Section : 02.05
Site 20903-5640 (White Oak)
Doc. #: 0004
00079

N60921.AR.000366
NSWC WHITE OAK
5090.3a

# Engineering Evaluation/ Cost Analysis (EE/CA)

for

# Site 28 and Site 47

## 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 0315

July 2001

TETRA TECH NUS, INC.

Section : 02.05
Site 20903-5640 (White Oak)
Doc. #: W/ 0004
00079

**TETRA TECH NUS, INC.**
661 Andersen Drive ▪ Pittsburgh, Pennsylvania 15220-2745
(412) 921-7090 ▪ FAX (412) 921-4040 ▪ www.tetratech.com

PITT-07-1-049

July 27, 2001

Project Number 7909

Ms. Krista Grigg
Department of the Navy
Engineering Field Activity Chesapeake
Code 181
Washington Navy Yard
1314 Harwood Street, S.E
Washington, D.C. 20374-5018

Reference: Clean Contract No. N62472-90-D-1298
Contract Task Order No. 0315

Subject: Final Engineering Evaluation/Cost Analysis – Sites 28 and 47
Former Naval Surface Warfare Center (NSWC) White Oak
Silver Spring, Maryland

Dear Krista,

Enclosed are two copies of the subject report incorporating comments received from the NSWC White Oak BRAC Cleanup Team (BCT). A response letter addressing the BCT comments is also provided. Copies of the report have also been forwarded to members of the BCT. If you have any questions regarding this report, please contact me at (412) 921-7134.

Very truly yours,

Scott A. Nesbit

Scott A. Nesbit, P.E.
Project Manager

SAN/kf
Enclosures

c: Darius Ostrauskas, USEPA Region III (3 copies)
Jeff Thornburg, MDE
Steven Richard, GSA
Bob Ridgway, GSA/ANADAC
Scott MacEwen, P.E., $CH_2M$ Hill
Phil Tully, IT/OHM
Roger Boucher, NORTHDIV (w/o enclosure)
John Trepanowski, P.E., TtNUS
Kelly Smay, TtNUS
Project File - 7909

**Response to EPA comments on the draft Engineering Evaluation/Cost Analysis for Site 28 and Site 47 dated March 2001.**

**Dated May 29, 2001**

*General Comments*

Site 28

1. The report appears to provide a basis for conducting a CERCLA removal action to address PCBs in soils at Site 28. Based on the extent of investigations and contamination at the site, a Record of Decision should be issued after the removal to select a remedial action for the site or to confirm that no further response action is needed. In this case, any removal action should be consistent with anticipated remedial actions.

***Response: Agree. It is anticipated that the current removal action will remove the source area.***

2. The objectives of the removal action should be more clearly identified. While it is noted that one objective is to "...remediate soil so that it no longer poses a human health risk to future land users...", the reasonably anticipated future use(s) of the property and the acceptable level of human health risk are not identified. Both should be identified in the EECA. If the removal action is not protective of certain human uses (e.g., residential use, day-care child use, etc.), remedial action in the form of institutional controls would be necessary.

***Response: Agree. This information will be included in the final EE/CA. The property was transferred within the Federal government for commercial/industrial use for the foreseeable future. Institutional controls will be implemented through a land use control assurance plan.***

3. While the second objective is to "...limit the soil's potential to act as a source for surface water contamination...", the results of the basewide Baseline Ecological Risk Assessment are not considered in identifying the removal action objectives. The EECA should consider the BERA in identifying more specific objectives related to protection of ecological receptors.

***Response: Agree. The objectives will be revised in the final EE/CA to address the results of the basewide Baseline Ecological Risk Assessment. The revised EE/CA will consider more specific objectives related to the protection of ecological receptors.***

4. Without a clear identification of the objectives, it is difficult to determine whether the estimated location and volume of soils targeted for a response are reasonable. A review of the investigation results to date

suggests that the extent of contamination is not fully identified and that the volume of soil to be addressed by a removal action may be greater than that estimated. However, even with a substantial volume increase, Alternative 3, Excavation, Off-Site Landfill Disposal and Site Restoration, would still appear to be the most reasonable alternative.

***Response: Since both alternatives assume the same amount of material would be excavated, disposed, and/or treated, the cost of each alternative would increase if the area of excavation requiring remediation would increase. Verification sampling will be conducted during the excavation activities to make sure all contaminated material above established PRGs is removed and handled properly. The cost included in the FS uses all information known for the site at this time and is completed for cost comparison of alternatives. However, since costs associated with alternative 2 also includes treatment of soil, it is anticipated that the cost of this alternative would increase at a greater rate than alternative 3 which includes only excavation and disposal. Therefore, we agree that Alternative 3 would still be the most reasonable alternative.***

5. While the extent of contamination does not appear to be fully identified, it is anticipated that verification sampling to be performed in conjunction with any removal action would confirm that the soils of concern have been removed and/or characterize remaining soils as needed.

***Response: Agree. As stated in the discussion of alternatives 2 and 3 for Site 28 and 47, verification sampling of the excavation walls and floors would be conducted to confirm that PRGs have been met and contaminant levels in the remaining soils fall below permissible regulatory limits.***

6. The report indicates that concrete would be characterized to determine whether remediation is required. The location of the concrete as well as the gravel layer should be identified in a figure. In addition, the approximate dates of the placement of the concrete and the gravel layer and the dates of PCB storage should be provided (if available).

***Response: As stated in Section 3.1.1 the exact location of the storage area (hard-packed gravel surface) for the transformers is unknown and the site was used between 1967 and 1975. However, the current location of concrete at the site will be included on Figure 3-1. Soil samples previously collected below the concrete have not identified any chemicals requiring removal and therefore, it is anticipated that concrete would not need further characterization.***

<u>Site 47</u>

7. The report appears to provide an adequate basis for conducting a CERCLA removal action to address PCBs in sediments and soils at Site 47. Based on extent of investigations and contamination at the site, a Record of Decision should be issued after the removal to select the final remedy for the site or to confirm that no further action is needed.

***Response: Agree.***

8. Again, the objectives of the removal action should be more clearly identified. While it is noted that one objective is to "...remediate contaminated sediment and soil within the drainage channel and along the channel embankments from the storm sewer outlet to the White Oak property line so that it no longer poses a human health risk to future land users...", the reasonably anticipated future use(s) of the property and the acceptable level of human health risk under this use are not identified. The EECA should identify both. In addition, actions should not necessarily be limited to "White Oak property".

***Response: Agree. The objectives will be more clearly identified in the revised EE/CA. The property was transferred within the Federal government for commercial/industrial use for the foreseeable future. Institutional controls will be implemented through a land use control assurance plan. Previous sampling results in the drainage channel have not shown contamination beyond the border of the White Oak property and therefore it is anticipated that no remediation will be required past the boundary. However, verification sampling will be conducted to verify contamination is below established PRGs.***

9. Another objective is to "...limit the soil and sediment's potential to migrate along the drainage channel...". While it is assumed that this objective relates to the protection of ecological receptors, there is no reference to the BERA to indicate which soils and sediments present an unacceptable risk to ecological receptors. The EECA should consider the BERA in identifying objectives related to protection of the environment.

***Response: Agree. The objectives will be revised in the final EE/CA to address the results of the basewide Baseline Ecological Risk Assessment. The revised EE/CA will consider more specific objectives related to the protection of ecological receptors.***

10. A third objective is "...to remediate sediment present in the catch basin and storm sewer behind Building 90 so that it no longer pose a human health risk to future land users...". The report should provide more information regarding the known or potential migration pathway(s) for the PCBs from transformer location of concern to the "Unnamed Tributary A". A more detailed map should indicate the location of the storm sewer(s), catch basin, the "drop inlet along the storm drain in the Building 90 parking lot", etc. The report should note that two small terra cotta pipes discharge to the tributary at the storm sewer outfall and indicate the relationship of these pipes, if any, to Building 90 and the storm sewer(s).

***Response: Figure 4-1 includes locations of the storm drains near Building 90. A more detailed figure is not available. The location of the terra cotta pipes will be investigated during the remedial action. The location of the storm sewer(s), catch basin, and drop inlet with respect to Unnamed Tributary A can be further investigated/identified during the remedial design phase.***

11. The report later proposes that "abandoned storm sewer pipes in the vicinity of Building 90 would also be excavated, demolished and disposed". However, the presence of the terra cotta pipes suggests that PCBs released from Building 90 may not have necessarily been discharged to the storm sewer. In addition, it is unclear whether the referenced storm sewer pipes have already been abandoned or would be abandoned as part of the action.

***Response: The terra cotta pipes and storm sewer pipes will be further investigated during the remedial action.***

12. It is indicated that the "...source of the contamination is uncertain but is believed to be caused by a transformer located in the northern portion of Building 90..." and that "...although the transformers remain within Building 90, modifications were completed on the basement floor (the floor was refloated) where the transformer leak was known to have occurred...". A map should indicate the location of the known (or potential) location(s) of the transformers of interest, the refloated floor, floor drains and any other features associated with migration pathways between the transformer and the tributary. Any file information related to the past actions taken in response to the PCB release should be included in the report as an appendix to the report.

***Response: The transformer is located in the northern portion of Building 90 and will be included on Figure 4-1. No further information is available on the floor or drains in the building.***

**Response to comments on the draft Engineering Evaluation/Cost Analysis for Sites 28 ad 47 dated March 2001.**

**From: TechLaw Inc.**

**Dated: April 11, 2001**

The sampling documented in this report does not demonstrate the complete extent of contamination requiring remediation at Site 28. As an example, when comparing Figure 3-2, Sampling Locations Site 28 to Figure 3-5, Approximate Limits of Contamination Site 28, the limit of contamination area shown at the northeast corner of the open storage fenced area is estimated without any evidence that the areas immediately outside the proposed boundary are "clean". The actual area requiring remediation may be significantly greater that the area (~1700 cy) currently used for cost analysis purposes. If the remediation area increases significantly, the cost analysis per alternative (and ultimately the proposed remediation) could change. In this specific case, unless the remediation area at Site 28 increases by an order of magnitude, Alternative 3, Excavation and Off-site Disposal would still be the preferred remediation method.

***Response: Since both alternatives assume the same amount of material would be excavated, disposed, and/or treated, the cost of each alternative would increase if the area of excavation requiring remediation would increase. The cost included in the FS uses all information known for the site at this time and is completed for cost comparison between alternatives. However, since costs associated with alternative 2 also includes treatment of the soil, it is anticipated that the cost of this alternative would increase at a greater rate than alternative 3 which includes only excavation and disposal. Therefore, we agree that Alternative 3, Excavation and Off-site Disposal would still be the preferred alternative.***

**SPECIFIC COMMENTS**

1. **Section 3.4.1, Data Evaluation, page 3-7:** The third paragraph states that when the maximum detected metals concentration exceeds screening levels and is greater than twice the average background, the metal was retained as a COPC. Please revise the text to include a discussion on the statistical significance of the twice average background value, and the appropriateness of using this number instead of the calculated UCLs.

***Response: The issue of the "2X average background value" has been addressed in response to Comment 2 of the EPA Technical Support Section comments. The response to the Technical Support comment is as follows:***

***"Agreed. The 2X Background test was used in the selection of COPCs and the tables (Tables 3-3 and 3-4) showing the 2X background comparison will be removed from the EE/CA. The background screening was performed by comparing maximum concentrations with the Upper Tolerance Limits (UTLs) for surface and subsurface soil presented in the Background Investigation Report for the Former Naval Surface Warfare Center, White Oak, Silver Spring, Maryland (TtNUS Inc., December 1998). These values are presented in Table 3-1 and Table 3-2 of the EE/CA. The text was also modified to reflect this change. Note that the COPCs selected by using the UTLs are the same as those obtained by using the 2X background test."***

2. **Table 3-4, Comparison of Metals Concentrations in Subsurface Soils, page 3-23:** Manganese lists a 2 times background average concentration of 242.3 mg/kg and a maximum background concentration of 70 mg/kg, which does not match the analytical data provided. Please review the data and correct these concentrations in Table 3-4.

***Response: As stated in the response to comment 2, Table 3-4 was removed from the EE/CA. Therefore, this comment is no longer applicable.***

3. **Appendix A.2, Risk Assessment Data:** This Appendix should contain the Statistical Summary of Analytical Results, Background Subsurface Soil (Footnote 2, Tables 3-3 and 3-4), but actually contains the 95% UCL calculations. Revise this Appendix to include the Statistical Summary of Analytical Results, Background Subsurface Soil.

***Response: The background statistical summaries for surface and subsurface were included in Appendix A.2. of the revised EE/CA.***

4. **Appendices A.3 and B.4, Removal Action Alternative Cost Estimates:** The first page of each Appendix section lists three sources used for the cost estimates provided in each Appendix. One of these sources is "Past experience with similar technologies/processes." Please revise the spreadsheets to footnote those unit costs which are based on past experience with similar technologies/processes.

***Response: Agree. The spreadsheets were revised to include footnotes on which costs are based on past experiences with similar technologies/processes.***

**MINOR COMMENTS**

1. **Section 1.7, Climate and Meteorology, page 1-4:** This section describes the average, annual temperatures, precipitation, and wind conditions at the Site. No reference is provided for these descriptions. Please revise the text to include a reference for the provided information.

***Response: Agree. This information was updated and a reference was included.***

2. **Section 3.4.4, Risk Characterization, page 3-9:** The last sentence states that the risk estimations are presented in Tables 3-4 and 3-5. The risks are actually presented in Tables 3-5 and 3-6. Please revise the text accordingly.

***Response: Based on the response to specific comments 1 and 2, these tables will now be Tables 3-3 and 3-4. The text will be adjusted accordingly.***

3. **Table 3-3, Comparison of Metals Concentrations in Surface Soil, page 3-22:** Footnote 2 lists the statistical summary in Appendix A.4, but the summary is actually in Appendix A.2. Please revise the table accordingly.

***Response: Since the table on page 3-22 (Table 3-3) will be removed from the EE/CA (See Response to Specific Comments 1 and 2), this comment is no longer applicable.***

4. **Table 3-4, Comparison of Metals Concentrations in Subsurface Soil, page 3-23:** Footnote 2 lists the statistical summary in Appendix A.4, but the summary is actually in Appendix A.2. Please revise the table accordingly.

***Response: Since the table on page 3-23 (Table 3-4) will be removed from the EE/CA (See Response to Specific Comments 1 and 2), this comment is no longer applicable.***

5. **Table 3-5, Streamlined Risk Evaluation in Surface Soil, page 3-24 and Table 3-6, Streamlined Risk Evaluation in Subsurface Soil, page 3-25:** Footnote 1 lists the exposure point concentration summary in Appendix A.4, but the summary is actually in Appendix A.2. Please revise the table accordingly.

***Response: Appendix A.4 will be changed to Appendix A.2 in the footnotes to these tables. These tables have become Tables 3-3 and 3-4 in the final EE/CA.***

**Response to EPA Technical Support Section comments on the draft EE/CA for Sites 28 and 47.**

**Dated: May 8, 2001**

1. Section 2.2, Removal Action Objectives. The last sentence in the last paragraph states " PRGs will likely be a combination of EPA Region 3 Industrial RBCs and background concentrations for NSWC-White Oak." Preliminary Remediation Goals (PRGs) should not be established by using the Region III RBC values. PRGs should be risk-based and therefore should be calculated based on the risk results from the streamlined approach presented in the document (with two minor adjustments). See comment #3 regarding the streamlined approach.

***Response: The interim action being conducted at Site 28 and 47 is intended to remove gross contamination. Residential risk values will be used to establish PRGs, however the sites are intended to be used for industrial purposes. Following the action, characterization of the sites will be conducted and a risk assessment will be performed to show that all soil/sediment concentrations are below industrial levels.***

Finally, the report does not discuss how it will be determined the remediation goals have been meet.

***Response: Disagree. A statement is included under Alternatives 2 and 3 in sections 3.5.2 and 3.5.3 for Site 28 and 4.5.2 and 4.5.3 for Site 47 that verification sampling will be conducted on the walls and floors of the excavation to confirm that PRGs have been met and contaminant levels in the remaining soils fall below permissible regulatory limits.***

2. Section 3.4.1, Data Evaluation. The third paragraph discusses the use of a background comparative statistical procedure set forth by USEPA Region IV. Region III does not follow guidance set forth by other regions. In addition, the comparative background statistical procedure (2X the background test) should not be used as a comparative background statistical procedure because for the following reasons:

- The procedure offers no degree of statistical validity and thus is difficult to justify scientifically.
- The Navy has a background guidance document entitled, "Statistical Analysis of Environmental Data," SWDIV and EFA West of Naval Facilities Engineering Command, July 1999 that has been reviewed and accepted (with the exception of when background data should be used) by USEPA Region III.
- Finally, the USEPA Region III has informed NSWC White Oak that the 2X Background test should not be used in a comment document dated January 31, 2001 for the Remedial Investigation of OU-1.

***Response: Agree. The 2X Background test will not be used in the selection of COPCs and Tables 3-3 and 3-4 showing the 2X background comparison will be removed from the EE/CA. The background***

***screening will be performed by comparing maximum concentrations with the Upper Tolerance Limits (UTLs) for surface and subsurface soil presented in the Background Investigation Report for the Former Naval Surface Warfare Center, White Oak, Silver Spring, Maryland (TtNUS Inc., December 1998). These values are presented in Table 3-1 and Table 3-2 of the EE/CA. The text will also modified to reflect this change. Note that the COPCs selected by using the UTLs are the same as those obtained by using the 2X background test.***

3. Section 3.4.4, Risk Characterization. In the equations (cancer and non-cancer) the maximum detected concentration should be used instead of the exposure point concentration since this is a streamlined approach and dermal and inhalation is not accounted for in this streamlined risk approach. Thus, to account for these pathways for exposure the maximum detected concentration should be used. In addition, to account for these pathways that are not taken into consideration (inhalation and dermal) USEPA recommends screening at a cumulative excess cancer risk of 5E-05 for cancer and a hazardous index (HI) of .5. This comment was made to NSWC White Oak on October 23, 2000 in a report entitled Corrective Measures Study for OU#2.

***Response: Agree that the target total cancer risk (TCR) will be 5E-05 and the target total hazard ratio (THR) will be 0.5 for the streamlined risk evaluation because the dermal and inhalation pathways are not evaluated. The text in Section 3.4.4 will be modified to reflect this change.***

***Disagree that the maximum concentrations should be used as the basis of the risk estimates. Since the target cancer risk (TCR) and the target hazard ratio (THR) will be adjusted to account for lack of the dermal and inhalation pathways, the requirement to use maximum concentrations would be extremely over-conservative. Note that the majority of concentrations used in the streamlined risk evaluation were maximum concentrations (all metal detections and most of the PAHs). Therefore, the use of maximum concentrations for all COPCs would not significantly affect the results of the risk assessment.***

**Response to Comments on the Draft Engineering Evaluation / Cost Analysis (EE/CA) for Site 28 and Site 47; Former Naval Surface Warfare Center (NSWC) White Oak; March 2001**

**From: BTAG**

**Dated: May 31, 2001**

1. For both Site 28 and Site 47, the appropriate ecological risk-based levels should be included as cleanup goals. These levels are presented in Table 7-1 of the Baseline Ecological Risk Assessment.

***Response: Agree. The levels presented in Table 7-1 of the BERA will be added to the EE/CA as cleanup goals.***

2. Section 2.2, Remedial Action Objectives, must be revised to address the protection of ecological receptors. This is particularly true in the case of the discussion for Site 47. Section 1.1 specifically indicates that the removal action at this site is being undertaken to address ecological risk concerns, yet Section 2.2 does not identify ecologically-based PRGs.

***Response: Agree. The EE/CA will be revised to include the protection of ecological receptors and identify ecologically-based PRGs.***

3. Section 3, particularly Sections 3.3 and 3.4, must be revised to address contaminant concentrations in soil that exceed the risk-based levels established in the BERA. The risk evaluation must address ecological risk issues.

***Response: Agree. The risk evaluation will be revised to address ecological risk issues.***

4. Section 4 must also be revised to address contaminant concentrations in both soil and sediment that exceed the risk-based levels established in the BERA. Again, the risk evaluation must address ecological risk issues.

***Response: Agree. The risk evaluation will be revised to address ecological risk issues.***

5. For Site 47, the costs associated with Alternatives 3 and 4 do not appear to include appropriate stream restoration measures. Restoration activities should be targeted at re-establishing pre-impact conditions and the cost estimates should reflect this approach.

***Response: Agree. Costs associated with Site 47 will be re-evaluated to include costs associated with stream restoration measures.***

Section: 02.05
Site 20903-5640 (White Oak)
Doc. #: 0004

020111/P

# ENGINEERING EVALUATION/COST ANALYSIS (EE/CA) FOR SITE 28 AND SITE 47

## 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, Inc.**
**600 Clark Avenue, Suite 3**
**King of Prussia, Pennsylvania 19406-1433**

**CONTRACT NUMBER N62472-90-D-1298**
**CONTRACT TASK ORDER 0315**

**July 2001**


**PREPARED BY:**

Scott A. Nesbit

SCOTT NESBIT, P.E.
PROJECT MANAGER
TETRA TECH NUS, INC.
PITTSBURGH, PENNSYLVANIA

**APPROVED BY:**

JOHN J. TREPANOWSKI, P.E.
PROGRAM MANAGER
TETRA TECH NUS, INC.
KING OF PRUSSIA, PENNSYLVANIA

# TABLE OF CONTENTS


**SECTION** **PAGE NO.**

**ACRONYMS** ..... v

**1.0 INTRODUCTION** ..... **1-1**
1.1 FACILITY DESCRIPTION ..... 1-1
1.2 TOPOGRAPHY ..... 1-2
1.3 ECOLOGICAL SETTING ..... 1-2
1.4 GEOLOGY AND SOILS ..... 1-3
1.5 SURFACE WATER HYDROLOGY ..... 1-3
1.6 HYDROGEOLOGY ..... 1-4
1.7 CLIMATE AND METEOROLOGY ..... 1-4
1.8 REPORT ORGANIZATION ..... 1-4

**2.0 IDENTIFICATION OF REMOVAL ACTION OBJECTIVES AND TECHNOLOGY SCREENING** ..... **2-1**
2.1 COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS ..... 2-1
2.2 REMOVAL ACTION OBJECTIVES ..... 2-2
2.3 REMOVAL ACTION SCHEDULE ..... 2-3
2.4 STATUTORY LIMITS ..... 2-4
2.5 PRELIMINARY TECHNOLOGY SCREENING ..... 2-4
2.6 REPRESENTATIVE TECHNOLOGIES AND PROCESS OPTIONS ..... 2-4

**3.0 SITE 28 – BUILDING T-14 SCRAPYARD** ..... **3-1**
3.1 SITE DESCRIPTION AND BACKGROUND ..... 3-1
3.1.1 Site Location and History ..... 3-1
3.1.2 Geology and Hydrogeology ..... 3-1
3.1.3 Surrounding Land Use ..... 3-2
3.1.4 Ecological Setting ..... 3-2
3.2 PREVIOUS INVESTIGATIONS ..... 3-3
3.2.1 RCRA Facility Assessment ..... 3-3
3.2.2 Site Screening ..... 3-3
3.2.3 EE/CA Field Investigation ..... 3-4
3.2.4 2000 Additional Investigations ..... 3-4
3.3 SOURCE, NATURE, AND EXTENT OF CONTAMINATION ..... 3-4
3.4 STREAMLINED RISK EVALUATION ..... 3-6
3.4.1 Data Evaluation ..... 3-7
3.4.2 Exposure Assessment ..... 3-8
3.4.3 Toxicity Assessment ..... 3-8
3.4.4 Risk Characterization ..... 3-8
3.4.5 Results of the Risk Characterization ..... 3-10
3.4.6 Characterization of Uncertainty ..... 3-10
3.5 IDENTIFICATION AND ANALYSIS OF REMOVAL ACTION ALTERNATIVES ..... 3-11
3.5.1 Alternative 1: No Action ..... 3-12
3.5.2 Alternative 2: Excavation, On-Site Treatment, Off-Site Landfill Disposal, and Site Restoration ..... 3-12
3.5.3 Alternative 3: Excavation, Off-Site Landfill Disposal, and Site Restoration ..... 3-15
3.6 COMPARATIVE ANALYSIS OF REMOVAL ACTION ALTERNATIVES ..... 3-16
3.6.1 Effectiveness ..... 3-16

## TABLE OF CONTENTS (Continued)


| SECTION | | | PAGE NO. |
|---|---|---|---|
| | 3.6.2 | Implementability | 3-17 |
| | 3.6.3 | Cost | 3-17 |
| | 3.7 | RECOMMENDED REMOVAL ACTION | 3-17 |
| **4.0** | **SITE 47 – BUILDING 90 DRAINAGE** | | **4-1** |
| | 4.1 | SITE DESCRIPTION AND BACKGROUND | 4-1 |
| | 4.1.1 | Site Location and History | 4-1 |
| | 4.1.2 | Geology and Hydrogeology | 4-1 |
| | 4.1.3 | Surrounding Land Use | 4-2 |
| | 4.1.4 | Ecological Setting | 4-2 |
| | 4.2 | PREVIOUS INVESTIGATIONS | 4-3 |
| | 4.2.1 | Site 11 RCRA Facility Investigation | 4-4 |
| | 4.2.2 | Site 11 Additional Investigation | 4-4 |
| | 4.2.3 | Site 47 Investigation | 4-4 |
| | 4.3 | SOURCE, NATURE, AND EXTENT OF CONTAMINATION | 4-5 |
| | 4.4 | STREAMLINED RISK EVALUATION | 4-6 |
| | 4.4.1 | Data Evaluation | 4-6 |
| | 4.4.2 | Exposure Assessment | 4-7 |
| | 4.4.3 | Toxicity Assessment | 4-8 |
| | 4.4.4 | Risk Characterization | 4-8 |
| | 4.4.5 | Results of the Risk Characterization | 4-9 |
| | 4.4.6 | Characterization of Uncertainty | 4-9 |
| | 4.5 | IDENTIFICATION AND ANALYSIS OF REMOVAL ACTION ALTERNATIVES | 4-10 |
| | 4.5.1 | Alternative 1: No Action | 4-11 |
| | 4.5.2 | Alternative 2: Excavation, On-Site Treatment, Off-Site Disposal, and Site Restoration | 4-11 |
| | 4.5.3 | Alternative 3: Excavation, Off-Site Landfill Disposal, and Site Restoration | 4-14 |
| | 4.5.4 | Alternative 4: Containment (Multi-Layer Cover) | 4-16 |
| | 4.6 | COMPARATIVE ANALYSIS OF REMOVAL ACTION ALTERNATIVES | 4-18 |
| | 4.6.1 | Effectiveness | 4-18 |
| | 4.6.2 | Implementability | 4-18 |
| | 4.6.3 | Cost | 4-19 |
| | 4.7 | RECOMMENDED REMOVAL ACTION | 4-19 |
| **REFERENCES** | | | **R-1** |

**APPENDICES**

**A SITE 28**
- **A.1 ANALYTICAL DATA**
- **A.2 BACKGROUND STATISTICAL SUMMARIES/RISK ASSESSMENT DATA**
- **A.3 REMOVAL ACTION ALTERNATIVE COST ESTIMATES**
- **A.4 SAMPLE LOG SHEETS**

**B SITE 47**
- **B.1 ANALYTICAL DATA**
- **B.2 ESTIMATE OF VOLUME OF PCB-CONTAMINATED SOIL AND SEDIMENT**
- **B.3 RISK ASSESSMENT DATA**
- **B.4 REMOVAL ACTION ALTERNATIVE COST ESTIMATES**
- **B.5 SAMPLE LOG SHEETS**

# TABLES


| NUMBER | | PAGE NO. |
|---|---|---|
| 2-1 | Federal ARARs and TBCs | 2-5 |
| 2-2 | State of Maryland ARARs and TBCs | 2-7 |
| 2-3 | Site 28 - Screening of Soil Technologies | 2-9 |
| 2-4 | Site 47 - Screening of Soil and Sediment Technologies | 2-11 |
| 3-1 | Summary of Analytical Data and Screening Criteria - Surface Soil | 3-19 |
| 3-2 | Summary of Analytical Data and Screening Criteria - Subsurface Soil | 3-22 |
| 3-3 | Streamlined Risk Evaluation - Surface Soil | 3-24 |
| 3-4 | Streamlined Risk Evaluation - Subsurface Soil | 3-25 |
| 3-5 | Site 28 - Summary Comparison of Removal Action Alternatives | 3-26 |
| 4-1 | Summary of Analytical Data and Screening Criteria - Surface Soil | 4-21 |
| 4-2 | Summary of Analytical Data and Screening Criteria - Sediment | 4-22 |
| 4-3 | Site 47 - Streamlined Risk Evaluation - Surface Soil | 4-23 |
| 4-4 | Site 47 - Streamlined Risk Evaluation - Sediment | 4-24 |
| 4-5 | Site 47 - Summary Comparison of Removal Action Alternatives | 4-25 |


# FIGURES


| NUMBER | | PAGE NO. |
|---|---|---|
| 1-1 | Facility Vicinity Map | 1-5 |
| 1-2 | Site Location Map | 1-7 |
| 3-1 | Site Layout Map - Site 1 EE/CA | 3-27 |
| 3-2 | Sample Locations - Site 28 | 3-28 |
| 3-3 | Tag Map - Selected Surface Soil Analytical Data - Site 28 | 3-29 |
| 3-4 | Tag Map - Selected Subsurface Soil Analytical Data - Site 28 | 3-31 |
| 3-5 | Appropriate Limits of Contamination - Site 28 | 3-33 |
| 3-6 | Process Flow Diagram - On-Site Thermal Desorption | 3-35 |
| 4-1 | Site Layout Map - Site 47 | 4-27 |
| 4-2 | Sample Locations - Site 47 | 4-29 |
| 4-3 | Selected Soil and Sediment Analytical data -Site 47 | 4-31 |
| 4-4 | Alternative 4 - Containment - Site 47 | 4-33 |

# ACRONYMS

| | |
|---|---|
| ALC | Adelphi Laboratory Center |
| AM | Action Memorandum |
| ARAR | Applicable or Relevant and Appropriate Requirement |
| bgs | Below Ground Surface |
| B&R | Brown & Root |
| CAA | Clean Air Act |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| CFR | Code of Federal Regulation |
| CLEAN | Comprehensive Long-Term Environmental Action Navy |
| COMAR | Code of Maryland Regulation |
| COPC | Constituents of Potential Concern |
| CTO | Contract Task Order |
| CWA | Clean Water Act |
| EE/CA | Engineering Evaluation/Cost Analysis |
| EFACHES | Engineering Field Activity – Chesapeake |
| EM | Electromagnetic |
| EM31 | EM-31 Terrain Conductivity Meter |
| EOD | Explosive Ordnance Division |
| EPA | U.S. Environmental Protection Agency |
| ERA | Ecological Risk Assessment |
| GSA | General Services Administration |
| HASP | Health and Safety Plan |
| HCS | Hazardous Contaminated Soil |
| HTTD | High-Temperature Thermal Desorption |
| IAS | Initial Assessment Study |
| IR | Installation Restoration |
| LDPE | Low-Density Polyethylene |
| LDR | Land Disposal Restriction |
| LTTD | Low-Temperature Thermal Desorption |
| LUCAP | Land Use Control Plan |
| mg/kg | Milligrams per Kilogram |
| mg/L | Milligrams per Liter |
| µg/kg | Micrograms per Kilogram |
| NCP | National Oil and Hazardous Substances Contingency Plan |
| NEESA | Naval Energy and Environmental Support Activity |

| | |
|---|---|
| NPDES | National Pollutant Discharge Elimination System |
| NSWC | Naval Surface Warfare Center |
| OSHA | Occupational Safety and Health Administration |
| OSWER | Office of Solid Waste and Emergency Response |
| PAH | Polycyclic Aromatic Hydrocarbon |
| PCB | Polychlorinated Biphenyl |
| PRG | Preliminary Remediation Goal |
| RBC | Risk-Based Concentration |
| RCRA | Resource Conservation and Recovery Act |
| RFA | RCRA Facility Assessment |
| RI | Remedial Investigation |
| SS | Site Screening |
| SVE | Soil Vapor Extraction |
| SVOC | Semivolatile Organic Compound |
| SWMU | Solid Waste Management Unit |
| TAL | Target Analyte List |
| TBC | To Be Considered |
| TCL | Target Compound List |
| TCR | Total Cancer Risk |
| TCLP | Toxicity Characteristic Leaching Procedure |
| THR | Total Hazard Risk |
| TOC | Total Organic Carbon |
| TSCA | Toxic Substances Control Act |
| TSDF | Treatment, Storage, and Disposal Facility |
| TtNUS | Tetra Tech NUS, Incorporated |
| UCL | Upper Confidence Limit |
| USGS | U.S. Geological Survey |
| USNR | U.S. Naval Reserve |
| UXO | Unexploded Ordnance |
| VOC | Volatile Organic Compound |

# 1.0 INTRODUCTION

The Engineering Field Activity Northeast of the Naval Facilities Engineering Command has issued Contract Task Order (CTO) 315 to Tetra Tech NUS, Inc. (TtNUS) under Comprehensive Long-Term Environmental Action Navy (CLEAN) Contract No. N62472-90-D-1298. Under CTO 315, TtNUS performed an Engineering Evaluation/Cost Analysis (EE/CA) for the former Naval Surface Warfare Center (NSWC) White Oak, located in Silver Spring, Maryland.

The work is part of the Navy's Installation Restoration (IR) Program, which is designed to identify contamination of Navy and Marine Corps facilities resulting from past operations and to institute corrective measures, as needed. The Navy has determined that a removal action under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) might be appropriate for two sites at the former NSWC-White Oak. This EE/CA develops, evaluates, and recommends a non-time-critical removal action to address contaminated soil at Site 28 and contaminated soil and sediment at Site 47. CTO 315 is administered by the Engineering Field Activity – Chesapeake (EFACHES).

## 1.1 FACILITY DESCRIPTION

NSWC-White Oak was a Navy-owned and -operated facility for naval surface warfare research. The facility is located approximately 5 miles north of Washington, D.C., off New Hampshire Avenue in Silver Spring, Maryland (see Figure 1-1). The NSWC-White Oak facility covered approximately 710 acres and is located in both Prince George's and Montgomery Counties. Adjacent to the southern corner of the property is the U.S. Army's Adelphi Laboratory Center (ALC) and the United States Naval Reserve (USNR) Training Center. A mixture of residential, park, industrial, and commercial properties border the remainder of the facility. When the facility was closed in 1997, the property was transferred to the General Services Administration (GSA) and the U.S. Army. The GSA-managed property is now called the Federal Research Facility at White Oak.

Figure 1-2 identifies the locations of the two sites addressed under this EE/CA. Site 28, the Building T-14 Scrapyard, is located in the central portion of the former NSWC-White Oak and was used between 1967 and 1975 to store transformers. The removal action at Site 28 is being undertaken to address soil at Site 28 so that it no longer poses a human health risk to future land users.

Site 47, Building 90 Drainage, is located along Bowdich Road in the central-eastern portion of the former NSWC-White Oak. Included in Site 47 is an unnamed tributary to Paint Branch, originating behind Building 90, that traverses approximately 2,200 feet to the northeast, eventually joining with a stream from

Site 2, Apple Orchard Landfill. The removal action at Site 47 is being undertaken to address PCB-contaminated soil and sediment so that it no longer poses a human health or ecological risk.

## 1.2 TOPOGRAPHY

The former NSWC-White Oak lies in gently rolling terrain. The topographic expression of the area represents the result of a deeply incised, dendritic stream channel pattern. Paint Branch and its tributaries dominate local drainage patterns.

The highest elevation on the facility is approximately 398 feet above mean sea level. The lowest elevation is roughly 145 feet above mean sea level. The terrain of the western portion of the facility slopes generally eastward toward Paint Branch, with about a 3.5 percent grade. Similar grades are encountered in the eastern portion of the facility, but slopes are generally more southward or are locally influenced by proximity to Paint Branch and its tributaries. Near stream channels, ground slopes increase to as much as 65 percent.

## 1.3 ECOLOGICAL SETTING

Vegetation communities on the facility have formed as a result of a variety of land uses, soil conditions, and slopes. Former land uses such as gravel mining, building construction, landfilling, and logging have influenced the succession stages and plant species of the site. This, in turn, has affected the animal communities on the facility. The physical environment of the facility is typical of the region. Thus, the vegetation communities and wildlife habitats on site are representative of regional patterns.

Developed areas consist primarily of lawns. Trees in developed areas consist of maples, oaks, elms, poplars, and dogwoods. The scrub-shrub community represents a successional stage between an old field and forest community and is diverse because it supports vegetation representative of both communities. Pine forest communities are also successional and indicative of disturbed areas. The majority of the forested regions within the facility can be classified as mixed deciduous, which consists of an abundance of broad-leaved trees and evergreens. In undisturbed areas, a forest community known as Oak-Hickory Forest results. The Oak-Hickory Forest is relatively dry and the soil is often sandy. The trees are generally widely spaced, with low undergrowth of shrubs and vines.

The most conspicuous mammalian species within the facility is the white-tailed deer. At present, there is no hunting is allowed on the facility. As a result, the deer on site are diurnal, commonly seen foraging in the mid-morning and mid-afternoon.

## 1.4 GEOLOGY AND SOILS

NSWC-White Oak lies along the boundary between the Piedmont and Coastal Plain physiographic provinces. The boundary, known as the Fall Line, represents the contact between the older Piedmont Plateau rocks to the west and the younger Atlantic Coastal Plain sedimentary units to the east. In the White Oak area, the Fall Line extends from the southwest to the northeast and lies to the west of and roughly parallel to the Montgomery-Prince George's County line. The topography of both provinces in the White Oak area is characterized by rolling hills with steeply eroded stream valleys.

Underlying NSWC-White Oak, unconsolidated sedimentary units of the Coastal Plain Province overlie fractured metamorphic and igneous rocks of the Piedmont Province. The Coastal Plain sediments include, in ascending order, the Potomac Group, the Upland Sand and Gravel, and undifferentiated Quaternary alluvial deposits. The Potomac Group is of Cretaceous age and consists of a sand, gravel, and silt unit and a clay unit. The Upland Sand and Gravel is of Tertiary age and consists of sand, gravel, and silt with clay lenses. The Coastal Plain sediments are less than a few tens of feet thick at the facility.

The Piedmont bedrock extending below the Coastal Plain sediments consists of the Wissahickon Formation, diamictite gneiss of late Precambrian age. The upper 50 to 70 feet of the Wissahickon Formation has weathered to an unconsolidated saprolite. The saprolite is a clayey material retaining the parent material structure. The Wissahickon Formation accounts for approximately 50 percent of the surficial geology at NSWC-White Oak. Bedrock outcrops of the Wissahickon gneiss occur along Paint Branch and Westfarm Branch in the central portion of the facility, due to the erosion of overlying sediments.

Except for streambed soils, the facility soils tend to be moderately to excessively well drained and moderately to severely eroded. Soils at the facility tend to be moderately acidic, with pH ranging between 4 and 6 standard units (B&R Environmental, 1998). This may be due to the presence of hydroxyl, humic, and fulvic acids derived from decaying organic matter.

## 1.5 SURFACE WATER HYDROLOGY

NSWC-White Oak lies entirely within the drainage basin of Paint Branch, a 12-mile-long tributary to the northeast branch of the Anacostia River. Like other streams in the region, Paint Branch is a gaining stream, because it is perennially supported by shallow groundwater discharge from small springs and seeps along its length. Another perennial stream, Westfarm Branch, flows through the eastern portion of the property. It originates approximately 1 mile north of the property and joins Paint Branch just south of the facility.

In addition to perennial streams, the facility is traversed by eight intermittent streams, all of which discharge to Paint Branch either on or near the property. Several of these streams are small and are not identified on U.S. Geological Survey (USGS) topographic maps.

## 1.6 HYDROGEOLOGY

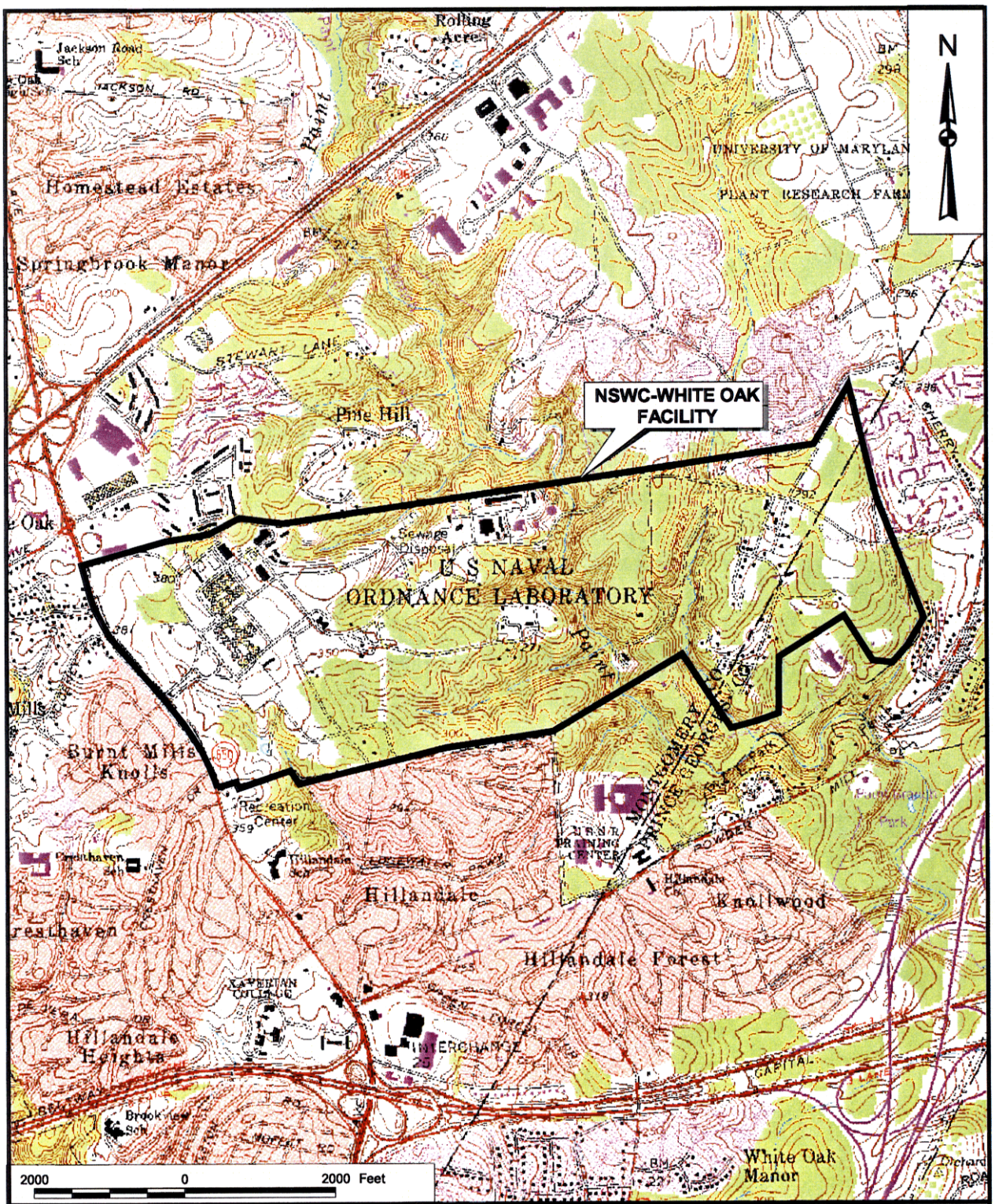
Based on the initial work by Malcolm-Pirnie, the groundwater at NSWC-White Oak occurs within both the Coastal Plain units and the Piedmont bedrock (Malcolm-Pirnie, 1992). Within the Coastal Plain units, topography influences groundwater flow, which is from upland areas to lower elevations, discharging to streams or other surface water bodies. Generally, groundwater is unconfined within the Coastal Plain units or, in the northeastern part of the facility, may be perched by clay lenses. Within the Piedmont bedrock, fracturing controls groundwater flow. The saprolite acts as an aquifer or aquitard, depending on the degree of remnant fracturing of the parent material. Groundwater is unconfined in the shallow bedrock if the saprolite exhibits remnant fracturing and confined if the saprolite does not exhibit remnant fracturing. The Coastal Plain units and the shallow Piedmont bedrock may be hydraulically connected.

## 1.7 CLIMATE AND METEOROLOGY

Summers at NSWC-White Oak are warm and humid, and winters are mild. Seasonal temperature variation is approximately 46° F. The warmest weather occurs in July, with daily temperatures ranging from 67° F to 87° F. The coldest weather occurs in late January and early February, with daily temperatures ranging from 23° F to 41° F. The average annual precipitation is approximately 43 inches. Seasonal variation in precipitation is not pronounced, gradually fluctuating between a typical minimum of less than 3 inches in February to a typical maximum of 4.4 inches in May and August (National Weather Service, 2001).

## 1.8 REPORT ORGANIZATION

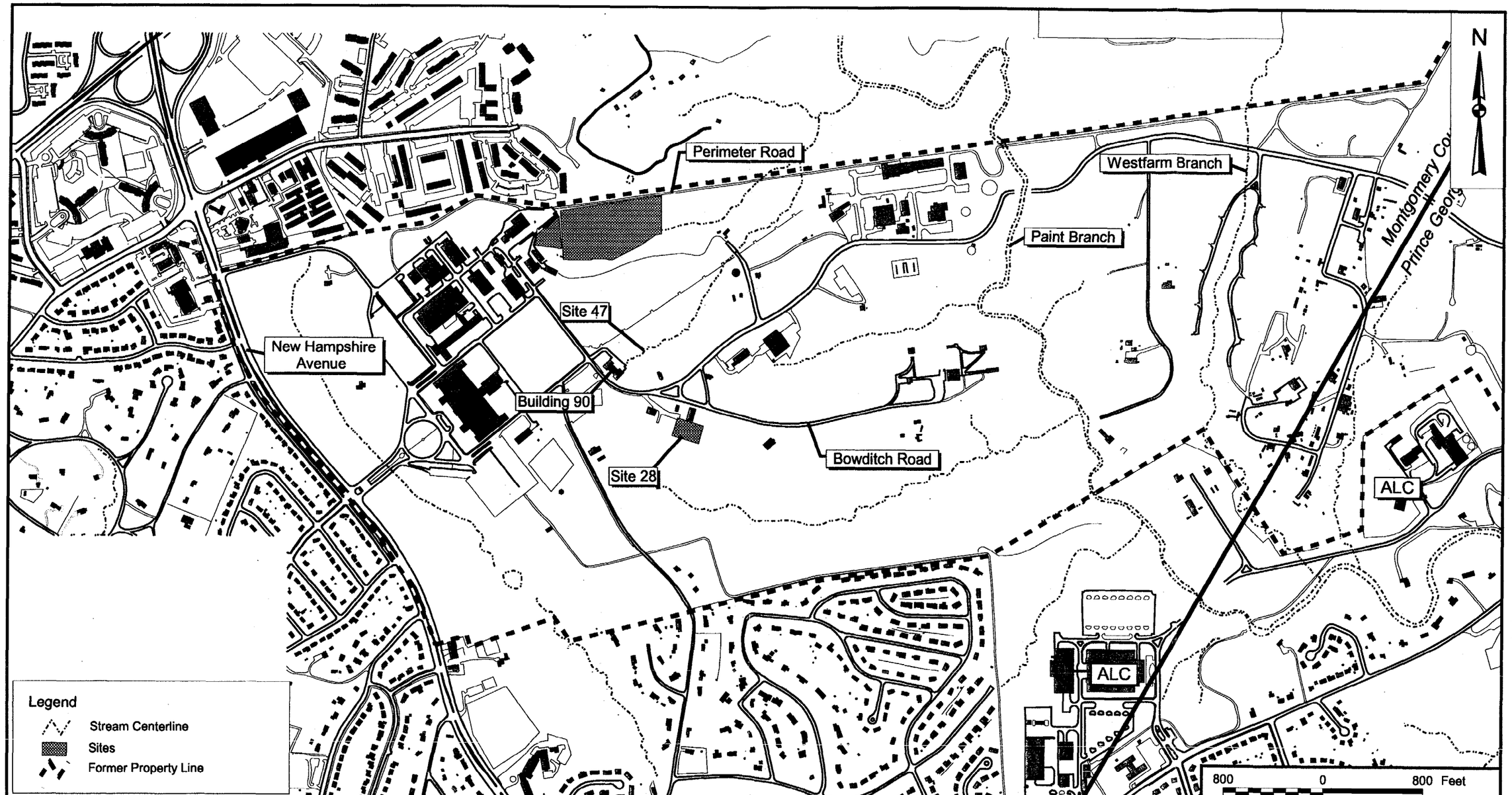
This EE/CA is organized in four sections. Section 1.0 contains the introduction and presents the general facility characteristics. Section 2.0 identifies the removal action objectives, including a discussion of compliance with applicable or relevant and appropriate requirements (ARARs). Section 2.0 also presents screening of available technologies for Site 28 and Site 47. Section 3.0 includes a site description and background, a discussion of previous investigations, the nature and extent of contamination, a streamlined risk evaluation, analysis of the selected removal action alternatives, a comparative analysis of alternatives, and the recommended alternative for Site 28. Section 4.0 presents similar information for Site 47. Cost estimates, analytical data, sample log sheets, and other information is provided in the appendices.




| DRAWN BY | DATE | Tetra Tech NUS, Inc. | CONTRACT NUMBER | OWNER NO. |
|---|---|---|---|---|
| MJJ | 06May99 | | 7909 | 0315 |
| CHECKED BY | DATE | FACILITY VICINITY MAP<br>SITE 28 AND SITE 47 EE/CA<br>FORMER NSWC-WHITE OAK<br>SILVER SPRING, MARYLAND | APPROVED BY | DATE |
| JDF | 4/20/00 | | RJK | 4/28/00 |
| COST/SCHEDULE-AREA | | | APPROVED BY | DATE |
| | | | — | — |
| SCALE | | | DRAWING NO. | REV |
| AS NOTED | | | FIGURE 1-1 | 0 |

P:\GIS\WHITEOAK\7801.APR 01_Figure 3-1 Layout MGS 2-12-01

P:\GIS\WHITEOAK\7909.APR LAYOUT2 MGS 2-20-01




| NO. | DATE | REVISIONS | BY | CHKD | APPD | REFERENCES |
|---|---|---|---|---|---|---|
| | | | | | | |

| | |
|---|---|
| DRAWN BY MJJ | DATE 23SEPT98 |
| CHECKED BY KMS | DATE 3/6/01 |
| COST/SCHEDULE-AREA | |
| SCALE AS NOTED | |

Tetra Tech NUS, Inc.

SITE LOCATION MAP
SITE 28 AND SITE 47 EE/CA
FORMER NSWC - WHITE OAK
SILVER SPRING, MARYLAND

| | |
|---|---|
| CONTRACT NUMBER 7909 | OWNER NUMBER 0315 |
| APPROVED BY SN | DATE 3/6/01 |
| APPROVED BY | DATE |
| DRAWING NO. FIGURE 1-2 | REV 0 |

# 2.0 IDENTIFICATION OF REMOVAL ACTION OBJECTIVES AND TECHNOLOGY SCREENING

The removal action objectives are developed to provide guidelines for evaluating the removal action and ensuring that the action complies with regulatory requirements. This section evaluates ARARs and discusses the removal action objectives and schedule, statutory limits, and applicable technologies for Site 28 and Site 47.

## 2.1 COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

ARARs are used to develop clean-up criteria for the removal action objectives and to identify removal action technologies. The term "ARAR" is defined in the National Oil and Hazardous Substances Contingency Plan (NCP) as follows:

- Applicable requirements are generally defined as clean-up standards, standards of control, or other substantive environmental protection requirements promulgated under federal or state environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, or location. Only those state standards that are identified by a state in a timely manner and that are more stringent than federal requirements may be considered as applicable requirements.

- Relevant and appropriate requirements are defined as clean-up standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state environmental or facility siting laws that are not directly "applicable" to a hazardous substance, pollutant, contaminant, remedial action, or location but that address situations sufficiently relevant to those encountered at the site that their use is appropriate. Only those state standards that are identified by a state in a timely manner and that are more stringent than federal requirements may be considered as relevant and appropriate requirements.

- Any promulgated standard, requirement, criterion, or limitation under a state environmental or facility siting law that is more stringent than the associated federal standard, requirement, criterion, or limitation.

Based on the manner in which they are applied during a removal action, ARARs are classified into the following three categories:

- Chemical Specific. Chemical-specific ARARs were developed to provide health- or risk-based concentration limits. These limits are specific for an individual chemical or group of chemicals. Often, these ARARs are used to determine the extent of site remediation. Chemical-specific ARARs may be concentration-based clean-up goals or may provide the basis for calculating such levels. In cases where no chemical-specific ARAR exists, chemical advisories may be used to develop removal action objectives.

- Location Specific. Location-specific ARARs are considered in view of natural or man-made site features. These ARARs are intended to limit activities within designated areas.

- Action Specific. Action-specific ARARs pertain to the implementation of a given remedy. These ARARs control or restrict hazardous substance- or pollutant-related activities. These controls are considered when specific removal activities are planned for a site.

In addition to ARARs, other regulations and guidance may be classified as guidance "To Be Considered" (TBC). TBCs are non-promulgated, non-enforceable guidelines or criteria that may be useful for developing removal actions or are necessary for determining what is protective of human health and/or the environment. TBCs are also identified in this section to aid in evaluating the removal actions. Potential federal ARARs and TBCs are presented in Table 2-1. Table 2-2 presents potential state ARARs and TBCs.

## 2.2 REMOVAL ACTION OBJECTIVES

The purpose of this EE/CA is to recommend an initial removal action that would best address the conditions at Site 28 and Site 47.

The removal action objective for Site 28 is being undertaken to address soil that may be acting as a contamination source:

- Remediate soil so that it no longer poses a human health risk to future land users.
- Limit the soil's potential to act as a source for surface water contamination.

U.S. Environmental Protection Agency (EPA) Region 3 residential Risk-based Concentrations (RBCs) will be used to evaluate the limits of contamination. In addition, the Base-wide risk based levels that were developed for the ecological COPCs in the Basewide Ecological Risk Assessment (TtNUS, March 2001) will also be used to evaluate the limits of contamination.

The removal action at Site 47 is being undertaken to address soil and sediment that may be acting as a contamination source:

- Remediate sediment present in the catch basin and storm sewer behind Building 90 so that it no longer poses a human health risk to future land users.

- Remediate contaminated sediment and soil within the drainage channel and along the channel embankments from the storm sewer outlet so that it no longer poses a human health risk to future land users.

- Limit the soil and sediment's potential to migrate along the drainage channel.

EPA Region 3 residential RBCs will be used to evaluate the site; however, PCB concentrations greater than 1 mg/kg (Toxic Substances Control Act and 40 CFR 761 clean-up goal for "high occupancy areas") will be used to evaluate the area requiring remediation. In addition, the Base-wide risk based levels that were developed for the ecological COPCs in the Base-wide Ecological Risk Assessment (TtNUS, March 2001) will also be used to evaluate the limits of contamination.

The residential RBCs are being used at this time since they are more conservative than the industrial criteria, are more protective of human health. The property consisting of Sites 28 and 47 was transferred within the Federal government for commercial/industrial use for the foreseeable future. Site-specific Preliminary Remediation Goals (PRGs) must be identified prior to removal action implementation. PRGs are chemical-specific concentration goals that dictate clean-up standards that must be met by a remedial action in order to be protective of human health and the environment. PRGs will likely be a combination of EPA Region 3 industrial RBCs, background concentrations for NSWC-White Oak and Base-wide ecological risk based levels.

## 2.3 REMOVAL ACTION SCHEDULE

The Navy, as the lead agency, determined the removal actions at Site 28 and Site 47 to be non-time-critical removal actions because a planning period of 6 months was available before removal action implementation. The removal action can begin within 4 to 6 months of the acceptance of the recommendations set forth in this EE/CA.

## 2.4 STATUTORY LIMITS

The statutory limits for fund-financed removal actions are presented in Section 104(c)(1) of CERCLA. These limits do not apply because the action at the former NSWC-White Oak is not financed by Superfund.

## 2.5 PRELIMINARY TECHNOLOGY SCREENING

This section screens technologies and identifies representative process options for treating the contaminated soil at Site 28 and contaminated soil and sediment at Site 47. Potentially applicable technologies were identified based on their ability to treat the site contaminants and to be implemented at the respective sites.

Table 2-3 and 2-4 present the technology screening for Site 28 and Site 47, respectively.

