Section : 06.04
Site 20903-5640 (White Oak)
Doc. #: 0005

N60921.AR.000197
NSWC WHITE OAK
5090.3a

Basis of Design Report
Site 4 – Chemical Burial Area Removal Action

The former Naval Surface Warfare Center – White Oak

Silver Spring, Maryland

Engineering Field Activity Chesapeake
Naval Facilities Engineering Command

Contract Number N62472-90-D-1298

Contract Task Order 0304

April 1999

TETRA TECH NUS, INC.

Section : 06.04
Site 20903-5640 (White Oak)
Doc. #: W/0005
00161

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PITT 04-9-037

April 8, 1999

Project Number 7773

Ms. Krista Grigg
Department of the Navy
Engineering Field Activity Chesapeake
Washington Navy Yard, Building 212
901 M Street, SE
Washington, DC 20374-5018

Reference: Clean Contract No. N62472-90-D-1298
Contract Task Order No. 0304

Subject: Final Basis of Design Report – Site 4
former Naval Surface Warfare Center - White Oak
Silver Spring, Maryland

Dear Ms. Grigg:

Enclosed find one copy of the Final Basis of Design Report (BOD) for Site 4 at the former Naval Surface Warfare Center - White Oak (NSWC-White Oak), Silver Spring, Maryland. The report provides a framework for implementing the removal action at Site 4 based on recommendations made in the Engineering Evaluation/Cost Analysis for Site 4. Comments received from the Navy on the draft document have been incorporated.

If you have any questions regarding this information, please call me at your earliest convenience at 412-921-7134.

Very truly yours,

Scott A. Nesbit

Scott A. Nesbit, P.E.
Project Manager

SAN/gp

Enclosure

c: Mr. Roger Boucher, NORTHDIV (w/o enclosure)
Ms. Armalia Berry, EFACHES (1 copy)
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Mr. Matt Bartman, TtNUS (w/o enclosure)
Ms. Loraine Shipley, TtNUS
Project File 7773

Section: 06.04
Site 20903-5640 (White Oak)
Doc. #: 0025

129806/P

BASIS OF DESIGN REPORT
SITE 4 – CHEMICAL BURIAL AREA
REMOVAL ACTION

THE FORMER
NAVAL SURFACE WARFARE CENTER – WHITE OAK
SILVER SPRING, MARYLAND

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

Submitted to:
Engineering Field Activity Chesapeake
Environmental Branch Code 18
Naval Facilities Engineering Command
Washington Navy Yard, Building 212
Washington, D.C. 20374-2121

Submitted by:
Tetra Tech NUS, Incorporated
600 Clark Avenue, Suite 3
King of Prussia, Pennsylvania 19406-1433

CONTRACT NUMBER N62472-90-D-1298
CONTRACT TASK ORDER 0304

APRIL 1999

PREPARED BY:

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ACRONYMS

bgs	below ground surface
CFR	Code of Federal Regulations
CTO	Contract Task Order
cy	cubic yard
EE/CA	Engineering Evaluation/Cost Analysis
NSWC	Naval Surface Warfare Center
OSWER	Office of Solid Waste and Emergency Response
PRG	Preliminary Removal Goal
RBC	Risk Based Concentration
RCRA	Resource Conservation and Recovery Act
SVOC	Semivolatile Organic Compound
TAL	Target Analyte List
TCE	Trichloroethylene
TCL	Target Compound List
TCLP	Toxicity Characteristic Leaching Procedure
TPH	Total Petroleum Hydrocarbon
TtNUS	Tetra Tech NUS, Incorporated
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound

1.0 INTRODUCTION

1.1 AUTHORITY

Tetra Tech NUS, Incorporated (TtNUS) (formerly Brown & Root Environmental) has prepared this Basis of Design for the Engineering Field Activity – Chesapeake, Naval Facilities Engineering Command under the Comprehensive Long-Term Environmental Action Navy Contract Number N62472-90-D-1298, Contract Task Order (CTO) 304. This work is part of the Navy's Installation Restoration Program, which is designed to identity contamination at Naval and Marine Corps facilities resulting from past operations and to institute corrective actions as necessary. The work completed under this task order is for the Federal Research Center at White Oak, formerly known as the Naval Surface Warfare Center (NSWC) White Oak, located in Silver Spring, Maryland.

1.2 OBJECTIVE

This report presents a Basis of Design for a removal action at Site 4, the Chemical Burial Area. A cost estimate has also been developed. The objectives of the removal action are to remediate contaminated soil and remove solid waste that is present at Site 4 to limit its potential as a source for groundwater contamination and to eliminate a potential threat to human health for future land users.

These objectives were determined during an Engineering Evaluation/Cost Analysis (EE/CA) for Site 4 (TtNUS, 1999). The removal action presented in this Basis of Design document was originally recommended in the EE/CA and has been selected for use at Site 4 in the accompanying Action Memorandum.

1.3 REPORT ORGANIZATION

Section 1.0 provided this brief introduction. Section 2.0 presents a general discussion of the site history and background. Section 3.0 provides information regarding waste characterization and regulatory requirements. Section 4.0 presents the design basis. The project schedule and project cost are presented in Sections 5.0 and 6.0, respectively.

2.0 SITE BACKGROUND

The Chemical Burial Area is located south of Perimeter Road in the northeastern corner of the former NSWC-White Oak. A site layout map for Site 4 is provided on Figure 2-1. The overall area of the site is approximately 1.1 acres. Land to the north of the site is private property and used as a quarry. An area in the southeastern corner of Site 4 was formerly used for telephone pole storage.

The site was used from the mid-1950s until the early 1970s to dispose of chemicals. Previous investigations of the site were based on the belief that four discrete burial trenches were used. Recent discussions with former NSWC-White Oak personnel have determined that disposal locations at Site 4 were not confined to discrete trenches, but may have occurred throughout the three burial areas indicated on Figure 2-1.

In preparation for disposal, an area was excavated to accommodate the amount of material to be disposed. Wastes reportedly disposed at Site 4 included acids, explosive compounds, kerosene, chlorinated solvents, and unidentified laboratory compounds. The total volume of chemicals disposed in the area was estimated to be between 400 and 600 cubic feet.

During the 1998 EE/CA field investigation, test trenches were excavated to identify the waste boundaries. Based on visual observations, findings from previous investigations, and analytical data from soil samples collected at Site 4, contaminated soil and solid waste are present beneath approximately one half of the site (0.5 acres). Figure 2-2 illustrates the extent of buried waste and the test trench locations. Survey data for the test trenches are provided in Appendix A.

The material present in Burial Area 3 was natural and undisturbed by human activity. This lack of physical evidence supports limited analytical data from this area and further indicates that this area was not used for disposal activities. Further action is not warranted for this portion of the site.

Soil contamination exists at depths up to 22 feet below ground surface (bgs) in the other two burial areas, but the highest contaminant concentrations occur primarily between 6 and 14 feet bgs. This interval corresponds with the location of buried waste. Further discussion regarding site contaminants is provided in Section 3.0.

