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Evaluation of Site Conditions Based on Results of Soil and Groundwater Sampling Operable Unit 13–Site 8

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Introduction

This technical memorandum (TM) presents an evaluation of the results from the analytical data obtained during sampling activities performed August 13 and 14, 2002, at Operable Unit (OU) 13–Site 8, NAS Pensacola, Florida. This evaluation also includes a rationale for no further action for soils rather than the originally proposed active remediation for the site.

Soil sampling originally was conducted at Site 8 to delineate contaminants and the extent for soil excavation. In addition to the scope outlined in the Sampling and Analysis Plan for soil delineation,CCI, also collected one groundwater sample in each area of soil contamination to evaluate whether the groundwater was affected by the chemicals detected in soil at the site.

Site History

Site 8 is located along the eastern side of John Towers Road, south of Taylor Road in the middle of the NAS Complex, as shown in **Figure 1**. Site 8 is an approximate 450- by 600-foot area currently occupied by Building 3561, which houses the NAS Pensacola Public Works Center (PWC) Maintenance/Material Department. 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. Miscellaneous office trailers and fenced storage areas, including Building 3678, are located north of 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. A chain-link fence surrounds most of the site. **Figure 2** presents the site layout.

During most of the 1980s, a limited portion of Building 3561 was used as a pesticide storage and equipment rinsing area. A tank washrack rinsing area was constructed in March 1981 midway along Building 3561's eastern side to contain and collect pesticide equipment wash water and rinsate. Wastewater from the wash rack was discharged to the sanitary sewer system. Base pest control operations were moved from Building 3561 to their current location at Building 1538 in the early 1990s (Naval Energy and Environmental Support Activity [NEESA], 1983).

Site 8 was formerly a base rifle range and disposal area. Various solid waste and dry refuse were reportedly placed in trenches and burned there during the late 1950s and 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 (NEESA, 1983).

Previous Investigations and Target Concentrations

An Initial Assessment Study, completed by NEESA in 1983, evaluated Site 8 based on information from historical records, field inspections, and interviews with NAS Pensacola personnel. No evidence of hazardous waste disposal was identified at Site 8. During Remedial Investigation (RI) activities conducted by EnSafe in 1996, two soil contamination areas were identified beneath the asphalt pavement at Site 8 in the vicinity of previous sample locations at 08S01 and 08S03. Sample 08S01 was taken from the western side of Building 3561 and sample 08S03 was taken adjacent to the eastern side of Building 3561. It was determined that sample 08S01 exhibited cadmium levels at 10.9 milligrams per kilogram (mg/kg) at 4 to 6 feet below land surface (ft bls) and 15.9 mg/kg at 7 to 9 ft bls.