## 2.6 REPRESENTATIVE TECHNOLOGIES AND PROCESS OPTIONS

The following technologies and process options have been retained from the preliminary screening for potential use at Site 28:

- No action
- Solvent extraction
- Dehalogenation
- Thermal desorption
- Incineration
- Off-site landfill disposal

The following technologies and process options have been retained from the preliminary screening for potential use at Site 47:

- No action
- Containment (multi-layer cover)
- Solvent extraction
- Dehalogenation
- High-temperature thermal desorption
- Incineration
- Off-site landfill disposal

TABLE 2-1

FEDERAL ARARs AND TBCs
SITE 28 AND SITE 47 EE/CA
NSWC-WHITE OAK, SILVER SPRING, MARYLAND
PAGE 1 OF 2

| ARAR/TBC | Type of ARAR | Synopsis | Comments |
|---|---|---|---|
| Clean Air Act (CAA) | Chemical Specific | Emission limitations related to attainment of National Ambient Air Quality Standards and Emission Standards for Hazardous Air Pollutants. | Potential removal action may involve air emissions. However, emissions are not likely to be affected by CAA due to small quantities of pollutants emitted and/or source not included in a regulated category. |
| Clean Water Act (CWA) | Chemical Specific | Regulates the discharge of pollutants into waterways. | Potential removal action may generate contaminated water, either due to solids (runoff) or chemical constituents (groundwater). |
| Resource Conservation and Recovery Act (RCRA) 40 Code of Federal Regulations (CFR) 261 | Chemical and Action Specific | Regulations governing identifying and listing hazardous waste. | Potential removal action may involve off-site disposal of materials. |
| EPA Region III Residential RBCs | TBC | Chemical concentrations at which various media (water, air, fish tissue, soil) would pose a potential risk to humans. | Potential removal action may require removal of material with contaminant levels in excess of these concentrations. |
| Land Disposal Restrictions (LDR) under RCRA 40 CFR 268 | TBC | Bans land disposal of hazardous waste unless treated to substantially reduce its toxicity or mobility. Sets forth treatment standards for wastewater and soil that must be met prior to land disposal. | Potential removal action may involve off-site land disposal of hazardous waste. |

TABLE 2-1

FEDERAL ARARs AND TBCs
SITE 28 AND SITE 47 EE/CA
NSWC-WHITE OAK, SILVER SPRING, MARYLAND
PAGE 2 OF 2

| ARAR/TBC | Type of ARAR | Synopsis | Comments |
|---|---|---|---|
| Polychlorinated Biphenyl (PCB) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions 40 CFR 761 | Chemical and Action Specific | Amends rules under the Toxic Substances Control Act (TSCA) that address the use, handling, and disposal of PCBs and PCB-contaminated material. | Potential removal action may include remediation of PCB-contaminated soil and/or debris. |
| Rules for Hazardous Materials Transport Department of Transportation 49 CFR 107 and 171 to 179 | Action Specific | Establishes requirements for the transport of hazardous materials. | Potential removal action may include the shipping of materials off-site for disposal. |

TABLE 2-2

STATE OF MARYLAND ARARs AND TBCs
SITE 28 AND SITE 47 EE/CA
NSWC-WHITE OAK, SILVER SPRING, MARYLAND
PAGE 1 OF 2

| Citation [1] | Title | Type of ARAR | Requirement Synopsis | Comments |
|---|---|---|---|---|
| 26.02.03 | Control of Noise Pollution | Action Specific | Provides limits on the maximum allowable levels of noise at the site boundaries during site remediation work to protect the health, general welfare, and property of the people of the state. | Potential removal action may involve use of heavy machinery. |
| 26.04.07 | Solid Waste Management | Action Specific | Provides requirements for construction, operation, and closure at solid waste acceptance facilities, including landfills. | Potential removal action may include an impermeable cap over the area. |
| 26.08 | Water Pollution | Chemical Specific | Governs discharges into waters of the state. | Potential removal action may generate contaminated water, either due to solids (runoff) or chemical constituents (groundwater). |
| 26.11 | Air Quality | Action Specific | Provides ambient air quality standards, general emissions standards, and restrictions for air emissions from construction activities, vents, and treatment technologies such as incinerators. Also includes nuisance and odor control. Construction activities may emit particulate matter into the ambient air. Remedial activities must follow regulations. | Potential removal action may involve air emissions. |
| 26.13.01 | Hazardous Waste Management System; General | Action Specific | Provides criteria to identify toxicity characteristic hazardous waste and listed waste. | Potential removal action may generate hazardous waste. Material to be transported off-site would need to be tested to determine whether it is a hazardous waste. |
| 26.13.02 | Identification and Listing of Hazardous Waste | Action Specific | Identifies those solid wastes that are subject to regulation as hazardous waste. This includes PCBs above 50 ppm. | |

**TABLE 2-2**

**STATE OF MARYLAND ARARs AND TBCs**
**SITE 28 AND SITE 47 EE/CA**
**NSWC-WHITE OAK, SILVER SPRING, MARYLAND**
**PAGE 2 OF 2**

| Citation [1] | Title | Type of ARAR | Requirement Synopsis | Comments |
|---|---|---|---|---|
| 26.13.03 | Standards Applicable to Generators of Hazardous Waste | Action Specific | Establishes standards for generators of hazardous waste. | Potential removal action may generate hazardous waste. |
| 26.13.04 | Standards Applicable to Transporters of Hazardous Waste | Action Specific | Provides regulations for transporting hazardous waste. Any hazardous waste found during site remediation must be disposed of according to this regulation. Any residues or by-products from treatment systems that are hazardous must be disposed properly. | Potential removal action may generate hazardous waste. |
| 26.17.01<br><br>26.17.02 | Erosion and Sediment Control<br><br>Stormwater Management | Action Specific<br><br>Action Specific | Any land-clearing, grading, or other earth disturbances require an erosion and sediment control plan. This plan must be approved before construction activities begin. Stormwater must be managed to prevent off-site sedimentation and maintain current site conditions. The primary goal is to maintain after development, as nearly as possible, the pre-development runoff characteristics and to reduce stream channel erosion, pollution, and sedimentation, and local flooding. | Potential removal action may involve significant earth disturbance. |
| 26.17.04 | Construction on Nontidal Waters and Floodplains | Location Specific | Permit is required to change the course, current, or cross-section of a nontidal stream or body of water, including the 100-year floodplain. | Potential removal action at Site 47 may include work in an unnamed tributary to Paint Branch |

1 Code of Maryland Regulation (COMAR) Section Number.

# TABLE 2-3

## SITE 28- SCREENING OF SOIL TECHNOLOGIES
## SITE 28 AND SITE 47 EE/CA
## NSWC-WHITE OAK, SILVER SPRING, MARYLAND
## PAGE 1 OF 2

| General Response Action | Technology Type | Process Options | Brief Description | Screening Comment |
|---|---|---|---|---|
| No Action | None | Not Applicable | No action is taken. | Retain as a baseline for comparison as required by the NCP. |
| Minimal Action | Natural Attenuation | Chemical/Biological | Allows naturally occurring chemical and microbial agents to degrade contaminants. | Do not retain. Technology is not suitable for all site contaminants. |
| Containment | Capping | Single- or Multi-Layer Cap | Low-permeability cap comprising single or multiple layers over an area of contamination; low-permeability material includes concrete, asphalt, soil, clay, synthetic membranes, etc. | Do not retain. Technology is not suitable given site conditions. |
| Removal | Excavation | Excavation | Excavation of contaminated soil and combination with other general action such as ex-situ treatment options. | Retain. Excavation is suitable for all site contaminants combined with any ex-situ process option as well as any disposal option. |
| In-situ Treatment | Physical/ Chemical | Soil Vapor Extraction (SVE) | A vacuum is applied to soil to induce the flow of air and remove volatile and semivolatile contaminants from the soil. Extracted vapor may require treatment prior to discharge. | Do not retain. Technology is not suitable for all site contaminants. |
| | | Soil Flushing | An extraction fluid (water or other aqueous solution) passes through soil by either injection or infiltration and removes contaminants. Extraction fluid is recovered from the underlying aquifer and treated. | Do not retain. Technology is not suitable for all site contaminants. |
| | | Solidification/Stabilization | Reduces the mobility of contaminants in soil using auger systems or injection systems to apply solidification/stabilization agents to soil. | Do not retain. Technology is not suitable for all site contaminants. |
| | Biological | Biodegradation | Enhances natural aerobic and/or anaerobic processes by injecting nutrients and appropriate chemicals into the subsurface. | Do not retain. Technology is not suitable for all site contaminants. |
| | | Bioventing | Enhances biodegradation in soil by providing oxygen to existing soil microorganisms. | Do not retain. Technology is not suitable for all site contaminants. |
| | Thermal | Vitrification | An electric current is used to melt soils, immobilizing inorganic contaminants and destroying volatile contaminants. | Do not retain. Technology has seen limited commercial use and is untested. |
| | | Thermally Enhanced SVE | Uses steam or hot-air injection to increase the mobility of semivolatiles in the subsurface. A vacuum is applied to the soil to remove contaminants. Extracted vapor may require treatment prior to discharge. | Do not retain. Technology is not suitable for all site contaminants. |

## TABLE 2-3

## SITE 28- SCREENING OF SOIL TECHNOLOGIES
## SITE 28 AND SITE 47 EE/CA
## NSWC-WHITE OAK, SILVER SPRING, MARYLAND
## PAGE 2 OF 2

| General Response Action | Technology Type | Process Options | Brief Description | Screening Comment |
|---|---|---|---|---|
| Ex-situ Treatment | Physical/ Chemical | Soil Washing | Removes contaminants either by dissolving or suspending them in the wash solution or concentrating them into a smaller volume of soil. | Do not retain. Technology is not suitable for all site contaminants. |
| | | Solidification/Stabilization | Excavated material is mixed with a reagent to stabilize or solidify the material. Resultant materials must be disposed off site. | Do not retain. Not effective for treating volatile organics. |
| | | Solvent Extraction | Waste and solvent are mixed in an extractor, dissolving the contaminants into the solvent. The solution is then placed in a separator, where the contaminants and solvent are separated for treatment and further use. | Potentially applicable. Retain for further consideration. |
| | | Dehalogenation | Contaminated soil is screened, processed with a crusher and pug mill, and mixed with either potassium or sodium hydroxide and catalysts. The mixture is heated in a rotary reactor to dehalogenate and partially volatilize the contaminants. | Potentially applicable. Retain for further consideration. |
| | Thermal | High-Temperature Thermal Desorption | Excavated material is heated to volatilize water and organic contaminants. A carrier gas or vacuum system transports volatilized water and organics to a gas treatment system. Treatment is performed on site with a mobile treatment unit. Treated soil can be used on site as backfill or disposed off site. | Potentially applicable. Retain for further consideration. |
| | | Incineration | High temperatures are used to volatilize and combust organics. Treatment is performed off site at a RCRA- and TSCA-permitted incinerator. Residual ash is disposed in a landfill. | Potentially applicable. Retain for further consideration. |
| Disposal | Physical | Landfill | Contaminated material is removed and transported to a permitted off-site treatment and/or disposal facility. Some pretreatment of the contaminated media may be required in order to meet LDRs | Potentially applicable. Retain for further consideration. |

# TABLE 2-4

## SITE 47-SCREENING OF SOIL AND SEDIMENT TECHNOLOGIES
## SITE 28 AND SITE 47 EE/CA
## NSWC-WHITE OAK, SILVER SPRING, MARYLAND
## PAGE 1 OF 2

| General Response Action | Technology Type | Process Options | Brief Description | Screening Comment |
|---|---|---|---|---|
| No Action | None | Not Applicable | No action is taken. | Retain as a baseline for comparison as required by the NCP. |
| Minimal Action | Natural Attenuation | Chemical/Biological | Allows naturally occurring chemical and microbial agents to degrade contaminants. | Do not retain. Technology is not suitable for PCBs. |
| Containment | Capping | Single- or Multi-Layer Cap | Low-permeability cap comprising single or multiple layers over an area of contamination; low-permeability material includes concrete, asphalt, soil, clay, synthetic membranes, etc. | Do not retain. Technology is not suitable given site conditions. |
| | Soil Cover | Multi-Layer Cover | Use of soil, geosynthetic net, and dense plant growth along ditches. | Potentially applicable. Retain for further consideration. |
| Removal | Excavation | Excavation | Excavation of contaminated soil/sediment and combination with other general action, such as ex-situ treatment options. | Retain. Excavation is suitable for all site contaminants combined with any ex-situ process option as well as any disposal option. |
| In-situ Treatment | Physical/ Chemical | Soil Vapor Extraction (SVE) | A vacuum is applied to soil to induce the flow of air and remove volatile and semivolatile contaminants from the soil. Extracted vapor may require treatment prior to discharge. | Do not retain. Technology is not suitable for PCBs or site conditions. |
| | | Soil Flushing | An extraction fluid (water or other aqueous solution) passes through soil by either injection or infiltration and removes contaminants. Extraction fluid is recovered from the underlying aquifer and treated. | Do not retain. Technology is not suitable for PCBs or site conditions. |
| | | Solidification/Stabilization | Reduces the mobility of contaminants in soil using auger systems or injection systems to apply solidification/stabilization agents to soil. | Do not retain. Technology is not suitable for PCBs. |
| | Biological | Biodegradation | Enhances natural aerobic and/or anaerobic processes by injecting nutrients and appropriate chemicals into the subsurface. | Do not retain. Technology is not suitable for PCBs. |
| | | Bioventing | Enhances biodegradation in soil by providing oxygen to existing soil microorganisms. | Do not retain. Technology is not suitable for PCBs. |
| | Thermal | Vitrification | An electric current is used to melt soils, immobilizing inorganic contaminants and destroying volatile contaminants. | Do not retain. Technology has seen limited commercial use and is untested. |
| | | Thermally Enhanced SVE | Uses steam or hot-air injection to increase the mobility of semivolatiles in the subsurface. A vacuum is applied to the soil to remove contaminants. Extracted vapor may require treatment prior to discharge. | Do not retain. Technology is not suitable for PCBs. |

# TABLE 2-4

## SITE 47-SCREENING OF SOIL AND SEDIMENT TECHNOLOGIES
## SITE 28 AND SITE 47 EE/CA
## NSWC-WHITE OAK, SILVER SPRING, MARYLAND
## PAGE 2 OF 2

| General Response Action | Technology Type | Process Options | Brief Description | Screening Comment |
|---|---|---|---|---|
| Ex-situ Treatment | Physical/ Chemical | Soil Washing | Removes contaminants either by dissolving or suspending them in the wash solution or concentrating them into a smaller volume of soil. | Do not retain. Technology is not suitable for PCBs. |
| | | Solidification/Stabilization | Excavated material is mixed with a reagent to stabilize or solidify the material. Resultant materials must be disposed off site. | Do not retain. Technology has limited effectiveness on organics and long-term effectiveness has not been demonstrated. |
| | | Solvent Extraction | Waste and solvent are mixed in an extractor, dissolving the contaminants into the solvent. The solution is then placed in a separator, where the contaminants and solvent are separated for treatment and further use. | Potentially applicable. Retain for further consideration. |
| | | Dehalogenation | Contaminated soil is screened, processed with a crusher and pug mill, and mixed with either potassium or sodium hydroxide and catalysts. The mixture is heated in a rotary reactor to dehalogenate and partially volatilize the contaminants. | Potentially applicable. Retain for further consideration. |
| | Thermal | High-Temperature Thermal Desorption | Excavated material is heated to volatilize water and organic contaminants. A carrier gas or vacuum system transports volatilized water and organics to a gas treatment system. Treatment is performed on site with a mobile treatment unit. Treated soil can be used on site as backfill or disposed off site. | Potentially applicable. Retain for further consideration. |
| | | Low-Temperature Thermal Desorption | Physical separation processes that are not designed to destroy organics. | Do not retain. Technology is not suitable for PCBs. |
| | | Incineration | High temperatures are used to volatilize and combust halogenated and other refractory organics. Treatment is performed off-site at a RCRA- and TSCA-permitted incinerator. | Potentially applicable. Retain for further consideration. |
| Disposal | Off-site | Landfill | Contaminated material is removed and transported to a permitted off-site treatment and/or disposal facility. Some pretreatment of the contaminated media maybe required in order to meet LDRs | Potentially applicable. Retain for further consideration. |

# 3.0 SITE 28 – BUILDING T-14 SCRAPYARD

This section includes the site description and background, a discussion of previous investigations and the nature and extent of contamination, an analysis of the selected removal action alternatives, a comparative analysis of the alternatives, and the recommended alternative for Site 28, the Building T-14 Scrapyard.

## 3.1 SITE DESCRIPTION AND BACKGROUND

The following is a discussion of the site location and history, subsurface geology and hydrogeology, surrounding land use, and ecological setting of Site 28, the Building T-14 Scrapyard.

### 3.1.1 Site Location and History

Site 28 is located in the central portion of the former NSWC-White Oak, south of Bowditch Road. It is east of Building T-14. The site is a fenced area measuring 150 feet by 200 feet that was used to temporarily store materials prior to disposal or reuse. The site layout is shown on Figure 3-1.

The site was identified as an IR site by the Navy and as a Solid Waste Management Unit (SWMU) by EPA during the RCRA Facility Assessment (RFA) in 1990 (Kearney/Centaur, 1990). The site was used between 1967 and 1975 to store transformers directly on the hard-packed gravel surface. The transformers were stored in a 20-foot by 40-foot area, the exact location of which is unknown. Some areas of the site are currently covered with concrete.

### 3.1.2 Geology and Hydrogeology

Site 28 is generally flat, with no distinct topographical features. It slopes gently southward at the southeastern corner. The maximum relief of the site is approximately 5 feet, with a maximum elevation of 350 feet and a low elevation of 345 feet.

Subsurface investigations (soil borings) inside the fenced yard at Site 28 indicated a gravel layer to a depth of approximately 2 feet. Inside the fenced area and in the area surrounding the fenced scrapyard, underlying the gravel layer, the soil is a mixture of clay, silt, and sand. Although none of the Site 28 borings extended beyond 4 feet deep, it is expected that Site 28 subsurface conditions include the same Coastal Plain deposits overlying a saprolite bedrock layer as observed in deeper borings at neighboring sites. Moist to wet conditions were encountered in the subsurface at depths between 1 and 3 feet during the most recent field investigation.

There are no surface water bodies at Site 28. The nearest surface water body is a small southward-flowing tributary of Paint Branch, located approximately 500 feet south of the site. The stream flows toward the southeast and empties into Paint Branch.

### 3.1.3 Surrounding Land Use

Site 28 is completely surrounded by NSWC-White Oak property.

### 3.1.4 Ecological Setting

Site 28 is in a developed area of the facility. Due to the pavement and buildings on and adjacent to the site, there is little vegetation or wildlife. No wetlands or other sensitive ecological habitats exist on or are adjacent to Site 28.

In developed areas of the facility, lawns consist of Kentucky bluegrass, red and tall fescue, Bermuda grass, red clover, Korean lespedeza, annual ryegrass, zoysia grass, and crown vetch. Weed species commonly found in these areas include white clover, yellow wood sorrel, chickweed, henbit, ground ivy, wild strawberry, purslane, spotted spurge, knotweed, garlic, mustard, dandelion, plantain, crabgrass, goosegrass, foxtail, knotweed, and nut sedge. Trees in developed areas consist of maples, oaks, elms, poplars, and dogwoods.

Amphibian species associated with developed areas include chorus frog and fowler's toad. Reptile species include fence lizard and box turtle, plus a variety of snakes, including black racer and black rat snake. Bird species include mourning dove, European starling, house sparrow, barn swallow, chimney swift, purple martin, American robin, catbird, brown thrasher, northern mockingbird, and song sparrow. Typical mammal species include opossum, eastern cottontail, gray squirrel, red fox, raccoon, and striped skunk. Since the facility is operationally closed, white-tailed deer are also seen foraging in the area.

Oak-Hickory forest is found south and west of Site 28, which is indicative of undisturbed lands. The Oak-Hickory forest is relatively dry and the soil is often sandy. The trees are generally widely spaced, with low undergrowth of shrubs and vines.

Plants in this forest type include pitch pine, tulip poplar, sweetgum, shagbark hickory, and mockernut hickory. Northern red, blackjack, and white and bur oak are found in the canopy layer. Shrub species include eastern redbud, flowering dogwood, northern spicebush, American hazel, rhododendron, and mountain laurel. Typical understory species include birdfoot violet, goat's rue, climbing bittersweet, wild geranium, big merrybells, solomon's zigzag, catbrier, and moccasin flower.

Animal species associated with this habitat type include opossum, gray squirrel, eastern chipmunk, eastern cottontail, raccoon, gray fox, white-tailed deer, broad-winged hawk, ruffed grouse, wild turkey, whippoorwill, red-bellied woodpecker, common flicker, blue jay, red-eyed vireo, scarlet tanager, summer tanager, and rose-breasted grosbeak. No comprehensive survey for endangered animal species has been conducted at the former NSWC-White Oak, although no endangered species are known to exist at the facility (EFACHES, 1999).

## 3.2 PREVIOUS INVESTIGATIONS

Site 28 was previously investigated during the RFA, the Site Screening (SS), an investigation in 1999 to support this EE/CA, and two additional investigations conducted in 2000. The following is a summary of the findings of each investigation.

### 3.2.1 RCRA Facility Assessment

The RFA performed in 1990 found no physical evidence of releases at the site and no documented releases in the file material (Kearney/Centaur Division, 1990).

### 3.2.2 Site Screening

The SS was performed in October 1997. The objectives of the investigation at Site 28 were to characterize subsurface conditions within the gravel portion of the scrapyard and in areas downgradient of the concrete portions of the scrapyard (TtNUS, 1998a). The investigation included surface and subsurface soil sampling. Sample locations are shown on Figure 3-2 and analytical results are presented in Section 3.3.

Six surface soil samples, 28-SS-01 through 28-SS-03 and 28-SS-07 through 28-SS-09, were collected from Site 28 at depths between 0 and 2 feet. The surface soil samples were collected from the same locations as six of the subsurface soil samples. Samples 28-SS-07, 28-SS-08, and 28-SS-09 were collected beyond the fence line to address the potential for contaminant migration from the concrete pad in the eastern end of the scrapyard. In particular, sample 28-SS-09 was collected within a drainageway along the scrapyard perimeter. The surface soil samples were analyzed for Target Compound List (TCL) volatile organic compounds (VOCs), TCL semivolatile organic compounds (SVOCs), Target Analyte List (TAL) metals plus cyanide, and TCL pesticides/polychlorinated biphenyls (PCBs).

Twelve subsurface soil samples were collected from nine soil borings, 28-SB-01 through 28-SB-09, at Site 28 to evaluate the vertical extent of contamination. Due to the coarse, gravelly nature of the soil at Site 28, a 3-inch split spoon was used in place of a hand auger to collect the subsurface soil samples. At

locations 28-SB-04, 28-SB-05, and 28-SB-06, samples were collected at 2-foot and 4-foot depths by boring through the existing concrete. One sample was collected from each of the remaining boring locations. Subsurface soil samples were analyzed for TCL VOCs, TCL SVOCs, TAL metals plus cyanide, and TCL pesticides/PCBs.

### 3.2.3 EE/CA Field Investigation

In April 1999, TtNUS performed fieldwork in support of this EE/CA. Sample locations are shown on Figure 3-2. Detailed findings of the field investigation are provided in Section 3.3.

Nineteen surface soil samples were collected to characterize and delineate PCB and SVOC contamination previously identified at the site. Fourteen surface soil samples, 28-PCB-01 through 28-PCB-14, were analyzed for TCL PCBs. Five surface soil samples, 28-SB-04A/B and 28-SB-07A/B/C, were analyzed for TCL SVOCs. Fourteen nearsurface soil samples were collected between 2 and 4 feet bgs and analyzed for TCL PCBs. These samples were collected in the same locations as the surface soil samples that were collected for PCB analysis.

### 3.2.4 2000 Additional Investigations

In May 2000, TtNUS collected additional surface soil samples (samples 28SS100 through 28SS108) at Site 28 to further define the extent of PCB contamination. These nine samples and one duplicate sample were collected from a depth of 0 to 6 inches and were analyzed for PCBs and TOC from the locations shown on Figure 3-2.

In August 2000, TtNUS collected additional surface soil samples (28SS201 through 28SS209) at Site 28 in support of the Basewide Ecological Risk Assessment (ERA). The Base-wide risk based levels that were developed for the ecological COPCs will be incorporated into this report. In addition to the parameters analyzed for the Basewide ERA, PCBs were analyzed in the surface soil samples to aid in further delineation of the extent of PCB contamination at Site 28. The samples were collected between 0 and 6 inches from the locations shown on Figure 3-2.

Detailed findings of the 2000 field investigations are provided in Section 3.3.

## 3.3 SOURCE, NATURE, AND EXTENT OF CONTAMINATION

This section includes a discussion of soil sample analytical results from all investigations performed to date at Site 28.

All current and historic analytical data were screened against EPA Region 3 residential RBCs and Ecological Screening Levels (TtNUS, March 2001). Table 3-1 summarizes the surface soil analytical data. Concentrations that exceed RBCs or ecological screening levels are highlighted in the table. Screening criteria exceedances in surface soil are shown on the tag map provided as Figure 3-3. Note that the tag map is not meant to show all locations where a given parameter was detected, only those locations where a parameter's concentration exceeded its RBC or screening level. Similarly, subsurface soil analytical data are summarized in Table 3-2 and exceedances are shown on Figure 3-4.

Inorganics for which there are no RBC values, specifically calcium, magnesium, and potassium are not shown on the tag maps. There is also no RBC value for lead, so data were screened against the OSWER residential standard for lead. A complete database of all analytical data is provided in Appendix A.1.

Background concentrations of inorganics in surface and subsurface soils at NSWC-White Oak are also provided in Tables 3-1 and 3-2, respectively, although they were not used to screen analytical data. Background concentrations were presented in the Background Investigation Report (TtNUS, 1998b).

Analytical data from the investigations indicated elevated polycyclic aromatic hydrocarbon (PAH) concentrations northeast and south of the scrapyard, specifically benzo(a)pyrene, benzo(b)fluoranthene and dibenzo(a,h)anthracene and hexachlorobenzene.

Aroclors 1248, 1254, and 1260 were detected in surface soil samples collected from a drainage swale in the southeastern corner of the site and along the southern and eastern fence line. PCB concentrations in excess of screening criteria were found at depth in two isolated subsurface samples, 28-PCB-11 and 28-SB-09. Benzo(a)pyrene, benzo(a)anthracene, benzo(b)fluoranthene, and indeno(1,2,3-cd)pyrene were also detected above screening criteria in sample 28-SB-07.

Aluminum, arsenic, chromium, and iron were detected at concentrations in excess of screening criteria in surface and subsurface soil samples. Additionally, vanadium was detected above screening criteria in surface soil and manganese in subsurface soil. However, many of the inorganic concentrations in surface soil and subsurface soil were below background concentrations.

Based on the analytical results, approximately 1,700 cubic yards of contaminated soil require remediation under this removal action. The elevated PCB concentrations found in and downgradient of the swale that drains the southeastern portion of the scrapyard may be the result of a spill in this area. As such, some concrete removal may also be appropriate. The areas requiring excavation are shown on Figure 3-5 and discussed below.

There are four areas requiring remediation due to elevated concentrations of PCBs or SVOCs.

An area measuring approximately 2,800 square feet would be excavated to a depth of 2 feet (210 cubic yards) in the northeast corner of the site, outside the fence line, in the vicinity of samples 28-SB-07, 28-SB-07A, 28-SB-07B, and 28-SB-07C.

In the southeastern corner of the site, an area measuring approximately 13,250 square feet, beginning at sample location 28SS100 and extending southward past sample locations 28-PCB-11 and 28-PCB-12 and west to sample location 28SS203, would be excavated to a depth of 2 feet. An area of deeper contamination in the vicinity of 28-PCB-11 would be excavated to a depth of 5 feet. The total volume of soil in this area is approximately 1025 cubic yards.

Also along the southern fence line, an area measuring 170 feet by 20 feet would be excavated to a depth of 1 foot. This area encompasses sample locations 28-PCB-01, 28-PCB-02, 28-SB-04, 28-SB-04A, 28-SB-04B, 28SS103, 28SS102, and 28SS201. An area of deeper contamination in the vicinity of 28-SB-04 would be excavated to a depth of 5 feet. The total volume of soil in this area is approximately 185 cubic yards. Sample locations 28-SB-04 and 28-SB-04B are within the portion of the site that is covered by concrete.

On the western side of the fenced area, an area measuring approximately 3,100 square feet would be excavated to a depth of 2 feet. This area encompasses sample locations 28-SB-01, 28-SB-02, and 28-SB-03. An area of deeper contamination in the vicinity of sample location 28-SB-03 would be excavated to a depth of 5 feet. The total volume of soil in this area is approximately 280 cubic yards.

## 3.4 STREAMLINED RISK EVALUATION

The streamlined risk evaluation is intermediate in scope between the limited risk evaluation undertaken for emergency removal actions and the conventional baseline assessment normally conducted for remedial actions. The risk evaluation uses sampling data from the site to identify the chemicals of concern, provide an estimate of how and to what extent people may be exposed to these chemicals, and provide an assessment of the health effects associated with these chemicals. For the EE/CA, the streamlined risk evaluation should focus on the specific problem that the removal action is intended to address. This EE/CA focuses on removal of contaminants from surface and subsurface soil at Site 28.

Although the risk evaluation is streamlined, it still consists of the five major components of a baseline human health risk assessment:

- Data Evaluation/Selection of Constituents of Potential Concern (COPC)
- Exposure Assessment
- Toxicity Assessment
- Risk Characterization
- Characterization of Uncertainty

A Basewide Ecological Risk Assessment (TtNUS, March 2001) was completed which included the evaluation of samples collected at Site 28. This report will include the Base-wide risk based levels that were developed for the ecological COPCs.

### 3.4.1 Data Evaluation

COPCs are limited to those chemicals with maximum detected concentrations that exceed the screening levels based on Region III RBCs for residential exposure to soil (for carcinogens, the screening level is the same as the Region III RBC value; for noncarcinogens, the screening level represents 0.1 times the RBC value). Statistical summaries of the surface and subsurface soil data are presented in Tables 3-1 and 3-2, respectively. Parameters for which sample concentrations exceeded residential and ecological screening levels (those highlighted in the tables) and basewide background levels (for metals) were selected as COPCs in this streamlined risk assessment.

The premise of this screening step is to focus the evaluation on those chemicals that primarily contribute to the risk. While dozens of constituents may actually be detected, many contribute minimally to the total risk. Essential human nutrients, such as magnesium, potassium, calcium, and sodium, are generally not included as COPCs because they are only toxic at high doses.

For inorganic chemicals, comparisons are also made to NSWC-White Oak basewide background concentrations. The background data for NSWC-White Oak is presented in the last column on Tables 3-1 and 3-2, and is included in Appendix A.2. If the maximum detected concentration of a chemical is greater than the background concentration, that chemical is identified as a COPC and is evaluated in the streamlined risk assessment. As shown in Tables 3-1 and 3-2, the maximum concentrations of aluminum, arsenic, chromium (total), iron, and vanadium were greater than the background concentration for surface soil and the concentration of manganese was greater than the background concentration for subsurface soil. Therefore, these metals were selected as COPCs in these media.

The results of the screening process indicate that benzo(a)pyrene, benzo(b)fluoranthene, dibenzo(a,h)anthracene, hexachlorobenzene, Arolcor-1248, Aroclor-1254, Aroclor-1260, aluminum, arsenic, chromium (total), iron, and vanadium were selected as COPCs in surface soil and that

benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, indeno(1,2,3-cd)pyrene, Aroclor-1248, Aroclor-1260, and manganese were identified as COPCs for subsurface soil.

### 3.4.2 Exposure Assessment

An exposure pathway is considered to be complete if it is determined that there is a source or release of chemicals from a source; an exposure point where contact can occur; and an exposure route by which contaminants are taken into the human body. For this streamlined risk evaluation, the focus is on residential and industrial exposures. The route of exposure evaluated by the Region III RBCs is incidental ingestion of soil.

The exposure point concentration is defined as the lesser of the maximum detected concentration or the 95 percent upper confidence limit of the mean (UCL). The UCL is calculated using risk assessment guidance from the EPA (1992). A value of one-half the detection limit is substituted in the calculation for nondetected values. For sample locations where duplicate samples were collected, the average of the duplicates was used as the value to represent that location.

Calculation of the UCL is dependent on the distribution of the sample set. The sample set distributions were determined using the Shapiro-Wilk W-test (Gilbert, 1987). When the results of the test were inconclusive, the distribution was assumed to be lognormal. For data sets with less than 10 samples, the UCL is considered to be a poor estimate of the mean, and the exposure concentration is defined as the maximum detection. The calculations of the UCLs for Site 28 are provided in Appendix A.2. The exposure point concentrations are compared to the Region III RBCs to derive a streamlined estimate of risk for residential and industrial exposures.

### 3.4.3 Toxicity Assessment

The toxicity assessment for COPCs examines information concerning the potential human health effects of exposure to COPCs. The goal of the toxicity assessment is to provide for each COPC a quantitative estimate of the relationship between the magnitude and type of exposure and the severity or probability of human health effects. In this streamlined risk evaluation, toxicity values are already incorporated into the RBCs. An assumption that exposure at the site is equivalent to the exposure used to derive the RBCs precludes the need to outline the toxicological indices for each COPC.

### 3.4.4 Risk Characterization

Risks from COPCs are calculated for either carcinogenic or noncarcinogenic effects. In this streamlined evaluation, risks are calculated by performing a ratio comparison to the Region III residential and

industrial RBCs. For carcinogenic effects, the total cancer risk (TCR) is represented by the following equation:

$$TCR = \Sigma_i \ (EPC/RBC)_i \times 10^{-6}$$

where

| | | |
|---|---|---|
| TCR | = | total cancer risk |
| i | = | carcinogenic COPC |
| EPCi | = | exposure point concentration |
| RBCi | = | risk-based concentration |

The value represents a probability of an individual developing cancer over a lifetime as a result of exposure to a potential carcinogen. Risks below $10^{-6}$ (1/1,000,000 or a risk of less than one in one million) are generally considered to be acceptable by the EPA, and risks greater than $10^{-4}$ (1/10,000) are generally considered to be unacceptable by the EPA. Because the Region III RBCs for soil only consider one exposure route (i.e., ingestion) and the dermal and inhalation exposures are not considered, the target risk level for this streamlined risk assessment is set at 5.0E-05 (1/20,000) to account for all applicable exposure pathways.

For noncarcinogenic effects, the total hazard ratio (THR) is represented by the following equation:

$$THR = \Sigma_j \ (EPC/RBC)_j$$

where

| | | |
|---|---|---|
| THR | = | total hazard ratio for systemic toxic effects |
| j | = | systemic toxicant COPC |

According to USEPA guidelines, the goal for noncarcinogenic health effects for a typical baseline risk assessment in one (1). However, because the Region III RBCs for soil only consider one exposure route (i.e., ingestion) and the dermal and inhalation exposures are not considered, the target level for this streamlined risk assessment is set at 0.5 to account for all applicable exposure pathways. The THR should not be construed as a probability in the manner of the TCR but rather as a numerical indicator of the extent to which a predicted intake exceeds or is less than the chemical's reference dose. The reference dose is the threshold concentration above which systemic effects are likely to occur.

The risks for surface soil and subsurface soil are presented in Tables 3-3 and 3-4, respectively.

### 3.4.5 Results of the Risk Characterization

The results of the streamlined risk evaluation indicate that risks are unacceptable for residential exposure to surface soil. The total hazard ratio (18.3) is greater than 0.5, which indicates that there is a potential for noncarcinogenic effects to occur. The primary contributors to the THR are Aroclor-1254 and iron. However, the RBC for iron is based on an allowable daily intake set for nutritional guidelines, thus resulting in a hazard ratio that may be overly conservative. The total cancer risk (8.7E-04) is greater than the target for this streamlined risk assessment (5.0E-05). The primary contributors to the TCR are PCBs, mainly Aroclor-1260. PCBs constitute approximately 95 percent of the carcinogenic risk from potential exposure to surface soil. Other contributors to the TCR were arsenic and PAHs. Although the maximum concentration for arsenic (12 mg/kg) exceeded the background screening level for surface soil (Table 3-1), this concentration is less than the maximum background soil concentration (12.7 mg/kg) found at NSWC-White Oak. Therefore, the concentrations of arsenic at the site may be within naturally occurring levels and risks from arsenic may be overestimated. Furthermore, the risks calculated for arsenic and benzo(a)pyrene are based on exposure to maximum concentrations and may be overestimated because a potential receptor is assumed to be constantly exposed to the maximum concentration. Industrial exposure to surface soil results in a cancer risk that exceeds the streamlined risk assessment goal of 5.0E-05 and the total THR for industrial exposure is greater than 0.05.

The results of the risk evaluation for subsurface soil at Site 28 indicate that the residential carcinogenic risk (4.2E-5) is less than target level of 5.0E-5 and the residential noncarcinogenic risk (THR = 0.32) is less than 0.5. For Industrial exposure to subsurface soil, the total carcinogenic risk is less than the target risk level and the total hazard ratio is less than 0.5.

### 3.4.6 Characterization of Uncertainty

There is uncertainty associated with all aspects of the streamlined risk evaluation. Uncertainty in the selection of COPCs is associated with the current status of the predictive databases and the procedures used to include or exclude constituents as COPCs. Aluminum, arsenic, iron, and vanadium were identified as COPCs in surface soil because the maximum concentrations for these metals exceeded risk-based screening levels and background screening concentrations for surface soil. However, the concentrations of these metals are less than the maximum background soil concentrations found at NSWC-White Oak. Therefore, the concentrations of aluminum, arsenic, iron, and vanadium at the site may within naturally occurring levels and risks calculated for these metals may be overestimated.

Uncertainty in the toxicity assessment and ultimately the derivation of RBCs include the quality of the existing data to support dose-response relationships and the weight of evidence used for determining the carcinogenicity of COPCs. Aluminum and iron were selected as COPCs in surface soil. However, the RBCs for these metals are based on concentrations needed to protect against a deficiency of these constituents rather than adverse effect levels. Therefore, there is some degree of uncertainty associated with the use of the RBCs for aluminum and iron.

Uncertainty associated with the exposure assessment includes the values used as input variables for an exposure pathway, the methods used and assumptions made to determine exposure point concentrations. The Region III RBCs used in the risk evaluation were based on soil ingestion only (dermal contact and inhalation are not considered in the calculation of the RBCs). This may result in an underestimation of risk because the calculated risks are based on only one exposure route. In this evaluation, maximum concentrations were used as exposure point concentrations for some COPCs tending to overestimate the potential risks.

Uncertainty in the risk characterization includes that associated with exposure to multiple chemicals and the cumulative uncertainty from combining conservative assumptions made in earlier activities.

## 3.5 IDENTIFICATION AND ANALYSIS OF REMOVAL ACTION ALTERNATIVES

The removal action alternatives for Site 28 are as follows:

- Alternative 1: No Action
- Alternative 2: Excavation, On-Site Treatment, Off-Site Landfill Disposal, and Site Restoration
- Alternative 3: Excavation, Off-Site Landfill Disposal, and Site Restoration

These alternatives were developed based on the technologies retained from the preliminary screening presented in Section 2.5 and summarized in Section 2.6. Alternative 1 will provide a comparative baseline as required by the NCP. Alternatives 2 and 3 were developed so that a comparison could be made between on-site treatment prior to off-site disposal and off-site disposal with no pre-treatment.

The following sections will describe these removal action alternatives and evaluate each based on effectiveness, implementability, and cost, as outlined in Guidance on Conducting Non-Time-Critical Removal Actions Under CERCLA (EPA, 1993).

### 3.5.1 Alternative 1: No Action

The no-action alternative is evaluated to provide a comparative baseline against which other alternatives can be evaluated. Under this alternative, no removal action would be taken and the site would be left as is, without implementing any removal, treatment, or mitigating actions.

#### 3.5.1.1 Effectiveness

Alternative 1 does not provide an effective solution for the waste present at Site 28, does not achieve the removal action objectives, and does not comply with ARARs.

#### 3.5.1.2 Implementability

Under Alternative 1, no removal action would be taken; therefore, there would not be any difficulties or uncertainties associated with implementation.

#### 3.5.1.3 Cost

There are no capital, operation, maintenance, or monitoring costs associated with this alternative.

### 3.5.2 Alternative 2: Excavation, On-Site Treatment, Off-Site Landfill Disposal, and Site Restoration

Under Alternative 2, contaminated soil at Site 28 (1,700 cubic yards) would be excavated to the limits shown on Figure 3-5, treated on site, and disposed off site in a municipal solid waste landfill. The excavated areas would be backfilled to existing grade with imported, clean material. Concrete that would be removed either due to contamination or to facilitate excavation would not be replaced.

The preliminary technology screening presented in Table 2-3 identified three viable technologies for on-site treatment of PCB-contaminated soil. Rather than evaluating each on-site treatment technology individually, thermal desorption was selected as a representative on-site treatment technology because it is a proven technology and mobile units are readily available. The effectiveness of solvent extraction and dehalogenation on PCB-contaminated soil is less certain. Additionally, dehalogenation systems are not yet commercially available.

Thermal desorption is a physical separation process that uses direct or indirect heating to thermally desorb or volatilize organic contaminants; it has also been proven effective for PCBs. The process is not designed to destroy organics. There are two types of thermal desorption processes: low temperature and high temperature. Low-temperature thermal desorption (LTTD) is less effective in treating PCB-

contaminated soil. High-temperature thermal desorption (HTTD) is a full-scale technology in which wastes are heated to 320° to 560° C (600° to 1,000° F). Thermal desorption systems are available as portable, skid-mounted systems for use on site.

Typically, wastes are processed through an externally fired pug mill or rotary drum system equipped with heat transfer surfaces that are heated by circulating hot oil. An induced airflow conveys the desorbed organic chemicals through a secondary treatment system, such as a granular activated carbon adsorption, catalytic oxidation, or condenser unit. The treated offgas is then discharged through a stack.

Bed temperatures and typical residence times will cause selected contaminants to volatilize but not be oxidized. Soils and sediments with water contents greater than 20 to 25 percent may require the installation of a dryer in the feed system to reduce the energy required to heat the soil. Some volatilization of contaminants occurs in the dryer, and the gases are routed to the thermal treatment chamber. A process flow diagram is provided on Figure 3-6.

Since the temperatures to be used are contaminant and matrix specific, further evaluation would be needed to determine the exact parameters of the thermal desorption system. A bench-scale or pilot-scale treatability study would need to be conducted to determine operating parameters and effectiveness prior to full-scale operations. Information necessary to evaluate the applicability of the technology includes soil moisture content and classification, texture, mercury content, chlorine content, pH, and the appropriate temperature for treatment.

Conventional excavation equipment would be employed to excavate and backfill the site. Areas to be excavated would be cleared of vegetation. Concrete removal and off-site disposal may be required in the southeastern corner of the fenced area. Wipe samples to determine whether there is PCB contamination on the concrete may also be necessary. The areas would be returned to existing grade with clean fill material and vegetated. Verification sampling of the excavation walls and floors would be conducted to confirm that PRGs have been met and contaminant levels in the remaining soils fall below permissible regulatory limits. All work would be performed in compliance with a site-specific Health and Safety Plan (HASP) and Occupational Safety and Health Administration (OSHA) regulations.

Site 28 is within the boundary of property transferred within the Federal government for commercial/industrial use for the foreseeable future. Institutional controls will be implemented through a land use control assurance plan.

#### 3.5.2.1 Effectiveness

This alternative complies with ARARs and would achieve the removal action objectives. The alternative would be protective of human health and the environment. Compliance with OSHA regulations and procedures set forth in a site-specific HASP would ensure protection of workers during implementation of the removal action.

Transportation of the material off site slightly increases the potential for human exposure due to a spill or accident. However, the low levels of contaminants present are not expected to pose a significant risk. This alternative would reduce the toxicity of the organic contaminants by thermal destruction. The volume of material would ultimately be unchanged because it will be landfilled elsewhere, and mobility would not be affected.

#### 3.5.2.2 Implementability

This alternative is technically feasible. Techniques to excavate materials similar to those at Site 28 are common. Mobile units and contractors are readily available to perform on-site thermal desorption and the technology has been proven to be effective for soils contaminated with PCBs and other organic compounds. A bench-scale or pilot-scale treatability study would be required to establish specific parameters and requirements. This alternative could be implemented in less than 1 year.

Offgas from the thermal treatment unit would require treatment and the appropriate state agencies would have to be contacted to determine the degree of treatment required. The substantive requirements of a RCRA hazardous waste treatment, storage, and disposal facility (TSDF) would have to be met by an on-site thermal desorption system. Such a system would also have to meet the substantive requirements of applicable air pollution regulations. Other state and local permits for operation of the treatment system on site may also be required.

The equipment needed to implement this alternative is readily available. . Standard equipment can be used to excavate and restore the site. Thermal desorption systems can treat between 50 and 150 cubic yards of contaminated soil per day. For this alternative, treatment would require 17 days, assuming a production rate of 100 cubic yards per day. Landfill capacity for municipal waste is readily available. Site-specific PRGs would have to be developed or identified prior to implementation.

A large, open area is required to stage the treatment unit and treated soil. There are open, paved areas within and adjacent to the site that could be used for these purposes.

The removal action would require acceptance and implementation of an erosion and sediment control plan, but erosion and sediment control requirements are not expected to be significant due to the minimal earth disturbance that is required.

The removal area is contained within the facility and, therefore, no easements or impacts to adjoining properties are anticipated. The location and presence of buried utilities in the vicinity of Site 28 are unknown. There are overhead utility lines south of the fenced area.

#### 3.5.2.3 Cost

A detailed cost estimate for this alternative is provided in Appendix A.3. The capital cost associated with this alternative is approximately $1,960,000. There are no long-term operation, maintenance, or monitoring costs associated with this alternative.

### 3.5.3 Alternative 3: Excavation, Off-Site Landfill Disposal, and Site Restoration

Under Alternative 3, contaminated soil at Site 28 (1,700 cubic yards) would be excavated to the limits shown on Figure 3-5 and disposed off site in a RCRA Subtitle C landfill. The excavated areas would be backfilled to existing grade with imported, clean material. Concrete that would be removed either due to contamination or to facilitate excavation would not be replaced.

Conventional excavation equipment would be employed to excavate the soil and backfill the site. Areas to be excavated would be cleared of vegetation. Concrete removal and off-site disposal may be required in the southeastern corner of the fenced area. Wipe samples to determine whether there is PCB contamination on the concrete may also be necessary. The areas would be restored with clean fill material and vegetated. Verification sampling of the excavation walls and floors would be conducted to confirm that PRGs have been met and contaminant levels in the remaining soils fall below permissible regulatory limits. All work would be performed in compliance with a site-specific HASP and OSHA regulations.

Site 28 falls within the boundary of property transferred within the Federal government for commercial/industrial use for the foreseeable future. Institutional controls will be implemented through a land use control assurance plan.

#### 3.5.3.1 Effectiveness

This alternative complies with ARARs and would achieve the removal action objectives. This alternative would be protective of human health and the environment. Compliance with OSHA regulations and

procedures set forth in a site-specific HASP would ensure protection of workers during implementation of the removal action.

Transportation of the material off site slightly increases the potential for human exposure due to a spill or accident. However, based on the risk assessment in Section 3.4, the low levels of contaminants present would not pose a significant risk. Toxicity, mobility, and volume would not be affected by this alternative.

#### 3.5.3.2 Implementability

This alternative is technically feasible. Techniques to excavate materials similar to those at Site 28 are common. This alternative could be implemented in less than 1 year.

The equipment needed to implement this alternative is readily available. Standard equipment can be used to excavate and restore the site. Site-specific PRGs would have to be developed or identified prior to implementation. Landfill capacity is readily available.

The removal action would require acceptance and implementation of an erosion and sediment control plan, but erosion and sediment control requirements are not expected to be significant due to the minimal earth disturbance that is required. The removal area is contained within the facility and, therefore, no easements or impacts to adjoining properties are anticipated. The location and presence of buried utilities in the vicinity of Site 28 are unknown. There are overhead utility lines south of the fenced area.

#### 3.5.3.3 Cost

A detailed cost estimate for this alternative is provided in Appendix A.3. The capital cost associated with this alternative is approximately $1,150,000. There are no long-term operation, maintenance, or monitoring costs associated with this alternative.

## 3.6 COMPARATIVE ANALYSIS OF REMOVAL ACTION ALTERNATIVES

Table 3-7 provides a summary of the comparative analysis presented below.

### 3.6.1 Effectiveness

Except for the no-action alternative, the alternatives comply with ARARs and meet the removal action objectives. The action-oriented alternatives are protective of human health and the environment, unlike the no-action alternative.

The no-action alternative is ineffective in the long term because the contaminated soil would remain, posing potential risk to future land users. Alternatives 2 and 3 are equally effective in the long term. Alternative 2 would reduce the toxicity of the soil by destroying the organic component, but volume and mobility would ultimately be unchanged. Alternative 3 is slightly less effective because it would not reduce the toxicity of the material.

### 3.6.2 Implementability

The no-action alternative is the most easily implemented of the three alternatives because no removal action would be taken and, therefore, there would not be difficulties or uncertainties associated with implementation.

The technologies to be used under the two action-oriented alternatives are well proven. Equipment and materials are readily available from vendors, suppliers, and subcontractors. Landfill capacity is readily available.

There are no long-term operation and maintenance requirements associated with Alternatives 2 and 3. Of the two action-oriented alternatives, Alternative 3 is more easily implemented and could be implemented within 3 to 6 months of acceptance of this EE/CA and the associated Action Memorandum (AM). Implementability of Alternative 2 is moderate due to the need for a treatability study and complications that arise from on-site waste treatment, specifically permitting requirements. These factors lengthen the time required prior to implementation to at least 6 to 9 months.

Additionally, on-site treatment of contaminated soil, as proposed under Alternative 2, is not necessary to allow the material to be disposed in a Subtitle C landfill. PCB concentrations are currently within the regulatory limits for disposal in a Subtitle C landfill. As such, the additional implementability concerns that result from on-site treatment proposed under Alternative 2 can be avoided.

### 3.6.3 Cost

Detailed cost estimates for the removal action alternatives are provided in Appendix A.3 and are summarized in Table 3-7.

## 3.7 RECOMMENDED REMOVAL ACTION

Alternative 3 is the recommended removal action for Site 28. It most effectively addresses the removal action objectives and complies with ARARs. It is also easier to implement than Alternative 2 and is much

lower in cost. The no-action alternative was eliminated because it is ineffective and does not comply with the identified removal action objectives and ARARs.

TABLE 3-1

SUMMARY OF ANALYTICAL DATA AND SCREENING CRITERIA - SURFACE SOIL
SITE 28 EE/CA
NSWC-WHITE OAK, SILVER SPRING, MARYLAND
PAGE 1 OF 3

| Parameter | Frequency of Detection[1] | Range of Detected Concentrations | Location of Maximum | Background[2] | Human Health Screening Levels | Ecological Screening Levels | |
|---|---|---|---|---|---|---|---|
| | | | | | Residential RBC[3] | Soil Risk-Based Levels[4] | |
| | | | | | | Gneiss Soil Type | Sand and Gravel Soil Type |
| **VOLATILES (mg/kg)** | | | | | | | |
| 2-Butanone | 3/9 | 0.007 - 0.018 | 28-SB-08(OLD) | NA | 4700 | NC | NC |
| Acetone | 4/9 | 0.032 - 0.12 | 28-SB-08(OLD) | NA | 780 | NC | NC |
| Chlorobenzene | 1/9 | 0.077 | 28-SB-4(2)(OLD) | NA | 160 | NC | NC |
| **SEMIVOLATILES (mg/kg)** | | | | | | | |
| 1,2-Dichlorobenzene | 1/14 | 0.086 | 28-SB-4(2)(OLD) | NA | 700 | NC | NC |
| 1,3-Dichlorobenzene | 1/14 | 0.52 | 28-SB-4(2)(OLD) | NA | 7 | NC | NC |
| 1,4-Dichlorobenzene | 1/14 | 1 | 28-SB-4(2)(OLD) | NA | 27 | NC | NC |
| 2,4-Dimethylphenol | 1/14 | 0.19 | 28-SB-08(OLD) | NA | 160 | NC | NC |
| 2-Methylnaphthalene | 1/14 | 0.08 | 28-SB-4(2)(OLD) | NA | 160 | NC | NC |
| 2-Methylphenol | 1/14 | 0.17 | 28-SB-08(OLD) | NA | 390 | NC | NC |
| 4-Methylphenol | 1/14 | 1.6 | 28-SB-08(OLD) | NA | 39 | NC | NC |
| Acenaphthene | 4/14 | 0.048 - 0.12 | 28-SB-4(2)(OLD) | NA | 470 | NC | NC |
| Anthracene | 3/14 | 0.12 - 0.14 | 28-SB-4(2)(OLD) | NA | 2300 | NC | NC |
| Benzo(a)anthracene | 6/14 | 0.066 - 0.65 | 28-SB-07C | NA | 0.87 | NC | NC |
| Benzo(a)pyrene | 6/14 | 0.068 - 0.81 | 28-SB-07C | NA | 0.087 | NC | NC |
| Benzo(b)fluoranthene | 7/14 | 0.064 - 1.2 | 28-SB-04A | NA | 0.87 | NC | NC |
| Benzo(g,h,i)perylene | 5/14 | 0.1 - 0.55 | 28-SB-07C | NA | 160[5] | NC | NC |
| Benzo(k)fluoranthene | 6/14 | 0.066 - 0.37 | 28-SB-07C | NA | 8.7 | NC | NC |
| Bis(2-ethylhexyl)phthalate | 3/14 | 0.047 - 0.25 | 28-SB-07C | NA | 46 | NC | NC |
| Carbazole | 3/14 | 0.041 - 0.14 | 28-SB-07B | NA | 32 | NC | NC |
| Chrysene | 6/14 | 0.077 - 0.85 | 28-SB-07C | NA | 87 | NC | NC |
| Di-n-butyl phthalate | 4/14 | 0.042 - 0.1 | 28-SB-09(OLD) | NA | 780 | NC | NC |
| Dibenzo(a,h)anthracene | 2/14 | 0.079 - 0.13 | 28-SB-07C | NA | 0.087 | NC | NC |
| Dibenzofuran | 1/14 | 0.039 | 28-SB-4(2)(OLD) | NA | 31 | NC | NC |
| Diethyl Phthalate | 1/14 | 0.042 | 28-SB-09(OLD) | NA | 6300 | NC | NC |
| Fluoranthene | 7/14 | 0.066 - 1.9 | 28-SB-07C | NA | 310 | NC | NC |
| Fluorene | 3/14 | 0.056 - 0.098 | 28-SB-4(2)(OLD) | NA | 310 | NC | NC |
| Hexachlorobenzene | 1/14 | 4.6 | 28-SB-04A | NA | 0.4 | NC | NC |
| Indeno(1,2,3-cd)pyrene | 5/14 | 0.12 - 0.6 | 28-SB-07C | NA | 0.87 | NC | NC |
| Naphthalene | 1/14 | 0.084 | 28-SB-4(2)(OLD) | NA | 160 | NC | NC |
| Phenanthrene | 7/14 | 0.055 - 1 | 28-SB-07B | NA | 160[5] | NC | NC |
| Phenol | 1/14 | 0.33 | 28-SB-08(OLD) | NA | 4700 | NC | NC |

TABLE 3-1

SUMMARY OF ANALYTICAL DATA AND SCREENING CRITERIA - SURFACE SOIL
SITE 28 EE/CA
NSWC-WHITE OAK, SILVER SPRING, MARYLAND
PAGE 2 OF 3

| Parameter | Frequency of Detection[1] | Range of Detected Concentrations | Location of Maximum | Background[2] | Human Health Screening Levels | Ecological Screening Levels | |
|---|---|---|---|---|---|---|---|
| | | | | | Residential RBC[3] | Soil Risk-Based Levels[4] | |
| | | | | | | Gneiss Soil Type | Sand and Gravel Soil Type |
| Pyrene | 8/14 | 0.041 - 1.6 | 28-SB-07C | NA | 230 | NC | NC |
| Total PAHs | | | | | | 510 | 27.5 |
| **PESTICIDES/PCBs (mg/kg)** | | | | | | | |
| 4,4'-DDE | 1/9 | 0.00071 | 28-SB-08(OLD) | NA | 1.9 | NC | NC |
| Aroclor 1248 | 2/48 | 0.08 - 1.6 | 28-PCB-01 | NA | 0.32 | NC | NC |
| Aroclor 1254 | 26/48 | 0.02 - 74 | 28SS101 | NA | 0.32 | NC | NC |
| Aroclor 1260 | 47/48 | 0.0066 - 2300 | 28SS103 | NA | 0.32 | NC | NC |
| Total PCBs | | | | | | 2.4[6] | 2.4[6] |
| Dieldrin | 1/9 | 0.00034 | 28-SS-02(OLD) | NA | 0.04 | NC | NC |
| **INORGANICS (mg/kg)** | | | | | | | |
| Aluminum | 9/9 | 16600 - 32200 | 28-SS-01(OLD) | 14953 | 7800 | NC | NC |
| Arsenic | 8/9 | 3.8 - 12 | 28-SB-6(2)(OLD) | 5.11 | 0.43 | NC | NC |
| Barium | 9/9 | 26 - 74.1 | 28-SB-4(2)(OLD) | 59.5 | 550 | NC | NC |
| Calcium | 7/9 | 326 - 1200 | 28-SB-4(2)(OLD) | 1040 | -- | NC | NC |
| Chromium | 9/9 | 18.7 - 73.6 | 28-SB-6(2)(OLD) | 29.35 | 23[7] | 137 | 341 |
| Cobalt | 7/9 | 3 - 63 | 28-SS-02(OLD) | 11.81 | 470 | NC | NC |
| Copper | 9/9 | 9.1 - 19.5 | 28-SB-6(2)(OLD) | 11.52 | 310 | 364 | 318 |
| Cyanide | 1/6 | 0.23 | 28-SB-08(OLD) | NA | 160 | NC | NC |
| Iron | 9/9 | 16000 - 36400 | 28-SB-6(2)(OLD) | 18946 | 2300 | NC | NC |
| Lead | 9/9 | 7.3 - 24.7 | 28-SB-08(OLD) | 60.2 | 400[8] | NC | NC |
| Magnesium | 9/9 | 541 - 2400 | 28-SS-02(OLD) | 1183 | -- | NC | NC |
| Manganese | 9/9 | 18.3 - 150 | 28-SB-08(OLD) | 490 | 160 | NC | NC |
| Mercury | 9/9 | 0.03 - 0.07 | 28-SB-09(OLD) | 0.142 | 2.3 | 0.24[6]/6.4 | 2.1 |
| Nickel | 9/9 | 5.1 - 13.5 | 28-SS-02(OLD) | 14.56 | 160 | 536 | 994 |
| Potassium | 9/9 | 478 - 1190 | 28-SS-02(OLD) | 845 | -- | NC | NC |
| Selenium | 6/9 | 0.72 - 2.6 | 28-SB-6(2)(OLD) | 0.68 | 39 | NC | NC |
| Vanadium | 9/9 | 28.8 - 61.2 | 28-SB-6(2)(OLD) | 30.08 | 55 | NC | NC |
| Zinc | 9/9 | 11.7 - 55.5 | 28-SB-08(OLD) | 30.67 | 2300 | 408 | 551 |

TABLE 3-1

SUMMARY OF ANALYTICAL DATA AND SCREENING CRITERIA - SURFACE SOIL
SITE 28 EE/CA
NSWC-WHITE OAK, SILVER SPRING, MARYLAND
PAGE 3 OF 3

| Parameter | Frequency of Detection[1] | Range of Detected Concentrations | Location of Maximum | Background[2] | Human Health Screening Levels | Ecological Screening Levels | |
|---|---|---|---|---|---|---|---|
| | | | | | Residential RBC[3] | Soil Risk-Based Levels[4] | |
| | | | | | | Gneiss Soil Type | Sand and Gravel Soil Type |

1 Duplicate samples are not included in the total number of samples presented.
2 Background Concentrations for Surface Soil at NSWC-White Oak. TtNUS, 1998b. (represented by the UCL).
3 EPA, Region III, May 2001. For noncarcinogens, values represent 0.1 times the RBC.
4 Basewide Ecological Risk Asessment for NSWC, White Oak (TtNUS, March 2001).
5 Value for naphthalene used.
6 Based on risks to terrestrial wildlife through food chain modeling; level is an average concentration.
7 Value for hexavalent chromium used.
8 Office of Solid Waste and Emergency Response (OSWER) Standard for Lead, Residential.
-- No value available.
NA - Not Applicable.
NC - Not Calculated
Shaded cell indicates maximum concentration exceeded the screening level for that parameter.

TABLE 3-2

SUMMARY OF ANALYTICAL DATA AND SCREENING CRITERIA - SUBSURFACE SOIL
SITE 28 EE/CA
NSWC-WHITE OAK, SILVER SPRING, MARYLAND
PAGE 1 OF 2

| Parameter | Frequency of Detection[1] | Range of Detected Concentrations | Location of Maximum | Background[2] | Human Health Screening Levels | Ecological Screening Levels | |
|---|---|---|---|---|---|---|---|
| | | | | | Residential RBC[3] | Soil Risk-Based Levels[4] | |
| | | | | | | Gneiss Soil Type | Sand and Gravel Soil Type |
| **VOLATILES (mg/kg)** | | | | | | | |
| Chlorobenzene | 1/9 | 0.015 | 28-SB-4(4)(OLD) | NA | 160 | NC | NC |
| **SEMIVOLATILES (mg/kg)** | | | | | | | |
| 1,2,4-Trichlorobenzene | 1/9 | 0.052 | 28-SB-4(4)(OLD) | NA | 78 | NC | NC |
| 1,4-Dichlorobenzene | 1/9 | 0.049 | 28-SB-4(4)(OLD) | NA | 27 | NC | NC |
| 4-Methylphenol | 1/9 | 0.046 | 28-SS-08(OLD) | NA | 39 | NC | NC |
| Acenaphthene | 1/9 | 0.28 | 28-SS-07(OLD) | NA | 470 | NC | NC |
| Anthracene | 1/9 | 0.35 | 28-SS-07(OLD) | NA | 2300 | NC | NC |
| Benzo(a)anthracene | 3/9 | 0.057 - 2 | 28-SS-07(OLD) | NA | 0.87 | NC | NC |
| Benzo(a)pyrene | 3/9 | 0.059 - 2.5 | 28-SS-07(OLD) | NA | 0.087 | NC | NC |
| Benzo(b)fluoranthene | 3/9 | 0.079 - 2.4 | 28-SS-07(OLD) | NA | 0.87 | NC | NC |
| Benzo(g,h,i)perylene | 1/9 | 1.9 | 28-SS-07(OLD) | NA | 160[5] | NC | NC |
| Benzo(k)fluoranthene | 3/9 | 0.051 - 2.5 | 28-SS-07(OLD) | NA | 8.7 | NC | NC |
| Carbazole | 1/9 | 0.19 | 28-SS-07(OLD) | NA | 32 | NC | NC |
| Chrysene | 3/9 | 0.074 - 2.3 | 28-SS-07(OLD) | NA | 87 | NC | NC |
| Di-n-butyl phthalate | 5/9 | 0.038 - 0.25 | 28-SB-01(OLD) | NA | 780 | NC | NC |
| Dibenzofuran | 1/9 | 0.071 | 28-SS-07(OLD) | NA | 31 | NC | NC |
| Fluoranthene | 3/9 | 0.12 - 4 | 28-SS-07(OLD) | NA | 310 | NC | NC |
| Fluorene | 1/9 | 0.17 | 28-SS-07(OLD) | NA | 310 | NC | NC |
| Indeno(1,2,3-cd)pyrene | 1/9 | 1.6 | 28-SS-07(OLD) | NA | 0.87 | NC | NC |
| Phenanthrene | 3/9 | 0.082 - 2.6 | 28-SS-07(OLD) | NA | 160[5] | NC | NC |
| Pyrene | 4/9 | 0.049 - 5.1 | 28-SS-07(OLD) | NA | 230 | NC | NC |
| Total PAHs | | | | | | 510 | 27.5 |
| **PESTICIDES/PCBs (mg/kg)** | | | | | | | |
| 4,4'-DDE | 1/9 | 0.00058 | 28-SS-08(OLD) | NA | 1.9 | NC | NC |
| Aroclor 1248 | 1/16 | 1.4 | 28-SB-03(OLD) | NA | 0.32 | NC | NC |
| Aroclor 1254 | 5/16 | 0.0097 - 0.074 | 28-PCB-02-0204 | NA | 0.32 | NC | NC |
| Aroclor 1260 | 14/16 | 0.0036 - 4.7 | 28-SS-09(OLD) | NA | 0.32 | NC | NC |
| Total PCBs | | | | | | 2.4[6] | 2.4[6] |
| Delta-BHC | 1/9 | 0.0008 | 28-SS-07(OLD) | NA | 0.1[7] | NC | NC |
| **INORGANICS (mg/kg)** | | | | | | | |
| Aluminum | 9/9 | 3670 - 17900 | 28-SB-01(OLD) | 20961 | 7800 | NC | NC |
| Arsenic | 6/9 | 2.8 - 6.9 | 28-SB-01(OLD) | 12.15 | 0.43 | NC | NC |
| Barium | 9/9 | 17.9 - 64.7 | 28-SB-4(4)(OLD) | 40.09 | 550 | NC | NC |
| Calcium | 7/9 | 734 - 3030 | 28-SB-03(OLD) | 247 | -- | NC | NC |

TABLE 3-2

SUMMARY OF ANALYTICAL DATA AND SCREENING CRITERIA - SUBSURFACE SOIL
SITE 28 EE/CA
NSWC-WHITE OAK, SILVER SPRING, MARYLAND
PAGE 2 OF 2

| Parameter | Frequency of Detection[1] | Range of Detected Concentrations | Location of Maximum | Background[2] | Human Health Screening Levels | Ecological Screening Levels | |
|---|---|---|---|---|---|---|---|
| | | | | | Residential RBC[3] | Soil Risk-Based Levels[4] | |
| | | | | | | Gneiss Soil Type | Sand and Gravel Soil Type |
| Chromium | 9/9 | 9.1 - 41 | 28-SB-01(OLD) | 41.05 | 23[8] | 137 | 341 |
| Cobalt | 4/9 | 4.6 - 7 | 28-SB-4(4)(OLD) | 16.6 | 470 | NC | NC |
| Copper | 9/9 | 9.8 - 15 | 28-SB-01(OLD) | 21.62 | 310 | 364 | 318 |
| Cyanide | 1/6 | 0.19 | 28-SS-08(OLD) | NA | 160 | NC | NC |
| Iron | 9/9 | 7200 - 25500 | 28-SB-01(OLD) | 28681 | 2300 | NC | NC |
| Lead | 9/9 | 5.8 - 40.7 | 28-SB-03(OLD) | 21.23 | 400[9] | NC | NC |
| Magnesium | 9/9 | 374 - 1530 | 28-SB-03(OLD) | 2987 | -- | NC | NC |
| Manganese | 9/9 | 12.8 - 508 | 28-SB-4(4)(OLD) | 503 | 160 | NC | NC |
| Mercury | 8/9 | 0.03 - 0.12 | 28-SB-03(OLD) | 0.051 | 2.3 | 0.24[6]/6.4 | 2.1 |
| Nickel | 8/9 | 3.2 - 9.8 | 28-SB-4(4)(OLD) | 13.84 | 160 | 536 | 994 |
| Potassium | 9/9 | 183 - 802 | 28-SB-4(4)(OLD) | 2792 | -- | NC | NC |
| Selenium | 5/9 | 0.53 - 0.91 | 28-SB-6(4)(OLD) | 2.73 | 39 | NC | NC |
| Vanadium | 9/9 | 12.8 - 39.8 | 28-SB-6(4)(OLD) | 44.31 | 55 | NC | NC |
| Zinc | 9/9 | 9.2 - 58.4 | 28-SB-03(OLD) | 84.2 | 2300 | 408 | 551 |

1 Duplicate samples are not included in the total number of samples presented.
2 Background Concentrations for Subsurface Soil at NSWC-White Oak. TtNUS, 1998b. (represented by the UCL).
3 EPA, Region III, May 2001. For noncarcinogens, values represent 0.1 times the RBC.
4 Basewide Ecological Risk Asessment for NSWC, White Oak (TtNUS, March 2001).
5 Value for naphthalene used.
6 Based on risks to terrestrial wildlife through food chain modeling; level is an average concentration.
7 Value for alpha-BHC used.
8 Value for hexavalent chromium used.
9 Office of Solid Waste and Emergency Response (OSWER) Standard for Lead, Residential.
-- No value available.
NA - Not Applicable.
NC - Not Calculated
Shaded cell indicates maximum concentration exceeded the screening level for that parameter.