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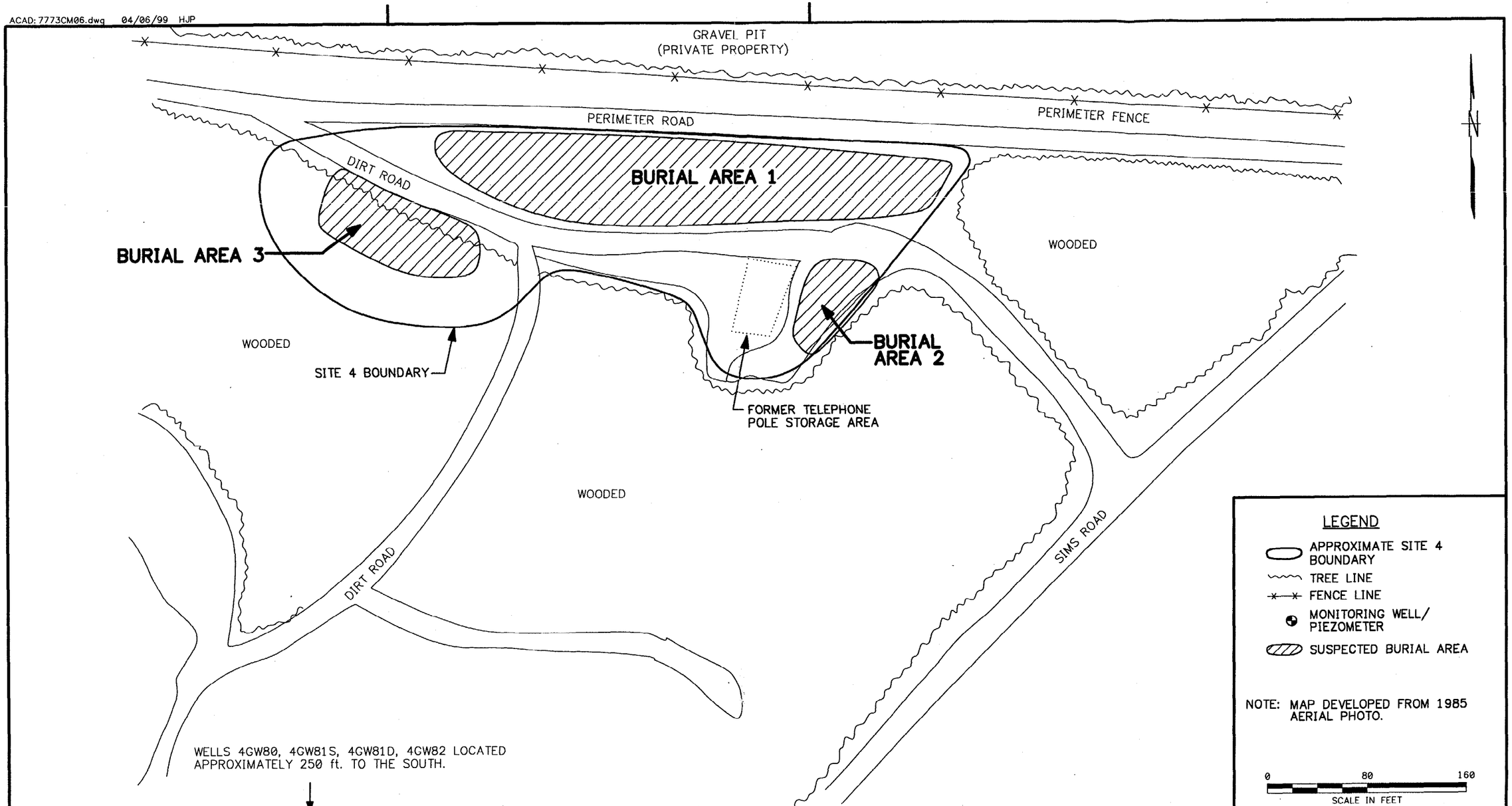


NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

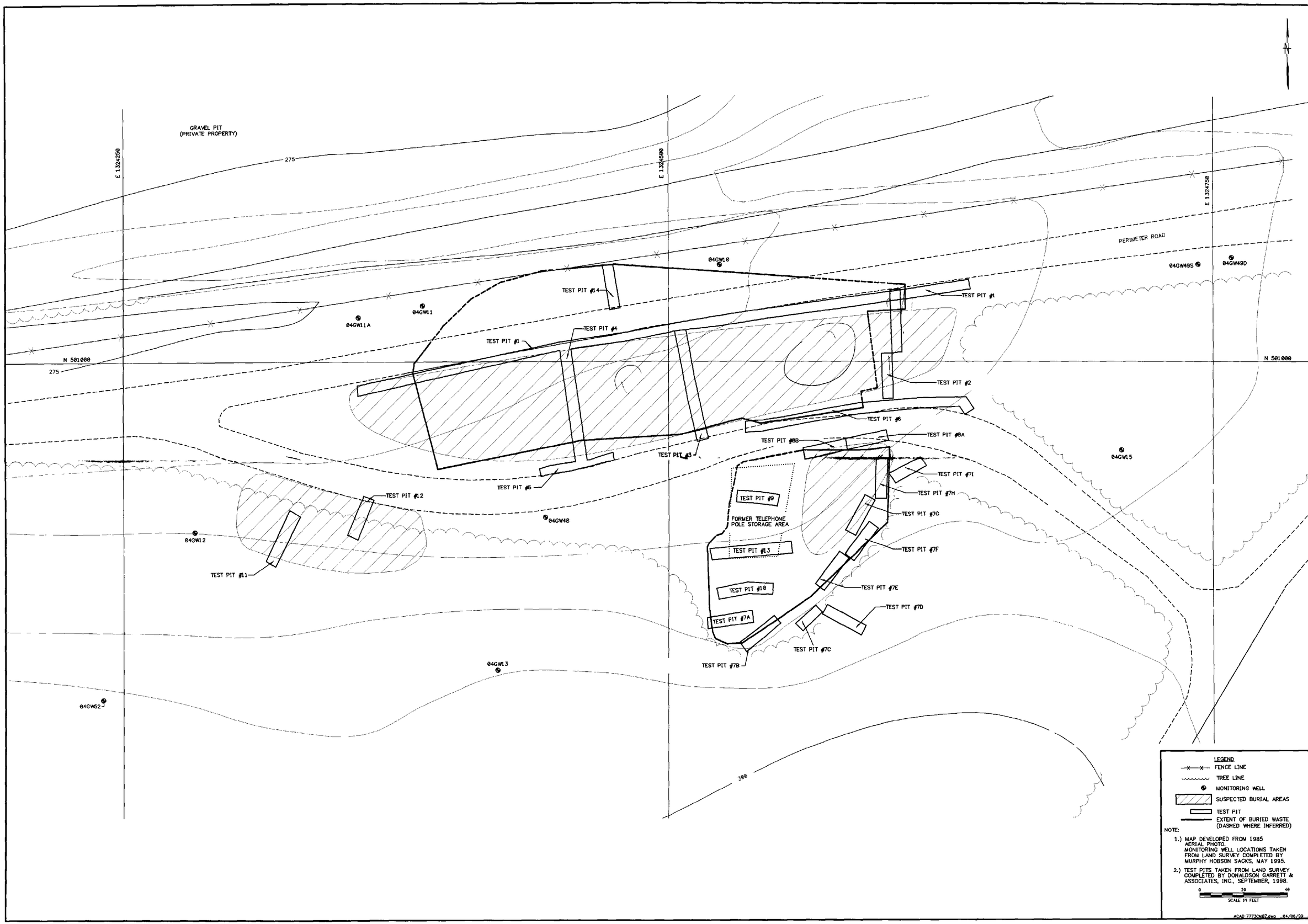
DRAWN BY DLT DATE 12/8/98
CHECKED BY LMS DATE 4/6/99
COST/SCHED-AREA
SCALE AS NOTED

Tetra Tech NUS, Inc.

SITE LAYOUT MAP
SITE 4 – CHEMICAL BURIAL AREA
BASIS OF DESIGN
NSWC-WHITE OAK, SILVER SPRING, MARYLAND

CONTRACT NO. 7773
OWNER NO.
APPROVED BY SD DATE 4/5/99
APPROVED BY DATE
DRAWING NO. FIGURE 2-1 REV. 0

FORM CADD NO. SOUTH_BH.DGN - REV 0 - 02/11/97



SYMBOL	DESCRIPTION	DATE	APPROVED
	REVISIONS		

09A	403		
04	404		
E.I.C.	405		
401	408		
402	04B		

REVIEWED BY ROICC DATE

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DES. DR. CHK. DATE
SUBMITTED BY: GAN TITLE 4/6/99
PROGRAM MANAGER DATE
APPROVED DATE
EFD FOR COMMANDER NAVFAC

SEAL AREA

DEPARTMENT OF THE NAVY
CHESAPEAKE DIVISION NAVAL FACILITIES ENGINEERING COMMAND
WASHINGTON, DC

NSWC-WHITE OAK SILVER SPRING, MD

TEST PIT LOCATIONS AND EXTENT OF BURIED WASTE – SITE 4 BASIS OF DESIGN

CODE I.D. NO. 80091
DRAWING SIZE: D
CONST. CONT. NO. XXXXXX-XX-X-XXXX
SPEC. XX-XX-XXXX
NAVFAC DRAWING NO. XXXXXXX
SHEET X OF X
2-2

Based on visual observations of buried waste and analytical results, approximately 6,900 cubic yards (cy) of soil and solid waste require remediation under this removal action. This volume was calculated by measuring the area shown on Figure 2-2 and multiplying by an average depth of waste. Depths used to calculate the waste volume were 8 feet for the area north of Perimeter Road, 10 feet for all of Burial Area 1, including the material underlying Perimeter Road, and 8 feet for Burial Area 2.