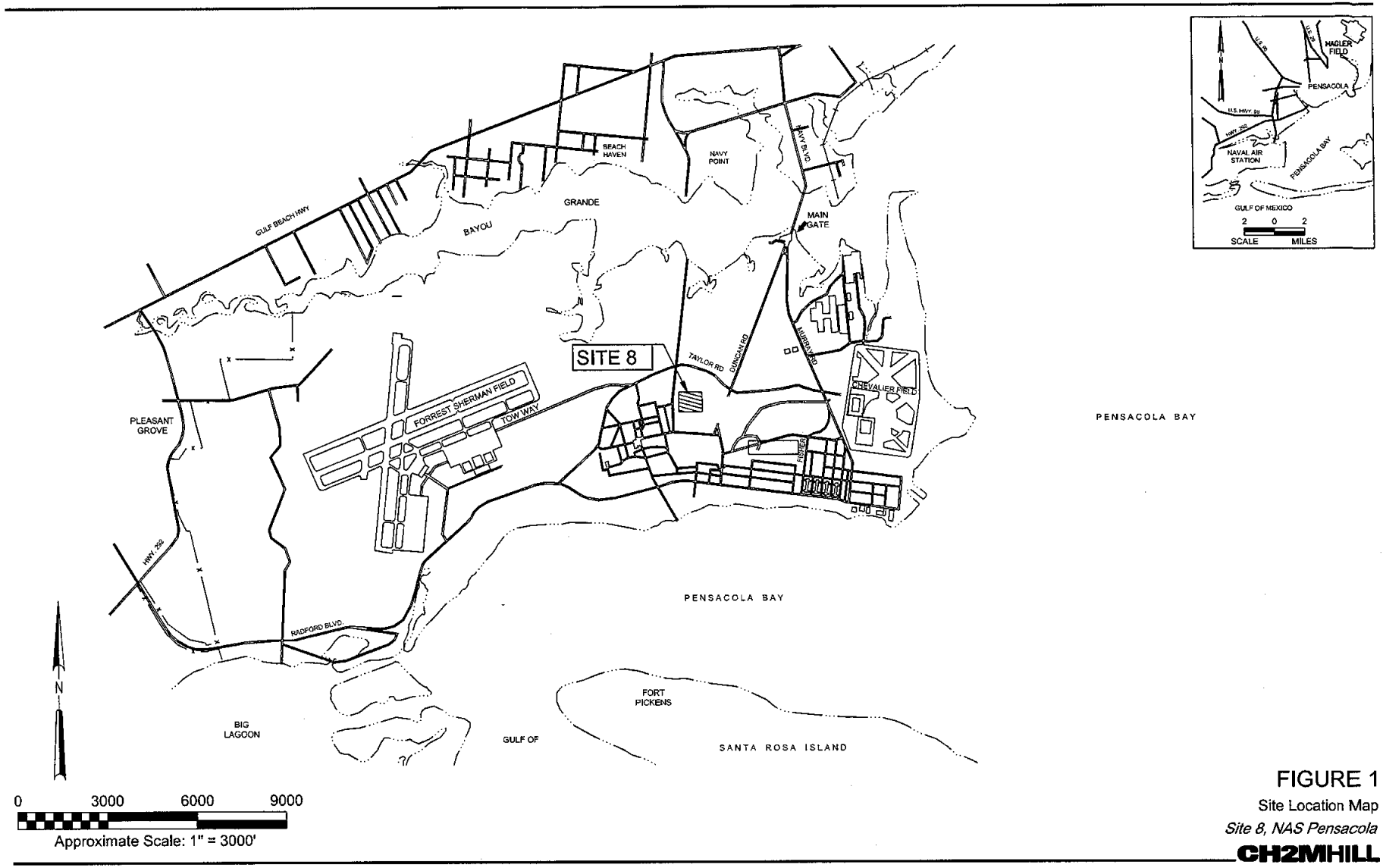

FIGURE 1
Site Location Map
Site 8, NAS Pensacola

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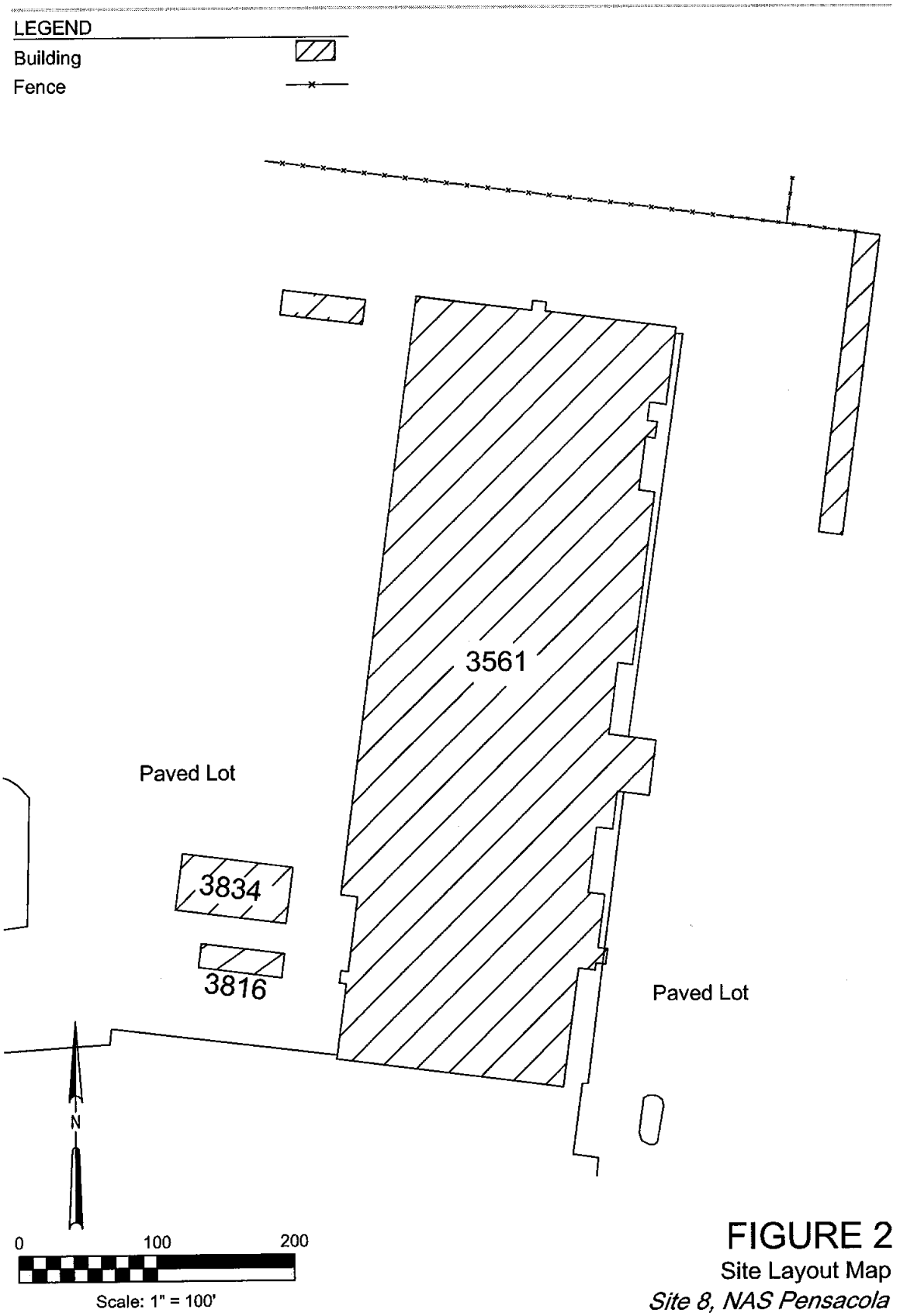