## TABLE 3-3

## STREAMLINED RISK EVALUATION-SURFACE SOIL
## SITE 28 EE/CA
## NSWC-WHITE OAK, SILVER SPRING, MARYLAND

| Parameter | Exposure Point Concentration [1] | Region III RBC[2] | | Risk Ratios (unitless) | |
|---|---|---|---|---|---|
| | | Residential | Industrial | Residential | Industrial |
| **Carcinogens (mg/kg)** | | | | | |
| Benzo(a)pyrene | 0.81 | 0.087 | 0.78 | 9.3E-06 | 1.0E-06 |
| Benzo(b)fluoranthene | 0.57 | 0.87 | 7.8 | 6.5E-07 | 7.3E-08 |
| Dibenzo(ah)anthracene | 0.13 | 0.087 | 0.78 | 1.5E-06 | 1.7E-07 |
| | | | | | |
| Hexachlorobenzene | 0.64 | 0.4 | 3.6 | 1.6E-06 | 1.8E-07 |
| | | | | | |
| Aroclor 1248 | 1.6 | 0.32 | 2.9 | 5.0E-06 | 5.5E-07 |
| Aroclor 1254 | 24.6 | 0.32 | 2.9 | 7.7E-05 | 8.5E-06 |
| Aroclor 1260 | 238.8 | 0.32 | 2.9 | 7.5E-04 | 8.2E-05 |
| | | | | | |
| Arsenic | 12 | 0.43 | 3.8 | 2.8E-05 | 3.2E-06 |
| | | | | | |
| | | **Total Cancer Risk** | | **8.7E-04** | **9.6E-05** |
| | | | | | |
| **Noncarcinogens (mg/kg)** | | | | | |
| Aroclor 1254 | 24.6 | 1.6 | 42.4 | 15.4 | 0.58 |
| Aluminum | 32200 | 78,000 | 2,000,000 | 0.41 | 0.016 |
| Arsenic | 12 | 23 | 610 | 0.52 | 0.020 |
| Chromium | 73.6 | 230 | 6100 | 0.32 | 0.012 |
| Iron | 36400 | 23,000 | 610,000 | 1.6 | 0.060 |
| Vanadium | 61.2 | 550 | 14,000 | 0.11 | 0.004 |
| | | | | | |
| | | **Total Hazard Ratio** | | **18.3** | **0.69** |

1 Maximum concentrations are used for metals because the datasets consist of less than 10 samples. Summary of exposure point concentrations calculations are presented in in Appendix A.2.

2 EPA, Region III, May 2001.

## TABLE 3-4

## STREAMLINED RISK EVALUATION-SUBSURFACE SOIL
## SITE 28 EE/CA
## NSWC-WHITE OAK, SILVER SPRING, MARYLAND

| Parameter | Exposure Point Concentration [1] | Region III RBC[2] | | Risk Ratios (unitless) | |
|---|---|---|---|---|---|
| | | Residential | Industrial | Residential | Industrial |
| **Carcinogens (mg/kg)** | | | | | |
| Benzo(a)anthracene | 2 | 0.87 | 7.8 | 2.3E-06 | 2.6E-07 |
| Benzo(a)pyrene | 2.5 | 0.087 | 0.78 | 2.9E-05 | 3.2E-06 |
| Benzo(b)fluoranthene | 2.4 | 0.87 | 7.8 | 2.8E-06 | 3.1E-07 |
| Indeno(1,2,3-cd)pyrene | 1.6 | 0.87 | 7.8 | 1.8E-06 | 2.1E-07 |
| | | | | | |
| Aroclor 1248 | 0.098 | 0.32 | 2.9 | 3.1E-07 | 3.4E-08 |
| Aroclor 1260 | 2.1 | 0.32 | 2.9 | 6.4E-06 | 7.1E-07 |
| | | **Total Cancer Risk** | | **4.2E-05** | **4.7E-06** |
| **Noncarcinogens (mg/kg)** | | | | | |
| Manganese | 508 | 1600 | 41000 | 0.32 | 0.012 |
| | | | | | |
| | | **Total Hazard Ratio** | | **0.32** | **0.012** |

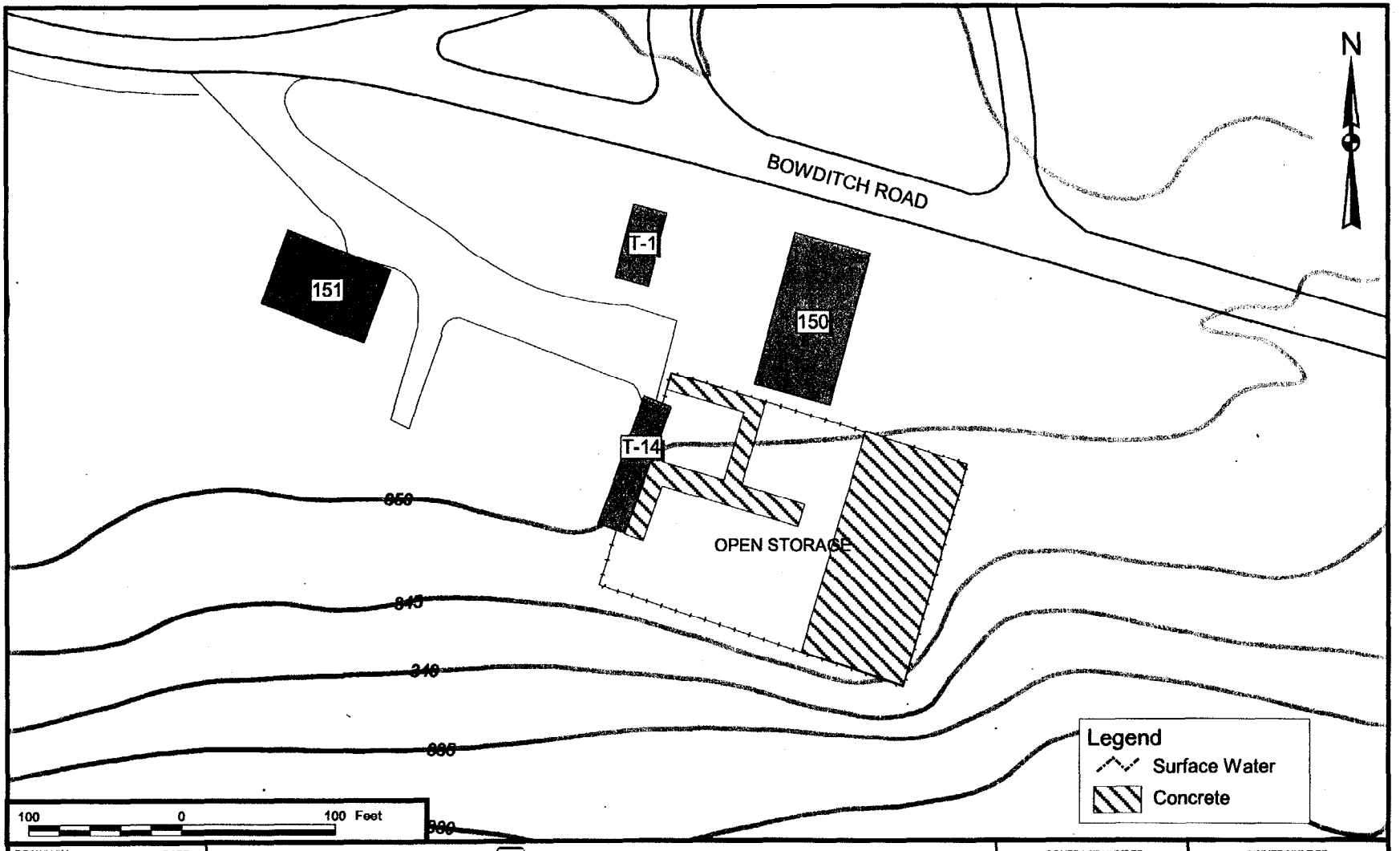
1 Maximum concentrations are used for PAHs and metals because the datasets consist of less than 10 samples. Summary of exposure point concentrations calculations are presented in in Appendix A.2.

2 EPA, Region III, May 2001.

TABLE 3-5

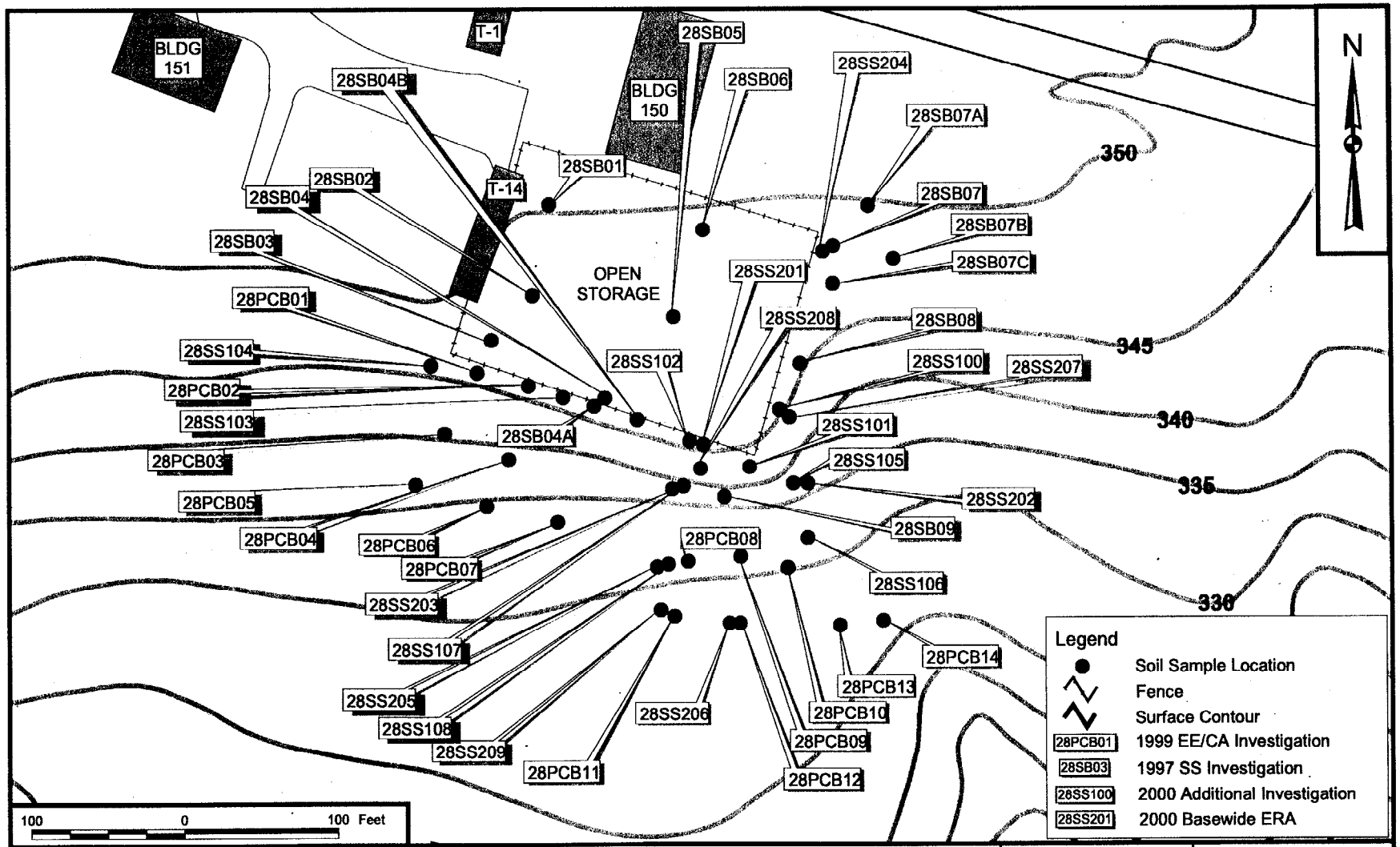
SITE 28 – SUMMARY COMPARISON OF REMOVAL ACTION ALTERNATIVES
SITE 28 AND SITE 47 EE/CA
NSWC-WHITE OAK, SILVER SPRING, MARYLAND

| No. | Alternative | Effectiveness | Implementability | Compliance with ARARs | Off-site Treatment/ Disposal Required | Cost |
|---|---|---|---|---|---|---|
| 1 | No Action | Low | High | No | No | $0 |
| 2 | Excavation, On-Site Treatment, Off-site Landfill Disposal, and Site Restoration | High | Moderate | Yes | Yes | $1,960,000 |
| 3 | Excavation, Off-Site Landfill Disposal, and Site Restoration | High | High | Yes | Yes | $1,150,000 |



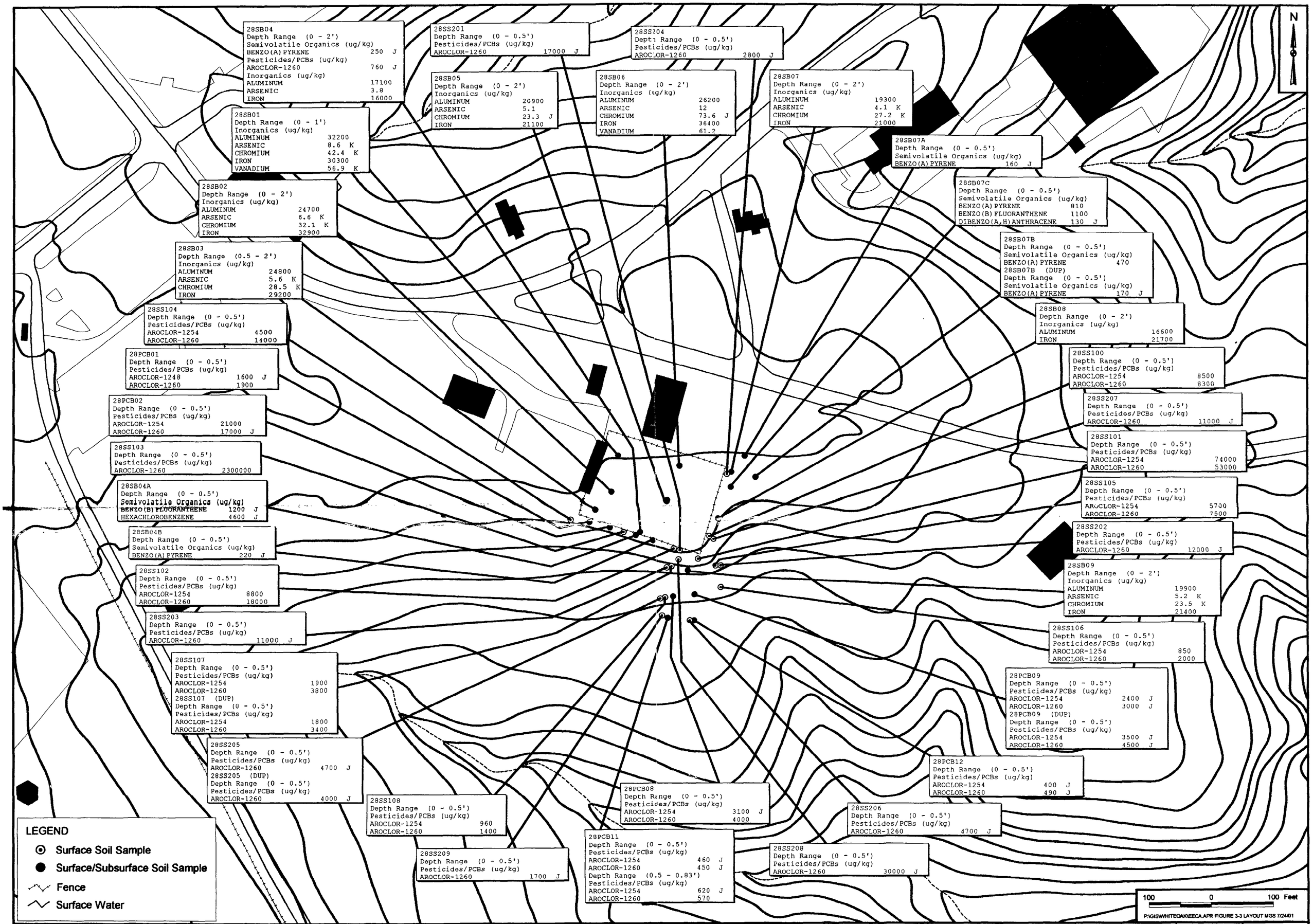

| | | | |
|---|---|---|---|
| DRAWN BY T. BECKMAN DATE 6/23/99 | Tetra Tech NUS, Inc. | CONTRACT NUMBER 7909 | OWNER NUMBER 0315 |
| CHECKED BY KJS DATE 7/25/01 | SITE LAYOUT MAP<br>SITE 1 EE/CA<br>NSWC - WHITE OAK<br>SILVER SPRING, MARYLAND | APPROVED BY JAN DATE 7/26/01 | |
| COST/SCHEDULE-AREA | | APPROVED BY DATE | |
| SCALE AS NOTED | | DRAWING NO. FIGURE 3-1 | REV 0 |

P:\GIS\WHITEOAK\EECA.APR FIG 3-1 LAYOUT MGS 7-25-01




| | | | |
|---|---|---|---|
| DRAWN BY M. Spangenberg DATE 2-12-01 | Tetra Tech NUS, Inc. | CONTRACT NUMBER 7909 | OWNER NUMBER 315 |
| CHECKED BY KMS DATE 3/6/01 | SAMPLE LOCATIONS<br>SITE 28 - BUILDING T-14 SCRAPYARD<br>NSWC WHITE OAK<br>SILVER SPRING, MARYLAND | APPROVED BY — DATE 3/6/01 | |
| COST/SCHEDULE-AREA | | APPROVED BY — DATE — | |
| SCALE AS NOTED | | DRAWING NO. FIGURE 3-2 | REV 0 |

P:\GIS\EECA\APR\Figure 3-2 Layout MGS 2-12-01




| NO. | DATE | REVISIONS | BY | CHKD | APPD | REFERENCES | NO. | RELEASED FOR | BY | DATE |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |

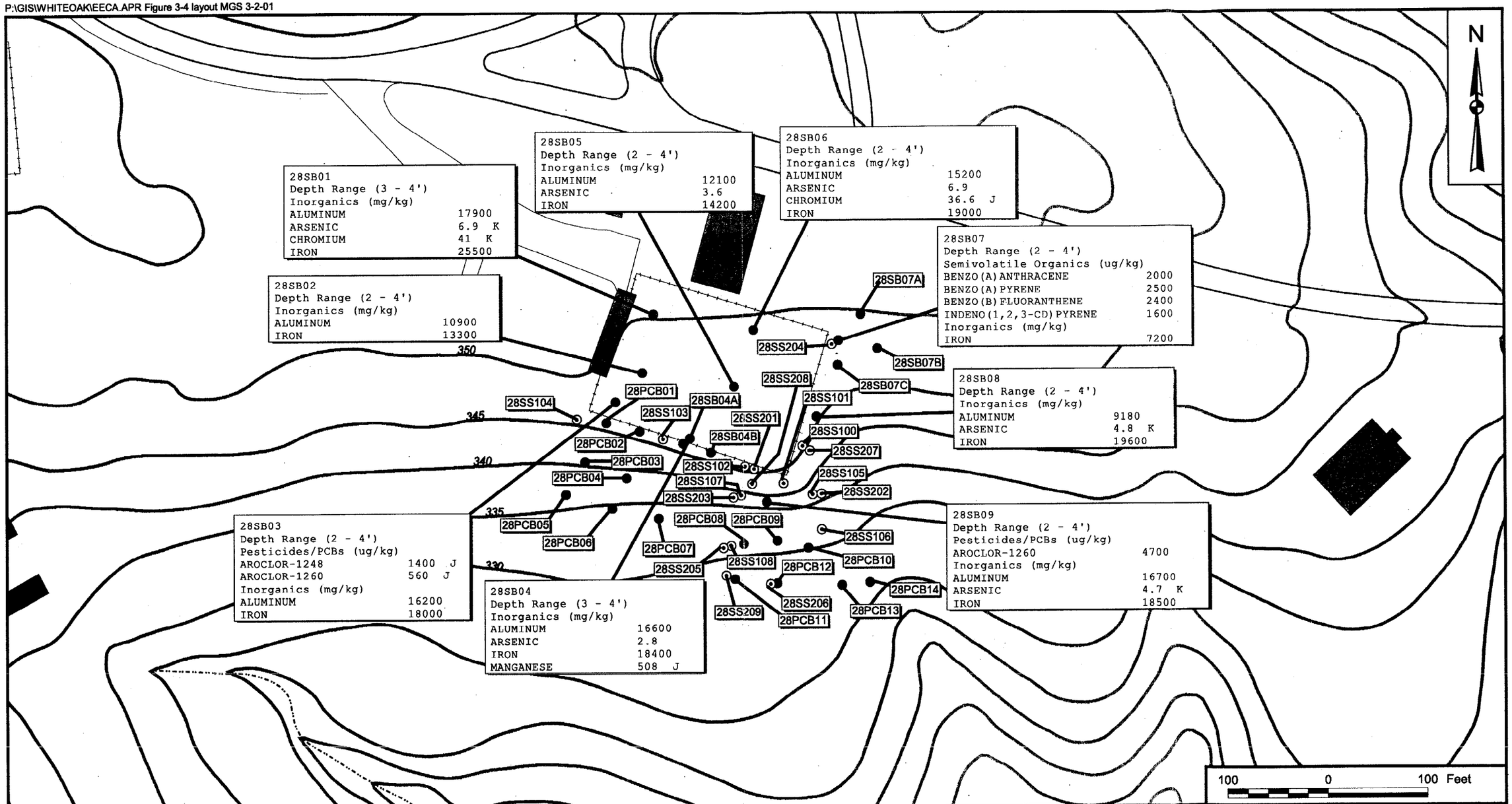
DRAWN BY M. Spangenberg DATE 2-19-01
CHECKED BY KMS DATE 3/6/01
COST/SCHEDULE-AREA
SCALE AS NOTED

Tetra Tech NUS, Inc.

TAG MAP-SELECTED SURFACE SOIL ANALYTICAL DATA
SITE 28-BUILDING T-14 SCRAPYARD
SITE 28 AND SITE 47 EE/CA
FORMER MSWC WHITEOAK
SILVER SPRING, MARYLAND

CONTRACT NO. 7909
OWNER NO. 0315
APPROVED BY SN DATE 3/6/01
APPROVED BY DATE
DRAWING NO. FIGURE 3-3
REV. 0

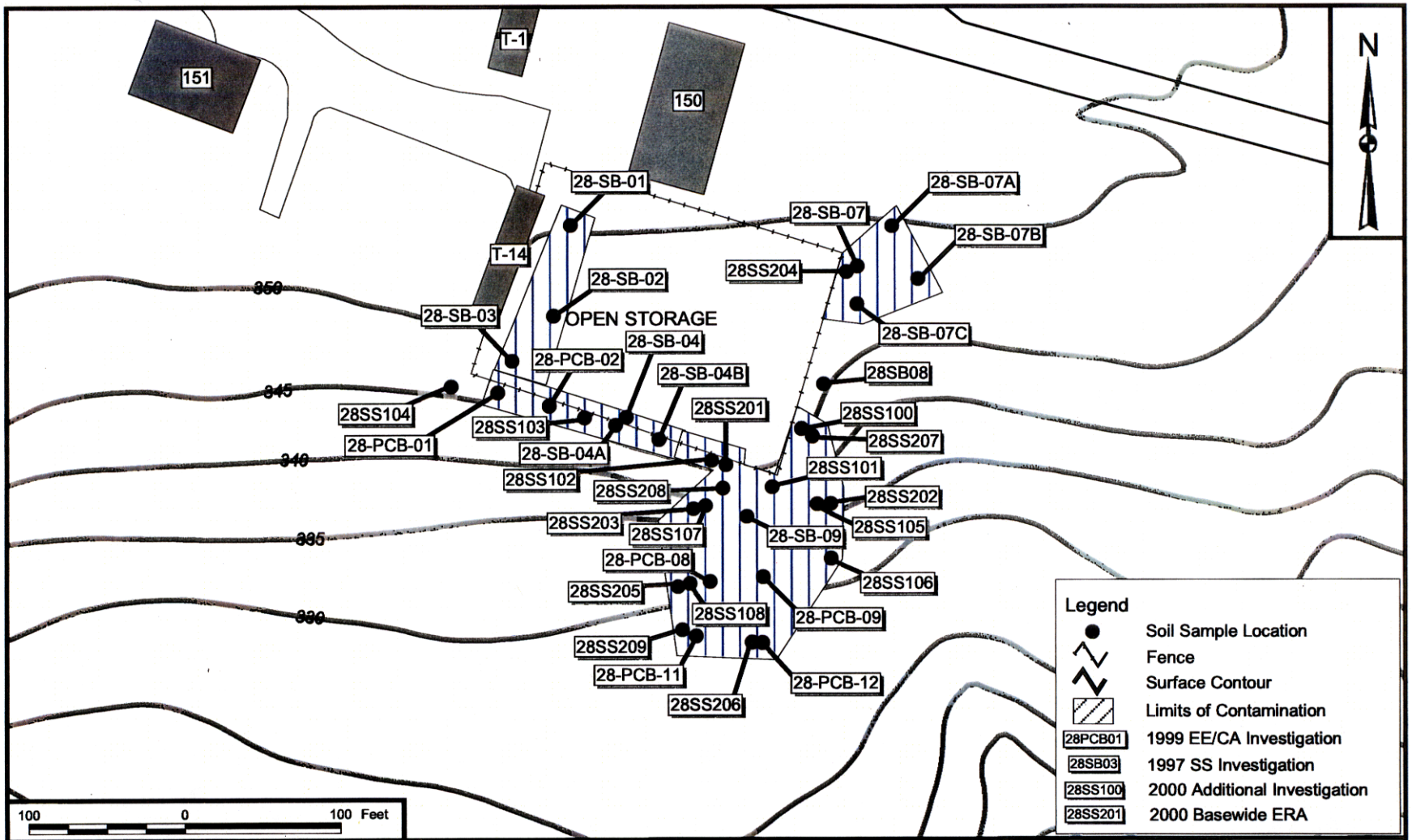
P:\GIS\WHITEOAK\EECA.APR Figure 3-4 layout MGS 3-2-01




Legend

- Surface/Subsurface Soil Sample
- Surface Soil Sample
- Fence
- Surface Water

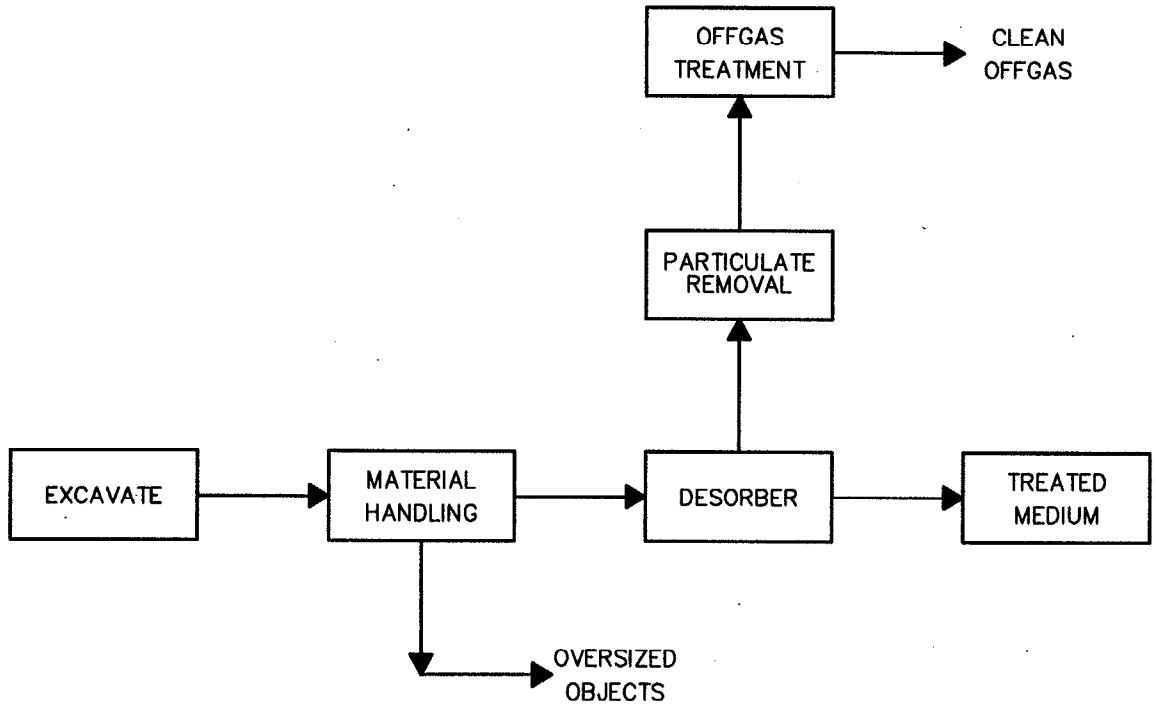
| | | | |
|---|---|---|---|
| DRAWN BY M. Spangenberg | DATE 3-2-01 | Tetra Tech NUS, Inc. | CONTRACT NUMBER 7909 / OWNER NUMBER 0315 |
| CHECKED BY KMS | DATE 3/6/01 | TAG MAP-SELECTED SUBSURFACE SOIL ANALYTICAL DATA<br>SITE 28 - BUILDING T-14 SCRAPYARD<br>SITE 28 AND SITE 47 EE/CA<br>FORMER NSWC WHITE OAK<br>SILVER SPRING, MARYLAND | APPROVED BY SW / DATE 3/6/01 |
| COST/SCHEDULE-AREA | | | APPROVED BY — / DATE — |
| SCALE AS NOTED | | | DRAWING NO. FIGURE 3-4 / REV 0 |




| | | | |
|---|---|---|---|
| DRAWN BY M. Spangenberg DATE 2-12-01 | Tetra Tech NUS, Inc. | CONTRACT NUMBER 7909 | OWNER NUMBER 0315 |
| CHECKED BY KMS DATE 3/6/01 | APPROXIMATE LIMITS OF CONTAMINATION<br>SITE 28-BUILDING T-14 SCRAPYARD<br>SITE 28 AND SITE 47 EE/CA<br>FORMER NSWC WHITE OAK<br>SILVER SPRING,MARYLAND | APPROVED BY SN | DATE 3/6/01 |
| COST/SCHEDULE-AREA | | APPROVED BY — | DATE — |
| SCALE AS NOTED | | DRAWING NO. FIGURE 3-5 | REV 0 |

P:\GIS\WHITEOAK\EECA.APR Figure 3-5 layout MGS 2-20-01

ACAD: 7909CF02.dwg 02/12/01 HJP




| | | | |
|---|---|---|---|
| DRAWN BY HJP DATE 2/12/01 | Tetra Tech NUS, Inc. | CONTRACT NO. 7909 | OWNER NO. 0315 |
| CHECKED BY KMS DATE 3/6/01 | PROCESS FLOW DIAGRAM<br>ON-SITE THERMAL DESORPTION<br>SITE 28 AND SITE 47 EE/CA<br>FORMER NSWC WHITE OAK<br>SILVER SPRING, MARYLAND | APPROVED BY SN | DATE 3/6/01 |
| COST/SCHED-AREA | | APPROVED BY | DATE |
| SCALE NONE | | DRAWING NO. FIGURE 3-6 | REV. 0 |

FORM CADD NO. TtNUS_AH.DWG - REV 0 - 1/22/98

# 4.0 SITE 47 – BUILDING 90 DRAINAGE

This section includes the site description and background, a discussion of previous investigations and the nature and extent of contamination, an analysis of the selected removal action alternatives, a comparative analysis of the alternatives, and the recommended alternative for Site 47, the Building 90 Drainage.

## 4.1 SITE DESCRIPTION AND BACKGROUND

The following is a discussion of the site location and history, subsurface geology and hydrogeology, surrounding land use, and ecological setting of Site 47, the Building 90 Drainage.

### 4.1.1 Site Location and History

Site 47, formerly part of Site 11, Industrial Wastewater Disposal Area 100, is located along Bowdich Road in the central-eastern portion of the former NSWC-White Oak. Included in Site 47 is an unnamed tributary to Paint Branch, originating behind Building 90, that traverses approximately 2,200 feet to the northeast, eventually joining with a stream from Site 2, Apple Orchard Landfill. The site layout is shown on Figure 4-1.

As mentioned above, Site 47 was initially part of Site 11. Previous sampling activities completed at Site 11 indicated that PCB contamination along the stream behind Building 90 was of concern (TtNUS, 1999). Following the initial investigation, follow-up sampling in spring 2000 identified additional PCB contamination within the drainageway, extending downstream approximately 2,000 feet. The source of this contamination is uncertain but is believed to be caused by a transformer located in the northern portion of the basement in Building 90. Although the transformers remain within Building 90, modifications were completed on the basement floor (the floor was refloated) where a transformer leak was known to have occurred. In order to completely characterize the extent and depth of contamination in the area, additional sampling was done in November 2000 (TtNUS, December 2000).

### 4.1.2 Geology and Hydrogeology

Site 47 is generally flat, with a stream (labeled Unnamed Tributary A) that runs northeastward to the base property line at Perimeter Road. The stream flows less than 6 inches deep and its width varies along the length of the stream between 1 and 5 feet and empties into Paint Branch off Base property.

No subsurface investigations have been conducted at Site 47 that would allow for the determination of site-specific geology and hydrogeology information. However, information is available for Site 11, which is located approximately 600 feet northwest of the site.

Based on information collected at Site 11 during the installation of groundwater monitoring wells, the site geology consists of a thin veneer of unconsolidated materials, including alluvial sediments and/or saprolite (highly weathered bedrock), overlying metamorphic bedrock (gneiss). The competent upper surface of the bedrock (Wissahickon Gneiss) mimics the land surface topography. The depth to the bedrock from ground surface ranges from approximately 46 feet to 32 feet. The land surface and the upper surface of the Wissahickon Gneiss are relatively flat, both with a slight dip to the northeast (TtNUS, January 2001).

Groundwater flow within the bedrock, as determined at Site 11, is limited to fractures and occurs under confined conditions and flows to the northeast.

### 4.1.3 Surrounding Land Use

Site 47 is completely surrounded by NSWC-White Oak property.

### 4.1.4 Ecological Setting

Site 47 is in a developed area of the facility. Unnamed Tributary A flows to the north, eventually connecting with Tributary 187 off the Base before Tributary 187 joins with Paint Branch. The tributary is shallow and shaded, and the streambed consists of sand, cobble, and some exposed bedrock (GSA, 1997). Cobbles were embedded up to 0.5 inch (GSA, 1997). The stream was sampled for benthic macroinvertebrates by Greenhorn & O'Mara, Inc, on November 13, 1995 and results indicated that the tributary had small amounts of EPT (*Ephemeroptera, Plecoptera, and Trichoptera*) taxa, which are considered indicative of a healthy stream (GSA, 1997). The study indicated that it is likely the low numbers of benthic macroinvertebrates at this site are due to the small size of the stream and the resulting lack of available habitat (GSA, 1997). Paint Branch represents the most important surface water body on the facility and is designated as Class III – Natural Trout Waters. Paint Branch has the largest fish population at the Base, which may be large enough to support, or partially support, piscivorous birds or mammals. Tributary A, although not previously sampled for fish, is unlikely to support significant fish populations based on its small size (1 foot wide by 1 to 2 inches deep) (TtNUS, December 2000).

Areas immediately adjacent to Building 90 consist of paved areas and roads. Areas surrounding Tributary A include hardwood stands and grasses. There are no identified wetland areas along Tributary A (TtNUS, December 2000).

In developed areas of the facility, lawns consist of Kentucky bluegrass, red and tall fescue, Bermuda grass, red clover, Korean lespedeza, annual ryegrass, zoysia grass, and crown vetch. Weed species

commonly found in these areas include white clover, yellow wood sorrel, chickweed, henbit, ground ivy, wild strawberry, purslane, spotted spurge, knotweed, garlic, mustard, dandelion, plantain, crabgrass, goosegrass, foxtail, knotweed, and nut sedge. Trees in developed areas consist of maples, oaks, elms, poplars, and dogwoods.

Amphibian species associated with developed areas include chorus frog and fowler's toad. Reptile species include fence lizard and box turtle, plus a variety of snakes, including black racer and black rat snake. Bird species include mourning dove, European starling, house sparrow, barn swallow, chimney swift, purple martin, American robin, catbird, brown thrasher, northern mockingbird, and song sparrow. Typical mammal species include opossum, eastern cottontail, gray squirrel, red fox, raccoon, and striped skunk. Since the facility is operationally closed, white-tailed deer are also seen foraging in the area.

Oak-Hickory forest is found south and west of Site 47, which is indicative of undisturbed lands. The Oak-Hickory forest is relatively dry and the soil is often sandy. The trees are generally widely spaced, with low undergrowth of shrubs and vines.

Plants in this forest type include pitch pine, tulip poplar, sweetgum, shagbark hickory, and mockernut hickory. Northern red, blackjack, and white and bur oak are found in the canopy layer. Shrub species include eastern redbud, flowering dogwood, northern spicebush, American hazel, rhododendron, and mountain laurel. Typical understory species include birdfoot violet, goat's rue, climbing bittersweet, wild geranium, big merrybells, solomon's zigzag, catbrier, and moccasin flower.

Animal species associated with this habitat type include opossum, gray squirrel, eastern chipmunk, eastern cottontail, raccoon, gray fox, white-tailed deer, broad-winged hawk, ruffed grouse, wild turkey, whippoorwill, red-bellied woodpecker, common flicker, blue jay, red-eyed vireo, scarlet tanager, summer tanager, and rose-breasted grosbeak. No comprehensive survey for endangered animal species has been conducted at the former NSWC-White Oak, although no endangered species are known to exist at the facility (EFACHES, 1999).

## 4.2 PREVIOUS INVESTIGATIONS

The Unnamed Tributary A was previously investigated during the RFA, and additional investigations for Site 11, and subsequent investigations for Site 47. The following is a summary of the findings of each investigation. Sample locations are shown on Figure 4-2.

### 4.2.1 Site 11 RCRA Facility Investigation

Two sediment samples (11SD100 and 11SD101) were collected in January 1999 from the tributary near Building 90 during the RFI investigation for Site 11 and analyzed for TCL VOCs, SVOCs, pesticides, PCBs, TAL metals plus cyanide, explosives, TOC, and grain size. Total PCB concentrations in SD100 and SD101 were 17.8 and 8.8 mg/kg, respectively. These concentrations were greater than the EPA Region 3 industrial RBC of 2.9 mg/kg. Therefore, additional investigations were proposed to focus on the delineation of PCB contamination in the drainage ditch near Building 90.

### 4.2.2 Site 11 Additional Investigation

Based on the PCB results from the two sediment samples collected in the drainage ditch in 1999, 10 sediment samples (11SD200 through 11SD210) were collected in May 2000 to further characterize the PCB contamination in the sediment from the tributary. These samples were collected from a maximum depth of 3 inches within the drainage ditch and were analyzed for PCBs and TOC.

### 4.2.3 Site 47 Investigation

Site 47 was investigated in November 2000 to determine the source area and extent of PCB contamination located along the drainage ditch north of Building 90. Soil and sediment samples collected during the investigation were analyzed for PCBs via EPA Method SW-846 8082. The investigation included the collection of two surface soil samples (0047-SS-01 and 0047-SS02) adjacent to the parking lot near the Building 90 transformer basement. In addition, a sediment sample (0047-SD-10) and a duplicate (0047-SD-11) were collected from the drop inlet along the storm drain in the Building 90 parking lot. These samples were taken in an attempt to find the source of PCB contamination at Site 47.

Thirteen sediment samples (0047-SD-01 through 0047-SD-09 and 0047-SD-12 through 0047-SD-15) were analyzed along the stream located north of Building 90. The purpose of the sampling was to characterize the depth and extent of contamination in the stream. Samples were collected at 200-foot intervals along the stream and provided to a fixed-based laboratory for PCB analysis. The fixed-based laboratory was requested to hold samples and analyze them in an upstream to downstream progression, at the direction of the TtNUS project manager. Samples were analyzed sequentially, from farthest upstream to farthest downstream until PCB concentrations less than 1 mg/kg were identified.

In addition, seven surface soil samples (0047-SS-03 through 0047-SS-09) were collected from along the banks of Site 47 to address the presence of PCB contamination beyond the stream banks that may have resulted from past storm events where the bank-full flow was exceeded. The surface soil samples were

collected from a depth of 0 to 6 inches from areas of Site 47 that had a broad floodplain and were not deeply incised.

In addition to the sampling discussed above, depth and width measurements were taken along the tributary at each sample station to help illustrate the path of the PCB contamination and to quantify the volume of sediment within the stream.

## 4.3 SOURCE, NATURE, AND EXTENT OF CONTAMINATION

This section includes a discussion of soil and sediment sample analytical results from all investigations performed to date at Site 47.

All current and historic analytical data were screened against EPA Region 3 residential RBCs. Table 4-1 summarizes the surface soil analytical data. Concentrations that exceed RBCs are highlighted in the table. Similarly, sediment analytical data are summarized in Table 4-2. Positive detections of PCBs in surface soil and sediment are shown on the tag map provided as Figure 4-3. A complete database of all analytical data is provided in Appendix B.1.

Analytical data from the field investigations indicated elevated PCB concentrations in the surface soil and sediment along the drainage channel from Building 90.

Aroclor 1260 was detected in six surface sol samples from the banks of the drainage channel in excess of screening criteria.

Aroclor 1254 and 1260 were detected in two and 24 sediment samples, respectively, from the drainage channel above screening criteria.

Arsenic was detected in one sediment sample (11SD100) above screening criteria.

Based on the calculations presented in Appendix B.2, approximately 0.5 cubic yard of contaminated sediment is present in the catch basin and storm sewer behind Building 90. The calculations also show that approximately 1,180 cubic yards of contaminated sediment and soil are present within the drainage channel and along the channel embankments from the storm sewer outlet to the White Oak property line. PCB concentrations were not detected in sediment samples taken from the drainage channel at off-base locations.

## 4.4 STREAMLINED RISK EVALUATION

The streamlined risk evaluation is intermediate in scope between the limited risk evaluation undertaken for emergency removal actions and the conventional baseline assessment normally conducted for remedial actions. The risk evaluation uses sampling data from the site to identify the chemicals of concern, provide an estimate of how and to what extent people may be exposed to these chemicals, and provide an assessment of the health effects associated with these chemicals. For the EE/CA, the streamlined risk evaluation should focus on the specific problem that the removal action is intended to address. For this site, the EE/CA focuses on removal of contaminants from soil and sediment at Site 47.

Although the risk evaluation is streamlined, it still consists of the five major components of a baseline human health risk assessment:

- Data Evaluation/Selection of Constituents of Potential Concern (COPC)
- Exposure Assessment
- Toxicity Assessment
- Risk Characterization
- Characterization of Uncertainty

A Basewide Ecological Risk Assessment (TtNUS, March 2001) was completed and this report will include the Base-wide risk based levels that were developed for the ecological COPCs.

### 4.4.1 Data Evaluation

COPCs are limited to those chemicals with maximum detected concentrations that exceed screening levels based on Region III RBCs for residential exposure to soil(for carcinogens, the screening level is the same as the Region III RBC value; for noncarcinogens, the screening level represents 0.1 times the RBC value) and ecological screening levels (TtNUS, March 2001). Statistical summaries of the surface soil and sediment data are presented in Tables 4-1 and 4-2, respectively. Parameters for which sample concentrations exceeded residential and ecological screening levels (those highlighted in the tables) and basewide background levels (for metals) were selected as COPCs in this streamlined risk assessment.

The premise of this screening step is to focus the evaluation on those chemicals that primarily contribute to the risk. While dozens of constituents may actually be detected, many contribute minimally to the total risk. Essential human nutrients, such as magnesium, potassium, calcium, and sodium, are generally not included as COPCs because they are only toxic at high doses.

For inorganic chemicals, comparisons are also made to NSWC-White Oak basewide background concentrations. The background data for NSWC-White Oak is presented on Table 4-2, and in Appendix B.3. If a metal's maximum detected concentration exceeds a screening level, it is then compared to the facility background value to determine if it is present at concentrations statistically significantly greater than background. If the maximum detected concentration of the chemical is greater than the background concentration, that chemical is identified as a COPC and is evaluated in the streamlined risk assessment. The comparison in Table 4-2 shows that arsenic was the only metal that exceeded the risk-based screening level. However, arsenic was not detected in any background sediment samples. Therefore, arsenic was selected as a COPC for sediment in the risk evaluation.

The results of the screening process presented in Tables 4-1 and 4-2 indicate that Aroclor-1260 was selected as a COPC for surface soil and that Aroclor-1254, Aroclor-1260, and arsenic were identified as COPCs for sediment.

### 4.4.2 Exposure Assessment

An exposure pathway is considered to be complete if it is determined that there is a source or release of chemicals from a source; an exposure point where contact can occur; and an exposure route by which contaminants are taken into the human body. For this streamlined risk evaluation, the focus is on residential and industrial exposures. The route of exposure evaluated by the Region III RBCs is incidental ingestion of soil or sediment.

The exposure point concentration is defined as the lesser of the maximum detected concentration or the 95 percent upper confidence limit of the mean (UCL). The UCL is calculated using risk assessment guidance from the EPA (1992). A value of one-half the detection limit is substituted in the calculation for nondetected values. For sample locations where duplicate samples were collected, the average of the duplicates was used as the value to represent that location.

Calculation of the UCL is dependent on the distribution of the sample set. The sample set distributions were determined using the Shapiro-Wilk W-test (Gilbert, 1987). When the results of the test were inconclusive, the distribution was assumed to be lognormal. For data sets with less than 10 samples, the UCL is considered to be a poor estimate of the mean, and the exposure concentration is defined as the maximum detection. The exposure point concentrations for the COPCs are presented in Tables 4-3 and 4-4 for surface soil and sediment, respectively. Maximum concentrations were used to evaluate risks for surface soil and sediment. The maximum concentration was used for Aroclor-1260 in surface soil and arsenic in sediment because the datasets contained less than ten samples and the maximum concentrations were used for Aroclor-1254 and Aroclor-1260 in sediment because the 95 percent UCLs exceeded the maximum concentrations. The calculations of the UCLs for Site 47 are provided in

Appendix B.3. The exposure point concentrations are compared to the Region III RBCs to derive a streamlined estimate of risk for residential and industrial exposures.

### 4.4.3. Toxicity Assessment

The toxicity assessment for COPCs examines information concerning the potential human health effects of exposure to COPCs. The goal of the toxicity assessment is to provide for each COPC a quantitative estimate of the relationship between the magnitude and type of exposure and the severity or probability of human health effects. In this streamlined risk evaluation, toxicity values are already incorporated into the RBCs. An assumption that exposure at the site is equivalent to the exposure used to derive the RBCs precludes the need to outline the toxicological indices for each COPC.

### 4.4.4 Risk Characterization

Risks from COPCs are calculated for either carcinogenic or noncarcinogenic effects. In this streamlined evaluation, risks are calculated by performing a ratio comparison to the Region III residential and industrial RBCs. For carcinogenic effects, the total cancer risk (TCR) is represented by the following equation:

$$TCR = \Sigma_i \ (EPC/RBC)_i \times 10^{-6}$$

where

| | | |
|---|---|---|
| TCR | = | total cancer risk |
| i | = | carcinogenic COPC |
| EPCi | = | exposure point concentration |
| RBCi | = | risk-based concentration |

The value represents a probability of an individual developing cancer over a lifetime as a result of exposure to a potential carcinogen. Risks below $10^{-6}$ (1/1,000,000 or a risk of less than one in one million) are generally considered to be acceptable by the EPA, and risks greater than $10^{-4}$ (1/10,000) are generally considered to be unacceptable by the EPA. Because the Region III RBCs for soil only consider one exposure route (i.e., ingestion) and the dermal and inhalation exposures are not considered, the target risk level for this streamlined risk assessment is set at 5.0E-05 (1/20,000) to account for all applicable exposure pathways.

For noncarcinogenic effects, the total hazard ratio (THR) is represented by the following equation:

$$THR = \Sigma_j \ (EPC/RBC)_j$$

where

| | | |
|---|---|---|
| THR | = | total hazard ratio for systemic toxic effects |
| j | = | systemic toxicant COPC |

According to USEPA guidelines, the goal for noncarcinogenic health effects for a typical baseline risk assessment in one (1). However, because the Region III RBCs for soil only consider one exposure route (i.e., ingestion) and the dermal and inhalation exposures are not considered, the target level for this streamlined risk assessment is set at 0.5 to account for all applicable exposure pathways. The THR should not be construed as a probability in the manner of the TCR but rather as a numerical indicator of the extent to which a predicted intake exceeds or is less than the chemical's reference dose. The reference dose is the threshold concentration above which systemic effects are likely to occur.

The risks for surface soil and sediment are presented in Tables 4-3 and 4-4, respectively.

### 4.4.5 Results of the Risk Characterization

The results of the streamlined risk evaluation indicate that risks are unacceptable for residential exposure to surface soil. The total cancer risk (6.6E-04) is greater than the streamlined risk assessment target risk of 5.0E-5. The primary contributor to the TCR is Aroclor-1260. Industrial exposure to surface soil results in a cancer risk that also exceeds the target risk level. No noncarcinogenic chemicals were identified as COPCs in surface soil at Site 47.

The results of the risk evaluation for sediment at Site 47 indicate that risks are unacceptable. The risk assessment results for sediment are based on the assumption that potential future residents are exposed to the sediment with the same frequency as soil (i.e., 350 days per year, the frequency value used to calculate the residential soil RBCs). The total hazard ratio (7.5) based on exposure to Aroclor-1254 is greater than 0.5, which indicates that there is a potential for noncarcinogenic effects to occur. The total cancer risk (1.2E-03) is greater than target risk level of 5.0E-5. The primary contributors to the TCR are Aroclor-1254 and Aroclor-1260. For Industrial exposure to sediment, the hazard ratio is less than 0.5 but the cancer risk (1.4E-04) exceeds the streamlined risk assessment's target risk level.

### 4.4.6 Characterization of Uncertainty

There is uncertainty associated with all aspects of the streamlined risk evaluation. Uncertainty in the selection of COPCs is associated with the current status of the predictive databases and the procedures

used to include or exclude constituents as COPCs. Arsenic was identified as a COPC in sediment because the maximum concentration exceeded the risk-based screening level and because it was not detected in sediment background samples. However, the maximum concentration of arsenic (0.79 mg/kg) in sediment is less than the maximum background soil concentrations found at NSWC-White Oak. Therefore, the concentrations of arsenic at the site may be within naturally occurring levels and risks calculated for this metal may be overestimated.

Uncertainty in the toxicity assessment and ultimately the derivation of RBCs include the quality of the existing data to support dose-response relationships and the weight of evidence used for determining the carcinogenicity of COPCs.

Uncertainty associated with the exposure assessment includes the values used as input variables for an exposure pathway, the methods used and assumptions made to determine exposure point concentrations. The Region III RBCs used in the risk evaluation were based on soil ingestion only (dermal contact and inhalation are not considered in the calculation of the RBCs). This may result in an underestimation of risk because the calculated risks are based on only one exposure route. In this evaluation, maximum concentrations were used as exposure point concentrations for some COPCs. Maximum concentrations were used to evaluate risks because the dataset for surface soil contained less than ten samples and the 95 percent UCLs exceeded the maximum concentrations for sediment. The use of maximum concentrations is likely to overestimate potential risks. Potential receptors are assumed to be exposed to soil and sediment for the same frequency and duration. The fact that exposure to sediment is assumed to be the same as exposure to soil may tend to overestimate potential risks for sediment because exposure to sediment is generally expected to be less than exposure to soil.

Uncertainty in the risk characterization includes that associated with exposure to multiple chemicals and the cumulative uncertainty from combining conservative assumptions made in earlier activities.

## 4.5 IDENTIFICATION AND ANALYSIS OF REMOVAL ACTION ALTERNATIVES

The removal action alternatives for Site 47 are as follows:

- Alternative 1: No Action
- Alternative 2: Excavation, On-Site Treatment, Off-Site Landfill Disposal, and Site Restoration
- Alternative 3: Excavation, Off-Site Landfill Disposal, and Site Restoration
- Alternative 3: Containment (Multi-Layer cover)

These alternatives were developed based on the technologies retained from the preliminary screening presented in Section 2.5 and summarized in Section 2.6. Alternative 1 will provide a comparative

baseline as required by the NCP. Alternatives 2, 3, and 4 were developed so that a comparison could be made between on-site treatment prior to off-site disposal, off-site disposal with no pre-treatment, and containment of the material on site.

The following sections will describe these removal action alternatives and evaluate each one based on effectiveness, implementability, and cost, as outlined in Guidance on Conducting Non-Time-Critical Removal Actions Under CERCLA (EPA, 1993).

### 4.5.1 Alternative 1: No Action

The no-action alternative is evaluated to provide a comparative baseline against which other alternatives can be evaluated. Under this alternative, no removal action would be taken and the site would be left as is, without implementing any removal, treatment, or mitigating actions.

#### 4.5.1.1 Effectiveness

Alternative 1 does not provide an effective solution for the PCB-contaminated soil and sediment present at Site 47, does not achieve the removal action objectives, and does not comply with ARARs.

#### 4.5.1.2 Implementability

Under Alternative 1, no removal action would be taken; therefore, there would not be any difficulties or uncertainties associated with implementation.

#### 4.5.1.3 Cost

There are no capital, operation, maintenance, or monitoring costs associated with this alternative.

### 4.5.2 Alternative 2: Excavation, On-Site Treatment, Off-Site Disposal, and Site Restoration

Under Alternative 2, 0.5 cubic yard of contaminated sediment from the catch basin and storm sewer and 1,180 cubic yards of contaminated sediment and soil within the drainage channel and along the channel embankments would be excavated, treated on site, and disposed in a municipal solid waste landfill. The excavated areas would be backfilled to existing grade with imported, clean material. Abandoned storm sewer pipes in the vicinity of Building 90 would also be excavated, demolished, and disposed. The pipes would not be replaced.

Site 47 is within the boundary of property transferred within the Federal government for commercial/industrial use for the foreseeable future. Institutional controls will be implemented through a land use control assurance plan.

The preliminary technology screening presented in Table 2-4 identified four viable technologies for on-site treatment of PCB-contaminated soil. Rather than evaluating each on-site treatment technology individually, high-temperature thermal desorption was selected as a representative on-site treatment technology because it is a proven technology and mobile units are readily available. The effectiveness of solvent extraction and dehalogenation on PCB-contaminated soil is less certain. Additionally, dehlogenation systems are not yet commercially available and moisture content (sediments) adversely impact product performance when using solvent extraction. On-site incineration of PCB-contaminated soil and sediment would not be cost beneficial considering the small amount of excavated material requiring treatment.

Thermal desorption is a physical separation process that uses direct or indirect heating to thermally desorb or volatilize organic contaminants; it has also been proven effective for PCBs. The process is not designed to destroy organics. There are two types of thermal desorption processes: low temperature and high temperature. Low-temperature thermal desorption (LTTD) is less effective in treating PCB-contaminated soil. High-temperature thermal desorption (HTTD) is a full-scale technology in which wastes are heated to 320° to 560° C (600° to 1,000° F). Thermal desorption systems are available as portable, skid-mounted systems for use on site.

Typically, wastes are processed through an externally fired pug mill or rotary drum system equipped with heat transfer surfaces that are heated by circulating hot oil. An induced airflow conveys the desorbed organic chemicals through a secondary treatment system, such as a granular activated carbon adsorption, catalytic oxidation, or condenser unit. The treated off-gas is then discharged through a stack.

Bed temperatures and typical residence times will cause selected contaminants to volatilize but not be oxidized. Soils and sediments with water contents greater than 20 to 25 percent may require the installation of a dryer in the feed system to reduce the energy required to heat the soil. Some volatilization of contaminants occurs in the dryer, and the gases are routed to the thermal treatment chamber. A process flow diagram is provided on Figure 3-6.

Since the temperatures to be used are contaminant and matrix specific, further evaluation would be needed to determine the exact parameters of the thermal desorption system. A bench-scale or pilot-scale treatability study would need to be conducted to determine operating parameters and effectiveness prior to full-scale operations. Information necessary to evaluate the applicability of the technology includes

soil/sediment moisture content and classification, texture, mercury content, chlorine content, pH, and the appropriate temperature for treatment.

Conventional excavation equipment would be employed to excavate and backfill the site. Areas to be excavated would be cleared of vegetation. The areas would be returned to existing grade with clean fill material and vegetated. Verification sampling of the excavation walls and floors would be conducted to confirm that PRGs have been met and contaminant levels in the remaining soils and sediments fall below permissible regulatory limits. Abandoned storm sewer pipes in the vicinity of Building 90 would also be excavated, demolished, and disposed. Wipe samples to determine whether there is PCB contamination on the pipes may also be necessary. All work would be performed in compliance with a site-specific HASP and OSHA regulations.

#### 4.5.2.1 Effectiveness

This alternative complies with ARARs and would achieve the removal action objectives. The alternative would be protective of human health and the environment. Compliance with OSHA regulations and procedures set forth in a site-specific HASP would ensure protection of workers during implementation of the removal action.

Transportation of the material off site slightly increases the potential for human exposure due to a spill or accident. However, the low levels of contaminants present are not expected to pose a significant risk. This alternative would reduce the toxicity of the PCBs by thermal destruction. The volume of material would ultimately be unchanged, because it would be landfilled elsewhere, and mobility would not be affected.

