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EVALUATION OF SITE CONDITIONS BASED ON SOIL AND GROUNDWATER SAMPLING RESULTS REVISION 1 SITE 24 WITH TRANSMITTAL NAS PENSACOLA FL
10/30/2002
CH2MHILL

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October 30, 2002

Mr. Bill Hill, ES31
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Subject: Contract No. N62467-98-D-0095
Contract Task Order 0085 – Naval Air Station (NAS) Pensacola – Pensacola, Florida
Evaluation of Site Conditions Based on Results of Soil and Groundwater Sampling, Operable Unit 13 – Site 24, Revision 01

Dear Mr. Hill:

CH2M HILL Constructors (CCI) is pleased to provide this electronic copy of the revised technical memorandum titled Evaluation of Site Conditions Based on Results of Soil and Groundwater Sampling, Operable Unit 13 – Site 24, Revision 01. Upon further evaluation of the site, and based on conversations with the Navy, the recommendation for future actions at the site has been modified.

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

Evaluation of Site Conditions Based on Results of Soil and Groundwater Sampling NAS Pensacola, Operable Unit 13, Site 24

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DATE: October 30, 2002

Contents

This technical memorandum (TM) presents an evaluation of the results from the analytical data obtained during sampling activities performed August 14 and 15, 2002, at NAS Pensacola, Florida. This evaluation also includes a rationale for no further action for soils rather than for active remediation for the site.

Soil sampling originally was conducted at Operable Unit (OU) 13, Site 24 to delineate contaminants and the extent for soil excavation. In addition to the scope outlined in the Sampling and Analysis Plan, 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

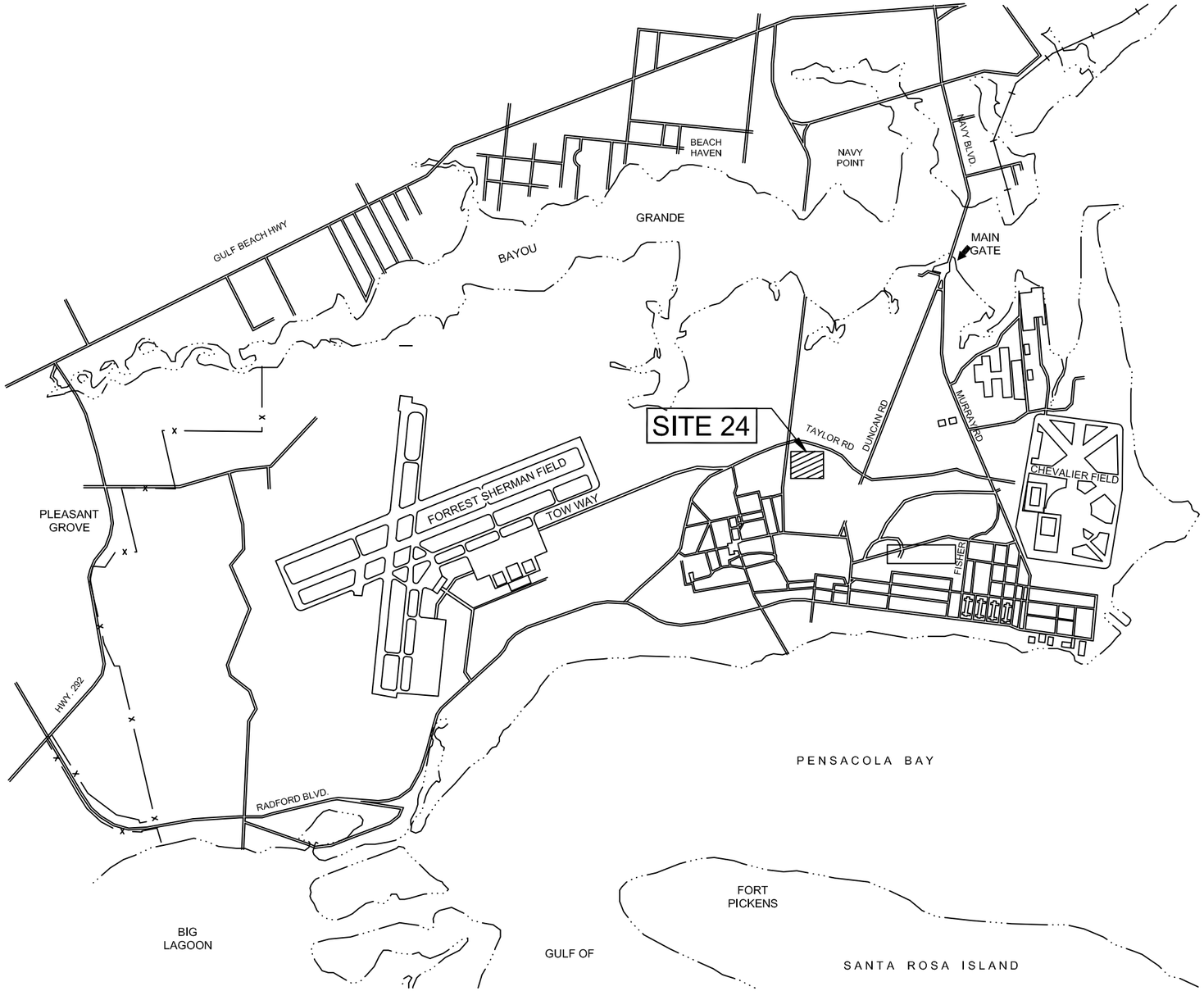
Site 24 is located along the eastern side of John Towers Road, south of Taylor Road in the middle of the NAS Complex, as shown in **Figure 1**. Site 24 is immediately north of Building 3561 near the northwestern corner of the Barrancas National Cemetery. Nearly three quarters of the site is now part 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 from east to west, which leads to the circular drive surrounding the columbarium. Cemetery personnel have reported finding buried metal, rubber, and plastic aircraft parts during excavation along the eastern boundary of Site 24 (Ensafe, Inc. [EnSafe], 2000). **Figure 2** presents the site layout.