FIGURE 2

Site Layout Map

Site 8, NAS Pensacola

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Both of these samples exceeded the subsurface soil remediation goal (RG) of 6 mg/kg for cadmium. The background reference concentration for cadmium in soil at NAS Pensacola is 1 mg/kg. In addition, sample 08S03 exhibited a dieldrin concentration of 2.01 mg/kg in surface soil (0 to 1 ft bls), and 0.49 mg/kg (5 to 7 ft bls) and 0.134 mg/kg (9 to 11 ft bls) in subsurface soil. Each of these samples exceeded the surface and subsurface soil RGs of 0.04 mg/kg and 0.001 mg/kg respectively, for dieldrin. **Table 1** presents a summary of the contaminant of concern (COC) results from the RI Phases I, II, and III sampling events.

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

Sample Location	Date	Depth (feet)	Cadmium (mg/kg)	Dieldrin (mg/kg)
		0-1	--	--
08S01	1996	4-6	**10.9**	--
		7-9	**15.9**	0.00348
		0-1	--	**2.010**
08S03	1996	5-7	--	**0.496**
		9-11	--	**0.134**
Preliminary Remediation Goals Applicable During Previous Investigation				
	Surface		3.9	0.040
	Subsurface		6	0.001

Notes:
Bold numbers indicate exceedance of remedial goal.
mg/kg = milligrams per kilogram
-- = not analyzed

Groundwater samples collected in 1996 and 1997 from temporary monitoring wells at the site did not reveal the presence of dieldrin. The preliminary RG for dieldrin in groundwater during the RI was 0.1 micrograms per liter (µg/L),. Cadmium was detected in four temporary wells ranging from 19 to 32 µg/L, all above the applicable preliminary RG of 5 µg/L for cadmium during the RI. Cadmium is also naturally occurring and the reference concentration for cadmium in groundwater at NAS Pensacola at 3.4 µg/L.

Cadmium sources generally are associated with operations such as metal plating and coating, batteries, machine enamels, and pigments. None of the above listed sources are readily identified at the site, although unidentified solid debris reportedly was buried at the site in the 1950s and 1960s.

The source of dieldrin at the site is likely to be either from general facility maintenance application or from potential disposal during pesticide mixing and rinsing of associated equipment at the site. Presence of higher dieldrin levels in surface soils with gradual decrease in levels with depth indicate that dieldrin is likely from application/release to surface soil. The site was used in the 1980s as a pesticide storage and mixing area; however, dieldrin was discontinued for general use in the early 1970s. According to the Agency for

Toxic Substances and Disease Registry (ATSDR) (1993), dieldrin was used extensively as an insecticide on crops such as corn and cotton from the 1950s until 1970. The U.S. Department of Agriculture canceled all uses of dieldrin in 1970. In 1972, however, the EPA approved use of dieldrin for killing termites mostly in sub-terrain applications. The use of dieldrin to control termites continued until 1987. In 1987, the manufacturer voluntarily canceled the registration for use in controlling termites (ATSDR, 1993).

The current leachability-based RGs, which are the target RGs for subsurface soil at the site, are 8 mg/kg and 0.004 mg/kg for cadmium and dieldrin, respectively. These numbers are soil target levels based on the leachability to groundwater, referred to as soil cleanup target levels (SCTLs) as established by FDEP in Chapter 62-777of the Florida Administrative Code (FAC). The subsurface leachability-based SCTLs are estimated assuming that area-wide average COC concentrations meet these target levels.

The current surface soil direct exposure-based RG for dieldrin is 0.210 mg/kg, which is three times the residential SCTL as listed in Chapter 62-777, FAC. In April 2002, EnSafe performed a statistical evaluation for the COCs in surface soil at OU-13. The evaluation was conducted in conjunction with the FDEP's *Use of the 95 Percent Upper Confidence Limit in Developing Exposure Point Concentrations of Contaminants in Soil* (May 11, 1999). This evaluation (upper confidence limit [UCL95%]) resulted in estimated UCL95% levels above the target RGs. Therefore the highest concentration areas in surface soil are identified for removal in order for the UCL95% to be below the target RG levels. There are no exposed soils at the site, therefore surface soils refer to the soil found 0 to 1 ft below the asphalt pavement at the site. The target levels for the COCs are listed in **Table 2**.

