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NAS CECIL FIELD, FL  
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ACTION MEMORANDUM FOR OPERABLE UNIT 5 (OU 5) SITE 49 FORMER SKEET RANGE  
NAS CECIL FIELD FL  
5/10/2002  
TETRA TECH NUS INC

**Action Memorandum  
For  
Operable Unit 5,  
Site 49 – Former Skeet Range  
Naval Air Station Cecil Field  
Jacksonville, Florida**

**May 2002**

## ACTION MEMORANDUM

**DATE:** May 10, 2002

**SUBJECT:** Action Memorandum for Operable Unit 5, Site 49 – Former Skeet Range at Naval Air Station (NAS) Cecil Field, Jacksonville, Florida.  
(FL-517-002-2474)

**PREPARED BY:** Tetra Tech NUS, Inc.  
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**PREPARED FOR:** Southern Division  
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**THROUGH:** Scott Glass  
BRAC Environmental Coordinator (BEC)

**TO:** NAS Cecil Field Administrative Record

### 1.0 PURPOSE

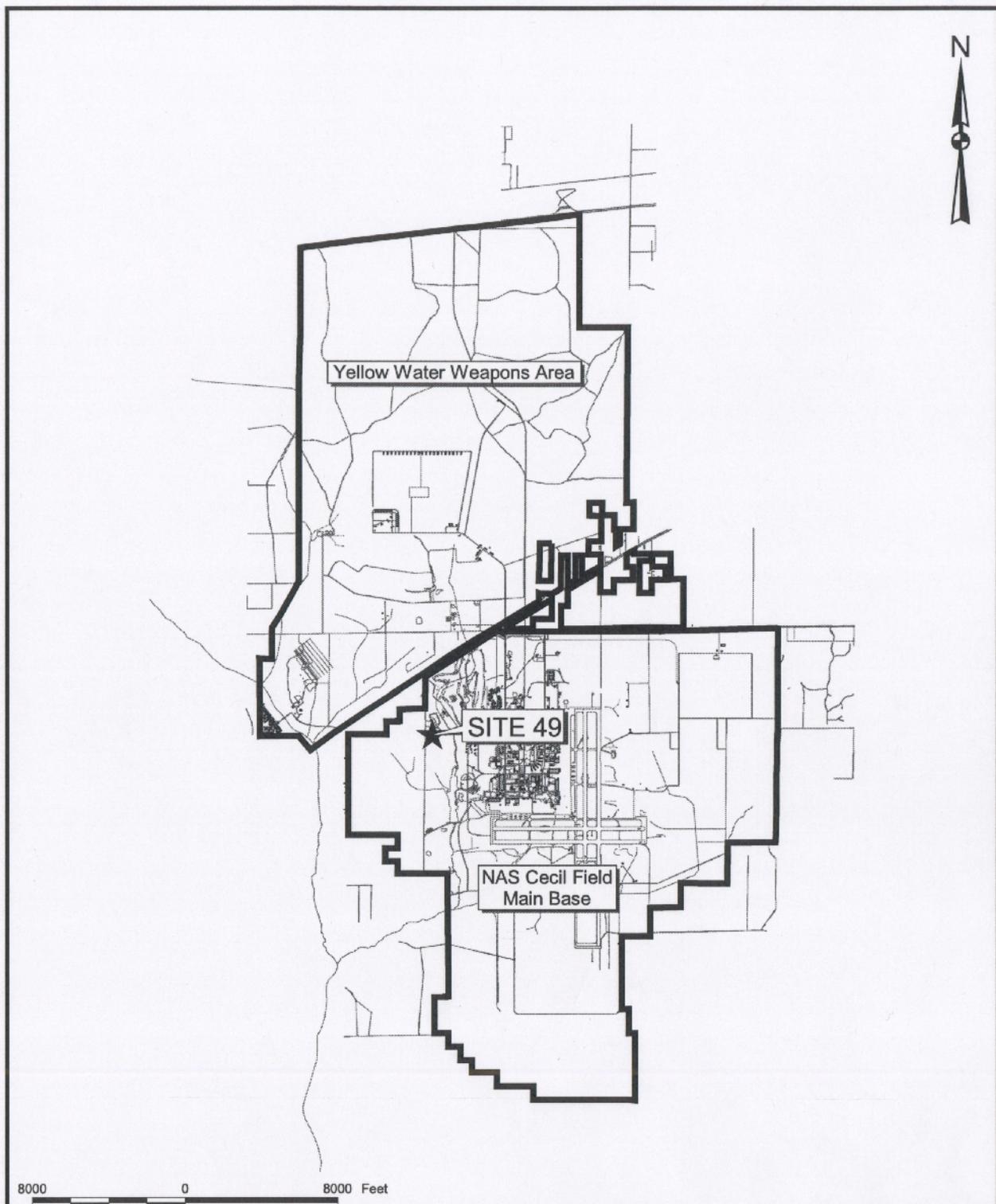
The purpose of this Action Memorandum for Operable Unit (OU) 5, Site 49 is to discuss the investigations performed, identify the need for a removal action, and present the proposed removal action to be conducted. The proposed removal action will be performed in accordance with the National Contingency Plan (NCP), 40 CFR 300.415.

This Action Memorandum has been prepared by Tetra Tech NUS, Inc. (TtNUS) for the Department of the Navy Southern Division, Naval Facilities Engineering Command (SOUTHNAVFACENGCOM). The work was conducted under the Comprehensive Long-Term Environmental Action Navy (CLEAN) Program, Contract Number N62467-94-D-0888, Contract Task Order (CTO) 0078.

### 2.0 SITE CONDITIONS AND BACKGROUND

#### 2.1 Site Description

OU 5, Site 49 consists of the former skeet range (Facility 804) located in the area known as the Main Base of NAS Cecil Field. The site is located at the western end of Lake Newman Street (formerly 6<sup>th</sup> Street), at the junction of Perimeter Road (Figure 2-1). The site is an unpaved and undeveloped area that has been cleared; it covers about 4.5 acres. The open area is surrounded by wooded areas, although the



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SCALE AS NOTED	



GENERAL LOCATION MAP  
SITE 49, FORMER SKEET RANGE  
NAVAL AIR STATION CECIL FIELD  
JACKSONVILLE, FLORIDA

CONTRACT NUMBER 0039	
APPROVED BY <i>AFB</i>	DATE 5/9/02
APPROVED BY <i>MPJ</i>	DATE 5/10/02
DRAWING NO. FIGURE 2-1	REV 0

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area to the northeast is cleared around Lake Newman. The wooded area south of the range (downrange) has sparse vegetation compared to the adjacent wooded areas. Clay pigeon fragments are scattered throughout the area. Five small buildings on site were previously used for storage and launching of clay pigeons and one other small building was used for electrical equipment. Building 807, the Skeet Range Office, is located at the northern end of the site (Figure 2-2). The area is undeveloped and the reuse plan identifies the area for Park/Buffer uses.

## **2.2 Site History**

The area known as OU 5, Site 49 was used as a skeet shooting range from 1965 to 1998. Prior to 1965, historic aerial photographs show that the area was unused and undeveloped. Building 807 was constructed in 1971. The site was identified in the Environmental Baseline Survey (EBS) (ABB-ES, 1994) as Potential Source of Contamination (PSC) 49. TtNUS performed field investigations for the assessment of surface and subsurface soil and groundwater at PSC 49 from June 1999 to May 2001. Based on the extent and type of contamination, the investigation was moved into the CERCLA program, and the area was identified as Site 49 and grouped into Operable Unit 5.

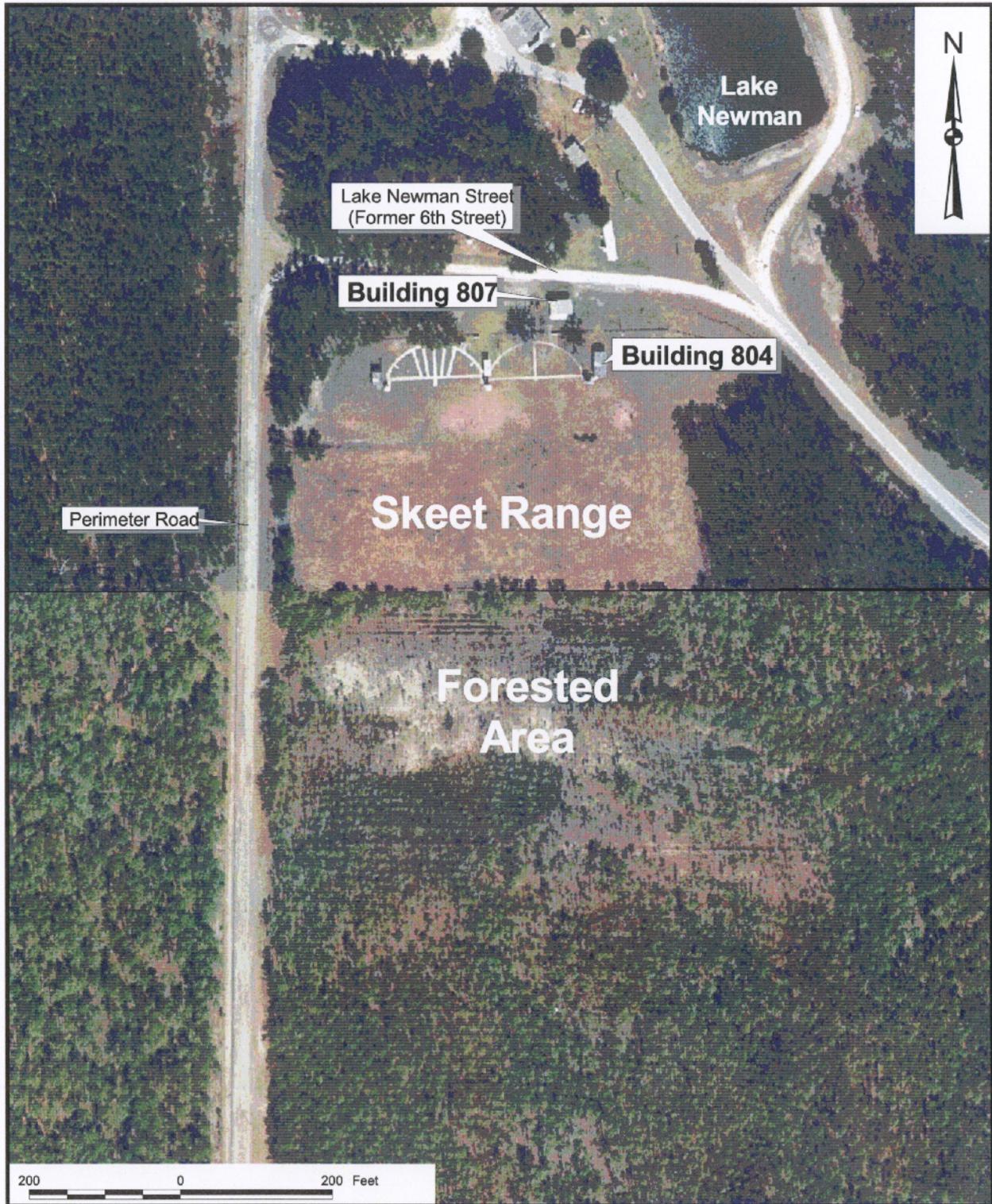
## **2.3 Previous Investigations**

This area was initially evaluated as Facility 804 during the EBS. Because of the potential for lead contamination, the EBS recommended further investigation; however, no Phase II Sampling and Analysis program was conducted at that time. The area was designated as PSC 49 in January 1999, and further evaluations of the site were conducted.

PSC 49 was investigated by TtNUS from June 1999 through May 2001. During this period, polynuclear aromatic hydrocarbon (PAH) and inorganic contamination was detected and delineated horizontally and vertically. Eight sampling events were conducted to delineate the extent of soil contamination. Sample locations are shown in Figure 2-3, and the analytical results (Table 2-1) are provided in the Engineering Evaluation/Cost Analysis (EE/CA) (TtNUS, 2002). Also located in the EE/CA is a summary table (Table 2-2) of the positive analytical results for the soil samples collected. This table also provides the frequencies, ranges of detection, and locations of maximum detections for volatile organic compounds (VOCs), semivolatle organic compound (SVOCs), inorganics, and total organic carbon (TOC) detected at this site.

## **2.4 Regulatory Agencies**

NAS Cecil Field is on the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) National Priorities List (NPL). Therefore, the Navy is the lead agency and the United States



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SCALE AS NOTED	



SITE LAYOUT MAP  
SITE 49, FORMER SKEET RANGE  
NAVAL AIR STATION CECIL FIELD  
JACKSONVILLE, FLORIDA

CONTRACT NUMBER 0039	
APPROVED BY <i>RPB</i>	DATE 5/9/02
APPROVED BY <i>Phil</i>	DATE 5/10/02
DRAWING NO. FIGURE 2-2	REV 0

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Environmental Protection Agency (U.S. EPA) and the Florida Department of Environmental Protection (FDEP) are the oversight agencies. U.S. EPA and FDEP have concurred on the removal determination for Site 49. The Navy, U.S. EPA, FDEP, and Navy contractors make up the Base Realignment and Closure (BRAC) Cleanup Team (BCT). Members of the BCT have the authorization to expedite cleanups at NAS Cecil Field.

A Restoration Advisory Board (RAB) has been established, and removal actions of this nature are presented to the RAB for comment and input. The removal action at OU 5, Site 49 has been identified as a non-time-critical removal action.

### **3.0 ENDANGERMENT DETERMINATION**

The removal action objective for Site 49 is to excavate contaminated soils to permit unrestricted use of the land. In addition, areas of soil outside the delineated area with visible lead pellets will also be excavated. Due to current and future activities at the site, there is a potential exposure to nearby human populations.

Actual or threatened releases of contaminants at Site 49, if not addressed by implementing the response action selected in this Action Memorandum, may present an imminent and substantial endangerment to public health, or welfare, or the environment.

### **4.0 PROPOSED ACTIONS AND ESTIMATED COSTS**

#### **4.1 Proposed Action**

The proposed removal action is designed to address contaminated soil in the area of Site 49. Investigations were conducted to delineate the extent of benzo(a)pyrene (BaP) and lead contamination identified in the soils at Site 49.

As documented in BCT meeting minutes, number 1494 for June 20, 2001, soils at this site will be remediated to a residential land use scenario. This removal action consists of the excavation and offsite disposal of approximately 5,681 cy of soil. Soils which exceed three times the FDEP Soil Cleanup Target Levels (SCTLs) for residential direct exposure or leachability to groundwater (FDEP, 1999) will be removed. In addition, the areas identified in the Remedial Design (Appendix A) as having lead pellets, as determined by a site evaluation conducted by TtNUS, are also to be excavated.