From the early 1950s until the early 1960s, Site 24 was used to mix dichlorodiphenyltrichloroethane (DDT) with diesel fuel for mosquito control. DDT reportedly was spilled in the mixing area while being transferred from drums to spray tanks, potentially contaminating the soil and groundwater. DDT was aerially applied for at least 10 years to control mosquito outbreaks. In subsequent years, DDT was applied via a fogger machine. On the average, two or three mosquito outbreaks occurred each year during the spring and summer. Following each outbreak, DDT generally was 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. An estimated 20 gallons of the 20 percent solution may have been spilled during the approximate 10-year period of DDT mixing at the site (Naval Energy and Environmental Support Activity, 1983). No other pesticides have been reported as being stored and used at this site.

Previous Investigations and Target Concentrations

Ecology & Environment, Inc., completed a Phase I screening investigation in 1991 to identify areas with contaminants of potential concern (COPCs). Soil and groundwater samples were collected during the investigation and submitted for laboratory analysis. Lead, total recoverable petroleum hydrocarbons (TRPHs), polynuclear aromatic hydrocarbons (PAHs), and the carbamate pesticide, fluometuron, were detected in soil. Metals, tetrachloroethene, and the carbamante pesticide, methomyl, were detected in groundwater. DDT was not detected. As a result, additional assessment was recommended (Ensafe, 2000).

Preliminary site characterizations were performed from 1995 through 1997 under the authority of the U.S. Navy Comprehensive Long-term Environmental Action Navy (CLEAN) program. Soil and groundwater samples were analyzed for the full target analyte list/target compound list (TAL/TCL). These analyses included TCL volatile organic compounds (VOCs), TCL semivolatile organic compounds (SVOCs), TCL pesticides, TCL polychlorinated biphenyls (PCBs), TAL metals (unfiltered for groundwater), and TAL cyanide. The investigation was raised to Remedial Investigation (RI) status after the analytical results showed preliminary remediation goal exceedances for metals, SVOCs, and pesticides at several locations (Ensafe, 1999).



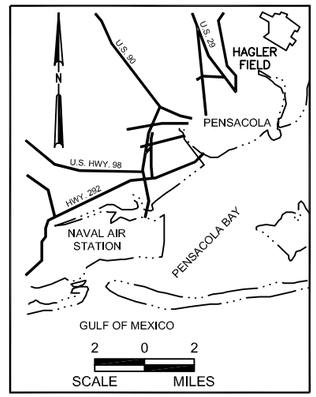


FIGURE 1

Site Location Map

Site 24, NAS Pensacola

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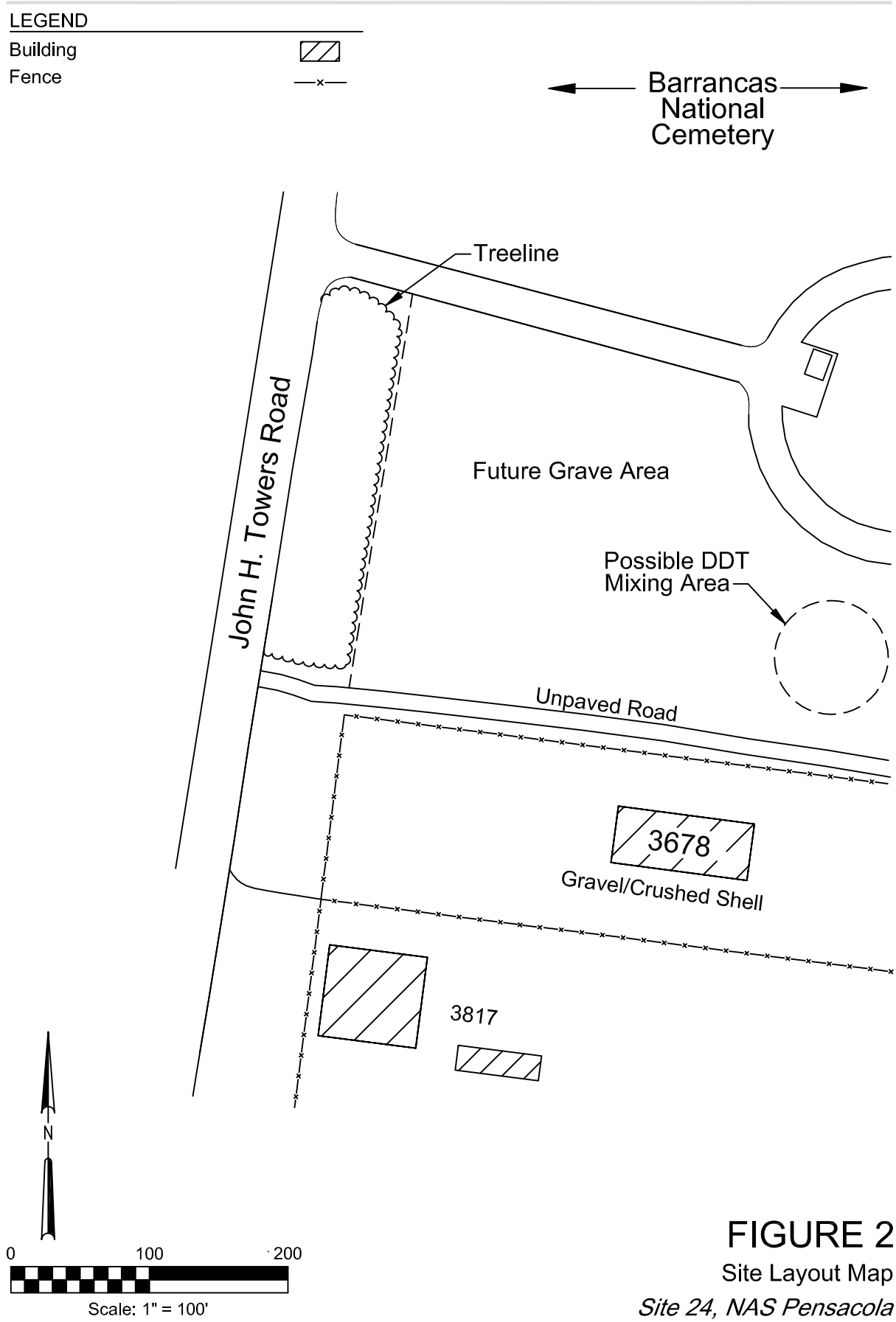

