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SOIL SAMPLING AND ANALYSIS PLAN SITES 8 AND 24 WITH TRANSMITTAL NAS PENSACOLA FL
5/14/2002
CH2MHILL

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May 14, 2002

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Subject: Contract No. N62467-98-D-0095
Contract Task Order 0085 – Naval Air Station (NAS) Pensacola – Pensacola, Florida
Soil Sampling and Analysis Plan, Operable Unit 13 – Sites 8 and 24, Revision 00

Dear Mr. Hill:

CH2M HILL Constructors (CCI) is pleased to provide a draft electronic copy of the Soil Sampling and Analysis Plan, Operable Unit 13 – Sites 8 and 24, NAS Pensacola, Revision 00.

Please contact me (850.939.8300, ext. 17) if you have any questions or comments regarding this material.

Sincerely,

CH2M HILL

Amy Twitty, P.G.
Project Manager

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CCI Project File No. 171578

Soil Sampling and Analysis Plan
Operable Unit 13 - Sites 8 and 24

Naval Air Station Pensacola
Pensacola, Florida

Revision 00

Contract No. N62467-98-D-0995
Contract Task Order No. 0085

Submitted to:

U.S. Naval Facilities
Engineering Command
Southern Division

Prepared by:

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May 2002

Prepared/Approved By:

Amy Twitty, P.G., Project Manager — Date

Approved By:

R. Scott Newman, Program Manager — Date

Client Acceptance:

U.S. Navy Responsible Authority — Date

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A EnSafe Inc. Technical Memorandum, 95 Percent UCL Calculations for OU 13

Acronym List

bls	below land surface
CCI	CH2M HILL Constructors, Inc.
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COCs	contaminants of concern
DDT	d(ichloro)d(iphenbyl)t(richloroethane)
EISOPQAM	EPA Region IV Environmental Investigation Standard Operating Procedures and Quality Assurance Manual
EnSafe	EnSafe, Inc.
EPA	U.S. Environmental Protection Agency
FDEP	Florida Department of Environmental Protection
IRA	Interim Remedial Action
LUCs	Land Use Controls
MS/MSD	matrix spike/matrix spike duplicate
msl	mean sea level
NAS	Naval air Station
NAVFAC	Naval Facilities Engineering Command
NEESA	Naval Energy and Environmental Support Activity
OU	Operable Unit
PPE	personal protective equipment
ppb	parts per billion
ppm	parts per million
PRG	preliminary remediation goal
PWC	Public Works Center
QA	quality assurance
QC	quality control
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
SAP	Sampling and Analysis Plan
SCTLs	soil cleanup target levels
TAT	turnaround time
UCL	Upper Confidence Level