3.0 WASTE CHARACTERIZATION AND REGULATORY REQUIREMENTS

This section presents a chemical characterization of the soil at Site 4 and the regulatory criteria to be met during the removal action.

3.1 WASTE CHARACTERIZATION

All current and historic analytical data was screened against United States Environmental Protection Agency (USEPA) Region III residential Risk-Based Concentrations (RBCs). Analytical data is summarized in Table 3-1. There is no RBC value for lead, so analytical data were screened against the Office of Solid Waste and Emergency Response's (OSWER) residential concentration for lead.

Background concentrations of inorganics in subsurface soils at NSWC-White Oak are also provided on Table 3-1, although they were not used to screen analytical data. Background concentrations were presented in the Background Investigation Report (TtNUS, 1998).

Table 3-2 summarizes the positive Toxicity Characteristic Leaching Procedure (TCLP) analytical data from composite samples that were collected during the EE/CA field investigation and compares the results to the regulatory levels. Based on the samples collected, material excavated for off-site disposal would not require classification as a hazardous waste.

The primary compounds detected at concentrations above RBCs were inorganics, including aluminum, antimony, arsenic, cadmium, chromium, copper, iron, lead, manganese, mercury, silver, thallium, vanadium, and zinc. The inorganics most frequently detected above RBC were arsenic and iron. However, concentrations were within or slightly in excess of the background arsenic concentration. Iron, while detected at concentrations above background is an essential human nutrient and is not a significant contributor to human health risk.

The only volatile organic compound (VOC) detected in excess of RBCs was 1,1,2,2-tetrachloroethane. Several semivolatile organic compounds (SVOCs), including 2-nitroaniline; benzo(a)anthracene; benzo(a)pryrene, benzo(b)fluoranthene; dibenzo(a,h)anthracene; and indeno(1,2,3-cd)pyrene, were detected in excess of RBCs and all of the maximum concentrations were from samples collected from the same trench (TP01). Several explosives were detected in sample 04-TP-0902-0506, with RDX and 1,3-dinitrotoluene exceeding RBCs. 4-Nitrotoluene was detected in three samples. It does not have an RBC value

TABLE 3-1

SUMMARY ANALYTICAL DATA AND SCREENING CRITERIA
BASIS OF DESIGN - SITE 4
NSWC-WHITE OAK, SILVER SPRING, MARYLAND
PAGE 1 OF 2

Parameter	Frequency of Detection	Range of Detected Concentrations	Location of Maximum	Screening Levels: Residential RBC [1]	Screening Levels: Background [2]	PRGs [3]
VOLATILES (mg/kg)						
1,1,1-Trichloroethane	2/72	0.003 - 0.0198	04-SB17-1214	160	NA	4100
1,1,2,2-Tetrachloroethane	6/70	0.0056 - 13	04-SB17-1214	3.2	NA	29
1,1,2-Trichloroethane	2/70	0.0061 - 0.0202	04-SB17-1214	1.1	NA	100
1,2-Dichloroethane	1/70	0.133	04-SB17-1214	7	NA	63
1,2-Dichloroethene (total)	3/70	0.006 - 0.0418	04-SB17-1214	70	NA	1800
2-Butanone	1/70	0.13	04-TP-10010708	4700	NA	120000
Acetone	11/72	0.0046 - 0.059	4SL2	780	NA	20000
Benzene	5/70	0.0012 - 0.0314	04-SB17-1214	22	NA	200
Carbon Disulfide	1/72	0.005	4SL1	780	NA	20000
Chlorobenzene	9/70	0.0057 - 4.6	04-TP-04031011	160	NA	4100
Chloroform	5/70	0.0004 - 0.006	04-TP-03010607	100	NA	940
Ethylbenzene	11/70	0.0015 - 0.28	04-TP-01040708	780	NA	20000
M+p-Xylenes	1/2	0.003	4SL1	16000	NA	410000
Methylene Chloride	3/72	0.0043 - 0.35	4SL2	85	NA	760
Styrene	3/49	0.0014 - 0.0022	04-TP-07010607	1600	NA	41000
Tetrachloroethene	3/71	0.0022 - 0.129	04-SB17-1214	12	NA	110
Toluene	11/70	0.001 - 0.531	04-SB17-1214	1600	NA	41000
Trichloroethene	13/75	0.0011 - 3.2	04-SB17-1214	58	NA	520
Xylenes, Total	12/70	0.0025 - 0.799	04-SB17-1214	16000	NA	410000
SEMIVOLATILES (mg/kg)						
1,4-Dichlorobenzene	2/73	1.1 - 1.1	04-TP-01060708	27	NA	240
2-Methylnaphthalene	19/73	0.064 - 30	04-TP-01040708	160	NA	4100
2-Nitroaniline [4]	1/49	2.5	04-TP-09020506	0.47	NA	120
Acenaphthene	11/73	0.15 - 12	04-TP-01040708	470	NA	12000
Acenaphthylene [5]	7/49	0.33 - 3.9	04-TP-01060708	160	NA	4100
Anthracene	12/73	0.073 - 5.8	04-TP-01040708	2300	NA	61000
Benzo(a)anthracene	16/73	0.12 - 5	04-TP-01040708	0.87	NA	7.8
Benzo(a)pyrene	15/73	0.12 - 7.8	04-TP-01060708	0.087	NA	0.78
Benzo(b)fluoranthene	13/73	0.13 - 6.5	04-TP-01040708 04-TP-01060708	0.87	NA	7.8
Benzo(g,h,i)perylene [5]	14/73	0.086 - 3	04-TP-01060708	160	NA	4100
Benzo(k)fluoranthene	10/73	0.12 - 3	04-TP-01060708	8.7	NA	78
Bis(2-Ethylhexyl)phthalate	44/79	0.027 - 5.4	04-TP-04020506	46	NA	410
Carbazole	5/73	0.044 - 0.27	04-TP-01070708	32	NA	290
Chrysene	18/73	0.041 - 6	04-TP-01040708	87	NA	780
Di-n-butyl phthalate	8/73	0.0359 - 0.56	04-TP-07031011	780	NA	20000
Dibenzo(a,h)anthracene	7/49	0.09 - 0.8	04-TP-01060708	0.087	NA	0.78
Dibenzofuran	12/73	0.051 - 1.6	04-TP-01040708	31	NA	8200
Diethyl Phthalate	4/73	0.039 - 3.8	04-SB15-0812	6300	NA	160000
Fluoranthene	18/73	0.13 - 19	04-TP-01040708	310	NA	8200
Fluorene	17/73	0.043 - 12	04-TP-01040708	310	NA	8200
Indeno(1,2,3-cd)pyrene	13/73	0.088 - 3.6	04-TP-01060708	0.87	NA	7.8
N-Nitrosodiphenylamine	1/73	1.3	04-TP-07031011	130	NA	1200
Naphthalene	10/73	0.0402 - 44	04-TP-01040708	160	NA	4100
Pentachlorophenol	2/73	0.089 - 0.216	04SB-21	5.3	NA	48
Phenanthrene [5]	23/73	0.058 - 31	04-TP-01040708	160	NA	4100
Phenol	1/49	0.059	04-TP-07031011	4700	NA	120000
Pyrene	19/75	0.05 - 19	04-TP-01040708	230	NA	6100
PESTICIDES/PCBs (mg/kg)						
Aroclor-1260	2/13	0.239 - 0.249	04-SB09-0809	0.32	NA	2.9
INORGANICS (mg/kg)						
Aluminum	73/81	506 - 69000	04-TP-01080708	7800	20961	200000
Antimony	6/68	0.293 - 38.6	04-TP-04020506	3.1	0.42	82
Arsenic	59/81	0.339 - 20.8	04-TP-03020506	0.43	12.15	12.15

TABLE 3-1

SUMMARY ANALYTICAL DATA AND SCREENING CRITERIA
BASIS OF DESIGN - SITE 4
NSWC-WHITE OAK, SILVER SPRING, MARYLAND
PAGE 2 OF 2