FIGURE 2

Site Layout Map

Site 24, NAS Pensacola

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The results of the RI identified four soil contamination areas at Site 24 in the vicinity of samples 24S01, 24S10, 24S11, and 24S12. Initially, dieldrin was identified as a chemical of concern (COC) based on an exceedance of the then target concentration of 0.001 milligrams per kilogram (mg/kg). However, the remediation goal for dieldrin in subsurface soil subsequently was changed to the leachability-based Florida soil cleanup target level (SCTL) of 0.004 mg/kg. Consequently, the dieldrin concentration detected in sample 24S01 no longer exceeded the cleanup level for dieldrin. Samples 24S10 and 24S12 still exceeded the subsurface SCTL for dieldrin. Sample 24S10 also exceeded the surface soil remedial goals for arsenic and benzo(a)pyrene and sample 24S11 exceeded the surface soil remediation goal for arsenic. **Table 1** presents a summary of the 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)	Arsenic (mg/kg)	Benzo(a)pyrene (mg/kg)	Dieldrin (mg/kg)
24S01	**1995**	**0-1**	**--**	--	--
		3-5	**--**	--	0.0023
24S10	**1996**	**0-1**	2.8	0.630	0.058
		5-7	--	--	0.022
24S11	**1996**	**0-1**	3.1	--	--
		4-6	--	--	--
24S12	**1996**	**0-1**	1.2	0.160	**0.10**
		4-6	--	--	0.0042
Preliminary Remediation Goals Applicable During Previous Investigation					
Surface			0.43/1.56 [a]	0.088	0.04
Subsurface			0.43/1.56 [a]	3.7	.001
Current Remedial Goals					
Surface			2.4 [b] /3.7 [c]	0.3 [b] /0.5 [c]	0.210 [b] /0.3 [c]
Subsurface			29 [d]	8 [d]	0.004 [d]

Notes:
mg/kg = milligrams per kilogram
-- = Regulatory limit not exceeded
[a] = Reference Concentration
[b] = Residential land use, direct exposure, 3 x SCTL
[c] = Industrial soil cleanup target level, Chapter 62-777, F.A.C.
[d] = Leachability to groundwater, Chapter 62-777, F.A.C.
Bold numbers indicate exceedance of current remedial goal.

The source of dieldrin at the site is unknown. According to the Agency for Toxic Substances and Disease Registry (ATSDR) (1993), sunlight and bacteria in the environment can change the pesticide aldrin to dieldrin. Aldrin and dieldrin are no longer used. From the 1950s until 1970, aldrin and dieldrin were used extensively as insecticides on crops such as corn and cotton. The U.S. Department of Agriculture canceled all uses of aldrin and dieldrin in 1970. In 1972, however, EPA approved aldrin and dieldrin for killing termites. The use of aldrin and 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 remediation goals (RGs), which are the target RGs for subsurface soil at the site, are 29 mg/kg, 8 mg/kg, and 0.004 mg/kg for arsenic, benzo(a)pyrene, and dieldrin, respectively. These numbers are based on the groundwater leachability SCTLs. The subsurface leachability-based SCTLs are estimated assuming that area-wide average concentrations meet these concentrations.

The surface soil direct exposure-based RGs are at 2.4 mg/kg for arsenic, 0.3 mg/kg for benzo(a)pyrene, and 0.210 mg/kg for dieldrin, which are three times the residential SCTLs. In April 2002, EnSafe performed a statistical evaluation for the COCs in surface soil at Site 24. The evaluation was conducted in conjunction with 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 identifying surface soil areas that exceeded the target RG levels. The target levels for the three 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
Arsenic	2.4	3 x SCTL	Residential land use, direct exposure
Dieldrin	0.004	Chapter 62-777	Leachability to groundwater
Benzo(a)pyrene	0.3	3 x SCTL	Residential land use, direct exposure

Notes:
mg/kg = milligrams per kilogram
COC = contaminant of concern

Groundwater samples collected in 1995 and 1996 from temporary monitoring wells at the site did not reveal the presence of benzo(a)pyrene. Only the sample collected from 24GS01 (located at former boring 24S01) exceeded the applicable RG of 0.1 micrograms per liter (µg/L) for dieldrin during the RI (0.26 and 0.34 µg/L). Samples collected from wells 24GS01 and 24GS03 (located at former boring 24S03) exhibited dieldrin in excess of the current RG of 0.005 µg/L. Both of these temporary wells were located on the western portion of the property. The sample collected from temporary well 24GS03 also exhibited an arsenic concentration of 10.6 µg/L. This concentration did not exceed the applicable RG of 50 µg/L during the RI; however, it slightly exceeds the new federal maximum contaminant level (MCL) of 10 µg/L.

Soil Investigation

On August 14 and 15, 2002, a total of 8 surface, 13 subsurface, and associated quality assurance/quality control (QA/QC) samples were collected by CCI in the vicinity of former sample 24S10 for the source delineation of arsenic and benzo(a)pyrene in surface soil and dieldrin in subsurface soil. Additionally, a total of 1 surface, 11 subsurface, and associated QA/QC samples were collected by CCI in the vicinity of former sample 24S12 for the delineation of arsenic and dieldrin, respectively.

Surface 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).

Delineation of the dieldrin subsurface soil contamination at former sample 24S10 was performed by taking four initial samples on all four sides, 25 feet to the north, south, east, and west of its location. To prevent the displacement of several large trees in the event of excavation, four additional samples were collected on 12.5-foot centers from the original sample (half the distance to the 25-foot samples). These samples were held at the laboratory pending the results of the 25-foot samples. Subsurface soil samples were collected from 5 to 7 feet below land surface (bls). Deeper subsurface samples were collected at various depths depending on the depth to groundwater, which was found as high as 9 feet bls.

One sample also was collected south of former sample 24S11 to delineate the arsenic surface soil contamination.

