-16, OLD-09-15, OLD-09-14, OLD-09-26, OLD-09-24, OLD-09-25, OLD-09-21, OLD-09-22, OLD-09-23, OLD-09-29, OLD-09-27, OLD-09-28, OLD-09-30, OLD-09-20, OLD-09-05, OLD-09-01, OLD-09-10, OLD-09-18, OLD-09-19, OLD-09-06, OLD-09-13, OLD-09-11, OLD-09-04, OLD-09-17, OLD-09-03, OLD-09-12, OLD-09-09, OLD-09-28, OLD-09-07, OLD-09-02, OLD-09-08

WOODED AREA
WOODED AREA
PERMEABLE ADSORPTIVE BARRIER
SHORELINE
DIRT ROAD
FORMER BUILDING (TYP.)
FORMER BUILDING (TYP.)
TRIDENT LANE
DRAINAGE DITCH (TYP.)
FORMER BUILDING (TYP.)

LEGEND

MONITORING WELL ◉

SCREEN INTERVAL TO NEAREST FOOT	SAMPLE COLLECTION DATE		
1 TO 10	10/21/97	3/16/99	8/3/99
ANALYTE As	**93.9**	1.5	**180/180**
	ANALYTE CONCENTRATION a,b		DUPLICATE OR FIELD-FILTERED (-F) SAMPLE

ESTIMATED CONCENTRATION J

SAMPLE FILTERED IN THE FIELD F

a-CONCENTRATION IN MICROGRAMS PER LITER (ug/L)
b-BOLD CONCENTRATION INDICATES EXCEEDANCE

SCREENING CRITERIA

ANALYTE	GCTL[a]	BGSV[a]
As	50	5

GCTL=GROUNDWATER CLEANUP TARGET LEVEL
BGSV=BACKGROUND SCREENING VALUE

-N-

50 0 50
SCALE IN FEET

DRAWN BY / DATE	JFF 02-27-04
CHECKED BY / DATE	TKG 02-27-04
REVISED BY / DATE	--- ---------
SCALE	AS NOTED

DEPARTMENT OF THE NAVY ☆ ONCO ☆ SOUTHERN DIV FACILITIES ENGINEERING

ARSENIC DISTRIBUTION MARCH 2003 OPERABLE UNIT 3 - STUDY AREA 9

NAVAL TRAINING CENTER ORLANDO, FLORIDA

CONTRACT NO.	N62467-94-D-0888
OWNER NO.	N4443
APPROVED BY / DATE	--- ---------
DRAWING NO.	FIGURE A-5
REV.	0

APPENDIX B

STUDY AREA 52
McCOY ANNEX

STUDY AREA 52

McCOY ANNEX, NTC, ORLANDO

1.0 INTRODUCTION

1.1 SITE DESCRIPTION

Study Area (SA) 52 is located in the west-central part of the McCoy Annex (Figure B-1). The site screening investigation of this SA (HLA, 1999) focused on the area in the vicinity of Building 7261 (Figure B-2). Available drawings indicate that Building 7261 was built between 1956 and 1962 and was demolished in the early 1980s. It was 1,616 square feet in size and was constructed with a concrete foundation, concrete floor, and wood walls. At various times, Building 7261 was used as an entomology laboratory, pesticide mixing area, covered storage, and maintenance shop.

1.2 BACKGROUND

Site screening investigations, completed in May 1996, confirmed that soil and groundwater contained pesticides above screening levels (HLA, 1999). An Interim Removal Action (IRA) (soil removal) was completed in September 1997 with 1,300 tons of soil excavated and backfilled with clean soil. Three monitoring wells were installed after the IRA. Well OLD-52-13, located in the area of the most contaminated soil, contained dieldrin above the Groundwater Cleanup Target Level (GCTL) (FDEP, 1999). The Orlando Partnering Team (OPT) recommended groundwater restrictions and quarterly groundwater monitoring. The most recent sampling (March 2004) indicated that the dieldrin concentration in OLD-52-13 remains above the Florida GCTL (0.015 µg/L vs. GCTL 0.005 µg/L) (Figure B-2).

1.3 OBJECTIVES

The objective of this groundwater monitoring program at SA 52 is to:

- Monitor concentrations of dieldrin in groundwater to determine if they fall below the FDEP GCTL for two consecutive sampling events.

Samples will be collected and analyzed in accordance with USEPA Level IV Data Quality Objectives (DQOs). The sampling frequency will be evaluated following each sampling event and a recommendation will be provided to the OPT.

2.0 GROUNDWATER SAMPLING

Well construction details are summarized in Table B-1 and well locations are shown on Figure B-2. The wells to be sampled, analytical parameters, rationale for sampling, contaminant of concern, and cleanup criterion are presented in the following tables.

Well Number	Analytical Parameters[(a)]	Rationale
OLD-52-11	Pesticides (Method 8081A)	Upgradient well
OLD-52-12	Pesticides (Method 8081A)	Downgradient well
OLD-52-13	Pesticides (Method 8081A)	Source area well

(a) Bottle requirements will be provided in the Field Instruction for each sampling event.