Parameter	Frequency of Detection	Range of Detected Concentrations	Location of Maximum	Screening Levels: Residential RBC [1]	Screening Levels: Background [2]	PRGs [3]
Barium	65/81	2.31 - 540	04-TP-09020506	550	40.09	14000
Beryllium	12/81	0.06 - 0.44	04-SB10-0708	16	2.37	4100
Cadmium	15/81	0.263 - 1690	04-TP-03020506	3.9	0.179	100
Calcium	49/81	15.8 - 51200	04-SB11-0809	--	247	247
Chromium [6]	79/81	1 - 260	04-TP-04040607	23	41.05	610
Cobalt	42/81	0.72 - 38.9	04-TP-03020506	470	16.6	12000
Copper	70/81	1.03 - 9530	04-TP-01080708	310	21.62	8200
Cyanide	2/20	2.13 - 2.28	04-SB07-1822	160	--	4100
Iron	73/81	588 - 112000	04-TP-04020506	2300	28681	61000
Lead	75/81	0.551 - 5200	04-TP-01040708	400 [7]	21.23	1000 [8]
Magnesium	66/81	6.05 - 11100	04-TP-07020607	--	2987	2987
Manganese	71/81	1.36 - 3780	04-TP-01040708	160	503	4100
Mercury	29/73	0.057 - 47.3	04-TP-01060708	2.3	0.051	61
Nickel	46/81	1.8 - 143	04-TP-07020607	160	13.84	4100
Potassium	46/81	22.5 - 753	04-SB13-0506	--	2792	2792
Selenium	28/81	0.342 - 10.5	04-SB02-1216	39	2.73	100
Silver	21/81	0.44 - 77.5	04-TP-01040708	39	0.096	100
Sodium	50/81	30.1 - 679	04-TP-07031011	--	69.4	69.4
Thallium	3/81	1.2 - 3	04-TP-01040708	0.55	--	14
Vanadium	69/81	2.19 - 64.3	04-TP-10010708	55	44.31	1400
Zinc	73/81	0.9 - 9270	04-TP-01040708	2300	84.2	61000
EXPLOSIVES (mg/kg)						
1,3,5-Trinitrobenzene	1/47	2.8	04-TP-09020506	230	NA	6100
1,3-Dinitrobenzene	1/47	1.7	04-TP-09020506	0.78	NA	20
2,4,6-Trinitrotoluene	1/47	0.042	04-TP-04020506	21	NA	190
2-Amino-4,6-dinitrotoluene [9]	2/47	0.061 - 0.062	04-TP-03020506	0.47	NA	410
4-Nitrotoluene	3/47	0.14 - 0.18	04-TP-08040506	--	NA	--
HMX	3/47	0.053 - 27	04-TP-03040910	390	NA	10000
RDX	1/47	6.8	04-TP-09020506	5.8	NA	52
Tetryl	3/47	0.039 - 0.13	04-TP-04020506	78	NA	2000
MISCELLANEOUS PARAMETERS (mg/kg)						
Total Petroleum Hydrocarbons (TPH) [10]	NA	NA	NA	--	NA	100
Dioxin (TCDD)	NA	NA	NA	0.0000046	NA	0.000038

1 USEPA Region III, 1998.
2 Background Concentrations for Subsurface Soil at NSWC-White Oak. TtNUS, 1998.
3 USEPA Region III, 1998.
4 Based on withdrawn RfD.
5 Value for naphthalene used.
6 Value for hexavalent chromium used.
7 Office of Solid Waste and Emergency Response (OSWER) Standard for Lead, residential.
8 OSWER Standard for Lead, industrial.
9 Value for 2,4-dinitrotoluene used.
10 Maryland UST Closure Regulations (COMAR 26.10)
-- No value available.
NA Not applicable.
Shaded cell indicates maximum concentration exceeded residential RBC for that parameter.

TABLE 3-2

POSITIVE TCLP ANALYTICAL DATA AND REGULATORY LIMITS
BASIS OF DESIGN - SITE 4
NSWC-WHITE OAK, SILVER SPRING, MARYLAND

Parameter	TCLP Analytical Results				Toxicity Characteristic (5)
	04-TP-0113-C (1)	04-TP-0505-C (2)	04-TP-0608-C (3)	04-TP-0805-C (4)	
VOLATILES (mg/L)					
Vinyl Chloride	ND	0.013 J	ND	0.026 J	0.2
INORGANICS (mg/L)					
Barium	0.194	0.944	0.109	0.105	100
Cadmium	ND	0.0245	ND	ND	1
Chromium	ND	0.0053	ND	0.0292	5
Lead	ND	0.444	ND	ND	5

1 Includes samples 04-TP-0101-0809, 04-TP-0102-0708, 04-TP-0103-0809, 04-TP-0104-0708, 04-TP-0105-0708, 04-TP-0106-0708, 04-TP0107-0708, 04-TP-0108-0708, 04-TP-0109-1012, 04-TP-0110-1012, 04-TP-0110D-1012, 04-TP-0111-1012, 04-TP-0112-1012.

2 Includes samples 04-TP-0301-0607, 04-TP-0302-0506, 04-TP-0303-0506, 04-TP-0304-0910, 04-TP-0305-0506, 04-TP-0305D-0506, 04-TP-0306-0708, 04-TP-0401-0708, 04-TP-0402-0506, 04-TP-0403-1011, 04-TP-0404-0607, 04-TP-0405-0910, 04-TP-0501-1213, 04-TP-0502-1213, 04-TP-0503-0607, 04-TP-0504-1314.

3 Includes samples 04-TP-0602-0506, 04-TP-0603-1112, 04-TP-0604-0809, 04-TP-0601-1011, 04-TP-0601D-1011, 04-TP-0202-0910, 04-TP-0203-0910, 04-TP-0204-0807.

4 Includes samples 04-TP-0701-0607, 04-TP-0702-0607, 04-TP-0703-1011, 04-TP-0704-0607, 04-TP-0704D-0607, 04-TP-0801-1112, 04-TP-0802-0607, 04-TP-0803-0607.

5 40 CFR Subpart C, Section 261.20. Table 1.
ND Parameter not detected above detection limit.

The primary contaminant of concern at Site 4 is trichloroethylene (TCE), due to its presence in the underlying aquifer. TCE has been detected in soil samples from Site 4, but never in excess of its RBC value. TCE was detected in samples collected along the southern boundary of Burial Area 1 and scattered throughout Burial Area 2, primarily between 5 and 10 feet bgs. Other contaminants that were present, but below RBC values, were benzene, toluene, ethyl benzene, and xylene. Presence of these compounds further indicates that waste containing petroleum products may have been buried in this area, as noted during test pit excavation activities when petroleum odors were detected.

Additional detail regarding the type and location of material found during the field investigation is provided in Section 3.3 of the EE/CA (TtNUS, 1999).

3.2 PRELIMINARY REMOVAL GOALS

The Preliminary Removal Goals (PRGs) for Site 4 subsurface soil are USEPA Region III industrial RBCs. Industrial screening levels were selected based on the anticipated future use of the site. For inorganic analytes, the greater of the RBC concentration and base-wide background concentration will be used as the PRG. The PRGs are also provided in Table 3-1. Samples collected during the EE/CA field investigation were not analyzed for total petroleum hydrocarbons (TPH) and dioxins. However, based on conditions noted in the field, these parameters have been added as removal action cleanup criteria.

3.3 REGULATORY REQUIREMENTS

The following section summarizes the applicable regulatory requirements for this removal action. All work must be performed in accordance with these regulations.

3.3.1 Off-Site Transportation and Disposal

Excavated material must be disposed of in accordance with appropriate federal and state regulations, including the Resource Conservation and Recovery Act (RCRA) characteristic hazardous waste regulations and land disposal restrictions. Excavated material will be sampled and analyzed to properly characterize it for off-site disposal.

3.3.2 Air Emission Standards

It is anticipated that only fugitive emissions will result from the removal action. The contractor must limit these emissions using techniques such as watering the work area and roadways during excavation and covering loaded rolloffs or trucks with tarps.

3.3.3 Excavations

All work must be conducted in compliance with Title 29, Code of Federal Regulations, Part 1926 (29 CFR 1926), Subpart P, Occupational Safety and Health Excavation Standard.

3.3.4 Hazardous Waste Site Work

All work must be conducted in compliance with 29 CFR 1910.120 and 1910.126, Hazardous Waste Operations and Emergency Response.