Delineation for dieldrin contamination in the subsurface soil at the location of former sample 24S12 was performed by taking four initial samples 25 feet to the north, south, east, and west of its location. As with sampling at 24S10, secondary samples also were collected 12.5 feet from sample 24S12 to mitigate the potential disturbance to the tree line. These samples were held at the laboratory pending the results of the 25-foot samples. Subsurface soil samples were collected from 5 to 7 feet bls. The water table is located at approximately 8 feet bls, so the 10- to 12-foot bls samples were not collected. **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 arsenic using EPA Method 6010B, benzo(a)pyrene using EPA Method 8270C, and 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 24S10 and 24S12 at locations 24S51 and 24S59, respectively. In collecting the samples, a 4-foot screen rod descended to the water table from approximately

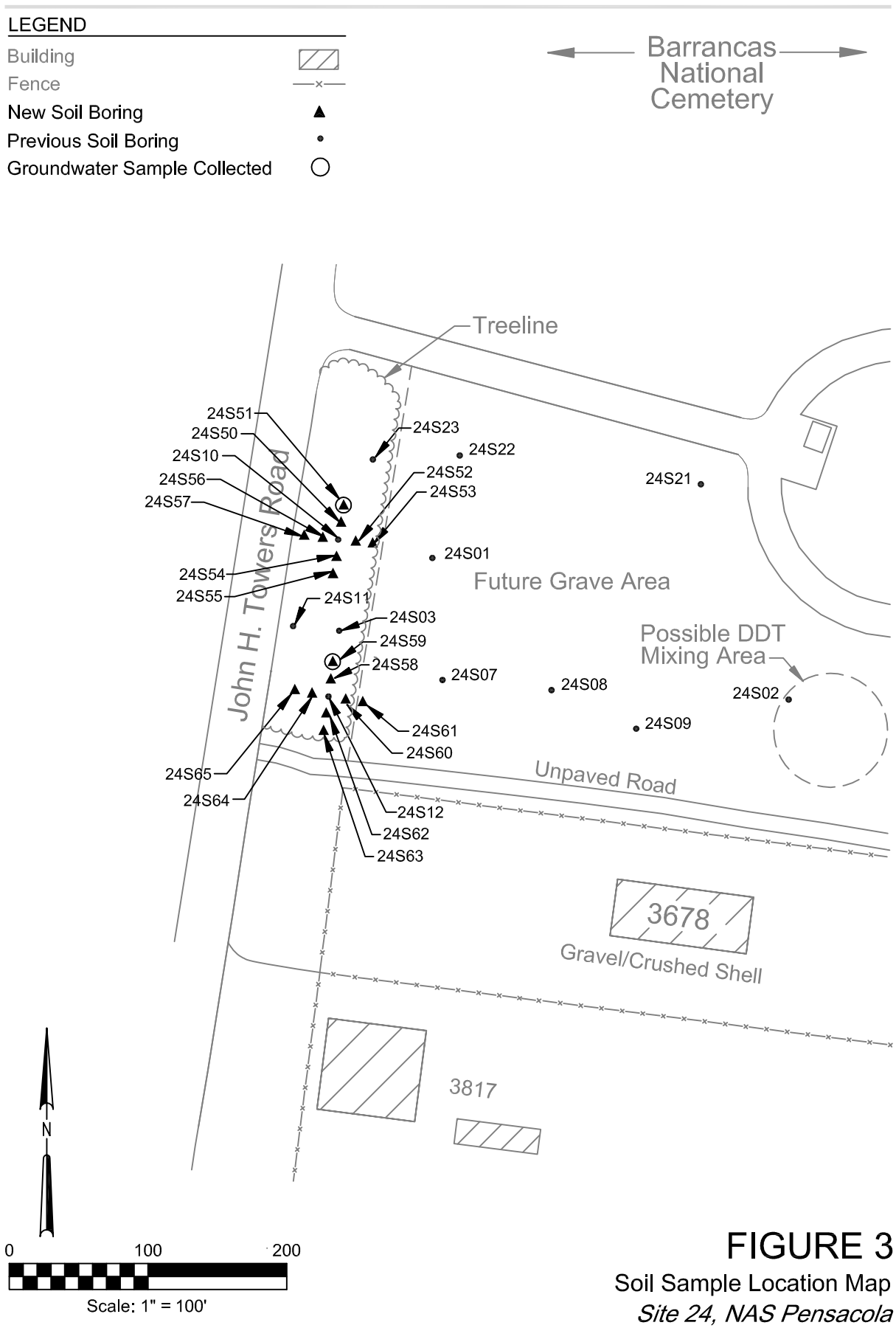

FIGURE 3

Soil Sample Location Map

Site 24, NAS Pensacola

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12 to 16 feet bls. Teflon® tubing was then lowered into the screen interval until it was 1 foot above the bottom of the screen (approximately 15 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 arsenic using EPA Method 6010B, benzo(a)pyrene using EPA Method 8270C, and dieldrin using EPA Method 8081A on a 48-hour turnaround time. The Horiba U-10 was used to check water quality. **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)
24S51	08/15/2002	25.2	6.33	0.537	6	8.53
24S59	08/14/2002	27.2	6.46	0.44	35	7.61

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 taken from the FDEP leachability based SCTLs found in Chapter 62-777, Florida Administration Code (FAC). As stated previously, the surface criteria for the COCs were established using three times the residential SCTL (based on the UCL95% methodology). **Tables 4** and **5** present a summary of the results from soil samples collected from the vicinity of 24S10 and 24S12, respectively. The analytical report is included in **Attachment A**. The Data Quality Evaluation (DQE) performed for the analytical results is presented in **Attachment B**.

Of the four initial surface samples collected and analyzed for arsenic and benzo(a)pyrene in the vicinity of sample 24S10, arsenic was found exceeding the target RG in sample 24S55, while all four samples analyzed for benzo(a)pyrene exceeded the target RG of 0.3 mg/kg.

Of the seven initial subsurface samples collected and analyzed for dieldrin near sample 24S10, samples 24S51, 24S55, and 24S57 exceeded the target RG of 0.004 mg/kg for subsurface soil. Because each of the samples on 25-foot centers exceeded one or more of the cleanup goals, no other samples were analyzed closer to the original sample.