Recent field surveys at NAS Cecil have determined that portions of the forested area at Site 49 are jurisdictional wetlands. A portion of the area of proposed excavation lies within these identified wetlands.

A gopher tortoise survey was conducted on April 29, 2002 to determine if any burrows of this species are within the excavation area. Seven gopher tortoise burrows outside the area of proposed excavation were observed at Site 49. The Florida Fish and Wildlife Conservation Commission has established guidelines for the protection of the gopher tortoise under Rules 68A-25.002 and 68A-27.002 of the Florida Administrative Code. The guidelines require mitigation for any activities that will destroy tortoise burrows. Given no gopher tortoise burrows will be impacted, no permit is required as long as the actions are conducted within the 90 day of the survey. If the removal action is to take place after July 27, 2002, then an additional survey will need to be conducted.

The removal design to be implemented to mitigate the public health threat posed by direct human contact and inhalation of airborne particles is provided in Appendix A. The removal action and disposal of the soil will be conducted in a manner that complies with all state, local, and federal regulations, including established quality assurance/quality control (QA/QC) protocols provided in the U.S. EPA Region 4 Environmental Investigations Standard Operating Procedure and Quality Assurance Manual (EISOPQAM) (U.S. EPA, 1996).

#### **4.2 Applicable or Relevant and Appropriate Requirements (ARARs)**

The proposed response action, which is to excavate soils that exceed the established pickup levels, will comply with the state and federal ARARs.

#### **4.3 Estimated Cost**

The estimated cost of implementation of this alternative is \$786,000.

#### **5.0 EXPECTED CHANGE IN THE SITUATION SHOULD THE RESPONSE ACTION BE DELAYED OR NOT TAKEN.**

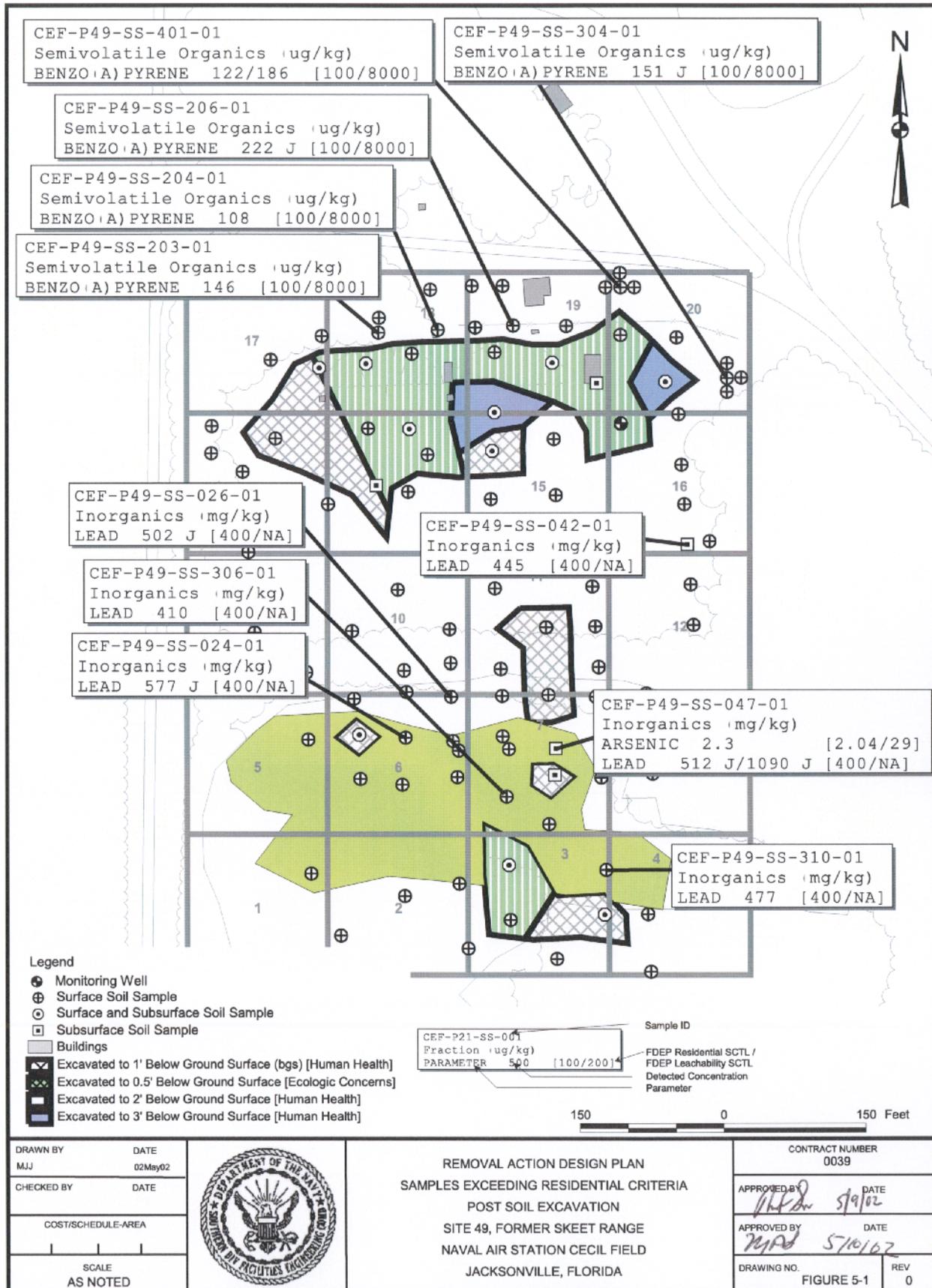
BaPEq concentrations in soils at Site 49 have been identified as exceeding three times the FDEP residential SCTL and leachability criteria. Since BaP accounted for most of the carcinogenic PAHs (cPAHs) exceedances, the BCT decided that these cPAHs should be considered as a family of compounds and quantified in terms of BaP equivalents (BaPEqs) (BCT, 2001). The BCT agreed that soils exceeding three times the residential SCTLs or the leachability to groundwater criteria for BaP and lead would be excavated and disposed offsite to achieve the residential land use scenario. Delayed action will increase the risk to public health by leaving contamination in place, thus increasing the time that potential receptors are exposed to these elevated concentrations.

Some soil samples remaining on site after the excavation activities have been completed may have concentrations in excess of residential SCTLs, but the exposure concentrations were determined to be less than the residential SCTLs. Figure 5-1 shows the sample locations remaining after the proposed excavation which have concentrations that exceed the residential FDEP SCTLs.

## **6.0 RECOMMENDATIONS**

This Action Memorandum presents the selected removal action (Appendix A) for Site 49 at NAS Cecil Field, developed in accordance with CERCLA as amended and consistent with the NCP. This decision to excavate and dispose soils offsite in a non-time-critical manner is based on information to be provided in the Administrative Record for NAS Cecil Field.

Conditions at Site 49 meet the NCP Section 300.415(b)(2) criteria for a removal, and it is recommended that this removal action be conducted. The total cost of this remedial action to comply with residential land use standards is estimated to cost \$786,000 to implement.



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## **REFERENCES**

ABB-ES (ABB Environmental Services, Inc.), 1994. Base Realignment and Closure Environmental Baseline Survey Report Naval Air Station (NAS) Cecil Field, November.

BRAC (Base Realignment and Closure) Cleanup Team (BCT), 2001. BCT Minutes No. 1494, Action No. 1196, Decision No. 540, Meeting of June 20.

Florida Department of Environmental Protection (FDEP), 1999. Contaminant Target Levels Rule, Soil, Groundwater and Surface Water Target Cleanup Levels. Florida Administrative Code (F.A.C.) Chapter 62-777, August.

Harding Lawson Associates (HLA), 1998. Inorganic Background Data Set.

TtNUS (Tetra Tech NUS), 2002. Engineering Evaluation/Cost Analysis for Operable Unit 5, Site 49, Former Skeet Range, Naval Air Station Cecil Field, Jacksonville, Florida. Prepared for SOUTHNAVFACENCOM, North Charleston, South Carolina, June.

U.S. EPA (U.S. Environmental Protection Agency), Region 4, 1996. Environmental Investigations Standard Operating Procedures and Quality Assurance Manual, Athens, Georgia.

**APPENDIX A**

**REMOVAL DESIGN**

**REMOVAL ACTION DESIGN PACKAGE  
FOR  
OPERABLE UNIT 5, SITE 49 – FORMER SKEET RANGE**

**SITE BACKGROUND**

Benzo(a)pyrene (BaP) and lead were detected at concentrations in excess of the Florida Department of Environmental Protection (FDEP) residential soil cleanup target levels (SCTLs). Also detected were a number of other carcinogenic polynuclear aromatic hydrocarbons (cPAHs), however, since BaP accounted for most of the cPAH exceedances, the BCT decided that these cPAHs should be considered as a family of compounds and quantified in terms of BaP equivalents (BaPEqs). The Base Realignment and Closure (BRAC) Cleanup Team (BCT) reviewed soil analytical results for Site 49, and a decision was made to delineate the extent of contaminated soil. The limits of contamination were determined and the results provided in the Engineering Evaluation / Cost Analysis (EE/CA) report (TtNUS, 2002).

The site was divided into 1/2-acre exposure units in order to evaluate the site for residential use. A statistical evaluation was conducted to determine the areas requiring removal to achieve an exposure unit upper confidence level (UCL) for BaPEq and an exposure unit average concentration for lead that was below their respective residential SCTL.

It was decided that soil samples with contaminant concentrations greater than three times the FDEP residential SCTLs or greater than the leachability criteria would be excavated. Excavation of these soils ensures protection of human health and groundwater. Some soil samples remaining on site after excavation activities have been completed may have concentrations in excess of the residential SCTLs, but the exposure unit concentrations were determined to be less than the residential SCTL.

The exposure concentration is represented best by the 95% UCL of the mean for BaPEq and by the average concentration for lead. Using an iterative statistical process, the concentration above which soil must be removed to achieve a UCL or average less than or equal to the Florida SCTL (pickup level) is determined. In theory, the sampling locations with the highest contaminant concentrations would be excavated and replaced with clean fill. The excavated sample points were assumed to be replaced with clean fill with a contaminant concentration equal to one-half the detection limit. If the UCL or average is less than the residential SCTL, protection of human health is ensured.

For Site 49, the UCL and average are less than the residential SCTLs when samples with concentrations greater than three times their respective SCTLs are removed. In addition, samples with concentrations

greater than leachability criteria are to be excavated. Therefore, the pickup levels for contaminants of concern at Site 49 are the lesser of the leachability criteria and three times the residential criteria.

<b>Contaminant</b>	<b>Leachability Criteria</b>	<b>FDEP Residential Criteria</b>	<b>Pickup Level</b>
BaPEq	8,000 µg/kg	100 µg/kg	300 µg/kg
Lead	NC	400 mg/kg	1,200 mg/kg

NC = No criterion.

The areas with concentrations greater than the pickup levels are shown on Figure E-1. The statistical evaluations used to ensure that post-excavation UCLs for BaPEq are less than SCTLs is presented in Table 1, and Table 2 provides the statistical evaluation for lead. These tables do not include samples excavated for leachability exceedances unless the concentrations were also three times greater than the residential SCTL.

#### **GUIDANCE NOTES**

This information is provided for general guidance purposes only. The approximate areas of excavation are shown on Figure E-1. The actual extent of excavation will be defined by Tetra Tech NUS, Inc. (TtNUS) with white spray-down paint (or equivalent) prior to the execution of the removal action. Analytical results identifying the areas that required removal and the vertical extent sample results are provided in tag map E-1.

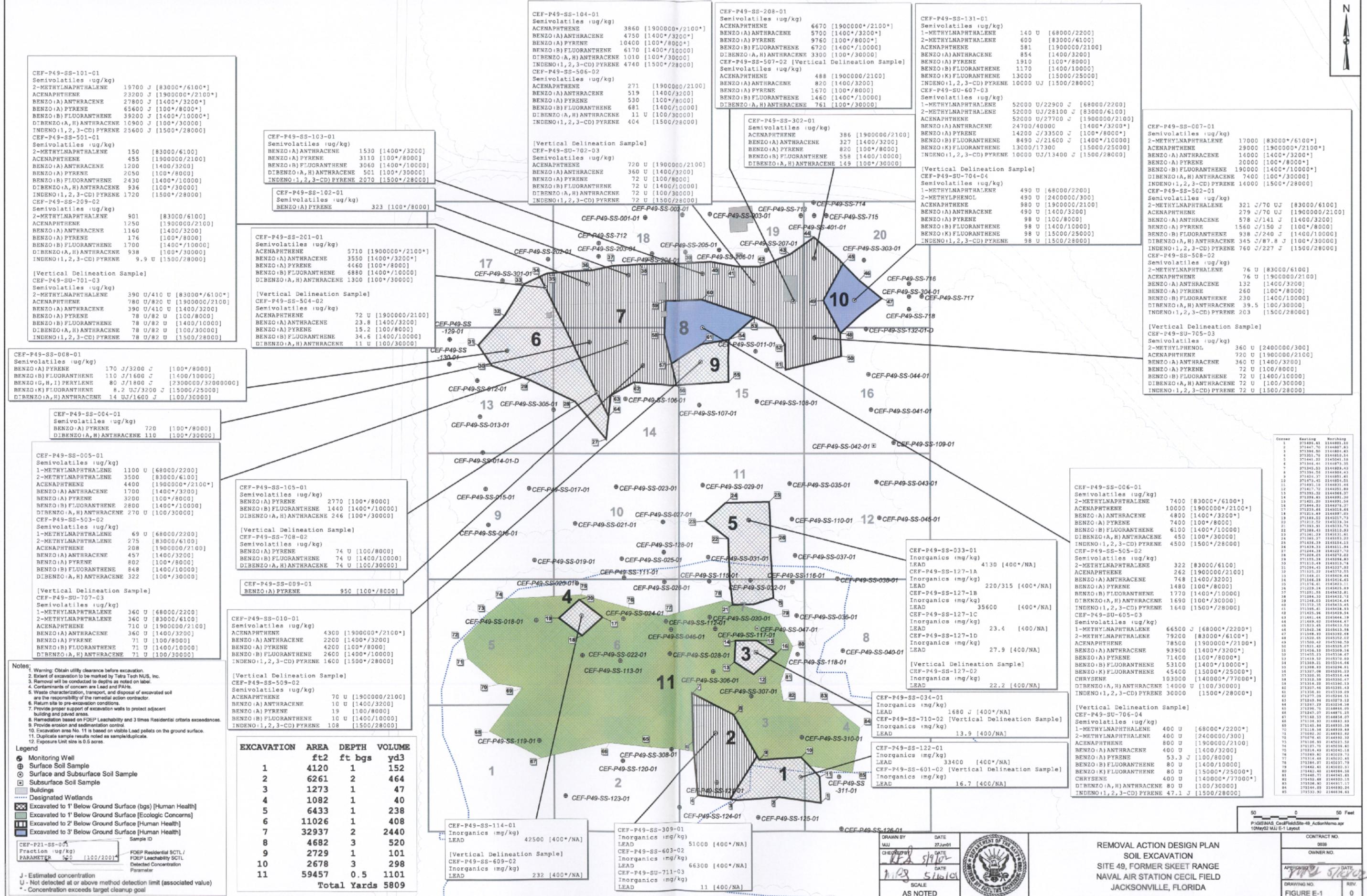
TtNUS conducted a Gopher Tortoise Burrow Survey on April 29, 2002. The locations are identified on Figure E-2. The survey identified that no burrows were located within the footprint of the excavation area, therefore a permit to conduct the removal action is not required. The construction activities are not permitted within a radius of 25 feet of identified burrow.