#### 4.5.2.2 Implementability

This alternative is technically feasible. Techniques to excavate materials similar to those at Site 47 are common. Mobile units and contractors are readily available to perform on-site thermal desorption and the technology has been proven to be effective for soils contaminated with PCBs. A bench-scale or pilot-scale treatability study would be required to establish specific parameters and requirements. This alternative could be implemented in less than 1 year.

Off-gas from the thermal treatment unit would require treatment and the appropriate state agencies would have to be contacted to determine the degree of treatment required. The substantive requirements of a RCRA hazardous waste TSDF would have to be met by an on-site thermal desorption system. Such a system would also have to meet the substantive requirements of applicable air pollution regulations. Other state and local permits for operation of the treatment system on site may also be required.

The equipment needed to implement this alternative is readily available. Standard equipment can be used to excavate and restore the site. Thermal desorption systems can treat between 50 and 150 cubic yards of contaminated soil per day. For this alternative, treatment would require 12 days, assuming a production rate of 100 cubic yards per day. Landfill capacity for municipal waste is readily available. Site-specific PRGs would have to be developed or identified prior to implementation.

A large, open area is required to stage the treatment unit and treated soil. There are open, paved areas within and adjacent to the site that could be used for these purposes.

The removal action would require acceptance and implementation of an erosion and sediment control plan, but erosion and sediment control requirements are not expected to be significant due to the minimal earth disturbance that is required.

The removal area is contained within the facility and, therefore, no easements or impacts to adjoining properties are anticipated. The location and presence of some buried utilities in the vicinity of Site 47 may be unknown. There are overhead utility lines near Building 90.

#### 4.5.2.3 Cost

A detailed cost estimate for this alternative is provided in Appendix B.4. The capital cost associated with this alternative is approximately $1,600,000. There are no long-term operation, maintenance, or monitoring costs associated with this alternative.

### 4.5.3 Alternative 3: Excavation, Off-Site Landfill Disposal, and Site Restoration

Under Alternative 3, soil and sediment at Site 47 contaminated with PCBs concentrations greater than the TSCA clean-up goal of 1 mg/kg for "high occupancy areas" (1,180.5 cubic yards) would be excavated to and disposed off site in a RCRA Subtitle D Landfill. The excavated areas would be backfilled to existing grade with imported, clean material. Abandoned storm sewer pipes in the vicinity of Building 90 would also be excavated, demolished, and disposed. The pipes would not be replaced.

Site 47 is within the boundary of property transferred within the Federal government for commercial/industrial use for the foreseeable future. Institutional controls would be implemented through a land use control assurance plan.

Conventional excavation equipment would be employed to excavate the soil/sediment and backfill the site. Areas to be excavated would be cleared of vegetation. Abandoned storm sewer pipes in the vicinity

of Building 90 will also be excavated, demolished, and disposed. Wipe samples to determine whether there is PCB contamination on the pipes may also be necessary. The areas would be restored with clean fill material and vegetated. Verification sampling of the excavation walls and floors would be conducted to confirm that PRGs have been met and contaminant levels in the remaining soils and sediments fall within regulatory limits. All work would be performed in compliance with a site-specific HASP and OSHA regulations.

#### 4.5.3.1 Effectiveness

This alternative complies with ARARs and would achieve the removal action objectives. This alternative would be protective of human health and the environment. Compliance with OSHA regulations and procedures set forth in a site-specific HASP would ensure protection of workers during implementation of the removal action.

Transportation of the material off site slightly increases the potential for human exposure due to a spill or accident. However, based on the risk assessment in Section 4.4, the low levels of contaminants present would not pose a significant risk. Toxicity, mobility, and volume would not be affected by this alternative.

#### 4.5.3.2 Implementability

This alternative is technically feasible. Techniques to excavate materials similar to those at Site 47 are common. This alternative could be implemented in less than 1 year.

The equipment needed to implement this alternative is readily available. Standard equipment can be used to excavate and restore the site. Site-specific PRGs would have to be developed or identified prior to implementation. Landfill capacity is readily available.

The removal action would require acceptance and implementation of an erosion and sediment control plan, but erosion and sediment control requirements are not expected to be significant due to the minimal earth disturbance that is required. The removal area is contained within the facility and, therefore, no easements or impacts to adjoining properties are anticipated. The location and presence of some buried utilities in the vicinity of Site 47 may be unknown. There are overhead utility lines near Building 90.

#### 4.5.3.3 Cost

A detailed cost estimate for this alternative is provided in Appendix B.4. The capital cost associated with this alternative is approximately $760,000. There are no long-term operation, maintenance, or monitoring costs associated with this alternative.

### 4.5.4 Alternative 4: Containment (Multi-Layer Cover)

This alternative would involve the installation of a cover system within the drainage ditch of Site 47 and along the banks where soil and sediment contamination is located. In addition, any pipes upstream near the source area would be removed and disposed. The cover would prevent direct exposure to the PCB-contaminated soil and sediment by human and ecological receptors and also would significantly reduce the potential for migration of PCBs downstream. The design of the cover system may present the necessity of slight contour adjustments to the subgrade for the overall performance of the cover system, although the movement of impacted soil and sediment would be kept to a minimum and would result in no net change in soil or sediment volume.

The limits of the cover and final cover components would be determined during the final design of the remedial action for Site 47. Field test kits may be used for the general screening of the limits of the cover system. The total area of the cover would be approximately 2.6 acres. The additional cover material that would be required to blend the cover system into the existing sides of the drainage ditch is accounted for in the increased area. The cover components from the bottom to the top would tentatively include the following:

- Geosynthetic layer.
- Cover soil consisting of a minimum thickness of 18-inch fill material.
- Vegetative supportive layer consisting of 6 inches of topsoil or soil amended and capable of sustaining vegetation.

Areas surrounding the cover system would be blended into the cover to protect the remedy from erosion. The cap may be designed to promote drainage through the tributary, to allow a uniform sheet flow of the surface water over the cover, or to incorporate perimeter drainage features to channel run-on as well as runoff. Permanent erosion-control measures would be installed where surface water would be concentrated and where the cap discharges into the existing drainage features. Temporary surface water controls would be installed during the installation of the cover system.

After the restoration and vegetation of the areas surrounding the cover system, institutional controls would be implemented at Site 47. These controls may include land use and future site disturbance restrictions. Land use restrictions on the cover area, preventing disturbance of the cover system, would be included in the Land Use Control Plan (LUCAP) or similar plan. Long-term maintenance would be performed on the cover system to ensure the effectiveness of the remedy. Maintenance may include repairing soil erosion, repairing vegetation, and clearing of drainage features.

Downstream sediment monitoring would be completed after installation of the cover system. A detailed monitoring plan would be developed and followed during the effort. The results of the monitoring would be used to evaluate the effectiveness of the corrective action and to determine if additional actions are necessary. The screening criteria that would be used to evaluate the effectiveness of the action would be defined in the monitoring plan. The corrective action would be reviewed every 5 years with sampling annually for 30 years.

#### 4.5.4.1 Effectiveness

This alternative complies with ARARs, and installation and maintenance of the cover system, along with monitoring and institutional controls, would be an effective long-term corrective action. Containment of impacted media would be protective of human health and the environment by preventing direct exposure. Furthermore, the cover would minimize the amount of potential contaminant migration of PCBs downstream. The containment alternative may pose short-term exposure to impacted media during minor regrading and initial cover layer placement. Compliance with OSHA regulations and procedures set forth in the site-specific HASP would ensure protection of workers during implementation.

The toxicity and volume of impacted media would not be reduced with this alternative. The mobility of contaminants would be reduced with the construction and long-term maintenance of the cover system.

#### 4.5.4.2 Implementability

This alternative is technically feasible. Techniques to contain materials with a cover system similar to those at Site 47 are common. After the design is completed, the alternative could be implemented in less than 1 year.

Cover components and qualified contractors are typically available to implement this alternative. Restrictions for future property use would involve legal assistance and regulatory approval. Site inspections, maintenance, and sampling and analysis activities can also be readily implemented.

#### 4.5.4.3 Cost

A detailed cost estimate for this alternative is provided in Appendix B.4. The capital cost associated with this alternative is approximately $1,100,000 and 30-year operation and maintenance costs of $4,500. The total cost of Alternative 4 is $1,220,000.

## 4.6 COMPARATIVE ANALYSIS OF REMOVAL ACTION ALTERNATIVES

This section presents a comparative analysis of the corrective measure alternatives in Section 4.5. The standards for comparison are identical to those presented for the detailed analysis of the individual alternatives. Table 4-5 provides a summary of the comparative analysis presented below.

### 4.6.1 Effectiveness

Except for the no-action alternative, the alternatives comply with ARARs and meet the objectives. The action-oriented alternatives are protective of human health and the environment, unlike the no-action alternative. Alternatives 2 and 3 provide options that would permanently remove the risk from contaminants and are the most protective of human health and the environment.

The no-action alternative is ineffective in the long term because the contaminated soil and sediment would remain, posing risk to future land users. Alternatives 2 and 3 are equally effective in the long term. Alternative 2 would reduce the toxicity of the soil by destroying the PCBs, but volume and mobility would ultimately be unchanged. Alternative 3 is slightly less effective because it would not reduce the toxicity of the material. Implementation of institutional controls under Alternative 4 would provide added assurance of protection of human health and the environment. Land use restrictions limit future access to the site and prevent disturbance of the cover system. Sediment sampling would be used to verify that the corrective action is effective.

### 4.6.2 Implementability

The no-action alternative is the most easily implemented of the four alternatives because no action would be taken and, therefore, there would not be difficulties or uncertainties associated with implementation.

The technologies to be used under Alternatives 2 and 3 are well proven. Equipment and materials are readily available from vendors, suppliers, and subcontractors. Landfill capacity is readily available. However, Alternative 2 would be more difficult to implement since the option would require a treatability study during the design to optimize the treatment system.

Alternative 4 is moderately implementable. Resources, equipment, and materials for the cover construction are readily available. Services for construction and maintenance of the cover are also readily available. Sediment monitoring would be easily implemented at the site after construction of the cover. Site grading and cover design would be needed prior to implementation.

Alternative 3 would be expected to be easier to implement than Alternatives 2 and 4. Except for procurement of the appropriate disposal facility and arrangement for transportation, this option would not require an extended planning phase or design. Limits of excavation and site restoration would need to be designed.

The administrative implementability of the long-term monitoring of Alternative 4 would be relatively easy as long as GSA retains ownership of the site. If the federal government were to sell the property, continued site security and maintenance and monitoring of the cover would be required. In addition, any transfer of property must be accompanied by land use restrictions, which would involve legal procedures. Alternatives 2 and 3 would not require any long-term maintenance or monitoring.

The PRGs would not be met with the implementation of Alternative 1. Alternatives 2 and 3 would either treat or remove materials above the PRGs. These options would permanently meet the media clean-up standards for Site 47. Excavation under Alternatives 2 and 3 would continue until confirmatory sampling indicates that the remaining soil and sediment have concentrations of COCs below the selected PRGs. Alternative 4 would prevent exposure to impacted material. The limitation to exposure pathways would reduce the risk to human receptors and therefore would meet the PRGs for direct contact.

### 4.6.3 Cost

Detailed cost estimates for the removal action alternatives are provided in Appendix B.4 and are summarized in Table 4-5.

## 4.7 RECOMMENDED REMOVAL ACTION

Alternative 3 is the recommended removal action for Site 47. It most effectively addresses the objectives and complies with ARARs. It is also easier to implement than Alternatives 2 and 4 and is much lower in cost. No long-term monitoring or maintenance is associated with Alternative 3. The no-action alternative was eliminated because it is ineffective and does not comply with the objectives and ARARs.

This page intentionally left blank.

TABLE 4-1

SUMMARY OF ANALYTICAL DATA AND SCREENING CRITERIA - SURFACE SOIL
SITE 47 EE/CA
NSWC-WHITE OAK, SILVER SPRING, MARYLAND

| Parameter | Frequency of Detection[1] | Range of Detected Concentrations | Location of Maximum | Background[2] | Human Health Screening Levels | Ecological Screening Levels | |
|---|---|---|---|---|---|---|---|
| | | | | | Residential RBC[3] | Soil Risk-Based Levels[4] | |
| | | | | | | Gneiss Soil Type | Sand and Gravel Soil Type |
| **PESTICIDES/PCBs (mg/kg)** | | | | | | | |
| Aroclor 1260 | 8/8 | 0.099 - 210 | 0047-SS-03 | NA | 0.32 | NC | NC |
| Total PCBs | | | | | | 2.4[5] | 2.4[5] |

1 Duplicate samples are not included in the total number of samples presented.
2 Background Concentrations for Surface Soil at NSWC-White Oak. TtNUS, 1998b. (represented by the UCL).
3 EPA, Region III, May 2001. For noncarcinogens, values represent 0.1 times the RBC.
4 Basewide Ecological Risk Asessment for NSWC, White Oak (TtNUS, March 2001).
5 Based on risks to terrestrial wildlife through food chain modeling; level is an average concentration.
NA - Not Applicable.
NC - Not Calculated
Shaded cell indicates maximum concentration exceeded the screening level for that parameter.

TABLE 4-2

SUMMARY OF ANALYTICAL DATA AND SCREENING CRITERIA - SEDIMENT
SITE 47 EE/CA
NSWC-WHITE OAK, SILVER SPRING, MARYLAND

| Parameter | Frequency of Detection[1] | Range of Detected Concentrations | Location of Maximum | Background[2] | Human Health Screening Levels | Ecological Screening Levels |
|---|---|---|---|---|---|---|
| | | | | | Residential RBC[3] | Sediment[4] |
| **SEMIVOLATILE ORGANICS (mg/kg)** | | | | | | |
| Benzo(a)anthracene | 1/2 | 0.054 | 11SD1010001 | NA | 0.87 | NC |
| Benzo(b)fluoranthene | 1/2 | 0.054 | 11SD1010001 | NA | 0.87 | NC |
| Chrysene | 1/2 | 0.058 | 11SD1010001 | NA | 87 | NC |
| Fluoranthene | 1/2 | 0.14 | 11SD1010001 | NA | 310 | NC |
| Phenanthrene | 1/2 | 0.068 | 11SD1010001 | NA | 160[5] | NC |
| Pyrene | 1/2 | 0.073 | 11SD1010001 | NA | 230 | NC |
| Total PAHs | | | | | | NC |
| **PESTICIDES/PCBs (mg/kg)** | | | | | | |
| alpha-Chlordane | 1/1 | 0.16 | 11SD1000001 | 0.00093 | 1.8 | NC |
| Aroclor 1254 | 2/27 | 3.5 - 12 | 11SD1000001 | NA | 0.32 | NC |
| Aroclor 1260 | 27/27 | 0.18 - 380 | 0047-SD-02 | NA | 0.32 | NC |
| Total PCBs | | | | | | 0.10[6]/1.0[7] |
| Dieldrin | 1/1 | 0.03 | 11SD1010001 | 0.0024 | 0.04 | NC |
| Endosulfan II | 2/2 | 0.17 - 0.2 | 11SD1000001 | NA | 47[8] | NC |
| Endrin Aldehyde | 2/2 | 0.19 - 0.22 | 11SD1010001 | NA | 2.3[9] | NC |
| **INORGANICS (mg/kg)** | | | | | | |
| Aluminum | 2/2 | 443 - 570 | 11SD1010001 | 12963 | 7800 | NC |
| Arsenic | 1/2 | 0.79 | 11SD1000001 | NA | 0.43 | NC |
| Barium | 2/2 | 3.4 - 3.7 | 11SD1010001 | 89.9 | 550 | NC |
| Chromium | 2/2 | 2.9 - 8.4 | 11SD1010001 | 25.3 | 23[10] | NC |
| Cobalt | 2/2 | 0.37 - 2 | 11SD1010001 | 11.59 | 470 | NC |
| Copper | 1/2 | 11.2 | 11SD1010001 | 31.18 | 310 | NC |
| Iron | 2/2 | 1820 - 1990 | 11SD1010001 | 19427 | 2300 | NC |
| Lead | 2/2 | 2.7 - 5.4 | 11SD1010001 | 29.5 | 400[11] | NC |
| Magnesium | 1/2 | 3200 | 11SD1010001 | 3410 | -- | NC |
| Manganese | 2/2 | 23.5 - 58.5 | 11SD1010001 | 523 | 160 | NC |
| Mercury | 2/2 | 0.23 - 0.4 | 11SD1000001 | 0.31 | 2.3 | 1.5[7] |
| Nickel | 2/2 | 1.5 - 36.8 | 11SD1010001 | 17.25 | 160 | NC |
| Vanadium | 2/2 | 2.2 - 3.3 | 11SD1000001 | 17.13 | 55 | NC |

1 Duplicate samples are not included in the total number of samples presented.
2 Background Concentrations for sediment at NSWC-White Oak. TtNUS, 1998b. (represented by the UCL).
3 EPA, Region III, May 2001. For non carcinogens, values represent 0.1 times the RBC.
4 Basewide Ecological Risk Asessment for NSWC, White Oak (TtNUS, March 2001).
5 Value for naphthalene used.
6 Based on risks to piscivorous wildlife; level is an average concentration.
7 Based on risks to benthic invertebrates
8 Endosulfan is used as a surrogate for Endosulfan II.
9 Endrin is used as a surrogate for Endrin Aldehyde.
10 Value for hexavalent chromium used.
11 Office of Solid Waste and Emergency Response (OSWER) Standard for Lead, Residential.
NA = Not Applicable.
NC - Not Calculated
Shaded cell indicates maximum concentration exceeded screening level for that parameter.

## TABLE 4-3

## STREAMLINED RISK EVALUATION-SURFACE SOIL
## SITE 47 EE/CA
## NSWC-WHITE OAK, SILVER SPRING, MARYLAND

| Parameter | Exposure Point Concentration [1] | Region III RBC[2] | | Risk Ratios (unitless) | |
|---|---|---|---|---|---|
| | | Residential | Industrial | Residential | Industrial |
| **Carcinogens (mg/kg)** | | | | **Carcinogenic Risk** | |
| Aroclor 1260 | 210 | 0.32 | 2.9 | 6.6E-04 | 7.2E-05 |
| | | **Total Cancer Risk** | | **6.6E-04** | **7.2E-05** |
| **Noncarcinogens (mg/kg)** | | | | | |
| **NA** | | | | | |
| | | **Total Hazard Ratio** | | **NA** | **NA** |

1 Maximum concentration is used as the exposure point concentration because the dataset consists of less than 10 samples.
2 EPA, Region III, October 2000.

## TABLE 4-4

## STREAMLINED RISK EVALUATION - SEDIMENT
## SITE 47 EE/CA
## NSWC-WHITE OAK, SILVER SPRING, MARYLAND

| Parameter | Exposure Point Concentration [1] | Region III RBC[2] | | Risk Ratios (unitless) | |
|---|---|---|---|---|---|
| | | Residential | Industrial | Residential | Industrial |
| **Carcinogens (mg/kg)** | | | | **Carcinogenic Risk** | |
| Aroclor 1254 | 12 | 0.32 | 2.9 | 3.8E-05 | 4.1E-06 |
| Aroclor 1260 | 380 | 0.32 | 2.9 | 1.2E-03 | 1.3E-04 |
| Arsenic | 0.79 | 0.43 | 3.8 | 1.8E-06 | 2.1E-07 |
| | | **Total Cancer Risk** | | **1.2E-03** | **1.4E-04** |
| **Noncarcinogens (mg/kg)** | | | | | |
| Aroclor 1254 | 12 | 1.6 | 42.4 | 7.5 | 0.28 |
| Arsenic | 0.79 | 23 | 610 | 0.03 | 0.001 |
| | | **Total Hazard Ratio** | | **7.5** | **0.28** |

1 Summary table of exposure point concentration calculations is presented in Appendix B.3.
Maximum concentrations for PCBs are used as the EPCs because the 95% UCLs exceeded the maximun
2 EPA, Region III, October 2000.

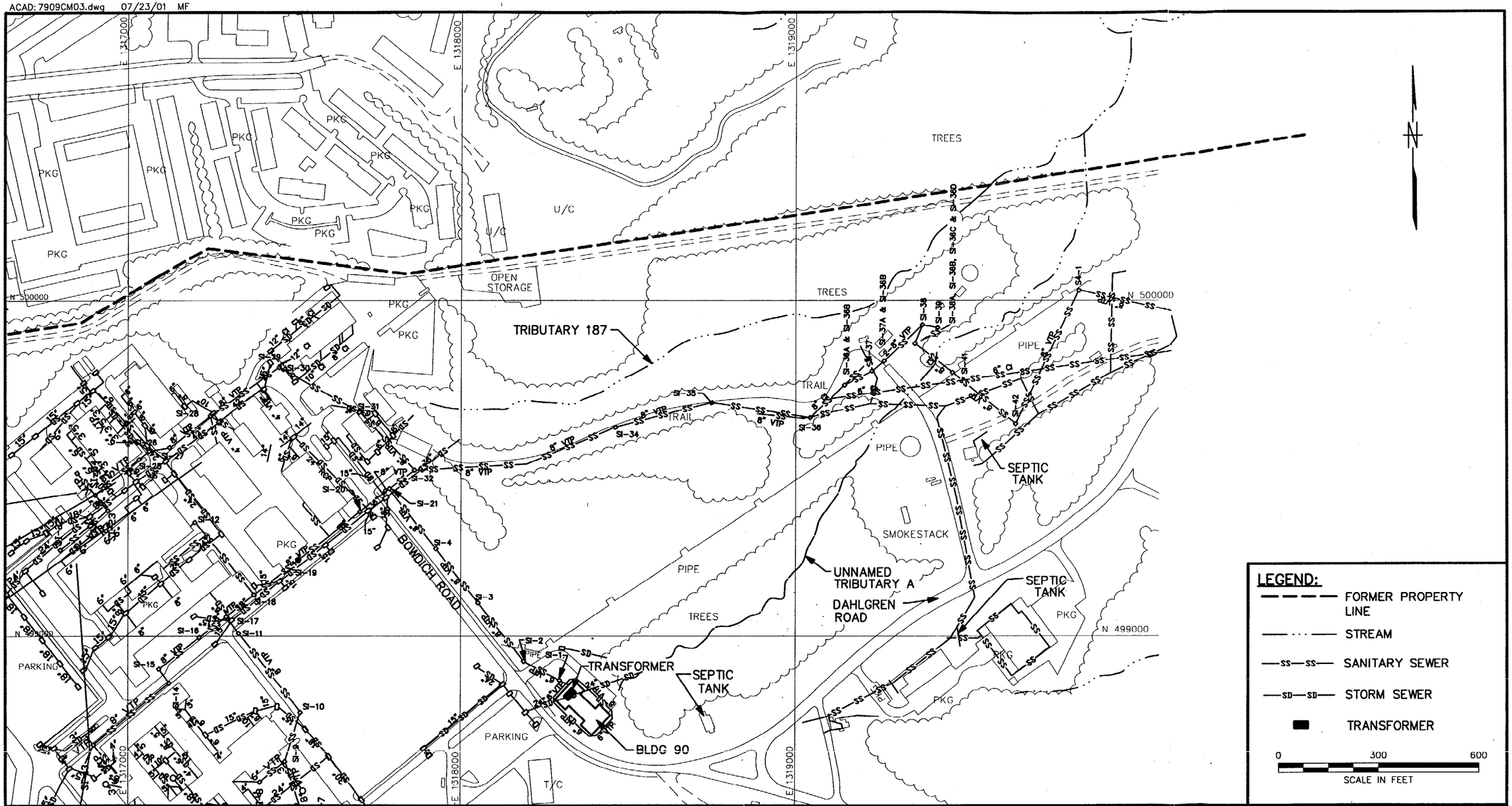
TABLE 4-5

SITE 47 – SUMMARY COMPARISON OF REMOVAL ACTION ALTERNATIVES
SITE 28 AND SITE 47 EE/CA
NSWC-WHITE OAK, SILVER SPRING, MARYLAND

| No. | Alternative | Effectiveness | Implementability | Compliance with ARARs | Off-site Treatment/ Disposal Required | Capital Cost | Total 30-Year O&M Cost | Total Present Worth Cost for Alternative |
|---|---|---|---|---|---|---|---|---|
| 1 | No Action | Low | High | No | No | $0 | $0 | $0 |
| 2 | Excavation, On-Site Treatment, Off-site Landfill Disposal, and Site Restoration | High | Moderate | Yes | Yes | $1,600,000 | $0 | $1,600,000 |
| 3 | Excavation, Off-Site Landfill Disposal, and Site Restoration | High | High | Yes | Yes | $760,000 | $0 | $760,000 |
| 4 | Containment | Moderate | Moderate | Yes | No | $1,100,000 | $4,500 | $1,220,000 |

This page intentionally left blank.

ACAD: 7909CM03.dwg 07/23/01 MF




| NO. | DATE | REVISIONS | BY | CHKD | APPD | REFERENCES |
|---|---|---|---|---|---|---|
| | | | | | | |

DRAWN BY HJP DATE 2/15/01
CHECKED BY KMS DATE 7/24/01
COST/SCHED-AREA
SCALE AS NOTED

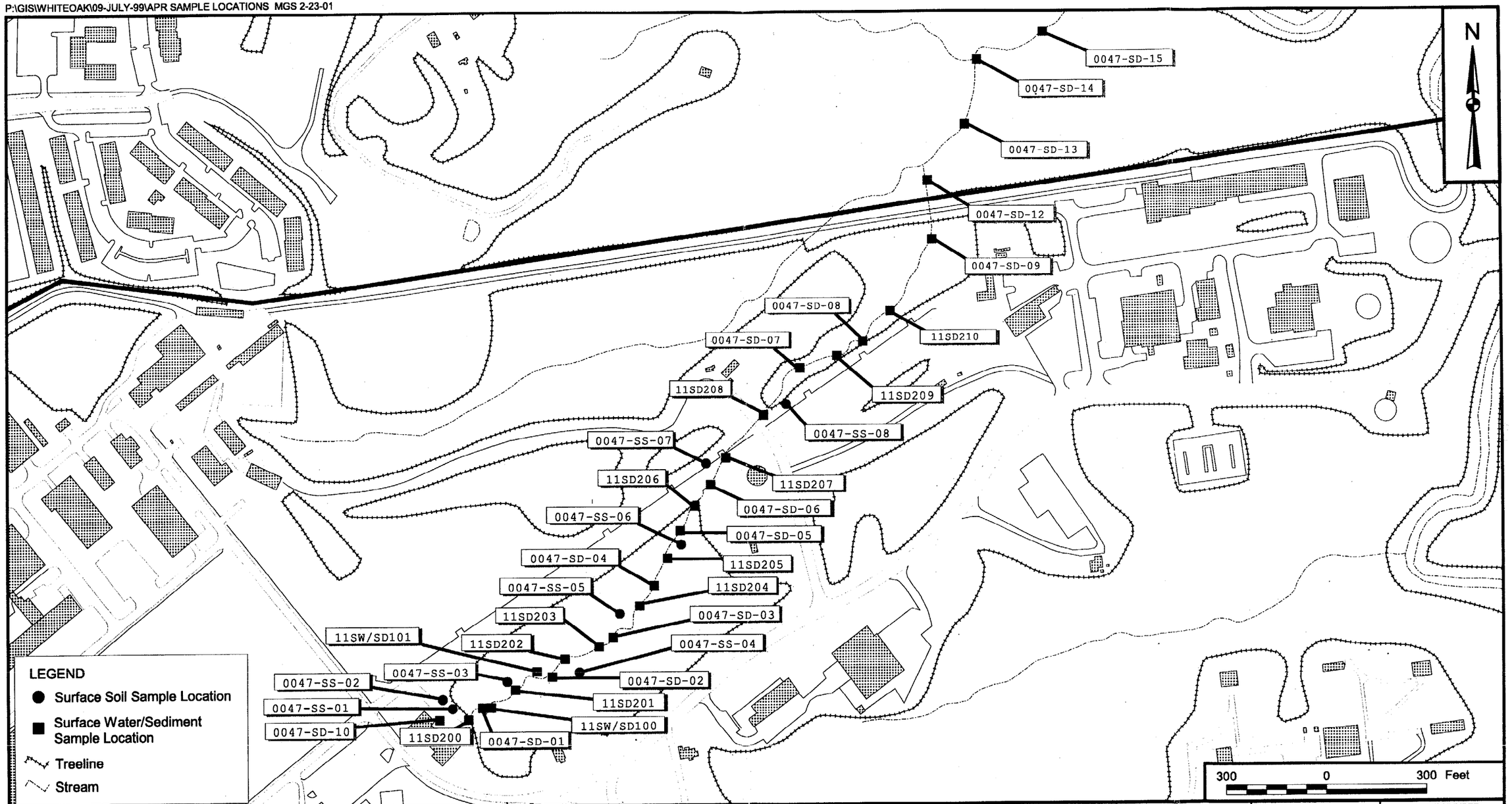
Tetra Tech NUS, Inc.

SITE LAYOUT MAP
SITE 47 – BUILDING 90 DRAINAGE
SITE 28 AND SITE 47 EE/CA
FORMER NSWC WHITE OAK
SILVER SPRINGS, MARYLAND

CONTRACT NO. 7909
OWNER NO. 0315
APPROVED BY SFN
DATE 7/24/01
APPROVED BY
DATE
DRAWING NO. FIGURE 4-1
REV. 0

FORM CADD NO. TtNUS_BH.DGN - REV 0 - 1/20/98

P:\GIS\WHITEOAK\09-JULY-99\APR SAMPLE LOCATIONS MGS 2-23-01



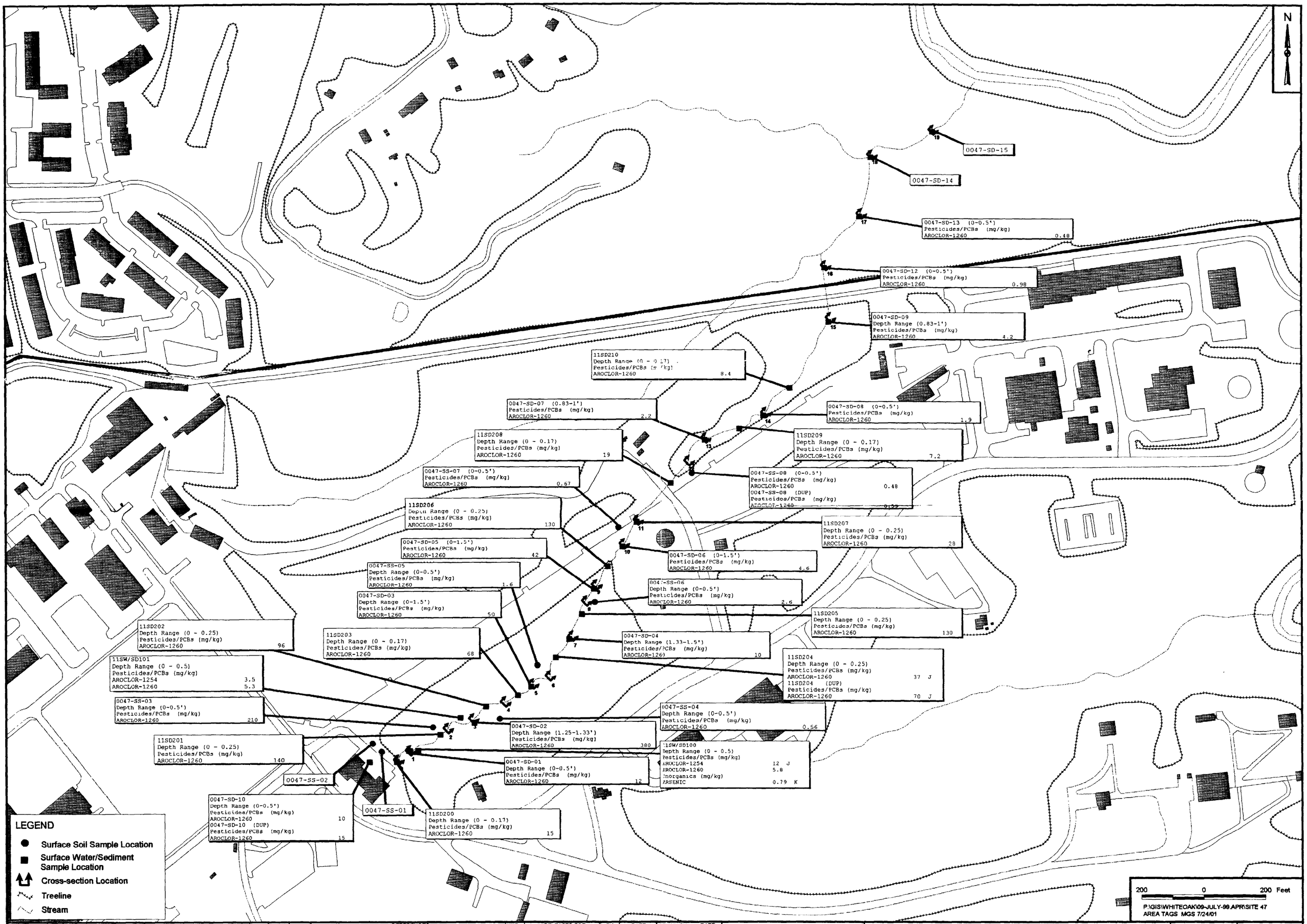

| NO. | DATE | REVISIONS | BY | CHKD | APPD | REFERENCES |
|---|---|---|---|---|---|---|
| | | | | | | |

| | |
|---|---|
| DRAWN BY M. Spangenberg | DATE 2-20-01 |
| CHECKED BY KMS | DATE 3/6/01 |
| COST/SCHEDULE-AREA | |
| SCALE AS NOTED | |

Tetra Tech NUS, Inc.

SAMPLE LOCATIONS
SITE 47 - BUILDING 90 DRAINAGE
SITE 28 AND SITE 47 EE/CA
FORMER NSWC WHITE OAK
SILVER SPRING, MARYLAND

| | |
|---|---|
| CONTRACT NUMBER 7909 | OWNER NUMBER 315 |
| APPROVED BY SN | DATE 3/6/01 |
| APPROVED BY — | DATE — |
| DRAWING NO. FIGURE 4-2 | REV 0 |




| NO | DATE | REVISIONS | BY | CHKD | APPD | REFERENCES | NO | RELEASED FOR | BY | DATE |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |

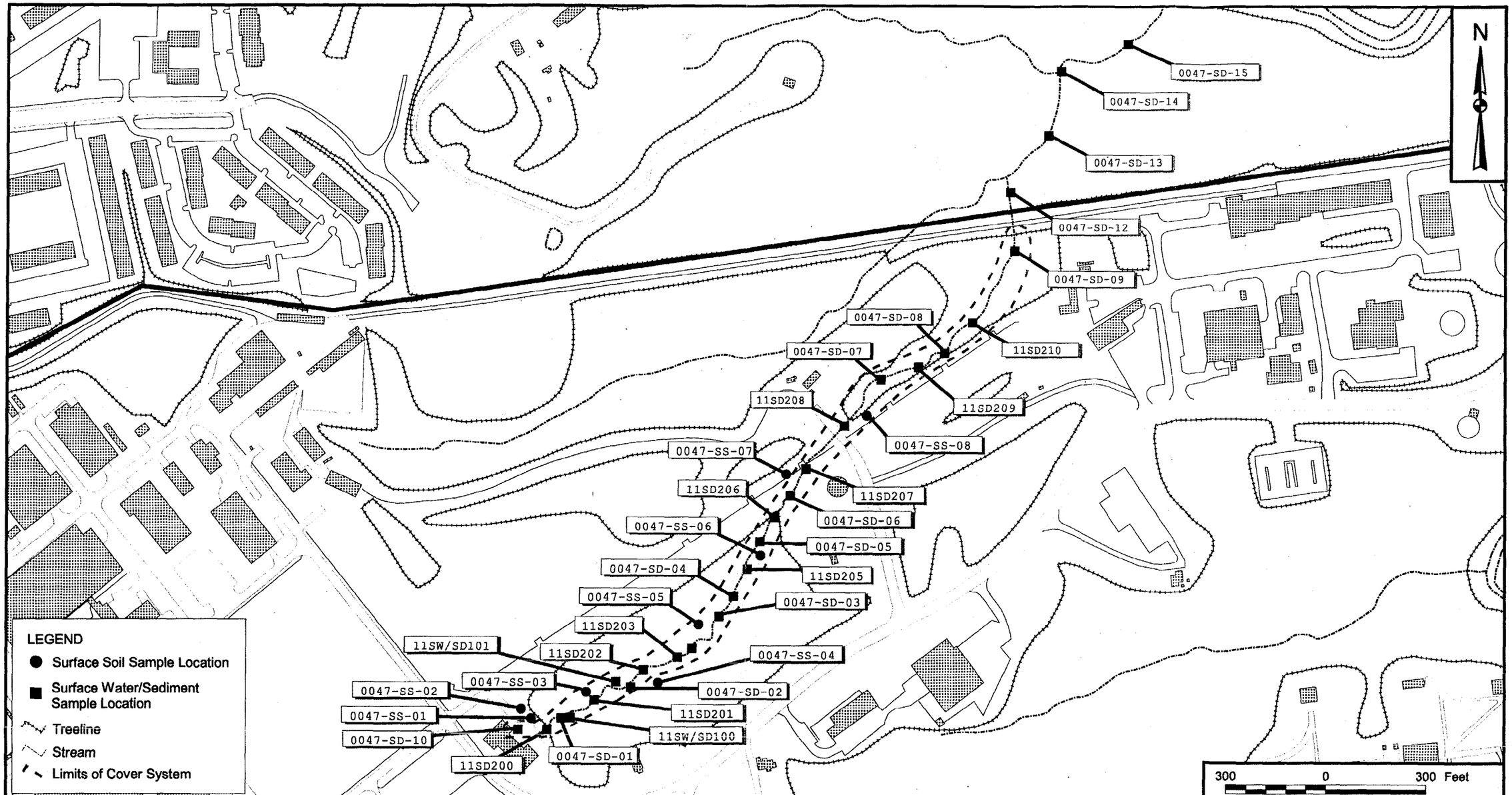
DRAWN BY DATE: M. Spangenberg 2-19-01
CHECKED BY DATE: KMS 3/6/01
COST/SCHEDULE-AREA
SCALE: AS NOTED

Tetra Tech NUS, Inc.

SELECTED SOIL AND SEDIMENT ANALYTICAL DATA
SITE 47 - BUILDING 90 DRAINAGE
SITE 28 AND SITE 47 EE/CA
FORMER NSWC WHITE OAK
SILVER SPRING, MARYLAND

| CONTRACT NO | OWNER NO. |
|---|---|
| 7909 | 315 |
| APPROVED BY | DATE |
| SN | 3/6/01 |
| APPROVED BY | DATE |
| DRAWING NO. FIGURE 4-3 | REV. 0 |

P:\GIS\WHITEOAK\09-JULY-99.APR\ALTERNATIVE 4 - CONTAINMENT MGS 3-1-01




| NO. | DATE | REVISIONS | BY | CHKD | APPD | REFERENCES |
|---|---|---|---|---|---|---|
| | | | | | | |

| | | | |
|---|---|---|---|
| DRAWN BY M. Spangenberg | DATE 3-1-01 | Tetra Tech NUS, Inc. | CONTRACT NUMBER 7909 / OWNER NUMBER 315 |
| CHECKED BY KMS | DATE 3/6/01 | ALTERNATIVE 4 - CONTAINMENT<br>SITE 47 - BUILDING 90 DRAINAGE<br>SITE 28 AND SITE 47 EE/CA<br>FORMER NSWC WHITE OAK<br>SILVER SPRING, MARYLAND | APPROVED BY SN / DATE 3/6/01 |
| COST/SCHEDULE-AREA | | | APPROVED BY / DATE |
| SCALE AS NOTED | | | DRAWING NO. FIGURE 4-4 / REV 0 |

# REFERENCES


B&R Environmental, 1998. Work Plan for Remedial Investigation and Feasibility Study for Naval Surface Warfare Center White Oak, Silver Spring, Maryland prepared for the Engineering Field Activity Chesapeake, Naval Facilities Engineering Command. King of Prussia, Pennsylvania. August.

EFACHES (Engineering Field Activity – Chesapeake), 1999. BRAC Cleanup Plan for the Naval Surface Warfare Center, Dahlgren Division, White Oak Detachment, Silver Spring, Maryland. May.

EPA (Environmental Protection Agency), 1992. Supplemental Guidance to RAGS: Calculating the Concentration Term. Office of Solid Waste and Emergency Response, Washington, DC.

EPA (Environmental Protection Agency), 1993. Guidance on Conducting Non-Time-Critical Removal Actions Under CERCLA, Office of Solid Waste and Emergency Response. EPA/540/R93/057. August

EPA (Environmental Protection Agency), 1995. Supplemental Guidance to RAGS: Region 4 Bulletins, Human Health Risk Assessment, Interim. Office of Health Assessment, Atlanta, Georgia.

EPA (Environmental Protection Agency), 1996. Application of the CERCLA Municipal Landfill Presumptive Remedy to Military Landfills. Office of Solid Waste and Emergency Response, Directive No. 9355.0-67FS. EPA/540/F-96/020. December.

EPA (Environmental Protection Agency), 2001. USEPA Region III Risk-Based Concentration Table, May.

General Services Administration (GSA), 1997. U.S. Food and Drug Administration Consolidation, Montgomery County, Final Environmental Impact Statement. April.

Gilbert, R.O., 1987. Statistical Methods for Environmental Pollution Monitoring. VanNostrand-Reinhold Company, New York, NY.

Kearney/Centaur Division, 1990. Phase II RCRA Facility Assessment of the Naval Surface Warfare Center White Oak Laboratory, Silver Spring, Maryland.

Malcolm-Pirnie, Inc., 1992. Draft Remedial Investigation Report, Dahlgren Division, White Oak Detachment, Silver Spring, Maryland. March.

National Weather Service, 2001. http://www.weather.com/weather/climatology/20903.July.

NEESA (Naval Energy and Environmental Support Activity), 1984. Initial Assessment Study, Naval Surface Warfare Center, White Oak, Silver Spring, Maryland. November.

TtNUS (Tetra Tech NUS, Incorporated), 1998a. Site Screening Report for Installation Restoration Program Sites 1, 5, 6, 12, 13, 28, 29, 31, 32, 33, and EBS 100 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 (Tetra Tech NUS, Incorporated), 1998b. 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 (Tetra Tech NUS, Incorporated), 1999. RCRA Facility Investigation for Sites 2, 3, 4, 7, 8, 9 and Paint Branch, Naval Surface Warfare Center, White Oak, Silver Spring Maryland. Prepared for the Engineering Field Activity Chesapeake, Naval Facilities Engineering Command. King of Prussia, PA. September.

TtNUS (Tetra Tech NUS, Incorporated), 2000. Letter Report for Site 47 – Building 90 Drainage Investigation for PCB Contamination, Former Naval Surface Warfare Center – White Oak, Silver Spring Maryland. Letter dated December 28, 2000 from Mr. Ronald J. Kotun, Ph. D. of Tetra Tech NUS, Incorporated Pittsburgh Pennsylvania to Ms. Krista Grigg, Engineering Field Activity Chesapeake, Washington, D.C.

TtNUS (Tetra Tech NUS, Incorporated), January 2001. Draft Site 11 RFI Addendum, Former Naval Surface Warfare Center, White Oak, Silver Spring, Maryland. Prepared for the Engineering Field Activity Chesapeake, Naval Facilities Engineering Command. King of Prussia, PA. January.

TtNUS (Tetra Tech NUS, Incorporated), March 2001. Draft Basewide Ecological Risk Assessment for Naval Surface Warfare Center, White Oak, Silver Spring, Maryland. Prepared for the Engineering Field Activity Chesapeake, Naval Facilities Engineering Command. King of Prussia, PA.

# APPENDIX A

## SITE 28

A.1 ANALYTICAL DATA

A.2 BACKGROUND STATISTICAL SUMMARIES/RISK ASSESSMENT DATA

A.3 REMOVAL ACTION ALTERNATIVE COST ESTIMATES

A.4 SAMPLE LOG SHEETS

# A.1 ANALYTICAL DATA

SITE 28
SUMMARY OF POSITIVE ANALYTICAL RESULTS FOR SURFACE SOIL
NSWC WHITE OAK, SILVER SPRING, MARYLAND


| LOCATION | 28PCB01 | 28PCB02 | 28PCB03 | 28PCB04 | 28PCB05 | 28PCB06 | 28PCB07 | 28PCB07 | 28PCB07 | 28PCB08 |
|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE ID: | 28-PCB-01 | 28-PCB-02 | 28-PCB-03 | 28-PCB-04 | 28-PCB-05 | 28-PCB-06 | 28-PCB-07 | 28-PCB-07-AVG | 28-PCB-07-D | 28-PCB-08 |
| DATE: | 04/06/99 | 04/06/99 | 04/06/99 | 04/06/99 | 04/06/99 | 04/06/99 | 04/06/99 | 04/06/99 | 04/06/99 | 04/06/99 |
| TOP DEPTH: | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BOTTOM DEPTH: | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| **Volatile Organics (ug/kg)** | | | | | | | | | | |
| ACETONE | | | | | | | | | | |
| CHLOROBENZENE | | | | | | | | | | |
| **Semivolatile Organics (ug/kg)** | | | | | | | | | | |
| 1,2-DICHLOROBENZENE | | | | | | | | | | |
| 1,3-DICHLOROBENZENE | | | | | | | | | | |
| 1,4-DICHLOROBENZENE | | | | | | | | | | |
| 2,4-DIMETHYLPHENOL | | | | | | | | | | |
| 2-METHYLNAPHTHALENE | | | | | | | | | | |
| 2-METHYLPHENOL | | | | | | | | | | |
| 4-METHYLPHENOL | | | | | | | | | | |
| ACENAPHTHENE | | | | | | | | | | |
| ANTHRACENE | | | | | | | | | | |
| BENZO(A)ANTHRACENE | | | | | | | | | | |
| BENZO(A)PYRENE | | | | | | | | | | |
| BENZO(B)FLUORANTHENE | | | | | | | | | | |
| BENZO(G,H,I)PERYLENE | | | | | | | | | | |
| BENZO(K)FLUORANTHENE | | | | | | | | | | |
| BIS(2-ETHYLHEXYL)PHTHALATE | | | | | | | | | | |
| CARBAZOLE | | | | | | | | | | |
| CHRYSENE | | | | | | | | | | |
| DI-N-BUTYL PHTHALATE | | | | | | | | | | |
| DIBENZO(A,H)ANTHRACENE | | | | | | | | | | |
| DIBENZOFURAN | | | | | | | | | | |
| DIETHYL PHTHALATE | | | | | | | | | | |
| FLUORANTHENE | | | | | | | | | | |
| FLUORENE | | | | | | | | | | |
| HEXACHLOROBENZENE | | | | | | | | | | |
| INDENO(1,2,3-CD)PYRENE | | | | | | | | | | |
| NAPHTHALENE | | | | | | | | | | |
| PHENANTHRENE | | | | | | | | | | |
| PHENOL | | | | | | | | | | |
| PYRENE | | | | | | | | | | |
| OV 2-BUTANONE | | | | | | | | | | |
| **Pesticides/PCBs (ug/kg)** | | | | | | | | | | |
| 4,4'-DDE | | | | | | | | | | |
| AROCLOR-1248 | 1600 J | 2000 U | 46 U | 80 J | 43 U | 40 U | 44 U | 44 U | 44 U | 88 U |
| AROCLOR-1254 | 38 U | 21000 | 240 J | 41 U | 48 J | 230 J | 54 J | 67.5 J | 81 J | 3100 J |
| AROCLOR-1260 | 1900 | 17000 J | 220 J | 240 J | 42 J | 220 J | 61 J | 67.5 J | 74 J | 4000 |
| DIELDRIN | | | | | | | | | | |
| **Inorganics (mg/kg)** | | | | | | | | | | |
| ALUMINUM | | | | | | | | | | |
| ARSENIC | | | | | | | | | | |
| BARIUM | | | | | | | | | | |
| CALCIUM | | | | | | | | | | |
| CHROMIUM | | | | | | | | | | |

SITE 28
SUMMARY OF POSITIVE ANALYTICAL RESULTS FOR SURFACE SOIL
NSWC WHITE OAK, SILVER SPRING, MARYLAND


| **LOCATION** | **28PCB01** | **28PCB02** | **28PCB03** | **28PCB04** | **28PCB05** | **28PCB06** | **28PCB07** | **28PCB07** | **28PCB07** | **28PCB08** |
|---|---|---|---|---|---|---|---|---|---|---|
| **SAMPLE ID:** | **28-PCB-01** | **28-PCB-02** | **28-PCB-03** | **28-PCB-04** | **28-PCB-05** | **28-PCB-06** | **28-PCB-07** | **28-PCB-07-AVG** | **28-PCB-07-D** | **28-PCB-08** |
| **DATE:** | **04/06/99** | **04/06/99** | **04/06/99** | **04/06/99** | **04/06/99** | **04/06/99** | **04/06/99** | **04/06/99** | **04/06/99** | **04/06/99** |
| **TOP DEPTH:** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** |
| **BOTTOM DEPTH:** | **0.5** | **0.5** | **0.5** | **0.5** | **0.5** | **0.5** | **0.5** | **0.5** | **0.5** | **0.5** |
| COBALT | | | | | | | | | | |
| COPPER | | | | | | | | | | |
| CYANIDE | | | | | | | | | | |
| IRON | | | | | | | | | | |
| LEAD | | | | | | | | | | |
| MAGNESIUM | | | | | | | | | | |
| MANGANESE | | | | | | | | | | |
| MERCURY | | | | | | | | | | |
| NICKEL | | | | | | | | | | |
| POTASSIUM | | | | | | | | | | |
| SELENIUM | | | | | | | | | | |
| VANADIUM | | | | | | | | | | |
| ZINC | | | | | | | | | | |
| **Miscellaneous Parameters** | | | | | | | | | | |
| CATION EXCHANGE CAPACITY MEQ/1 | | | | | | | | | | |
| PH S.U. | | | | | | | | | | |
| SIEVE # 10 | | | | | | | | | | |
| SIEVE # 140 | | | | | | | | | | |
| SIEVE # 20 | | | | | | | | | | |
| SIEVE # 200 | | | | | | | | | | |
| SIEVE # 4 | | | | | | | | | | |
| SIEVE # 40 | | | | | | | | | | |
| SIEVE # 60 | | | | | | | | | | |
| SIEVE 1" | | | | | | | | | | |
| SIEVE 1-1/2" | | | | | | | | | | |
| SIEVE 2" | | | | | | | | | | |
| SIEVE 3" | | | | | | | | | | |
| SIEVE 3/4" | | | | | | | | | | |
| SIEVE 3/8" | | | | | | | | | | |
| TOTAL ORGANIC CARBON MG/KG | | | | | | | | | | |

SITE 28
SUMMARY OF POSITIVE ANALYTICAL RESULTS FOR SURFACE SOIL
NSWC WHITE OAK, SILVER SPRING, MARYLAND


| LOCATION | 28PCB08 | 28PCB09 | 28PCB09 | 28PCB09 | 28PCB09 | 28PCB10 | 28PCB10 | 28PCB11 | 28PCB11 |
|---|---|---|---|---|---|---|---|---|---|
| SAMPLE ID: | 28-PCB-08-0204 | 28-PCB-09 | 28-PCB-09-0204 | 28-PCB-09-AVG | 28-PCB-09-D | 28-PCB-10 | 28-PCB-10-0204 | 28-PCB-11 | 28-PCB-11-0204 |
| DATE: | 04/06/99 | 04/06/99 | 04/06/99 | 04/06/99 | 04/06/99 | 04/06/99 | 04/06/99 | 04/06/99 | 04/06/99 |
| TOP DEPTH: | 0.8 | 0 | 1 | 0 | 0 | 0 | 0.5 | 0 | 0.5 |
| BOTTOM DEPTH: | 1 | 0.5 | 1.25 | 0.5 | 0.5 | 0.5 | 1 | 0.5 | 0.83 |
| **Volatile Organics (ug/kg)** | | | | | | | | | |
| ACETONE | | | | | | | | | |
| CHLOROBENZENE | | | | | | | | | |
| **Semivolatile Organics (ug/kg)** | | | | | | | | | |
| 1,2-DICHLOROBENZENE | | | | | | | | | |
| 1,3-DICHLOROBENZENE | | | | | | | | | |
| 1,4-DICHLOROBENZENE | | | | | | | | | |
| 2,4-DIMETHYLPHENOL | | | | | | | | | |
| 2-METHYLNAPHTHALENE | | | | | | | | | |
| 2-METHYLPHENOL | | | | | | | | | |
| 4-METHYLPHENOL | | | | | | | | | |
| ACENAPHTHENE | | | | | | | | | |
| ANTHRACENE | | | | | | | | | |
| BENZO(A)ANTHRACENE | | | | | | | | | |
| BENZO(A)PYRENE | | | | | | | | | |
| BENZO(B)FLUORANTHENE | | | | | | | | | |
| BENZO(G,H,I)PERYLENE | | | | | | | | | |
| BENZO(K)FLUORANTHENE | | | | | | | | | |
| BIS(2-ETHYLHEXYL)PHTHALATE | | | | | | | | | |
| CARBAZOLE | | | | | | | | | |
| CHRYSENE | | | | | | | | | |
| DI-N-BUTYL PHTHALATE | | | | | | | | | |
| DIBENZO(A,H)ANTHRACENE | | | | | | | | | |
| DIBENZOFURAN | | | | | | | | | |
| DIETHYL PHTHALATE | | | | | | | | | |
| FLUORANTHENE | | | | | | | | | |
| FLUORENE | | | | | | | | | |
| HEXACHLOROBENZENE | | | | | | | | | |
| INDENO(1,2,3-CD)PYRENE | | | | | | | | | |
| NAPHTHALENE | | | | | | | | | |
| PHENANTHRENE | | | | | | | | | |
| PHENOL | | | | | | | | | |
| PYRENE | | | | | | | | | |
| OV 2-BUTANONE | | | | | | | | | |
| **Pesticides/PCBs (ug/kg)** | | | | | | | | | |
| 4,4'-DDE | | | | | | | | | |
| AROCLOR-1248 | 40 UL | 80 U | 44 U | 145 U | 210 U | 42 U | 41 UJ | 230 U | 220 U |
| AROCLOR-1254 | 40 UL | 2400 J | 180 J | 2950 J | 3500 J | 140 J | 82 J | 460 J | 620 J |
| AROCLOR-1260 | 40 UL | 3000 J | 210 | 3750 J | 4500 J | 160 J | 99 J | 450 J | 570 |
| DIELDRIN | | | | | | | | | |
| **Inorganics (mg/kg)** | | | | | | | | | |
| ALUMINUM | | | | | | | | | |
| ARSENIC | | | | | | | | | |
| BARIUM | | | | | | | | | |
| CALCIUM | | | | | | | | | |
| CHROMIUM | | | | | | | | | |

SITE 28
SUMMARY OF POSITIVE ANALYTICAL RESULTS FOR SURFACE SOIL
NSWC WHITE OAK, SILVER SPRING, MARYLAND


| **LOCATION** | **28PCB08** | **28PCB09** | **28PCB09** | **28PCB09** | **28PCB09** | **28PCB10** | **28PCB10** | **28PCB11** | **28PCB11** |
|---|---|---|---|---|---|---|---|---|---|
| **SAMPLE ID:** | **28-PCB-08-0204** | **28-PCB-09** | **28-PCB-09-0204** | **28-PCB-09-AVG** | **28-PCB-09-D** | **28-PCB-10** | **28-PCB-10-0204** | **28-PCB-11** | **28-PCB-11-0204** |
| **DATE:** | **04/06/99** | **04/06/99** | **04/06/99** | **04/06/99** | **04/06/99** | **04/06/99** | **04/06/99** | **04/06/99** | **04/06/99** |
| **TOP DEPTH:** | **0.8** | **0** | **1** | **0** | **0** | **0** | **0.5** | **0** | **0.5** |
| **BOTTOM DEPTH:** | **1** | **0.5** | **1.25** | **0.5** | **0.5** | **0.5** | **1** | **0.5** | **0.83** |
| COBALT | | | | | | | | | |
| COPPER | | | | | | | | | |
| CYANIDE | | | | | | | | | |
| IRON | | | | | | | | | |
| LEAD | | | | | | | | | |
| MAGNESIUM | | | | | | | | | |
| MANGANESE | | | | | | | | | |
| MERCURY | | | | | | | | | |
| NICKEL | | | | | | | | | |
| POTASSIUM | | | | | | | | | |
| SELENIUM | | | | | | | | | |
| VANADIUM | | | | | | | | | |
| ZINC | | | | | | | | | |
| **Miscellaneous Parameters** | | | | | | | | | |
| CATION EXCHANGE CAPACITY MEQ/1 | | | | | | | | | |
| PH S.U. | | | | | | | | | |
| SIEVE # 10 | | | | | | | | | |
| SIEVE # 140 | | | | | | | | | |
| SIEVE # 20 | | | | | | | | | |
| SIEVE # 200 | | | | | | | | | |
| SIEVE # 4 | | | | | | | | | |
| SIEVE # 40 | | | | | | | | | |
| SIEVE # 60 | | | | | | | | | |
| SIEVE 1" | | | | | | | | | |
| SIEVE 1-1/2" | | | | | | | | | |
| SIEVE 2" | | | | | | | | | |
| SIEVE 3" | | | | | | | | | |
| SIEVE 3/4" | | | | | | | | | |
| SIEVE 3/8" | | | | | | | | | |
| TOTAL ORGANIC CARBON MG/KG | | | | | | | | | |

SITE 28
SUMMARY OF POSITIVE ANALYTICAL RESULTS FOR SURFACE SOIL
NSWC WHITE OAK, SILVER SPRING, MARYLAND


| LOCATION | 28PCB12 | 28PCB12 | 28PCB13 | 28PCB13 | 28PCB14 | 28PCB14 | 28SB01 | 28SB02 | 28SB03 |
|---|---|---|---|---|---|---|---|---|---|
| SAMPLE ID: | 28-PCB-12 | 28-PCB-12-0204 | 28-PCB-13 | 28-PCB-13-0204 | 28-PCB-14 | 28-PCB-14-0204 | 28-SS-01(OLD) | 28-SS-02(OLD) | 28-SS-03(OLD) |
| DATE: | 04/06/99 | 04/06/99 | 04/06/99 | 04/06/99 | 04/06/99 | 04/06/99 | 10/23/97 | 10/23/97 | 10/23/97 |
| TOP DEPTH: | 0 | 3 | 0 | 0.5 | 0 | 0.5 | 0 | 0 | 0.5 |
| BOTTOM DEPTH: | 0.5 | 3 | 0.5 | 1 | 0.5 | 1 | 1 | 2 | 2 |
| **Volatile Organics (ug/kg)** | | | | | | | | | |
| ACETONE | | | | | | | 11 U | 12 U | 12 U |
| CHLOROBENZENE | | | | | | | 11 U | 12 U | 12 U |
| **Semivolatile Organics (ug/kg)** | | | | | | | | | |
| 1,2-DICHLOROBENZENE | | | | | | | 370 U | 400 U | 410 U |
| 1,3-DICHLOROBENZENE | | | | | | | 370 U | 400 U | 410 U |
| 1,4-DICHLOROBENZENE | | | | | | | 370 U | 400 U | 410 U |
| 2,4-DIMETHYLPHENOL | | | | | | | 370 U | 400 U | 410 U |
| 2-METHYLNAPHTHALENE | | | | | | | 370 U | 400 U | 410 U |
| 2-METHYLPHENOL | | | | | | | 370 U | 400 U | 410 U |
| 4-METHYLPHENOL | | | | | | | 370 U | 400 U | 410 U |
| ACENAPHTHENE | | | | | | | 370 U | 400 U | 410 U |
| ANTHRACENE | | | | | | | 370 U | 400 U | 410 U |
| BENZO(A)ANTHRACENE | | | | | | | 370 U | 400 U | 410 U |
| BENZO(A)PYRENE | | | | | | | 370 U | 400 U | 410 U |
| BENZO(B)FLUORANTHENE | | | | | | | 370 U | 400 U | 410 U |
| BENZO(G,H,I)PERYLENE | | | | | | | 370 U | 400 U | 410 U |
| BENZO(K)FLUORANTHENE | | | | | | | 370 U | 400 U | 410 U |
| BIS(2-ETHYLHEXYL)PHTHALATE | | | | | | | 370 U | 400 U | 410 U |
| CARBAZOLE | | | | | | | 370 U | 400 U | 410 U |
| CHRYSENE | | | | | | | 370 U | 400 U | 410 U |
| DI-N-BUTYL PHTHALATE | | | | | | | 370 U | 45 J | 410 U |
| DIBENZO(A,H)ANTHRACENE | | | | | | | 370 U | 400 U | 410 U |
| DIBENZOFURAN | | | | | | | 370 U | 400 U | 410 U |
| DIETHYL PHTHALATE | | | | | | | 370 U | 400 U | 410 U |
| FLUORANTHENE | | | | | | | 370 U | 400 U | 410 U |
| FLUORENE | | | | | | | 370 U | 400 U | 410 U |
| HEXACHLOROBENZENE | | | | | | | 370 U | 400 U | 410 U |
| INDENO(1,2,3-CD)PYRENE | | | | | | | 370 U | 400 U | 410 U |
| NAPHTHALENE | | | | | | | 370 U | 400 U | 410 U |
| PHENANTHRENE | | | | | | | 370 U | 400 U | 410 U |
| PHENOL | | | | | | | 370 U | 400 U | 410 U |
| PYRENE | | | | | | | 370 U | 400 U | 410 U |
| OV 2-BUTANONE | | | | | | | 11 UJ | 12 UJ | 12 UJ |
| **Pesticides/PCBs (ug/kg)** | | | | | | | | | |
| 4,4'-DDE | | | | | | | 3.7 U | 4 UL | 4 U |
| AROCLOR-1248 | 200 U | 38 UL | 49 U | 40 U | 45 U | 39 UJ | 37 U | 40 UL | 40 U |
| AROCLOR-1254 | 400 J | 20 J | 120 J | 40 U | 150 J | 39 UJ | 37 U | 40 UL | 40 U |
| AROCLOR-1260 | 490 J | 25 J | 150 J | 7.1 J | 150 J | 6.6 J | 71 | 12 J | 19 J |
| DIELDRIN | | | | | | | 3.7 U | 0.34 J | 4 U |
| **Inorganics (mg/kg)** | | | | | | | | | |
| ALUMINUM | | | | | | | 32200 | 24700 | 24800 |
| ARSENIC | | | | | | | 8.6 K | 6.6 K | 5.6 K |
| BARIUM | | | | | | | 33.2 | 63.5 | 66.5 |
| CALCIUM | | | | | | | 82.5 B | 1180 J | 624 J |
| CHROMIUM | | | | | | | 42.4 K | 32.1 K | 28.5 K |