1.0 Background

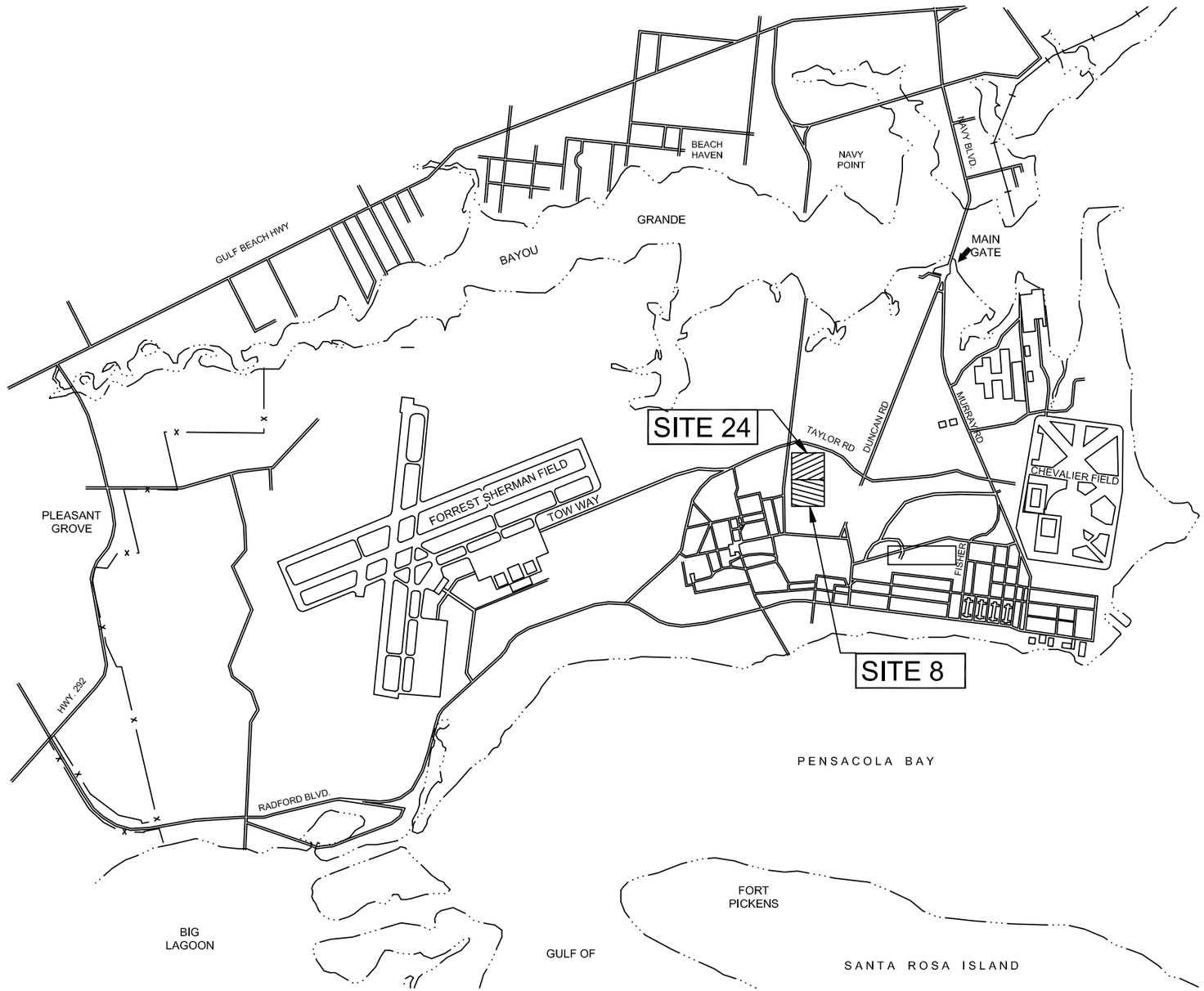
CH2M HILL Constructors, Inc. (CCI) has been contracted by the Department of the Navy, Southern Division, Naval Facilities Engineering Command (NAVFAC), to prepare this Sampling and Analysis Plan for work to be performed by CCI at Naval Air Station (NAS) Pensacola in Pensacola, Florida. The work is being performed under Contract No. N62467-98-D-0995, Contract Task Order (CTO) No. 0085, and in accordance with the management approach outlined in the CCI Contract Management Plan dated July 1998.

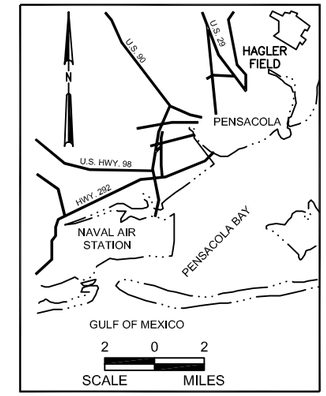
NAS Pensacola is located in Escambia County, approximately 5 miles west of the Pensacola city limits. The approximately 5,000-acre installation was constructed in the 1800s. Prior to construction, the facility was undeveloped and sparsely vegetated. Land use at NAS Pensacola consists of various military housing, training, and support facilities as well as large industrial complexes for major repairs and refurbishment of aircraft engines and frames. Sites 8 and 24 are located along the eastern side of John Tower Road, south of Taylor Road in the middle of the NAS complex (Figure 1); and are included in Operable Unit (OU) 13.

Site 8 site is an approximate 450- by 600-foot area currently occupied by Building 3561, which houses the NAS Pensacola Pubic Works Center (PWC) Maintenance/Material Department (Figure 2). An extensive asphalt-paved area surrounds Building 3561 to the north, east, and west, covering nearly all land surface. An approximate 20-foot wide concrete apron immediately surrounds the building to the east and west and is covered by an awning. The PWC stores building materials on the paved area west of the building. Site 8 is generally flat with a land surface elevation averaging 29 feet above mean sea level (msl). Miscellaneous office trailers and fences storage, including Building 3678, are north of the Building 3561 (EnSafe, Inc. [EnSafe], 2000). The paved area east of the building is used for PWC storage and employee parking. Sidewalks and a grassy median are to the south, between Buildings 3560 and 3561. Most of the site is surrounded by a chain-link fence.