Contaminant of Concern	Criterion Type
Dieldrin	0.005 µg/L GCTL

GCTL – Groundwater Cleanup Target Level.

3.0 REFERENCES

FDEP (Florida Department of Environmental Protection), 1999. *Development of Soil Cleanup Target Levels* for Chapter 62-777, F.A.C., May.

HLA (Harding Lawson Associates), 1999. *Base Realignment and Closure Environmental Site Screening Report Interim Remedial Action, Study Area 52,* Naval Training Center, Orlando, Florida, Unit Identification Code N65928, Contract No. N62467-89-D-0317/107, March.

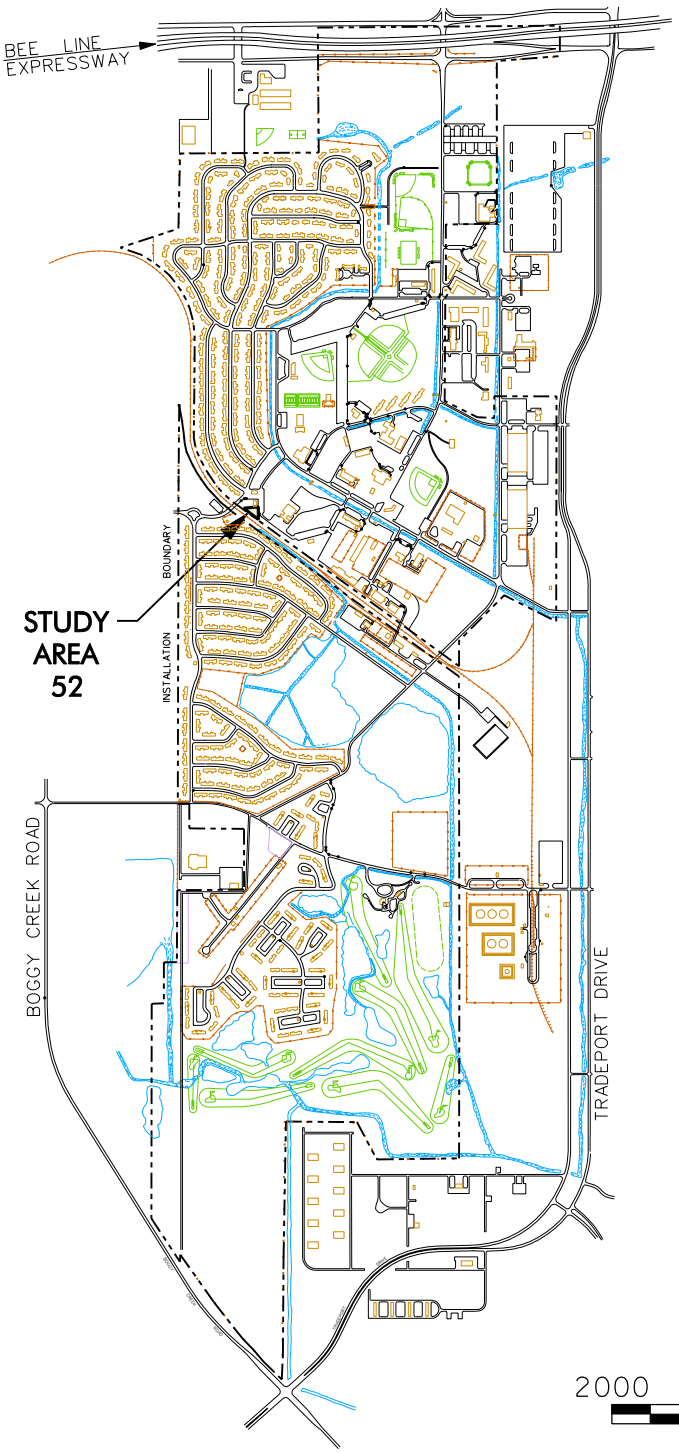
TABLE B-1

WELL CONSTRUCTION DATA
STUDY AREA 52

McCOY ANNEX
NAVAL TRAINING CENTER
ORLANDO, FLORIDA

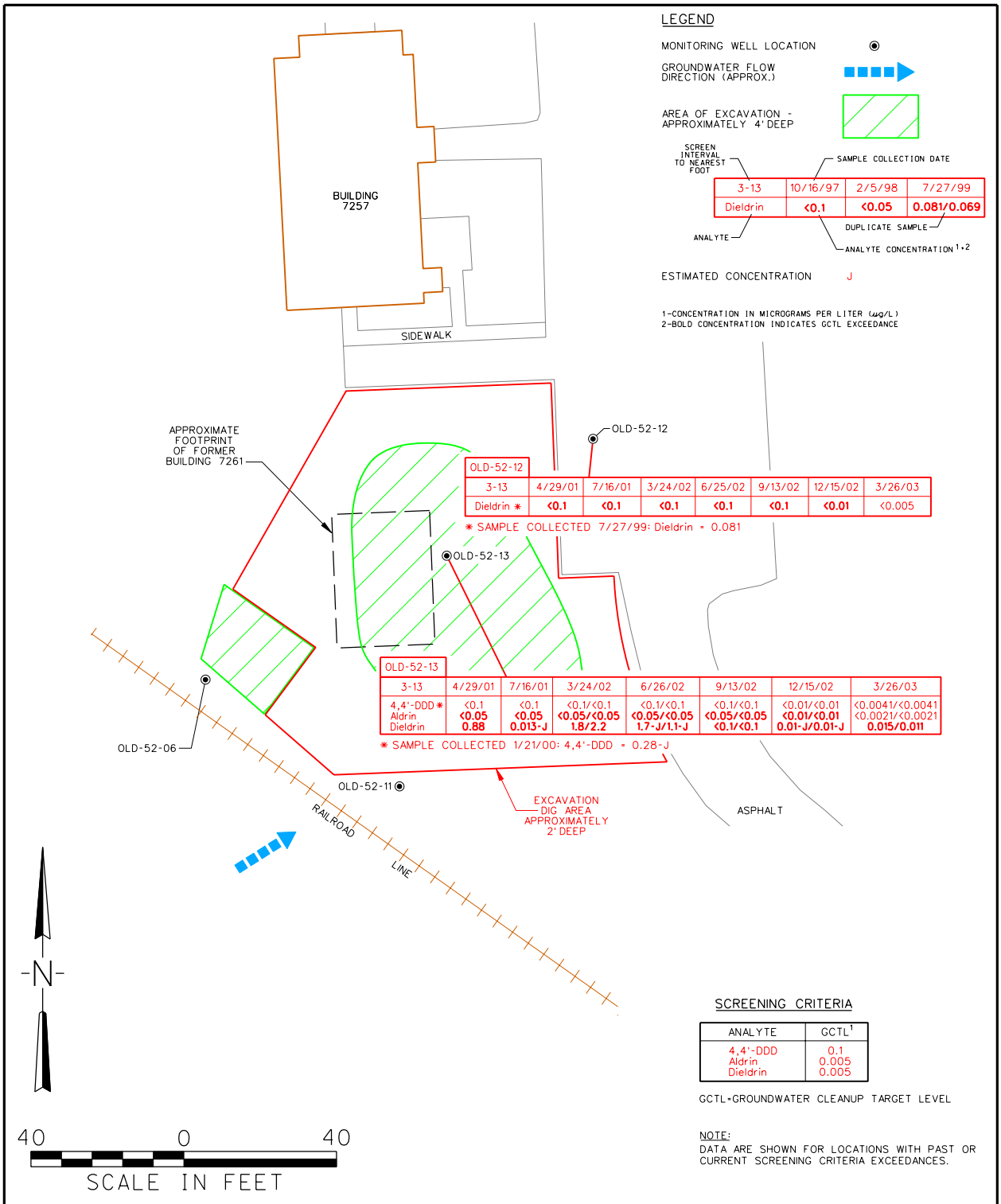
Well	Well Diameter (inches)	Screen Interval (ft BGS)	Date Installed	TOC Elevation (ft AMSL)
OLD-52-06	2	6 - 10	12/17/96	94.22
OLD-52-11	2	4 - 14	10/13/97	93.14
OLD-52-12	2	3 - 13	10/13/97	91.73
OLD-52-13	2	3 - 13	10/13/97	91.36

CAD FILE NO./DATE: P:\Oak Ridge Drafting\NTC Orlando\mca-006.dgn 02-27-04 JFF