SITE 28
SUMMARY OF POSITIVE ANALYTICAL RESULTS FOR SURFACE SOIL
NSWC WHITE OAK, SILVER SPRING, MARYLAND


| LOCATION | 28PCB12 | 28PCB12 | 28PCB13 | 28PCB13 | 28PCB14 | 28PCB14 | 28SB01 | 28SB02 | 28SB03 |
|---|---|---|---|---|---|---|---|---|---|
| SAMPLE ID: | 28-PCB-12 | 28-PCB-12-0204 | 28-PCB-13 | 28-PCB-13-0204 | 28-PCB-14 | 28-PCB-14-0204 | 28-SS-01(OLD) | 28-SS-02(OLD) | 28-SS-03(OLD) |
| DATE: | 04/06/99 | 04/06/99 | 04/06/99 | 04/06/99 | 04/06/99 | 04/06/99 | 10/23/97 | 10/23/97 | 10/23/97 |
| TOP DEPTH: | 0 | 3 | 0 | 0.5 | 0 | 0.5 | 0 | 0 | 0.5 |
| BOTTOM DEPTH: | 0.5 | 3 | 0.5 | 1 | 0.5 | 1 | 1 | 2 | 2 |
| COBALT | | | | | | | 3 K | 6.3 | 6.2 |
| COPPER | | | | | | | 15.5 J | 15 J | 12.5 J |
| CYANIDE | | | | | | | 0.21 U | 0.28 U | 0.25 U |
| IRON | | | | | | | 30300 | 32900 | 29200 |
| LEAD | | | | | | | 8.5 K | 15.5 K | 11.8 K |
| MAGNESIUM | | | | | | | 650 K | 2400 | 2180 |
| MANGANESE | | | | | | | 24.3 | 121 | 132 |
| MERCURY | | | | | | | 0.05 | 0.06 | 0.05 |
| NICKEL | | | | | | | 8.2 J | 13.5 J | 12.9 J |
| POTASSIUM | | | | | | | 549 K | 1190 K | 1050 K |
| SELENIUM | | | | | | | 0.72 J | 0.53 UJ | 0.55 UJ |
| VANADIUM | | | | | | | 56.9 K | 48.5 K | 43.6 K |
| ZINC | | | | | | | 16.5 J | 40.4 J | 38.1 J |
| **Miscellaneous Parameters** | | | | | | | | | |
| CATION EXCHANGE CAPACITY MEQ/1 | | | | | | | | | |
| PH S.U | | | | | | | 4.67 | 4.93 | 5.05 |
| SIEVE # 10 | | | | | | | | | |
| SIEVE # 140 | | | | | | | | | |
| SIEVE # 20 | | | | | | | | | |
| SIEVE # 200 | | | | | | | | | |
| SIEVE # 4 | | | | | | | | | |
| SIEVE # 40 | | | | | | | | | |
| SIEVE # 60 | | | | | | | | | |
| SIEVE 1" | | | | | | | | | |
| SIEVE 1-1/2" | | | | | | | | | |
| SIEVE 2" | | | | | | | | | |
| SIEVE 3" | | | | | | | | | |
| SIEVE 3/4" | | | | | | | | | |
| SIEVE 3/8" | | | | | | | | | |
| TOTAL ORGANIC CARBON MG/KG | | | | | | | | | |

SITE 28
SUMMARY OF POSITIVE ANALYTICAL RESULTS FOR SURFACE SOIL
NSWC WHITE OAK, SILVER SPRING, MARYLAND


| LOCATION | 28SB04 | 28SB04A | 28SB04B | 28SB05 | 28SB06 | 28SB07 | 28SB07A | 28SB07B | 28SB07B |
|---|---|---|---|---|---|---|---|---|---|
| SAMPLE ID: | 28-SB-4(2)(OLD) | 28-SB-04A | 28-SB-04B | 28-SB-5(2)(OLD) | 28-SB-6(2)(OLD) | 28-SB-07(OLD) | 28-SB-07A | 28-SB-07B | 28-SB-07B-AVG |
| DATE: | 10/24/97 | 04/06/99 | 04/06/99 | 10/24/97 | 10/24/97 | 10/23/97 | 04/06/99 | 04/06/99 | 04/06/99 |
| TOP DEPTH: | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BOTTOM DEPTH: | 2 | 0.5 | 0.5 | 2 | 2 | 2 | 0.5 | 0.5 | 0.5 |
| **Volatile Organics (ug/kg)** | | | | | | | | | |
| ACETONE | 79 J | | | 32 J | 11 U | 11 U | | | |
| CHLOROBENZENE | 77 | | | 11 U | 11 U | 11 U | | | |
| **Semivolatile Organics (ug/kg)** | | | | | | | | | |
| 1,2-DICHLOROBENZENE | 86 J | 12000 U | 400 U | 370 UJ | 360 UJ | 380 U | 400 U | 400 U | 400 U |
| 1,3-DICHLOROBENZENE | 520 J | 12000 U | 400 U | 370 UJ | 360 UJ | 380 U | 400 U | 400 U | 400 U |
| 1,4-DICHLOROBENZENE | 1000 J | 12000 U | 400 U | 370 UJ | 360 UJ | 380 U | 400 U | 400 U | 400 U |
| 2,4-DIMETHYLPHENOL | 390 UJ | 12000 U | 400 U | 370 UJ | 360 UJ | 380 U | 400 U | 400 U | 400 U |
| 2-METHYLNAPHTHALENE | 80 J | 12000 U | 400 U | 370 UJ | 360 UJ | 380 U | 400 U | 400 U | 400 U |
| 2-METHYLPHENOL | 390 UJ | 12000 U | 400 U | 370 UJ | 360 UJ | 380 U | 400 U | 400 U | 400 U |
| 4-METHYLPHENOL | 390 UJ | 12000 U | 400 U | 370 UJ | 360 UJ | 380 U | 400 U | 400 U | 400 U |
| ACENAPHTHENE | 120 J | 12000 U | 400 U | 370 UJ | 360 UJ | 380 U | 400 U | 100 J | 100 J |
| ANTHRACENE | 140 J | 12000 U | 400 U | 370 UJ | 360 UJ | 380 U | 400 U | 120 J | 120 J |
| BENZO(A)ANTHRACENE | 350 J | 12000 U | 180 J | 370 UJ | 360 UJ | 380 U | 160 J | 460 | 310 J |
| BENZO(A)PYRENE | 250 J | 12000 U | 220 J | 370 UJ | 360 UJ | 380 U | 160 J | 470 | 320 J |
| BENZO(B)FLUORANTHENE | 230 J | 1200 J | 340 J | 370 UJ | 360 UJ | 380 U | 210 J | 610 | 420 J |
| BENZO(G,H,I)PERYLENE | 190 J | 12000 U | 130 J | 370 UJ | 360 UJ | 380 U | 100 J | 310 J | 215 J |
| BENZO(K)FLUORANTHENE | 210 J | 12000 U | 110 J | 370 UJ | 360 UJ | 380 U | 85 J | 210 J | 145.5 J |
| BIS(2-ETHYLHEXYL)PHTHALATE | 390 UJ | 12000 U | 400 U | 370 UJ | 360 UJ | 380 U | 47 J | 58 J | 62 J |
| CARBAZOLE | 69 J | 12000 U | 400 U | 370 UJ | 360 UJ | 380 U | 400 U | 140 J | 90.5 J |
| CHRYSENE | 340 J | 12000 U | 260 J | 370 UJ | 360 UJ | 380 U | 190 J | 550 | 375 J |
| DI-N-BUTYL PHTHALATE | 390 UJ | 12000 U | 400 U | 370 UJ | 360 UJ | 46 J | 400 U | 400 U | 400 U |
| DIBENZO(A,H)ANTHRACENE | 390 UJ | 12000 U | 400 U | 370 UJ | 360 UJ | 380 U | 400 U | 79 J | 79 J |
| DIBENZOFURAN | 39 J | 12000 U | 400 U | 370 UJ | 360 UJ | 380 U | 400 U | 400 U | 400 U |
| DIETHYL PHTHALATE | 390 UJ | 12000 U | 400 U | 370 UJ | 360 UJ | 380 U | 400 U | 400 U | 400 U |
| FLUORANTHENE | 730 J | 12000 U | 420 | 370 UJ | 360 UJ | 66 J | 460 | 1500 | 980 |
| FLUORENE | 98 J | 12000 U | 400 U | 370 UJ | 360 UJ | 380 U | 400 U | 73 J | 73 J |
| HEXACHLOROBENZENE | 390 UJ | 4600 J | 400 U | 370 UJ | 360 UJ | 380 U | 400 U | 400 U | 400 U |
| INDENO(1,2,3-CD)PYRENE | 180 J | 12000 U | 170 J | 370 UJ | 360 UJ | 380 U | 120 J | 340 J | 240 J |
| NAPHTHALENE | 84 J | 12000 U | 400 U | 370 UJ | 360 UJ | 380 U | 400 U | 400 U | 400 U |
| PHENANTHRENE | 610 J | 12000 U | 240 J | 370 UJ | 360 UJ | 55 J | 260 J | 1000 | 640 J |
| PHENOL | 390 UJ | 12000 U | 400 U | 370 UJ | 360 UJ | 380 U | 400 U | 400 U | 400 U |
| PYRENE | 660 J | 12000 U | 340 J | 370 UJ | 360 UJ | 62 J | 390 J | 1300 | 830 J |
| OV 2-BUTANONE | 10 J | | | 11 U | 11 U | 11 U | | | |
| **Pesticides/PCBs (ug/kg)** | | | | | | | | | |
| 4,4'-DDE | 3.9 UJ | | | 3.7 UJ | 3.6 UJ | 3.8 U | | | |
| AROCLOR-1248 | 39 UJ | | | 37 UJ | 36 UJ | 38 U | | | |
| AROCLOR-1254 | 39 UJ | | | 37 UJ | 36 UJ | 38 U | | | |
| AROCLOR-1260 | 760 J | | | 46 J | 11 J | 46 | | | |
| DIELDRIN | 3.9 UJ | | | 3.7 UJ | 3.6 UJ | 3.8 U | | | |
| **Inorganics (mg/kg)** | | | | | | | | | |
| ALUMINUM | 17100 | | | 20900 | 26200 | 19300 | | | |
| ARSENIC | 3.8 | | | 5.1 | 12 | 4.1 K | | | |
| BARIUM | 74.1 | | | 64.4 | 26 | 27.6 | | | |
| CALCIUM | 1200 J | | | 927 J | 95.5 B | 326 J | | | |
| CHROMIUM | 18.7 J | | | 23.3 J | 73.6 J | 27.2 K | | | |

SITE 28
SUMMARY OF POSITIVE ANALYTICAL RESULTS FOR SURFACE SOIL
NSWC WHITE OAK, SILVER SPRING, MARYLAND


| LOCATION | 28SB04 | 28SB04A | 28SB04B | 28SB05 | 28SB06 | 28SB07 | 28SB07A | 28SB07B | 28SB07B |
|---|---|---|---|---|---|---|---|---|---|
| SAMPLE ID: | 28-SB-4(2)(OLD) | 28-SB-04A | 28-SB-04B | 28-SB-5(2)(OLD) | 28-SB-6(2)(OLD) | 28-SB-07(OLD) | 28-SB-07A | 28-SB-07B | 28-SB-07B-AVG |
| DATE: | 10/24/97 | 04/06/99 | 04/06/99 | 10/24/97 | 10/24/97 | 10/23/97 | 04/06/99 | 04/06/99 | 04/06/99 |
| TOP DEPTH: | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BOTTOM DEPTH: | 2 | 0.5 | 0.5 | 2 | 2 | 2 | 0.5 | 0.5 | 0.5 |
| COBALT | 5.6 | | | 5.6 | 2.4 B | 1.9 B | | | |
| COPPER | 9.4 J | | | 9.1 J | 19.5 J | 10.9 J | | | |
| CYANIDE | | | | | | 0.25 U | | | |
| IRON | 16000 | | | 21100 | 36400 | 21000 | | | |
| LEAD | 17.4 J | | | 10.1 J | 8.3 J | 7.3 K | | | |
| MAGNESIUM | 1450 J | | | 1670 J | 541 J | 603 K | | | |
| MANGANESE | 148 J | | | 91.3 J | 18.3 J | 27.2 | | | |
| MERCURY | 0.05 | | | 0.06 | 0.03 | 0.03 | | | |
| NICKEL | 10 | | | 11.2 | 6.6 | 5.1 J | | | |
| POTASSIUM | 794 J | | | 1170 J | 503 J | 478 K | | | |
| SELENIUM | 1 K | | | 0.52 U | 2.6 L | 1 J | | | |
| VANADIUM | 28.8 | | | 37.3 | 61.2 | 38.1 K | | | |
| ZINC | 45.8 J | | | 34 J | 13.3 J | 11.7 J | | | |
| **Miscellaneous Parameters** | | | | | | | | | |
| CATION EXCHANGE CAPACITY MEQ/1 | | | | | | | | | |
| PH S.U. | | | | | | 5.09 | | | |
| SIEVE # 10 | | | | | | | | | |
| SIEVE # 140 | | | | | | | | | |
| SIEVE # 20 | | | | | | | | | |
| SIEVE # 200 | | | | | | | | | |
| SIEVE # 4 | | | | | | | | | |
| SIEVE # 40 | | | | | | | | | |
| SIEVE # 60 | | | | | | | | | |
| SIEVE 1" | | | | | | | | | |
| SIEVE 1-1/2" | | | | | | | | | |
| SIEVE 2" | | | | | | | | | |
| SIEVE 3" | | | | | | | | | |
| SIEVE 3/4" | | | | | | | | | |
| SIEVE 3/8" | | | | | | | | | |
| TOTAL ORGANIC CARBON MG/KG | | | | | | | | | |

SITE 28
SUMMARY OF POSITIVE ANALYTICAL RESULTS FOR SURFACE SOIL
NSWC WHITE OAK, SILVER SPRING, MARYLAND


| LOCATION | 28SB07B | 28SB07C | 28SB08 | 28SB09 | 28SS100 | 28SS101 | 28SS102 | 28SS103 | 28SS104 | 28SS105 | 28SS106 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE ID: | 28-SB-07B-D | 28-SB-07C | 28-SB-08(OLD) | 28-SB-09(OLD) | 28SS100 | 28SS101 | 28SS102 | 28SS103 | 28SS104 | 28SS105 | 28SS106 |
| DATE: | 04/06/99 | 04/06/99 | 10/23/97 | 10/23/97 | 05/02/00 | 05/02/00 | 05/02/00 | 05/02/00 | 05/02/00 | 05/02/00 | 05/02/00 |
| TOP DEPTH: | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BOTTOM DEPTH: | 0.5 | 0.5 | 2 | 2 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| **Volatile Organics (ug/kg)** | | | | | | | | | | | |
| ACETONE | | | 120 J | 69 J | | | | | | | |
| CHLOROBENZENE | | | 12 U | 12 U | | | | | | | |
| **Semivolatile Organics (ug/kg)** | | | | | | | | | | | |
| 1,2-DICHLOROBENZENE | 400 U | 400 U | 390 U | 400 U | | | | | | | |
| 1,3-DICHLOROBENZENE | 400 U | 400 U | 390 U | 400 U | | | | | | | |
| 1,4-DICHLOROBENZENE | 400 U | 400 U | 390 U | 400 U | | | | | | | |
| 2,4-DIMETHYLPHENOL | 400 U | 400 U | 190 J | 400 U | | | | | | | |
| 2-METHYLNAPHTHALENE | 400 U | 400 U | 390 U | 400 U | | | | | | | |
| 2-METHYLPHENOL | 400 U | 400 U | 170 J | 400 U | | | | | | | |
| 4-METHYLPHENOL | 400 U | 400 U | 1600 | 400 U | | | | | | | |
| ACENAPHTHENE | 400 U | 79 J | 48 J | 400 U | | | | | | | |
| ANTHRACENE | 400 U | 120 J | 390 U | 400 U | | | | | | | |
| BENZO(A)ANTHRACENE | 160 J | 650 | 66 J | 400 U | | | | | | | |
| BENZO(A)PYRENE | 170 J | 810 | 68 J | 400 U | | | | | | | |
| BENZO(B)FLUORANTHENE | 230 J | 1100 | 64 J | 400 U | | | | | | | |
| BENZO(G,H,I)PERYLENE | 120 J | 550 | 390 U | 400 U | | | | | | | |
| BENZO(K)FLUORANTHENE | 81 J | 370 J | 66 J | 400 U | | | | | | | |
| BIS(2-ETHYLHEXYL)PHTHALATE | 66 J | 250 J | 46 B | 400 U | | | | | | | |
| CARBAZOLE | 41 J | 140 J | 390 U | 400 U | | | | | | | |
| CHRYSENE | 200 J | 850 | 77 J | 400 U | | | | | | | |
| DI-N-BUTYL PHTHALATE | 400 U | 400 U | 42 J | 100 J | | | | | | | |
| DIBENZO(A,H)ANTHRACENE | 400 U | 130 J | 390 U | 400 U | | | | | | | |
| DIBENZOFURAN | 400 U | 400 U | 390 U | 400 U | | | | | | | |
| DIETHYL PHTHALATE | 400 U | 400 U | 390 U | 42 J | | | | | | | |
| FLUORANTHENE | 460 | 1900 | 170 J | 400 U | | | | | | | |
| FLUORENE | 400 U | 56 J | 390 U | 400 U | | | | | | | |
| HEXACHLOROBENZENE | 400 U | 400 U | 390 U | 400 U | | | | | | | |
| INDENO(1,2,3-CD)PYRENE | 140 J | 600 | 390 U | 400 U | | | | | | | |
| NAPHTHALENE | 400 U | 400 U | 390 U | 400 U | | | | | | | |
| PHENANTHRENE | 280 J | 950 | 160 J | 400 U | | | | | | | |
| PHENOL | 400 U | 400 U | 330 J | 400 U | | | | | | | |
| PYRENE | 360 J | 1600 | 180 J | 41 J | | | | | | | |
| OV 2-BUTANONE | | | 18 J | 7 J | | | | | | | |
| **Pesticides/PCBs (ug/kg)** | | | | | | | | | | | |
| 4,4'-DDE | | | 0.71 J | 4 UL | | | | | | | |
| AROCLOR-1248 | | | 39 U | 40 UL | 7800 U | 19000 U | 7400 U | 390000 U | 1900 U | 2000 U | 390 U |
| AROCLOR-1254 | | | 39 U | 40 UL | 8500 | 74000 | 8800 | 390000 U | 4500 | 5700 | 850 |
| AROCLOR-1260 | | | 58 | 49 L | 8300 | 53000 | 18000 | 2300000 | 14000 | 7500 | 2000 |
| DIELDRIN | | | 3.9 U | 4 UL | | | | | | | |
| **Inorganics (mg/kg)** | | | | | | | | | | | |
| ALUMINUM | | | 16600 | 19900 | | | | | | | |
| ARSENIC | | | 3.9 B | 5.2 K | | | | | | | |
| BARIUM | | | 58.2 | 65.8 | | | | | | | |
| CALCIUM | | | 1190 J | 1180 J | | | | | | | |
| CHROMIUM | | | 20.5 K | 23.5 K | | | | | | | |

SITE 28
SUMMARY OF POSITIVE ANALYTICAL RESULTS FOR SURFACE SOIL
NSWC WHITE OAK, SILVER SPRING, MARYLAND


| **LOCATION** | **28SB07B** | **28SB07C** | **28SB08** | **28SB09** | **28SS100** | **28SS101** | **28SS102** | **28SS103** | **28SS104** | **28SS105** | **28SS106** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SAMPLE ID:** | **28-SB-07B-D** | **28-SB-07C** | **28-SB-08(OLD)** | **28-SB-09(OLD)** | **28SS100** | **28SS101** | **28SS102** | **28SS103** | **28SS104** | **28SS105** | **28SS106** |
| **DATE:** | **04/06/99** | **04/06/99** | **10/23/97** | **10/23/97** | **05/02/00** | **05/02/00** | **05/02/00** | **05/02/00** | **05/02/00** | **05/02/00** | **05/02/00** |
| **TOP DEPTH:** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** |
| **BOTTOM DEPTH:** | **0.5** | **0.5** | **2** | **2** | **0.5** | **0.5** | **0.5** | **0.5** | **0.5** | **0.5** | **0.5** |
| COBALT | | | 5.7 | 5.6 | | | | | | | |
| COPPER | | | 11 J | 11.7 J | | | | | | | |
| CYANIDE | | | 0.23 | 0.28 U | | | | | | | |
| IRON | | | 21700 | 21400 | | | | | | | |
| LEAD | | | 24.7 K | 24.3 K | | | | | | | |
| MAGNESIUM | | | 1340 K | 1610 K | | | | | | | |
| MANGANESE | | | 150 | 63.7 | | | | | | | |
| MERCURY | | | 0.06 | 0.07 | | | | | | | |
| NICKEL | | | 8.8 J | 9.8 J | | | | | | | |
| POTASSIUM | | | 754 K | 880 K | | | | | | | |
| SELENIUM | | | 0.74 J | 0.73 J | | | | | | | |
| VANADIUM | | | 31.8 K | 37.5 K | | | | | | | |
| ZINC | | | 55.5 J | 52 J | | | | | | | |
| **Miscellaneous Parameters** | | | | | | | | | | | |
| CATION EXCHANGE CAPACITY MEQ/1 | | | | | | | | | | | |
| PH S.U. | | | 6.8 | 6.98 | | | | | | | |
| SIEVE # 10 | | | | | | | | | | | |
| SIEVE # 140 | | | | | | | | | | | |
| SIEVE # 20 | | | | | | | | | | | |
| SIEVE # 200 | | | | | | | | | | | |
| SIEVE # 4 | | | | | | | | | | | |
| SIEVE # 40 | | | | | | | | | | | |
| SIEVE # 60 | | | | | | | | | | | |
| SIEVE 1" | | | | | | | | | | | |
| SIEVE 1-1/2" | | | | | | | | | | | |
| SIEVE 2" | | | | | | | | | | | |
| SIEVE 3" | | | | | | | | | | | |
| SIEVE 3/4" | | | | | | | | | | | |
| SIEVE 3/8" | | | | | | | | | | | |
| TOTAL ORGANIC CARBON MG/KG | | | | | 14100 | 19400 | 12300 | 19300 | 16000 | 13900 | 10200 |

SITE 28
SUMMARY OF POSITIVE ANALYTICAL RESULTS FOR SURFACE SOIL
NSWC WHITE OAK, SILVER SPRING, MARYLAND


| LOCATION | 28SS107 | 28SS107 | 28SS107 | 28SS108 | 28SS201 | 28SS202 | 28SS203 | 28SS204 | 28SS205 | 28SS205 | 28SS205 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE ID: | 28SS107 | 28SS107-AVG | 28SS107-D | 28SS108 | 28-SS-201 | 28-SS-202 | 28-SS-203 | 28-SS-204 | 28-SS-205 | 28-SS-205-AVG | 28-SS-205-D |
| DATE: | 05/02/00 | 05/02/00 | 05/02/00 | 05/02/00 | 08/14/00 | 08/14/00 | 08/14/00 | 08/14/00 | 08/14/00 | 08/14/00 | 08/14/00 |
| TOP DEPTH: | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BOTTOM DEPTH: | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| **Volatile Organics (ug/kg)** | | | | | | | | | | | |
| ACETONE | | | | | | | | | | | |
| CHLOROBENZENE | | | | | | | | | | | |
| **Semivolatile Organics (ug/kg)** | | | | | | | | | | | |
| 1,2-DICHLOROBENZENE | | | | | | | | | | | |
| 1,3-DICHLOROBENZENE | | | | | | | | | | | |
| 1,4-DICHLOROBENZENE | | | | | | | | | | | |
| 2,4-DIMETHYLPHENOL | | | | | | | | | | | |
| 2-METHYLNAPHTHALENE | | | | | | | | | | | |
| 2-METHYLPHENOL | | | | | | | | | | | |
| 4-METHYLPHENOL | | | | | | | | | | | |
| ACENAPHTHENE | | | | | | | | | | | |
| ANTHRACENE | | | | | | | | | | | |
| BENZO(A)ANTHRACENE | | | | | | | | | | | |
| BENZO(A)PYRENE | | | | | | | | | | | |
| BENZO(B)FLUORANTHENE | | | | | | | | | | | |
| BENZO(G,H,I)PERYLENE | | | | | | | | | | | |
| BENZO(K)FLUORANTHENE | | | | | | | | | | | |
| BIS(2-ETHYLHEXYL)PHTHALATE | | | | | | | | | | | |
| CARBAZOLE | | | | | | | | | | | |
| CHRYSENE | | | | | | | | | | | |
| DI-N-BUTYL PHTHALATE | | | | | | | | | | | |
| DIBENZO(A,H)ANTHRACENE | | | | | | | | | | | |
| DIBENZOFURAN | | | | | | | | | | | |
| DIETHYL PHTHALATE | | | | | | | | | | | |
| FLUORANTHENE | | | | | | | | | | | |
| FLUORENE | | | | | | | | | | | |
| HEXACHLOROBENZENE | | | | | | | | | | | |
| INDENO(1,2,3-CD)PYRENE | | | | | | | | | | | |
| NAPHTHALENE | | | | | | | | | | | |
| PHENANTHRENE | | | | | | | | | | | |
| PHENOL | | | | | | | | | | | |
| PYRENE | | | | | | | | | | | |
| OV 2-BUTANONE | | | | | | | | | | | |
| **Pesticides/PCBs (ug/kg)** | | | | | | | | | | | |
| 4,4'-DDE | | | | | | | | | | | |
| AROCLOR-1248 | 760 U | 770 U | 780 U | 170 U | 2500 UJ | 2500 UJ | 1600 UJ | 820 UJ | 820 UJ | 820 UJ | 820 UJ |
| AROCLOR-1254 | 1900 | 1850 | 1800 | 960 | 2500 UJ | 2500 UJ | 1600 UJ | 820 UJ | 820 UJ | 820 UJ | 820 UJ |
| AROCLOR-1260 | 3800 | 3600 | 3400 | 1400 | 17000 J | 12000 J | 11000 J | 2800 J | 4700 J | 4350 J | 4000 J |
| DIELDRIN | | | | | | | | | | | |
| **Inorganics (mg/kg)** | | | | | | | | | | | |
| ALUMINUM | | | | | | | | | | | |
| ARSENIC | | | | | | | | | | | |
| BARIUM | | | | | | | | | | | |
| CALCIUM | | | | | | | | | | | |
| CHROMIUM | | | | | | | | | | | |

SITE 28
SUMMARY OF POSITIVE ANALYTICAL RESULTS FOR SURFACE SOIL
NSWC WHITE OAK, SILVER SPRING, MARYLAND


| **LOCATION** | **28SS107** | **28SS107** | **28SS107** | **28SS108** | **28SS201** | **28SS202** | **28SS203** | **28SS204** | **28SS205** | **28SS205** | **28SS205** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SAMPLE ID:** | **28SS107** | **28SS107-AVG** | **28SS107-D** | **28SS108** | **28-SS-201** | **28-SS-202** | **28-SS-203** | **28-SS-204** | **28-SS-205** | **28-SS-205-AVG** | **28-SS-205-D** |
| **DATE:** | **05/02/00** | **05/02/00** | **05/02/00** | **05/02/00** | **08/14/00** | **08/14/00** | **08/14/00** | **08/14/00** | **08/14/00** | **08/14/00** | **08/14/00** |
| **TOP DEPTH:** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** |
| **BOTTOM DEPTH:** | **0.5** | **0.5** | **0.5** | **0.5** | **0.5** | **0.5** | **0.5** | **0.5** | **0.5** | **0.5** | **0.5** |
| COBALT | | | | | | | | | | | |
| COPPER | | | | | | | | | | | |
| CYANIDE | | | | | | | | | | | |
| IRON | | | | | | | | | | | |
| LEAD | | | | | | | | | | | |
| MAGNESIUM | | | | | | | | | | | |
| MANGANESE | | | | | | | | | | | |
| MERCURY | | | | | | | | | | | |
| NICKEL | | | | | | | | | | | |
| POTASSIUM | | | | | | | | | | | |
| SELENIUM | | | | | | | | | | | |
| VANADIUM | | | | | | | | | | | |
| ZINC | | | | | | | | | | | |
| **Miscellaneous Parameters** | | | | | | | | | | | |
| CATION EXCHANGE CAPACITY MEQ/1 | | | | | 15 | | 10 | 22 | 22 | | |
| PH S.U. | | | | | | | | | | | |
| SIEVE # 10 | | | | | 20 | | 14 | 22 | 4 | | |
| SIEVE # 140 | | | | | 3 | | 3 | 9 | 5 | | |
| SIEVE # 20 | | | | | 24 | | 30 | 14 | 28 | | |
| SIEVE # 200 | | | | | 9 | | 7 | 9 | 33 | | |
| SIEVE # 4 | | | | | 11 | | 5 | 18 | 1 | | |
| SIEVE # 40 | | | | | 11 | | 20 | 11 | 15 | | |
| SIEVE # 60 | | | | | 10 | | 13 | 3 | 15 | | |
| SIEVE 1" | | | | | 0 | | 0 | 0 | 0 | | |
| SIEVE 1-1/2" | | | | | 0 | | 0 | 0 | 0 | | |
| SIEVE 2" | | | | | 0 | | 0 | 0 | 0 | | |
| SIEVE 3" | | | | | 0 | | 0 | 0 | 0 | | |
| SIEVE 3/4" | | | | | 3 | | 3 | 8 | 0 | | |
| SIEVE 3/8" | | | | | 9 | | 6 | 10 | 0 | | |
| TOTAL ORGANIC CARBON MG/KG | 10000 | 11450 | 12900 | 24700 | 1400 | | 1200 | 1200 | 1500 | | |

SITE 28
SUMMARY OF POSITIVE ANALYTICAL RESULTS FOR SURFACE SOIL
NSWC WHITE OAK, SILVER SPRING, MARYLAND


| LOCATION | 28SS206 | 28SS207 | 28SS208 | 28SS209 |
|---|---|---|---|---|
| SAMPLE ID: | 28-SS-206 | 28-SS-207 | 28-SS-208 | 28-SS-209 |
| DATE: | 08/14/00 | 08/14/00 | 08/14/00 | 08/14/00 |
| TOP DEPTH: | 0 | 0 | 0 | 0 |
| BOTTOM DEPTH: | 0.5 | 0.5 | 0.5 | 0.5 |
| **Volatile Organics (ug/kg)** | | | | |
| ACETONE | | | | |
| CHLOROBENZENE | | | | |
| **Semivolatile Organics (ug/kg)** | | | | |
| 1,2-DICHLOROBENZENE | | | | |
| 1,3-DICHLOROBENZENE | | | | |
| 1,4-DICHLOROBENZENE | | | | |
| 2,4-DIMETHYLPHENOL | | | | |
| 2-METHYLNAPHTHALENE | | | | |
| 2-METHYLPHENOL | | | | |
| 4-METHYLPHENOL | | | | |
| ACENAPHTHENE | | | | |
| ANTHRACENE | | | | |
| BENZO(A)ANTHRACENE | | | | |
| BENZO(A)PYRENE | | | | |
| BENZO(B)FLUORANTHENE | | | | |
| BENZO(G,H,I)PERYLENE | | | | |
| BENZO(K)FLUORANTHENE | | | | |
| BIS(2-ETHYLHEXYL)PHTHALATE | | | | |
| CARBAZOLE | | | | |
| CHRYSENE | | | | |
| DI-N-BUTYL PHTHALATE | | | | |
| DIBENZO(A,H)ANTHRACENE | | | | |
| DIBENZOFURAN | | | | |
| DIETHYL PHTHALATE | | | | |
| FLUORANTHENE | | | | |
| FLUORENE | | | | |
| HEXACHLOROBENZENE | | | | |
| INDENO(1,2,3-CD)PYRENE | | | | |
| NAPHTHALENE | | | | |
| PHENANTHRENE | | | | |
| PHENOL | | | | |
| PYRENE | | | | |
| OV 2-BUTANONE | | | | |
| **Pesticides/PCBs (ug/kg)** | | | | |
| 4,4'-DDE | | | | |
| AROCLOR-1248 | 820 UJ | 3300 UJ | 3300 UJ | 330 UJ |
| AROCLOR-1254 | 820 UJ | 3300 UJ | 3300 UJ | 330 UJ |
| AROCLOR-1260 | 4700 J | 11000 J | 30000 J | 1700 J |
| DIELDRIN | | | | |
| **Inorganics (mg/kg)** | | | | |
| ALUMINUM | | | | |
| ARSENIC | | | | |
| BARIUM | | | | |
| CALCIUM | | | | |
| CHROMIUM | | | | |

SITE 28
SUMMARY OF POSITIVE ANALYTICAL RESULTS FOR SURFACE SOIL
NSWC WHITE OAK, SILVER SPRING, MARYLAND


| **LOCATION** | **28SS206** | **28SS207** | **28SS208** | **28SS209** |
|---|---|---|---|---|
| **SAMPLE ID:** | **28-SS-206** | **28-SS-207** | **28-SS-208** | **28-SS-209** |
| **DATE:** | **08/14/00** | **08/14/00** | **08/14/00** | **08/14/00** |
| **TOP DEPTH:** | **0** | **0** | **0** | **0** |
| **BOTTOM DEPTH:** | **0.5** | **0.5** | **0.5** | **0.5** |
| COBALT | | | | |
| COPPER | | | | |
| CYANIDE | | | | |
| IRON | | | | |
| LEAD | | | | |
| MAGNESIUM | | | | |
| MANGANESE | | | | |
| MERCURY | | | | |
| NICKEL | | | | |
| POTASSIUM | | | | |
| SELENIUM | | | | |
| VANADIUM | | | | |
| ZINC | | | | |
| **Miscellaneous Parameters** | | | | |
| CATION EXCHANGE CAPACITY MEQ/1 | | | 44 | 17 |
| PH S.U. | | | | |
| SIEVE # 10 | | | 14 | 13 |
| SIEVE # 140 | | | 5 | 4 |
| SIEVE # 20 | | | 23 | 25 |
| SIEVE # 200 | | | 20 | 22 |
| SIEVE # 4 | | | 3 | 3 |
| SIEVE # 40 | | | 15 | 13 |
| SIEVE # 60 | | | 16 | 12 |
| SIEVE 1" | | | 0 | 0 |
| SIEVE 1-1/2" | | | 0 | 0 |
| SIEVE 2" | | | 0 | 0 |
| SIEVE 3" | | | 0 | 0 |
| SIEVE 3/4" | | | 3 | 4 |
| SIEVE 3/8" | | | 1 | 3 |
| TOTAL ORGANIC CARBON MG/KG | | | 1800 | 1500 |

- U - Chemical was not detected at the numerical detection limit (quantitation limit),
B - Chemical was detected but the result is considered a false positive as a consequence of either laboratory or field blank contamination.
J - Chemical was detected, however, the associated numerical result is estimated
K - Chemical was detected, however the associated numerical result is considered biased high.
L - Chemical was detected, however the associated numerical result is considered biased low.
UJ - Chemical was not detected, however the numerical detection limit is regarded as inaccurate or imprecise.
UL - Chemical was not detected, however the numerical detection limit is regarded as having a low bias.

SITE 28
SUMMARY OF POSITIVE ANALYTIC RESULTS FOR SUBSURFACE SOIL
NSWC WHITE OAK, SILVER SPRING, MARYLAND


| LOCATION: | 28PCB01 | 28PCB02 | 28PCB03 | 28PCB04 | 28PCB04 | 28PCB04 | 28PCB05 | 28PCB06 | 28PCB07 | 28SB01 |
|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE ID: | 28-PCB-01-0204 | 28-PCB-02-0204 | 28-PCB-03-0204 | 28-PCB-04-0204 | 28-PCB-04-0204-AVG | 28-PCB-04-0204-D | 28-PCB-05-0204 | 28-PCB-06-0204 | 28-PCB-07-0204 | 28-SB-01(OLD) |
| DATE | 04/06/99 | 04/06/99 | 04/06/99 | 04/06/99 | 04/06/99 | 04/06/99 | 04/06/99 | 04/06/99 | 04/06/99 | 10/23/97 |
| TOP DEPTH | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 |
| BOTTOM DEPTH | 2.5 | 4 | 3 | 3 | 3 | 3 | 4 | 4 | 4 | 4 |
| **Volatile Organics (ug/kg)** | | | | | | | | | | |
| CHLOROBENZENE | | | | | | | | | | 11 U |
| **Semivolatile Organics (ug/kg)** | | | | | | | | | | |
| 1,2,4-TRICHLOROBENZENE | | | | | | | | | | 370 U |
| 1,4-DICHLOROBENZENE | | | | | | | | | | 370 U |
| 4-METHYLPHENOL | | | | | | | | | | 370 U |
| ACENAPHTHENE | | | | | | | | | | 370 U |
| ANTHRACENE | | | | | | | | | | 370 U |
| BENZO(A)ANTHRACENE | | | | | | | | | | 370 U |
| BENZO(A)PYRENE | | | | | | | | | | 370 U |
| BENZO(B)FLUORANTHENE | | | | | | | | | | 370 U |
| BENZO(G,H,I)PERYLENE | | | | | | | | | | 370 U |
| BENZO(K)FLUORANTHENE | | | | | | | | | | 370 U |
| CARBAZOLE | | | | | | | | | | 370 U |
| CHRYSENE | | | | | | | | | | 370 U |
| DI-N-BUTYL PHTHALATE | | | | | | | | | | 250 J |
| DIBENZOFURAN | | | | | | | | | | 370 U |
| FLUORANTHENE | | | | | | | | | | 370 U |
| FLUORENE | | | | | | | | | | 370 U |
| INDENO(1,2,3-CD)PYRENE | | | | | | | | | | 370 U |
| PHENANTHRENE | | | | | | | | | | 370 U |
| PYRENE | | | | | | | | | | 370 U |
| **Pesticides/PCBs (ug/kg)** | | | | | | | | | | |
| 4,4'-DDE | | | | | | | | | | 3.7 U |
| AROCLOR-1248 | 40 U | 41 UJ | 37 U | 37 U | 37.5 U | 38 U | 37 U | 37 UL | 43 U | 37 U |
| AROCLOR-1254 | 25 J | 74 J | 61 J | 9.7 J | 11.35 J | 13 J | 17 J | 37 UL | 43 U | 37 U |
| AROCLOR-1260 | 35 J | 66 J | 75 | 9.9 J | 9.8 J | 9.7 J | 14 J | 37 UL | 43 U | 13 J |
| DELTA-BHC | | | | | | | | | | 1.8 U |
| **Inorganics (mg/kg)** | | | | | | | | | | |
| ALUMINUM | | | | | | | | | | 17900 |
| ARSENIC | | | | | | | | | | 6.9 K |
| BARIUM | | | | | | | | | | 19.2 |
| CALCIUM | | | | | | | | | | 74 B |
| CHROMIUM | | | | | | | | | | 41 K |
| COBALT | | | | | | | | | | 1.7 B |
| COPPER | | | | | | | | | | 15 J |
| CYANIDE | | | | | | | | | | 0.19 U |
| IRON | | | | | | | | | | 25500 |
| LEAD | | | | | | | | | | 5.8 K |
| MAGNESIUM | | | | | | | | | | 374 K |
| MANGANESE | | | | | | | | | | 89.1 |
| MERCURY | | | | | | | | | | 0.03 |
| NICKEL | | | | | | | | | | 6.5 J |
| POTASSIUM | | | | | | | | | | 314 K |
| SELENIUM | | | | | | | | | | 0.5 UJ |
| VANADIUM | | | | | | | | | | 36.4 K |
| ZINC | | | | | | | | | | 10.6 J |
| **Miscellaneous Parameters** | | | | | | | | | | |
| PH S.U. | | | | | | | | | | 4.83 |

SITE 28
SUMMARY OF POSITIVE ANALYTIC RESULTS FOR SUBSURFACE SOIL
NSWC WHITE OAK, SILVER SPRING, MARYLAND


| LOCATION: | 28SB02 | 28SB03 | 28SB04 | 28SB05 | 28SB06 | 28SB07 | 28SB08 | 28SB09 |
|---|---|---|---|---|---|---|---|---|
| SAMPLE ID: | 28-SB-02(OLD) | 28-SB-03(OLD) | 28-SB-4(4)(OLD) | 28-SB-5(4)(OLD) | 28-SB-6(4)(OLD) | 28-SS-07(OLD) | 28-SS-08(OLD) | 28-SS-09(OLD) |
| DATE | 10/23/97 | 10/23/97 | 10/24/97 | 10/24/97 | 10/24/97 | 10/23/97 | 10/23/97 | 10/23/97 |
| TOP DEPTH | 2 | 2 | 3 | 2 | 2 | 2 | 2 | 2 |
| BOTTOM DEPTH | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| **Volatile Organics (ug/kg)** | | | | | | | | |
| CHLOROBENZENE | 11 U | 12 U | 15 | 11 U | 11 U | 11 U | 11 U | 12 U |
| **Semivolatile Organics (ug/kg)** | | | | | | | | |
| 1,2,4-TRICHLOROBENZENE | 370 U | 390 U | 52 J | 360 UJ | 360 UJ | 390 U | 360 U | 410 U |
| 1,4-DICHLOROBENZENE | 370 U | 390 U | 49 J | 360 UJ | 360 UJ | 390 U | 360 U | 410 U |
| 4-METHYLPHENOL | 370 U | 390 U | 400 UJ | 360 UJ | 360 UJ | 390 U | 46 J | 410 U |
| ACENAPHTHENE | 370 U | 390 U | 400 UJ | 360 UJ | 360 UJ | 280 J | 360 U | 410 U |
| ANTHRACENE | 370 U | 390 U | 400 UJ | 360 UJ | 360 UJ | 350 J | 360 U | 410 U |
| BENZO(A)ANTHRACENE | 370 U | 390 U | 400 UJ | 360 UJ | 360 UJ | 2000 | 77 J | 57 J |
| BENZO(A)PYRENE | 370 U | 390 U | 400 UJ | 360 UJ | 360 UJ | 2500 | 78 J | 59 J |
| BENZO(B)FLUORANTHENE | 370 U | 390 U | 400 UJ | 360 UJ | 360 UJ | 2400 | 80 J | 79 J |
| BENZO(G,H,I)PERYLENE | 370 U | 390 U | 400 UJ | 360 UJ | 360 UJ | 1900 | 360 U | 410 U |
| BENZO(K)FLUORANTHENE | 370 U | 390 U | 400 UJ | 360 UJ | 360 UJ | 2500 | 86 J | 51 J |
| CARBAZOLE | 370 U | 390 U | 400 UJ | 360 UJ | 360 UJ | 190 J | 360 U | 410 U |
| CHRYSENE | 370 U | 390 U | 400 UJ | 360 UJ | 360 UJ | 2300 | 92 J | 74 J |
| DI-N-BUTYL PHTHALATE | 38 J | 57 J | 400 UJ | 360 UJ | 360 UJ | 390 U | 47 J | 99 J |
| DIBENZOFURAN | 370 U | 390 U | 400 UJ | 360 UJ | 360 UJ | 71 J | 360 U | 410 U |
| FLUORANTHENE | 370 U | 390 U | 400 UJ | 360 UJ | 360 UJ | 4000 | 200 J | 120 J |
| FLUORENE | 370 U | 390 U | 400 UJ | 360 UJ | 360 UJ | 170 J | 360 U | 410 U |
| INDENO(1,2,3-CD)PYRENE | 370 U | 390 U | 400 UJ | 360 UJ | 360 UJ | 1600 | 360 U | 410 U |
| PHENANTHRENE | 370 U | 390 U | 400 UJ | 360 UJ | 360 UJ | 2600 | 140 J | 82 J |
| PYRENE | 370 U | 49 J | 400 UJ | 360 UJ | 360 UJ | 5100 | 210 J | 130 J |
| **Pesticides/PCBs (ug/kg)** | | | | | | | | |
| 4,4'-DDE | 3.7 U | 3.9 U | 3.9 UJ | 3.6 UJ | 3.6 UJ | 3.7 U | 0.58 J | 4 U |
| AROCLOR-1248 | 37 U | 1400 J | 39 UJ | 36 UJ | 36 UJ | 37 U | 36 U | 40 U |
| AROCLOR-1254 | 37 U | 39 U | 39 UJ | 36 UJ | 36 UJ | 37 U | 36 U | 40 U |
| AROCLOR-1260 | 6.4 J | 560 J | 210 J | 5.9 J | 3.6 J | 210 | 42 J | 4700 |
| DELTA-BHC | 1.8 U | 1.9 U | 2 UJ | 1.8 UJ | 1.8 UJ | 0.8 J | 1.8 U | 2 U |
| **Inorganics (mg/kg)** | | | | | | | | |
| ALUMINUM | 10900 | 16200 | 16600 | 12100 | 15200 | 3670 | 9180 | 16700 |
| ARSENIC | 2.1 B | 3.4 B | 2.8 | 3.6 | 6.9 | 1.9 B | 4.8 K | 4.7 K |
| BARIUM | 31.1 | 62.9 | 64.7 | 24.8 | 20.8 | 17.9 | 32.2 | 56.7 |
| CALCIUM | 2610 J | 3030 J | 819 J | 1890 J | 162 B | 734 J | 2390 J | 1530 J |
| CHROMIUM | 14.8 K | 21.6 K | 16.8 J | 20.2 J | 36.6 J | 9.1 K | 19.7 K | 20.7 K |
| COBALT | 2.4 B | 4.6 | 7 | 1.8 B | 1.4 B | 1.6 B | 4.7 | 5.1 |
| COPPER | 9.8 J | 14.7 J | 12.6 J | 11.6 J | 11 J | 12.2 J | 12 J | 13 J |
| CYANIDE | 0.26 U | 0.24 U | | | | 0.25 U | 0.19 | 0.23 U |
| IRON | 13300 | 18000 | 18400 | 14200 | 19000 | 7200 | 19600 | 18500 |
| LEAD | 10.3 K | 40.7 K | 15.1 J | 7.3 J | 7 J | 40.1 K | 13.5 K | 19.5 K |
| MAGNESIUM | 1110 K | 1530 K | 1210 J | 709 J | 374 J | 399 K | 699 K | 1450 K |
| MANGANESE | 65.2 | 106 | 508 J | 41.3 J | 12.8 J | 71.8 | 115 | 66.5 |
| MERCURY | 0.06 | 0.12 | 0.03 | 0.05 | 0.02 U | 0.05 | 0.04 | 0.12 |
| NICKEL | 5.8 J | 8.9 J | 9.8 | 4.6 | 3.6 B | 3.2 J | 5.5 J | 9.4 J |
| POTASSIUM | 513 K | 701 K | 802 J | 501 J | 411 J | 183 K | 405 K | 759 K |
| SELENIUM | 0.53 J | 0.52 UJ | 0.7 K | 0.5 U | 0.91 K | 0.5 UJ | 0.58 J | 0.55 J |
| VANADIUM | 21.8 K | 30.7 K | 25.3 | 25.8 | 39.8 | 12.8 K | 32.8 K | 32.2 K |
| ZINC | 18.6 J | 58.4 J | 33.2 J | 14.8 J | 9.2 J | 33.9 J | 26.3 J | 47.8 J |
| **Miscellaneous Parameters** | | | | | | | | |
| PH S.U. | 5.21 | 7.49 | | | | 7.51 | 7.95 | 7.81 |

U - Chemical was not detected at the numerical detection limit (quantitation limit).

B - Chemical was detected but the result is considered a false positive as a consequence of either laboratory or field blank contamination.

J - Chemical was detected, however, the associated numerical result is estimated

K - Chemical was detected, however the associated numerical result is considered biased high.

L - Chemical was detected, however the associated numerical result is considered biased low.

UJ - Chemical was not detected, however the numerical detection limit is regarded as inaccurate or imprecise.

UL - Chemical was not detected, however the numerical detection limit is regarded as having a low bias.

## A.2 BACKGROUND STATISTICAL SUMMARIES/RISK ASSESSMENT DATA

TABLE 2.6-3

STATISTICAL SUMMARY OF ANALYTICAL RESULTS
BACKGROUND SURFACE SOIL
BACKGROUND INVESTIGATION REPORT
FORMER NSWC WHITE OAK
SILVER SPRING, MARYLAND


| Parameter (1) | Number of Samples | Number of Detections | Average | Maximum Detection | UCL Normal | UCL Log Normal | Distribution of Data | UCL Selected | Maryland Soils (3) | Eastern US Soils (2) |
|---|---|---|---|---|---|---|---|---|---|---|
| Inorganics (mg/kg) | | | | | | | | | | |
| Aluminum | 10 | 10 | 11213 | 20900 | 13885.4459 | 14953.4471 | LOGNORMAL | 14953 | NA | 7000-100000 |
| Arsenic | 10 | 9 | 3.66 | 6.7 | 4.5848 | 5.1108 | LOGNORMAL | 5.11 | 1.1-7.1 | <0.1-73 |
| Barium | 10 | 10 | 49.96 | 76.5 | 59.5396 | 65.6103 | NORMAL | 59.5 | 150-700 | 10-1500 |
| Beryllium | 10 | 3 | 0.0545 | 0.19 | 0.0935 | 0.2144 | UNDEFINED | 0.19 | ND-3 | <1-7 |
| Calcium | 10 | 4 | 261.815 | 1050 | 448.2994 | 1039.915 | LOGNORMAL | 1040 | NA | 100-280000 |
| Chromium | 10 | 10 | 19.48 | 55.9 | 27.5746 | 29.3503 | LOGNORMAL | 29.35 | 15-100 | 1-1000 |
| Cobalt | 10 | 10 | 5.524 | 13.8 | 7.6151 | 11.8099 | LOGNORMAL | 11.81 | ND-20 | <0.3-70 |
| Copper | 10 | 9 | 8.72 | 17.8 | 11.523 | 16.2258 | NORMAL | 11.52 | 5-70 | <1-700 |
| Iron | 10 | 10 | 13959 | 25500 | 17266.1398 | 18945.7645 | LOGNORMAL | 18946 | NA | 100->100000 |
| Lead | 10 | 10 | 32.775 | 133 | 53.8832 | 60.1839 | LOGNORMAL | 60.2 | 10-50 | <10-300 |
| Magnesium | 10 | 10 | 931 | 1690 | 1182.7126 | 1472.176 | NORMAL | 1183 | NA | 50-50000 |
| Manganese | 10 | 10 | 181.255 | 490 | 261.7912 | 493.2461 | UNDEFINED | 490 | NA | <2-7000 |
| Mercury | 10 | 9 | 0.0665 | 0.195 | 0.0969 | 0.1424 | LOGNORMAL | 0.142 | 0.04-0.14 | 0.01-3.4 |
| Nickel | 10 | 10 | 9.145 | 28.6 | 13.3127 | 14.5572 | LOGNORMAL | 14.56 | ND-30 | <5-700 |
| Potassium | 10 | 10 | 562.4 | 1020 | 734.063 | 845.2054 | LOGNORMAL | 845 | NA | 50-37000 |
| Selenium | 10 | 2 | 0.3745 | 0.68 | 0.4646 | 0.4719 | UNDEFINED | 0.68 | <0.1-0.5 | <0.1-3.9 |
| Silver | 10 | 1 | 0.1975 | 1.145 | 0.3905 | 0.338 | UNDEFINED | 1.15 | NA | NA |
| Vanadium | 10 | 9 | 24.855 | 42.8 | 30.0805 | 32.8302 | NORMAL | 30.08 | 20-150 | <7-300 |
| Zinc | 10 | 10 | 25.195 | 43.5 | 30.6714 | 35.9456 | NORMAL | 30.67 | 8-113 | <5-2900 |
| Semivolatile organics (ug/kg) | | | | | | | | | | |
| Acenaphthene | 10 | 1 | 174.65 | 66.5 | 197.262 | 221.415 | UNDEFINED | 66.5 | NA | NA |
| Anthracene | 10 | 1 | 178.8 | 108 | 194.0989 | 200.4986 | UNDEFINED | 108 | NA | NA |
| Benzo(a)anthracene | 10 | 2 | 187.9 | 340 | 228.6803 | 288.202 | UNDEFINED | 340 | NA | NA |
| Benzo(a)pyrene | 10 | 2 | 180.4 | 265 | 212.0274 | 268.2905 | UNDEFINED | 265 | NA | NA |
| Benzo(b)fluoranthene | 10 | 2 | 182.3 | 275 | 213.5603 | 255.2117 | UNDEFINED | 275 | NA | NA |
| Benzo(g,h,i)perylene | 10 | 2 | 176.3 | 220 | 203.5988 | 250.069 | UNDEFINED | 220 | NA | NA |
| Benzo(k)fluoranthene | 10 | 2 | 188.1 | 335 | 227.2636 | 273.4356 | UNDEFINED | 335 | NA | NA |
| Chrysene | 10 | 2 | 196.2 | 400 | 243.3776 | 269.5996 | UNDEFINED | 400 | NA | NA |
| Dibenzo(a,h)anthracene | 10 | 1 | 177.5 | 95 | 195.0629 | 204.9544 | UNDEFINED | 95 | NA | NA |
| Fluoranthene | 10 | 3 | 225.5 | 800 | 346.1821 | 413.4985 | UNDEFINED | 800 | NA | NA |
| Fluorene | 10 | 1 | 174.7 | 67 | 197.2227 | 220.9997 | UNDEFINED | 67 | NA | NA |
| Indeno(1,2,3-cd)pyrene | 10 | 2 | 173.8 | 200 | 201.0287 | 254.8541 | UNDEFINED | 200 | NA | NA |
| Phenanthrene | 10 | 2 | 211.8 | 570 | 288.8906 | 332.6035 | UNDEFINED | 570 | NA | NA |
| Pyrene | 10 | 3 | 207.5 | 630 | 298.8674 | 379.5883 | UNDEFINED | 630 | NA | NA |

TABLE 2.6-3

STATISTICAL SUMMARY OF ANALYTICAL RESULTS
BACKGROUND SURFACE SOIL
BACKGROUND INVESTIGATION REPORT
FORMER NSWC WHITE OAK
SILVER SPRING, MARYLAND


| Parameter (1) | Number of Samples | Number of Detections | Average | Maximum Detection | UCL Normal | UCL Log Normal | Distribution of Data | UCL Selected | Maryland Soils (3) | Eastern US Soils (2) |
|---|---|---|---|---|---|---|---|---|---|---|
| Pesticide/PCBs (ug/kg) | | | | | | | | | | |
| 4,4'-DDD | 10 | 3 | 2.536 | 9.2 | 3.923 | 4.4947 | UNDEFINED | 9.2 | NA | NA |
| 4,4'-DDE | 10 | 7 | 10.002 | 81 | 24.527 | 123.755 | UNDEFINED | 81 | NA | NA |
| 4,4'-DDT | 10 | 4 | 7.46 | 49 | 16.0528 | 20.1739 | UNDEFINED | 49 | NA | NA |
| Alpha chlordane | 10 | 1 | 1.1 | 2.6 | 1.4064 | 1.3566 | UNDEFINED | 2.6 | NA | NA |
| Dieldrin | 10 | 4 | 2.383 | 8.8 | 3.7197 | 4.4352 | UNDEFINED | 8.8 | NA | NA |
| Endosulfan I | 10 | 1 | 0.911 | 0.71 | 0.9583 | 0.9752 | UNDEFINED | 0.71 | NA | NA |
| Gamma chlordane | 10 | 2 | 0.949 | 1.5 | 1.0895 | 1.1367 | UNDEFINED | 1.5 | NA | NA |
| Heptachlor epoxide | 10 | 2 | 1.2 | 2.4 | 1.5242 | 1.5434 | UNDEFINED | 2.4 | NA | NA |
| Radionuclides (pci/g) | | | | | | | | | | |
| Radium-226 | 10 | 6 | 2.268 | 6.38 | 3.4155 | 33.5669 | NORMAL | 3.4155 | NA | NA |

Notes:
NA - Not Available
UCL - Upper Confidence Limit
(1) Only positive detections shown.
(2) Shacklette, Hansford T. and Josephine G. Boerngen, Element Concentrations in Soils and Other Surficial Materials of the Conterminous United States, U. S. Geological Survey Professional Paper 1270, 1984 (surface soil values are presented in table).
(3) Dragun, James, Ph.D., Elements in North American Soils. HMCRI, Greenbelt, MD, 1991 (surface soil values are presented in table).

TABLE 2.6-4

STATISTICAL SUMMARY OF ANALYTICAL RESULTS
BACKGROUND SUBSURFACE SOIL
BACKGROUND INVESTIGATION REPORT
FORMER NSWC WHITE OAK
SILVER SPRING, MARYLAND

| Parameter (1) | Number of Samples | Number of Detections | Average | Maximum Detection | UCL Normal | UCL Log Normal | Distribution of Data | UCL Selected | Maryland Soils (3) | Eastern US Soils (2) |
|---|---|---|---|---|---|---|---|---|---|---|
| Inorganics (mg/kg) | | | | | | | | | | |
| Aluminum | 12 | 12 | 15384.5 | 40700 | 20961.2285 | 47084.1175 | NORMAL | 20961 | NA | 7000-100000 |
| Antimony | 12 | 3 | 0.3273 | 0.42 | 0.3558 | 0.3578 | UNDEFINED | 0.42 | NA | <1-8.5 |
| Arsenic | 11 | 10 | 4.4773 | 12.7 | 6.5957 | 12.1494 | LOGNORMAL | 12.15 | 1.1-7.1 | <0.1-73 |
| Barium | 12 | 12 | 30.8142 | 61.7 | 40.0935 | 57.7397 | NORMAL | 40.09 | 150-700 | 10-1500 |
| Beryllium | 12 | 5 | 0.3653 | 2.37 | 0.7224 | 12.5888 | UNDEFINED | 2.37 | ND-3 | <1-7 |
| Cadmium | 9 | | 0.1211 | NA | 0.1794 | 0.4049 | NORMAL | 0.179 | <0.01-5.6 | NA |
| Calcium | 10 | 2 | 104.3 | 363 | 174.732 | 247.2544 | LOGNORMAL | 247 | NA | 100-280000 |
| Chromium | 12 | 12 | 22.5325 | 45.8 | 29.7224 | 41.054 | LOGNORMAL | 41.05 | 15-100 | 1-1000 |
| Cobalt | 12 | 9 | 5.7108 | 16.6 | 8.6096 | 20.5703 | UNDEFINED | 16.6 | ND-20 | <0.3-70 |
| Copper | 12 | 12 | 13.94 | 40.5 | 19.1356 | 21.6175 | LOGNORMAL | 21.62 | 5-70 | <1-700 |
| Iron | 12 | 12 | 21781.6667 | 48600 | 28681.3907 | 47705.9265 | NORMAL | 28681 | NA | 100->100000 |
| Lead | 12 | 12 | 11.4325 | 41 | 16.8411 | 21.2297 | LOGNORMAL | 21.23 | 10-50 | <10-300 |
| Magnesium | 11 | 11 | 1013 | 3710 | 1579.7746 | 2987.1372 | LOGNORMAL | 2987 | NA | 50-50000 |
| Manganese | 12 | 12 | 121.1458 | 503 | 201.1913 | 1217.779 | UNDEFINED | 503 | NA | <2-7000 |
| Mercury | 10 | 9 | 0.0395 | 0.08 | 0.0505 | 0.0621 | NORMAL | 0.051 | 0.04-0.14 | 0.01-3.4 |
| Nickel | 11 | 11 | 7.8527 | 26.7 | 11.7007 | 13.839 | LOGNORMAL | 13.84 | ND-30 | <5-700 |
| Potassium | 12 | 12 | 761.7583 | 2930 | 1191.2677 | 2792.1973 | LOGNORMAL | 2792 | NA | 50-37000 |
| Selenium | 9 | 5 | 1.0372 | 3.1 | 1.6128 | 2.7271 | LOGNORMAL | 2.73 | <0.1-0.5 | <0.1-3.9 |
| Silver | 9 | | 0.0922 | NA | 0.0961 | 0.1019 | NORMAL | 0.096 | NA | NA |
| Sodium | 12 | 3 | 56.7958 | 69.4 | 89.581 | 99.4365 | UNDEFINED | 69.4 | NA | <500-50000 |
| Vanadium | 12 | 12 | 34.4358 | 70.9 | 44.3124 | 60.6101 | NORMAL | 44.31 | 20-150 | <7-300 |
| Zinc | 12 | 11 | 24.1263 | 84.2 | 36.9737 | 114.0412 | UNDEFINED | 84.2 | 8-113 | <5-2900 |
| Radionuclides (pci/g) | | | | | | | | | | |
| Radium-226 | 8 | 6 | 2.0331 | 2.87 | 2.347 | 41.9948 | UNDEFINED | 2.87 | NA | NA |

NA - Not Available
UCL - Upper Confidence Limit
(1) Only positive detections shown.
(2) Shacklette, Hansford T. and Josephine G. Boerngen, Element Concentrations in Soils and Other Surficial Materials of the Conterminous United States, U. S. Geological Survey Professional Paper 1270, 1984 (surface soil values are presented in table).
(3) Dragun, James, Ph.D., Elements in North American Soils. HMCRI, Greenbelt, MD, 1991 (surface soil values are presented in table).