Site 8 is the former base rifle range and disposal area. Various solid wastes and dry refuse were reportedly placed in trenches and burned there in the late 1950s and early 1960s (EnSafe, 2000). Aerial photographs and maps from the 1950s and 1960s show a rifle range at the current location of Building 3561. Earlier aerial photographs show an excavation at the northern end of the rifle range, while later photographs show the excavated area overgrown with vegetation (EnSafe, 2000). Most of the excavation noted in the earlier photographs is currently covered by Building 3561 and the surrounding paved area, which were covered in the mid 1970s. Facility personnel reported no waste or residue was identified during the building's construction (Naval Energy and Environmental Support Activity [NEESA], 1983).

Site 24 is immediately north of Building 3561 (Figure 1) near the northwest corner of the Barrancas National Cemetery. Nearly three quarters of the site is now part of the Barrancas National Cemetery and contains multiple gravesites. Only the southwestern corner of the site, now covered with grass, does not contain gravesites. A paved road transects the site





0 3000 6000 9000

Approximate Scale: 1" = 3000'

FIGURE 1

Site Location Map

OU-13, NAS Pensacola

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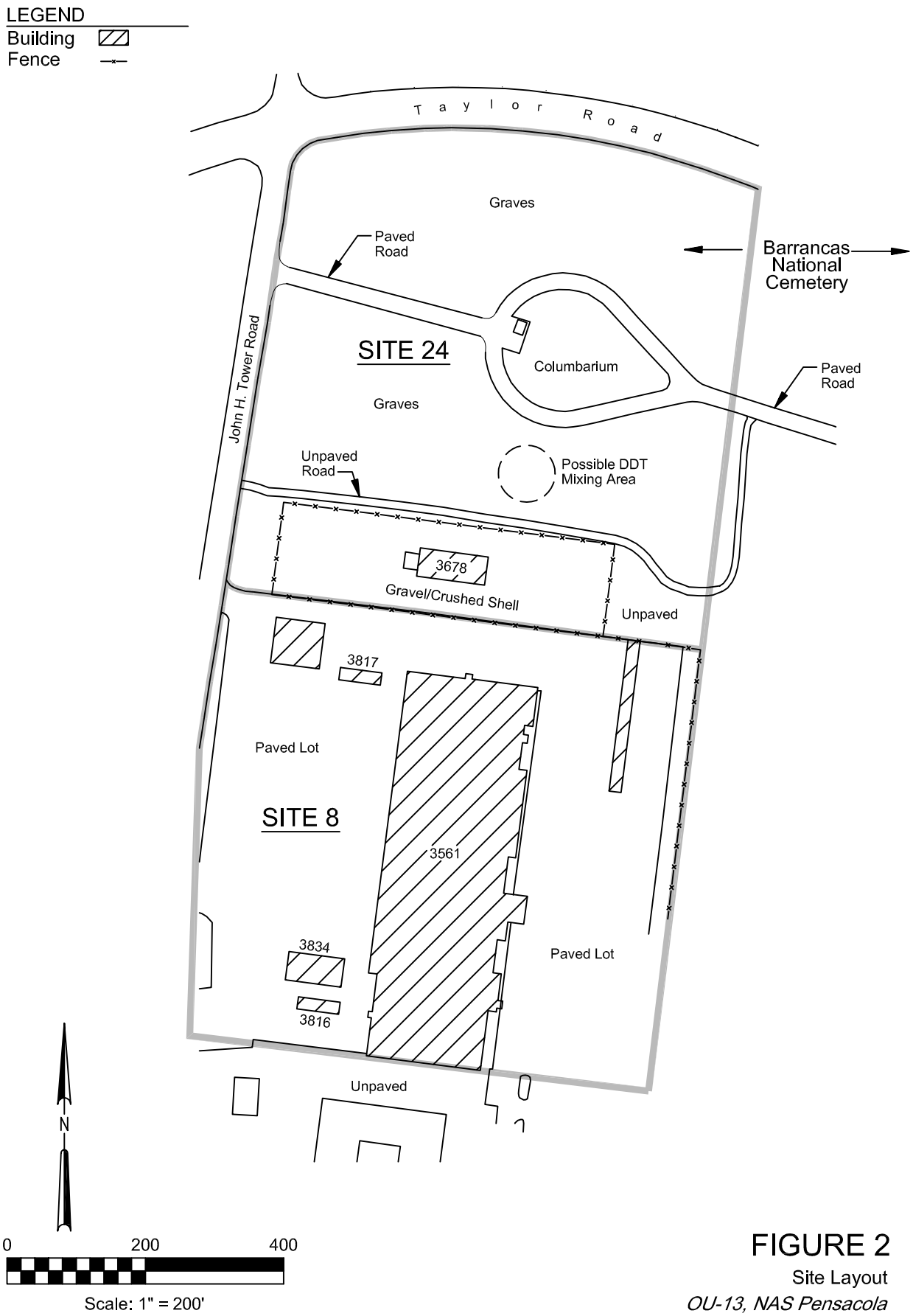