A portion of the areas of excavation lies within a designated wetland area. TtNUS prepared a Wetlands Impact Memo (Attachment 1) that was submitted to Mr. Steve Sabia, of FDEP describing the Removal Action and proposed restoration. Mr. Sabia has concurred with the proposed restoration and requested to receive a copy of the Final Removal Action Design Package for Site-49. TtNUS also prepared and submitted a predischage notification to the U.S. Army Corps of Engineers requesting approval under Nationwide Permit Number 38 for wetland impacts resulting from the removal action. The predischage notification consisted of a cover letter, figures outlining the proposed impacts, and a description of proposed wetland restoration work, as well as Section A of the Join Application for Environmental Resource Permit (Attachment 2).

The Remedial Action Contractor (RAC) will be responsible for the following:

- The schedule and methods of excavation.
- All aspects of work site health and safety.
- Identification and avoidance of all above-ground and underground utilities or other man-made structures.
- Waste characterization, transport (both on and off site), and disposal of all excavated soil.
- Notification of TtNUS and the Navy if observations indicate contaminants may extend beyond the planned lateral or vertical limits of the excavation.
- Except where necessary for avoidance of structures or utilities, or where otherwise specified by TtNUS, the depths of the excavation areas should extend between 1 to 3 feet below ground surface.
- Excavated soil shall be stockpiled on, and covered with, heavy-duty polyethylene sheeting at the site. This shall be done in a manner to avoid the potential for contaminating surrounding soil or surface water. Alternatively, soils may be stockpiled in properly covered roll-off containers.
- Stockpiling and combining of materials from different sites is permitted with prior approval of the BCT, if similar types and concentrations of contaminants are involved and were generated by similar processes.
- Materials used to backfill the excavations will be from an uncontaminated source and capable of supporting the same type of vegetation as the removed soil. The ground surface shall be restored to a similar or better condition than existed prior to excavation.
- Portions of excavation areas 1, 2, 3, 4, 5 and 11 lie within a designation wetland area. The restoration of impacted areas shall follow the guidelines provided in Attachment 3 – Wetland Restoration Specifications.

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CEF-P49-SS-101-01  
Semivolatiles (ug/kg)  
2-METHYLNAPHTHALENE 19700 J [83000\*/6100\*]  
ACENAPHTHENE 23200 J [1900000\*/2100\*]  
BENZO(A)ANTHRACENE 27800 J [1400\*/3200\*]  
BENZO(A)PYRENE 65600 J [100\*/8000\*]  
BENZO(B)FLUORANTHENE 39200 J [1400\*/10000\*]  
DIBENZO(A,H)ANTHRACENE 10900 J [100\*/30000\*]  
INDENO(1,2,3-CD)PYRENE 25600 J [1500\*/28000\*]  
CEF-P49-SS-501-01  
Semivolatiles (ug/kg)  
2-METHYLNAPHTHALENE 150 [83000/6100]  
ACENAPHTHENE 455 [1900000/2100]  
BENZO(A)ANTHRACENE 1200 [1400/3200]  
BENZO(A)PYRENE 2050 [100\*/8000]  
BENZO(B)FLUORANTHENE 2430 [1400\*/10000\*]  
DIBENZO(A,H)ANTHRACENE 936 [100\*/30000\*]  
INDENO(1,2,3-CD)PYRENE 1720 [1500\*/28000\*]  
CEF-P49-SS-209-02  
Semivolatiles (ug/kg)  
2-METHYLNAPHTHALENE 901 [83000/6100]  
ACENAPHTHENE 1250 [1900000/2100]  
BENZO(A)ANTHRACENE 1160 [1400/3200]  
BENZO(A)PYRENE 176 [100\*/8000]  
BENZO(B)FLUORANTHENE 1700 [1400\*/10000\*]  
DIBENZO(A,H)ANTHRACENE 938 [100\*/30000\*]  
INDENO(1,2,3-CD)PYRENE 9.9 U [1500/28000]

CEF-P49-SS-103-01  
Semivolatiles (ug/kg)  
BENZO(A)ANTHRACENE 1530 [1400\*/3200\*]  
BENZO(A)PYRENE 3110 [100\*/8000\*]  
BENZO(B)FLUORANTHENE 3060 [1400\*/10000\*]  
DIBENZO(A,H)ANTHRACENE 501 [100\*/30000\*]  
INDENO(1,2,3-CD)PYRENE 2070 [1500\*/28000\*]

CEF-P49-SS-201-01  
Semivolatiles (ug/kg)  
ACENAPHTHENE 5710 [1900000\*/2100\*]  
BENZO(A)ANTHRACENE 3550 [1400\*/3200\*]  
BENZO(A)PYRENE 4460 [100\*/8000\*]  
BENZO(B)FLUORANTHENE 6880 [1400\*/10000\*]  
DIBENZO(A,H)ANTHRACENE 1300 [100\*/30000\*]

[Vertical Delineation Sample]  
CEF-P49-SU-701-03  
Semivolatiles (ug/kg)  
2-METHYLNAPHTHALENE 390 U/410 U [83000\*/6100\*]  
ACENAPHTHENE 780 U/820 U [1900000/2100]  
BENZO(A)ANTHRACENE 390 U/410 U [1400/3200]  
BENZO(A)PYRENE 78 U/82 U [100/8000]  
BENZO(B)FLUORANTHENE 78 U/82 U [1400/10000]  
DIBENZO(A,H)ANTHRACENE 78 U/82 U [100/30000]  
INDENO(1,2,3-CD)PYRENE 78 U/82 U [1500/28000]

[Vertical Delineation Sample]  
CEF-P49-SS-504-02  
Semivolatiles (ug/kg)  
ACENAPHTHENE 72 U [1900000/2100]  
BENZO(A)ANTHRACENE 23.8 [1400/3200]  
BENZO(A)PYRENE 15.2 [100/8000]  
BENZO(B)FLUORANTHENE 34.6 [1400/10000]  
DIBENZO(A,H)ANTHRACENE 11 U [100/30000]

CEF-P49-SS-008-01  
Semivolatiles (ug/kg)  
BENZO(A)PYRENE 170 J/3200 J [100\*/8000]  
BENZO(B)FLUORANTHENE 110 J/1600 J [1400/10000]  
BENZO(G,H,I)PERYLENE 80 J/1800 J [2300000/32000000]  
BENZO(K)FLUORANTHENE 8.2 U/3200 J [15000/25000]  
DIBENZO(A,H)ANTHRACENE 14 U/1600 J [100/30000]

CEF-P49-SS-004-01  
Semivolatiles (ug/kg)  
BENZO(A)PYRENE 720 [100\*/8000]  
DIBENZO(A,H)ANTHRACENE 110 [100\*/30000]

CEF-P49-SS-005-01  
Semivolatiles (ug/kg)  
1-METHYLNAPHTHALENE 1100 U [68000/2200]  
2-METHYLNAPHTHALENE 3500 [83000/6100]  
ACENAPHTHENE 4400 [1900000\*/2100\*]  
BENZO(A)ANTHRACENE 1700 [1400\*/3200\*]  
BENZO(A)PYRENE 3200 [100\*/8000]  
BENZO(B)FLUORANTHENE 2800 [1400\*/10000\*]  
DIBENZO(A,H)ANTHRACENE 270 U [100/30000]

CEF-P49-SS-105-01  
Semivolatiles (ug/kg)  
BENZO(A)PYRENE 2770 [100\*/8000]  
BENZO(B)FLUORANTHENE 1440 [1400\*/10000\*]  
DIBENZO(A,H)ANTHRACENE 246 [100\*/30000]

[Vertical Delineation Sample]  
CEF-P49-SS-503-02  
Semivolatiles (ug/kg)  
1-METHYLNAPHTHALENE 69 U [68000/2200]  
2-METHYLNAPHTHALENE 275 [83000/6100]  
ACENAPHTHENE 208 [1900000/2100]  
BENZO(A)ANTHRACENE 457 [1400/3200\*]  
BENZO(A)PYRENE 802 [100\*/8000]  
BENZO(B)FLUORANTHENE 848 [1400/10000\*]  
DIBENZO(A,H)ANTHRACENE 322 [100\*/30000]

CEF-P49-SS-009-01  
BENZO(A)PYRENE 950 [100\*/8000]

[Vertical Delineation Sample]  
CEF-P49-SU-707-03  
Semivolatiles (ug/kg)  
1-METHYLNAPHTHALENE 360 U [68000/2200]  
2-METHYLNAPHTHALENE 360 U [83000/6100]  
ACENAPHTHENE 710 U [1900000/2100]  
BENZO(A)ANTHRACENE 360 U [1400/3200\*]  
BENZO(A)PYRENE 71 U [100/8000]  
BENZO(B)FLUORANTHENE 71 U [1400/10000\*]  
DIBENZO(A,H)ANTHRACENE 71 U [100/30000]

CEF-P49-SS-010-01  
Semivolatiles (ug/kg)  
ACENAPHTHENE 4300 [1900000\*/2100\*]  
BENZO(A)ANTHRACENE 2200 [1400\*/3200\*]  
BENZO(A)PYRENE 4200 [100\*/8000\*]  
BENZO(B)FLUORANTHENE 2600 [1400\*/10000\*]  
INDENO(1,2,3-CD)PYRENE 1600 [1500\*/28000\*]

[Vertical Delineation Sample]  
CEF-P49-SS-509-02  
Semivolatiles (ug/kg)  
ACENAPHTHENE 70 U [1900000/2100]  
BENZO(A)ANTHRACENE 10 U [1400/3200]  
BENZO(A)PYRENE 19 [100/8000]  
BENZO(B)FLUORANTHENE 10 U [1400/10000\*]  
INDENO(1,2,3-CD)PYRENE 108 [1500/28000]

[Vertical Delineation Sample]  
CEF-P49-SS-011-01  
Semivolatiles (ug/kg)  
ACENAPHTHENE 70 U [1900000/2100]  
BENZO(A)ANTHRACENE 10 U [1400/3200]  
BENZO(A)PYRENE 19 [100/8000]  
BENZO(B)FLUORANTHENE 10 U [1400/10000\*]  
INDENO(1,2,3-CD)PYRENE 108 [1500/28000]

EXCAVATION	AREA	DEPTH	VOLUME
	ft2	ft bgs	yd3
1	4120	1	152
2	6261	2	464
3	1273	1	47
4	1082	1	40
5	6433	1	238
6	11026	1	408
7	32937	2	2440
8	4682	3	520
9	2729	1	101
10	2678	3	298
11	59457	0.5	1101
<b>Total Yards</b>			<b>5809</b>

CEF-P49-SS-114-01  
Inorganics (mg/kg)  
LEAD 42500 [400\*/NA]

[Vertical Delineation Sample]  
CEF-P49-SS-603-02  
Inorganics (mg/kg)  
LEAD 66300 [400\*/NA]

CEF-P49-SU-711-03  
Inorganics (mg/kg)  
LEAD 232 [400\*/NA]

CEF-P49-SS-309-01  
Inorganics (mg/kg)  
LEAD 51000 [400\*/NA]

CEF-P49-SS-603-02  
Inorganics (mg/kg)  
LEAD 66300 [400\*/NA]

CEF-P49-SU-711-03  
Inorganics (mg/kg)  
LEAD 11 [400\*/NA]

CEF-P49-SS-122-01  
Inorganics (mg/kg)  
LEAD 33400 [400\*/NA]

CEF-P49-SS-601-02 [Vertical delineation Sample]  
Inorganics (mg/kg)  
LEAD 16.7 [400/NA]

CEF-P49-SS-126-01  
DATE 7/21/01  
SCALE AS NOTED

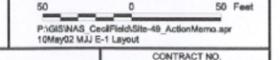
CEF-P49-SS-006-01  
Semivolatiles (ug/kg)  
2-METHYLNAPHTHALENE 7400 [83000\*/6100\*]  
ACENAPHTHENE 10000 [1900000\*/2100\*]  
BENZO(A)ANTHRACENE 4800 [1400\*/3200\*]  
BENZO(A)PYRENE 7400 [100\*/8000\*]  
BENZO(B)FLUORANTHENE 6100 [1400\*/10000\*]  
DIBENZO(A,H)ANTHRACENE 450 [100\*/30000\*]  
INDENO(1,2,3-CD)PYRENE 4500 [1500\*/28000\*]

CEF-P49-SS-505-02  
Semivolatiles (ug/kg)  
2-METHYLNAPHTHALENE 322 [83000/6100]  
ACENAPHTHENE 262 [1900000/2100]  
BENZO(A)ANTHRACENE 768 [1400/3200]  
BENZO(A)PYRENE 1480 [100\*/8000]  
BENZO(B)FLUORANTHENE 1770 [1400\*/10000\*]  
DIBENZO(A,H)ANTHRACENE 1690 [100\*/30000\*]  
INDENO(1,2,3-CD)PYRENE 1640 [1500\*/28000\*]

CEF-P49-SU-605-03  
Semivolatiles (ug/kg)  
1-METHYLNAPHTHALENE 66500 J [68000\*/2200\*]  
2-METHYLNAPHTHALENE 79200 [83000\*/6100\*]  
ACENAPHTHENE 78500 [1900000\*/2100\*]  
BENZO(A)ANTHRACENE 93900 [1400\*/3200\*]  
BENZO(A)PYRENE 71400 [100\*/8000\*]  
BENZO(B)FLUORANTHENE 53100 [1400\*/10000\*]  
BENZO(K)FLUORANTHENE 45400 [15000\*/25000\*]  
CHRYSENE 103000 [140000\*/77000\*]  
DIBENZO(A,H)ANTHRACENE 14000 U [100/30000]  
INDENO(1,2,3-CD)PYRENE 30000 [1500\*/28000\*]