## SUMMARY OF 95% UCL CALCULATIONS
## SUBSURFACE SOIL - SITE 28

| PARAMETER | # DETECTS | CNT | AVG | W NORM | W LOG | W TEST | SAMP UCL NORM | SAMP UCL LOG | DIST | MAX DETECT |
|---|---|---|---|---|---|---|---|---|---|---|
| BENZO(A)ANTHRACENE | 3 | 9 | 0.3621111 | 0.4637 | 0.7513 | 0.829 | 0.74 | 0.99 | U | 2 |
| BENZO(A)PYRENE | 3 | 9 | 0.418 | 0.4473 | 0.728 | 0.829 | 0.90 | 1.23 | U | 2.5 |
| BENZO(B)FLUORANTHENE | 3 | 9 | 0.4093333 | 0.4435 | 0.6842 | 0.829 | 0.87 | 1.07 | U | 2.4 |
| INDENO(1,2,3-CD)PYRENE | 1 | 9 | 0.3455556 | 0.4071 | 0.4492 | 0.829 | 0.64 | 0.61 | U | 1.6 |
| AROCLOR-1248 | 1 | 16 | 0.1053281 | 0.275 | 0.3111 | 0.887 | 0.26 | 0.10 | U | 1.4 |
| AROCLOR-1260 | 14 | 16 | 0.3744188 | 0.3499 | 0.9255 | 0.887 | 0.88 | 2.06 | L | 4.7 |
| MANGANESE | 9 | 9 | 119.5222 | 0.5973 | 0.9169 | 0.829 | 211.90 | 370.14 | L | 508 |

## SUMMARY OF 95% UCL CALCULATIONS
## SURFACE SOIL - SITE 28

| PARAMETER | # DETECTS | CNT | AVG | W NORM | W LOG | W TEST | SAMP UCL NORM | SAMP UCL LOG | DIST | MAX DETECT |
|---|---|---|---|---|---|---|---|---|---|---|
| BENZO(A)PYRENE | 6 | 14 | 0.6552143 | 0.3672 | 0.6972 | 0.8740 | 1.3878704 | 1.0318698 | U | 0.81 |
| BENZO(B)FLUORANTHENE | 7 | 14 | 0.3506429 | 0.6242 | 0.8299 | 0.8740 | 0.5156932 | 0.5679064 | U | 1.2 |
| DIBENZO(A,H)ANTHRACENE | 2 | 14 | 0.596 | 0.3142 | 0.4938 | 0.8740 | 1.3323728 | 0.7716473 | U | 0.13 |
| HEXACHLOROBENZENE | 1 | 14 | 0.5096429 | 0.3023 | 0.3366 | 0.8740 | 1.0668862 | 0.6360743 | U | 4.6 |
| AROCLOR-1248 | 2 | 48 | 4.7141667 | 0.1711 | 0.8289 | 0.9470 | 11.5240995 | 4.6755775 | U | 1.6 |
| AROCLOR-1254 | 24 | 48 | 7.0465521 | 0.2626 | 0.9026 | 0.9470 | 14.2752556 | 24.5920375 | U | 74 |
| AROCLOR-1260 | 47 | 48 | 52.7749833 | 0.1611 | 0.9583 | 0.9470 | 133.1082385 | 238.7553341 | L | 2300 |
| ALUMINUM | 9 | 9 | 22411.1111 | 0.9292 | 0.9529 | 0.8290 | 25521.7019 | 26053.8322 | L | 32200 |
| ARSENIC | 8 | 9 | 5.8833 | 0.9251 | 0.9701 | 0.8290 | 7.7102 | 9.1881 | L | 12 |
| CHROMIUM | 9 | 9 | 32.2 | 0.7440 | 0.8836 | 0.8290 | 42.7826 | 44.5458 | L | 73.6 |
| IRON | 9 | 9 | 25555.5556 | 0.9144 | 0.9213 | 0.8290 | 29779.8799 | 31023.4449 | L | 36400 |
| VANADIUM | 9 | 9 | 42.6333 | 0.9307 | 0.9563 | 0.8290 | 49.4522 | 51.021 | L | 61.2 |

**CALCULATION WORKSHEET** Order No. 19116 (01-91)



| CLIENT | JOB NUMBER |
|---|---|
| NWSC White Oak | 7909 0001 |

SUBJECT: Sample Calculation of Statistical Analyses

| BASED ON | DRAWING NUMBER |
|---|---|
| | |

| BY | CHECKED BY | APPROVED BY | DATE |
|---|---|---|---|
| ANO | JLL 3/5/01 | | |

| Sample | Parameter | Result | Units | Date |
|---|---|---|---|---|
| 28-SS-01 (old) | Benzo (a) pyrene | 185 | ug/kg | 10/23/97 |
| 28-SS-02 (old) | Benzo (a) pyrene | 200 | ug/kg | 10/23/97 |
| 28-SS-03 (old) | Benzo (a) pyrene | 205 | ug/kg | 10/23/97 |
| 28-SB-4 (2)(old) | Benzo (a) pyrene | 250 | ug/kg | 10/24/97 |
| 28-SB-04A | Benzo (a) pyrene | 6000 | ug/kg | 4/6/99 |
| 28-SB-04B | Benzo (a) pyrene | 220 | ug/kg | 4/6/99 |
| 28-SB-5 (2)(old) | Benzo (a) pyrene | 185 | ug/kg | 10/24/97 |
| 28-SB-6 (2)(old) | Benzo (a) pyrene | 180 | ug/kg | 10/24/97 |
| 28-SB-07 (old) | Benzo (a) pyrene | 190 | ug/kg | 10/23/97 |
| 28-SB-07A | Benzo (a) pyrene | 160 | ug/kg | 4/6/99 |
| 28-SB-07B-Avg | Benzo (a) pyrene | 320 | ug/kg | 4/6/99 |
| 28-SB-07C | Benzo (a) pyrene | 810 | ug/kg | 4/6/99 |
| 28-SB-08 (old) | Benzo (a) pyrene | 68 | ug/kg | 10/23/97 |
| 28-SB-09 (old) | Benzo (a) pyrene | 200 | ug/kg | 10/23/97 |

(1) Calculate the Arithmetic Mean ($\bar{X}$):

$$\bar{X} = \frac{\sum_{i=1}^{n} X_i}{n}$$

$$\sum X_i = 185 + 200 + 205 + 250 + 6000 + 220 + 185 + 180 + 190 + 160 + 320 + 810 + 68 + 200 = (9173)$$

$$\bar{X} = \frac{9173}{14} = 655.2143$$

| | |
|---|---|
| CLIENT NWSC WHITE OAK | JOB NUMBER 7909 0601 |
| SUBJECT Sample Calculation of Statistical Analyses | |
| BASED ON | DRAWING NUMBER |
| BY ANO / CHECKED BY JLL | APPROVED BY / DATE 3/5/01 |

(2) Calculate Standard Deviation ($S_x$)

$$S_x = \sqrt{\frac{\Sigma(x_i - \bar{x})^2}{n-1}}$$

$$\Sigma(x_i - \bar{x})^2 = (185-655)^2 + (200-655)^2 + (205-655)^2 + (250-655)^2 + (6000-655)^2 + (220-655)^2 + (185-655)^2 + (180-655)^2 + (190-655)^2 + (160-655)^2 + (320-655)^2 + (810-655)^2 + (68-655)^2 + (200-655)^2$$

$$\sum_{i=1}^{5} (x_i - \bar{x})^2 = 221101.5 + 207220 + 202692 + 164199 + 28566734 + 189411 + 22101 + 225829 + 216424 + 112368 + 23958 + 344821 + 207220$$

$$= 31148318$$

$n = 14$

$$S_x = \sqrt{\frac{31148318}{13}} = (1547.9)$$

(3) Calculate the Shapiro-Wilk W-Statistic (Wcalc)

$$W_{calc} = \left(\frac{b}{S_x\sqrt{n-1}}\right)^2$$

Calculate b by creating a Table with:

- Column 1 = Results Ordered from Smallest to Largest ($R_i$)
- Column 2 = Results Ordered from Largest to Smallest ($R_{n-1}+1$)
- Column 3 = Column 2 - Column 1 ($R_{n-1}+1 - R_i$)
- Column 4 = Coefficient $a_i$ ⟶ found in Table 1
- Column 5 = Column 3 X Column 4 = $b_i = a_i(R_{n-1}+1 - R_i)$

$b = \sum_{i=1}^{k} b_i$ where k is the greatest integer less than or equal to $n/2$

| | | | |
|---|---|---|---|
| CLIENT NWSC WhiteOak | | JOB NUMBER 7909 0601 | |
| SUBJECT Sample Calculation of Statistical Analyse | | | |
| BASED ON | | DRAWING NUMBER | |
| BY AND | CHECKED BY JLi | APPROVED BY | DATE 3/5/01 |

(4) Calculate the 95% Upper Confidence Limit ($UCL_{0.95}$)

$$UCL_{0.95} = \bar{x} + t_{0.95,n-1} \frac{s_x}{\sqrt{n}}$$

Determine $t_{0.95,n-1}$ from Table 3

$$t_{0.95,13} = 1.771$$

$$UCL_{0.95} = 655 + \frac{(1.771)(1547.9)}{\sqrt{14}}$$

$$= 655 + \frac{2741.3}{3.741}$$

$$= 1387.6$$

| | |
|---|---|
| CLIENT: NWSC White Oak | JOB NUMBER: 7909 0601 |
| SUBJECT: Sample Calculation & Statistical Analyses | |
| BASED ON | DRAWING NUMBER |
| BY: ANO / CHECKED BY: JLL | APPROVED BY / DATE: 3/5/01 |

| $R_i$ | $R_{n-i}-1$ | $R_{n-i+1}-R_i$ | $a_i$ | $b_i$ | $i$ |
|---|---|---|---|---|---|
| 68 | 6000 | 5932 | .5251 | 3114.9 | 1 |
| 160 | 810 | 650 | .3318 | 215.7 | 2 |
| 180 | 320 | 140 | .2460 | 34.4 | 3 |
| 185 | 250 | 65 | .1802 | 11.7 | 4 |
| 185 | 220 | 35 | .1240 | 4.34 | 5 |
| 190 | 205 | 15 | .0727 | 1.1 | 6 |
| 200 | 200 | 0 | | | 7 |
| 200 | 200 | | | | 8 |
| 205 | 190 | | | | 9 |
| 220 | 185 | | | | 10 |
| 250 | 185 | | | | 11 |
| 320 | 180 | | | | 12 |
| 810 | 160 | | | | 13 |
| 6000 | 68 | | | | 14 |

$b = 3382.1$

$$W_{calc} = \left(\frac{b}{S_x\sqrt{n-1}}\right)^2 = \left(\frac{3382.1}{1547.9\sqrt{14-1}}\right)^2 = 0.3672$$

Determine $W_{TEST}$ at 5% Level of Significance from Table 2

$$W_{TEST} = 0.874$$

Since $W_{TEST} > W_{calc}$ we reject the hypothesis that the data has a normal distribution.

TABLE 1
COEFFICIENTS $A_i$ FOR W TEST OF NORMALITY FOR N=2 to 50

| i/n | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.7071 | 0.7071 | 0.6872 | 0.6646 | 0.6431 | 0.6233 | 0.6052 | 0.5888 | 0.5739 |
| 2 | | | 0.1677 | 0.2413 | 0.2806 | 0.3031 | 0.3164 | 0.3244 | 0.3291 |
| 3 | | | | | 0.0875 | 0.1401 | 0.1743 | 0.1976 | 0.2141 |
| 4 | | | | | | | 0.0561 | 0.0947 | 0.1224 |
| 5 | | | | | | | | | 0.0399 |

| i/n | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.5601 | 0.5475 | 0.5359 | 0.5251 | 0.5150 | 0.5056 | 0.4968 | 0.4886 | 0.4808 | 0.4734 |
| 2 | 0.3315 | 0.3325 | 0.3325 | 0.3318 | 0.3306 | 0.3290 | 0.3273 | 0.3253 | 0.3232 | 0.3211 |
| 3 | 0.2260 | 0.2347 | 0.2412 | 0.2460 | 0.2495 | 0.2521 | 0.2540 | 0.2553 | 0.2561 | 0.2565 |
| 4 | 0.1429 | 0.1586 | 0.1707 | 0.1802 | 0.1878 | 0.1939 | 0.1988 | 0.2027 | 0.2059 | 0.2085 |
| 5 | 0.0695 | 0.0922 | 0.1099 | 0.1240 | 0.1353 | 0.1447 | 0.1524 | 0.1587 | 0.1641 | 0.1686 |
| 6 | | 0.0303 | 0.0539 | 0.0727 | 0.0880 | 0.1005 | 0.1109 | 0.1197 | 0.1271 | 0.1334 |
| 7 | | | | 0.0240 | 0.0433 | 0.0593 | 0.0725 | 0.0837 | 0.0932 | 0.1013 |
| 8 | | | | | | 0.0196 | 0.0359 | 0.0496 | 0.0612 | 0.0711 |
| 9 | | | | | | | | 0.0163 | 0.0303 | 0.0422 |
| 10 | | | | | | | | | | 0.0140 |

| i/n | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.4643 | 0.4590 | 0.4542 | 0.4493 | 0.4450 | 0.4407 | 0.4366 | 0.4328 | 0.4291 | 0.4254 |
| 2 | 0.3185 | 0.3156 | 0.3126 | 0.3098 | 0.3069 | 0.3043 | 0.3018 | 0.2992 | 0.2968 | 0.2944 |
| 3 | 0.2578 | 0.2571 | 0.2563 | 0.2554 | 0.2543 | 0.2533 | 0.2522 | 0.2510 | 0.2499 | 0.2487 |
| 4 | 0.2119 | 0.2131 | 0.2139 | 0.2145 | 0.2148 | 0.2151 | 0.2152 | 0.2151 | 0.2150 | 0.2148 |
| 5 | 0.1736 | 0.1764 | 0.1787 | 0.1807 | 0.1822 | 0.1836 | 0.1848 | 0.1857 | 0.1864 | 0.1870 |
| 6 | 0.1399 | 0.1443 | 0.1480 | 0.1512 | 0.1539 | 0.1563 | 0.1584 | 0.1601 | 0.1616 | 0.1630 |
| 7 | 0.1092 | 0.1150 | 0.1201 | 0.1245 | 0.1283 | 0.1316 | 0.1346 | 0.1372 | 0.1395 | 0.1415 |
| 8 | 0.0804 | 0.0878 | 0.0941 | 0.0997 | 0.1046 | 0.1089 | 0.1128 | 0.1162 | 0.1192 | 0.1219 |
| 9 | 0.0530 | 0.0618 | 0.0696 | 0.0764 | 0.0823 | 0.0876 | 0.0923 | 0.0965 | 0.1002 | 0.1036 |
| 10 | 0.0263 | 0.0368 | 0.0459 | 0.0539 | 0.0610 | 0.0672 | 0.0728 | 0.0778 | 0.0822 | 0.0862 |
| 11 | | 0.0122 | 0.0228 | 0.0321 | 0.0403 | 0.0476 | 0.0540 | 0.0598 | 0.0650 | 0.0697 |
| 12 | | | | 0.0107 | 0.0200 | 0.0284 | 0.0358 | 0.0424 | 0.0483 | 0.0537 |
| 13 | | | | | | 0.0094 | 0.0178 | 0.0253 | 0.0320 | 0.0381 |
| 14 | | | | | | | | 0.0084 | 0.0159 | 0.0227 |
| 15 | | | | | | | | | | 0.0076 |

| i/n | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.4220 | 0.4188 | 0.4156 | 0.4127 | 0.4096 | 0.4068 | 0.4040 | 0.4015 | 0.9689 | 0.3964 |
| 2 | 0.2921 | 0.2898 | 0.2876 | 0.2854 | 0.2834 | 0.2813 | 0.2794 | 0.2774 | 0.2755 | 0.2737 |
| 3 | 0.2475 | 0.2463 | 0.2451 | 0.2439 | 0.2427 | 0.2415 | 0.2403 | 0.2391 | 0.2380 | 0.2368 |
| 4 | 0.2145 | 0.2141 | 0.2137 | 0.2132 | 0.2127 | 0.2121 | 0.2116 | 0.2110 | 0.2104 | 0.2098 |
| 5 | 0.1874 | 0.1878 | 0.1880 | 0.1882 | 0.1883 | 0.1883 | 0.1883 | 0.1881 | 0.1880 | 0.1878 |
| 6 | 0.1641 | 0.1651 | 0.1660 | 0.1667 | 0.1673 | 0.1678 | 0.1683 | 0.1686 | 0.1689 | 0.1691 |
| 7 | 0.1433 | 0.1449 | 0.1463 | 0.1475 | 0.1487 | 0.1496 | 0.1503 | 0.1513 | 0.1520 | 0.1526 |
| 8 | 0.1243 | 0.1265 | 0.1284 | 0.1301 | 0.1317 | 0.1331 | 0.1344 | 0.1356 | 0.1366 | 0.1376 |
| 9 | 0.1066 | 0.1093 | 0.1118 | 0.1140 | 0.1160 | 0.1179 | 0.1196 | 0.1211 | 0.1225 | 0.1237 |
| 10 | 0.0899 | 0.0931 | 0.0961 | 0.0988 | 0.1013 | 0.1036 | 0.1056 | 0.1075 | 0.1092 | 0.1108 |
| 11 | 0.0739 | 0.0777 | 0.0821 | 0.0844 | 0.0873 | 0.0900 | 0.0924 | 0.0947 | 0.0967 | 0.0986 |
| 12 | 0.0585 | 0.0629 | 0.0669 | 0.0706 | 0.0739 | 0.0770 | 0.0798 | 0.0824 | 0.0848 | 0.0870 |
| 13 | 0.0435 | 0.0485 | 0.0530 | 0.0572 | 0.0610 | 0.0645 | 0.0677 | 0.0706 | 0.0733 | 0.0759 |
| 14 | 0.0289 | 0.0344 | 0.0395 | 0.0441 | 0.0484 | 0.0523 | 0.0559 | 0.0592 | 0.0622 | 0.0651 |
| 15 | 0.0144 | 0.0206 | 0.0262 | 0.0314 | 0.0361 | 0.0404 | 0.0444 | 0.0481 | 0.0515 | 0.0546 |
| 16 | | 0.0068 | 0.0131 | 0.0187 | 0.0239 | 0.0287 | 0.0331 | 0.0372 | 0.0409 | 0.0444 |
| 17 | | | | 0.0062 | 0.0119 | 0.0172 | 0.0220 | 0.0264 | 0.0305 | 0.0343 |
| 18 | | | | | | 0.0057 | 0.0110 | 0.0158 | 0.0203 | 0.0244 |
| 19 | | | | | | | | 0.0053 | 0.0101 | 0.0146 |
| 20 | | | | | | | | | | 0.0049 |

| i/n | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.3940 | 0.3917 | 0.3894 | 0.3872 | 0.3850 | 0.3830 | 0.3808 | 0.3789 | 0.3770 | 0.3751 |
| 2 | 0.2719 | 0.2701 | 0.2684 | 0.2667 | 0.2651 | 0.2635 | 0.2620 | 0.2604 | 0.2589 | 0.2574 |
| 3 | 0.2357 | 0.2345 | 0.2334 | 0.2323 | 0.2313 | 0.2302 | 0.2291 | 0.2281 | 0.2271 | 0.2260 |
| 4 | 0.2091 | 0.2085 | 0.2078 | 0.2072 | 0.2065 | 0.2058 | 0.2052 | 0.2045 | 0.2038 | 0.2032 |
| 5 | 0.1876 | 0.1874 | 0.1871 | 0.1868 | 0.1865 | 0.1862 | 0.1859 | 0.1855 | 0.1851 | 0.1847 |
| 6 | 0.1693 | 0.1694 | 0.1695 | 0.1695 | 0.1695 | 0.1695 | 0.1695 | 0.1693 | 0.1692 | 0.1691 |
| 7 | 0.1531 | 0.1535 | 0.1539 | 0.1542 | 0.1545 | 0.1548 | 0.1550 | 0.1551 | 0.1553 | 0.1554 |
| 8 | 0.1384 | 0.1392 | 0.1398 | 0.1405 | 0.1410 | 0.1415 | 0.1420 | 0.1423 | 0.1427 | 0.1430 |
| 9 | 0.1249 | 0.1259 | 0.1269 | 0.1278 | 0.1286 | 0.1293 | 0.1300 | 0.1306 | 0.1312 | 0.1317 |
| 10 | 0.1123 | 0.1136 | 0.1149 | 0.1160 | 0.1170 | 0.1180 | 0.1189 | 0.1197 | 0.1205 | 0.1212 |
| 11 | 0.1004 | 0.1020 | 0.1035 | 0.1049 | 0.1062 | 0.1073 | 0.1085 | 0.1095 | 0.1105 | 0.1113 |
| 12 | 0.0891 | 0.0909 | 0.0927 | 0.0943 | 0.0959 | 0.0972 | 0.0986 | 0.0998 | 0.1010 | 0.1020 |
| 13 | 0.0782 | 0.0804 | 0.0824 | 0.0842 | 0.0860 | 0.0876 | 0.0892 | 0.0906 | 0.0919 | 0.0932 |
| 14 | 0.0677 | 0.0701 | 0.0724 | 0.0745 | 0.0775 | 0.0785 | 0.0801 | 0.0817 | 0.0832 | 0.0846 |
| 15 | 0.0575 | 0.0602 | 0.0628 | 0.0651 | 0.0673 | 0.0694 | 0.0713 | 0.0731 | 0.0748 | 0.0764 |
| 16 | 0.0476 | 0.0506 | 0.0534 | 0.0560 | 0.0584 | 0.0607 | 0.0628 | 0.0648 | 0.0667 | 0.0685 |
| 17 | 0.0379 | 0.0411 | 0.0442 | 0.0471 | 0.0497 | 0.0522 | 0.0546 | 0.0568 | 0.0588 | 0.0606 |
| 18 | 0.0283 | 0.0318 | 0.0352 | 0.0383 | 0.0412 | 0.0439 | 0.0465 | 0.0489 | 0.0511 | 0.0532 |
| 19 | 0.0188 | 0.0227 | 0.0263 | 0.0296 | 0.0328 | 0.0357 | 0.0385 | 0.0411 | 0.0436 | 0.0459 |
| 20 | 0.0094 | 0.0136 | 0.0175 | 0.0211 | 0.0245 | 0.0277 | 0.0307 | 0.0335 | 0.0361 | 0.0386 |
| 21 | | 0.0045 | 0.0087 | 0.0126 | 0.0163 | 0.0197 | 0.0229 | 0.0259 | 0.0288 | 0.0314 |
| 22 | | | | 0.0042 | 0.0081 | 0.0188 | 0.0153 | 0.0185 | 0.0215 | 0.0244 |
| 23 | | | | | | 0.0039 | 0.0076 | 0.0111 | 0.0143 | 0.0174 |
| 24 | | | | | | | | 0.0037 | 0.0071 | 0.0104 |
| 25 | | | | | | | | | | 0.0350 |

TABLE 2

PERCENTAGE POINTS OF THE W TEST FOR N=3 to 50

| n | 0.01 | 0.05 |
|---|---|---|
| 3 | 0.753 | 0.767 |
| 4 | 0.687 | 0.748 |
| 5 | 0.686 | 0.762 |
| 6 | 0.713 | 0.788 |
| 7 | 0.730 | 0.803 |
| 8 | 0.749 | 0.818 |
| 9 | 0.764 | 0.829 |
| 10 | 0.781 | 0.842 |
| 11 | 0.792 | 0.850 |
| 12 | 0.805 | 0.859 |
| 13 | 0.814 | 0.866 |
| 14 | 0.825 | 0.874 |
| 15 | 0.835 | 0.881 |
| 16 | 0.844 | 0.887 |
| 17 | 0.851 | 0.892 |
| 18 | 0.858 | 0.897 |
| 19 | 0.863 | 0.901 |
| 20 | 0.868 | 0.905 |
| 21 | 0.873 | 0.908 |
| 22 | 0.878 | 0.911 |
| 23 | 0.881 | 0.914 |
| 24 | 0.884 | 0.916 |
| 25 | 0.888 | 0.918 |
| 26 | 0.891 | 0.920 |
| 27 | 0.894 | 0.923 |
| 28 | 0.896 | 0.924 |
| 29 | 0.898 | 0.926 |
| 30 | 0.900 | 0.927 |

| n | 0.01 | 0.05 |
|---|---|---|
| 31 | 0.902 | 0.929 |
| 32 | 0.904 | 0.930 |
| 33 | 0.906 | 0.931 |
| 34 | 0.908 | 0.933 |
| 35 | 0.910 | 0.934 |
| 36 | 0.912 | 0.935 |
| 37 | 0.914 | 0.936 |
| 38 | 0.916 | 0.938 |
| 39 | 0.917 | 0.939 |
| 40 | 0.919 | 0.940 |
| 41 | 0.920 | 0.941 |
| 42 | 0.922 | 0.942 |
| 43 | 0.923 | 0.943 |
| 44 | 0.924 | 0.944 |
| 45 | 0.926 | 0.945 |
| 46 | 0.927 | 0.945 |
| 47 | 0.928 | 0.946 |
| 48 | 0.929 | 0.947 |
| 49 | 0.929 | 0.947 |
| 50 | 0.930 | 0.947 |

TABLE 3

PERCENTILES OF STUDENT's t-DISTRIBUTION WITH n DEGREES OF FREEDOM

| n\F | 0.60 | 0.75 | 0.90 | 0.95 | 0.975 | 0.99 | 0.995 | 0.9995 |
|---|---|---|---|---|---|---|---|---|
| 1 | 0.325 | 1.000 | 3.078 | 6.314 | 12.706 | 31.821 | 63.656 | 636.578 |
| 2 | 0.289 | 0.816 | 1.886 | 2.920 | 4.303 | 6.965 | 9.925 | 31.600 |
| 3 | 0.277 | 0.765 | 1.638 | 2.353 | 3.182 | 4.541 | 5.841 | 12.924 |
| 4 | 0.271 | 0.741 | 1.533 | 2.132 | 2.776 | 3.747 | 4.604 | 8.610 |
| 5 | 0.267 | 0.727 | 1.476 | 2.015 | 2.571 | 3.365 | 4.032 | 6.869 |
| | | | | | | | | |
| 6 | 0.265 | 0.718 | 1.440 | 1.943 | 2.447 | 3.143 | 3.707 | 5.959 |
| 7 | 0.263 | 0.711 | 1.415 | 1.895 | 2.365 | 2.998 | 3.499 | 5.408 |
| 8 | 0.262 | 0.706 | 1.397 | 1.860 | 2.306 | 2.896 | 3.355 | 5.041 |
| 9 | 0.261 | 0.703 | 1.383 | 1.833 | 2.262 | 2.821 | 3.250 | 4.781 |
| 10 | 0.260 | 0.700 | 1.372 | 1.812 | 2.228 | 2.764 | 3.169 | 4.587 |
| | | | | | | | | |
| 11 | 0.260 | 0.697 | 1.363 | 1.796 | 2.201 | 2.718 | 3.106 | 4.437 |
| 12 | 0.259 | 0.695 | 1.356 | 1.782 | 2.179 | 2.681 | 3.055 | 4.318 |
| 13 | 0.259 | 0.694 | 1.350 | 1.771 | 2.160 | 2.650 | 3.012 | 4.221 |
| 14 | 0.258 | 0.692 | 1.345 | 1.761 | 2.145 | 2.624 | 2.977 | 4.140 |
| 15 | 0.258 | 0.691 | 1.341 | 1.753 | 2.131 | 2.602 | 2.947 | 4.073 |
| | | | | | | | | |
| 16 | 0.258 | 0.690 | 1.337 | 1.746 | 2.120 | 2.583 | 2.921 | 4.015 |
| 17 | 0.257 | 0.689 | 1.333 | 1.740 | 2.110 | 2.567 | 2.898 | 3.965 |
| 18 | 0.257 | 0.688 | 1.330 | 1.734 | 2.101 | 2.552 | 2.878 | 3.922 |
| 19 | 0.257 | 0.688 | 1.328 | 1.729 | 2.093 | 2.539 | 2.861 | 3.883 |
| 20 | 0.257 | 0.687 | 1.325 | 1.725 | 2.086 | 2.528 | 2.845 | 3.850 |
| | | | | | | | | |
| 21 | 0.257 | 0.686 | 1.323 | 1.721 | 2.080 | 2.518 | 2.831 | 3.819 |
| 22 | 0.256 | 0.686 | 1.321 | 1.717 | 2.074 | 2.508 | 2.819 | 3.792 |
| 23 | 0.256 | 0.685 | 1.319 | 1.714 | 2.069 | 2.500 | 2.807 | 3.768 |
| 24 | 0.256 | 0.685 | 1.318 | 1.711 | 2.064 | 2.492 | 2.797 | 3.745 |
| 25 | 0.256 | 0.684 | 1.316 | 1.708 | 2.060 | 2.485 | 2.787 | 3.725 |
| | | | | | | | | |
| 26 | 0.256 | 0.684 | 1.315 | 1.706 | 2.056 | 2.479 | 2.779 | 3.707 |
| 27 | 0.256 | 0.684 | 1.314 | 1.703 | 2.052 | 2.473 | 2.771 | 3.689 |
| 28 | 0.256 | 0.683 | 1.313 | 1.701 | 2.048 | 2.467 | 2.763 | 3.674 |
| 29 | 0.256 | 0.683 | 1.311 | 1.699 | 2.045 | 2.462 | 2.756 | 3.660 |
| 30 | 0.256 | 0.683 | 1.310 | 1.697 | 2.042 | 2.457 | 2.750 | 3.646 |
| | | | | | | | | |
| 40 | 0.255 | 0.681 | 1.303 | 1.684 | 2.021 | 2.423 | 2.704 | 3.551 |
| 60 | 0.254 | 0.679 | 1.296 | 1.671 | 2.000 | 2.390 | 2.660 | 3.460 |
| 120 | 0.254 | 0.677 | 1.289 | 1.658 | 1.980 | 2.358 | 2.617 | 3.373 |
| 1,000,000 | 0.253 | 0.674 | 1.282 | 1.645 | 1.960 | 2.326 | 2.576 | 3.290 |

$F = 1 - \alpha$

## TABLE A12
## VALUES OF $H_{0.95}$ FOR COMPUTING A ONE-SIDED UPPER 95% CONFIDENCE LIMIT ON A LOGNORMAL MEAN

| Sy\n | 3 | 5 | 7 | 10 | 12 | 15 | 21 | 31 | 51 | 101 | 201 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.10 | 2.750 | 2.035 | 1.886 | 1.802 | 1.775 | 1.749 | 1.722 | 1.701 | 1.684 | 1.670 | 1.652 |
| 0.20 | 3.295 | 2.198 | 1.992 | 1.881 | 1.843 | 1.809 | 1.771 | 1.742 | 1.718 | 1.697 | 1.676 |
| 0.30 | 4.109 | 2.402 | 2.125 | 1.977 | 1.927 | 1.882 | 1.833 | 1.793 | 1.761 | 1.733 | 1.705 |
| 0.40 | 5.220 | 2.651 | 2.282 | 2.089 | 2.026 | 1.968 | 1.905 | 1.856 | 1.813 | 1.777 | 1.727 |
| 0.50 | 6.495 | 2.947 | 2.465 | 2.220 | 2.141 | 2.068 | 1.989 | 1.928 | 1.876 | 1.830 | 1.784 |
| 0.60 | 7.807 | 3.287 | 2.673 | 2.368 | 2.271 | 2.181 | 2.085 | 2.010 | 1.946 | 1.891 | 1.836 |
| 0.70 | 9.120 | 3.662 | 2.904 | 2.532 | 2.414 | 2.306 | 2.191 | 2.102 | 2.025 | 1.960 | 1.895 |
| 0.80 | 10.43 | 4.062 | 3.155 | 2.710 | 2.570 | 2.443 | 2.307 | 2.202 | 2.112 | 2.035 | 1.958 |
| 0.90 | 11.74 | 4.478 | 3.420 | 2.902 | 2.738 | 2.589 | 2.432 | 2.310 | 2.206 | 2.117 | 2.028 |
| 1.00 | 13.05 | 4.905 | 3.698 | 3.103 | 2.915 | 2.744 | 2.564 | 2.423 | 2.306 | 2.205 | 2.104 |
| 1.25 | 16.33 | 6.001 | 4.426 | 3.639 | 3.389 | 3.163 | 2.923 | 2.737 | 2.580 | 2.447 | 2.314 |
| 1.50 | 19.6 | 7.120 | 5.184 | 4.207 | 3.896 | 3.612 | 3.311 | 3.077 | 2.881 | 2.713 | 2.545 |
| 1.75 | 22.87 | 8.250 | 5.960 | 4.795 | 4.422 | 4.081 | 3.719 | 3.437 | 3.200 | 2.997 | 2.794 |
| 2.00 | 26.14 | 9.387 | 6.747 | 5.396 | 4.962 | 4.564 | 4.141 | 3.812 | 3.533 | 3.295 | 3.057 |
| 2.50 | 32.69 | 11.67 | 8.339 | 6.621 | 6.067 | 5.557 | 5.013 | 4.588 | 4.228 | 3.92 | 3.612 |
| 3.00 | 39.23 | 13.97 | 9.945 | 7.864 | 7.191 | 6.57 | 5.907 | 5.388 | 4.947 | 4.569 | 4.191 |
| 3.50 | 45.77 | 16.27 | 11.56 | 9.118 | 8.326 | 7.596 | 6.815 | 6.201 | 5.681 | 5.233 | 4.758 |
| 4.00 | 52.31 | 18.58 | 13.18 | 10.38 | 9.469 | 8.63 | 7.731 | 7.024 | 6.424 | 5.908 | 5.392 |
| 4.50 | 58.85 | 20.88 | 14.8 | 11.64 | 10.62 | 9.669 | 8.652 | 7.854 | 7.174 | 6.59 | 6.006 |
| 5.00 | 65.39 | 23.19 | 16.43 | 12.91 | 11.77 | 10.71 | 9.579 | 8.688 | 7.929 | 7.277 | 6.625 |
| 6.00 | 78.47 | 27.81 | 19.68 | 15.45 | 14.08 | 12.81 | 11.44 | 10.36 | 9.449 | 8.661 | 7.873 |
| 7.00 | 91.55 | 32.43 | 22.94 | 18.00 | 16.39 | 14.9 | 13.31 | 12.05 | 10.98 | 10.05 | 9.12 |
| 8.00 | 104.6 | 37.06 | 26.2 | 20.55 | 18.71 | 17.01 | 15.18 | 13.74 | 12.51 | 11.45 | 10.39 |
| 9.00 | 117.7 | 41.68 | 29.46 | 23.1 | 21.03 | 19.11 | 17.05 | 15.43 | 14.05 | 12.85 | 11.65 |
| 10.00 | 130.8 | 46.31 | 32.73 | 25.66 | 23.35 | 21.22 | 18.93 | 17.13 | 15.59 | 14.26 | 12.93 |

# A.3 REMOVAL ACTON ALTERNATIVE COST ESTIMATES

# NAVAL SURFACE WARFARE CENTER - WHITE OAK
## Silver Spring, Maryland
## Site 28 - Engineering Evaluation/Cost Analysis

**Cost Estimate Assumptions**

The following underlying assumptions apply to all cost estimates prepared for the above referenced site. Alternative specific assumptions are also provided, as necessary.

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

*ECHOS Environmental Restoration Unit Cost Book, 2000*
*Means Site Work and Landscape Cost Data, 17th Edition, 2000*
Previous cost estimates / past experience / other sources.

All field work would be performed in a standard construction uniform. No level of safety is required, except where noted below.

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.

Confirmatory samples would be collected from the excavations using methods outlined in 40 CFR 761.283, Subpart O. A total of 40 samples were assumed.

Alternative No. 2 – Excavation, On-site Treatment, Off-site Landfill Disposal, Site Restoration

Estimated project duration is 45 days (9 weeks), based on the following task durations:

| | |
|---|---|
| Mobilization | 5 days |
| Includes equipment and personnel mobilization, utility connection, site survey | |
| Excavation (100 cy/day) | 17 days |
| On-site Treatment (1) | 8 days |
| Concrete removal | 3 days |
| Backfill (200 cy/day) | 9 days |
| Demobilization | 3 days |
| Includes vegetation, equipment and personnel demobilization | |

(1) Performed concurrently with excavation
Note: Time required to prepare pre- and post-construction submittals is in addition to the durations outlined above.

Minimal surveying would be necessary.

Soil excavation and on-site treatment 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.

Nearby paved areas would be used to stage the on-site treatment unit.

Following treatment, material would be loaded into trucks for immediate off-site disposal. Roll-off boxes would not be used.

The disturbed areas would be vegetated upon completion.

Alternative No. 3 – Excavation, Off-site Landfill Disposal, Site Restoration

Estimated project duration is 37 days (8 weeks), based on the following task durations:

| | |
|---|---|
| Mobilization | 5 days |
| Includes equipment and personnel mobilization, utility connection, site survey | |
| Excavation (100 cy/day) | 17 days |
| Backfill (200 cy/day) | 9 days |
| Concrete removal | 3 days |
| Demobilization | 3 days |
| Includes vegetation, equipment and personnel demobilization | |

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

Minimal surveying would be necessary.

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.

Material buried at the site would be characterized for disposal purposes prior to mobilization. Costs for this activity have been included as a separate task. Additional characterization of the material, once excavated, would not be performed.

Material would be excavated and loaded into trucks for immediate off-site disposal. Roll-off boxes would not be used.

The disturbed areas would be vegetated upon completion.

NSWC - WHITE OAK
SILVER SPRING, MARYLAND
SITE 28 - BUILDING T-14 SCRAPYARD
ALTERNATIVE 2 - EXCAVATION, ON-SITE TREATMENT, OFF-SITE LANDFILL DISPOSAL, SITE RESTORATION

| Item | Quantity | Unit | Unit Cost | | | | Extended Cost | | | | Subtotal | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Subcontract | Material | Labor | Equipment | Subcontract | Material | Labor | Equipment | | |
| **1 MOBILIZATION/DEMOBILIZATION** | | | | | | | | | | | | |
| 1.1 Office Trailer (1) | 3 | mo | $345.00 | | | | $1,035 | $0 | $0 | $0 | $1,035 | (a) |
| 1.2 Field Office Support | 3 | mo | | $135.00 | | | $0 | $405 | $0 | $0 | $405 | (a) |
| 1.3 Storage Trailer (1) | 3 | mo | $85.00 | | | | $255 | $0 | $0 | $0 | $255 | (a) |
| 1.4 Utility connections (electric and phone) | 1 | ls | $1,500.00 | | | | $1,500 | $0 | $0 | $0 | $1,500 | (b) |
| 1.5 Site utilities - usage | 3 | mo | | $240.00 | | | $0 | $720 | $0 | $0 | $720 | (a) |
| 1.6 Personnel mobilization/demobilization | 10 | ea | | | $500.00 | | $0 | $0 | $5,000 | $0 | $5,000 | (b) |
| 1.7 Equipment mobilization/demobilization | 1 | ls | $2,000.00 | | | | $2,000 | $0 | $0 | $0 | $2,000 | (b), trailers, excavator, FEL |
| 1.8 Per diem | 70 | mn dy | | | $165.00 | | $0 | $0 | $11,550 | $0 | $11,550 | (b) |
| **2 DECONTAMINATION** | | | | | | | | | | | | |
| 2.1 Decontamination Trailer | 3 | mo | $2,275.00 | | | | $6,825 | $0 | $0 | $0 | $6,825 | (a) |
| 2.2 Equipment Decon Pad | 1 | ls | | $500.00 | $450.00 | $155.00 | $0 | $500 | $450 | $155 | $1,105 | (b) |
| 2.3 Decon Water | 3000 | gal | | $0.20 | | | $0 | $600 | $0 | $0 | $600 | (b) |
| 2.4 Decon Water Storage Tank, 6,000 gallon | 3 | mo | $600.00 | | | | $1,800 | $0 | $0 | $0 | $1,800 | (a) |
| 2.5 Clean Water Storage Tank, 4,000 gallon | 3 | mo | $540.00 | | | | $1,620 | $0 | $0 | $0 | $1,620 | (a) |
| 2.6 PPE (5 p * 5 days * 9 weeks) | 225 | day | | $30.00 | | | $0 | $6,750 | $0 | $0 | $6,750 | (a) |
| 2.7 Disposal of Decon Waste (liquid & solid) | 3 | mo | $900.00 | | | | $2,700 | $0 | $0 | $0 | $2,700 | (b) |
| 2.8 Pressure washer | 3 | mo | | | | $510.00 | $0 | $0 | $0 | $1,530 | $1,530 | (a), duration of excav and disp. |
| 2.9 Waste profile decontamination water | 1 | ls | $1,000.00 | | | | $1,000 | $0 | $0 | $0 | $1,000 | (b) |
| **3 SITE PREPARATION** | | | | | | | | | | | | |
| 3.1 Construction survey | 1 | ls | $1,000.00 | | | | $1,000 | $0 | $0 | $0 | $1,000 | (b) |
| 3.2 Clear and grub | 0.45 | acre | | | $41.00 | $80.50 | $0 | $0 | $18 | $36 | $55 | (a) |
| **4 EXCAVATION** | | | | | | | | | | | | |
| 4.1 Excavator /w operator to excavate/load contaminated soil | 17 | day | | | $514.95 | $1,017.00 | $0 | $0 | $8,754 | $17,289 | $26,043 | (a) |
| 4.2 Haul material to be treated to treatment unit | 17 | day | | | $162.24 | $475.00 | $0 | $0 | $2,758 | $8,075 | $10,833 | (a), 1 dump truck w/ driver |
| 4.3 Remove concrete in southwestern portion of scrapyard | 156 | cy | | | $54.50 | $38.50 | $0 | $0 | $8,502 | $6,006 | $14,508 | (a) |
| 4.4 Confirmatory sampling and analysis | 40 | ea | $500.00 | $20.00 | | | $20,000 | $800 | $0 | $0 | $20,800 | (b), PCBs, SVOCs |
| 4.5 Laborers | 17 | day | | | $420.08 | | $0 | $0 | $7,141 | $0 | $7,141 | (a), 2 laborers duration of excav/tr |
| **5 ON-SITE TREATMENT** | | | | | | | | | | | | |
| 5.1 Mobilize and demobilize treatment unit | 1 | ls | $350,000.00 | | | | $350,000 | $0 | $0 | $0 | $350,000 | (b) |
| 5.2 Permitting/engineering for treatment unit | 1 | ls | $37,131.00 | | | | $37,131 | $0 | $0 | $0 | $37,131 | (a) |
| 5.3 Front end loader w/ operator | 17 | day | | | $272.34 | $500.00 | $0 | $0 | $4,630 | $8,500 | $13,130 | (a), move soil around at treatment |
| 5.4 On-site thermal desorption | 2210 | ton | $150.00 | | | | $331,500 | $0 | $0 | $0 | $331,500 | (b), 1.3 tons/cubic yard |
| **6 OFF-SITE LANDFILL DISPOSAL** | | | | | | | | | | | | |
| 6.1 T & D of Concrete to Subtitle C Landfill (20 tons) | 1 | load | $1,328.80 | | | | $1,329 | $0 | $0 | $0 | $1,329 | (b), 22 tons/truck |
| 6.2 Transport treated soil to MSW landfill (111@50 mi) | 5550 | ton-mi | $3.00 | | | | $16,650 | $0 | $0 | $0 | $16,650 | (b), 20 tons/truck |
| 6.3 Dispose of material at MSW landfill | 2210 | ton | $35.00 | | | | $77,350 | $0 | $0 | $0 | $77,350 | (b), 1.3 tons/cubic yard |
| 6.4 Waste disposal application fee | 1 | ls | $1,000.00 | | | | $1,000 | $0 | $0 | $0 | $1,000 | (b) |
| **7 SITE RESTORATION** | | | | | | | | | | | | |
| 7.1 Remove decon pad and dispose | 100 | ton | $35.00 | | | | $3,500 | $0 | $0 | $0 | $3,500 | (b), haul to and dispose at MSW la |
| 7.2 Import fill material | 1300 | cy | | $8.25 | | | $0 | $10,725 | $0 | $0 | $10,725 | (a) |
| 7.3 Place, grade, and compact fill material | 1300 | cy | | | $0.27 | $0.51 | $0 | $0 | $351 | $663 | $1,014 | (a) |
| 7.4 Import vegetative cover | 400 | cy | | $15.55 | | | $0 | $6,220 | $0 | $0 | $6,220 | (a) |
| 7.5 Place, grade vegetative cover | 400 | cy | | | $0.32 | $0.81 | $0 | $0 | $128 | $324 | $452 | (a) |
| 7.6 Vegetate site | 25 | msf | | $29.00 | $7.40 | $7.85 | $0 | $725 | $185 | $196 | $1,106 | (a), utility mix w/ mulch and fertiliz |
| 7.7 Disconnect utilities | 1 | ls | $500.00 | | | | $500 | $0 | $0 | $0 | $500 | (b) |
| **8 OFFICE SUPPORT/FIELD SUPPORT** | | | | | | | | | | | | |
| 8.1 Site Supervisor | 9 | week | | | $980.00 | | $0 | $0 | $8,820 | $0 | $8,820 | (b) |
| 8.2 Job Foreman | 9 | week | | | $674.00 | | $0 | $0 | $6,066 | $0 | $6,066 | (b) |
| 8.3 Project Accountant | 9 | week | | | $550.00 | | $0 | $0 | $4,950 | $0 | $4,950 | (b) |
| 8.4 Health and Safety Officer | 9 | week | | | $647.00 | | $0 | $0 | $5,823 | $0 | $5,823 | (b) |

NSWC - WHITE OAK
SILVER SPRING, MARYLAND
SITE 28 - BUILDING T-14 SCRAPYARD
ALTERNATIVE 2 - EXCAVATION, ON-SITE TREATMENT, OFF-SITE LANDFILL DISPOSAL, SITE RESTORATION

| Item | Quantity | Unit | Unit Cost | | | | Extended Cost | | | | Subtotal | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Subcontract | Material | Labor | Equipment | Subcontract | Material | Labor | Equipment | | |
| 8.5 Site Engineer | 9 | week | | | $663.00 | | $0 | $0 | $5,967 | $0 | $5,967 | (b) |
| 8.6 Project Manager (office - 1/2 time) | 4.5 | week | | | $1,158.00 | | $0 | $0 | $5,211 | $0 | $5,211 | (b) |
| 8.7 Project Engineer (office - 1/2 time) | 4.5 | week | | | $999.00 | | $0 | $0 | $4,496 | $0 | $4,496 | (b) |
| **9 PROJECT DOCUMENTATION** | | | | | | | | | | | | |
| 9.1 Pre- and post-construction submittals | 250 | hours | | | $40.00 | | $0 | $0 | $10,000 | $0 | $10,000 | (b) |
| 9.2 Post-removal survey | 1 | ls | $1,000.00 | | | | $1,000 | $0 | $0 | $0 | $1,000 | (b) |
| **Subtotal** | | | | | | | $859,695 | $27,445 | $100,800 | $42,774 | $1,030,715 | |
| **Local Area Adjustments** | | | | | | | 100.0% | 103.5% | 91.0% | 91.0% | | |
| **Subtotal** | | | | | | | $859,695 | $28,406 | $91,728 | $38,925 | $1,018,753 | |
| Overhead on Labor Cost @ 30% | | | | | | | | | $27,518 | | $27,518 | |
| G & A on Labor Cost @ 10% | | | | | | | | | $9,173 | | $9,173 | |
| G & A on Material Cost @ 10% | | | | | | | | $2,841 | | | $2,841 | |
| G & A on Subcontract Cost @ 10% | | | | | | | $85,969 | | | | $85,969 | |
| **Total Direct Cost** | | | | | | | $945,664 | $31,246 | $128,420 | $38,925 | $1,144,255 | |
| Indirects on Total Direct Cost @ 30% | | | | | | | | | | | $343,276 | |
| Profit on Total Direct Cost @ 10% | | | | | | | | | | | $114,425 | |
| **Subtotal** | | | | | | | | | | | $1,601,957 | |
| Health & Safety Monitoring @ 2% | | | | | | | | | | | $32,039 | |
| **Total Field Cost** | | | | | | | | | | | $1,633,996 | |
| Contingency on Total Field Cost @ 15% | | | | | | | | | | | $245,099 | |
| Engineering on Total Field Cost @ 5% | | | | | | | | | | | $81,700 | |
| **TOTAL COST** | | | | | | | | | | | **$1,960,795** | |

(a) ECHOS Environmental Restoration Unit Cost Book, 2000 / Means Site Work and Landscape Cost Data, 2000.
(b) Previous cost estimates / past experience / other sources.

NSWC - WHITE OAK
SILVER SPRING, MARYLAND
SITE 28 - BUILDING T-14 SCRAPYARD
ALTERNATIVE 3 - EXCAVATION, 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) | 2 | mo | $345.00 | | | | $690 | $0 | $0 | $0 | $690 | (a) |
| 1.2 Field Office Support | 2 | mo | | $135.00 | | | $0 | $270 | $0 | $0 | $270 | (a) |
| 1.3 Storage Trailer (1) | 2 | mo | $85.00 | | | | $170 | $0 | $0 | $0 | $170 | (a) |
| 1.4 Utility connections (electric and phone) | 1 | ls | $1,500.00 | | | | $1,500 | $0 | $0 | $0 | $1,500 | (b) |
| 1.5 Site utilities - usage | 2 | mo | | $240.00 | | | $0 | $480 | $0 | $0 | $480 | (a) |
| 1.6 Personnel mobilization/demobilization | 10 | ea | | | $500.00 | | $0 | $0 | $5,000 | $0 | $5,000 | (b) |
| 1.7 Equipment mobilization/demobilization | 1 | ls | $2,000.00 | | | | $2,000 | $0 | $0 | $0 | $2,000 | (b), trailers, excavator, FEL |
| 1.8 Per diem | 70 | mn dy | | | $165.00 | | $0 | $0 | $11,550 | $0 | $11,550 | (b) |
| **2 DECONTAMINATION** | | | | | | | | | | | | |
| 2.1 Decontamination Trailer | 2 | mo | $2,275.00 | | | | $4,550 | $0 | $0 | $0 | $4,550 | (a) |
| 2.2 Equipment Decon Pad | 1 | ls | | $500.00 | $450.00 | $155.00 | $0 | $500 | $450 | $155 | $1,105 | (b) |
| 2.3 Decon Water | 2000 | gal | | $0.20 | | | $0 | $400 | $0 | $0 | $400 | (b) |
| 2.4 Decon Water Storage Tank, 6,000 gallon | 2 | mo | $600.00 | | | | $1,200 | $0 | $0 | $0 | $1,200 | (a) |
| 2.5 Clean Water Storage Tank, 4,000 gallon | 2 | mo | $540.00 | | | | $1,080 | $0 | $0 | $0 | $1,080 | (a) |
| 2.6 PPE (5 p * 5 days * 6 weeks) | 150 | day | | $30.00 | | | $0 | $4,500 | $0 | $0 | $4,500 | (a) |
| 2.7 Disposal of Decon Waste (liquid & solid) | 2 | mo | $900.00 | | | | $1,800 | $0 | $0 | $0 | $1,800 | |
| 2.8 Pressure washer | 2 | mo | | | | $510.00 | $0 | $0 | $0 | $1,020 | $1,020 | (a), duration of excav and disp. |
| 2.9 Waste profile decontamination water | 1 | ls | $1,000.00 | | | | $1,000 | $0 | $0 | $0 | $1,000 | (b) |
| **3 SITE PREPARATION** | | | | | | | | | | | | |
| 3.1 Construction survey | 1 | ls | $1,000.00 | | | | $1,000 | $0 | $0 | $0 | $1,000 | |
| 3.2 Clear and grub | 0.45 | acre | | | $41.00 | $80.50 | $0 | $0 | $18 | $36 | $55 | (a) |
| **4 EXCAVATION** | | | | | | | | | | | | |
| 4.1 Excavator /w operator to excavate/load contaminated s | 17 | day | | | $514.95 | $1,017.00 | $0 | $0 | $8,754 | $17,289 | $26,043 | (a) |
| 4.2 Confirmatory sampling and analysis | 40 | ea | $500.00 | $20.00 | | | $20,000 | $800 | $0 | $0 | $20,800 | (b), PCBs, SVOCs |
| 4.3 Remove concrete in southwestern portion of scrapyard | 156 | cy | | | $41.50 | $29.00 | $0 | $0 | $6,474 | $4,524 | $10,998 | (a) |
| 4.4 Laborers | 17 | day | | | $210.04 | | $0 | $0 | $3,571 | $0 | $3,571 | (a), 2 laborer duration of excav/treat |
| **5 OFF-SITE LANDFILL DISPOSAL** | | | | | | | | | | | | |
| 5.1 T & D of Concrete to Subtitle C Landfill (20 tons) | 1 | load | $1,328.80 | | | | $1,329 | $0 | $0 | $0 | $1,329 | (b), 22 tons/truck |
| 5.2 Transport and Disposal of Soil to Subtitle C Landfill | 2210 | ton | $195.00 | | | | $430,950 | $0 | $0 | $0 | $430,950 | (b), O691.3 tons/cy |
| 5.3 Waste disposal application fee | 1 | ls | $1,000.00 | | | | $1,000 | $0 | $0 | $0 | $1,000 | (b) |
| **6 SITE RESTORATION** | | | | | | | | | | | | |
| 6.1 Remove decon pad and dispose | 100 | tons | $35.00 | | | | $3,500 | $0 | $0 | $0 | $3,500 | (b), haul to and dispose at MSW landfill |
| 6.2 Import fill material | 1300 | cy | | $8.25 | | | $0 | $10,725 | $0 | $0 | $10,725 | (a) |
| 6.3 Place, grade, and compact fill material | 1300 | cy | | | $0.27 | $0.51 | $0 | $0 | $351 | $663 | $1,014 | (a) |
| 6.4 Import vegetative cover | 400 | cy | | $15.55 | | | $0 | $6,220 | $0 | $0 | $6,220 | (a) |
| 6.5 Place, grade vegetative cover | 400 | cy | | | $0.32 | $0.81 | $0 | $0 | $128 | $324 | $452 | (a) |
| 6.6 Vegetate site | 25 | msf | | $29.00 | $7.40 | $7.85 | $0 | $725 | $185 | $196 | $1,106 | (a), utility mix w/ mulch and fertilizer |
| 6.7 Disconnect utilities | 1 | ls | $500.00 | | | | $500 | $0 | $0 | $0 | $500 | (b) |
| **7 OFFICE SUPPORT/FIELD SUPPORT** | | | | | | | | | | | | |
| 7.1 Site Supervisor | 7.5 | week | | | $980.00 | | $0 | $0 | $7,350 | $0 | $7,350 | (b) |
| 7.2 Job Foreman | 7.5 | week | | | $674.00 | | $0 | $0 | $5,055 | $0 | $5,055 | (b) |
| 7.3 Project Accountant | 7.5 | week | | | $550.00 | | $0 | $0 | $4,125 | $0 | $4,125 | (b) |
| 7.4 Health and Safety Officer | 7.5 | week | | | $647.00 | | $0 | $0 | $4,853 | $0 | $4,853 | (b) |
| 7.5 Site Engineer | 7.5 | week | | | $663.00 | | $0 | $0 | $4,973 | $0 | $4,973 | (b) |
| 7.6 Project Manager (office - 1/2 time) | 4 | week | | | $1,158.00 | | $0 | $0 | $4,632 | $0 | $4,632 | (b) |
| 7.7 Project Engineer (office - 1/2 time) | 4 | week | | | $999.00 | | $0 | $0 | $3,996 | $0 | $3,996 | (b) |
| **8 PROJECT DOCUMENTATION** | | | | | | | | | | | | |
| 8.1 Pre- and post-construction submittals | 100 | hours | | | $40.00 | | $0 | $0 | $4,000 | $0 | $4,000 | (b) |
| 8.2 Post-removal survey | 1 | ls | $1,000.00 | | | | $1,000 | $0 | $0 | $0 | $1,000 | (b) |
| 8.3 Sampling and waste characterization | 1 | ls | $2,500.00 | $250.00 | $500.00 | $500.00 | $2,500 | $250 | $500 | $500 | $3,750 | (b) |

NSWC - WHITE OAK
SILVER SPRING, MARYLAND
SITE 28 - BUILDING T-14 SCRAPYARD
ALTERNATIVE 3 - EXCAVATION, OFF-SITE LANDFILL DISPOSAL, SITE RESTORATION

| Item | Quantity | Unit | Unit Cost | | | | Extended Cost | | | | Subtotal | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Subcontract | Material | Labor | Equipment | Subcontract | Material | Labor | Equipment | | |
| **Subtotal** | | | | | | | $475,769 | $24,870 | $75,964 | $24,707 | $601,311 | |
| **Local Area Adjustments** | | | | | | | 100.0% | 103.5% | 91.0% | 91.0% | | |
| **Subtotal** | | | | | | | $475,769 | $25,740 | $69,127 | $22,484 | $593,121 | |
| Overhead on Labor Cost @ 30% | | | | | | | | | $20,738 | | $20,738 | |
| G & A on Labor Cost @ 10% | | | | | | | | | $6,913 | | $6,913 | |
| G & A on Material Cost @ 10% | | | | | | | | $2,574 | | | $2,574 | |
| G & A on Subcontract Cost @ 10% | | | | | | | $47,577 | | | | $47,577 | |
| **Total Direct Cost** | | | | | | | $523,346 | $28,314 | $96,778 | $22,484 | $670,922 | |
| Indirects on Total Direct Cost @ 30% | | | | | | | | | | | $201,277 | |
| Profit on Total Direct Cost @ 10% | | | | | | | | | | | $67,092 | |
| **Subtotal** | | | | | | | | | | | $939,291 | |
| Health & Safety Monitoring @ 2% | | | | | | | | | | | $18,786 | |
| **Total Field Cost** | | | | | | | | | | | $958,077 | |
| Contingency on Total Field Cost @ 15% | | | | | | | | | | | $143,712 | |
| Engineering on Total Field Cost @ 5% | | | | | | | | | | | $47,904 | |
| **TOTAL COST** | | | | | | | | | | | **$1,149,693** | |

(a) ECHOS Environmental Restoration Unit Cost Book, 2000 / Means Site Work and Landscape Cost Data, 2000.
(b) Previous cost estimates / past experience / other sources.