FIGURE 2

Site Layout

OU-13, NAS Pensacola

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from east to west which leads to the circular drive surrounding the columbarium. Figure 2 presents the site layout. Cemetery personnel have reported finding buried metal, rubber, and plastic aircraft parts during excavation along the eastern boundary of Site 24 (EnSafe, 2000).

The fenced storage area around Building 3678, located in the northern portion of Site 24, has a gravel/crushed shell land surface. The site is generally flat with land elevations between 24 and 26 feet above msl.

From the early 1950s until the early 1960s, Site 24 was used to mix DDT with diesel fuel for mosquito control. DDT, reportedly spilled in the mixing area while being transferred from drums to spray tanks, may have contaminated local soil and groundwater (EnSafe, 2000). DDT was aerially applied for at least 10 years to control mosquito outbreaks. In later years, DDT was applied by a fogger machine. On the average, two or three mosquito outbreaks occurred each year during the spring and summer. Following each outbreak, DDT was generally applied for a 1-week period (EnSafe, 2000). For each application, 500 gallons of 20 percent DDT solution was mixed with 300 gallons of diesel fuel. The fogger machine used 300 gallons of 20 percent DDT mixed with 300 gallons of diesel fuel. It is estimated that up to 20 gallons of the 20 percent solution may have been spilled during the approximate 10-year period of DDT mixing at the site (NEESA, 1983).

An Initial Assessment Study was completed by NEESA in 1983, followed by a Phase I screening investigation in 1991. A Remedial Investigation/Feasibility Study (RI/FS) has also been completed for the sites. Table 1 presents a summary of the contaminants of concern (COC) results from the RI Phase I, II and III sampling events. Figure 3 presents the RI sample locations. EnSafe submitted a draft Proposed Plan and Record of Decision (ROD) which proposed the removal of soil to industrial criteria with Land Use Controls (LUCs). However, in an effort to remove the land use restrictions on soil at the site and achieve residential soil cleanup goals, EnSafe performed a statistical evaluation of the data using FDEP's paper *Use of the 95 Percent Upper Confidence Limit (UCL) in Developing Exposure Point Concentrations of Contaminants in Soil* (May 11, 1999). Based on their statistical analysis using the 95 percent UCL, the new interim action will remove two surface soil "hot spots" and four subsurface "hot spots" to residential criteria and no LUCs will be required for soil. EnSafe's technical memorandum is included in Attachment A.

Remediation activities at OU 13 are regulated under the authority of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). An Interim Remedial Action (IRA) was recommended to be completed at OU 13 to minimize human health and ecological risk and to make way for the additional gravesites at Site 24. This sampling and analysis plan outlines the surface and subsurface soil sampling to be performed to fully delineate the COCs present at the sites prior to IRA activities.

TABLE 1
Previous Soil Sampling Analytical Results
OU 13, NAS Pensacola

Sample Location	Date	Depth (feet)	Arsenic (ppm)	Cadmium (ppm)	Benzo(a) pyrene (ppb)	Aldrin (ppb)	Dieldrin (ppb)
Site 8							
08S01	1996	0-1	--	--	--	--	--
		4-6	--	10.9	--	--	--
		7-9	--	15.9	--	--	3.48
08S03	1996	0-1	--	--	--	--	2010
		5-7	--	--	--	21	496
		9-11	--	--	--	9.06	134
Site 24							
24S01	1995	0-1	--	--	--	--	--
		3-5	--	--	--	--	2.3
24S10	1996	0-1	2.8	--	630	--	58
		5-7	--	--	--	--	22
24S11	1996	0-1	3.1	--	--	--	--
		4-6	--	--	--	--	--
24S12	1996	0-1	1.2	--	160	--	100
		4-6	--	--	--	--	4.2
Preliminary Remediation Goals Applicable During Previous Investigation							
Surface			0.43/1.56	3.9	88	38	40
Subsurface			0.43/1.56	6	3,700	5	1