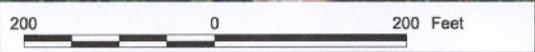
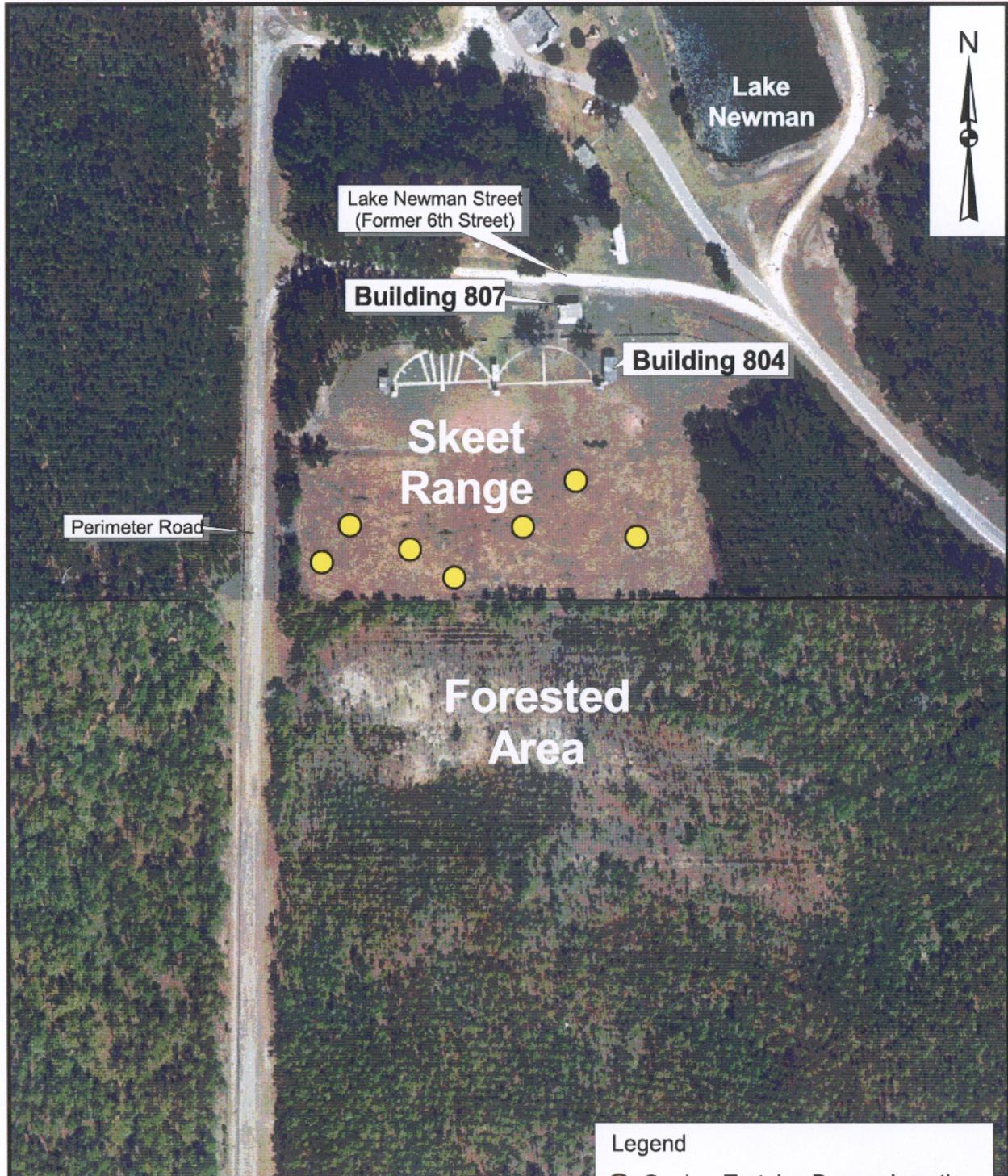
[Vertical Delineation Sample]  
CEF-P49-SU-706-04  
Semivolatiles (ug/kg)  
1-METHYLNAPHTHALENE 400 U [68000\*/2200\*]  
2-METHYLNAPHTHALENE 400 U [2400000/300]  
ACENAPHTHENE 800 U [1900000/2100]  
BENZO(A)ANTHRACENE 400 U [1400/3200]  
BENZO(A)PYRENE 53.3 J [100/8000]  
BENZO(B)FLUORANTHENE 80 U [1400/10000\*]  
BENZO(K)FLUORANTHENE 80 U [15000\*/25000\*]  
CHRYSENE 400 U [140000\*/77000\*]  
DIBENZO(A,H)ANTHRACENE 80 U [100/30000\*]  
INDENO(1,2,3-CD)PYRENE 47.1 J [1500/28000\*]

Corner	Easting	Northing
1	371491.41	2144801.10
2	371467.70	2144801.43
3	371391.80	2144801.43
4	371391.70	2144802.24
5	371441.20	2145241.10
6	371441.20	2145241.10
7	371345.53	2144829.43
8	371345.53	2144829.43
9	371345.53	2144829.43
10	371345.53	2144829.43
11	371491.41	2144801.10
12	371491.41	2144801.10
13	371491.41	2144801.10
14	371491.41	2144801.10
15	371491.41	2144801.10
16	371491.41	2144801.10
17	371491.41	2144801.10
18	371491.41	2144801.10
19	371491.41	2144801.10
20	371491.41	2144801.10
21	371491.41	2144801.10
22	371491.41	2144801.10
23	371491.41	2144801.10
24	371491.41	2144801.10
25	371491.41	2144801.10
26	371491.41	2144801.10
27	371491.41	2144801.10
28	371491.41	2144801.10
29	371491.41	2144801.10
30	371491.41	2144801.10
31	371491.41	2144801.10
32	371491.41	2144801.10
33	371491.41	2144801.10
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51	371491.41	2144801.10
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81	371491.41	2144801.10
82	371491.41	2144801.10
83	371491.41	2144801.10
84	371491.41	2144801.10
85	371491.41	2144801.10



REMOVAL ACTION DESIGN PLAN  
SOIL EXCAVATION  
SITE 49, FORMER SKEET RANGE  
NAVAL AIR STATION CECIL FIELD  
JACKSONVILLE, FLORIDA

CONTRACT NO. 0058  
OWNER NO. [Redacted]  
APPROVED BY: [Signature]  
DATE: 7/21/01  
DRAWING NO. [Redacted]  
REV. 0



**Legend**  
 Gopher Tortoise Burrow Location

DRAWN BY MJJ	DATE 26Jun01
CHECKED BY	DATE
COST/SCHEDULE-AREA	
SCALE AS NOTED	



GOPHER TORTOISE BURROWS  
 SITE 49, FORMER SKEET RANGE  
 NAVAL AIR STATION CECIL FIELD  
 JACKSONVILLE, FLORIDA

CONTRACT NUMBER 0039	
APPROVED BY <i>[Signature]</i>	DATE 5/9/02
APPROVED BY <i>[Signature]</i>	DATE 5/10/02
DRAWING NO. FIGURE E-2	REV 0

P:\GIS\NAS\_CecilField\Site-49\_ActionMemo.apr 01May02 MJJ E-2 Layout



TABLE 1

ATTAINMENT OF RESIDENTIAL SCTLs FOR BaPEq  
 OPERABLE UNIT 5, SITE 49 - FORMER SKEET RANGE  
 NAVAL AIR STATION CECIL FIELD  
 JACKSONVILLE, FLORIDA  
 PAGE 2 OF 2

nsample	BAPEQ [17]	BAPEQ (RES)	BAPEQ [18]	BAPEQ (RES)	BAPEQ [19]	BAPEQ (RES)	BAPEQ [20]	BAPEQ (RES)
MIN	27.0000	5.0000	34.0000	34.0000	35.0000	35.0000	29.0000	29.0000
MAX	6,871.00	61.00	85,880.00	189.00	103,657.00	183.00	33,575.00	163.00
MEAN	1,749.75	33.25	11,447.75	65.63	10,158.40	54.67	3,124.83	58.83
t 0.95, n-1	0.29969307	0.306908288	0.249974912	0.271078248	0.2197537	0.244735616	0.226568602	0.27471824
STANDARD DEVIATION	3,414.20	23.47	30,098.96	59.40	26,322.88	42.96	9,611.99	43.95
COEFFICIENT OF VARIATION	1.95	0.71	2.63	0.91	2.59	0.79	3.08	0.75
n	4	4	8	8	15	15	12	12
UCL <sub>0.95</sub>	2,261.36	36.85	14,107.88	71.32	11,651.96	57.38	3,753.50	62.32
Goal	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
remediation level	5	5	34	34	35	35	35	35
	6871	5	85880	34	103657	35	33575	35
	61	61	3536	34	14342	35	2214	35
	40	40	1402	34	13005	35	1108	35
	27	27	375	34	9435	35	163	163
			189	189	4291	35	120	120
			127	127	3598	35	100	100
			39	39	2808	35	49	49
			34	34	700	35	36	36
					183	183	35	35
					122	122	35	35
					79	79	34	34
					50	50	29	29
					36	36		
					35	35		
					35	35		

TABLE 2

**ATTAINMENT OF RESIDENTIAL SCTLs FOR LEAD  
OPERABLE UNIT 5, SITE 49 - FORMER SKEET RANGE  
NAVAL AIR STATION CECIL FIELD  
JACKSONVILLE, FLORIDA**

UNIT 3	LEAD	UNIT 6	LEAD	UNIT 7	LEAD	UNIT 11	LEAD	UNIT 16	LEAD
66300	2.5	42500	2.5	1680	2.5	35600	2.5	32.9	2.5
51000	2.5	577	577	1440	2.5	4130	2.5	131	131
33400	2.5	502	502	801	801	383	383	445	445
2300	2.5	232	232	410	410	363	363	345	345
477	477	82.9	82.9	334	334	268	268	149	149
22.7	22.7	65.7	65.7	208	208	181	181	2.3	2.3
16.7	16.7	50.9	50.9	98.9	98.9	56	56	3.3	3.3
5.5	5.5	29.2	29.2	86	86	44.3	44.3	3.4	3.4
19190.24	66.4875	22.8	22.8	55.9	55.9	27.9	27.9	138.9875	135.1875
		17.1	17.1	49.8	49.8	23.4	23.4		
		4407.96	158.21	40.1	40.1	22.2	22.2		
				13.9	13.9				
						3736.255	124.8909		
				434.8	175.2167				

**ATTACHMENT 1**

**WETLAND IMPACT MEMORANDUM**



**TETRA TECH NUS, INC.**

20251 Century Blvd., Suite 200, Germantown, MD 20874-7114  
(301) 528-5552

April 3, 2002

Mr. Steve Sabia  
Florida Department of Environmental Protection  
7825 Baymeadows Way  
Suite 200B  
Jacksonville, Florida 32256

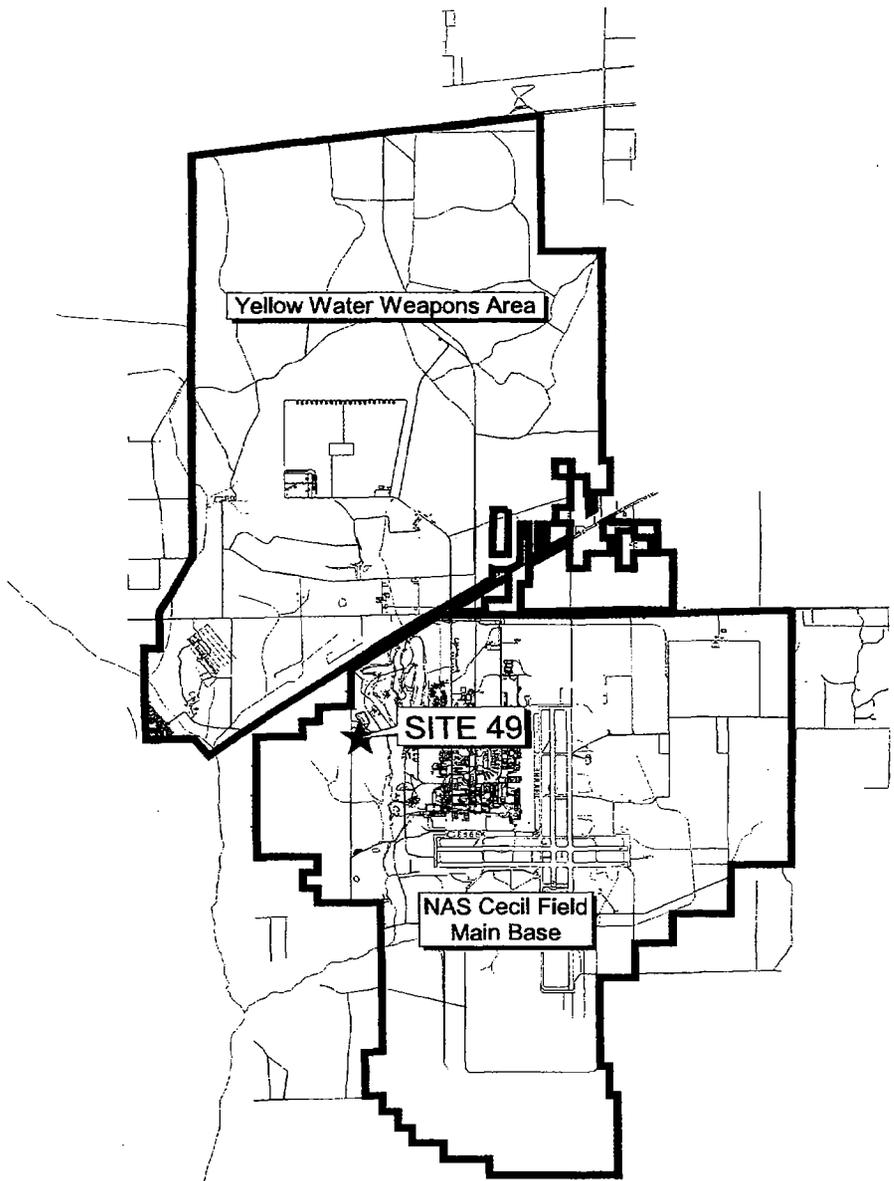
Subject: Wetland Impacts from Proposed Removal Action at Site 49 (Former Skeet Range), NAS Cecil Field

Dear Mr. Sabia:

Tetra Tech NUS (TtNUS) is under contract to Southern Division, Naval Facilities Engineering Command to design a removal action addressing contaminated surface soils at Operable Unit (OU) 5, Site 49 (Former Skeet Range) at the Naval Air Station (NAS) Cecil Field (Figure 1). NAS Cecil Field is on the National Priorities List (NPL) of sites identified by the U.S. Environmental Protection Agency (EPA) as requiring priority cleanup under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The following letter describes wetland impacts that will be unavoidable if the Navy implements a removal action to clean up contaminated soils at Site 49 in accordance with the National Contingency Plan (NCP; 40 CFR 3000.415). The Navy will submit a complete design package for the removal action as soon as the design is complete.