## A.4 SAMPLE LOG SHEETS

# SAMPLE LOG SHEET

NUS CORPORATION

- [ ] Surface Soil
- [x] Subsurface Soil
- [ ] Sediment
- [ ] Lagoon / Pond
- [ ] Other _____

Page _____ of 1

Case # 2046/1446

By G. E. Gette

Project Site Name NSWC, Dahlgren W. D. Project Site Number 28-SS-01

NUS Source No. _____ Source Location 28 - SB - 01 (4)

| Sample Method: Split Spoon | Composite Sample Data | | |
|---|---|---|---|
| | Sample | Time | Color / Description |
| Depth Sampled: 3-4' | | | |
| Sample Date & Time: 10/23/97 SS 1440 SB 1400 | | | |
| Sampled By: G. E. Gette | | | |
| Signatures: [illegible] | | | |

Type of Sample
- [x] Low Concentration
- [ ] High Concentration
- [x] Grab
- [ ] Composite
- [ ] Grab - Composite

Sample Data

| Color | Description: (Sand, Clay, Dry, Moist, Wet, etc.) |
|---|---|
| | |

Analysis:
- VOC
- SVOC
- Pest/PCB
- Metals
- CN

Description of Sample Location

Very Stiff gravelly, Cobbly Silty Sand (Rusty brown Color)

| | Organic | Inorganic |
|---|---|---|
| Traffic Report # | NA | NA |
| Tag # | NA | NA |
| AB # | NA | NA |
| Date Shipped | | |
| Time Shipped | | |
| Lab | SOUTHWEST | SOUTHWEST |
| Volume | | |

# SAMPLE LOG SHEET

NUS CORPORATION

- [x] Surface Soil
- [x] Subsurface Soil
- [ ] Sediment
- [ ] Lagoon / Pond
- [ ] Other _____

Page 1 of 1

Case # 2046/1446

By L. HUDGINS

Project Site Name WHITE OAK ~~Project Site Number~~ 28-SB-02(3)

NUS Source No. _____ Source Location 28-SS-02

Sample Method: 3" SPLIT SPOON

Depth Sampled: SS = 0-2', SB = 2-4'

Sample Date & Time: 10/23/97 SS = 1550 SB = 1549

Sampled By: L. HUDGINS

Signatures:

Type of Sample

- [x] Low Concentration
- [ ] High Concentration
- [x] Grab
- [ ] Composite
- [ ] Grab - Composite

Composite Sample Data

| Sample | Time | Color / Description |
|---|---|---|
| | | |

Sample Data

| Color | Description: (Sand, Clay, Dry, Moist, Wet, etc.) |
|---|---|
| | |

Analysis:

VOC - 4 oz
SVOC, PEST/PCB - 8 oz
METALS, CN - 8 oz

Description of Sample Location SEE MAP

| | Organic | Inorganic |
|---|---|---|
| Traffic Report # | NA | NA |
| Tag # | NA | NA |
| AB# | NA | NA |
| Date Shipped | | |
| Time Shipped | | |
| Lab | SOUTHWEST | SOUTHWEST |
| Volume | | |

# SAMPLE LOG SHEET

NUS CORPORATION

- [x] Surface Soil
- [x] Subsurface Soil
- [ ] Sediment
- [ ] Lagoon / Pond
- [ ] Other _____

Page 1 of 1

Case # 2046/1446

By L. HUDGINS

Project Site Name WHITE OAK

~~Project Site Number~~ 28-SB-03 (3)

NUS Source No.

Source Location 28-SS-03

Sample Method: 3" SPLIT SPOON

Depth Sampled: SS = 0.5 - 2'
SB = 2 - 4'

Sample Date & Time: 10/23/97
SS = 1505 SB = 1515

Sampled By: L. HUDGINS

Signature:

Type of Sample
- [x] Low Concentration
- [ ] High Concentration
- [x] Grab
- [ ] Composite
- [ ] Grab - Composite

Composite Sample Data

| Sample | Time | Color / Description |
|---|---|---|
| | | |

Sample Data

| Color | Description: (Sand, Clay, Dry, Moist, Wet, etc.) |
|---|---|
| | ORANGE-BRN SAND W/COPP |

Analysis:

VOC = 4oz
SVOC, PEST/PCB = 8 oz
METALS, CN = 8oz

Description of Sample Location SEE MAP

| | Organic | Inorganic |
|---|---|---|
| Traffic Report # | NA | NA |
| Tag # | NA | NA |
| AB # | NA | NA |
| Date Shipped | | |
| Time Shipped | | |
| Lab | SOUTHWEST | SOUTHWEST |
| Volume | | |

# SAMPLE LOG SHEET

NUS CORPORATION

- [X] Surface Soil
- [X] Subsurface Soil
- [ ] Sediment
- [ ] Lagoon / Pond
- [ ] Other _____

Page 1 of 1

Case # 2046/1446

By _____

Project Site Name: NSWC, ~~Bethesda~~ White Oak

Project Site Number: 28-SB-04 (4)

NUS Source No.: _____

Source Location: 28 - SB - 04 (2)

| Sample Method: Split Spoon | Composite Sample Data | | |
|---|---|---|---|
| | Sample | Time | Color / Description |
| Depth Sampled: 3 - 4' | | | |
| Sample Date & Time: 10/23/97 0-2 8:15 4-6 8:20 | | | |
| Sampled By: T. Madden | | | |
| Signatures: Christian Madden | | | |

**Type of Sample**

- [X] Low Concentration
- [ ] High Concentration
- [X] Grab
- [ ] Composite
- [ ] Grab - Composite

**Sample Data**

| Color | Description: (Sand, Clay, Dry, Moist, Wet, etc.) |
|---|---|
| | |

**Analysis:**

VOCs
SVOCs
Pest/PCBs
Metals + CN

**Description of Sample Location**

See Map

4" aggregate on top

| | Organic | Inorganic |
|---|---|---|
| Traffic Report # | NA | NA |
| Tag # | NA | NA |
| AB # | NA | NA |
| Date Shipped | | |
| Time Shipped | | |
| Lab | SOUTHWEST | SOUTHWEST |
| Volume | | |

# SAMPLE LOG SHEET

NUS CORPORATION

- [X] Surface Soil
- [X] Subsurface Soil
- [ ] Sediment
- [ ] Lagoon / Pond
- [ ] Other _____

Page 1 of 1

Case # 2046/1446

By G. Foote

Project Site Name NSWC, Dahlgren

Project Site Number 28-SB-05(4)

NUS Source No.

Source Location 28-SB-05(2)

Sample Method: Split Spoon

Depth Sampled: 0-2' + 2-4'

Sample Date & Time: 10/26/97 0-2 835 2-4 845

Sampled By: T. Madden

Signatures: Tristan Madden

Type of Sample
- [X] Low Concentration
- [ ] High Concentration
- [X] Grab
- [ ] Composite
- [ ] Grab - Composite

Analysis:
- VOC
- SVOC
- Metals TCN
- Pesticides

Composite Sample Data

| Sample | Time | Color / Description |
|---|---|---|
| 0-2 | 835 | Brn Silty Sand w/ Gravel, trace Stiff |
| 2-4 | 0845 | " " " " " |

Sample Data

| Color | Description: (Sand, Clay, Dry, Moist, Wet, etc.) |
|---|---|
| | |

Description of Sample Location

| | Organic | Inorganic |
|---|---|---|
| Traffic Report # | NA | NA |
| Tag # | NA | NA |
| AB # | NA | NA |
| Date Shipped | | |
| Time Shipped | | |
| Lab | SOUTHWEST | SOUTHWEST |
| Volume | | |

# SAMPLE LOG SHEET

NUS CORPORATION

- [ ] Surface Soil
- [x] Subsurface Soil
- [ ] Sediment
- [ ] Lagoon / Pond
- [ ] Other _____

Page 1 of 1

Case # 2046/1446

By G. Elotte

Project Site Name NSWC, Dahlgren

Project Site Number 28-SB-06 (2)

NUS Source No.

Source Location 28 - SB - 06 (4)

Sample Method: Split Spoon

Depth Sampled: 2-4' 0-2'

Sample Date & Time: 10/20/97

Sampled By: T Malden

Signatures: Tristan Malden

Type of Sample

- [x] Low Concentration
- [ ] High Concentration
- [x] Grab
- [ ] Composite
- [ ] Grab - Composite

Analysis:

VOC
SVOC
Pest/PCBs
Metals + CN

Composite Sample Data

| Sample | Time | Color / Description |
|---|---|---|
| 0-2 | 910 | Brn silt sand trace clay gravel / cobbles |
| 2-4 | 925 | Brn gravelly silty sand |

Sample Data

| Color | Description: (Sand, Clay, Dry, Moist, Wet, etc.) |
|---|---|
| | |

Description of Sample Location

| | Organic | Inorganic |
|---|---|---|
| Traffic Report # | NA | NA |
| Tag # | NA | NA |
| AB # | NA | NA |
| Date Shipped | | |
| Time Shipped | | |
| Lab | SOUTHWEST | SOUTHWEST |
| Volume | | |

# SAMPLE LOG SHEET

NUS CORPORATION

- [x] Surface Soil
- [x] Subsurface Soil
- [ ] Sediment
- [ ] Lagoon / Pond
- [ ] Other _____

Page 1 of 1

Case # 2046/1446

By C. EFOTTE

Project Site Name NSWC, ~~Dahlgren~~ WO

Project Site Number

NUS Source No.

Source Location 28-SS/SB-07

Sample Method: HSA – Split Spoon

Depth Sampled: 4'

Sample Date & Time: 10/23/92 1250

Sampled By: C. EFOTTE

Signatures:

Type of Sample

- [x] Low Concentration
- [ ] High Concentration
- [x] Grab
- [ ] Composite
- [ ] Grab - Composite

Analysis:

VOC 40z
SVOC
Pest/PCB 8 X 8 oz
Metals
CN 1 8 oz

Composite Sample Data

| Sample | Time | Color / Description |
|---|---|---|
| 0-2' | 1250 | Dk to grey fine sand 0- silty sand cobbles 1- |
| 2-4 | 1310 | Cobbly & gravelly silty sa |

Sample Data

| Color | Description: (Sand, Clay, Dry, Moist, Wet, etc.) |
|---|---|
| | |

Description of Sample Location

| | Organic | Inorganic |
|---|---|---|
| Traffic Report # | NA | NA |
| Tag # | NA | NA |
| AB# | NA | NA |
| Date Shipped | | |
| Time Shipped | | |
| Lab | SOUTHWEST | SOUTHWEST |
| Volume | | |

# SAMPLE LOG SHEET

NUS CORPORATION

- [ ] Surface Soil
- [x] Subsurface Soil
- [ ] Sediment
- [ ] Lagoon / Pond
- [ ] Other _____

Page 1 of 1

Case # 2046/1446

By G. EFOTTE

Project Site Name ~~NSWC, Dahlgren~~ NO

Project Site Number 28-SS-08

NUS Source No.

Source Location 28-SB-08(3)

Sample Method: HSA Split-Spoon

Depth Sampled: 4'

Sample Date & Time: 10/23/92 1320

Sampled By: G. EFOTTE

Signatures:

Type of Sample

- [x] Low Concentration
- [ ] High Concentration
- [x] Grab
- [ ] Composite
- [ ] Grab - Composite

Analysis:

| | |
|---|---|
| VOC | 40 |
| SVOC | 6 |
| Pest/PCBs | 3 |
| Metals | 7 |
| CN | 1 |

Composite Sample Data

| Sample | Time | Color / Description |
|---|---|---|
| 28-SS-08 | 1320 | See Below |

Sample Data

| Color | Description: (Sand, Clay, Dry, Moist, Wet, etc.) |
|---|---|
| | |

Description of Sample Location

0-2' - 6" Humus (top soil)
Silty sand with cobbles & gr

2-4 Gray silty sand with cr
at 3-4' depth.

| | Organic | Inorganic |
|---|---|---|
| Traffic Report # | NA | NA |
| Tag # | NA | NA |
| AB # | NA | NA |
| Date Shipped | | |
| Time Shipped | | |
| Lab | SOUTHWEST | SOUTHWEST |
| Volume | | |

# SAMPLE LOG SHEET

NUS CORPORATION

- [x] Surface Soil
- [x] Subsurface Soil
- [ ] Sediment
- [ ] Lagoon / Pond
- [ ] Other _____

Page 1 of 1

Case # 2046/1446

By

Project Site Name: NSWC, Dahlgren (W.O)

Project Site Number

NUS Source No.

Source Location: 28-SB-09

Sample Method: Spoon

Depth Sampled:

Sample Date & Time: 10/23/97 SS 1400 / SB 1615

Sampled By: G. E Pottle

Signatures:

Type of Sample

- [x] Low Concentration
- [ ] High Concentration
- [x] Grab
- [ ] Composite
- [ ] Grab - Composite

Composite Sample Data

| Sample | Time | Color / Description |
|---|---|---|
| 28-SB 09 (0-2) | 1400 | Brn/grey wet clay |
| 28-SB 0C | 2-4 1615 | |

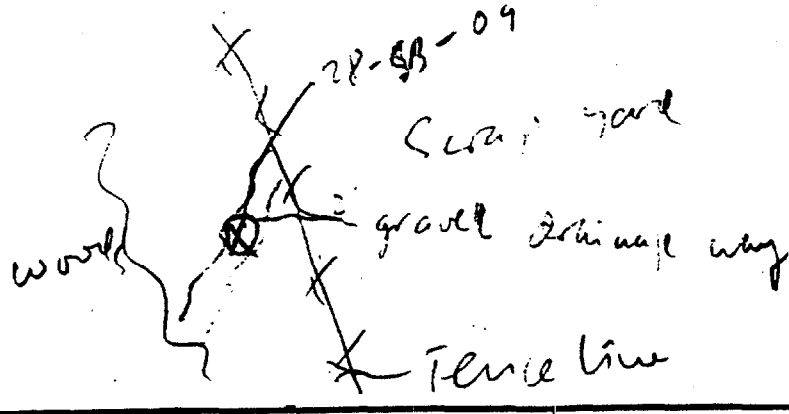
Sample Data

| Color | Description: (Sand, Clay, Dry, Moist, Wet, etc.) |
|---|---|
| | |

Analysis:

VOC — 4 oz
CVOV
Pesi/PCB } 8 oz
Metal
CN } 8 oz

Description of Sample Location




- Brn - grey, Wet Clay, trace silt

| | Organic | Inorganic |
|---|---|---|
| Traffic Report # | NA | NA |
| Tag # | NA | NA |
| AB# | NA | NA |
| Date Shipped | | |
| Time Shipped | | |
| Lab | SOUTHWEST | SOUTHWEST |
| Volume | | |

Project [illegible] No.

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: WHITE OAK SITE
Project No.: ~~[illegible]~~ CTO 315 ~~0202~~

- [x] Surface Soil
- [ ] Subsurface Soil
- [ ] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Sample ID No.: 28-PCB-01
Sample Location: 28-PCB-01
Sampled By: CCL
C.O.C. No.: 12101 (Quantera)

Type of Sample:
- [x] Low Concentration
- [ ] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 4/6/99<br>Time: 0945<br>Method: Hand Auger<br>Monitor Reading (ppm): | 0-6" | BROWN | Medium To Coarse Grained SAND, Poorly SORTED, with trace micas & MOIST, |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| | | | | |
| Method: | | | | |
| | | | | |
| Monitor Readings (Range in ppm): | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| ~~[illegible]~~ | ~~[illegible]~~ | | |
| ~~[illegible]~~ | ~~[illegible]~~ | | |
| ~~[illegible]~~ | ~~[illegible]~~ | | |
| ~~[illegible]~~ | ~~[illegible]~~ | | |
| TCL PCBs | 1-4oz GLASS | 1 | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

**OBSERVATIONS / NOTES:**

**MAP:** See Figure 2-8 in Work Plan

**Circle if Applicable:**

MS/MSD

Duplicate ID No.:

**Signature(s):** Charles C. Ty III

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: WHITEOAK SITE
Project No.: ~~CTO 315~~ ~~7087~~
CTO 315 ~~0002~~

- [ ] Surface Soil
- [x] Subsurface Soil
- [ ] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Sample ID No.: 28 - PCB-01-0204
Sample Location: 28-PCB-01
Sampled By: CLL
C.O.C. No.: 12101 (Quanterra

Type of Sample:
- [x] Low Concentration
- [ ] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 4/6/99 | 2-2.5' | Brown | Sandy CLAY, moist |
| Time: 0953 | | | |
| Method: Hand Auger | | | |
| Monitor Reading (ppm): | | | |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| | | | | |
| Method: | | | | |
| | | | | |
| Monitor Readings (Range in ppm): | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| [redacted] | [redacted] | | |
| [redacted] | [redacted] | | |
| [redacted] | [redacted] | | |
| [redacted] | [redacted] | | |
| TCL PCBS | 1 - 4 oz GLASS | 1 | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

**OBSERVATIONS / NOTES:**

**MAP:** See Figure 2-8 in Work Plan

**Circle if Applicable:**

MS/MSD

Duplicate ID No.:

**Signature(s):** Charles C. Fry III

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: WHITE OAK SITE
Project No.: ~~[illegible]~~ ~~[illegible]~~ CTO 315 ~~[illegible]~~

- [x] Surface Soil
- [ ] Subsurface Soil
- [ ] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Sample ID No.: 28-PCB-Ø2
Sample Location: 28-PCB-Ø2
Sampled By: CCL
C.O.C. No.: 12101 (QUANTERRA)

Type of Sample:
- [x] Low Concentration
- [ ] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 4/6/99<br>Time: 0930<br>Method: HAND AUGER<br>Monitor Reading (ppm): Ø.Ø | 0-6" | Brown | SILTY SAND, fine to medium grained, moist with trace MICAS. |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| Method: | | | | |
| Monitor Readings (Range in ppm): | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| ~~[illegible] VOLATILES~~ | ~~[illegible] 4-GLASS~~ | | |
| ~~[illegible]~~ | ~~[illegible] GLASS~~ | | |
| ~~[illegible]~~ | ~~[illegible]~~ | | |
| ~~[illegible]~~ | ~~[illegible] GLASS~~ | | |
| TCL PCBS | 1-4oz GLASS | 1 | |

**OBSERVATIONS / NOTES:**

**MAP:** See Figure 2-8 in Work Plan

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s): Charles C. Long III

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: WHITE OAK SITE
Project No.: [redacted] CTO 315 [redacted]

- [ ] Surface Soil
- [x] Subsurface Soil
- [ ] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Sample ID No.: 28-PCB-02-020
Sample Location: 28-PCB-02
Sampled By: CCL
C.O.C. No.: 12101 (Quanterra)

Type of Sample:
- [x] Low Concentration
- [ ] High Concentration

**GRAB SAMPLE DATA:**

| Date: 4/6/99 | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Time: 0937 | 2-4' | BROWN/TAN | Very Soft CLAY, MOIST. |
| Method: HAND AUGER | | | |
| Monitor Reading (ppm): | | | |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| | | | | |
| Method: | | | | |
| | | | | |
| Monitor Readings (Range in ppm): | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| [redacted] | [redacted] | | |
| [redacted] | [redacted] | | |
| [redacted] | [redacted] | | |
| [redacted] | [redacted] | | |
| TCL PCBS | 1-4 oz GLASS | 1 | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

**OBSERVATIONS / NOTES:**

**MAP:** See Figure 2-8 in Work Plan

**Circle if Applicable:**

MS/MSD

Duplicate ID No.:

**Signature(s):** Charles C. Ly III

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: WHITEOAK SITE
Project No.: ~~CTO 218~~ ~~7884~~ CTO 315 ~~0202~~

- [x] Surface Soil
- [ ] Subsurface Soil
- [ ] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Sample ID No.: 28-PCB-03
Sample Location: 28-PCB-03
Sampled By: CCL
C.O.C. No.: 12101 (Quantersa)

Type of Sample:
- [x] Low Concentration
- [ ] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 4/6/99<br>Time: 0950<br>Method: ~~Gr.~~ Hand Auger<br>Monitor Reading (ppm): 0.0 | 0-6" | Dark Brown | Medium Grained Clayey SAND, moist, |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| Method: | | | | |
| Monitor Readings (Range in ppm): | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| [redacted] | [redacted] | | |
| [redacted] | [redacted] | | |
| [redacted] | [redacted] | | |
| [redacted] | [redacted] | | |
| TCL PCBs | 1-4oz GLASS | 1 | |

**OBSERVATIONS / NOTES:**

**MAP:** See Figure 2-8 in Work Plan

**Circle if Applicable:**

MS/MSD

Duplicate ID No.:

**Signature(s):** Charles C. Fry III

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: WHITE OAK SITE
Project No.: [redacted] CTO-315 [redacted]

- [ ] Surface Soil
- [x] Subsurface Soil
- [ ] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Sample ID No.: 28-PCB-03-0204
Sample Location: 28-PCB-03
Sampled By: CCL
C.O.C. No.: 12101 (QuanTerra)

Type of Sample:
- [x] Low Concentration
- [ ] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 4/6/99<br>Time: 1011<br>Method: Hand Auger<br>Monitor Reading (ppm): Ø.Ø | 2-3' | Light Brown | Medium to Coarse grained SAND with some coarse Quartz. |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| | | | | |
| Method: | | | | |
| | | | | |
| Monitor Readings (Range in ppm): | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| [redacted] | [redacted] | | |
| [redacted] | [redacted] | | |
| [redacted] | [redacted] | | |
| [redacted] | [redacted] | | |
| TCL PCBs | 1-4 oz GLASS | [redacted] 1 | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

**OBSERVATIONS / NOTES:**

**MAP:** See Figure 2-8 in Work Plan

**Circle if Applicable:**

MS/MSD

Duplicate ID No.: [redacted]

**Signature(s):** Charles C. Fry III

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: WHITE OAK SITE
Project No.: [redacted] CTO-315 [redacted]

- [x] Surface Soil
- [ ] Subsurface Soil
- [ ] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Sample ID No.: 28-PCB-04
Sample Location: 28-PCB-04
Sampled By: CLL
C.O.C. No.: 12101 (Quantera)

Type of Sample:
- [x] Low Concentration
- [ ] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 4/6/99<br>Time: 1005<br>Method: HAND AUGER<br>Monitor Reading (ppm): Ø, Ø | 0-6" | Dark Brown | CLAYEY SAND, medium grained with some Coarse Quartz, MOIST. |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| | | | | |
| Method: | | | | |
| | | | | |
| Monitor Readings (Range in ppm): | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| [redacted] | [redacted] | | |
| [redacted] | [redacted] | | |
| [redacted] | [redacted] | | |
| [redacted] | [redacted] | | |
| TCL PCBs | 1-4oz GLASS | 1 | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

**OBSERVATIONS / NOTES:**

**MAP:** See Figure 2-8 in Work Plan

**Circle if Applicable:**

MS/MSD

Duplicate ID No.:

**Signature(s):** Charles C. Ley III

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: WHITE OAK SITE
Project No.: ~~[illegible]~~ CTO-315 ~~[illegible]~~

- [ ] Surface Soil
- [x] Subsurface Soil
- [ ] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Sample ID No.: 28-PCB-04-0204
Sample Location: 28-PCB-04
Sampled By: CCL
C.O.C. No.: 12101 (Quentera)

Type of Sample:
- [x] Low Concentration
- [ ] High Concentration

**GRAB SAMPLE DATA:**

| Date: 4/6/99 | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Time: 1027 | 2-3' | ORANGISH BROWN | Sandy CLAY, moist with some large Quartz Gravels. |
| Method: Hand Auger | | | |
| Monitor Reading (ppm): Ø.Ø | | | |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| | | | | |
| Method: | | | | |
| | | | | |
| Monitor Readings (Range in ppm): | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| ~~[illegible]~~ | ~~[illegible]~~ | | |
| ~~[illegible]~~ | ~~[illegible]~~ | | |
| ~~[illegible]~~ | ~~[illegible]~~ | | |
| ~~[illegible]~~ | ~~[illegible]~~ | | |
| TCL PCBs | 1-4oz GLASS | 2 | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

**OBSERVATIONS / NOTES:**

Resistance met @ 3', Duplicate Sample Taken

**MAP:** See Figure 2-B in Work Plan

**Circle if Applicable:**

MS/MSD

Duplicate ID No.: 28-PCB-201

**Signature(s):** Charles C. Fye III

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: WHITE OAK SITE
Project No.: [redacted] CTO-315 [redacted]

- [x] Surface Soil
- [ ] Subsurface Soil
- [ ] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Sample ID No.: 28-PCB-05
Sample Location: 28-PCB-05
Sampled By: CCL
C.O.C. No.: 12101 (Quanterra)

Type of Sample:
- [x] Low Concentration
- [ ] High Concentration

**GRAB SAMPLE DATA:**

| Date: 4/6/99 | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Time: 1043 | 0-6" | Brown | CLAYEY SAND, medium to coarse grained, moist with trace coarse quartz. |
| Method: [redacted] Hand Auger | | | |
| Monitor Reading (ppm): Ø. Ø | | | |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| | | | | |
| Method: | | | | |
| | | | | |
| Monitor Readings (Range in ppm): | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| [redacted] | [redacted] | | |
| [redacted] | [redacted] | | |
| [redacted] | [redacted] | | |
| [redacted] | [redacted] | | |
| TCL PCBs | 1-4 oz GLASS | 1 | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

**OBSERVATIONS / NOTES:**

**MAP:** See Figure 2-8 in Work Plan

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s): Charles C. Fry III

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: WHITE OAK SITE
Project No.: CTO-315

- [ ] Surface Soil
- [x] Subsurface Soil
- [ ] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Sample ID No.: 28-PCB-05-0204
Sample Location: 28-PCB-05
Sampled By: CCL
C.O.C. No.: 12101 (QuanTerra)

Type of Sample:
- [x] Low Concentration
- [ ] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 4/6/99<br>Time: 1100<br>Method: Hand Auger<br>Monitor Reading (ppm): 5.8 | 2-4' | ORANGISH BROWN | Sandy CLAY, MOIST. |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| Method: | | | | |
| Monitor Readings (Range in ppm): | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| TCL PCBs | 1-4 OZ GLASS | 1 | |

**OBSERVATIONS / NOTES:**

**MAP:** See Figure 2-8 in Work Plan.

**Circle if Applicable:**

MS/MSD

Duplicate ID No.:

**Signature(s):** Charles C. Fry III

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: WHITE OAK SITE
Project No.: CTO-315

- [x] Surface Soil
- [ ] Subsurface Soil
- [ ] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Sample ID No.: 28-PCB-Ø6
Sample Location: 28-PCB-Ø6
Sampled By: CCL
C.O.C. No.: 12101 (QuanTerra)

Type of Sample:
- [x] Low Concentration
- [ ] High Concentration

**GRAB SAMPLE DATA:**

| Date: 4/6/99 | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Time: 1038 | 0-6" | BROWN | CLAYEY SAND, medium grained with trace Coarse Quartz. |
| Method: Hand Auger | | | |
| Monitor Reading (ppm): Ø.Ø | | | |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| | | | | |
| Method: | | | | |
| | | | | |
| Monitor Readings (Range in ppm): | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| [redacted] | [redacted] | | |
| [redacted] | [redacted] | | |
| [redacted] | [redacted] | | |
| [redacted] | [redacted] | | |
| TCL PCBs | 1-4 oz GLASS | 1 | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

**OBSERVATIONS / NOTES:**

**MAP:** See Figure 2-B in Work Plan

**Circle if Applicable:**

MS/MSD

Duplicate ID No.:

**Signature(s):** Charles C. Fry III

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: WHITE OAK SITE
Project No.: ~~CTO-278~~ ~~7087~~ CTO-315 ~~0202~~

- [ ] Surface Soil
- [x] Subsurface Soil
- [ ] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Sample ID No.: 28-PCB-06-0204
Sample Location: 28-PCB-06
Sampled By: CCI
C.O.C. No.: 12101 (Quanterra)

Type of Sample:
- [x] Low Concentration
- [ ] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 4/6/99<br>Time: 1050<br>Method: Hand Auger<br>Monitor Reading (ppm): Ø.Ø | 2-4' | ORANGE BROWN | Medium To Coarse Grained SAND with CLAY, moist with some coarse Quartz. |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| | | | | |
| Method: | | | | |
| | | | | |
| Monitor Readings (Range in ppm): | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| ~~[illegible]~~ | ~~[illegible]~~ | | |
| ~~[illegible] PESTICIDES~~ | ~~[illegible]~~ | | |
| ~~[illegible]~~ | ~~[illegible]~~ | | |
| ~~[illegible]~~ | ~~[illegible]~~ | | |
| | | | |
| TCL PCBs | 1-4oz GLASS | 1 | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

**OBSERVATIONS / NOTES:**

**MAP:** See Figure 2-8 in Work Plan

**Circle if Applicable:**

| MS/MSD | Duplicate ID No.: |
|---|---|
| — | — |

**Signature(s):** Charles C. Fry III

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: WHITE OAK SITE
Project No.: ~~CTO 215~~ ~~7087~~ CTO-315 ~~2202~~

- [x] Surface Soil
- [ ] Subsurface Soil
- [ ] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Sample ID No.: 28-PCB-07
Sample Location: 28-PCB-07
Sampled By: CCL
C.O.C. No.: 12101 (QuanTerra)

Type of Sample:
- [x] Low Concentration
- [ ] High Concentration

**GRAB SAMPLE DATA:**

| Date: 4/6/99 | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Time: 1015 | 0-6" | Gray to Black | CLAYEY SAND, moist with some coarse Quartz. |
| Method: Hand Auger | | | |
| Monitor Reading (ppm): Ø.Ø | | | |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| | | | | |
| Method: | | | | |
| | | | | |
| Monitor Readings (Range in ppm): | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| ~~[illegible]~~ | ~~[illegible]~~ | | |
| ~~[illegible]~~ | ~~[illegible] GLASS~~ | | |
| ~~[illegible]~~ | ~~[illegible]~~ | | |
| ~~[illegible]~~ | ~~[illegible] GLASS~~ | | |
| TCL PCBS | 1-4oz GLASS | 2 | |

**OBSERVATIONS / NOTES:**

Duplicate Sample Collected.

**MAP:** See Figure 2-8 in Work Plan

**Circle if Applicable:**

MS/MSD ~~/~~ Duplicate ID No.: 28-PCB-200

**Signature(s):** Charles C. Ty III

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: WHITE OAK SITE
Project No.: ~~[illegible]~~ ~~[illegible]~~
CTO-315 ~~[illegible]~~

- [ ] Surface Soil
- [x] Subsurface Soil
- [ ] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Sample ID No.: 28-PCB-07-0204
Sample Location: 28-PCB-07
Sampled By: CCL
C.O.C. No.: 12101 (QuanTerra)

Type of Sample:
- [x] Low Concentration
- [ ] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 4/6/99<br>Time: 1647<br>Method: Hand Auger<br>Monitor Reading (ppm): Ø.Ø | 2-4' | ORANGISH BROWN | SOFT CLAY, MOIST. |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| | | | | |
| Method: | | | | |
| | | | | |
| Monitor Readings (Range in ppm): | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| ~~[illegible]~~ | ~~[illegible]~~ | | |
| ~~[illegible]~~ | ~~[illegible]~~ | | |
| ~~[illegible]~~ | ~~[illegible]~~ | | |
| ~~[illegible]~~ | ~~[illegible]~~ | | |
| TCL PCBs | 1-4oz GLASS | 1 | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

**OBSERVATIONS / NOTES:**

**MAP:** See Figure 2-8 in Work Plan

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s): Charles C. Fry III

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: WHITE OAK SITE
Project No.: [redacted] CTO-315 [redacted]

- [x] Surface Soil
- [ ] Subsurface Soil
- [ ] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Sample ID No.: 28-PCB-08
Sample Location: 28-PCB-08
Sampled By: CCL
C.O.C. No.: 12101 (QuanTerra)

Type of Sample:
- [x] Low Concentration
- [ ] High Concentration

**GRAB SAMPLE DATA:**

| Date: 4/6/99 | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Time: 1057 | 0-6" | Dark Brown | CLAYEY SAND, MOIST. |
| Method: Hand Auger | | | |
| Monitor Reading (ppm): Ø.Ø. | | | |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| | | | | |
| Method: | | | | |
| | | | | |
| Monitor Readings (Range in ppm): | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| [redacted] | [redacted] | | |
| [redacted] | [redacted] | | |
| [redacted] | [redacted] | | |
| [redacted] | [redacted] | | |
| | | | |
| TCL PCBs | 1 - 4oz GLASS | 1 | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

**OBSERVATIONS / NOTES:**

**MAP:** See Figure 2-8 in Work Plan

**Circle if Applicable:**

MS/MSD

Duplicate ID No.:

**Signature(s):** Charles C. [illegible] III

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: WHITE OAK SITE
Project No.: CTO - 315

[ ] Surface Soil
[x] Subsurface Soil
[ ] Sediment
[ ] Other:
[ ] QA Sample Type:

Sample ID No.: 28-PCB-08-0204
Sample Location: 28-PCB-08
Sampled By: CCL
C.O.C. No.: 12101 (QUANTERRA)

Type of Sample:
[x] Low Concentration
[ ] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 4/6/99<br>Time: 1230<br>Method: Hand Auger<br>Monitor Reading (ppm): 2.8 | 0.8" - 1' | ORANGE BROWN | MOIST TO WET CLAY. |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| | | | | |
| Method: | | | | |
| | | | | |
| Monitor Readings (Range in ppm): | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| TCL PCBs | 1 - 4oz GLASS | 1 | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

**OBSERVATIONS / NOTES:**

Sample obtained Right above Saturated Zone.

**MAP:** See Figure 2-8 in Work Plan.

**Circle if Applicable:**

MS/MSD: —

Duplicate ID No.: —

**Signature(s):** Charles C. Fry III

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: WHITE OAK SITE
Project No.: CTO - 315

Sample ID No.: 28-PCB-09
Sample Location: 28-PCB-09
Sampled By: CCL
C.O.C. No.: 12102 (QuanTerra)

- [x] Surface Soil
- [ ] Subsurface Soil
- [ ] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Type of Sample:
- [x] Low Concentration
- [ ] High Concentration

**GRAB SAMPLE DATA:**

| Date: 4/6/99 | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Time: 1202 | 0-6" | ORANGISH BROWN | Medium Grained SAND with Some CLAY, moist with Trace MICAS & Coarse QTZ. |
| Method: GRAB | | | |
| Monitor Reading (ppm): Ø.Ø | | | |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| | | | | |
| Method: | | | | |
| | | | | |
| Monitor Readings (Range in ppm): | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| TCL PCBs | 1-4oz GLASS | 1 | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

**OBSERVATIONS / NOTES:**

Duplicate Sample Taken

**MAP:** See Figure 2-8 in Work Plan.

**Circle if Applicable:**

| MS/MSD | Duplicate ID No.: |
|---|---|
| — | 28-PCB-203 |

**Signature(s):** Charles C. Fay III

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: WHITE OAK SITE
Project No.: CTO-315

Sample ID No.: 28-PCB-09-0204
Sample Location: 28-PCB-09
Sampled By: CCL
C.O.C. No.: 12102 (QUANTERRA)

- [ ] Surface Soil
- [x] Subsurface Soil
- [ ] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Type of Sample:
- [x] Low Concentration
- [ ] High Concentration

**GRAB SAMPLE DATA:**

| Date: 4/6/99 | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Time: 1233<br>Method: ~~Grab~~ Hand Auger<br>Monitor Reading (ppm): 3.7 | 1-1.25' | ORANGE BROWN | SOFT, moist CLAY, to WET. |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| | | | | |
| Method: | | | | |
| | | | | |
| Monitor Readings (Range in ppm): | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| TCL PCBs | 1-4oz GLASS | 1 | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

**OBSERVATIONS / NOTES:**

Sample obtained Right above Saturated Zone.

**MAP:** See Figure 2-8 in Work Plan

**Circle if Applicable:**

MS/MSD

Duplicate ID No.:

**Signature(s):** Theodore C. Ling III

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: WHITE OAK SITE
Project No.: CTO-315

- [x] Surface Soil
- [ ] Subsurface Soil
- [ ] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Sample ID No.: 28-PCB-10
Sample Location: 28-PCB-10
Sampled By: CCL
C.O.C. No.: 12102 (QUANTERRA)

Type of Sample:
- [x] Low Concentration
- [ ] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 4/6/99<br>Time: 1205<br>Method: GRAB<br>Monitor Reading (ppm): Ø, Ø | 0-6" | BROWN | CLAYEY SAND, MOIST with TRACE MICAS & COARSE QTZ. |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| | | | | |
| Method: | | | | |
| | | | | |
| Monitor Readings (Range in ppm): | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| TCL PCBS | 1 - 4oz GLASS | 1 | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

**OBSERVATIONS / NOTES:**

**MAP:** See Figure 2-8 in Work Plan

**Circle if Applicable:**

MS/MSD

Duplicate ID No.:

**Signature(s):** Charles C. [illegible] III

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: WHITE OAK SITE
Project No.: CTO-315

Sample ID No.: 28PGB-10-0204
Sample Location: 28PGB-10
Sampled By: CCL
C.O.C. No.: 12102 (QuanTerra)

- [ ] Surface Soil
- [x] Subsurface Soil
- [ ] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Type of Sample:
- [x] Low Concentration
- [ ] High Concentration

**GRAB SAMPLE DATA:**

| Date: 4/6/99 | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Time: 1244 | 6" - 1' | ORANGE BROWN | WET CLAY. |
| Method: Hand Auger | | | |
| Monitor Reading (ppm): Ø.7 | | | |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| | | | | |
| Method: | | | | |
| | | | | |
| Monitor Readings (Range in ppm): | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| TCL PCBs | 1-4oz. GLASS | 1 | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

**OBSERVATIONS / NOTES:**

Sample Collected Right above Saturated Zone.

**MAP:** See Figure 2-8 in Work Plan

**Circle if Applicable:**

| MS/MSD | Duplicate ID No.: |
|---|---|
| — | — |

**Signature(s):** Charles C. Clay III

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: WHITE OAK SITE
Project No.: CTO -315

- [x] Surface Soil
- [ ] Subsurface Soil
- [ ] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Sample ID No.: 28-PCB-11
Sample Location: 28-PCB-11
Sampled By: CCL
C.O.C. No.: 12102 (Quanterra)

Type of Sample:
- [x] Low Concentration
- [ ] High Concentration

**GRAB SAMPLE DATA:**

| Date: 4/6/99 | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Time: 1056 | 0-6" | Dark Brown | Sandy CLAY, moist. |
| Method: Hand Auger | | | |
| Monitor Reading (ppm) 2.3 | | | |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| | | | | |
| Method: | | | | |
| | | | | |
| Monitor Readings (Range in ppm): | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| [redacted] VOLATILES | [redacted] | | |
| [redacted] TCL PESTICIDES | [redacted] | | |
| [redacted] | [redacted] | | |
| [redacted] | [redacted] | | |
| | | | |
| TCL PCBs | 1-4oz GLASS | 3 | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

**OBSERVATIONS / NOTES:**

**MAP:** See Figure 2-8 in Work Plan.

Circle if Applicable: MS/MSD

Duplicate ID No.:

Signature(s): Charles C. Lay III

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: WHITE OAK SITE
Project No.: CTO-315

- [ ] Surface Soil
- [x] Subsurface Soil
- [ ] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Sample ID No.: 28-PCB-11-0204
Sample Location: 28-PCB-11
Sampled By: CCL
C.O.C. No.: 12102 (QuanTerra)

Type of Sample:
- [x] Low Concentration
- [ ] High Concentration

**GRAB SAMPLE DATA:**

| Date: 4/6/99 | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Time: 1200<br>Method: GRAB<br>Monitor Reading (ppm): Ø.Ø | 6-10" | BROWN | CLAYEY SAND, MOIST, |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| | | | | |
| Method: | | | | |
| | | | | |
| Monitor Readings (Range in ppm): | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| TCL PCBs | 1-4oz. GLASS | 1 | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

**OBSERVATIONS / NOTES:**

**MAP:** See Figure 2-8 in Work Plan.

**Circle if Applicable:**

MS/MSD

Duplicate ID No.:

**Signature(s):** Charles C. Ng III

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: WHITE OAK SITE
Project No.: CTO-315

Sample ID No.: 28-PCB-12
Sample Location: 28-PCB-12
Sampled By: CCL
C.O.C. No.: 12102 (QUANTERRA)

- [x] Surface Soil
- [ ] Subsurface Soil
- [ ] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Type of Sample:
- [x] Low Concentration
- [ ] High Concentration

**GRAB SAMPLE DATA:**

| Date: 4/6/99 | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Time: 1202<br>Method: GRAB<br>Monitor Reading (ppm): Ø.Ø | 0-6" | ORANGE BROWN | Sandy CLAY, soft + moist. |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| | | | | |
| Method: | | | | |
| | | | | |
| Monitor Readings (Range in ppm): | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| TCL PCBs | 1-4 oz. GLASS | / | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

**OBSERVATIONS / NOTES:**

**MAP:** Figure 2-8 in Work Plan.

**Circle if Applicable:**

MS/MSD

Duplicate ID No.:

**Signature(s):** Charles C. Fry III

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: WHITE OAK SITE
Project No.: CTO-315

Sample ID No.: 28-PCB-12-0204
Sample Location: 28-PCB-12
Sampled By: CCL
C.O.C. No.: 12102 (Quanterra)

- [ ] Surface Soil
- [x] Subsurface Soil
- [ ] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Type of Sample:
- [x] Low Concentration
- [ ] High Concentration

**GRAB SAMPLE DATA:**

| Date: 4/6/99 | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Time: 1255 | 3' | Reddish Brown | Medium to Coarse SAND, TRACE CLAY with Some Coarse QTZ, MOIST. |
| Method: Hand Auger | | | |
| Monitor Reading (ppm): 2.7 | | | |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| | | | | |
| Method: | | | | |
| | | | | |
| Monitor Readings (Range in ppm): | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| TCL PCBs | 1 - 4oz. GLASS | 1 | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

**OBSERVATIONS / NOTES:**

Sample Collected Right above Saturated Zone,

**MAP:** See Figure 2-8 in Work Plan.

**Circle if Applicable:**

MS/MSD

Duplicate ID No.:

**Signature(s):** Stanley C. Ley III

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: WHITE OAK SITE
Project No.: CTO-315

Sample ID No.: 28-PCB-13
Sample Location: 28-PCB-13
Sampled By: CCL
C.O.C. No.: 12102 (Quantera)

- [x] Surface Soil
- [ ] Subsurface Soil
- [ ] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Type of Sample:
- [x] Low Concentration
- [ ] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 4/6/99<br>Time: 1206<br>Method: Grab<br>Monitor Reading (ppm): Ø.Ø | 0-6" | GRAYISH BROWN | CLAYEY SAND, MOIST with TRACE MICAS. |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| Method: | | | | |
| Monitor Readings (Range in ppm): | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| TCL PCBs | 1-4oz. GLASS | ✓ | |

**OBSERVATIONS / NOTES:**

**MAP:** See Figure 2-8 in Work Plan.

**Circle if Applicable:**

MS/MSD

Duplicate ID No.:

**Signature(s):** Thomas C. Ly III

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: WHITE OAK SITE
Project No.: CTO-315

Sample ID No.: 28-PCB-13-0204
Sample Location: 28-PCB-13
Sampled By: CCL
C.O.C. No.: 12102 (QUANTERRA)

- [ ] Surface Soil
- [x] Subsurface Soil
- [ ] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Type of Sample:
- [x] Low Concentration
- [ ] High Concentration

**GRAB SAMPLE DATA:**

| Date: 4/6/99 | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Time: 1252 | 0.6" - 1' | ORANGE BROWN | WET CLAY. |
| Method: Hand Auger | | | |
| Monitor Reading (ppm): 4.1 | | | |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| | | | | |
| Method: | | | | |
| | | | | |
| Monitor Readings (Range in ppm): | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| TCL PCBs | 1-4 oz. GLASS | 1 | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

**OBSERVATIONS / NOTES:**

Sample Collected Right Above Saturated Zone.

**MAP:** See Figure 2-8 in Work Plan.

**Circle if Applicable:**

MS/MSD

Duplicate ID No.:

**Signature(s):**

Charles C. Fry III

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: WHITE OAK SITE
Project No.: CTO-315

Sample ID No.: 28-PCB-14
Sample Location: 28-PCB-14
Sampled By: CCL
C.O.C. No.: 12102 (QuanTerra)

- [x] Surface Soil
- [ ] Subsurface Soil
- [ ] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Type of Sample:
- [x] Low Concentration
- [ ] High Concentration

**GRAB SAMPLE DATA:**

| Date: 4/6/99 | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Time: 1210 | 0-6" | DARK BROWN | Medium Grained SAND with Some CLAY + Trace MICAS. |
| Method: GRAB | | | |
| Monitor Reading (ppm): Ø.Ø | | | |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| | | | | |
| Method: | | | | |
| | | | | |
| Monitor Readings (Range in ppm): | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| TCL PCBs | 1 - 4oz GLASS | ✓ | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

**OBSERVATIONS / NOTES:**

**MAP:** See Figure 2-8 in Work Plan.

**Circle if Applicable:**

MS/MSD

Duplicate ID No.:

**Signature(s):** Charles C. Ly III

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: WHITE OAK SITE
Project No.: CTO-315

[ ] Surface Soil
[x] Subsurface Soil
[ ] Sediment
[ ] Other:
[ ] QA Sample Type:

Sample ID No.: 28-[redacted]14-0204 (PCB)
Sample Location: 28-[redacted]14
Sampled By: CCL
C.O.C. No.: 12102 (Quantera)

Type of Sample:
[x] Low Concentration
[ ] High Concentration

**GRAB SAMPLE DATA:**

| Date: 4/6/99 | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Time: 1244 | 6" - 1' | ORANGE BROWN | WET CLAY. |
| Method: Hand Auger | | | |
| Monitor Reading (ppm): 0.8 | | | |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| | | | | |
| Method: | | | | |
| | | | | |
| Monitor Readings (Range in ppm): | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| TCL PCBs | 1 - 4oz. GLASS | 1 | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

**OBSERVATIONS / NOTES:**

Sample collected Right Above Saturated Zone.

**MAP:** See Figure 2.8 in Work Plan.

**Circle if Applicable:**

MS/MSD

Duplicate ID No.:

**Signature(s):** Charles C. Fry III

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: WHITE OAK SITE
Project No.: CTO-315

Sample ID No.: 28-SB-07A
Sample Location: 28-SB-07A
Sampled By: CCL
C.O.C. No.: 12103 (QUANTERRA)

- [x] Surface Soil
- [ ] Subsurface Soil
- [ ] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Type of Sample:
- [x] Low Concentration
- [ ] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 4/6/99<br>Time: 1135<br>Method: GRAB<br>Monitor Reading (ppm): 0.0 | 0-6" | ORANGISH BROWN | CLAYEY SAND, MOIST |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| | | | | |
| Method: | | | | |
| | | | | |
| Monitor Readings (Range in ppm): | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| TCL SEMIVOLATILES | 1-4 oz. GLASS | ( | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

**OBSERVATIONS / NOTES:**

**MAP:** See Figure 2-6 IN Work Plan.

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s): Charles C. Ty III

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: WHITEOAK SITE
Project No.: ~~CTO 278~~ ~~7087~~ CTO-315 ~~0202~~

- [x] Surface Soil
- [ ] Subsurface Soil
- [ ] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Sample ID No.: 28-SB-07B
Sample Location: 28-SB-07B
Sampled By: CCL
C.O.C. No.: 12103 (QuanTerra)

Type of Sample:
- [x] Low Concentration
- [ ] High Concentration

**GRAB SAMPLE DATA:**

| Date: 4/6/99 | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Time: 1130 | 0-6" | Dark Brown | Medium Grained SAND with Some CLAY, MOIST |
| Method: GRAB | | | |
| Monitor Reading (ppm): Ø.Ø | | | |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| | | | | |
| Method: | | | | |
| Monitor Readings (Range in ppm): | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| ~~TCL VOLATILES~~ | ~~[illegible] GLASS~~ | | |
| ~~TCL [illegible]~~ | ~~[illegible] GLASS~~ | | |
| ~~TAL [illegible]~~ | ~~[illegible] GLASS~~ | | |
| ~~[illegible]~~ | ~~[illegible] GLASS~~ | | |
| | | | |
| TCL SEMIVOLATILES | 1-4 oz GLASS | 2 | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

**OBSERVATIONS / NOTES:**

Duplicate Sample Taken.

**MAP:** See Figure 2-8 in Work Plan.

**Circle if Applicable:**

MS/MSD

Duplicate ID No.: 28-SB-202

**Signature(s):** Charles C. Fry III

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: WHITE OAK SITE
Project No.: CTO-315

Sample ID No.: 28-SB-07C
Sample Location: 28-SB-07C
Sampled By: CCL
C.O.C. No.: 12103 (Quanterra)

- [x] Surface Soil
- [ ] Subsurface Soil
- [ ] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Type of Sample:
- [x] Low Concentration
- [ ] High Concentration

**GRAB SAMPLE DATA:**

| Date: 4/6/99 | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Time: 1130 | 0-6" | Dark Brown | Medium grained SAND with some CLAY, moist. |
| Method: GRAB | | | |
| Monitor Reading (ppm): Ø.Ø | | | |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| | | | | |
| Method: | | | | |
| | | | | |
| Monitor Readings (Range in ppm): | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| TCL Semivolatiles | 1-4oz GLASS | 1 | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

**OBSERVATIONS / NOTES:**

**MAP:** See Figure 2-8 in Work Plan.

**Circle if Applicable:**

MS/MSD

Duplicate ID No.:

**Signature(s):** Charles Cary III

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: WHITE OAK SITE
Project No.: CTO-315

- [x] Surface Soil
- [ ] Subsurface Soil
- [ ] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Sample ID No.: 28-SB-049
Sample Location: 28-SB-049
Sampled By: CCL
C.O.C. No.: 12103 (QUANTERRA)

Type of Sample:
- [x] Low Concentration
- [ ] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 4/6/99<br>Time: 1120<br>Method: GRAB<br>Monitor Reading (ppm): Ø.Ø | 0-6" | BROWN | CLAYEY SAND, MOIST. |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| | | | | |
| Method: | | | | |
| | | | | |
| Monitor Readings (Range in ppm): | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| [redacted] | [redacted] | | |
| [redacted] | [redacted] | | |
| [redacted] | [redacted] | | |
| [redacted] | [redacted] | | |
| | | | |
| TCL SVOCs | 1-4 oz GLASS | 1 | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

**OBSERVATIONS / NOTES:**

**MAP:** See Figure 2-8 in Work Plan.

**Circle if Applicable:**

MS/MSD

Duplicate ID No.:

**Signature(s):** Charles C. Ing III

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: WHITE OAK SITE
Project No.: ~~CTO 249~~ ~~7087~~ CTO-315 ~~0202~~

- [x] Surface Soil
- [ ] Subsurface Soil
- [ ] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Sample ID No.: 28-SB-048
Sample Location: 28-SB-048
Sampled By: CCL
C.O.C. No.: 12103 (QUANTERRA)

Type of Sample:
- [x] Low Concentration
- [ ] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 4/6/99<br>Time: 1123<br>Method: GRAB<br>Monitor Reading (ppm): Ø.Ø | 0-6" | BROWN | CLAYEY SAND, MOIST. |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| | | | | |
| Method: | | | | |
| | | | | |
| Monitor Readings (Range in ppm): | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| ~~[illegible]~~ | ~~[illegible]~~ | | |
| ~~[illegible]~~ | ~~[illegible]~~ | | |
| ~~[illegible]~~ | ~~[illegible]~~ | | |
| ~~[illegible]~~ | ~~[illegible]~~ | | |
| | | | |
| TCL SEMIVOLATILES | 1-4 oz GLASS | 1 | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

**OBSERVATIONS / NOTES:**

**MAP:** See Figure 2-8 in Work Plan.

**Circle if Applicable:**

MS/MSD

Duplicate ID No.:

**Signature(s):** Charles C. Fry III

Tetra Tech NUS, Inc.

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: NSWC WHITE OAK
Project No.: CTO 298 WBS# 7687

Sample ID No.: 28SS100
Sample Location: SITE 28
Sampled By: SIMPSON / PRYOR
C.O.C. No.: 050200

[X] Surface Soil
[ ] Subsurface Soil
[ ] Sediment
[ ] Other:
[ ] QA Sample Type:

Type of Sample:
[X] Low Concentration
[ ] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 5.2.00<br>Time: 0750<br>Method: S. STEEL TROWEL<br>Monitor Reading (ppm): — | 0 - 6" | LT. BRN. | MOIST SILT TR. F. SAND W/GRAVEL 1½" Ø MAX. TR ROOTS |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| | | | | |
| Method: | | | | |
| | | | | |
| Monitor Readings (Range in ppm): | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| TOC | 2 oz W/M GLASS | ✓ | |
| PCB | 4 oz W/M GLASS | ✓ | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

**OBSERVATIONS / NOTES:**

COMPACT SOIL, GRASS REMOVED, SOME TRASH IN AREA (PLASTIC, STEEL) NOT IN SAMPLE. MIXED IN-SITU

**MAP:**

6'± OFF E. SIDE OF FENCE CLOSE TO S.E. CORNER

**Circle if Applicable:**

MS/MSD

Duplicate ID No.:

**Signature(s):**

Tetra Tech NUS, Inc.

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: NSWC WHITE OAK
Project No.: CTO 298 JOB# 7687

[X] Surface Soil
[ ] Subsurface Soil
[ ] Sediment
[ ] Other:
[ ] QA Sample Type:

Sample ID No.: 28SS101
Sample Location: SITE 28
Sampled By: SIMPSON/PRYOR
C.O.C. No.: 050200

Type of Sample:
[X] Low Concentration
[ ] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 5-2-00<br>Time: 0752<br>Method: S. STEEL TROWEL<br>Monitor Reading (ppm): | 0-6" | LT. BRN. | MOIST, SILT W/F. SAND & F. GRAVEL, TR. ROOTS |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| Method: | | | | |
| Monitor Readings (Range in ppm): | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| TOC | 2 oz W/M GLASS | — | |
| PCB | 4 oz W/M GLASS | — | |

**OBSERVATIONS / NOTES:**

COMPACT SOIL, GRASS SURFACE REMOVED
SAMPLE MIXED IN-SITU

**MAP:**

2' ± OFF FENCE
IN SE CORNER

**Circle if Applicable:**

MS/MSD

Duplicate ID No.:

**Signature(s):**

Tetra Tech NUS, Inc.

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: NSWC WHITE OAK
Project No.: CTO 298 JOB# 7687

Sample ID No.: 28SS102
Sample Location: SITE 28
Sampled By: SIMPSON / PRYOR
C.O.C. No.: 050200

[X] Surface Soil
[ ] Subsurface Soil
[ ] Sediment
[ ] Other:
[ ] QA Sample Type:

Type of Sample:
[X] Low Concentration
[ ] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 5.2.00<br>Time: 0755<br>Method: S. STEEL TROWEL<br>Monitor Reading (ppm): — | 0 – 6" | LT. BRN. | MOIST, SILT w/ F. SAND & F. GRAVEL, TR. ROOTS |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| Method: | | | | |
| Monitor Readings (Range in ppm): | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| TOC | 2 oz w/M GLASS | ✓ | |
| PCB | 4 oz w/M GLASS | ✓ | |

**OBSERVATIONS / NOTES:**

COMPACT SOIL, GRASS SURFACE REMOVED
SAMPLE MIXED IN-SITU

**MAP:**

2½' ± OFF FENCE
ON S. SIDE

SEE FIG. 4-2

**Circle if Applicable:**

| MS/MSD | Duplicate ID No.: |
|---|---|
| — | — |

**Signature(s):**

Tetra Tech NUS, Inc.

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: NSWC WHITE OAK
Project No.: CTO 298 JOB# 7687

Sample ID No.: 2SS103
Sample Location: SITE 28
Sampled By: SIMPSON / PRYOR
C.O.C. No.: 050200

[X] Surface Soil
[ ] Subsurface Soil
[ ] Sediment
[ ] Other:
[ ] QA Sample Type:

Type of Sample:
[X] Low Concentration
[ ] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 5·2·00<br>Time: 0757<br>Method: S. STEEL TROWEL<br>Monitor Reading (ppm): — | 0-6" | LT. BRN. | MOIST, SILT W/F. SAND TR. F. GRAVEL, TR. ROOTS |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| Method: | | | | |
| Monitor Readings (Range in ppm): | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| TOC | 2 oz w/m GLASS | ✓ | |
| PCB | 4 oz w/m GLASS | ✓ | |

**OBSERVATIONS / NOTES:**

COMPACT SOIL, GRASS SURFACE REMOVED
SAMPLE MIXED IN-SITU

**MAP:**

3' ± OFF FENCE
2 CENTER OF S. SIDE

**Circle if Applicable:**

MS/MSD

Duplicate ID No.:

**Signature(s):**

Tetra Tech NUS, Inc.

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: NSWC WHITE OAK
Project No.: CTO 298 JOB# 7687

Sample ID No.: 28SS 104
Sample Location: SITE 28
Sampled By: SIMPSON / PRYOR
C.O.C. No.: 050200

- [x] Surface Soil
- [ ] Subsurface Soil
- [ ] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Type of Sample:
- [x] Low Concentration
- [ ] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 5.2.00<br>Time: 0801<br>Method: S. STEEL TRUWEL<br>Monitor Reading (ppm): — | 0-6" | LT. BRN. | MOIST, SILT W/ F. SAND TR. F. GRAVEL, TR. ROOTS |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| Method: | | | | |
| Monitor Readings (Range in ppm): | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| TOC | 2 oz w/m GLASS | ✓ | |
| PCB | 4 oz w/m GLASS | ✓ | |

**OBSERVATIONS / NOTES:**

COMPACT SOIL, GRASS SURFACE REMOVED
SAMPLE MIXED IN-SITU

**MAP:**

4' ± OFF SW CORNER OF FENCE.

**Circle if Applicable:**

| MS/MSD | Duplicate ID No.: |
|---|---|
| — | — |

**Signature(s):**

Tetra Tech NUS, Inc.

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: NSWC WHITE OAK
Project No.: CTO 298 JOB # 7697

[X] Surface Soil
[ ] Subsurface Soil
[ ] Sediment
[ ] Other:
[ ] QA Sample Type:

Sample ID No.: 28SS105
Sample Location: SITE 28
Sampled By: SIMPSON/PRYOR
C.O.C. No.: 050200

Type of Sample:
[X] Low Concentration
[ ] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 5-2-00<br>Time: 0819<br>Method: S. STEEL TROWEL<br>Monitor Reading (ppm): — | 0 - 6" | LT. BRN | MOIST, SILT W F. SAND SOME GRAVEL 1"Ø MAX |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| Method: | | | | |
| Monitor Readings (Range in ppm): | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| TOC | 2 oz W/M GLASS | — | |
| PCB | 4 oz W/M GLASS | — | |

**OBSERVATIONS / NOTES:**

GRASS SURFACE REMOVED
MIXED IN-SITU

**MAP:**

30'± OFF SE CORNER OF FENCE

SEE FIG. 4-2

**Circle if Applicable:**

| MS/MSD | Duplicate ID No.: |
|---|---|
| — | — |

**Signature(s):** [illegible] S. Simp

Tetra Tech NUS, Inc.

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: NSWC WHITE OAK
Project No.: CTO 298 JOB # 7697

Sample ID No.: 28SS106
Sample Location: SITE 28
Sampled By: SIMPSON / PRYOR
C.O.C. No.: 050200

[X] Surface Soil
[ ] Subsurface Soil
[ ] Sediment
[ ] Other:
[ ] QA Sample Type:

Type of Sample:
[X] Low Concentration
[ ] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 5-2-00<br>Time: 0814<br>Method: S. STEEL TROWEL<br>Monitor Reading (ppm): — | 0-6" | TAN | SILT & F. SAND, MOIST<br>SOME GRAVEL 1" ϕ MAX<br>TR. ROOTS |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| | | | | |
| Method: | | | | |
| | | | | |
| Monitor Readings (Range in ppm): | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| TOC | 2 oz w/m GLASS | — | |
| PCB | 4 oz w/m GLASS | — | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

**OBSERVATIONS / NOTES:**

GRASS SURFACE REMOVED
MIXED IN-SITU

**MAP:**

50'± OFF SE. CORNER OF FENCE

SEE FIG 4-2

**Circle if Applicable:**

| MS/MSD | Duplicate ID No.: |
|---|---|
| — | — |

**Signature(s):**

[illegible] / S Simpson

Tetra Tech NUS, Inc.

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: NSWC WHITE OAK
Project No.: CTO 298 JOB# 7687

Sample ID No.: 28SS107
Sample Location: SITE 28
Sampled By: SIMPSON / PRYOR
C.O.C. No.: 050200

[X] Surface Soil
[ ] Subsurface Soil
[ ] Sediment
[ ] Other:
[ ] QA Sample Type:

Type of Sample:
[X] Low Concentration
[ ] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 5.2.00<br>Time: 0805<br>Method: S. STEEL TROWEL<br>Monitor Reading (ppm): — | 0 - 6" | TAN | SILT & F. SAND, TR. F. GRAVEL, TR. ROOTS, MOIST |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| Method: | | | | |
| Monitor Readings (Range in ppm): | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| TOC (3) | 2 oz W/M GLASS | ✓ | |
| PCB (3) | 4 oz W/M GLASS | ✓ | |
| 3X VOL COLLECTED DMP SAMPLE, MS/MSD | | | |

**OBSERVATIONS / NOTES:**

GRASS REMOVED FROM SURFACE
SAMPLE MIXED IN-SITU

**MAP:**

6' ± S. SW FROM UTILITY POLE.