Notes:

ppb = parts per billion
ppm = parts per million
-- = Regulatory limit not exceeded

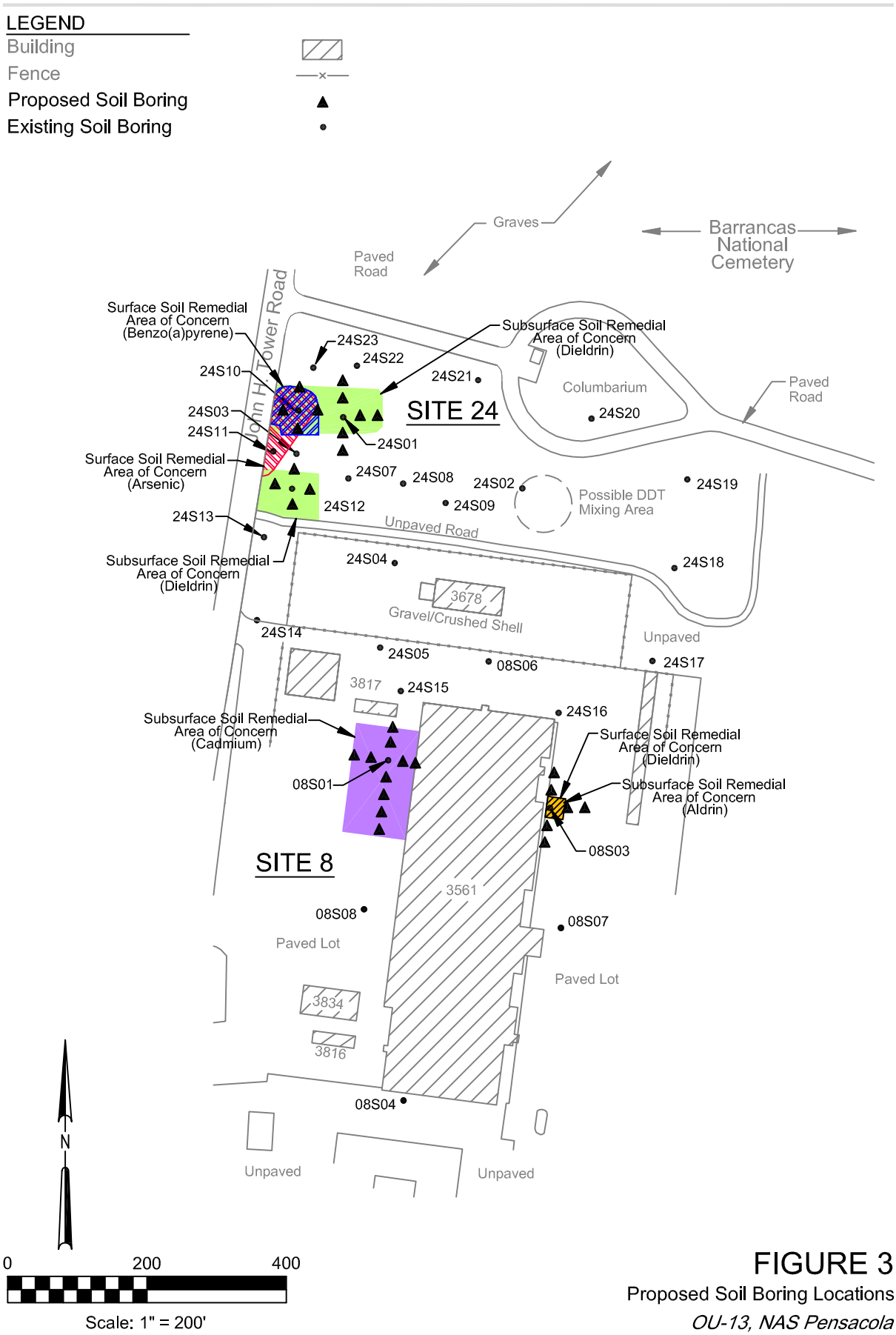

FIGURE 3

Proposed Soil Boring Locations

OU-13, NAS Pensacola

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2.0 Summary of Work

In order to better define the areas of soil contamination or "hot spots" at OU 13, a minimum of 15 surface soil samples and 60 subsurface samples will be collected. Samples will be collected in the vicinity of RI samples 08S01 and 08S03 at Site 8 and 24S01, 24S10, 24S11 and 24 S12 at Site 24 for the source delineation of the COCs. The COCs include arsenic, cadmium, benzo(a)pyrene, dieldrin, and aldrin.