The Navy requests that the Florida Department of Environmental Protection (FDEP) review the wetland impacts described below and indicate whether further action or authorizations are required. The Navy believes that because the removal action will be performed in the context of CERCLA, and because the FDEP will review the wetland impacts as part of its overall review of the removal action, that formal application for wetland permits is not necessary.

Site Description: Site 49 consists of an unpaved land area that was used as a skeet shooting range (Facility 804) from 1965 to 1998 (Photograph 1). Historic aerial photographs indicate that the land area was undeveloped prior to its use as a skeet range. An environmental baseline survey completed by the Navy in 1994 (ABB-ES, 1994) recommended that soils in the vicinity of the skeet range be investigated for possible lead contamination originating from lead shot. TtNUS, under contract to the Navy, performed soil sampling that detected and delineated



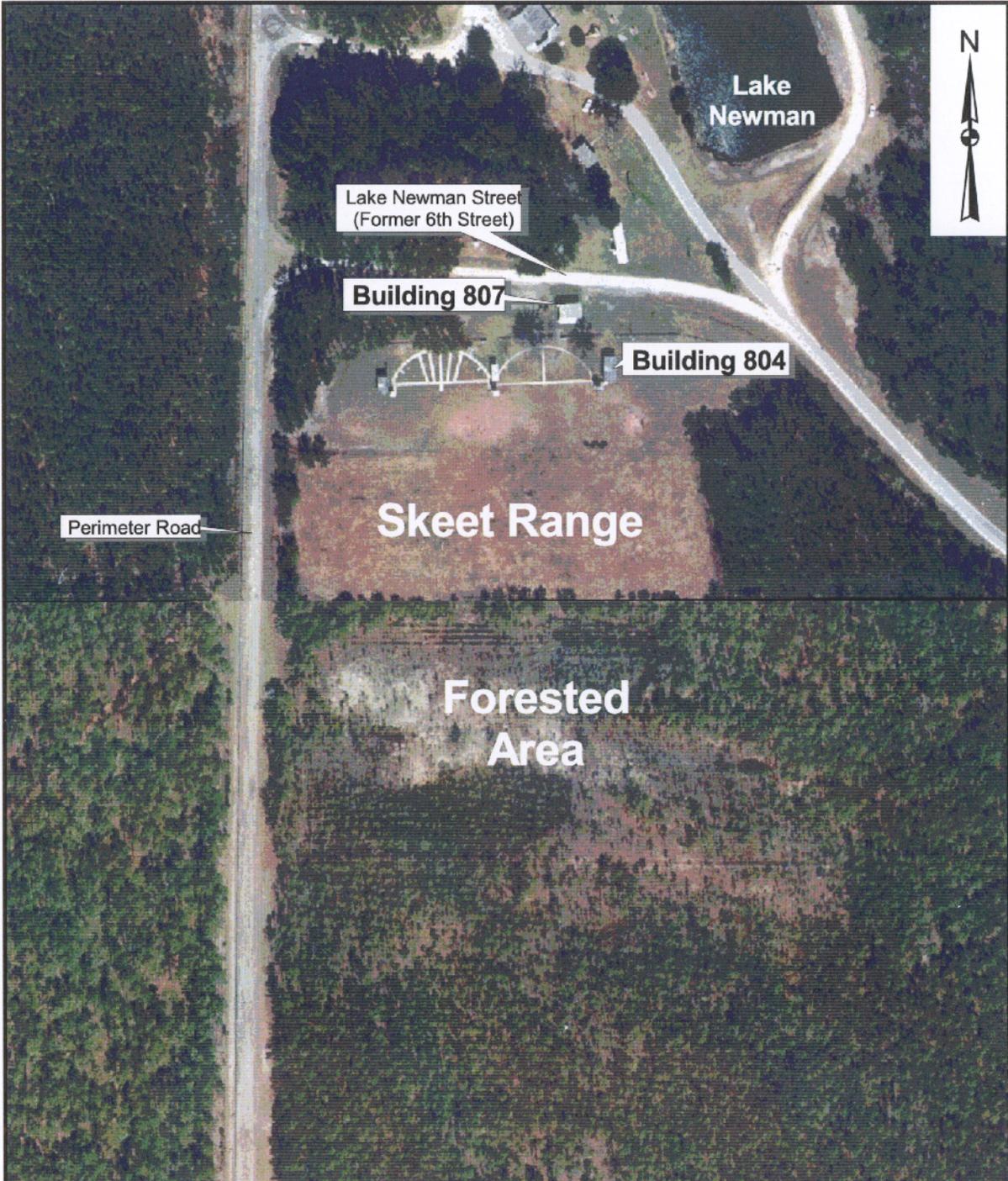
8000 0 8000 Feet

DRAWN BY MLJ	DATE 26 Jun 01
CHECKED BY	DATE
COST/SCHEDULE-AREA	
SCALE AS NOTED	



GENERAL LOCATION MAP  
SITE 49, FORMER SKEET RANGE  
NAVAL AIR STATION CECIL FIELD  
JACKSONVILLE, FLORIDA

CONTRACT NUMBER 0039	
APPROVED BY <i>[Signature]</i>	DATE 5/9/02
APPROVED BY <i>[Signature]</i>	DATE 5/10/02
DRAWING NO. FIGURE 1	REV 0



DRAWN BY MJJ	DATE 26Jun01
CHECKED BY	DATE
COST/SCHEDULE-AREA	
SCALE AS NOTED	



SITE LAYOUT MAP  
 SITE 49, FORMER SKEET RANGE  
 NAVAL AIR STATION CECIL FIELD  
 JACKSONVILLE, FLORIDA

CONTRACT NUMBER 0039	
APPROVED BY <i>MPS</i>	DATE 5/9/02
APPROVED BY <i>MPS</i>	DATE
DRAWING NO. PHOTOGRAPH	REV 1 0

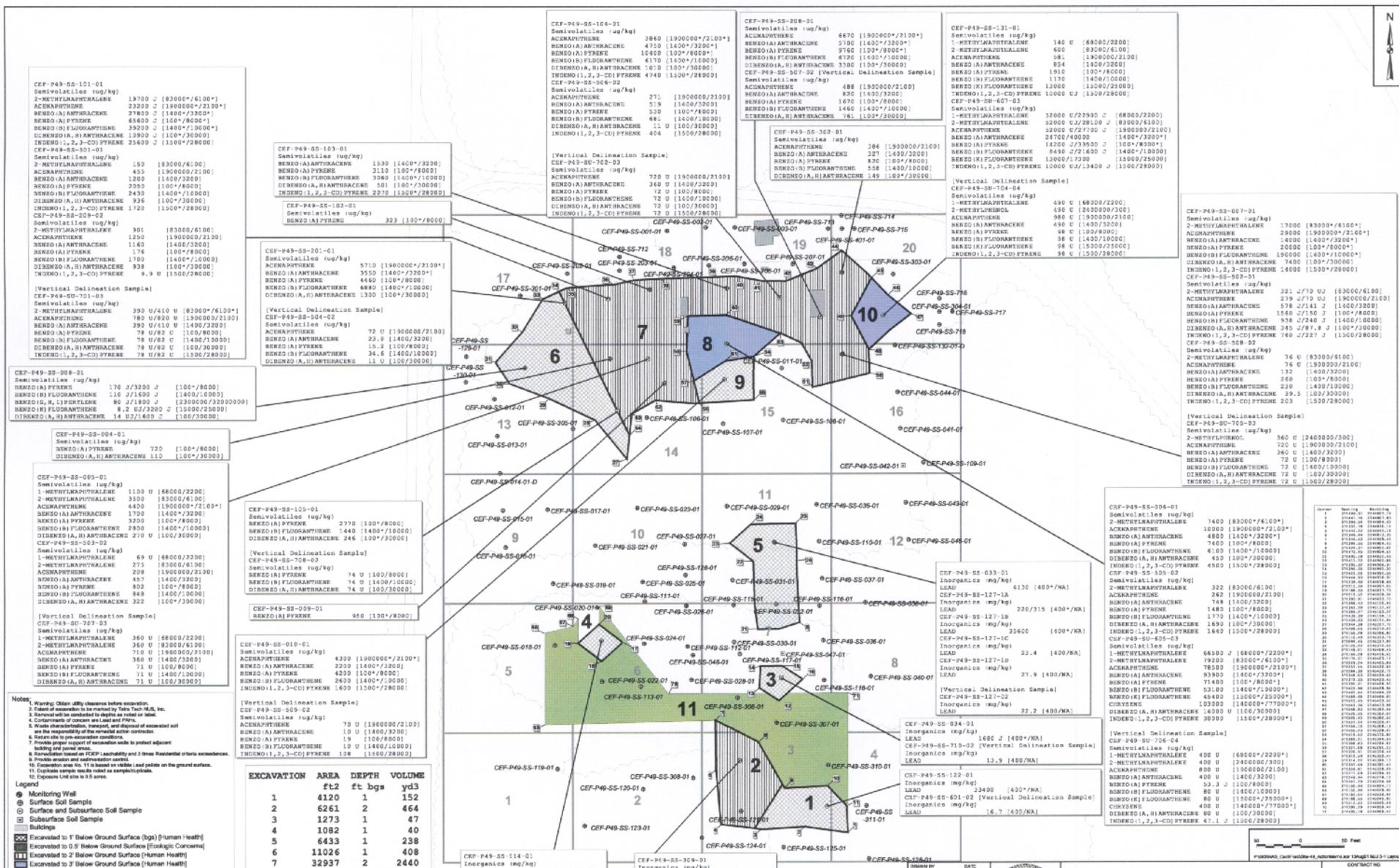
contamination by polynuclear aromatic hydrocarbons and inorganic constituents (including lead). The results of TtNUS's investigations are reported in an Engineering Evaluation/Cost Analysis (EE/CA) (TtNUS, 2002a). A tag map from the EE/CA that summarizes soil sample locations and detected contaminants is provided as Figure 2. The Navy concludes that unless the removal action is promptly implemented, contaminated soils at Site 49 could present an imminent and substantial endangerment to public health or the environment (TtNUS, 2002b).

Description of Proposed Removal Action: The removal action calls for excavation and proper off-site disposal of approximately 5,194 cubic yards of contaminated soil from 11 areas of soil contamination totaling approximately 99,481 square feet (2.3 acres). Each area of soil contamination (designated as Areas 1 through 11) is shown in Figure 2. The size (surface area), proposed excavation depth, and a brief description for each of the 11 areas are presented in Table 1.

Wetland Delineation: Wetlands on Site 49 were delineated by Environmental Resource Solutions (ERS), contractor to the City of Jacksonville, as part of a larger wetland delineation addressing all lands potentially affected by a proposed project to expand an existing lake (Lake Fretwell) to increase stormwater management capabilities in areas of NAS Cecil Field undergoing redevelopment. The wetland delineation identified areas meeting the definitions for wetlands established by the U.S. Army Corps of Engineers (COE) (33 CFR 328), the EPA (40 CFR 230), and the State of Florida (Chapter 62-340 F.A.C.).

Figure 3 depicts the delineated wetland boundary and its spatial relation to each area of soil contamination. Wetlands occur only in the southern part of Site 49. According to ERS, the boundaries meeting the Federal and State of Florida wetland definitions are coincident. The wetlands support sparse herbaceous and shrub cover with stunted and widely spaced planted slash pine (Photograph 2). The U.S. Department of Agriculture, Soil Conservation Service mapped soils in the vicinity of the Site 49 wetlands as "pits" in a soil survey completed in 1978 for areas within the City of Jacksonville (USDA, 1978). The soil survey defines this term as a "borrow pits" from which soil has been removed. The soils appear to have been graded in the past, either as part of constructing or operating the skeet range or to provide borrow. The soils are sandy with little or no topsoil.

According to ERS, the delineated wetland boundary has been flagged and surveyed but not yet officially verified by the COE or the St. John's Water Management District. The City of Jacksonville plans to apply for an official verification of the wetland delineation and to submit a Joint Permit Application requesting permits required to disturb wetlands, including wetlands on Site 49, to expand Lake Fretwell.



**Notes:**

1. Warning: Obtain utility clearance before excavation.
2. Excavation to be marked by Yellow Tech MCL, Inc.
3. Excavation to be marked by Yellow Tech MCL, Inc.
4. Construction of concrete as per L&P/PA.
5. Utility clearance obtained on site.
6. Excavation to be marked by Yellow Tech MCL, Inc.
7. Provide proper support of excavation walls to protect adjacent buildings and road.
8. Excavation based on CEFIP (accuracy and 3 lines Residential clearances).
9. Provide erosion and sediment controls.
10. Construction area No. 11 is based on visible lead pellets on the ground surface.
11. Duplicate sample results noted at sample locations.
12. Exposure Limit in 5 years.