TABLE 2
Soil Target Concentrations for the COCs
OU 13, NAS Pensacola

COC	Target Concentration (mg/kg)	Source	Rationale
Cadmium (subsurface)	8	Chapter 62-777	Leachability to groundwater
Dieldrin (surface)	0.21	3 X Chapter 62-777SCTL	Residential land use, direct exposure (UCL95%)
Dieldrin (subsurface)	0.004	Chapter 62-777	Leachability to groundwater

mg/kg = milligrams per kilogram
COC = contaminant of concern
SCTL = soil cleanup target level

Soil Investigation

On August 13 and 14, 2002, a total of 20 subsurface samples and associated quality assurance/quality control (QA/QC) samples were collected by CCI in the vicinity of former sample 08S01 for the delineation of cadmium. Additionally, a total of 6 surface, 12 subsurface, and associated QA/QC samples were collected by CCI in the vicinity of former sample 08S03 for the delineation of dieldrin.

All soil samples were collected using a direct push drill rig equipped with 4-foot samplers lined with plastic sleeves. Soil was mixed thoroughly and placed in 4-ounce glass jars. All sampling was conducted in accordance with CCI's *Basewide Work Plan for NAS Pensacola* (CCI, 2000), FDEP Standard Operating Procedures (SOPs), and EPA, Region 4, *Environmental Investigation Standard Operating Procedures and Quality Assurance Manual* (May 1996, revised 1997).

The delineation of the cadmium contamination at former sample 08S01 was performed by collecting three initial samples 25 feet to the north, south, and west of its location. In addition, three samples were then collected from these sampling points (50 feet from original sample location), and two more samples were collected 75 and 100 feet to the south of the original sample. Because of the location of Building 3561, initial and secondary samples were collected 18 feet and 36 feet to the east of former sample 08S01. All samples collected in this sampling effort were from 5 to 7 feet and 10 to 12 ft bls. Initially, only the samples collected closest to the original samples (on 25-foot centers) were analyzed. The additional samples were held at the laboratory pending the results of the 25-foot samples. When the results of this initial set of samples did not exceed target RG, other samples were not analyzed, as the extent for potential excavation is already defined. **Figure 3** indicates the layout for each soil sample location.

The delineation of the dieldrin contamination at former sample 08S03 was achieved by collecting surface and subsurface samples at 25- and 50-foot increments to the north, south, and east of its location. Samples were collected from zero to 1 foot, 5 to 7 feet, and 10 to 12 feet bls. Initially, only the samples collected closest to the original samples (on 25-foot centers) were analyzed. The additional samples were held at the laboratory pending the results of the 25-foot samples. Similar to the approach for cadmium above, when the results of this initial set of samples from first 25-foot distance did not exceed target RG, other samples were not analyzed, as the extent for potential excavation is already defined. **Figure 3** indicates the layout for each soil sample and location.

All samples were delivered to Kemron Environmental Services in Marietta, Ohio (a Navy-approved laboratory). Select samples were analyzed for cadmium using EPA Method 6010B and for dieldrin using EPA Method 8081A on a 48-hour turnaround time.

Groundwater Investigation

A direct push drill rig was used to collect two groundwater samples and one duplicate sample. The purpose of the sampling was to evaluate whether the soil contamination had affected groundwater. The groundwater samples were collected at the most downgradient locations to former samples 08S01 and 08S03 at locations 08S104 and 08S113, respectively. In collecting the samples, a 4-foot screen rod descended to the water table from approximately 15 to19 feet bls. Teflon® tubing was then lowered into the screen interval until it was 1 foot above the bottom of the screen (approximately 18 feet bls). The tubing was attached to a peristaltic pump and the groundwater was pumped to the surface using low flow. To minimize turbidity, 3 gallons of water were purged before the collection of the groundwater samples.

All groundwater samples were delivered to Kemron Environmental Services. Select samples were analyzed for cadmium using EPA Method 6010B and for dieldrin using EPA