2.1 Health and Safety

Health and safety hazards are associated with work to be performed under this contract. Therefore, work is anticipated to be conducted in Level D personal protective equipment (PPE), with provisions to upgrade to Level C protection as specified in the Basewide Health and Safety Plan (CCI, 2000).

2.2. Soil Investigation

Currently, a volume of soil measuring approximately 100 by 150 feet by 15 feet deep is proposed to be removed from the vicinity of former sample 08S01 based on cadmium in subsurface soil. However, the actual horizontal and vertical extent of contamination is not well defined and may be smaller then the proposed volume. In the immediate vicinity of subsurface soil sample 08S01 on the west side of Building 3561, soil samples will be collected from four soil sample locations approximately 25 feet from the original sample to the north, south, east and west. Additionally, four samples will be collected another 25 feet out from these sample locations (50 feet out from original sample) and another two samples will be collected to the south (at 75 and 100 feet south of the original sample). At each location, soil samples will be collected from 5 to 7 feet and 10 to 12 feet below land surface (bls). Initially, only the four samples immediately surrounding the original sample location will be analyzed for cadmium. Based on the analytical results of these initial samples, analysis of the remaining samples may be necessary to complete the delineation of COCs. No surface samples will be collected or analyzed in this area. Refer to Figure 3 for the layout for each soil sample location.

Former soil sample 08S03 collected adjacent to the east side of Building 3561 at Site 8 exceeded the surface remedial goal for dieldrin and the subsurface remedial goal for aldrin. Surface and subsurface samples will be collected at 25- and 50-foot increments to the north, south, and east of original sample 08S03. Samples will be collected from 0 to 1, 5 to 7 and 10 to 12 feet bls or until groundwater is encountered. Surface soil samples will be analyzed for dieldrin and subsurface soil will be analyzed for aldrin. Initially, only the surface soil and 5- to 7-foot samples collected 25 feet from the original sample location will be analyzed for the COCs. Based on the analytical results of these initial samples, analysis of the remaining samples may be necessary to complete the delineation of COCs.

At Site 24, surface soil at sample 24S10 exceeded the preliminary remediation goal (PRG) for arsenic and benzo(a)pyrene. Surface soil at 24S11 also exceeded the PRG for arsenic. Five

surface soil samples are proposed to be collected in the area of these samples to better define the extent of surface soil contamination (four immediately surrounding former sample 24S10 and one south of 24S11). Figure 3 presents the proposed sample locations. Subsurface soil in this western area of Site 24 is contaminated with dieldrin to at least 7 feet bls. A minimum of 11 samples will be collected on approximate 25-foot centers out from original samples 24S01, 24S10 and 24S12 at Site 24 (some in the same locations at the surface samples). Soil samples will be collected from 5 to 7 and 10 to 12 feet bls at each location and analyzed for dieldrin. Initially, only those samples collected nearest the original samples at the 5- to 7-foot depth will be analyzed for COCs. Based on the analytical results of these initial samples, analysis of the remaining samples may be necessary to complete delineation of COCs.

Soil samples will be collected using decontaminated stainless steel hand augers or a drill rig equipped with direct push technology. Soil will be placed into stainless steel bowls, thoroughly mixed using stainless steel spoons, and placed in 8-ounce glass jars. Soil samples will be described using the Unified Soil Classification System and recorded in a bound logbook by CCI personnel. All sampling will be conducted in accordance with CCI's Basewide Work Plan for NAS Pensacola (CCI, 2000), FDEP Standard Operating Procedures and the U.S. Environmental Protection Agency (EPA) Region IV Environmental Investigation Standard Operating Procedures and Quality Assurance Manual (EISOPQAM) dated May 1996, revised 1997.

All samples will be shipped to a Navy-approved laboratory for analysis on a 48-hour turnaround time (TAT). Select samples will be analyzed first while others are held pending the results of the initial samples. Samples will be analyzed for arsenic and/or cadmium using EPA Method 6010B, benzo(a)pyrene using EPA Method 8310, and aldrin and dieldrin using EPA Method 8081A. Level III Data Quality Objectives will be used for reporting purposes. Components of the soil sampling plan are listed in Table 2.