TABLE 4
Surface Soil Sampling Results in Vicinity of Sample 24S10
OU 13, NAS Pensacola

Sample ID	Depth (feet bls)	Arsenic EPA Method 6010B (mg/kg)	Benzo(a)pyrene EPA Method 8270C (mg/kg)	Dieldrin EPA Method 8081A (mg/kg)
085-24-51-S-1	0-1	0.918	**4.030**	--
085-24-51-S-7	5-7	--	--	0.000861 U
085-24-51-S-11	9-11	--	--	**0.0376**
085-24-53-S-1	0-1	0.74	**0.741 J**	--
085-24-53-S-7	5-7	--	--	0.000856 U
085-24-53-S-11	Groundwater encountered at 7.5 to 8 feet bls			
085-24-55-S-1	0-1	**3.89**	**7.57**	--
085-24-55-S-7	5-7	--	--	0.000866 U
085-24-55-S-11	9-11	--	--	**0.0572 J**
085-24-57-S-1	0-1	0.549 J	**0.459 J**	--
085-24-57-S-7	5-7	--	--	**0.00695**
085-24-57-S-11	9-11	--	--	**0.0478 J**
Residential Cleanup Goals for Surface Soil		2.4	0.3	--
Industrial Cleanup Goals for Surface Soil		3.7	0.5	0.3
Leachability based target concentration for Subsurface Soil (Chapter 62-777 FAC)		--	--	0.004

Notes:
bls = below land surface
mg/kg = milligrams per kilogram
U = undetected
J = estimated value
-- = not analyzed
FAC = Florida Administrative Code
EPA = U.S. Environmental Protection Agency
Bold numbers indicate exceedance of cleanup criteria

TABLE 5
Soil Sampling Results in Vicinity of Former Sample 24S12
OU 13, NAS Pensacola

Sample ID	Depth (feet bls)	Arsenic EPA Method 6010B (mg/kg)	Dieldrin EPA Method 8081A (mg/kg)
085-24-58-S-7	5-7	--	0.00086 U
085-24-59-S-7	5-7	--	0.000887 U
085-24-66-S-7 (Duplicate of 085-24-59-S-7)	5-7	--	0.00112 J
085-24-60-S-7	5-7	--	**0.0275 J**
085-24-61-S-7	5-7	--	0.00102 J
085-24-62-S-7	5-7	--	0.000859 U

TABLE 5
Soil Sampling Results in Vicinity of Former Sample 24S12
OU 13, NAS Pensacola

Sample ID	Depth (feet bls)	Arsenic EPA Method 6010B (mg/kg)	Dieldrin EPA Method 8081A (mg/kg)
085-24-63-S-7	5-7	--	0.00394
085-24-64-S-7	5-7	--	0.000858 U
085-24-65-S-1	0-1	0.697	--
085-24-65-S-7	5-7	--	0.00108 J
Residential Cleanup Goals for Surface Soil		2.4	
Industrial Cleanup Goals for Surface Soil (Chapter 62-777 FAC)		3.7	
Leachability based target concentration for Subsurface Soil (Chapter 62-777 FAC)			0.004

Notes:
bls = below land surface
mg/kg = milligrams per kilogram
U = undetected
J = estimated value
-- = not analyzed

EPA = U.S. Environmental Protection Agency
FAC = Florida Administrative Code
Bold numbers indicate exceedance of cleanup criteria

Sample 24S65, located south of original sample 24S11, was analyzed for surface arsenic to define the southern extent of surface arsenic contamination. Arsenic results were not above the target RG for this sample. This sample location also was used to delineate dieldrin in the subsurface.

Of the four initial samples collected from a depth of 5 to 7 feet bls on 25-foot centers and analyzed for dieldrin in the vicinity of sample 24S12, none of the samples exceeded the selected target cleanup goal. Therefore, the second set of samples collected on 12.5-foot centers from the original sample also was analyzed. Sample 24S60, collected 12.5 feet east of original sample 24S12, exceeded the dieldrin target leachability-based RG of 0.004 mg/kg for subsurface soil. **Figure 4** presents the results for soil samples.

The entire area encompassed by both surface and subsurface contamination is more than 5,300 square feet. This area includes more than a dozen large trees including pines, oaks, and two large cherry laurel trees planted along the road by the cemetery. The area east of sample 24S53 will be used by the cemetery for gravesites. The area between the graves and the road will remain as a buffer between the cemetery and John Towers Road.

Soil data were validated by Heartland Environmental Services, Inc. The reported results for samples analyzed for dieldrin required qualifications. In some instances, the laboratory provided results from both the primary and confirmation analysis, yielding two results for one sample. In accordance with Method 8000B, paragraph 7.10.4.2, for samples 085-24-51-S-44, 085-24-57-S-7, 085-24-60-S-7, and 085-24-63-S-7, which displayed two results, the higher of the two results was accepted and displayed in **Tables 4** and **5**. Additionally, dieldrin was qualified as estimated in one sample because of low surrogate recovery. The DQE performed for the analytical results is presented in **Attachment B**.