3.3.5 Other Requirements

The removal action contractor will be responsible for conducting all activities in compliance with other codes and regulations. These responsibilities include, but are not limited to, the following:

- Obtaining all required permits and authorizations (including erosion control plans)
- Performing utility clearances prior to any intrusive activities
- Characterizing waste material for disposal

4.0 DESIGN BASIS

4.1 PROJECT SCOPE

The project will require the following tasks:

- Obtain all permits, including approval of an erosion and sediment control plan
- Locate underground utilities
- Sample and characterize material for disposal
- Mobilize labor and equipment to the site
- Construct a decontamination pad for use during the project
- Install erosion and sediment control measures (silt fence) around the perimeter of the site
- Excavate soil and load into dump trucks
- Dispose of all waste materials off site
- Backfill the area with clean fill obtained from off site, including 6 inches of vegetative cover
- Vegetate the area with grass
- Replace asphalt
- Decontaminate all equipment
- Demobilize from the site

4.2 ASSUMPTIONS

Based on findings of previous investigations at Site 4, the following assumptions have been made to estimate the quantity of material to be excavated and disposed off site.

- Material will be removed to depths of 9 to 12 feet bgs.

- The total volume of material to be excavated and disposed has been estimated at 6,900 cy. This volume was determined and presented in the EE/CA for Site 4 (TtNUS, 1999).

- Excavated material will be characterized prior to excavation to facilitate excavation, loading, and immediate off-site disposal.

- Of the 6,900 cy of material requiring disposal, approximately 20 percent (1,400 cy) will require incineration as hazardous waste. The remaining 80 percent (5,500 cy) will be disposed at a municipal waste landfill as nonhazardous solid waste. These quantities have been estimated based on findings

of the field investigation. Actual quantities may vary and all material must be properly characterized prior to shipment off site.

- Confirmatory samples will be collected from the excavation. Prior to removal action implementation, a Confirmatory Sampling and Analysis Plan that will outline sampling frequency, methods, analytical parameters, and cleanup levels will be developed and submitted to the USEPA and Maryland Department of the Environment for review and approval prior to project initiation. Plan development and implementation will be performed by TtNUS.

- An area measuring approximately 1 acre will need to be vegetated following the removal action.

- A section of Perimeter Road measuring 240 linear feet will be replaced following excavation. The asphalt roadway shall have the following cross section: 6 inches aggregate subbase, 4 inches asphalt binder, and 2 inches asphalt wear course.

5.0 SCHEDULE

Based on the information provided in the previous sections of this report, it is estimated that this project will have the following schedule:

Confirmatory Sampling and Analysis Plan ..... 4 weeks
Pre-Construction Submittals, including Erosion and Sediment Control Plan ..... 4-6 weeks

Following approval of these documents, the removal action duration is estimated to be 12 weeks, based on 8-hour workdays, and the following task durations:

- Mobilization 5 days
- Excavation (200 cy/day) 35 days
- Backfill (400 cy/day) 18 days
- Demobilization 5 days

6.0 COST ESTIMATE

Based on the information developed in the previous sections of this report, the following preliminary cost estimate was developed:

Total Capital Cost $2,145,000

See Appendix B for the cost estimate.

REFERENCES

TtNUS, 1998. Background Investigation Report for Naval Surface Warfare Center – White Oak, Silver Spring, Maryland prepared for Engineering Field Activity Chesapeake, Naval Facilities Engineering Command. King of Prussia, Pennsylvania. December.

TtNUS, 1999. Engineering Evaluation/Cost Analysis for Site 4 and Site 33 at the former Naval Surface Warfare Center – White Oak, Silver Spring, Maryland prepared for Engineering Field Activity Chesapeake, Naval Facilities Engineering Command. King of Prussia, Pennsylvania. January.

USEPA, 1998. Risk-Based Concentration Table. Philadelphia, Pennsylvania, October.

APPENDIX A

SURVEY DATA

Donaldson, Garrett & Associates, Inc.

MACON • CHARLOTTE

SURVEY REPORT

for

SITE 4- CHEMICAL BURIAL AREA

NAVAL SURFACE WARFARE CENTER

WHITE OAK

SILVER SPRING, MARYLAND

CONTRACT NO. 1298-98-637

DG&A PROJECT NO. 2775-022-N1

Prepared for:

TETRA TECH NUS

Submitted by:

DONALDSON, GARRETT & ASSOCIATES, INC.

STATE OF MARYLAND
JAMES W. NEWBERRY
NO. 20026
PROFESSIONAL LAND SURVEYOR

9-22-98

SEPTEMBER 1998

500 E. Morehead Street, Suite 103
Charlotte, North Carolina 28202-2606
Phone: (704) 374-1955 • FAX: (704) 374-1956

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II. SITE 04- CHEMICAL BURIAL AREA

I.

PROJECT SUMMARY

PROJECT SUMMARY

Horizontal and Vertical Surveys were performed to determine the location and elevation of various test pits in the area designated as "Site 4 - Chemical Burial Area" located at the Naval Surface Warfare Center - White Oak (NSWC), Silver Spring, Maryland.

Horizontal locations were referenced to existing survey traverse stations established by Donaldson, Garrett & Associates, Inc. while surveying Monitoring Well Locations at Site 4 in January, 1998. The coordinate values of all the surveyed points are referenced to the Maryland State Plane Coordinate System, NAD 83 Datum.

Elevations were referenced to Mean Sea Level, National Geodetic Vertical Datum, 1929 Adjustment(NGVD 29) The existing survey traverse stations described above were tied to existing USGS or NGS Benchmarks at NSWC. Elevations were determined by closed loop trigonometric leveling traverse. Error of closure was determined for each level loop and adjustments applied.

The field surveys commenced on August 31, 1998 and completed on September 2, 1998. All work provided under the subcontract complies with all requirements of the specifications and engineer approved deviations.

II.

SITE 04- CHEMICAL BURIAL AREA

Prepared by: DONALDSON, GARRETT & ASSOCIATES, INC. #CGDS08890
List-Coords/Brg-Azi N98_04 9/02/98 19:20:56 Factor: 1.0000000

Pt.No.	Code	North	East	Elevation	Desc.
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18	18	500346.94600	1324452.16900	290.590	DEL 18 CK
19	19	500148.54424	1325007.91655	288.332	DEL 19 CK
55	55	500695.98634	1324652.78287	302.132	DEL 55
56	56	501025.97029	1324517.23273	278.485	DEL 56
57	57	500970.51111	1323992.27696	269.632	DEL 57
58	58	500772.80451	1323660.06251	257.173	DEL 58
59	17	500544.66187	1323902.82549	264.562	DEL 17
100		500909.77558	1324318.72175	284.035	04TP11
101		500928.16163	1324327.14984	281.041	04TP11
102		500921.54891	1324356.35665	282.806	TP12
103		500935.50058	1324361.58443	280.879	TP12
104		500975.36418	1324273.60515	276.673	EG/EA RD
105		500973.67572	1324251.56062	276.748	EG/EA RD
106		500951.61608	1324312.85807	279.443	EG RD
107		500961.44130	1324316.73084	278.894	EG RD
108		500947.40048	1324373.04968	280.758	EG RD
109		500938.87684	1324370.19589	281.321	EG RD
110		500933.19170	1324417.13680	282.347	EG RD
111		500943.21919	1324417.86418	281.752	EG RD
112		500946.43891	1324451.16242	281.772	EG RD
113		500936.87385	1324453.33115	282.303	EG RD
114		500948.50161	1324499.73589	281.903	EG RD
115		500957.86742	1324498.78964	281.564	EG RD
116		500967.41179	1324547.94998	281.202	EG RD
117		500955.93864	1324550.05344	281.844	EG RD
118		500965.96732	1324593.22816	282.542	END G RD BGN A RD
119		500976.14716	1324591.24894	282.276	END G RD BGN A RD
120		500977.56014	1324620.86415	283.604	EA RD
121		500963.31464	1324618.60215	283.716	EA RD
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125		500936.28777	1324670.18870	287.746	EA RD
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127		501055.99670	1324684.19424	285.183	EA RD
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129		501048.78223	1324636.24519	282.612	EA RD
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131		501032.80663	1324587.27892	280.792	EA RD
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133		501033.35882	1324534.78829	278.727	EA RD
134		501023.18863	1324536.16750	278.827	EA RD
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137		501031.46537	1324490.50068	277.293	PP-930
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145	500983.96190	1324249.89208	275.889	EA RD
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156	501018.53046	1324522.05506	277.539	04TP0107
157	501011.51448	1324479.89654	276.667	04TP0106
158	501009.44098	1324462.88370	276.632	04TP0105
159	501005.86446	1324438.48904	276.228	04TP0104
160	501001.39796	1324408.49763	275.993	04TP0103
161	500995.50071	1324384.90743	276.114	04TP0102
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171	501015.59504	1324505.63537	277.728	04TP03
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173	500968.83021	1324514.94147	281.325	04TP0306
174	500970.77951	1324514.59042	281.070	04TP0305
175	500982.34628	1324511.96425	280.383	04TP0304
176	500993.01181	1324509.80545	279.690	04TP0303
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180	500956.28802	1324474.84090	281.496	04TP05
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182	500953.13583	1324462.17643	281.708	04TP0503
183	500951.15150	1324454.48964	281.698	04TP0502
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194	500985.41874	1324605.55645	282.820	04TP02
195	501030.35016	1324604.45083	281.435	04TP02
196	501022.28461	1324604.69811	281.952	04TP0201
197	501012.36580	1324604.96721	281.972	04TP0202
198	501002.38234	1324605.13698	282.270	04TP0203
199	500993.47083	1324605.44541	282.737	04TP0204
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223	500912.15357	1324521.86621	283.080	04TP13
224	500912.78375	1324530.37524	283.930	04TP1301
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226	500894.36535	1324524.93268	286.525	04TP10
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228	500882.75867	1324550.80470	286.677	04TP07B
229	500876.89468	1324558.41741	290.892	04TP07C
230	500876.23456	1324542.89583	286.497	04TP0701
231	500868.81489	1324532.86537	291.134	04TP07B
232	500883.06853	1324534.23789	286.673	04TP07A
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Prepared by: DONALDSON, GARRETT & ASSOCIATES, INC. #CGDS08890
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Operator: js, jp Pressure:
Date: 09/01/98