Field documentation, waste handling, decontamination and quality control will be conducted in accordance with the Basewide Work Plan. All soil cuttings will be returned to the associated borehole. Decontamination water will be drummed and left onsite for subsequent disposal during IRA activities.

TABLE 2
Soil Sample Collection and Analysis Summary
OU 13, NAS Pensacola

Previous Sample Location	Station IDs	Depth (feet bls)	Arsenic	Cadmium	Benzo (a) pyrene	Aldrin	Dieldrin
Surface Soil Sampling							
08S03	08S100 – 08S105	0-1					6
24S10	24S100 – 24S103	0-1	4		4		
24S11	24S104	0-1	1				
Subsurface Soil Sampling							
08S01	08S106 – 08S115	5-7		10			
		10-12		10			
08S03	08S100 – 08S105	5-7				6	
		10-12				6	
24S01	24S105 – 24S110	5-7					6
		10-12					6
24S10	24S100 – 24S102	5-7					3
		10-12					3
24S12	24S111 – 24S115	5-7					5
		10-12					5
Total Number of Samples			5	20	4	12	34
QA/QC Samples							
Field Duplicates (10%)			1	2	1	2	3
MS/MSD (5%)			1	1	1	1	2
Pre-cleaned Equip Blanks (5%)	Pre-EB01—02		1	1	1	1	2
Field-cleaned Equip Blanks (5%)	Post-EB01—02		1	1	1	1	2
Estimated No. of samples to be collected:					75 + 9 QA/QC = 84		

Notes: MS/MSD = Matrix Spike/Matrix Spike Duplicate

3.0 Reporting Requirements

The surface soil samples for arsenic, benzo(a)pyrene and dieldrin will be compared to the 95 percent UCL calculated for the site as outlined in the April 29, 2002, Technical Memorandum from EnSafe (Attachment A). Subsurface soil results will be compared to the State of Florida soil cleanup target levels (SCLTs) based on leachability to groundwater. If soil delineation cannot be reasonably achieved to these cleanup goals (i.e., soil volume increases to considerably more than originally anticipated and becomes cost prohibitive), the hot spots will then be delineated based on industrial criteria and LUCs may be placed on the soil after the IRA is complete. These determinations will be made with consent of the Navy. All results will be summarized in a brief letter report and presented to the Partnering Team. Based on the results presented in the report, a final action (i.e., hot spot removal) will be determined for the site and an estimated amount of soil to be excavated will be established.

4.0 Works Sited

CH2M HILL Constructors, Inc. 2000. *Basewide Health and Safety Plan, NAS Pensacola, Pensacola, Florida.*

CH2M HILL Constructors, Inc. 2000. *Basewide Work Plan, NAS Pensacola, Pensacola, Florida.*

EnSafe, 2002. *Technical Memorandum, 95% UCL Calculations for OU 13.* April 29, 2002.

EnSafe 2002, *Focused Feasibility Study Report, OU 13, Sites 8 and 24,Naval Air Station, Pensacola, Florida.* May 2000.

EnSafe, 1997, *Remedial Investigation Report, Operable Unit 13 – Sites 8 and 24, NAS Pensacola.* June 20, 1997.

Naval Energy and Environmental Support Activity. 1983. *Initial Assessment Study of Naval Air Station Pensacola, Pensacola, Florida.* (NEESA 13-015).

U.S. Environmental Protection Agency. May 1996. *EPA Region IV Environmental Investigation Standard Operating Procedures and Quality Assurance Manual*. Revised 1997.

Attachment A

EnSafe Inc. Technical Memorandum
95 Percent UCL Calculations for OU 13

Use of the 95% Upper Confidence Limit In Developing Exposure Point Concentrations for Contaminants in Soils

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N. Christine Halmes, Ph.D.

Center for Environmental & Human Toxicology
University of Florida

May 11, 1999

Occasionally, there is some confusion regarding the use of average soil concentrations in risk assessment, both for estimating risks from a site and in determining whether existing soil concentrations are consistent with risk-based soil cleanup goals. The purpose of this brief report is to clarify some of these issues.