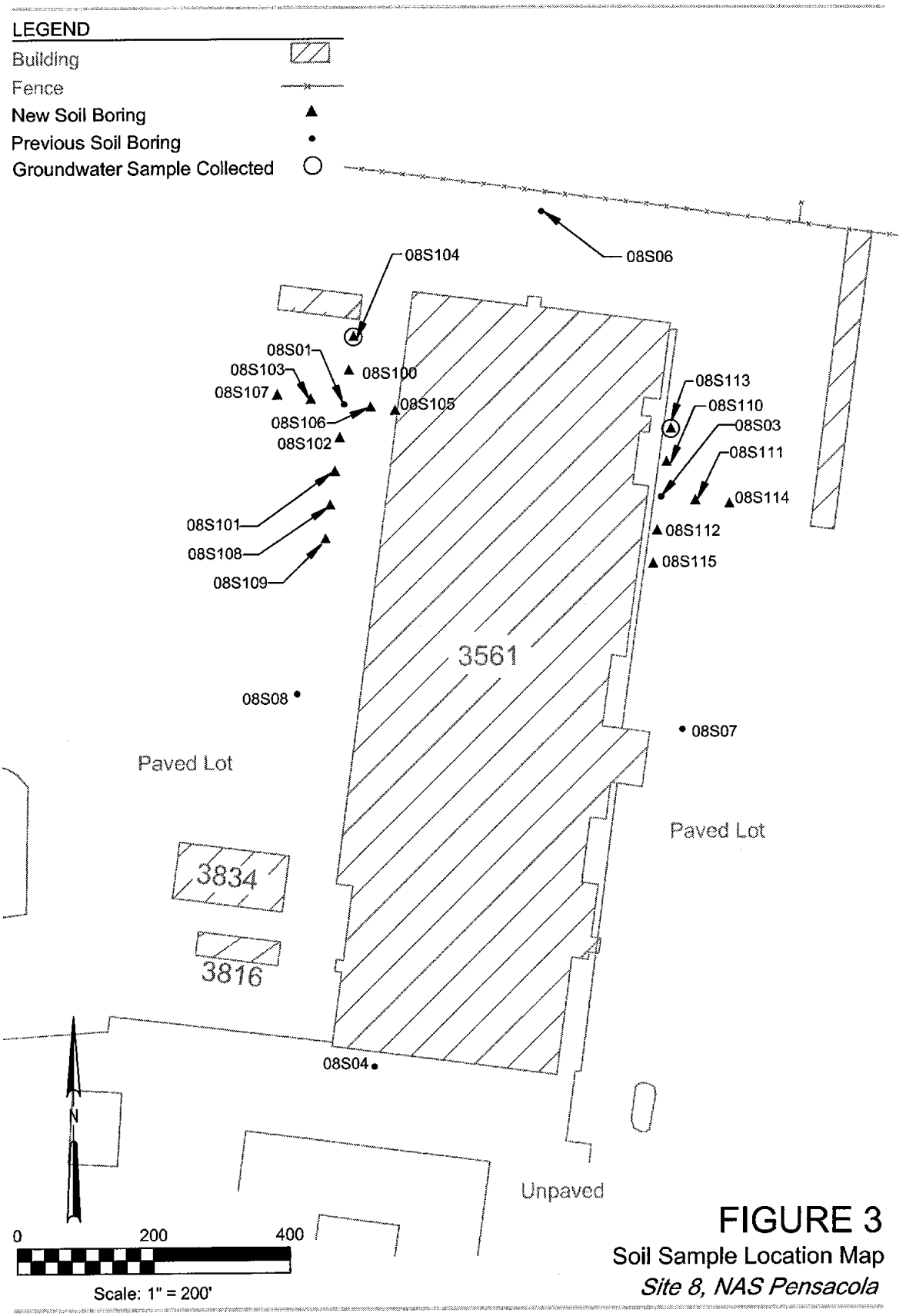

FIGURE 3

Soil Sample Location Map

Site 8, NAS Pensacola

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Method 8081A on a 48-hour turnaround time. The Horiba U-10 water quality meter was used to check groundwater parameters. **Table 3** presents the groundwater field parameter data.

TABLE 3
Groundwater Field Parameter Data
OU 13, NAS Pensacola

Monitoring Well	Measurement Date	Water Temperature (°C)	pH	Specific Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)
08S104	08/13/2002	29.2	5.71	0.476	129	9.74
08S113	08/14/2002	28.3	5.35	0.115	15	9.23

Notes:

°C = degrees Celsius
mg/L = milligrams per liter
mS/cm = micro Siemens per centimeter
NTU = nephelometric turbidity unit

Results

Soil

Analytical results for subsurface soil were compared to the target RGs established for the site using the FDEP leachability-based SCTLs found in Chapter 62-777, FAC. As stated previously, the surface soil RG for dieldrin was established at 0.21 mg/kg. using three times the residential SCTL (based on the UCL95% methodology, see Table 2). **Tables 4** and **5** present summaries of the analytical results for soil samples collected from the vicinity of 08S01 and 08S03, respectively. The complete analytical report is included in **Attachment A**. The Data Quality Evaluation (DQE) performed for the analytical results is presented in **Attachment B**.

TABLE 4
Surface Soil Sampling Results in Vicinity of Sample 08S01
OU 13, NAS Pensacola

Sample ID	Depth (feet bls)	Cadmium (mg/kg) EPA Method 6010B
085-08-100-S-7	5-7	0.0485 U
085-08-100-S-12	10-12	0.283
085-08-102-S-7	5-7	0.156
085-08-102-S-12	10-12	1.34
085-08-103-S-7	5-7	0.23
085-08-103-S-12	10-12	0.222

TABLE 4
Surface Soil Sampling Results in Vicinity of Sample 08S01
OU 13, NAS Pensacola

Sample ID	Depth (feet bls)	Cadmium (mg/kg) EPA Method 6010B
085-08-106-S-7	5-7	0.0512
085-08-106-S-12	10-12	0.0971
Leachability based target RG for Subsurface Soil (Chapter 62-777 FAC)		8

Notes:
bls = below land surface
mg/kg = milligrams per kilogram
U = undetected
EPA = U.S. Environmental Protection Agency
FAC = Florida Administrative Code
RG = Remedial Goal

TABLE 5
Surface Soil Sampling Results in Vicinity of Sample 08S03
OU 13, NAS Pensacola