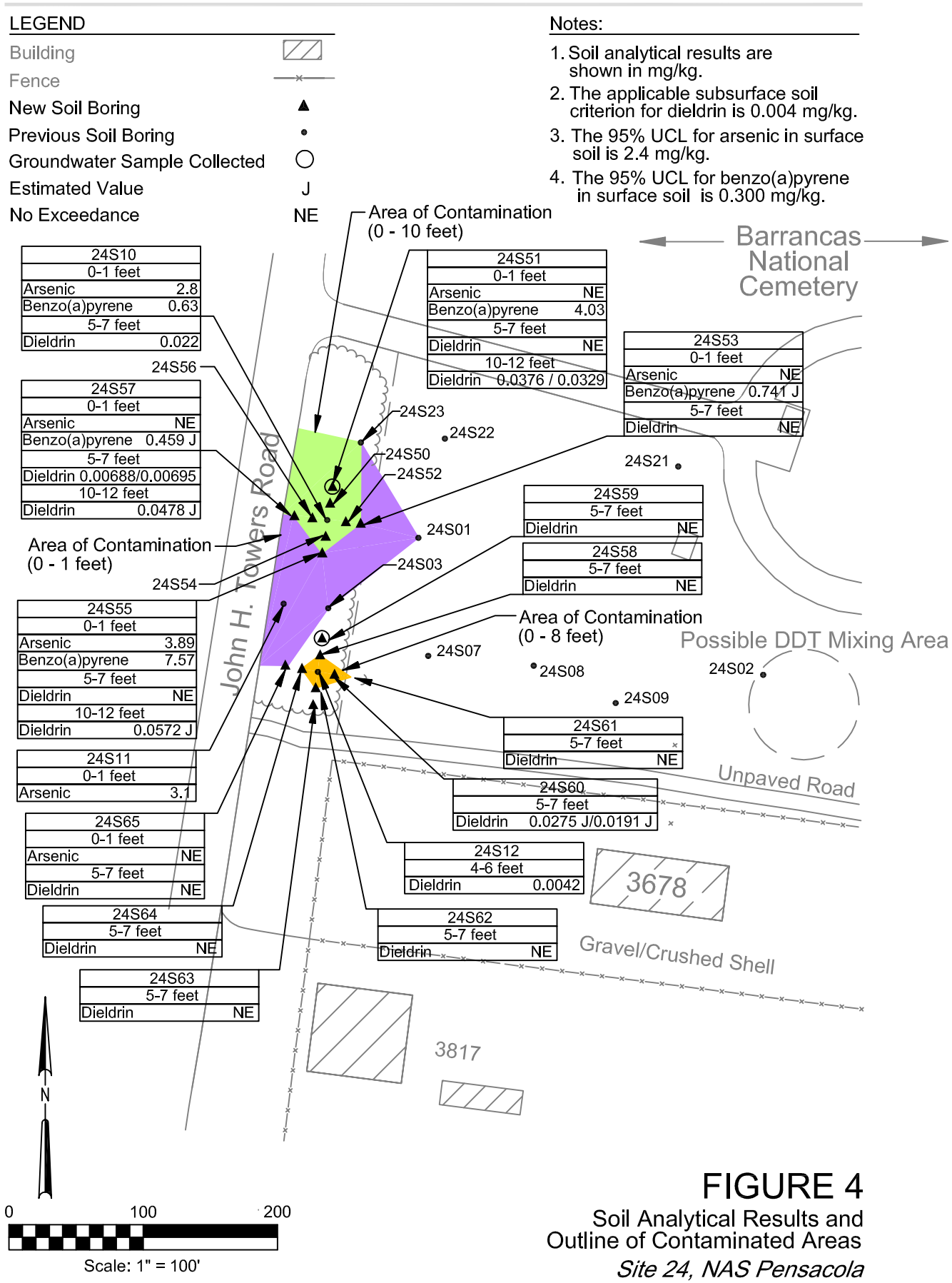

FIGURE 4

Soil Analytical Results and Outline of Contaminated Areas

Site 24, NAS Pensacola

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Groundwater

Groundwater sample results were compared to the RGs listed in the Focused Feasibility Study (FFS) (EnSafe, 2000), as well as to current federal drinking water standards (*2002 Edition of the Drinking Water Standards and Health Advisories,* EPA 2002) and the State of Florida groundwater cleanup target levels (GCTLs) (Chapter 62-777 and Chapter 62-550). The FFS stated that the RGs were either the EPA MCLs or the Florida Primary Drinking Water Standards (FPDWSs), whichever was more stringent (EnSafe, 2000). No RG was listed for benzo(a)pyrene in the FFS. The results indicate that arsenic, benzo(a)pyrene, and dieldrin were not detected in groundwater above the RGs listed in the FFS.

The results were then compared to current federal drinking water standards and to state groundwater cleanup levels. All results were below the Florida GCTLs. There were no detectable concentrations of benzo(a)pyrene or dieldrin. 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 .0005 µg/L but below the MDL of 0.025 µg/L could not be detected or reported. The EPA MCL for arsenic has been modified recently from 50 µg/L to 10 µg/L. The sample results from both groundwater monitoring points exceed the new EPA MCL for arsenic. The EPA MCLs are drinking water standards, and although they are relevant and appropriate, they are not applicable in this case because the groundwater is not a drinking water source. Refer to **Table 6** for a summary of groundwater results.

TABLE 6
Groundwater Sampling Results

Sample ID	Arsenic EPA Method 6010B (µg/L)	Benzo(a)pyrene EPA Method 8270C (µg/L)	Dieldrin EPA Method 8081A (µg/L)
085-24-51-GW-16	31.2	0.1 U	0.025 U
085-24-59-GW-16	32.1	--	0.0291 UJ
085-24-FD1-GW-16 (Duplicate of 085-24-59-GW-16)	27.3	--	0.0275 U
Remedial Goals listed in FFS	50[a]	NL	0.1[a]
Current Florida Groundwater Cleanup Target Levels	50.0[b]	0.2[b]	0.005[c]
Current Federal Drinking Water Standards[d]	10	0.2	NL

Notes:
[a] = primary MCL
[b] = primary standard as provided from 62-550 FAC
[c] = minimum criteria practical quantitation limit as provided from 62-777 FAC
[d] = 2002 Edition of the Drinking Water Standards and Health Advisories (EPA 2002)
bls = below land surface
µg/L = micrograms per liter
U = undetected
UJ = quantitation limit is qualified as estimated
-- = not analyzed
NL = not listed

It should be noted that the groundwater samples were not collected from properly installed and developed groundwater monitoring wells, and therefore, the inorganic constituents could be entrained in the sediments from the samples and may not be representative of

groundwater conditions at the site. Arsenic concentrations in temporary wells installed and sampled at the site during previous investigations were all well below the RG of 50 µg/L.

During data validation, it was noted that sample 085-24-59-GW-16 collected sample location 24S59 from exhibited an organochlorine pesticide surrogate recovery below the QC limit. As a result, the reported positive or non-detect dieldrin result was qualified as estimated. The 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 target concentrations for the medium of interest. For example, surface soil exposure point concentrations, which are the UCL on the mean at the 95 percent level (UCL95%) concentration for COCs (arsenic and benzo(a)pyrene), should not exceed their respective direct exposure-based target concentrations (target RBCs, RGs, or SCTLs) for the selected land use. The target concentrations for Site 24 were selected to be three times the FDEP residential direct exposure SCTLs by the remedial management team; in other words, individual samples may have concentrations slightly above the target concentrations, but the sitewide upperbound averages (e.g., UCL95%) do not exceed the target levels.