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e Desc.									
2:	18	5.310	19	5.230	0.00000	590.106	-2.240	09/01/	98
12:38:21									
3:				5.000	280.14300	402.611	11.310	55	55
DEL 55									
4:				5.000	100.14270	402.615	11.168	55	55
DEL 55 R									
5:				5.230	179.59550	590.095	-2.437	19	19
DEL 19 CK									
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13:05:42									
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DEL 56									
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DEL 56 R									
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DEL 18 CK									
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13:				10.400	180.00020	356.739	28.179	55	5
DEL 55 CK									
14:	57	5.580	56	5.410	0.00000	527.856	8.814	09/01/	9
13:57:11									
15:				5.000	155.16270	386.622	-12.974	58	5
DEL 58									
16:				5.000	335.16200	386.618	-13.092	58	5
DEL 58 R									
17:				5.410	180.00010	527.859	8.643	56	5
DEL 56 CK									
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DEL 17									
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DEL 17 R									

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DEL 57 CK									
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TP12									
27:				5.000	335.51500	180.031	1.794	103	
TP12									
28:				5.000	354.17470	248.828	-2.412	104	
EG/EA RD									
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EG/EA RD									
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EG RD									
31:				5.000	348.11270	210.630	-0.191	107	
EG RD									
32:				5.000	337.26370	164.201	1.673	108	
EG RD									
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EG RD									
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EG RD									
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EG RD									
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EG RD									
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EG RD									
39:				5.000	291.11020	70.556	2.479	115	
EG RD									
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EG RD									
41:				5.000	250.55140	77.341	2.759	117	
EG RD									
42:				5.000	224.19270	96.828	3.457	118	
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43:				5.000	219.58370	89.223	3.191	119	
END G RD BGN A RD									
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EA RD									
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EA RD									
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A RD									
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EA RD									
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EA RD									

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EA RD					
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EA RD					
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EA RD					
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EA RD					
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72:	5.000	359.32270	278.051	-4.646	148
PP-7226					
73:	5.000	353.46350	161.392	-3.026	149
04TP01					
74:	5.000	181.37270	118.931	3.432	150
04TP01					
75:	5.000	181.39310	116.809	3.450	151
04TP0112					
76:	5.000	182.26350	101.911	2.834	15[illegible]
04TP0111					
77:	5.000	182.55170	92.012	2.646	153
04TP0110					
78:	5.000	184.18590	72.263	1.570	154
04TP0109					

79: 04TP0108	5.000	194.15480	27.839	-0.185	155
80: 04TP0107	5.000	243.04500	8.866	-1.546	156
81: 04TP0106	5.000	344.51560	40.037	-2.418	157
82: 04TP0105	5.000	349.06530	56.807	-2.453	158
83: 04TP0104	5.000	351.42270	81.270	-2.857	159
84: 04TP0103	5.000	353.17490	111.477	-3.092	160
85: 04TP0102	5.000	353.03500	135.788	-2.971	161
86: 04TP0101	5.000	353.42110	159.165	-2.833	162
87: 04TP04	5.000	350.25330	67.326	-2.432	163
88: 04TP04	5.000	314.33140	91.986	2.507	164
89: 04TP0405	5.000	315.51210	89.718	2.382	165
90: 04TP0406	5.000	321.26450	82.864	0.975	166
91: 04TP0404	5.000	327.13110	77.159	-0.478	167
92: 04TP0403	5.000	334.08540	72.693	-1.025	168
93: 04TP0402	5.000	337.02530	71.350	-1.210	169
94: 04TP0401	5.000	343.20520	69.010	-1.666	170
95: 04TP03	5.000	324.12520	15.561	-1.357	171
96: 04TP03	5.000	277.40480	59.220	2.172	172
97: 04TP0306	5.000	278.19380	57.186	2.240	173
98: 04TP0305	5.000	278.46190	55.254	1.985	174
99: 04TP0304	5.000	282.55020	43.941	1.298	175
100: 04TP0303	5.000	288.43500	33.785	0.605	176
101: 04TP0302	5.000	296.43230	25.798	-0.282	177
102: 04TP0301	5.000	317.52540	16.765	-1.089	178
103: 04TP05	5.000	320.34190	109.113	2.849	179
104: 04TP05	5.000	307.20440	81.564	2.411	180
105: 04TP0504	5.000	308.14140	81.815	2.385	181
106: 04TP0503	5.000	313.07010	91.302	2.623	182
107: 04TP0502	5.000	316.00510	97.645	2.613	183
108: 04TP0501	5.000	319.14550	104.481	2.841	184

109: 04TP06	5.000	255.56290	59.662	2.399	185
110: 04TP06	5.000	207.29110	128.487	5.137	186
111: 04TP0607	5.000	207.20560	128.204	5.224	187
112: 04TP0606	5.000	210.52580	107.842	4.109	188
113: 04TP0605	5.000	220.32260	84.571	3.167	189
114: 04TP0604	5.000	230.57500	72.076	2.513	190
115: 04TP0603	5.000	241.00120	65.420	2.296	191
116: 04TP0602	5.000	242.46550	64.460	2.265	192
117: 04TP0601	5.000	251.12410	61.266	2.319	193
118: 04TP02	5.000	210.41310	97.188	3.735	194
119: 04TP02	5.000	183.09220	87.328	2.350	195
120: 04TP0201	5.000	188.26380	87.543	2.867	196
121: 04TP0202	5.000	194.50430	88.783	2.887	197
122: 04TP0203	5.000	201.03060	91.014	3.185	198
123: 04TP0204	5.000	206.15210	94.009	3.652	199
124: 04TP08	5.000	222.37320	101.160	3.168	20
125: 04TP08	5.000	250.13370	79.131	3.055	201
126: 04TP0803	5.000	243.41050	81.901	2.845	202
127: 04TP0802	5.000	237.07100	85.137	2.996	203
128: 04TP0801	5.000	229.15280	91.916	3.155	204
129: 04TP07I	5.000	222.46090	122.291	6.982	205
130: 04TP07I	5.000	229.40310	115.792	5.442	206
131: 04TP0704	5.000	232.42300	112.381	4.473	207
132: 04TP0706	12.000	237.54310	115.183	12.221	208
133: 04TP07E07	12.000	238.07240	115.269	12.264	209
134: 04TP0705	12.000	240.23320	118.247	12.345	210
135: 04TP0703	5.000	252.17290	132.560	6.721	211
136: 04TP0702	5.000	253.00440	135.256	6.863	21
137: 04TP07	5.000	253.44520	137.831	7.216	213
138: 04TP7D	5.000	254.04570	151.790	11.163	214