		Dieldrin by EPA Method 8081A (mg/kg)	
Sample ID	**Depth (feet bls)**	**Surface Soil**	**Subsurface Soil**
085-08-110-S-1	0-1	0.0123	--
085-08-110-S-7	5-7	--	0.0023 J
085-08-110-S-12	10-12	--	0.000857 U
085-08-111-S-1	0-1	0.000888 U	
085-08-111-S-7	5-7	--	0.00115 J
085-08-111-S-12	10-12	--	0.000848 U
085-08-112-S-1	0-1	0.00159 J	--
085-08-112-S-7	5-7	--	0.000845 U
085-08-112-S-12	10-12	--	0.000841 U
Residential Cleanup Goals for Surface Soil (3 x SCTL)		0.21	
Industrial Cleanup Goals for Surface Soil (Chapter 62-777 FAC)		0.3	
Leachability based target RG for Subsurface Soil (Chapter 62-777 FAC)			0.004

Notes:
bls = below land surface
mg/kg = milligrams per kilogram
U = undetected
J = estimated value
EPA = U.S. Environmental Protection Agency
FAC = Florida Administrative Code
-- = not analyzed
RG = Remedial Goal

Of the eight initial samples collected closest to sample 08S01 and analyzed for cadmium, no samples exceeded the associated RG of 8 mg/kg. Therefore, the remaining samples collected were not analyzed. Thus, the area in which elevated cadmium is occurring is limited to the original sample location, and it might be in the form of a piece of metal debris. Assuming the entire area between 08S01 and the nearest "clean" soil samples is contaminated, there would be 2,150 square feet of contaminated soil. This conservatively estimated area is much smaller than the ½ acre (21,780 square feet) contamination area typically assumed in estimating leachability criteria. All the surrounding samples are much lower than the target RG value. **Figure 4** presents the results for soil samples.

Of the eight initial samples collected closest to sample 08S03 and analyzed for dieldrin, no samples exceeded the established RG. Therefore, the remaining samples collected were not analyzed. Similar assumption as one described above for cadmium applies for dieldrin area also, where exposure area with elevated dieldrin (625 square feet) is much smaller than a typical exposure unit assumed for estimation of RG. **Figure 4** presents the results for soil samples.

The only cadmium and dieldrin soil contamination identified at the site is in the original RI soil samples (08S01 and 08S03). Through this investigation, soil delineation at the site has been achieved for cadmium and dieldrin, with the exception of the western extent of dieldrin at sample 08S03, where contamination may be present under the concrete building foundation. Two areas totaling approximately 2,775 square feet (approximately 1,074 cubic yards) contain COCs above the surface and/or subsurface remedial goals. The entire area is covered with asphalt and/or concrete. Thus the there is no direct exposure related human health concern or potential leachability to groundwater at the present time. Such pathways are valid in the future only if the pavement is removed.

Soil data were validated by Heartland Environmental Services, Inc. It was noted that sample 085-08-111-S-7 exhibited a surrogate recovery above the quality control limit for dieldrin. The reported positive result was qualified as estimated. The complete DQE performed for the analytical results is presented in **Attachment B**.

Groundwater

No detectable concentrations of cadmium or dieldrin were reported in the groundwater sample results. However, the method detection limit (MDL) for dieldrin was 0.025 µg/L (above the associated GCTL), as analyzed using the EPA-approved analytical method. Therefore, any concentrations of dieldrin above the RG of 0.0005 µg/L but below the MDL of 0.025 µg/L could not be detected or reported. Currently there is no reason to believe dieldrin could leach to groundwater due to limited area of soil and presence of impervious pavement over the area. Refer to **Table 6** for a summary of groundwater results.

LEGEND

Building	
Fence	
New Soil Boring	▲
Previous Soil Boring	•
Groundwater Sample Collected	○
Not Detected	ND
No Exceedance	NE

Notes:

1. Soil analytical results are shown in mg/kg.
2. The applicable subsurface soil criterion for cadmium is 8.0 mg/kg.
3. The applicable surface soil criterion for dieldrin is 0.210 mg/kg.
4. The applicable subsurface soil criterion for dieldrin is 0.004 mg/kg.