**Legend:**

- Monitoring Well
- Surface Soil Sample
- Surface and Subsurface Soil Sample
- Subsurface Soil Sample
- Buildings
- Excavated to 1' Below Ground Surface (bgs) (Human Health)
- Excavated to 0.5' Below Ground Surface (Ecotoxic Concerns)
- Excavated to 2' Below Ground Surface (Human Health)
- Excavated to 3' Below Ground Surface (Human Health)

**Vertical Delineation Sample:**

CEP-P49-SS-114-01  
Inorganics (mg/kg)  
LEAD 42300 (400\*/KA)

CEP-P49-SS-309-01  
Inorganics (mg/kg)  
LEAD 51000 (400\*/KA)

CEP-P49-SS-603-02  
Inorganics (mg/kg)  
LEAD 66300 (400\*/KA)

CEP-P49-SS-711-03  
Inorganics (mg/kg)  
LEAD 11 (400\*/KA)

CEP-P49-SS-124-01  
Inorganics (mg/kg)  
LEAD 11 (400\*/KA)

CEP-P49-SS-125-01  
Inorganics (mg/kg)  
LEAD 11 (400\*/KA)

EXCAVATION AREA	DEPTH ft	VOLUME bgs yd3
1	4120	1 152
2	6261	2 464
3	1273	1 47
4	1082	1 40
5	6433	1 238
6	11026	1 408
7	32937	2 2440
8	4682	3 520
9	2729	1 191
10	2678	3 208
11	26260	0.5 486
<b>Total Yards</b>		<b>5194</b>

**REMOVAL ACTION DESIGN PLAN**  
SOIL EXCAVATION  
SITE 49, FORMER SKEET RANGE  
NAVAL AIR STATION, ORCIL FIELD  
JACKSONVILLE, FLORIDA

DATE: 10/20/04  
DRAWN BY: M. J. SIOGAARD  
CHECKED BY: M. J. SIOGAARD  
DATE: 10/20/04  
SCALE: AS NOTED

APPROVED BY: DATE: 10/20/04  
DRAWING NO. FIGURE 2 OF 0

**Table 1**  
**Proposed Excavation Activities**  
**Removal Action for NAS Cecil Field Site 49 (Former Skeet Range)**

Area	Surface Area (Sq. Ft.)	Proposed Excavation Depth (Ft. Bgs)	Proposed Excavation Volume (Cu. Yd.)	Description
1	4,120	1	152	Slash Pine and scrub vegetation south of former skeet range
2	6,261	2	464	Slash Pine and scrub vegetation south of former skeet range
3	1,273	1	47	Slash Pine and scrub vegetation south of former skeet range
4	1,082	1	40	Slash Pine and scrub vegetation south of former skeet range
5	6,433	1	238	Slash Pine and scrub vegetation south of former skeet range
6	11,026	1	408	Old field vegetation in forest clearing formerly used as skeet range
7	32,937	2	2,440	Old field vegetation in forest clearing formerly used as skeet range
8	4,682	3	520	Old field vegetation in forest clearing formerly used as skeet range
9	2,729	1	101	Old field vegetation in forest clearing formerly used as skeet range
10	2,678	1	298	Old field vegetation in forest clearing formerly used as skeet range
11	26,260	0.5	486	Slash Pine and scrub vegetation south of former skeet range
<b>TOTAL</b>	<b>99,481</b>	<b>N/A</b>	<b>5194</b>	<b>N/A</b>

Sq. Ft.: Square Feet  
 Ft: Feet  
 Bgs: below ground surface  
 Cu. Yd.: Cubic Yards

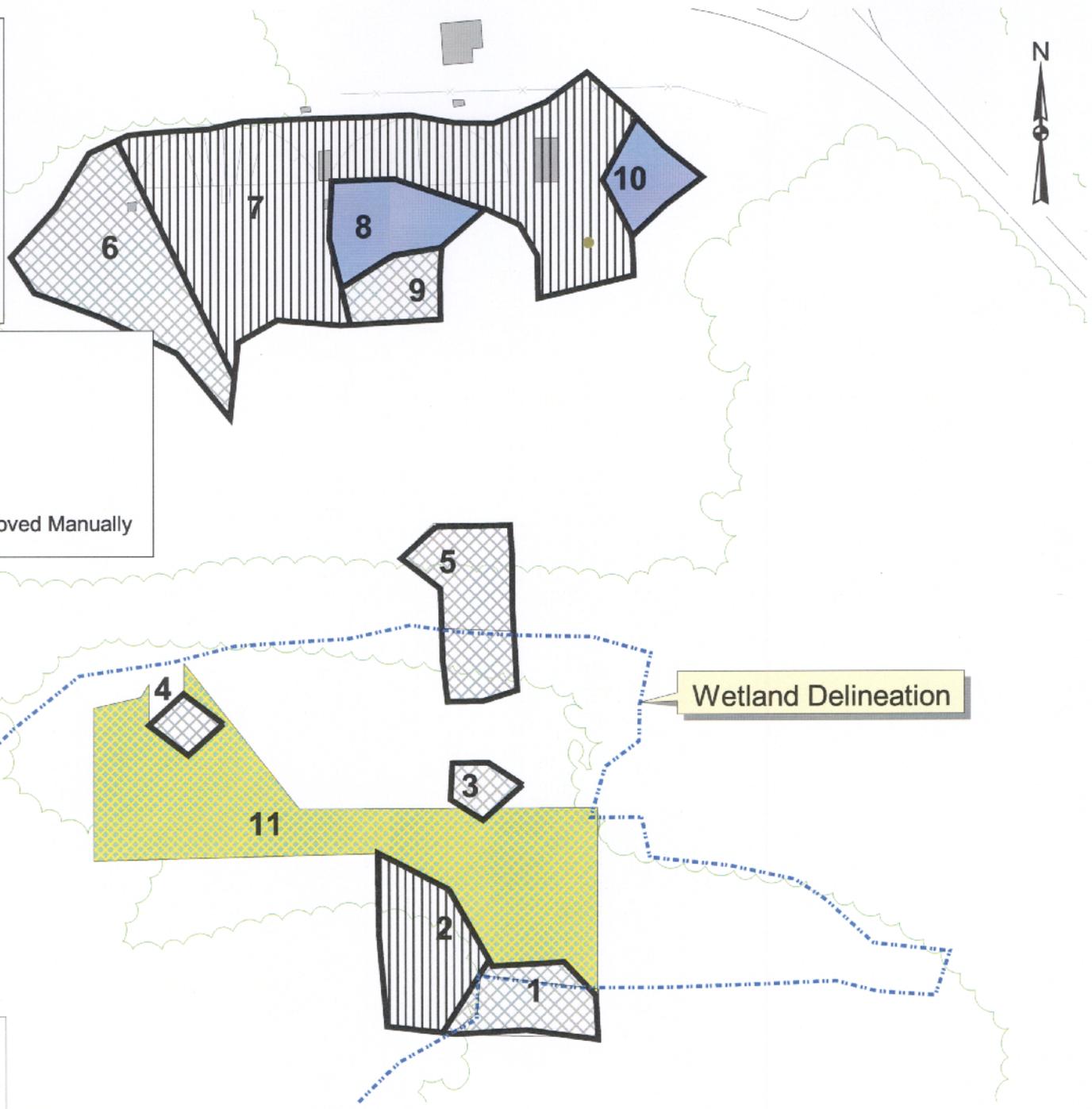
EXCAVATION	AREA	DEPTH	VOLUME
	ft2	ft bgs	yd3
1	4120	1	152
2	6261	2	464
3	1273	1	47
4	1082	1	40
5	6433	1	238
6	11026	1	408
7	32937	2	2440
8	4682	3	520
9	2729	1	101
10	2678	3	298
11	26260	0.5	486
Total Yards			5194

**Human Health**

-  Excavated to 1' bgs
-  Excavated to 2' bgs
-  Excavated to 3' bgs

**Ecologic Concerns**

-  Visible Lead Pellets to be Removed Manually



**FIGURE 3**

100 0 100 Feet



DRAWN BY	DATE
MJJ	02Apr02
CHECKED BY	DATE
_____	_____
COST/SCHEDULE-AREA	
SCALE	
AS NOTED	



SITE 49, FORMER SKEET RANGE  
 NAVAL AIR STATION CECIL FIELD  
 JACKSONVILLE, FLORIDA

CONTRACT NUMBER	
0039	
APPROVED BY	DATE
_____	_____
APPROVED BY	DATE
_____	_____
DRAWING NO.	REV
PHOTOGRAPH 2	0

Anticipated Wetland Impacts: Excavation of contaminated soils from wetlands within Areas 1, 2, 3, 4, 5, and 11 will result in the removal of approximately 1,162 cubic yards of wetland (hydric) soil and the destruction of wetland (hydrophytic) vegetation from approximately 38,251 square feet (0.9 acre) of wetlands (Table 2). The excavation will be accomplished using backhoes or other mechanized construction equipment. It will not be possible to perform the excavation without first completely removing all trees and other vegetation growing in the affected areas. Because Areas 6 through 10 are not located in wetlands (Figure 3), their excavation will not disturb wetlands. As a beneficial impact, the removal action will decrease the exposure of vegetation and fauna in the remainder of the wetlands south of Site 49 to lead and other ecotoxic contaminants.

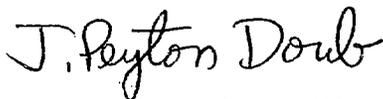
Proposed Wetland Mitigation: Because all of part of Areas 1, 2, 3, 4, 5, and 11 are located in wetlands, excavation and offsite disposal of contaminated soil is not possible without disturbing the wetlands. The wetland impacts resulting from the removal action are therefore unavoidable.

The Navy will minimize disturbance to wetlands during the removal action by staging excavation equipment outside of the wetlands. Prior to ground disturbance, the Navy will install silt fences around the perimeter of each area of soil contamination. The silt fences will minimize sedimentation of adjoining undisturbed wetlands during the removal action. The silt fences will be left in place until the excavated areas are vegetatively stabilized.

Because Site 49 would be subject to re-grading as part of the City of Jacksonville's proposed expansion of Lake Fretwell, the Navy does not propose to restore the affected wetlands to their baseline condition. Instead, the Navy would apply topsoil to a minimum depth (2 inches) to allow for vegetative stabilization of disturbed wetlands. Nowhere would the depth of applied topsoil exceed the existing grade. The Navy would then seed the affected areas with a mixture of indigenous wetland grasses, rushes, and forbs agreed upon in consultation with the FDEP.

Please call me at (301) 528-3089 if you have any questions regarding wetlands issues or Mark Jonnet at (412) 921-8622 if you have any general questions about the project.

Sincerely,



J. Peyton Doub, CEP, PWS  
Professional Wetland Scientist #358

**Table 2**  
**Anticipated Wetland Impacts**  
**Removal Action for NAS Cecil Field Site 49 (Former Skeet Range)**

Area	Total Area (Sq. Ft.)		Volume of Soil Proposed for Excavation (Cu Yd.)		Area of Vegetation Proposed for Removal (Sq. Ft.)	
	Total	Wetlands	Total	From Wetlands	Total	From Wetlands
1	4,120	1,075	152	40	4,120	1,075
2	6,261	6,261	464	464	6,261	6,261
3	1,273	1,273	47	47	1,273	1,273
4	1,082	1,082	40	40	1,082	1,082
5	6,433	2,300	238	85	6,433	2,300
6	11,026	0	408	0	11,026	0
7	32,937	0	2,440	0	32,937	0
8	4,682	0	520	0	4,682	0
9	2,729	0	101	0	2,729	0
10	2,678	0	298	0	2,678	0
11	26,260	26,260	486	486	26,260	26,260
<b>TOTAL</b>	<b>99,481</b>	<b>38,251</b>	<b>5,194</b>	<b>1,162</b>	<b>99,481</b>	<b>38,251</b>

Sq. Ft.: Square Feet  
 Cu. Yd.: Cubic Yards

#### References

ABB-ES (ABB Environmental Services, Inc.). 1994. *Base Realignment and Closure Environmental Baseline Survey Report Naval Air Station (NAS) Cecil Field*. November.

TiNUS (Tetra Tech NUS). 2002a. *Engineering Evaluation/Cost Analysis for Operable Unit 5, Site 49, Former Skeet Range, Naval Air Station Cecil Field, Jacksonville, Florida*. Prepared for SOUTHNAVFACENGCOM, North Charleston, South Carolina. June.

TiNUS (Tetra Tech NUS). 2002b. *Action Memorandum for Operable Unit 5, Site 49 – Former Skeet Range at Naval Air Station Cecil Field, Jacksonville, Florida*. Prepared for SOUTHNAVFACENGCOM, North Charleston, South Carolina. March 15.

USDA (U.S. Department of Agriculture). 1978. *Soil Survey of City of Jacksonville, Duval County, Florida*. Soil Conservation Service.

**ATTACHMENT 2**

**JOINT APPLICATION FOR ENVIRONMENTAL RESOURCE PERMITS**



**TETRA TECH NUS, INC.**

20251 Century Blvd., Suite 200, Germantown, MD 20874-7114  
(301) 528-5552

April 23, 2002

Mr. Osvaldo Collazo  
Atlantic Permits Branch Office  
CESAJ-RD-A  
400 West Bay Street  
Room 201  
Jacksonville, Florida 32202

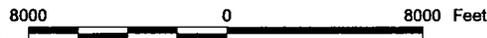
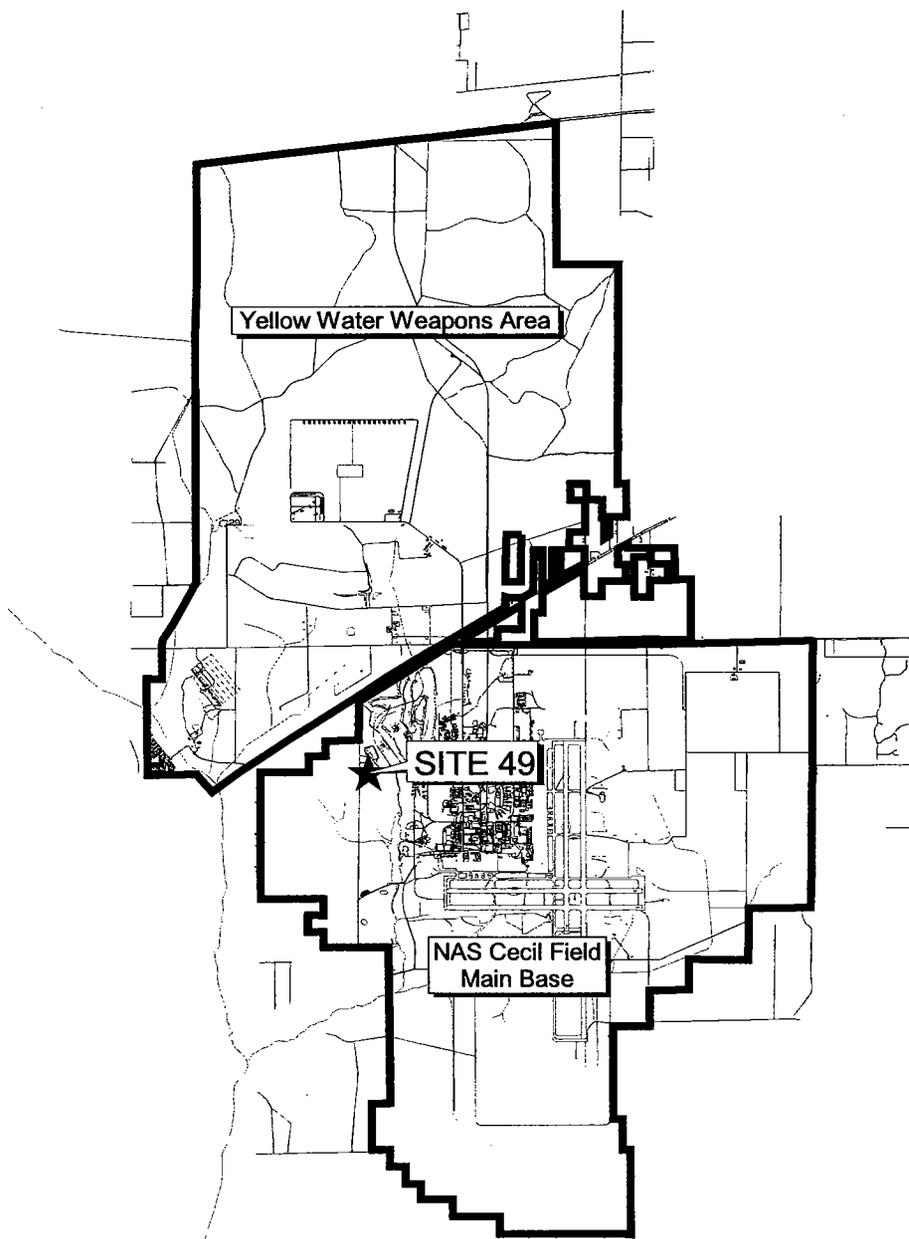
Subject: Request for Authorization Under National Permit No. 38,  
Wetland Impacts from Removal Action at Site 49 (Former Skeet Range),  
NAS Cecil Field

Dear Mr. Collazo:

Tetra Tech NUS (TtNUS) is under contract to Southern Division, Naval Facilities Engineering Command to design a removal action addressing contaminated surface soils at Operable Unit (OU) 5, Site 49 (Former Skeet Range) at the Naval Air Station (NAS) Cecil Field (Figure 1). NAS Cecil Field is on the National Priorities List (NPL) of sites identified by the U.S. Environmental Protection Agency (EPA) as requiring priority cleanup under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The following letter has been forwarded to the Navy and describes wetland impacts that will be unavoidable if the Navy implements a removal action to clean up contaminated soils at Site 49 in accordance with the National Contingency Plan (NCP; 40 CFR 3000.415).