139:				5.000	250.36540	163.290	14.915	215	
04TP7D									
140:				5.000	247.14330	85.737	2.378	216	
04TP0806									
141:				5.000	248.04310	84.348	2.325	217	
04TP0804									
142:				5.000	252.19390	98.691	3.952	218	
04TP09									
143:				5.000	269.56010	87.959	2.693	219	
04TP09									
144:				5.000	263.23500	90.745	2.873	220	
04TP0902									
145:				5.000	260.31570	92.150	2.728	221	
04TP0901									
146:				5.000	257.34270	117.111	5.279	222	
04TP13									
147:				5.500	273.41590	113.911	4.495	223	
04TP13									
148:				5.000	269.24280	113.947	4.845	224	
04TP1301									
149:				5.000	263.47060	132.605	6.814	225	
04TP10									
150:				6.000	272.40570	131.830	8.440	226	
04TP10									
151:				6.400	267.29420	130.958	8.122	227	
04TP1001									
152:				5.000	262.50160	147.094	7.592	228	
04TP07B									
153:				5.000	260.35140	154.660	11.807	229	
04TP07C									
154:				5.000	266.18200	151.919	7.412	230	
04TP0701									
155:				5.000	270.21010	157.931	12.049	231	
04TP07B									
156:				5.000	269.14410	143.910	7.588	232	
04TP07A									
157:				5.100	274.47150	145.107	10.264	233	
04TP07A									
158:	56	5.570	57	5.000	359.59590	527.906	-9.391	09/02/ 98	
09:33:38									
159:				5.000	3.47260	41.653	-1.762	234	
04TP014									
160:				5.000	25.38050	47.239	-3.091	235	
04TP014									
161:				5.000	21.32330	45.429	-2.875	236	
04TP1401									

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Pt.No.	Code	North	East	Elevation	Desc.

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NAVAL SURFACE WARFARE CENTER - WHITE OAK
SILVER SPRING, MARYLAND

TEST PIT LOCATIONS

DESIGNATION	NORTH	EAST	ELEVATION
04TP01	500,991.71	1,324,359.52	276.06
04TP01	501,035.11	1,324,635.81	282.52
04TP0101	500,991.99	1,324,361.74	276.25
04TP0102	500,995.50	1,324,384.91	276.11
04TP0103	501,001.40	1,324,408.50	275.99
04TP0104	501,005.86	1,324,438.49	276.23
04TP0105	501,009.44	1,324,462.88	276.63
04TP0106	501,011.51	1,324,479.90	276.67
04TP0107	501,018.53	1,324,522.06	277.54
04TP0108	501,021.98	1,324,544.79	278.90
04TP0109	501,028.13	1,324,589.46	280.65
04TP0110	501,030.96	1,324,609.11	281.73
04TP0111	501,032.35	1,324,618.94	281.92
04TP0112	501,034.88	1,324,633.70	282.53
04TP014	501,024.34	1,324,475.61	277.29
04TP014	501,041.82	1,324,472.73	275.96
04TP02	500,985.42	1,324,605.56	282.82
04TP02	501,030.35	1,324,604.45	281.43
04TP0201	501,022.29	1,324,604.70	281.95
04TP0202	501,012.37	1,324,604.97	281.97
04TP0203	501,002.38	1,324,605.14	282.27
04TP0204	500,993.47	1,324,605.45	282.74
04TP03	501,015.60	1,324,505.64	277.73
04TP03	500,966.78	1,324,515.53	281.26
04TP0301	501,013.48	1,324,506.05	278.00
04TP0302	501,001.84	1,324,508.12	278.80
04TP0303	500,993.01	1,324,509.81	279.69
04TP0304	500,982.35	1,324,511.96	280.38
04TP0305	500,970.78	1,324,514.59	281.07
04TP0306	500,968.83	1,324,514.94	281.32
04TP04	501,007.86	1,324,452.39	276.65
04TP04	500,954.00	1,324,459.94	281.59
04TP0401	500,999.36	1,324,453.56	277.42
04TP0402	500,991.40	1,324,454.82	277.87
04TP0403	500,987.58	1,324,455.51	278.06
04TP0404	500,977.61	1,324,457.11	278.61
04TP0405	500,957.07	1,324,459.77	281.47
04TP0406	500,967.80	1,324,458.22	280.06
04TP05	500,948.20	1,324,440.70	281.93
04TP05	500,956.29	1,324,474.84	281.50
04TP0501	500,949.83	1,324,445.69	281.93

04TP0502	500,951.15	1,324,454.49	281.70
04TP0503	500,953.14	1,324,462.18	281.71
04TP0504	500,956.74	1,324,473.63	281.47
04TP06	500,969.94	1,324,537.73	281.48
04TP06	500,978.97	1,324,636.82	284.22
04TP0601	500,970.36	1,324,542.95	281.40
04TP0602	500,972.06	1,324,552.58	281.35
04TP0603	500,972.40	1,324,554.78	281.38
04TP0604	500,975.07	1,324,568.26	281.60
04TP0605	500,978.06	1,324,586.92	282.25
04TP0606	500,980.65	1,324,615.09	283.19
04TP0607	500,979.36	1,324,636.67	284.31
04TP07	500,898.43	1,324,569.50	286.30
04TP0701	500,876.24	1,324,542.90	286.50
04TP0702	500,901.48	1,324,570.12	285.95
04TP0703	500,904.63	1,324,570.60	285.81
04TP0704	500,944.21	1,324,594.34	283.56
04TP0705	500,929.87	1,324,586.13	284.43
04TP0706	500,935.36	1,324,588.34	284.31
04TP07A	500,883.07	1,324,534.24	286.67
04TP07A	500,880.90	1,324,520.38	289.25
04TP07B	500,882.76	1,324,550.81	286.68
04TP07B	500,868.82	1,324,532.87	291.13
04TP07C	500,876.90	1,324,558.42	290.89
04TP07E07	500,935.02	1,324,588.05	284.35
04TP07I	500,952.82	1,324,615.23	286.07
04TP07I	500,946.05	1,324,601.02	284.53
04TP08	500,965.66	1,324,598.45	282.25
04TP08	500,954.73	1,324,551.68	282.14
04TP0801	500,963.02	1,324,584.21	282.24
04TP0802	500,959.72	1,324,570.71	282.08
04TP0803	500,956.78	1,324,561.05	281.93
04TP0804	500,951.47	1,324,556.77	281.41
04TP0806	500,950.83	1,324,558.52	281.46
04TP09	500,935.61	1,324,556.91	283.04
04TP09	500,938.51	1,324,526.58	281.78
04TP0901	500,937.17	1,324,541.86	281.81
04TP0902	500,937.42	1,324,537.08	281.96
04TP10	500,896.38	1,324,545.36	285.90
04TP10	500,894.37	1,324,524.93	286.52
04TP1001	500,896.46	1,324,536.67	285.81
04TP11	500,909.78	1,324,318.72	284.03
04TP11	500,928.16	1,324,327.15	281.04
04TP12	500,921.55	1,324,356.36	282.81
04TP13	500,914.88	1,324,554.31	284.36
04TP13	500,912.15	1,324,521.87	283.08
04TP1301	500,912.78	1,324,530.38	283.93
04TP1401	501,038.12	1,324,473.46	276.18
04TP7D	500,885.18	1,324,573.97	290.25

04TP7D	500,878.48	1,324,587.32	294.00
O4TP12	500,935.50	1,324,361.58	280.88

APPENDIX B

COST ESTIMATE

Basis of Design - Site 4
The former Naval Surface Warfare Center – White Oak
Silver Spring, Maryland

Cost Estimate Assumptions

The prices used in the cost estimates are from one of the following sources:

ECHOS Environmental Restoration Unit Cost Book, 1998
Means Site Work and Landscape Cost Data, 17th Edition, 1998
Past experience with similar technologies/processes

It was assumed that the contractor would staff a project with 5 people from the company to provide oversight:

Site Supervisor	Site Engineer
Job Foreman	Health and Safety Officer
Project Accountant	

Per diem would be paid for the first 2 weeks (14 days) of the project duration. All other field crew members (equipment operator, laborers, etc.) would be hired locally.

A Project Manager and Project Engineer would work in the office, and be dedicated to the project half time.

Daily and weekly labor costs are based on 8-hour work days and 40-hour work weeks.

Estimated project duration is 3 months (22 working days per month), based on the following task durations:

Mobilization	5 days
Includes equipment and personnel mobilization, utility connection, site survey	
Excavation (200 cy/day)	35 days
Backfill (400 cy/day)	18 days
Demobilization	5 days
Includes vegetation, asphalt replacement, equipment and personnel demobilization	

Note: Time required to prepare pre- and post-construction submittals is in addition to the durations outlined above.

The site would not require clearing and grubbing prior to excavation. Minimal surveying would be necessary. No post-construction survey would be performed.

Twenty percent of the soil and waste excavated (1,385 cy) would require off-site disposal at a RCRA incinerator.