In most cases, risks from contaminated soils are evaluated based on chronic exposure. Under these circumstances, an individual will be exposed to contaminated soils over an area rather than at one specific location. If the individual's contact with the contaminated area is random, the best representation of the concentration to which he/she is exposed is the average contaminant concentration over that area. The ability to accurately generate an average concentration over a given area is dependent upon a number of things, including the location of the sampling and the number of samples. Because there may be some uncertainty as to whether the average of a given set of samples in fact represents the true average over the area of interest, the USEPA recommends use of a 95% upper confidence limit estimate (95% UCL) of the mean generated from the data. [Note: See the attached sheet for the formula used to calculate the 95% UCL] This is considered to be conservative in that there is, in effect, 95% certainty that the true average is less than the value used for risk calculations or comparisons.

Because it provides the best indication of exposure concentration over time, the 95% UCL of the mean concentration is generally the most appropriate basis for comparing site contaminant concentrations with soil cleanup target levels (SCTLs). There are a few exceptions to this, when the maximum concentration rather than the 95% UCL should be compared with the SCTL. These are:

1. <u>When the 95% UCL value exceeds the maximum concentration observed concentration</u>. If the site contaminant concentrations are quite variable, the 95% UCL can exceed the highest concentration observed on site. In this situation, the USEPA recommends using the maximum detected concentration, rather than the 95% UCL, for risk assessment purposes.

2. <u>When there are insufficient data to support calculation of a 95% UCL</u>. USEPA guidance recommends that a 95% UCL value should not be calculated (and the maximum concentration used instead) if there are fewer than 10 samples (*Supplemental Guidance to RAGS: Calculating the Concentration Term*, OSWER, 1992).

3. <u>When SCTLs are based on acute toxicity in children</u>. Small children occasionally ingest relatively large quantities of soil while playing. Typical residential SCTLs based on chronic, low-level exposure to soils are probably also protective under circumstances of a large, acute soil dose for most chemicals, but there are some important exceptions (Calabrese et al., Environ. Health Perspect. 105:1354-1358, 1997). During development of residential SCTLs for the Brownfields program, eight chemicals were identified as having potentially unacceptable risks associated

with an acute, large soil ingestion episode in children (e.g., 5 to 10 g. of soil on a single occasion). For each of these chemicals — barium, cadmium, copper, cyanide, fluoride, nickel, phenol, and vanadium — residential SCTLs were derived based on acute toxicity in children. Since these SCTLs are based on protection during a one-time soil exposure incident, it is important that they not be exceeded at any point on-site where children might be exposed. In situations involving current or potential residential land use and the presence of these specific chemicals, the residential SCTLs for these chemicals should be compared with maximum detected soil concentrations rather than 95% UCL values. That is, these specific SCTLs should be used as "not-to-exceed" values.

In evaluating whether contaminant concentrations on site are consistent with the SCTLs, it should not be automatically assumed that a site-wide average should be used. The general idea is to average concentrations over an area based on reasonable activity patterns for the most-exposed potential receptor. Observations of human activity associated with the site can be used to assist in a determination of the appropriate size of areas for averaging when evaluating risks posed by current site conditions. It is often more difficult to decide what constitutes reasonable averaging for future land use where human activity patterns are unknown. It has been suggested that when future residential exposure scenarios are involved, concentrations should be averaged over no more than 0.5-acre sections, corresponding to an average residential lot, for comparison with residential SCTLs.

Areas of localized, high contaminant concentrations ("hot spots") may be of concern, even in situations where the 95% UCL of the mean concentration for the chemical is within acceptable limits. The need to consider hot spots arises from concern that toxicity may result, under some circumstances, from relatively brief exposure to very high contaminant concentrations. Data with which to evaluate toxicity from such acute exposures are often not readily available, and a conservative, expedient approach is to set an upper limit for hot spot concentrations based on some multiple of the SCTL. As a general rule, an upper limit for contaminant concentrations in hot spots of 3-times the SCTL should be health protective [with the notable exception of residential SCTLs based on acute toxicity in children, as discussed above].

Equation for the Calculation of the 95% UCL of the Arithmetic Mean for a Lognormal Distribution:

$$95\%UCL = e^{(\bar{x}+0.5s^2+sH/\sqrt{n-1})}$$

Where:

e = constant (base of the natural log, equal to 2.718)

$\bar{x}$ = mean of the log transformed data

s = standard deviation of the log transformed data

H = H-statistic

N = number of samples

Equation for the Calculation of the 95% UCL of the Arithmetic Mean for a Normal Distribution:

$$95\%UCL = \bar{x} + t(s/\sqrt{n})$$

Where:

s = standard deviation of the untransformed data

$\bar{x}$ = mean of the untransformed data

t = Student-t statistic

n = number of samples