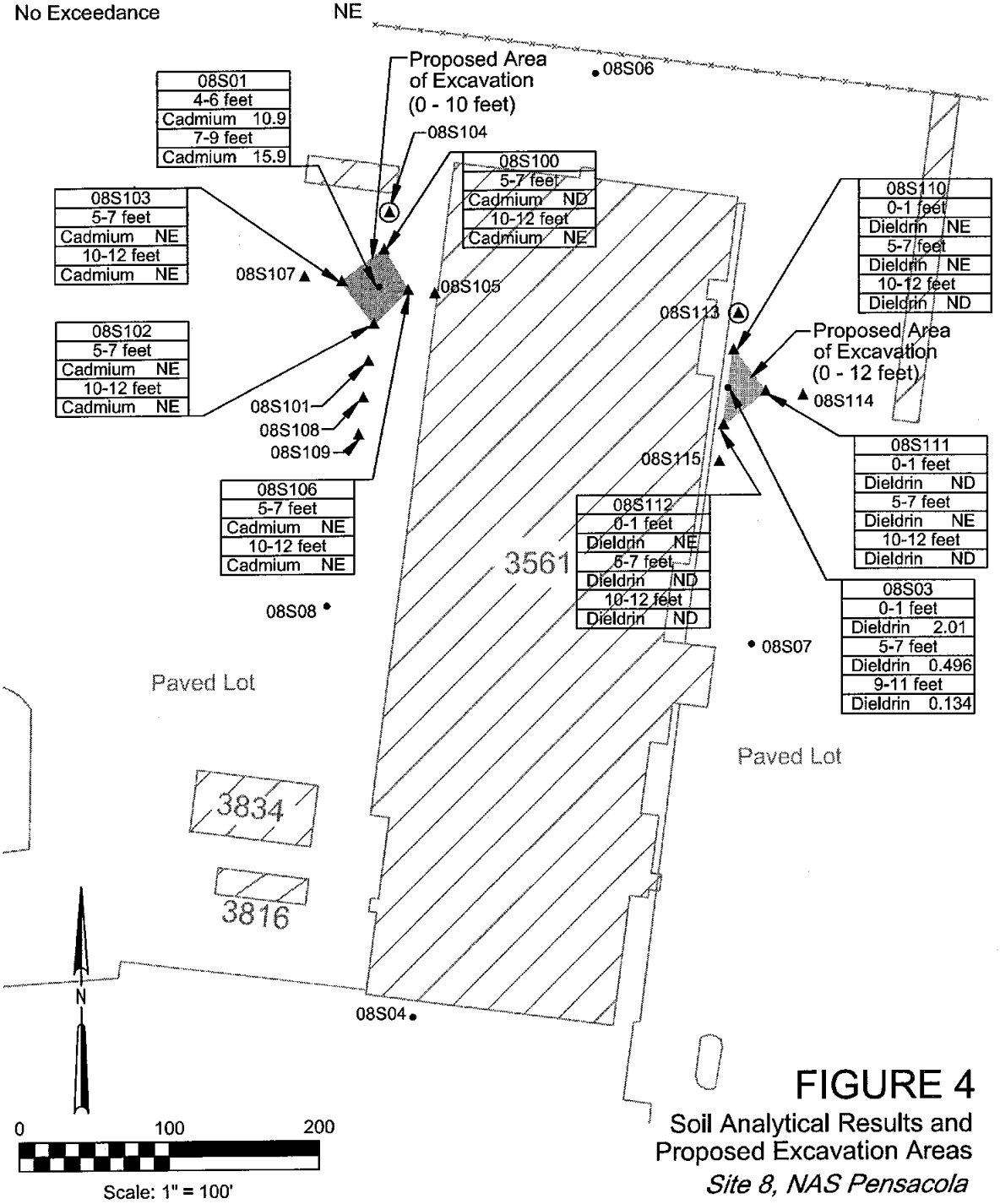

FIGURE 4

Soil Analytical Results and Proposed Excavation Areas

Site 8, NAS Pensacola

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TABLE 6
Groundwater Sampling Results
OU 13, NAS Pensacola

Sample ID	Cadmium (µg/L) EPA Method 6010B	Dieldrin (µg/L) EPA Method 8081A
085-08-104-GW	2.5 U	--
085-08-FD1-GW (Duplicate of 085-08-104-GW)	2.5 U	--
085-08-113-GW-19	--	0.0263 UJ
Regulatory Guidance for Groundwater	5.0 [a]	0.005 [b]

[a] primary standard as provided from 62-550 FAC
[b] minimum criteria practical quantitation limit as provided from 62-777 FAC
µg/L = micrograms per liter
U = undetected
UJ = quantitation limit is qualified as estimated
-- = not analyzed
EPA = U.S. Environmental Protection Agency

Heartland Environmental Services, Inc., conducted data validation. It was noted that sample 085-08-113-GW-19 exhibited a surrogate recovery below the quality control limit for dieldrin. The reported non-detect result was qualified as estimated. The complete DQE performed for the analytical results is presented in **Attachment B.**

Data Interpretation and Recommendations

Typically, remedial actions are identified as necessary at hazardous waste sites when there is unacceptable risk to human health and/or the environment because of the presence of site-specific, operations-related wastes. The remedial actions are implemented such that sitewide statistical averages do not exceed the RGs for the medium of interest. For example, surface soil exposure point concentrations, which are the Upper Confidence Limit (UCL) on the mean at the 95 percent level (UCL95%) concentration for COCs, should not exceed their respective direct exposure-based RGs for the selected land use. The surface soil RGs for Site 8 were selected to be three times the FDEP residential direct exposure SCTLs by the remedial management team. Individual samples may have concentrations above the RGs, but the sitewide upperbound averages (e.g., UCL95%) do not exceed the RGs.