The majority of soil excavation would be performed in Level D personal protective equipment (addition of tyvek coverall). Labor costs were increased by 18% to account for decreases in efficiency due to the PPE.

Based on conditions encountered during the EE/CA field investigation, Level C PPE (respiratory protection) is anticipated. It was assumed that equipment operators and laborers would be required to wear Level C PPE 20% of the time during excavation (or 7 days). Labor costs were increased by 45% and equipment costs increased 25% to account for decreases in efficiency due to the PPE.

All other field work would be performed in standard construction clothing.

The Navy would perform confirmatory sampling. As such, sampling and analysis costs have not been included in the design estimate.

The portion of Perimeter Road removed during excavation would be replaced with 6 inches of gravel, 4 inches of asphalt binder, and 2 inches of asphalt wear.

NSWC - WHITE OAK
SILVER SPRING, MARYLAND
SITE 4 - CHEMICAL BURIAL AREA
EXCAVATION, OFF-SITE INCINERATION OR OFF-SITE LANDFILL DISPOSAL, SITE RESTORATION

Item	Quantity	Unit	Unit Cost Subcontract	Unit Cost Material	Unit Cost Labor	Unit Cost Equipment	Extended Cost Subcontract	Extended Cost Material	Extended Cost Labor	Extended Cost Equipment	Subtotal	Comments
1 MOBILIZATION/DEMOBILIZATION												
1.1 Office Trailer (1)	3	mo				$215.00	$0	$0	$0	$645	$645	
1.2 Storage Trailer (1)	3	mo				$120.00	$0	$0	$0	$360	$360	
1.3 Construction Survey	1	ls	$1,000.00				$1,000	$0	$0	$0	$1,000	
1.4 Utility Hook-ups (electric and phone)	1	ls	$1,500.00				$1,500	$0	$0	$0	$1,500	
1.5 Site Utilities - usage	3	mo		$249.60			$0	$749	$0	$0	$749	
1.6 Personnel Mobilization/Demobilization	10	ea			$500.00		$0	$0	$5,000	$0	$5,000	
1.7 Equipment Mobilization/Demobilization	2	ea	$2,000.00				$4,000	$0	$0	$0	$4,000	trailers, excavator, FEL
1.8 Per diem	70	mn dy			$162.00		$0	$0	$11,340	$0	$11,340	
2 DECONTAMINATION												
2.1 Truck Decontamination Pad	1	ls		$5,818.40	$6,618.70	$666.00	$0	$5,818	$6,619	$666	$13,103	
2.2 Clean Water Storage Tank	3	mo				$150.00	$0	$0	$0	$450	$450	
2.3 Spent Water Storage Tank	3	mo				$150.00	$0	$0	$0	$450	$450	
2.4 Pressure Washer	2.5	mo				$465.00	$0	$0	$0	$1,163	$1,163	duration of excav and disp. activiti
2.5 Transportation and Disposal of Decontamination Water	2245	gal	$2.00				$4,490	$0	$0	$0	$4,490	5 gallons/truck
2.6 Waste Profile Decontamination Water	1	ls	$1,000.00				$1,000	$0	$0	$0	$1,000	
3 EXCAVATION												
3.1 Excavator /w operator to excavate/load buried waste	28	day			$260.00	$465.00	$0	$0	$7,280	$13,020	$20,300	
3.2 Excavator /w operator (Level C)	7	day			$319.58	$582.00	$0	$0	$2,237	$4,074	$6,311	
3.3 Photoionization Detector to screen excav matl	35	day				$345.00	$0	$0	$0	$12,075	$12,075	
3.4 Laborers for PID, logistics	98	day			$194.94		$0	$0	$19,104	$0	$19,104	3 laborers, dur of excav/treat/tran
3.5 Laborers for PID, logistics (Level C)	21	day			$239.54		$0	$0	$5,030	$0	$5,030	3 laborers, dur of excav/treat/tran
4 OFF-SITE DISPOSAL												
4.1 Transport treated waste to RCRA Incinerator (90@340 mi)	30600	mi	$1.97				$60,282	$0	$0	$0	$60,282	20 tons/truck
4.2 Dispose of material at RCRA Incinerator	1800	ton	$500.00				$900,000	$0	$0	$0	$900,000	1.3 tons/cy; WTI, East Liverpool,
4.3 Transport treated waste to MSW Landfill (359@50 mi)	17950	mi	$1.97				$35,362	$0	$0	$0	$35,362	20 tons/truck
4.4 Dispose of material at MSW Landfill	7170	ton	$35.00				$250,950	$0	$0	$0	$250,950	1.3 tons/cy
4.5 Waste Disposal Application Fees	1	ls	$2,000.00				$2,000	$0	$0	$0	$2,000	
4.6 Truck Scale	2	mo				$2,862.00	$0	$0	$0	$5,724	$5,724	
5 SITE RESTORATION												
5.1 Remove decon pad and dispose	80	cy	$35.00				$2,800	$0	$0	$0	$2,800	haul to and dispose at MSW landf
5.2 Import fill material	6521	cy		$6.07			$0	$39,582	$0	$0	$39,582	
5.3 Place, grade, and compact fill material	6521	cy			$0.26	$0.51	$0	$0	$1,695	$3,326	$5,021	
5.4 Import vegetative cover	404	cy		$14.92			$0	$6,028	$0	$0	$6,028	
5.5 Place, grade vegetative cover	404	cy			$0.30	$0.83	$0	$0	$121	$335	$457	
5.6 Vegetate site	43.6	msf		$28.00	$7.00	$7.35	$0	$1,221	$305	$320	$1,846	utility mix w/ mulch and fertilizer
5.7 Replace Perimeter Road	240	lf		$7.67	$4.39	$4.39	$0	$1,841	$1,054	$1,054	$3,948	12 ft wide
5.8 Disconnect utilities	1	ls	$500.00				$500	$0	$0	$0	$500	
6 OFFICE SUPPORT/FIELD SUPPORT												
6.1 Site Supervisor	13	week			$980.00		$0	$0	$12,740	$0	$12,740	
6.2 Job Foreman	13	week			$674.00		$0	$0	$8,762	$0	$8,762	
6.3 Project Accountant	13	week			$550.00		$0	$0	$7,150	$0	$7,150	
6.4 Health and Safety Officer	13	week			$647.00		$0	$0	$8,411	$0	$8,411	
6.5 Site Engineer	13	week			$663.00		$0	$0	$8,619	$0	$8,619	
6.6 Project Manager (office - 1/2 time)	6.5	week			$1,158.00		$0	$0	$7,527	$0	$7,527	
6.7 Project Engineer (office - 1/2 time)	6.5	week			$999.00		$0	$0	$6,494	$0	$6,494	
7 PROJECT DOCUMENTATION												
7.1 Pre- and Post-construction submittals	320	hours			$40.00		$0	$0	$12,800	$0	$12,800	

NSWC - WHITE OAK
SILVER SPRING, MARYLAND
SITE 4 - CHEMICAL BURIAL AREA
EXCAVATION, OFF-SITE INCINERATION OR OFF-SITE LANDFILL DISPOSAL, SITE RESTORATION

Item	Quantity	Unit	Unit Cost Subcontract	Unit Cost Material	Unit Cost Labor	Unit Cost Equipment	Extended Cost Subcontract	Extended Cost Material	Extended Cost Labor	Extended Cost Equipment	Subtotal	Comments
Subtotal Direct Costs less Subcontract								$55,239	$132,288	$43,662	$231,189	
Overhead on Labor Cost @ 30%									$39,686		$39,686	
G & A on Labor Cost @ 10%									$13,229		$13,229	
G & A on Material Cost @ 10%								$5,524			$5,524	
Total Direct Cost								$60,763	$185,203	$43,662	$289,628	
Indirects on Total Direct Labor Cost @ 75%									$138,903		$138,903	
Profit on Total Direct Cost @ 10%											$28,963	
Subtotal											$457,493	
Health & Safety Monitoring @ 3%											$13,725	
Total Field Cost											**$471,218**	
Subtotal Subcontractor Cost							$1,263,884				$1,263,884	
G & A on Subcontract Cost @ 10%							$126,388				$126,388	
Profit on Subcontractor Cost @ 5%											$63,194	
Subcontractor Cost											**$1,453,466**	
Contingency on Total Field and Subcontractor Costs @ 10%											**$192,468**	
Engineering on Total Field Cost @ 6%											**$28,273**	
TOTAL COST											**$2,145,426**	