The Navy requests that the U.S. Army Corps of Engineers (COE) review the wetland impacts described below and indicate whether the impacts are authorized under Nationwide Permit 38 (Cleanup of Hazardous and Toxic Waste). In accordance with your request via telephone call on April 22, 2002, Section A of the Joint Application Form developed for use in Florida is attached. The Navy is seeking approval from the Florida Department of Environmental Protection under separate cover.

Site Description: Site 49 consists of an unpaved land area that was used as a skeet shooting range (Facility 804) from 1965 to 1998 (Photograph 1). Historic aerial photographs indicate that the land area was undeveloped prior to its use as a skeet range. An environmental baseline survey completed by the Navy in 1994 (ABB-ES, 1994) recommended that soils in the vicinity of the skeet range be investigated for possible lead contamination originating from lead shot. TtNUS, under contract to the Navy, performed soil sampling that detected and delineated

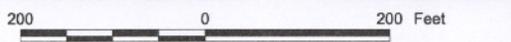


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MJJ	26Jun01
CHECKED BY	DATE
COST/SCHEDULE-AREA	
SCALE	
AS NOTED	



GENERAL LOCATION MAP  
SITE 49, FORMER SKEET RANGE  
NAVAL AIR STATION CECIL FIELD  
JACKSONVILLE, FLORIDA

CONTRACT NUMBER	
0039	
APPROVED BY	DATE
<i>[Signature]</i>	5/9/02
APPROVED BY	DATE
<i>[Signature]</i>	5/16/02
DRAWING NO.	REV
FIGURE 1	0



DRAWN BY	DATE
MJJ	26Jun01
CHECKED BY	DATE
COST/SCHEDULE-AREA	
SCALE	
AS NOTED	



SITE LAYOUT MAP  
 SITE 49, FORMER SKEET RANGE  
 NAVAL AIR STATION CECIL FIELD  
 JACKSONVILLE, FLORIDA

CONTRACT NUMBER	
0039	
APPROVED BY	DATE
<i>MPS</i>	29/02
APPROVED BY	DATE
<i>5110102</i>	<i>MPS</i>
DRAWING NO.	REV
PHOTOGRAPH	1 0

contamination by polynuclear aromatic hydrocarbons and inorganic constituents (including lead). The results of TtNUS's investigations are reported in an Engineering Evaluation/Cost Analysis (EE/CA) (TtNUS, 2002a). A tag map from the EE/CA that summarizes soil sample locations and detected contaminants is provided as Figure 2. The Navy concludes that unless the removal action is promptly implemented, contaminated soils at Site 49 could present an endangerment to public health or the environment (TtNUS, 2002b).

Description of Proposed Removal Action: The removal action calls for excavation and proper off-site disposal of approximately 5,194 cubic yards of contaminated soil from 11 areas of soil contamination totaling approximately 99,481 square feet (2.3 acres). Each area of soil contamination (designated as Areas 1 through 11) is shown in Figure 2. The size (surface area), proposed excavation depth, and a brief description for each of the 11 areas are presented in Table 1.

Wetland Delineation: Wetlands on Site 49 were delineated by Environmental Resource Solutions (ERS), contractor to the City of Jacksonville, as part of a larger wetland delineation addressing all lands potentially affected by a proposed project to expand an existing lake (Lake Fretwell) to increase stormwater management capabilities in areas of NAS Cecil Field undergoing redevelopment. The wetland delineation identified areas meeting the definitions for wetlands established by the U.S. Army Corps of Engineers (COE) (33 CFR 328), the EPA (40 CFR 230), and the State of Florida (Chapter 62-340 F.A.C).

Figure 3 depicts the delineated wetland boundary and its spatial relation to each area of soil contamination. Wetlands occur only in the southern part of Site 49. According to ERS, the boundaries meeting the Federal and State of Florida wetland definitions are coincident. The wetlands support sparse herbaceous and shrub cover with stunted and widely spaced planted slash pine (Photograph 2). The U.S. Department of Agriculture, Soil Conservation Service mapped soils in the vicinity of the Site 49 wetlands as "pits" in a soil survey completed in 1978 for areas within the City of Jacksonville (USDA, 1978). The soil survey defines this term as a "borrow pits" from which soil has been removed. The soils appear to have been graded in the past, either as part of constructing or operating the skeet range or to provide borrow. The soils are sandy with little or no topsoil.

According to ERS, the delineated wetland boundary has been flagged and surveyed but not yet officially verified by the COE or the St. John's Water Management District. The City of Jacksonville plans to apply for an official verification of the wetland delineation and to submit a Joint Permit Application requesting permits required to disturb wetlands, including wetlands on Site 49, to expand Lake Fretwell.



**Table 1  
 Proposed Excavation Activities  
 Removal Action for NAS Cecil Field Site 49 (Former Skeet Range)**

Area	Surface Area (Sq. Ft.)	Proposed Excavation Depth (Ft. Bgs)	Proposed Excavation Volume (Cu. Yd.)	Description
1	4,120	1	152	Slash Pine and scrub vegetation south of former skeet range
2	6,261	2	464	Slash Pine and scrub vegetation south of former skeet range
3	1,273	1	47	Slash Pine and scrub vegetation south of former skeet range
4	1,082	1	40	Slash Pine and scrub vegetation south of former skeet range
5	6,433	1	238	Slash Pine and scrub vegetation south of former skeet range
6	11,026	1	408	Old field vegetation in forest clearing formerly used as skeet range
7	32,937	2	2,440	Old field vegetation in forest clearing formerly used as skeet range
8	4,682	3	520	Old field vegetation in forest clearing formerly used as skeet range
9	2,729	1	101	Old field vegetation in forest clearing formerly used as skeet range
10	2,678	1	298	Old field vegetation in forest clearing formerly used as skeet range
11	26,260	0.5	486	Slash Pine and scrub vegetation south of former skeet range
<b>TOTAL</b>	<b>99,481</b>	<b>N/A</b>	<b>5194</b>	<b>N/A</b>

Sq. Ft.: Square Feet  
 Ft: Feet  
 Bgs: below ground surface  
 Cu. Yd.: Cubic Yards

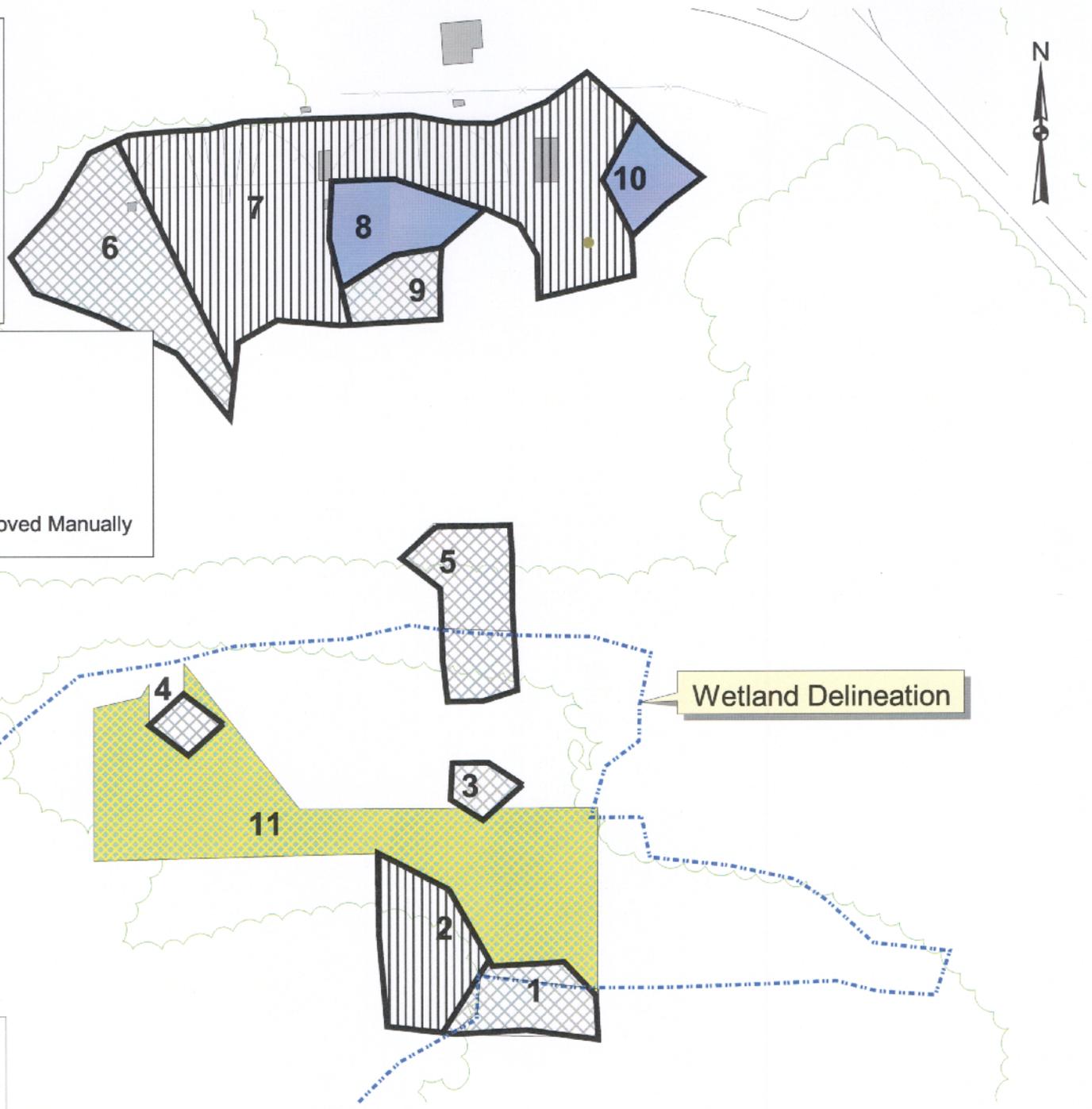
EXCAVATION	AREA	DEPTH	VOLUME
	ft2	ft bgs	yd3
1	4120	1	152
2	6261	2	464
3	1273	1	47
4	1082	1	40
5	6433	1	238
6	11026	1	408
7	32937	2	2440
8	4682	3	520
9	2729	1	101
10	2678	3	298
11	26260	0.5	486
Total Yards			5194

**Human Health**

-  Excavated to 1' bgs
-  Excavated to 2' bgs
-  Excavated to 3' bgs

**Ecologic Concerns**

-  Visible Lead Pellets to be Removed Manually



**FIGURE 3**

100 0 100 Feet



DRAWN BY MJJ	DATE 02Apr02
CHECKED BY	DATE
COST/SCHEDULE-AREA	
SCALE AS NOTED	



SITE 49, FORMER SKEET RANGE  
 NAVAL AIR STATION CECIL FIELD  
 JACKSONVILLE, FLORIDA

CONTRACT NUMBER 0039	
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO. PHOTOGRAPH 2	REV 0

Anticipated Wetland Impacts: Excavation of contaminated soils from wetlands within Areas 1, 2, 3, 4, 5, and 11 will result in the removal of approximately 1,162 cubic yards of wetland (hydric) soil and the destruction of wetland (hydrophytic) vegetation from approximately 38,251 square feet (0.9 acre) of wetlands (Table 2). The excavation will be accomplished using backhoes or other mechanized construction equipment. It will not be possible to perform the excavation without first completely removing all trees and other vegetation growing in the affected areas. Because Areas 6 through 10 are not located in wetlands (Figure 3), their excavation will not disturb wetlands. As a beneficial impact, the removal action will decrease the exposure of vegetation and fauna in the remainder of the wetlands south of Site 49 to lead and other ecotoxic contaminants.

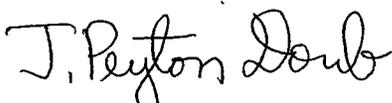
Proposed Wetland Mitigation: Because all of part of Areas 1, 2, 3, 4, 5, and 11 are located in wetlands, excavation and offsite disposal of contaminated soil is not possible without disturbing the wetlands. The wetland impacts resulting from the removal action are therefore unavoidable.

The Navy will minimize disturbance to wetlands during the removal action by staging excavation equipment outside of the wetlands. Prior to ground disturbance, the Navy will install silt fences around the perimeter of each area of soil contamination. The silt fences will minimize sedimentation of adjoining undisturbed wetlands during the removal action. The silt fences will be left in place until the excavated areas are vegetatively stabilized.

Because Site 49 would be subject to re-grading as part of the City of Jacksonville's proposed expansion of Lake Fretwell, the Navy does not propose to restore the affected wetlands to their baseline condition. Instead, the Navy would apply topsoil to a minimum depth (2 inches) to allow for vegetative stabilization of disturbed wetlands. Nowhere would the depth of applied topsoil exceed the existing grade. The Navy would then seed the affected areas with a mixture of indigenous wetland grasses, rushes, and forbs agreed upon in consultation with the FDEP.

Please call me at (301) 528-3089 if you have any questions regarding wetlands issues or Mark Jonnet at (412) 921-8622 if you have any general questions about the project.