Surface soil concentrations of dieldrin ranged from 0.00115 mg/kg to 2.01 mg/kg (including historical samples). The UCL95% concentration for dieldrin in surface soil was calculated to be 0.042 mg/kg, which is below the residential RG of 0.21 mg/kg for dieldrin. Because the UCL95% is below the residential RG and the entire dieldrin-affected area lies beneath asphalt and/or concrete and is less than ½ -acre in size, no active soil remediation is required.

The leachability-based target RGs are calculated based on generic assumptions for the soils in the contamination area and no dilution attenuation is assumed, which is a conservative assumption; therefore, a site-specific leachability RG was not developed for this site. The SCTLs typically are used as screening values, and are thus designed to be conservative.

Only two subsurface soil samples (collected at location 08S03) exceeded the leachability-based RG for dieldrin. The sitewide average concentration of dieldrin in subsurface soil at Site 8, 0.071 mg/kg also exceeds the RG of 0.004 mg/kg.

Because dieldrin is persistent, tends to partition into organic carbon in soils, and has low solubility, it tends to have sporadic high detections even when a release is aged. Dieldrin, which was discontinued for use in the early 1970s, has a half life in soil of about 5 years in exposed soils (ATSDR, 1993). However, it is likely to persist for longer periods of time in paved areas. The dieldrin is likely from historical routine pesticide applications prior to paving of the area, and is likely to remain at similar concentrations as long as the impervious pavement is present. Because of absence of groundwater recharge under the paved areas, leachbility is not a concern of relatively low dieldrin contamination. Due to the high soil binding nature of organo-chlorine pesticides, including dieldrin, once the solvent in which they are dissolved attenuates, future migration potential due to water percolation/dissolution is low even if the pavement is removed. Thus dieldrin present at the site is not a long-term leachability or exposure concern.

Dieldrin is not a direct exposure concern at the site at the present time due to presence of pavement preventing exposures. Even if the pavement is removed under a future altered land use, the exposure point concentrations (average of surface soil concentrations) are lower than acceptable risk-based target RG levels for commercial/industrial land use. The overall area in which dieldrin is occurring is much smaller than a typical exposure unit or area assumed for leachbility (½-acre). For the reasons discussed above, and its absence in latest groundwater samples in spite of its reported presence in the deepest soils, dieldrin is not leaching to groundwater, contrary to the indication of the exceedance above the target RG for leachability. Thus, no further actions are recommended to address subsurface dieldrin in soil at Site 8.

Cadmium concentrations in the subsurface soil at Site 8 range from 0.05 mg/kg to 15.9 mg/kg. Only two subsurface soil samples (collected at location 08S01) exceeded the leachability-based RG for cadmium. As previously stated, the subsurface leachability-based SCTLs are estimated assuming that area wide average concentrations meet these concentrations. The sitewide average concentration for cadmium in the subsurface soil is 2.65 mg/kg, which is below the leachability based target RG of 8 mg/kg. Additionally, cadmium was not detected in groundwater sample collected downgradient from highest soil sample location in spite of its reported presence in the deepest soils , indicating cadmium is not leaching to groundwater. Thus, no further actions are recommended to address subsurface cadmium in soil at Site 8.

Acronyms

ATSDR	Agency for Toxic substances and Disease Registry
bls	below land surface
CCI	CH2M HILL Constructors, Inc.
COC	contaminant of concern
DQE	data quality evaluation
EPA	U.S. Environmental Protection Agency
FAC	Florida Administration Code
FDEP	Florida Department of Environmental Management

GCTL	groundwater cleanup target level
MDL	method detection limit
µg/L	micrograms per liter
mg/kg	milligrams per kilogram
NAS	Naval Air Station
NEESA	Naval Energy and Environmental Support Activity
OU	operable unit
PWC	Public Works Center
QA/QC	quality assurance/quality control
RBC	risk-based concentration
RG	remediation goal
RI	Remedial Investigation
SCTL	soil cleanup target level
SOP	standard operating procedure
TM	technical memorandum
UCL	upper confidence limit

References

ATSDR. April 1993. *Public Health Statement for Aldrin and Dieldrin.* Agency for Toxic Substances and Disease Registry A Public Health Service, Atlanta, Georgia.

CH2M HILL Constructors, Inc. June 2000. *Basewide Work Plan Naval Air Station Pensacola, Pensacola, Florida.*

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

EnSafe. April 2002. *95 Percent Upper Confidence Level Calculations for Operable Unit 13.*

Florida Department of Environmental Protection. May 1999. *Use of the 95 Percent Upper Confidence Limit in Developing Exposure Point Concentrations of Contaminants in Soils.*

Naval Energy and Environmental Support Activity. 1983. *Initial Assessment Study of Naval Air Station Pensacola, Pensacola, Florida.*

U.S. Environmental Protection Agency. May 1996; revised 1997. *Environmental Investigation Standard Operating Procedures and Quality Assurance Manual.* EPA Region 4.

This Data Transfer Memorandum for Site 8 at Naval Air Station Pensacola was prepared under the direction of a Registered Professional Geologist.

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10/31/02

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ATTACHMENT A

Analytical Reports

ATTACHMENT B

Data Quality Evaluation