Additionally, if a chemical is part of site background because of human activities (i.e., anthropogenic background), an exceedence of the target RG that is health-protection based may occur. However, overall risks are within the background levels. All of the COCs identified for Site 24 also are known to occur in either the natural or anthropogenic background of the industrial/urban environments. The site originally was identified as a former DDT mixing area, which may have historically used solvents for pesticide mixing. However, the affected area identified is located adjacent to a roadway, includes a buffer zone for the road, and is the outer edge of the site. Typical routine facility maintenance application of pesticides may have occurred in this area. During the detailed investigations conducted for soils and groundwater at Site 24, none of the originally suspected constituents (i.e., DDT) were identified. The following text presents COC-specific discussions and a rationale for recommendations for no further action for soils rather than for active remediation at the site.

Dieldrin: The average undiluted MDL and reporting limit (RL) for dieldrin in soil during this investigation was 0.0008 and 0.0035 mg/kg, respectively. The leachability-based cleanup target level for dieldrin (0.004 mg/kg) is close to these limits; thus, most of the detected concentrations exceed the target RG. Typical source areas (with spills/disposal) tend to have much higher dieldrin concentrations, ranging from greater than 1.0 mg/kg to hundreds of mg/kg. All of the detectable concentrations of dieldrin in subsurface soil at Site 24 are below 0.06 mg/kg and the average concentration is 0.015 mg/kg, which is much lower, and closer to typical reporting limits. This result indicates that detected dieldrin levels are not indicative of spills/releases with high concentrations in an area, and are either due to the sitewide general application of this persistent pesticide as part of the historical

facility maintenance, or to a site-specific release that may have degraded or attenuated with time.

Because this pesticide 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. All of the detected concentrations are similar across all soil samples at the site, mostly nearer to the roadway, with no specific elevated concentration, or have no particular distribution patterns or trends such as indicative of highly elevated concentration area(s); therefore, it is probably a result from historical use as a maintenance pesticide across the base. Dieldrin, which was discontinued for use in the early 1970s, has a half life in soil of about 5 years (ATSDR, 1993). So, it is likely to reduce to less than 1 percent of the original concentration in 35 years from the time of release. If the observed concentrations are from applications or releases between 1960 to 1970 (last year when its use was discontinued), 32 to 40 years have passed. Thus, the observed concentrations are about 1.56 percent to <1 percent of the original release concentrations. The primary loss pathway is through surface runoff and photooxidation in the surface soil (ATSDR, 1993). The most likely reasons for the detected concentrations in subsurface soils are the physical disturbance of surface soil, which would carry the surface dieldrin to the subsurface, or sampling artifacts that were conducted according to the procedural guidance. This may also explain why dieldrin was detected in monitoring well samples in newly installed wells in 1995 and 1996. More recent groundwater samples in the same area did not have detectable dieldrin. Another possibility is when dieldrin is mixed with a solvent or other mixing agent for dispersal, it tends to cling onto the solvent rather than adsorbing onto the soil. As the solvent travels through the soil column, it takes the dieldrin with it.

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, so 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.

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 dieldrin in soil at Site 24.

Benzo(a)pyrene equivalents: The area with detectable levels of benzo(a)pyrene is located along the buffer zone of John Towers Road, an asphalt-paved road. Additionally, a gravel road approximately 10 feet wide runs parallel to John Towers Road between the road and the tree line and is used as a frontage road. Presence of benzo(a)pyrene is likely from anthropogenic sources such as the asphalt used for paving roads and parking, rather than from site-specific operations at Site 24. All of the detected carcinogenic PAHs are converted to benzo(a)pyrene equivalent concentrations using EPA Region 4 recommended methodology and toxicity equivalency factors.

As reported in the ATSDR toxicity profile for PAHs, asphalt contains 85 percent PAHs by weight, and most of these PAHs (including benzo[a]pyrene) are commonly found in soil samples collected adjacent to and within the buffer zones of asphalt-paved roads (ATSDR, 1995). The area where benzo(a)pyrene has been detected at the site is consistent with this situation. In contrast, diesel fuel, which was used at the site 50 years ago in the DDT mixing

area 300 feet east of the benzo(a)pyrene-affected area (see **Figure 4**), contains less than 1 percent PAHs by weight. PAHs in diesel fuel tend to degrade faster (half-life between 50 days to 1 year; thus, in fewer than 7 years, less than 1 percent of the original concentration is expected to remain at the site) than PAHs matrixed into asphalt material, which are detectable over longer periods of time. The vehicular traffic also may contribute from exhaust emissions; however, lack of uniformity of the observed PAHs (expected of air emission) indicates that air emission from exhausts may not be a significant source for the detected PAHs. The detected concentrations are nearer to the road and in the downslope areas, where small asphalt pieces could have reached the sampling area of the site either through runoff or spraying pavement pieces by moving vehicles. The implementation of any remedy to remove these PAHs would be ineffective, because the asphalt continues to contribute to such similar levels in this area from the nearby road. Therefore, no further action should be taken with regard to the likely anthropogenic background-related benzo(a)pyrene levels at the site to protect human health or the ecology.

Arsenic: Arsenic concentrations at Site 24 range from 0.549 J to 3.89 mg/kg. The reference concentration for arsenic at NAS Pensacola is 1.01 mg/kg, as established using Site 1 data. In this data set, arsenic concentrations ranged from 0.305 to 2.4 mg/kg. The range of arsenic values found at Site 24 is consistent with the base's background samples. As previously stated, the cleanup goal for arsenic is 2.4 mg/kg (or three times the residential SCTL), based on the UCL95% methodology. Three samples at the site exceed the established cleanup goal. Only one sample at the site exceeds the current commercial/industrial SCTL of 3.7 mg/kg. In the draft rule change for Chapter 62-777, the proposed commercial/industrial value for arsenic is 4.1 mg/kg. If this rule is accepted and promulgated (as expected in January 2003), all of the arsenic concentrations at Site 24 will be below the commercial/industrial SCTL.

Additionally, as described in the Site 15 Golf Course investigation at NAS Pensacola, arsenic is known to be naturally occurring in the northwestern Florida area, as documented in a background study conducted for NAS Whiting Field in northern Santa Rosa County (Odenthal, 2001). Many sites at NAS Whiting Field had concentrations of arsenic above the FDEP cleanup criteria but most of these sites had no documented use of arsenic. NAS Whiting Field collected a background data set from the Navy's outlying fields in northwest Florida (Pace Field, Spencer Field, Santa Rosa Field, and Harold Field). Arsenic concentrations in this background, offsite data set, ranged from zero to 12 mg/kg. The study concluded that arsenic concentrations in areas with no known contamination are comparable to the sites at NAS Whiting Field having no known arsenic sources. In a letter dated April 11, 2001, FDEP noted the arsenic concentrations at NAS Whiting Field are within the range of naturally occurring concentrations at outlying fields. Although it is specific for NAS Whiting Field, a copy of this letter is included in **Attachment C**.