Sincerely,



J. Peyton Doub, CEP, PWS  
Professional Wetland Scientist #358

**Table 2**  
**Anticipated Wetland Impacts**  
**Removal Action for NAS Cecil Field Site 49 (Former Skeet Range)**

Area	Total Area (Sq. Ft.)		Volume of Soil Proposed for Excavation (Cu Yd.)		Area of Vegetation Proposed for Removal (Sq. Ft.)	
	Total	Wetlands	Total	From Wetlands	Total	From Wetlands
1	4,120	1,075	152	40	4,120	1,075
2	6,261	6,261	464	464	6,261	6,261
3	1,273	1,273	47	47	1,273	1,273
4	1,082	1,082	40	40	1,082	1,082
5	6,433	2,300	238	85	6,433	2,300
6	11,026	0	408	0	11,026	0
7	32,937	0	2,440	0	32,937	0
8	4,682	0	520	0	4,682	0
9	2,729	0	101	0	2,729	0
10	2,678	0	298	0	2,678	0
11	26,260	26,260	486	486	26,260	26,260
<b>TOTAL</b>	<b>99,481</b>	<b>38,251</b>	<b>5,194</b>	<b>1,162</b>	<b>99,481</b>	<b>38,251</b>

Sq. Ft.: Square Feet  
 Cu. Yd.: Cubic Yards

**JOINT APPLICATION FOR  
ENVIRONMENTAL RESOURCE PERMIT/**

**AUTHORIZATION TO USE  
SOVEREIGN SUBMERGED LANDS/**

**FEDERAL DREDGE AND FILL PERMIT**

**FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION/  
WATER MANAGEMENT DISTRICTS/  
U.S. ARMY CORPS OF ENGINEERS**

SECTION A

FOR AGENCY USE ONLY	
ACOE Application #	DEP/WMD Application #
Date Application Received	Date Application Received
Proposed Project Lat.	Fee Received \$
Proposed Project Long.	Fee Receipt #

**PART 1:**

Are any of the activities described in this application proposed to occur in, on, or over wetlands or other surface waters?

yes  no

Is this application being filed by or on behalf of a government entity or drainage district?  yes  no

A. Type of Environmental Resource Permit Requested (check at least one). See Attachment 2 for thresholds and descriptions.

- Noticed General - include information requested in Section B.
- Standard General (Single Family Dwelling) - include information requested in Sections C and D.
- Standard General (all other Standard General projects) - include information requested in Sections C and E.
- Individual (Single Family Dwelling) - include information requested in Sections C and D.
- Individual (all other Individual projects) - include information requested in Sections C and E.
- Conceptual - include information requested in Sections C and E.
- Mitigation Bank Permit (construction) - include information requested in Sections C and F. (If the proposed mitigation bank involves the construction of a surface water management system requiring another permit defined above, check the appropriate box and submit the information requested by the applicable section.)
- Mitigation Bank (conceptual) - include information requested in Sections C and F.

B. Type of activity for which you are applying (check at least one)

- Construction or operation of a new system, other than a solid waste facility, including dredging or filling in, on or over wetlands and other surface waters.
- Construction, expansion or modification of a solid waste facility.
- Alteration or operation of an existing system which was not previously permitted by a WMD or DEP.
- Modification of a system previously permitted by a WMD or DEP.  
 Provide previous permit numbers:
 

<input type="checkbox"/> Alteration of a system	<input type="checkbox"/> Extension of permit duration
<input type="checkbox"/> Abandonment of a system	<input type="checkbox"/> Construction of additional phases of a system
<input type="checkbox"/> Removal of a system	

C. Are you requesting authorization to use Sovereign Submerged Lands?

yes  no

(See Section G and Attachment 5 for more information before answering this question.)

D. For activities in, on, or over wetlands or other surface waters, check type of federal dredge and fill permit requested:

- |  |   |                                  |
|--|---|----------------------------------|
| <input type="checkbox"/> Individual            | <input type="checkbox"/> Programmatic General | <input type="checkbox"/> General |
| <input checked="" type="checkbox"/> Nationwide | <input type="checkbox"/> Not Applicable       |                                  |

E. Are you claiming to qualify for an exemption?  yes  no

If yes, provide rule number if known. N/A

<b>PART 3: A. OWNER(S) OF LAND</b>	<b>B. ENTITY TO RECEIVE PERMIT (IF OTHER THAN OWNER)</b>
Name Southern Division, Naval Facilities Engineering Command	Name Southern Division, Naval Facilities Engineering Command
Title and Company U.S. Navy	Title and Company U.S. Navy
Address P.O. Box 19000	Address P.O. Box 19000
City, State, Zip North Charleston, SC 29419-9010	City, State, Zip North Charleston, SC 29419-9010
Telephone and Fax Phone: (843) 820-5587 Fax: (843) 820-5563	Telephone and Fax Phone: (843) 820-5587 Fax: (843) 820-5563
<b>C. AGENT AUTHORIZED TO SECURE PERMIT</b>	<b>D. CONSULTANT (IF DIFFERENT FROM AGENT)</b>
Name N/A	Name J. Peyton Doub, CEP, PWS
Title and Company N/A	Title and Company Tetra Tech NUS, Inc.
Address N/A	Address 20251 Century Blvd., Suite 200
City, State, Zip N/A	City, State, Zip Germantown, MD 20874-7114
Telephone and Fax N/A	Telephone and Fax Phone: (301) 528-3089 Fax: (301) 528-3000

**PART 4: (Please provide metric equivalent for federally funded projects):**

- A. Name of Project, including phase if applicable: Remediation of Installation Restoration Site 49 (Skeet Range)
- B. Is this application for part of a multi-phase project?  
 yes  no
- C. Total applicant-owned area contiguous to the project?  
8,477 ac.; 3,431 ha.
- D. Total area served by the system: 2.3 ac.; 0.9 ha.
- E. Impervious area for which a permit is sought: 0 ac.; 0 ha.
- F. Volume of water that the system is capable of impounding:  
0 ac. ft.; 0 m
- G. What is the total area of work in, on, or over wetlands or other surface waters?  
0.9 ac.; 0.4 ha. 38,251 sq. ft.; 3554 sq. m.
- H. Total volume of material to be dredged: 1,162 yd; 888 m
- I. Number of new boat slips proposed: 0 wet slips; 0 dry slips

**PART 5:**

Project location (use additional sheets if needed):

County(ies) NAS Cecil Field, in the City of Jacksonville, Duval County

Section(s)	Township	Range
Section(s)	Township	Range
Section(s)	Township	Range

Land Grant name, if applicable: NAS Cecil Field

Tax Parcel Identification Number: NAS Cecil Field

Street Address Road or other location: Intersection of Lake Newman Street and Perimeter Road

City, Zip Code, if applicable: NAS Cecil Field, Jacksonville, Florida 32202

**PART 6: Describe in general terms the proposed project, system, or activity.**

The proposed project is to excavate contaminated surface soils from an area on the former Naval Air Station (NAS) Cecil Field termed the Former Skeet Range (Site 49). The Navy performed soil sampling at Site 49 that detected and delineated contamination by lead and other constituents at concentrations posing a significant risk to human health and the environment. Based on the sampling results, the Navy proposes to excavate contaminated surface soil from approximately 99,481 square feet (approximately 2.3 acres). A wetland delineation performed by the City of Jacksonville for a portion of NAS Cecil Field, including Site 49, identified approximately 38,251 square feet (approximately 0.9 acres) of the area subject to excavation as wetlands meeting the definition in 33 CFR 328 (following procedures in the 1987 Corps of Engineers Wetlands Delineation Manual). The Navy will then create restored wetlands in the excavated area, resulting in no net loss of wetlands. Additional details of the project are provided in the cover letter.

**PART 7:**

A. If there have been any pre-application meetings, including on-site meetings, with regulatory staff, please list the date(s), location(s), and names of key staff and project representatives.

Telephone call. April 22, 2002. Between Osvaldo Collazo of the Jacksonville District, U.S. Army Corps of Engineers, Atlantic Permits Branch Office (904 232 1659) and J. Peyton Doub of Tetra Tech NUS.

B. Please identify by number any MSSW/Wetland Resource/ERP/ACOE Permits pending, issued or denied for projects at the location, and any related enforcement actions.

Agency	Date	No.\Type of Application	Action Taken
<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>

C. Note: The following information is required for projects proposed to occur in, on or over wetlands that need a federal dredge and fill permit or an authorization to use state owned submerged lands. Please provide the names, addresses and zip codes of property owners whose property directly adjoins the project (excluding application) and/or (for proprietary authorizations) is located within a 500 ft. radius of the applicant's land. Please attach a plan view showing the owner's names and adjoining property lines. Attach additional sheets if necessary.

- |           |           |
|-----------|-----------|
| 1.        | 2.        |
| U.S. Navy | U.S. Navy |
| 3.        | 4.        |
| U.S. Navy | U.S. Navy |
| 5.        | 6.        |
| U.S. Navy | U.S. Navy |
| 7.        | 8.        |
| U.S. Navy | U.S. Navy |

**ATTACHMENT 3**

**RECOMMENDED WETLAND RESTORATION SPECIFICATIONS**

**CECIL FIELD SITE 49 – FORMER SKEET RANGE**  
**RECOMMENDED WETLAND RESTORATION SPECIFICATIONS**

The following recommendations outline a procedure for restoring wetlands disturbed by the proposed excavation of soils contaminated by lead and other chemical constituents at Cecil Field Site 49. Soil will be excavated at Site 49 to a depth of 0.5 feet (6 inches) in 26,260 square feet of wetlands, a depth of 1.0 foot in 5,730 square feet of wetlands, and a depth of 2.0 feet in 6,261 square feet of wetlands. The excavated areas will not be restored to their existing grade or to forested vegetation. Instead, the excavated areas will be restored as shallow depressional wetlands supporting herbaceous perennial grasses that are regionally indigenous to similar wetland settings.

The proposed excavation of Areas 2, 3, 4, and 11 will disturb wetlands at Site 49, and the proposed excavation of portions of Areas 1 and 5 will disturb wetlands. Because the excavation will reduce the final elevation of the affected areas, it is expected that the remainder of Areas 1 and 5 will become wetlands as a result of excavation. Therefore, the entirety of the excavations at Areas 1, 2, 3, 4, 5, and 11 will be restored as depressional wetlands. The total area of wetland restoration will therefore be 45,429 square feet (just greater than 1.0 acre).

It is expected that the remaining contaminated areas at Site 49 (Areas 6, 7, 8, 9, and 10) are located far enough up-gradient that their excavation will not result in additional wetlands. If it is found that these up-gradient areas support wetland hydrology after excavation, then they will be similarly restored as depressional wetlands.

The following are specific recommendations for restoring excavated areas as depressional wetlands.

1. Gently disk the soil surface in each excavated area to alleviate surface soil compaction caused by excavation equipment.
2. Add 4 inches of clean topsoil to the excavated areas within the wetlands. Approximately 561 cubic yards of topsoil will be required.
3. Topsoil should be naturally friable with a U.S. Department of Agriculture soil textural classification of loamy sand, sandy loam, or loam. Finer textural classifications are not recommended because the topsoil might pond surface runoff within the excavated areas for such extended periods that vegetation can not survive.

**CECIL FIELD SITE 49 – FORMER SKEET RANGE**  
**RECOMMENDED WETLAND RESTORATION SPECIFICATIONS**

**Page 2**

4. Topsoil should be obtained from sources free of infestation by Phragmites (*Phragmites australis*), reed canary grass (*Phalaris arundinacea*), or other plant species recognized as invasive in wetland settings.
5. Apply 10-20-20 fertilizer to the topsoil surface at a rate of 400 pounds per acre. Approximately 417 pounds will be required.
6. Apply ground agricultural limestone to the soil surface at a rate of 2 tons per acre. Approximately 2.1 tons of ground agricultural limestone will be required.
7. Gently disk the topsoil after application to incorporate the fertilizer and limestone and to create a surface suitable for seeding.
8. Broadcast the seed mix shown below in Table 1, either manually or using a hand-held seeding device. Quantities of seed required are estimated in the table.
9. Use of matting to stabilize soils prior to seed germination is not recommended initially. However, use of a biodegradable geotextile mat such as coconut fiber should be considered if substantial gully erosion necessitates re-seeding parts of the wetlands.

Table 1, below, summarizes the recommended seed mix for the wetland restoration areas. The first two grass species recommended are warm season grasses that are of significantly higher value as food and cover for wildlife than are the cool season grasses in most common erosion control seed mixes. However, unlike many warm-season grasses, both species are recognized as providing good erosion control. Both are indigenous in the coastal plain throughout the East Coast, including northern Florida. Neither are invasive, and neither produce allelopathic effects in soil whereby root secretions inhibit the natural establishment of other vegetation.

The remaining grass species in the seed mix are “nurse crop” cool-season grasses intended to germinate rapidly, provide soil stabilization until the slower warm-season grasses become established, and create conditions that encourage establishment of the warm-season grasses. Different species are recommended for different times during the year. Although cool-season

**CECIL FIELD SITE 49 – FORMER SKEET RANGE  
RECOMMENDED WETLAND RESTORATION SPECIFICATIONS**

**Page 3**

grasses and not regionally indigenous, the nurse crop species are not invasive and will not hinder ultimate establishment of indigenous warm-season grasses.

The species selected are commercially available as seed, although seed may not be as widely available for the cool season grass species used in most common erosion control mixes. It may be necessary to purchase the seed from a supplier of native plant seed.

**TABLE 1  
CECIL FIELD SITE 49 – SKEET RANGE  
PROPOSED SEED MIX**

Scientific Name	Common Name	Seeding Rate (lb. PLS/A <sup>1</sup> )	Quantity Required (lb. PLS)	Comments
<i>Panicum virgatum</i>	Switchgrass	25	26.1	Warm season grass typical of seasonally saturated or shallowly inundated wetlands. Good value to wildlife. FACW <sup>2</sup> .
<i>Dichanthelium clandestium</i>	Deertongue Grass	12	12.5	Warm season grass typical of seasonally saturated or shallowly inundated wetlands. Good value to wildlife. FACW <sup>2</sup> .
Seasonal Nurse Crop <sup>3</sup>		20	20.9	Feb. 1 – Apr. 30: Annual Rye May 1 – Aug. 31: Foxtail Millet Sep. 1 – Nov. 15: Annual Rye Nov. 15 – Jan. 31: Winter Rye These cool season grasses are introduced but not invasive.

Notes:

1. PLS/A = Pounds Pure Live Seed per Acre. To calculate PLS, multiply actual weight by [(Percent Purity of the Seed X Germination Percentage)/100].
2. FACW = Facultative Wetland. Refers to plant species recognized as naturally occurring in wetlands 67 – 99 percent of the time.
3. Because seed of most warm seeded grasses can require 2-3 weeks to germinate, faster germinating "nurse crops" are often sown to provide earlier temporary stabilization.