DRAWN BY: JFF — DATE: 02-27-04	DEPARTMENT OF THE NAVY · SOUTHERN DIV FACILITIES ENGINEERING COM	SITE LOCATION MAP STUDY AREA 52 McCOY ANNEX NAVAL TRAINING CENTER ORLANDO, FLORIDA	CONTRACT NO.: N62467-94-D-0888
CHECKED BY: TKG — DATE: 02-27-04			OWNER NO.: N4443
REVISED BY: --- — DATE: ---			APPROVED BY: --- — DATE: ---
SCALE: AS NOTED			DRAWING NO.: FIGURE B-1 — REV.: 0

CAD FILE NO./DATE: P:\Oak Ridge Drafting\NTC Orlando\sa52-017.dgn 02-27-04 JFF



SCREENING CRITERIA

ANALYTE	GCTL[1]
4,4'-DDD	0.1
Aldrin	0.005
Dieldrin	0.005

GCTL=GROUNDWATER CLEANUP TARGET LEVEL

NOTE:
DATA ARE SHOWN FOR LOCATIONS WITH PAST OR CURRENT SCREENING CRITERIA EXCEEDANCES.

DRAWN BY: JFF	DATE: 02-27-04	GROUNDWATER EXCEEDANCES MARCH 2003 STUDY AREA 52 - McCOY ANNEX NAVAL TRAINING CENTER ORLANDO, FLORIDA	CONTRACT NO. N62467-94-D-0888
CHECKED BY: TKG	DATE: 02-27-04		OWNER NO. N4443
REVISED BY: ---	DATE: --------		APPROVED BY: --- DATE: --------
SCALE: AS NOTED			DRAWING NO. FIGURE B-2 REV. 0