The pesticides used in the golf course maintenance area at Site 15 were known to contain arsenic; however, many of the arsenic concentrations around the golf course itself are consistent with the background concentrations as described above. The same is true for Site 24. The area affected with arsenic is not associated with the former DDT mixing area (approximately 300 feet away) and the low concentrations of arsenic are consistent with basewide and areawide background concentrations. The decision made for the remediation of Site 15 included only excavating areas with arsenic concentrations above 17.4 mg/kg. Areas within the fairways exhibiting arsenic concentrations between 0.98 and 12 mg/kg were not excavated. Because site-specific concentrations at Site 24 are within the range of

these background concentrations, no further actions are recommended to address arsenic at the site.

Other Considerations: Originally, the goal for Site 24 was to excavate areas of contamination exceeding the residential criteria (based on the UCL95%) and to avoid land use controls (LUCs) on soil at the site. Because groundwater has not been affected in the area after more than 50 years of operation at the site and COCs in the soil are consistent with the background/anthropogenic concentrations, soil removal is not necessary. A greater impact to the environment would be realized by destroying more than a dozen trees in the area. Therefore, the Navy recommends no further action for soil at the site. Because arsenic, dieldrin and benzo(a)pyrene are not mobile or leachable in soil and have not been detected above the RGs in recent groundwater samples at the site, it will not be necessary to monitor for these COCs in groundwater.

As stated in the draft Proposed Plan for the site, LUCs will be placed on the site because of the elevated levels of iron and manganese in groundwater. This approach will be coupled with long-term groundwater monitoring for iron and manganese. A monitoring program should be developed and permanent monitoring wells should be installed at the site for the long-term monitoring of iron and manganese. Additionally, all temporary monitoring wells at the site should be properly abandoned.

Acronyms

ATSDR	Agency for Toxic substances and Disease Registry
bls	below land surface
CCI	CH2M HILL Constructors, Inc.
CLEAN	Comprehensive Long-term Environmental Action Navy
COC	contaminant of concern
COPC	chemical of potential concern
DDT	dichlorodiphenyltrichloroethane
DQE	data quality evaluation
EPA	U.S. Environmental Protection Agency
FAC	Florida Administration Code
FDEP	Florida Department of Environmental Management
FFS	Focused Feasibility Study
FPDWS	Florida Primary Drinking Water Standard
GCTL	groundwater cleanup target level
LUC	land use control
MCL	maximum contaminant level
MDL	method detection limit
µg/L	micrograms per liter
mg/kg	milligrams per kilogram
NAS	Naval Air Station
OU	operable unit
PAH	polynuclear aromatic hydrocarbon
PCB	polychlorinated biphenyl
QA/QC	quality assurance/quality control

RG	remediation goal
RI	Remedial Investigation
RL	reporting limit
SCTL	soil cleanup target level
SOP	standard operating procedure
SVOC	semivolatile organic compound
TAL/TCL	target analyte list/target compound list
TM	technical memorandum
TRPH	total recoverable petroleum hydrocarbon
UCL	upper confidence limit
VOC	volatile organic compound

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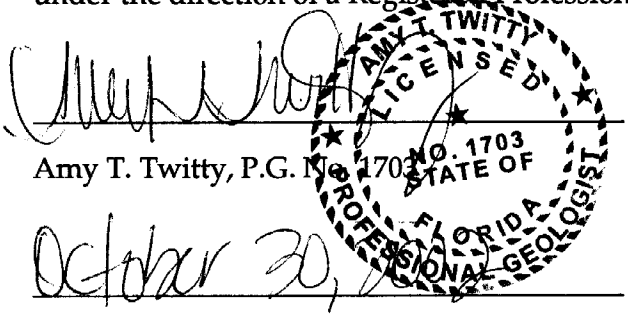
This Data Transfer Memorandum for Site 24 at Naval Air Station Pensacola was prepared under the direction of a Registered Professional Geologist.



Amy T. Twitty, P.G. No. 1703

October 20, 2006

Date

ATTACHMENT A

Analytical Reports

ATTACHMENT B

Data Quality Evaluation

ATTACHMENT C

FDEP Letter

Department of Environmental Protection

Jeb Bush
Governor

Twin Towers Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

David B. Struhs
Secretary

April 11, 2001

Mr. James Holland
NAS Whiting Field
7151 USS Wasp Street
Milton, Florida 32570-6159

file: arsenic2.doc

RE: Analysis of Soil for Arsenic at Outlying Landing Fields

Dear Mr. Holland:

I have reviewed the above document dated April 3, 2001 (received April 9, 2001). The document describes soil sampling locations and analytical results for arsenic at four outlying landing fields associated with, but not adjacent to, NAS Whiting Field. Those facilities are Pace Field, Spencer Field, Santa Rosa Field and Harold Field. There are no known contaminated sites at those fields. Utilizing the information furnished in the document and in comparison with similar data from NAS Whiting Field, the Navy has requested a determination that arsenic levels observed at NAS Whiting Field are comparable with those seen at the outlying landing fields and that they are in naturally occurring concentrations.

Based on my review of those data, I have concluded that arsenic levels observed in soils at NAS Whiting Field are within the range of concentrations observed at the outlying fields and that they therefore are in naturally occurring concentrations. This determination may be applied only to arsenic in the soil for sites at NAS Whiting Field for which sufficient data presently exist. Please be aware that this finding does not preclude a future determination of a release of arsenic at any particular site if information and data warrant that conclusion.

If you have questions or need further clarification please contact me at (850) 921-4230.

Sincerely,

James H. Cason, P.G.
Remedial Project Manager

cc: Mollie Palmer, Office of the Secretary
Linda Martin, Southern Division, North Charleston
Amy Twitty, CH2M Hill, Navarre

TJB JJC ESN for

"Protect, Conserve and Manage Florida's Environment and Natural Resources"

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