SEE FIG 4-2

**Circle if Applicable:**

MS/MSD ✓

Duplicate ID No.: FD050200-01

**Signature(s):**

K. S. Simpson

Tetra Tech NUS, Inc.

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: NSWC WHITE OAK
Project No.: CTO 298 JOB# 7687

Sample ID No.: 28SS108
Sample Location: SITE 28
Sampled By: SIMPSON/PRYOR
C.O.C. No.: 050200

[X] Surface Soil
[ ] Subsurface Soil
[ ] Sediment
[ ] Other:
[ ] QA Sample Type:

Type of Sample:
[X] Low Concentration
[ ] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 5.2.00<br>Time: 0910<br>Method: S. STEEL TRUWEL<br>Monitor Reading (ppm): — | 0-6" | LT. BRN | SILT TR F. SAND, MOIST, TR ROOTS |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| Method: | | | | |
| Monitor Readings (Range in ppm): | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| TOC | 2 oz W/M GLASS | ✓ | |
| PCB | 4 oz W/M GLASS | ✓ | |

**OBSERVATIONS / NOTES:**

IN WOODED AREA
10'± INTO WOODS GOING S FROM GRASS AREA
MIXED IN-SITU

**MAP:**

15'± W OF 28PCB9

SEE FIG 4-2

**Circle if Applicable:**

| MS/MSD | Duplicate ID No.: |
|---|---|
| | |

**Signature(s):**

Tetra Tech NUS, Inc.

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: White Oak - ERA
Project No.: 7687

Sample ID No.: 28-SS-201
Sample Location:
Sampled By: A. Bernhardt; B. Knight
C.O.C. No.:

- [x] Surface Soil
- [ ] Subsurface Soil
- [ ] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Type of Sample:
- [x] Low Concentration
- [ ] High Concentration

**GRAB SAMPLE DATA:**

| | Depth Interval | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 8-14-00<br>Time: 1140<br>Method: S Steel Trough<br>Monitor Reading (ppm): — | 0-6" | Brown | Sandy Silt w/ Many Rocks |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth Interval | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| Method: | | | | |
| Monitor Readings (Range in ppm): | | | | |

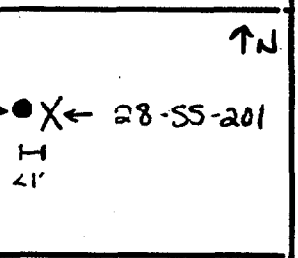
**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| PCBs - Quick Turn | glass jar | yes | |
| Additional Parameters - Hold | glass jar | yes | |
| Bioaccumulation Test - Hold | Ziplock bag | yes | |

**OBSERVATIONS / NOTES:**

· Found a flag for 28SS102 (historic sample)

**MAP:**




**Circle if Applicable:**

| MS/MSD | Duplicate ID No.: |
|---|---|
| | |

**Signature(s):**

Tetra Tech NUS, Inc.

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: White Oak - ERA
Project No.: 7687

Sample ID No.: 28-SS-202
Sample Location:
Sampled By: A. Bernhardt; B. Knight
C.O.C. No.:

- [x] Surface Soil
- [ ] Subsurface Soil
- [ ] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Type of Sample:
- [x] Low Concentration
- [ ] High Concentration

**GRAB SAMPLE DATA:**

Date: 8-14-00
Time: 1150
Method: S. Steel Trough
Monitor Reading (ppm):

| Depth Interval | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|
| 0-6" | Brown | Sandy silt |

**COMPOSITE SAMPLE DATA:**

Date:
Method:
Monitor Readings (Range in ppm):

| Time | Depth Interval | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| | | | |

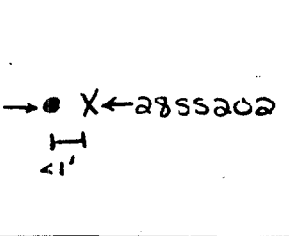
**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| PCBs - Quick Turn | glass jar | yes | |
| Additional Parameters - Hold | glass jar | yes | |
| Bioaccumulation Test - Hold | Ziploc bag | yes | |

**OBSERVATIONS / NOTES:**

Found a flag for 28-SS-105 (historic sample)

**MAP:**




**Circle if Applicable:**

| MS/MSD | Duplicate ID No.: |
|---|---|
| | |

**Signature(s):**

Tetra Tech NUS, Inc.

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: White Oak - ERA
Project No.: 7687

Sample ID No.: 28-SS-203
Sample Location:
Sampled By: A. Bernhardt, B. Knight
C.O.C. No.:

- [x] Surface Soil
- [ ] Subsurface Soil
- [ ] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Type of Sample:
- [x] Low Concentration
- [ ] High Concentration

**GRAB SAMPLE DATA:**

| | Depth Interval | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 8-14-00<br>Time: 1220<br>Method: S Steel Trowel<br>Monitor Reading (ppm): | 0-6" | Brown | Sandy Silt |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth Interval | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| Method: | | | | |
| Monitor Readings (Range in ppm): | | | | |

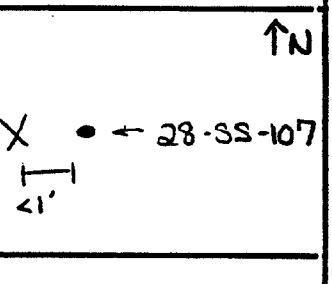
**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| PCBs - Quick Turn | glass jar | yes | |
| Additional Parameters - Hold | glass jar | yes | |
| Bioaccumulation Test - Hold | ziploc bag | yes | |

**OBSERVATIONS / NOTES:**

Found a flag for 28-SS-107 (historic sample)

**MAP:**




**Circle if Applicable:**

| MS/MSD | Duplicate ID No.: |
|---|---|
| | |

**Signature(s):**

Tetra Tech NUS, Inc.

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: White Oak - ERA
Project No.: 7687

Sample ID No.: 28-SS-204
Sample Location:
Sampled By: A. Bernhardt; B. Knight
C.O.C. No.:

- [x] Surface Soil
- [ ] Subsurface Soil
- [ ] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Type of Sample:
- [x] Low Concentration
- [ ] High Concentration

**GRAB SAMPLE DATA:**

| | Depth Interval | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 8-14-00<br>Time: 1230<br>Method: S. Steel Trowel<br>Monitor Reading (ppm): | 0-6" | Brown | Sandy-silt soil w/ large rocks |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth Interval | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| Method: | | | | |
| Monitor Readings (Range in ppm): | | | | |

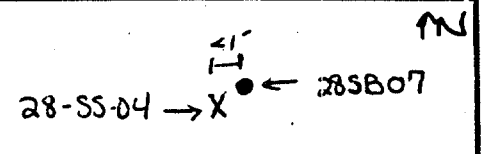
**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| PCBs - Quick Turn | glass jar | yes | |
| Additional Parameters - Hold | glass jar | yes | |
| Bioaccumulation Test - Hold | ziploc Bag | yes | |

**OBSERVATIONS / NOTES:**

Found a flag for 28-SB-07 (historic sample)

**MAP:**




**Circle if Applicable:**

| MS/MSD | Duplicate ID No.: |
|---|---|
| | |

**Signature(s):**

Tetra Tech NUS, Inc.

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: White Oak - ERA
Project No.: 7687

Sample ID No.: 28-SS-205
Sample Location:
Sampled By: A. Bernhardt; B. Knight
C.O.C. No.:

- [x] Surface Soil
- [ ] Subsurface Soil
- [ ] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Type of Sample:
- [x] Low Concentration
- [ ] High Concentration

**GRAB SAMPLE DATA:**

| | Depth Interval | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 8-14-00<br>Time: 1235<br>Method: S. Steel Trough<br>Monitor Reading (ppm): | 0-6" | Brown | Sandy - silt |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth Interval | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| Method: | | | | |
| Monitor Readings (Range in ppm): | | | | |

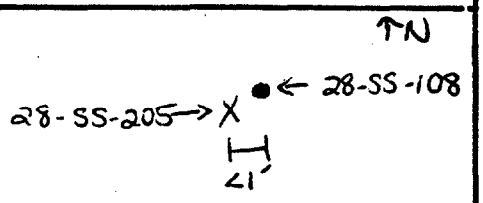
**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| PCBS - Quick Turn | glass jar | yes | |
| Additional Parameters - Hold | glass jar | yes | |
| Bioaccumulation Test - Hold | ziploc bag | yes | |

**OBSERVATIONS / NOTES:**

Found a flag for 28-SS-108 (historic sample)

**MAP:**




**Circle if Applicable:**

| MS/MSD | Duplicate ID No.: |
|---|---|
| | |

**Signature(s):**

Tetra Tech NUS, Inc.

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: White Oak - ERA
Project No.: 7687

Sample ID No.: 28-SS-06
Sample Location:
Sampled By: A. Bernhardt; B. Knight
C.O.C. No.:

- [x] Surface Soil
- [ ] Subsurface Soil
- [ ] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Type of Sample:
- [x] Low Concentration
- [ ] High Concentration

**GRAB SAMPLE DATA:**

| Date: 8-14-00 | Depth Interval | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Time: 1240 | 0-6" | Brown | Sandy silt |
| Method: S. Steel Trough | | | |
| Monitor Reading (ppm): — | | | |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth Interval | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| Method: | | | | |
| Monitor Readings (Range in ppm): | | | | |

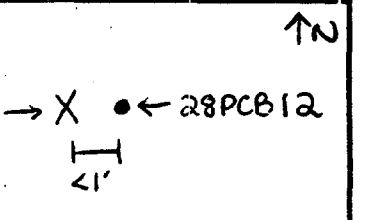
**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| PCB - Quick Turn | glass jar | yes | |
| Additional Parameters - Hold | glass jar | yes | |
| Bioaccumulation Test - Hold | ziploc bag | yes | |

**OBSERVATIONS / NOTES:**

Found a flag for 28-PCB-12 (historic sample)

**MAP:**




**Circle if Applicable:**

| MS/MSD | Duplicate ID No.: |
|---|---|
| | |

**Signature(s):**

Tetra Tech NUS, Inc.

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: White Oak - EBA
Project No.: 7687

Sample ID No.: 28-SS-207
Sample Location:
Sampled By: A. Bernhardt; B. Knight
C.O.C. No.:

- [x] Surface Soil
- [ ] Subsurface Soil
- [ ] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Type of Sample:
- [x] Low Concentration
- [ ] High Concentration

**GRAB SAMPLE DATA:**

| | Depth Interval | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 8-14-00<br>Time: 1250<br>Method: S. Steel Trough<br>Monitor Reading (ppm): | 0-6" | Brown | Silty sand w/ some yellow clay and rocks |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth Interval | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| Method: | | | | |
| Monitor Readings (Range in ppm): | | | | |

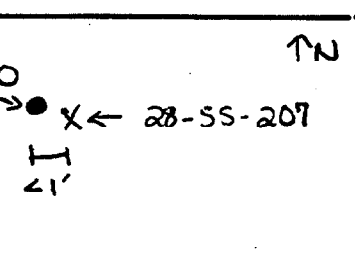
**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| PCB - Quick Turn | glass jar | yes | |
| Additional Parameters - Hold | glass jar | yes | |
| Bioaccumulation Test - Hold | Ziploc bag | yes | |

**OBSERVATIONS / NOTES:**

Found a flag for 28-SS-100 (historic sample)

**MAP:**




**Circle if Applicable:**

| MS/MSD | Duplicate ID No.: |
|---|---|
| | |

**Signature(s):**

Tetra Tech NUS, Inc.

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: White Oak - ERA
Project No.: 7687

Sample ID No.: 28-SS-208
Sample Location:
Sampled By: A. Bernhardt; A. Knight
C.O.C. No.:

[X] Surface Soil
[ ] Subsurface Soil
[ ] Sediment
[ ] Other:
[ ] QA Sample Type:

Type of Sample:
[X] Low Concentration
[ ] High Concentration

**GRAB SAMPLE DATA:**

| | Depth Interval | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 8-14-00<br>Time: 1300<br>Method: S. Steel Trough<br>Monitor Reading (ppm): | 0-6" | Brown | Silty Sand with some yellow clay |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth Interval | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| Method: | | | | |
| Monitor Readings (Range in ppm): | | | | |

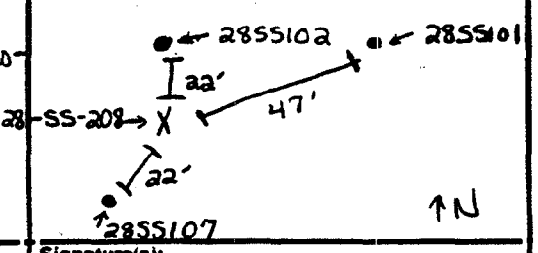
**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| PCB - Quick Turn | glass jar | yes | |
| Additional Parameters - Hold | glass jar | yes | |
| Bioaccumulation Test - Hold | ziploc bag | yes | |

**OBSERVATIONS / NOTES:**

Flags were located for historic samples 28-SS-102, 28-SS-101, & 28-SS-107

**MAP:**




**Circle if Applicable:**

| MS/MSD | Duplicate ID No.: |
|---|---|
| | |

**Signature(s):**

Tetra Tech NUS, Inc.

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: White Oak - ERA
Project No.: 7687

Sample ID No.: 28-SS-209
Sample Location:
Sampled By: A. Bernhardt; B. Knight
C.O.C. No.:

- [x] Surface Soil
- [ ] Subsurface Soil
- [ ] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Type of Sample:
- [x] Low Concentration
- [ ] High Concentration

**GRAB SAMPLE DATA:**

| | Depth Interval | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 8-14-00<br>Time: 1305<br>Method: S. Steel Trough<br>Monitor Reading (ppm): | 0-6" | Brown | Silty sand w/ some yellow clay |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth Interval | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| Method: | | | | |
| Monitor Readings (Range in ppm): | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| PCB - Quick Turn | glass jar | yes | |
| Additional Parameters - Hold | glass jar | yes | |
| Bioaccumulation Test - Hold | ziploc bag | yes | |

**OBSERVATIONS / NOTES:**

Flag Found for 28PCB11 (historic sample)

**MAP:**

↑N

28-SS-209 → X ● ← 28PCB11

<1'

**Circle if Applicable:**

| MS/MSD | Duplicate ID No.: |
|---|---|
| | |

**Signature(s):**

# APPENDIX B

## SITE 47

B.1 ANALYTICAL DATA

B.2 ESTIMATE OF VOLUME OF PCB CONTAMINATED SOIL AND SEDIMENT

B.3 RISK ASSESSEMENT DATA

B.4 REMOVAL ACTION ALTERNATIVE COST ESTIMATES

B.5 SAMPLE LOG SHEETS

# B.1 ANALYTICAL DATA

SITE 47
SUMMARY OF POSITIVE ANALYTICAL RESULTS FOR SURFACE SOIL
NSWC WHITE OAK, SILVER SPRING, MARYLAND

| LOCATION: | 0047-SS-01 | 0047-SS-02 | 0047-SS-03 | 0047-SS-04 | 0047-SS-05 | 0047-SS-06 | 0047-SS-07 | 0047-SS-08 | 0047-SS-08 | 0047-SS-08 |
|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE ID: | 0047-SS-01 | 0047-SS-02 | 0047-SS-03 | 0047-SS-04 | 0047-SS-05 | 0047-SS-06 | 0047-SS-07 | 0047-SS-08 | 0047-SS-08-AVG | 0047-SS-08-D |
| DATE: | 11/01/00 | 11/01/00 | 11/01/00 | 11/01/00 | 11/01/00 | 11/01/00 | 11/01/00 | 11/01/00 | 11/01/00 | 11/01/00 |
| TOP DEPTH: | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BOTTOM DEPTH: | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| **Pesticides/PCBs (ug/kg)** | | | | | | | | | | |
| AROCLOR-1260 | 120 | 99 | 210000 | 560 | 1600 | 2600 | 670 | 480 | 535 | 590 |

U - Chemical was not detected at the numerical detection limit (quantitation limit).

B - Chemical was detected but the result is considered a false positive as a consequence of either laboratory or field blank contamination.

J - Chemical was detected, however, the associated numerical result is estimated

K - Chemical was detected, however the associated numerical result is considered biased high.

L - Chemical was detected, however the associated numerical result is considered biased low.

UJ - Chemical was not detected, however the numerical detection limit is regarded as inaccurate or imprecise.

UL - Chemical was not detected, however the numerical detection limit is regarded as having a low bias.

SITE 47
SUMMARY OF POSITIVE ANALYTICAL RESULTS FOR SEDIMENT
NSWC WHITE OAK, SILVER SPRING, MARYLAND


| LOCATION | 0047-SD-01 | 0047-SD-02 | 0047-SD-03 | 0047-SD-04 | 0047-SD-05 | 0047-SD-06 | 0047-SD-07 | 0047-SD-08 | 0047-SD-09 | 0047-SD-10 | 0047-SD-10 | 0047-SD-10 | 0047-SD-12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE ID | 0047-SD-01 | 0047-SD-02 | 0047-SD-03 | 0047-SD-04 | 0047-SD-05 | 0047-SD-06 | 0047-SD-07 | 0047-SD-08 | 0047-SD-09 | 0047-SD-10 | 0047-SD-10-AVG | 0047-SD-10-D | 0047-SD-12 |
| DATE | 11/01/00 | 11/01/00 | 11/01/00 | 11/01/00 | 11/01/00 | 11/01/00 | 11/01/00 | 11/01/00 | 11/01/00 | 11/02/00 | 11/02/00 | 11/02/00 | 11/02/00 |
| TOP DEPTH | 0 | 1.25 | 0 | 1.33 | 0 | 0 | 0.83 | 0 | 0.83 | 0 | 0 | 0 | 0 |
| BOTTOM DEPTH | 0.5 | 1.33 | 1.5 | 1.5 | 1.5 | 1.5 | 1 | 0.5 | 1 | 0.5 | 0.5 | 0.5 | 0.5 |
| **Semivolatile Organics (ug/kg)** | | | | | | | | | | | | | |
| BENZO(A)ANTHRACENE | | | | | | | | | | | | | |
| BENZO(B)FLUORANTHENE | | | | | | | | | | | | | |
| CHRYSENE | | | | | | | | | | | | | |
| FLUORANTHENE | | | | | | | | | | | | | |
| PHENANTHRENE | | | | | | | | | | | | | |
| PYRENE | | | | | | | | | | | | | |
| **Pesticides/PCBs (ug/kg)** | | | | | | | | | | | | | |
| ALPHA-CHLORDANE | | | | | | | | | | | | | |
| AROCLOR-1254 | 2000 U | 81000 U | 4000 U | 2000 U | 8500 U | 490 U | 390 U | 120 U | 880 U | 1500 U | 2350 U | 3200 U | 210 U |
| AROCLOR-1260 | 12000 | 380000 | 50000 | 10000 | 42000 | 4600 | 2200 | 1900 | 4200 | 10000 | 12500 | 15000 | 980 |
| DIELDRIN | | | | | | | | | | | | | |
| ENDOSULFAN II | | | | | | | | | | | | | |
| ENDRIN ALDEHYDE | | | | | | | | | | | | | |
| **Inorganics (mg/kg)** | | | | | | | | | | | | | |
| ALUMINUM | | | | | | | | | | | | | |
| ARSENIC | | | | | | | | | | | | | |
| BARIUM | | | | | | | | | | | | | |
| CHROMIUM | | | | | | | | | | | | | |
| COBALT | | | | | | | | | | | | | |
| COPPER | | | | | | | | | | | | | |
| IRON | | | | | | | | | | | | | |
| LEAD | | | | | | | | | | | | | |
| MAGNESIUM | | | | | | | | | | | | | |
| MANGANESE | | | | | | | | | | | | | |
| MERCURY | | | | | | | | | | | | | |
| NICKEL | | | | | | | | | | | | | |
| VANADIUM | | | | | | | | | | | | | |
| **Miscellaneous Parameters (mg/kg)** | | | | | | | | | | | | | |
| MISC TOTAL ORGANIC CARBON | | | | | | | | | | | | | |

SITE 47
SUMMARY OF POSITIVE ANALYTICAL RESULTS FOR SEDIMENT
NSWC WHITE OAK, SILVER SPRING, MARYLAND


| LOCATION | 0047-SD-13 | 0047-SD-14 | 0047-SD-15 | 11SD200 | 11SD201 | 11SD202 | 11SD203 | 11SD204 | 11SD204 | 11SD204 | 11SD205 | 11SD206 | 11SD207 | 11SD208 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE ID | 0047-SD-13 | 0047-SD-14 | 0047-SD-15 | 11SD200 | 11SD201 | 11SD202 | 11SD203 | 11SD204 | 11SD204-AVG | 11SD204-D | 11SD205 | 11SD206 | 11SD207 | 11SD208 |
| DATE | 11/02/00 | 11/02/00 | 11/02/00 | 05/02/00 | 05/02/00 | 05/02/00 | 05/02/00 | 05/02/00 | 05/02/00 | 05/02/00 | 05/02/00 | 05/02/00 | 05/02/00 | 05/03/00 |
| TOP DEPTH | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BOTTOM DEPTH | 0.5 | 0.5 | 0.5 | 0.17 | 0.25 | 0.25 | 0.17 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.17 |
| **Semivolatile Organics (ug/kg)** | | | | | | | | | | | | | | |
| BENZO(A)ANTHRACENE | | | | | | | | | | | | | | |
| BENZO(B)FLUORANTHENE | | | | | | | | | | | | | | |
| CHRYSENE | | | | | | | | | | | | | | |
| FLUORANTHENE | | | | | | | | | | | | | | |
| PHENANTHRENE | | | | | | | | | | | | | | |
| PYRENE | | | | | | | | | | | | | | |
| **Pesticides/PCBs (ug/kg)** | | | | | | | | | | | | | | |
| ALPHA-CHLORDANE | | | | | | | | | | | | | | |
| AROCLOR-1254 | 86 U | 38 U | 43 U | 4300 U | 17000 U | 12000 U | 4100 U | 4500 U | 7000 U | 9500 U | 13000 U | 11000 U | 5900 U | 2600 U |
| AROCLOR-1260 | 480 | 200 | 180 | 15000 | 140000 | 96000 | 68000 | 37000 J | 53500 J | 70000 J | 130000 | 130000 | 28000 | 19000 |
| DIELDRIN | | | | | | | | | | | | | | |
| ENDOSULFAN II | | | | | | | | | | | | | | |
| ENDRIN ALDEHYDE | | | | | | | | | | | | | | |
| **Inorganics (mg/kg)** | | | | | | | | | | | | | | |
| ALUMINUM | | | | | | | | | | | | | | |
| ARSENIC | | | | | | | | | | | | | | |
| BARIUM | | | | | | | | | | | | | | |
| CHROMIUM | | | | | | | | | | | | | | |
| COBALT | | | | | | | | | | | | | | |
| COPPER | | | | | | | | | | | | | | |
| IRON | | | | | | | | | | | | | | |
| LEAD | | | | | | | | | | | | | | |
| MAGNESIUM | | | | | | | | | | | | | | |
| MANGANESE | | | | | | | | | | | | | | |
| MERCURY | | | | | | | | | | | | | | |
| NICKEL | | | | | | | | | | | | | | |
| VANADIUM | | | | | | | | | | | | | | |
| **Miscellaneous Parameters (mg/kg)** | | | | | | | | | | | | | | |
| MISC TOTAL ORGANIC CARBON | | | | 9480 J | 42200 J | 27600 J | 6510 J | 6540 J | 9120 J | 11700 J | 25900 J | 30100 J | 9970 J | 18000 J |

SITE 47
SUMMARY OF POSITIVE ANALYTICAL RESULTS FOR SEDIMENT
NSWC WHITE OAK, SILVER SPRING, MARYLAND


| LOCATION | 11SD209 | 11SD210 | 11SW/SD100 | 11SW/SD101 |
|---|---|---|---|---|
| SAMPLE ID | 11SD209 | 11SD210 | 11SD1000001 | 11SD1010001 |
| DATE | 05/03/00 | 05/03/00 | 01/13/99 | 01/13/99 |
| TOP DEPTH | 0 | 0 | 0 | 0 |
| BOTTOM DEPTH | 0.17 | 0.17 | 0.5 | 0.5 |
| **Semivolatile Organics (ug/kg)** | | | | |
| BENZO(A)ANTHRACENE | | | 380 U | 54 J |
| BENZO(B)FLUORANTHENE | | | 380 U | 54 J |
| CHRYSENE | | | 380 U | 58 J |
| FLUORANTHENE | | | 380 U | 140 J |
| PHENANTHRENE | | | 380 U | 68 J |
| PYRENE | | | 380 U | 73 J |
| **Pesticides/PCBs (ug/kg)** | | | | |
| ALPHA-CHLORDANE | | | 160 | 14 R |
| AROCLOR-1254 | 1100 U | 3600 U | 12000 J | 3500 |
| AROCLOR-1260 | 7200 | 8400 | 5800 | 5300 |
| DIELDRIN | | | 86 R | 30 J |
| ENDOSULFAN II | | | 200 | 170 J |
| ENDRIN ALDEHYDE | | | 190 | 220 |
| **Inorganics (mg/kg)** | | | | |
| ALUMINUM | | | 443 J | 570 J |
| ARSENIC | | | 0.79 K | 0.66 U |
| BARIUM | | | 3.4 | 3.7 |
| CHROMIUM | | | 2.9 | 8.4 |
| COBALT | | | 0.37 | 2.0 |
| COPPER | | | 4.2 B | 11.2 K |
| IRON | | | 1820 J | 1990 J |
| LEAD | | | 2.7 J | 5.4 J |
| MAGNESIUM | | | 133 B | 3200 |
| MANGANESE | | | 23.5 | 58.5 |
| MERCURY | | | 0.40 | 0.23 |
| NICKEL | | | 1.5 | 36.8 |
| VANADIUM | | | 3.3 | 2.2 |
| **Miscellaneous Parameters (mg/kg)** | | | | |
| MISC TOTAL ORGANIC CARBON | 6070 J | 32500 J | 130 | 130 U |

U - Chemical was not detected at the numerical detection limit (quantitation limit).
B - Chemical was detected but the result is considered a false positive as a consequence of either laboratory or field blank contamination.
J - Chemical was detected, however, the associated numerical result is estimated
K - Chemical was detected, however the associated numerical result is considered biased high.
L - Chemical was detected, however the associated numerical result is considered biased low.
UJ - Chemical was not detected, however the numerical detection limit is regarded as inaccurate or imprecise.
UL - Chemical was not detected, however the numerical detection limit is regarded as having a low bias.

# B.2 ESTIMATE OF VOLUME OF PCB CONTAMINATED SOIL AND SEDIMENT

| | | | |
|---|---|---|---|
| CLIENT: NSWC-White Oak (EFACHES) | | | JOB NUMBER: CTO 298 (7687-0501) |
| SUBJECT: Estimate of Volume of PCB Contaminated Soil and Sediment at Site 47 | | | |
| BASED ON: Available field and analytical data. | | | DRAWING NUMBER: |
| BY: CAR<br>Date: 12/6/00 | CHECKED BY: JSW<br>Date: 12/22/00 | | APPROVED BY: SW 12/22/00 DATE: |

**(1) SCOPE**

Estimate the volume of soil and sediment at Site 47 contaminated with PCBs in excess of 1 mg/kg.

Estimate the volume of contaminated sediment in the catch basin and storm sewer pipe behind Bldg 90.

Estimate the volume of contaminated soil and sediment in the stream and along the stream banks.

**(2) GIVEN**

Figures 1 and 2 are tag maps showing the distribution of PCBs in soil and sediment at Site 47.

**(3) ASSUMPTIONS**

The PCB cleanup goal under TSCA and 40 CFR 761 for "high occupancy areas" is 1 mg/kg.

**(4) VOLUME OF SEDIMENT IN CATCH BASIN AND STORM SEWER PIPE BEHIND BUILDING 90**

**Catch Basin**

Approximate catch basin dimensions = 3.25' x 3.25'

Assume 0.5' of sediment in catch basin (sample depth 0-6").

Volume of sediment = 3.25' x 3.25' x 0.5' = 5.28 $ft^3$ = 0.20 $yd^3$

Based on the analytical data presented on Figure 1, all of the sediment in the catch basin has PCB concentrations > 1.0 mg/kg (see Samples 0047-SD-10 and 0047-SD-11).

**Storm Sewer Pipe**

The pipe has a diameter of 2.0' and is approximately 190' long.

Assume there is 0.08' (approx. 1") of contaminated sediment in the bottom of the pipe.

For a circular segment: Angle = 2 (arccos((r-d)/r)); Area = $1/2r^2$(Angle-sin(Angle))

Angle = 0.822 radians; Area = 0.045 $ft^2$

Volume = Area x Length = 8.51 $ft^3$ = 0.32 $yd^3$

**Total**

The total volume of contaminated sediment in the catch basin and pipe = 0.52 $yd^3$.

| | | | |
|---|---|---|---|
| CLIENT: NSWC-White Oak (EFACHES) | | | JOB NUMBER: CTO 298 (7687-0501) |
| SUBJECT: Estimate of Volume of PCB Contaminated Soil and Sediment at Site 47 | | | |
| BASED ON: Available field and analytical data. | | | DRAWING NUMBER: |
| BY: CAR<br>Date: 12/6/00 | CHECKED BY: JSW<br>Date: 12/22/00 | | APPROVED BY: SJ DATE: 12/22/00 |

## (5) VOLUME OF CONTAMINTATED SOIL AND SEDIMENT IN AND ALONG SITE 47 STREAM

**Given**

Field measurements were taken at 19 cross-sections on November 1 and 2, 2000.
The measurements are summarized in Table 1 and cross-section locations are shown on Figure 2.

Cross-sections 1 through 10 are depicted on p. 4 through 8.

Distances between cross-sections were measured from Figure 2.

No measurements were taken at the outlet of the stormsewer into the stream channel; therefore, it was assumed that the stream channel at cross-section 0 was similar to cross-section 1.

**TABLE 1**

| Cross Section | Top Width of Channel (ft) | Channel Depth (ft) | Stream Width (ft) | Stream Depth (ft) | Distance Between Cross Sections (ft) |
|---|---|---|---|---|---|
| 0 | 9.42 | 4.08 | 2.00 | 0.42 | |
| 1 | 9.42 | 4.08 | 2.00 | 0.42 | 65 |
| 2 | 7.33 | 4.00 | 3.25 | 0.42 | 145 |
| 3 | 8.67 | 2.58 | 3.75 | 0.17 | 125 |
| 4 | 12.42 | 6.00 | 2.50 | 0.33 | 140 |
| 5 | 9.58 | 3.00 | 1.50 | 0.33 | 120 |
| 6 | 33.00 | 3.00 | 3.00 | 0.50 | 70 |
| 7 | 7.58 | 3.50 | 3.42 | 0.50 | 180 |
| 8 | 9.25 | 1.25 | 4.00 | 0.25 | 215 |
| 9 | 50.00 | 2.00 | 4.00 | 0.33 | 70 |
| 10 | 7.00 | 3.00 | 1.00 | 0.08 | 190 |
| 11 | 12.00 | 1.50 | 2.00 | 0.42 | 85 |
| 12 | 5.00 | 3.00 | 1.00 | 0.25 | 315 |
| 13 | 5.00 | 1.00 | 2.50 | 0.04 | 120 |
| 14 | 6.00 | 2.00 | 1.00 | 0.08 | 250 |
| 15 | 12.00 | 3.00 | 3.00 | 0.25 | 435 |
| 16 | 13.00 | 2.00 | 2.00 | 0.33 | 210 |
| 17 | 18.00 | 3.00 | 4.00 | 0.33 | 250 |
| 18 | 15.00 | 4.00 | 4.00 | 0.50 | 235 |
| 19 | 21.00 | 4.00 | 5.00 | 0.50 | 275 |

**Assumptions**

Based on the analytical data for surface soil samples presented on Figure 2, the depth of contamination along the stream banks is approximately 1 foot deep.

| | | | |
|---|---|---|---|
| CLIENT: | NSWC-White Oak (EFACHES) | JOB NUMBER: | CTO 298 (7687-0501) |
| SUBJECT: | Estimate of Volume of PCB Contaminated Soil and Sediment at Site 47 | | |
| BASED ON: | Available field and analytical data. | DRAWING NUMBER: | |
| BY: CAR<br>Date: 12/6/00 | CHECKED BY: JSW<br>Date: 12/22/00 | APPROVED BY: SW 12/22/00 | DATE: |

**Assumptions (cont'd)**

For cross-section 14, stream width and depth were not measurable, width and depth were assumed.

PCB contamination > 1 mg/kg along the banks extends along both sides of the stream from cross-section 0 to cross-section 10 (see samples 0047-SS-07 and 0047-SS-08).

Based on the analytical data for sediment samples presented on Figure 2, the depth of contamination extends approximately 2 feet below the stream bottom.

PCB contamination > 1 mg/kg along the stream bed extends from cross-section 0 to property line (see sample 0047-SD-12).

The Average End Area Method was used to calculate the volume of contaminated soil and sediment.

**Calculations**

**TABLE 2**

| Cross Section | Left Bank Area ($ft^2$) | Area Under Stream ($ft^2$) | Right Bank Area ($ft^2$) | Distance (ft) | Volume ($ft^3$) | Volume ($yd^3$) |
|---|---|---|---|---|---|---|
| 0 | 5.51 | 4.00 | 5.51 | | | |
| 1 | 5.51 | 4.00 | 5.51 | 65 | 976.30 | 36.16 |
| 2 | 4.49 | 6.50 | 4.49 | 145 | 2211.25 | 81.90 |
| 3 | 3.56 | 7.50 | 3.56 | 125 | 1881.25 | 69.68 |
| 4 | 7.78 | 5.00 | 7.78 | 140 | 2462.60 | 91.21 |
| 5 | 5.03 | 3.00 | 5.03 | 120 | 2017.20 | 74.71 |
| 6 | 15.30 | 6.00 | 15.30 | 70 | 1738.10 | 64.37 |
| 7 | 4.07 | 6.84 | 4.07 | 180 | 4642.20 | 171.93 |
| 8 | 2.91 | 8.00 | 2.91 | 145 | 2088.00 | 77.33 |
| 9 | 23.09 | 8.00 | 23.09 | 70 | 2380.00 | 88.15 |
| 10 | 4.24 | 2.00 | 4.24 | 190 | 6142.70 | 227.51 |
| 11 | 0.00 | 4.00 | 0.00 | 85 | 615.40 | 22.79 |
| 12 | 0.00 | 2.00 | 0.00 | 315 | 945.00 | 35.00 |
| 13 | 0.00 | 5.00 | 0.00 | 120 | 420.00 | 15.56 |
| 14 | 0.00 | 2.00 | 0.00 | 250 | 875.00 | 32.41 |
| 15 | 0.00 | 6.00 | 0.00 | 435 | 1740.00 | 64.44 |
| PL | 0.00 | 4.00 | 0.00 | 130 | 650.00 | 24.07 |
| | | | | | **Total =** | 1177.22 |

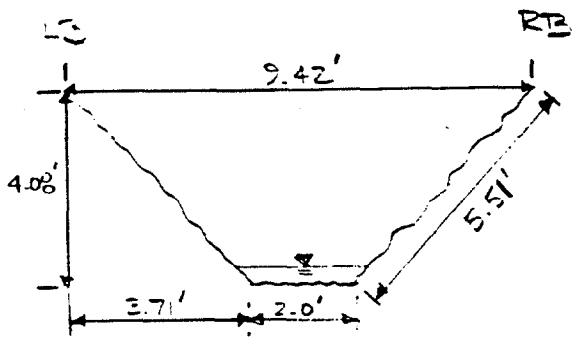
(Note: Distance between cross-section 15 and Property Line = 130').

**(6) CONCLUSION**

There is approximately 1,200 $yd^3$ of soil and sediment contaminated with PCBs at concentrations > 1 mg/kg at Site 47.

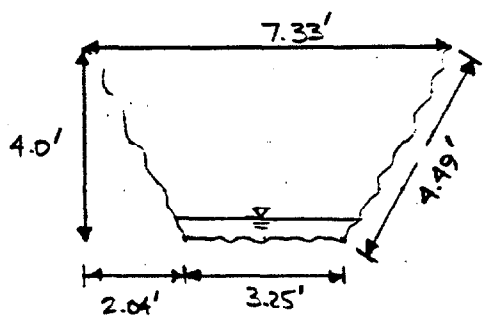
| | | | |
|---|---|---|---|
| CLIENT: NSWC-White Oak (EFACHES) | | JOB NUMBER: CTO 298 (7687-0501) | |
| SUBJECT: Estimate of Volume of PCB Contaminated Soil and Sediment at Site 47 | | | |
| BASED ON: Available field and analytical data. | | DRAWING NUMBER: | |
| BY: CAR<br>Date: 12/6/00 | CHECKED BY: JSW<br>Date: 12/22/00 | APPROVED BY: SJ 12/22/00 | DATE: |

CROSS-SECTION 1 SCALE: 1" = 4'




LEFT BANK AREA = 5.51 ft²
AREA UNDER STREAM = 4.00 ft²
RIGHT BANK AREA = 5.51 ft²

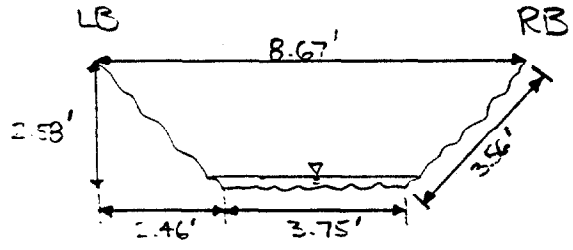
CROSS-SECTION 2 SCALE: 1" = 4'




LEFT BANK AREA = 4.49 ft²
AREA UNDER STREAM = 6.50 ft²
RIGHT BANK AREA = 4.49 ft²

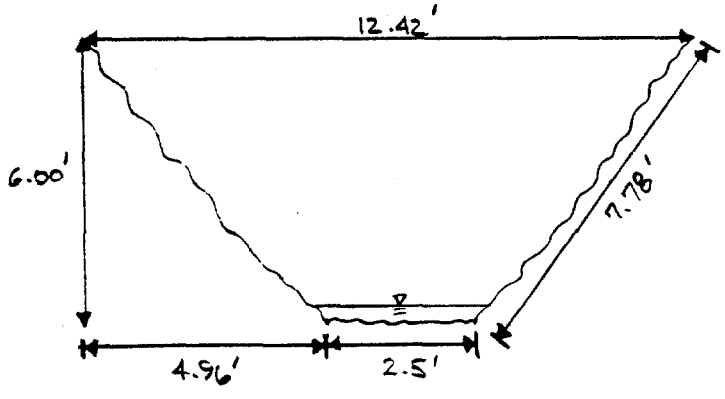
| | | | |
|---|---|---|---|
| CLIENT: NSWC-White Oak (EFACHES) | | | JOB NUMBER: CTO 298 (7687-0501) |
| SUBJECT: Estimate of Volume of PCB Contaminated Soil and Sediment at Site 47 | | | |
| BASED ON: Available field and analytical data. | | | DRAWING NUMBER: |
| BY: CAR<br>Date: 12/6/00 | CHECKED BY: JSW<br>Date: 12/22/00 | | APPROVED BY: SW 12/22/00 DATE: |

CROSS-SECTION 3 SCALE: 1" = 4'




LEFT BANK AREA = 3.56 ft²
AREA UNDER STREAM = 7.50 ft²
RIGHT BANK AREA = 3.56 ft²

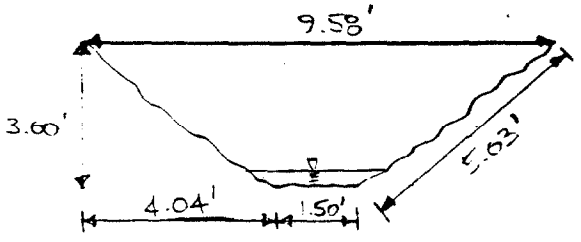
CROSS-SECTION 4 SCALE: 1" = 4'




LEFT BANK AREA = 7.78 ft²
AREA UNDER STREAM = 5.0 ft²
RIGHT BANK AREA = 7.78 ft²

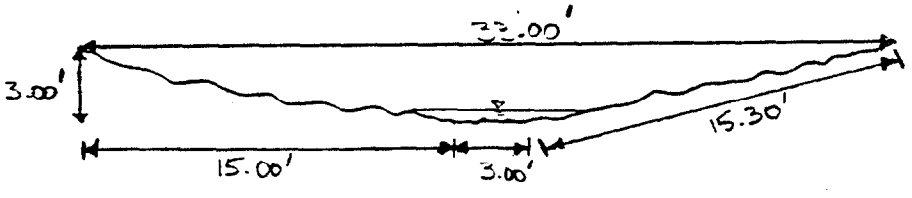
| | | | |
|---|---|---|---|
| CLIENT: NSWC-White Oak (EFACHES) | | | JOB NUMBER: CTO 298 (7687-0501) |
| SUBJECT: Estimate of Volume of PCB Contaminated Soil and Sediment at Site 47 | | | |
| BASED ON: Available field and analytical data. | | | DRAWING NUMBER: |
| BY: CAR<br>Date: 12/6/00 | CHECKED BY: JSW<br>Date: 12/22/00 | | APPROVED BY: SN 12/22/00 DATE: |

CROSS-SECTION 5 SCALE: 1" = 4'




LEFT BANK AREA = 5.03 ft²
AREA UNDER STREAM = 3.00 ft²
RIGHT BANK AREA = 5.03 ft²

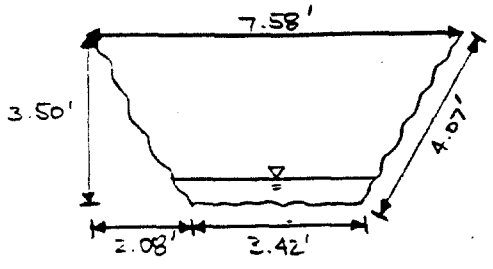
CROSS-SECTION 6 SCALE: 1" = 8'




LEFT BANK AREA = 15.30 ft²
AREA UNDER STREAM = 6.00 ft²
RIGHT BANK AREA = 15.30 ft²

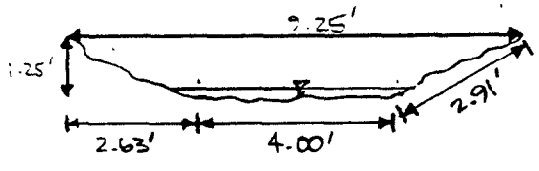
| | | | |
|---|---|---|---|
| CLIENT: NSWC-White Oak (EFACHES) | | | JOB NUMBER: CTO 298 (7687-0501) |
| SUBJECT: Estimate of Volume of PCB Contaminated Soil and Sediment at Site 47 | | | |
| BASED ON: Available field and analytical data. | | | DRAWING NUMBER: |
| BY: CAR<br>Date: 12/6/00 | CHECKED BY: JSW<br>Date: 12/22/00 | | APPROVED BY: SN 12/22/00 DATE: |

CROSS-SECTION 7 SCALE 1" = 4'




LEFT BANK AREA = 4.07 ft²
AREA UNDER STREAM = 6.34 ft²
RIGHT BANK AREA = 4.07 ft²

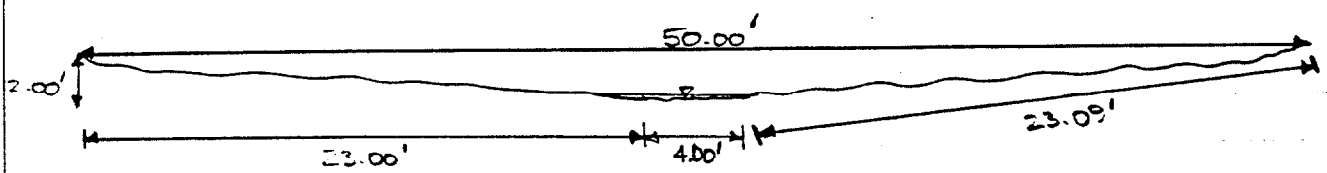
CROSS-SECTION 8 SCALE 1" = 4'




LEFT BANK AREA = 2.91 ft²
AREA UNDER STREAM = 8.00 ft²
RIGHT BANK AREA = 2.91 ft²

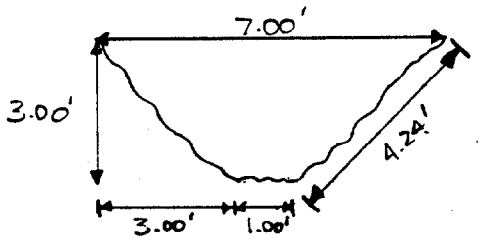
| | | | |
|---|---|---|---|
| CLIENT: NSWC-White Oak (EFACHES) | | JOB NUMBER: CTO 298 (7687-0501) | |
| SUBJECT: Estimate of Volume of PCB Contaminated Soil and Sediment at Site 47 | | | |
| BASED ON: Available field and analytical data. | | DRAWING NUMBER: | |
| BY: CAR<br>Date: 12/6/00 | CHECKED BY: JSW<br>Date: 12/22/00 | APPROVED BY: SN 12/22/00 | DATE: |

CROSS-SECTION 9 SCALE: 1" = 8'




LEFT BANK AREA = 23.09 ft²
AREA UNDER STREAM = 8.00 ft²
RIGHT BANK AREA = 23.09 ft²

CROSS-SECTION 10 SCALE: 1" = 4'




LEFT BANK AREA = 4.24 ft²
AREA UNDER STREAM = 2.00 ft²
RIGHT BANK AREA = 4.24 ft²

## B.3 RISK ASSESSMENT DATA

TABLE 2.6-3

STATISTICAL SUMMARY OF ANALYTICAL RESULTS
BACKGROUND SURFACE SOIL
BACKGROUND INVESTIGATION REPORT
FORMER NSWC WHITE OAK
SILVER SPRING, MARYLAND


| Parameter (1) | Number of Samples | Number of Detections | Average | Maximum Detection | UCL Normal | UCL Log Normal | Distribution of Data | UCL Selected | Maryland Soils (3) | Eastern US Soils (2) |
|---|---|---|---|---|---|---|---|---|---|---|
| Inorganics (mg/kg) | | | | | | | | | | |
| Aluminum | 10 | 10 | 11213 | 20900 | 13885.4459 | 14953.4471 | LOGNORMAL | 14953 | NA | 7000-100000 |
| Arsenic | 10 | 9 | 3.66 | 6.7 | 4.5848 | 5.1108 | LOGNORMAL | 5.11 | 1.1-7.1 | <0.1-73 |
| Barium | 10 | 10 | 49.96 | 76.5 | 59.5396 | 65.6103 | NORMAL | 59.5 | 150-700 | 10-1500 |
| Beryllium | 10 | 3 | 0.0545 | 0.19 | 0.0935 | 0.2144 | UNDEFINED | 0.19 | ND-3 | <1-7 |
| Calcium | 10 | 4 | 261.815 | 1050 | 448.2994 | 1039.915 | LOGNORMAL | 1040 | NA | 100-280000 |
| Chromium | 10 | 10 | 19.48 | 55.9 | 27.5746 | 29.3503 | LOGNORMAL | 29.35 | 15-100 | 1-1000 |
| Cobalt | 10 | 10 | 5.524 | 13.8 | 7.6151 | 11.8099 | LOGNORMAL | 11.81 | ND-20 | <0.3-70 |
| Copper | 10 | 9 | 8.72 | 17.8 | 11.523 | 16.2258 | NORMAL | 11.52 | 5-70 | <1-700 |
| Iron | 10 | 10 | 13959 | 25500 | 17266.1398 | 18945.7645 | LOGNORMAL | 18946 | NA | 100->100000 |
| Lead | 10 | 10 | 32.775 | 133 | 53.8832 | 60.1839 | LOGNORMAL | 60.2 | 10-50 | <10-300 |
| Magnesium | 10 | 10 | 931 | 1690 | 1182.7126 | 1472.176 | NORMAL | 1183 | NA | 50-50000 |
| Manganese | 10 | 10 | 181.255 | 490 | 261.7912 | 493.2461 | UNDEFINED | 490 | NA | <2-7000 |
| Mercury | 10 | 9 | 0.0665 | 0.195 | 0.0969 | 0.1424 | LOGNORMAL | 0.142 | 0.04-0.14 | 0.01-3.4 |
| Nickel | 10 | 10 | 9.145 | 28.6 | 13.3127 | 14.5572 | LOGNORMAL | 14.56 | ND-30 | <5-700 |
| Potassium | 10 | 10 | 562.4 | 1020 | 734.063 | 845.2054 | LOGNORMAL | 845 | NA | 50-37000 |
| Selenium | 10 | 2 | 0.3745 | 0.68 | 0.4646 | 0.4719 | UNDEFINED | 0.68 | <0.1-0.5 | <0.1-3.9 |
| Silver | 10 | 1 | 0.1975 | 1.145 | 0.3905 | 0.338 | UNDEFINED | 1.15 | NA | NA |
| Vanadium | 10 | 9 | 24.855 | 42.8 | 30.0805 | 32.8302 | NORMAL | 30.08 | 20-150 | <7-300 |
| Zinc | 10 | 10 | 25.195 | 43.5 | 30.6714 | 35.9456 | NORMAL | 30.67 | 8-113 | <5-2900 |
| Semivolatile organics (ug/kg) | | | | | | | | | | |
| Acenaphthene | 10 | 1 | 174.65 | 66.5 | 197.262 | 221.415 | UNDEFINED | 66.5 | NA | NA |
| Anthracene | 10 | 1 | 178.8 | 108 | 194.0989 | 200.4986 | UNDEFINED | 108 | NA | NA |
| Benzo(a)anthracene | 10 | 2 | 187.9 | 340 | 228.6803 | 288.202 | UNDEFINED | 340 | NA | NA |
| Benzo(a)pyrene | 10 | 2 | 180.4 | 265 | 212.0274 | 268.2905 | UNDEFINED | 265 | NA | NA |
| Benzo(b)fluoranthene | 10 | 2 | 182.3 | 275 | 213.5603 | 255.2117 | UNDEFINED | 275 | NA | NA |
| Benzo(g,h,i)perylene | 10 | 2 | 176.3 | 220 | 203.5988 | 250.069 | UNDEFINED | 220 | NA | NA |
| Benzo(k)fluoranthene | 10 | 2 | 188.1 | 335 | 227.2636 | 273.4356 | UNDEFINED | 335 | NA | NA |
| Chrysene | 10 | 2 | 196.2 | 400 | 243.3776 | 269.5996 | UNDEFINED | 400 | NA | NA |
| Dibenzo(a,h)anthracene | 10 | 1 | 177.5 | 95 | 195.0629 | 204.9544 | UNDEFINED | 95 | NA | NA |
| Fluoranthene | 10 | 3 | 225.5 | 800 | 346.1821 | 413.4985 | UNDEFINED | 800 | NA | NA |
| Fluorene | 10 | 1 | 174.7 | 67 | 197.2227 | 220.9997 | UNDEFINED | 67 | NA | NA |
| Indeno(1,2,3-cd)pyrene | 10 | 2 | 173.8 | 200 | 201.0287 | 254.8541 | UNDEFINED | 200 | NA | NA |
| Phenanthrene | 10 | 2 | 211.8 | 570 | 288.8906 | 332.6035 | UNDEFINED | 570 | NA | NA |
| Pyrene | 10 | 3 | 207.5 | 630 | 298.8674 | 379.5883 | UNDEFINED | 630 | NA | NA |

TABLE 2.6-3

STATISTICAL SUMMARY OF ANALYTICAL RESULTS
BACKGROUND SURFACE SOIL
BACKGROUND INVESTIGATION REPORT
FORMER NSWC WHITE OAK
SILVER SPRING, MARYLAND


| Parameter (1) | Number of Samples | Number of Detections | Average | Maximum Detection | UCL Normal | UCL Log Normal | Distribution of Data | UCL Selected | Maryland Soils (3) | Eastern US Soils (2) |
|---|---|---|---|---|---|---|---|---|---|---|
| Pesticide/PCBs (ug/kg) | | | | | | | | | | |
| 4,4'-DDD | 10 | 3 | 2.536 | 9.2 | 3.923 | 4.4947 | UNDEFINED | 9.2 | NA | NA |
| 4,4'-DDE | 10 | 7 | 10.002 | 81 | 24.527 | 123.755 | UNDEFINED | 81 | NA | NA |
| 4,4'-DDT | 10 | 4 | 7.46 | 49 | 16.0528 | 20.1739 | UNDEFINED | 49 | NA | NA |
| Alpha chlordane | 10 | 1 | 1.1 | 2.6 | 1.4064 | 1.3566 | UNDEFINED | 2.6 | NA | NA |
| Dieldrin | 10 | 4 | 2.383 | 8.8 | 3.7197 | 4.4352 | UNDEFINED | 8.8 | NA | NA |
| Endosulfan I | 10 | 1 | 0.911 | 0.71 | 0.9583 | 0.9752 | UNDEFINED | 0.71 | NA | NA |
| Gamma chlordane | 10 | 2 | 0.949 | 1.5 | 1.0895 | 1.1367 | UNDEFINED | 1.5 | NA | NA |
| Heptachlor epoxide | 10 | 2 | 1.2 | 2.4 | 1.5242 | 1.5434 | UNDEFINED | 2.4 | NA | NA |
| Radionuclides (pci/g) | | | | | | | | | | |
| Radium-226 | 10 | 6 | 2.268 | 6.38 | 3.4155 | 33.5669 | NORMAL | 3.4155 | NA | NA |

Notes:
NA - Not Available
UCL - Upper Confidence Limit
(1) Only positive detections shown.
(2) Shacklette, Hansford T. and Josephine G. Boerngen, Element Concentrations in Soils and Other Surficial Materials of the Conterminous United States, U. S. Geological Survey Professional Paper 1270, 1984 (surface soil values are presented in table).
(3) Dragun, James, Ph.D., Elements in North American Soils. HMCRI, Greenbelt, MD, 1991 (surface soil values are presented in table).

TABLE 2.6-2

STATISTICAL SUMMARY OF ANALYTICAL RESULTS
BACKGROUND SEDIMENT
BACKGROUND INVESTIGATION REPORT
FORMER NSWC WHITE OAK
SILVER SPRING, MARYLAND

| Parameter | Number of Samples | Number of Detections | Average | Maximum Detection | UCL Normal | UCL Log Normal | Distribution of Data | UCL Selected |
|---|---|---|---|---|---|---|---|---|
| Inorganics (mg/kg) | | | | | | | | |
| Aluminum | 7 | 7 | 5432.8571 | 13200 | 8238.9373 | 12962.6055 | LOGNORMAL | 12963 |
| Barium | 7 | 7 | 36.4429 | 89.9 | 55.6824 | 92.6947 | UNDEFINED | 89.9 |
| Beryllium | 7 | 3 | 0.2679 | 0.92 | 0.5467 | 114.6955 | UNDEFINED | 0.92 |
| Calcium | 7 | 7 | 599 | 1560 | 957.2314 | 1493.0372 | LOGNORMAL | 1493 |
| Chromium | 7 | 7 | 14.1286 | 25.3 | 19.7504 | 25.3004 | UNDEFINED | 25.3 |
| Cobalt | 7 | 7 | 6.9571 | 11.7 | 9.4425 | 11.5886 | LOGNORMAL | 11.59 |
| Copper | 7 | 2 | 8.9857 | 33 | 16.8666 | 31.1757 | LOGNORMAL | 31.18 |
| Iron | 7 | 7 | 13210 | 21300 | 16863.7184 | 19426.5481 | LOGNORMAL | 19427 |
| Lead | 7 | 7 | 11.4 | 29.5 | 17.835 | 30.3902 | UNDEFINED | 29.5 |
| Magnesium | 7 | 7 | 1467 | 3410 | 2196.3483 | 3704.4186 | UNDEFINED | 3410 |
| Manganese | 7 | 7 | 298.1429 | 573 | 413.8471 | 522.894 | LOGNORMAL | 523 |
| Mercury | 4 | 3 | 0.0925 | 0.31 | 0.2634 | 10039.8025 | UNDEFINED | 0.31 |
| Nickel | 7 | 7 | 12.2857 | 19.4 | 17.2495 | 29.8633 | NORMAL | 17.25 |
| Potassium | 7 | 7 | 974.2857 | 2960 | 1673.5316 | 3263.9787 | UNDEFINED | 2960 |
| Sodium | 7 | 5 | 67.6571 | 101 | 91.3389 | 145.0716 | NORMAL | 91.34 |
| Vanadium | 7 | 7 | 13.6571 | 20.5 | 17.131 | 20.4236 | NORMAL | 17.13 |
| Zinc | 7 | 7 | 40.6571 | 72.5 | 56.872 | 89.6599 | NORMAL | 56.87 |
| Pesticide/PCBs (ug/kg) | | | | | | | | |
| 4,4'-DDE | 6 | 2 | 1.6517 | 0.93 | 2.3789 | 10.2953 | UNDEFINED | 0.93 |
| Alpha chlordane | 6 | 3 | 1.18 | 3.4 | 2.1162 | 6.0523 | UNDEFINED | 3.4 |
| Dieldrin | 6 | 2 | 1.8583 | 2.4 | 2.5652 | 25.3026 | UNDEFINED | 2.4 |
| Gamma chlordane | 6 | 3 | 1.155 | 3.4 | 2.1025 | 5.8471 | UNDEFINED | 3.4 |
| Heptachlor epoxide | 6 | 1 | 1.4417 | 3.2 | 2.1533 | 2.4096 | UNDEFINED | 3.2 |

## SUMMARY OF 95% UCL CALCULATIONS
## SURFACE SOIL - SITE 47

| PARAMETER | DETECTS | COUNT | AVERAGE | W NORMAL | W LOGNORMAL | W TEST | DISTRIBUTION | UCL - NORMAL | UCL - LOGNORMAL | DETECTS - MAX |
|---|---|---|---|---|---|---|---|---|---|---|
| AROCLOR-1260 | 8 | 8 | 27 | 0.4282 | 0.8357 | 0.8180 | LOGNORMAL | 77 | 17439 | 210 |

## SUMMARY OF 95% UCL CALCULATIONS
## SEDIMENT - SITE 47

| PARAMETER | DETECTS | COUNT | AVERAGE | W NORMAL | W LOGNORMAL | W TEST | DISTRIBUTION | UCL - NORMAL | UCL - LOGNORMAL | DETECTS - MAX |
|---|---|---|---|---|---|---|---|---|---|---|
| AROCLOR-1254 | 2 | 27 | 3.97 | 0.4915 | 0.9485 | 0.9230 | LOGNORMAL | 6.56 | 34.4 | 12 |
| AROCLOR-1260 | 27 | 27 | 45.5 | 0.5974 | 0.9678 | 0.9230 | LOGNORMAL | 71.6 | 401 | 380 |

## B.4 REMOVAL ACTION ALTERNATIVE COST ESTIMATES

# NAVAL SURFACE WARFARE CENTER - WHITE OAK
## Silver Spring, Maryland
## Site 47 - Engineering Evaluation/Cost Analysis

**Cost Estimate Assumptions**

The following underlying assumptions apply to all cost estimates prepared for the above referenced site. Alternative specific assumptions are also provided, as necessary.

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

*ECHOS Environmental Restoration Unit Cost Book, 2000*
*Means Site Work and Landscape Cost Data, 17th Edition, 2000*
Previous cost estimates / past experience / other sources.

All field work would be performed in a standard construction uniform. No level of safety is required, except where noted below.

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.

Abandoned storm sewer pipes near Building 90 would be removed and disposed off site.

Confirmatory samples would be collected from the excavations using methods outlined in 40 CFR 761.283, Subpart O. A total of 40 samples were assumed. (Alternatives 2 and 3)

Alternative No. 2 – Excavation, On-site Treatment, Off-site Landfill Disposal, Site Restoration

Estimated project duration is 29 days (6 weeks), based on the following task durations:

| | |
|---|---|
| Mobilization | 5 days |
| Includes equipment and personnel mobilization, utility connection, site survey | |
| Excavation (100 cy/day) | 12 days |
| On-site Treatment (1) | 5 days |
| Storm sewer pipe removal | 3 days |
| Backfill (200 cy/day) | 6 days |
| Demobilization | 3 days |
| Includes vegetation, equipment and personnel demobilization | |

(1) Performed concurrently with excavation
Note: Time required to prepare pre- and post-construction submittals is in addition to the durations outlined above.

Minimal surveying would be necessary.

Soil and sediment excavation and on-site treatment 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.

Nearby paved areas would be used to stage the on-site treatment unit.

Following treatment, material would be loaded into trucks for immediate off-site disposal. Roll-off boxes would not be used.

For site/stream restoration, fill and vegetative cover soil volumes would be sufficient to replace the volume of excavated material. The disturbed areas would be vegetated upon completion.

Alternative No. 3 – Excavation, Off-site Landfill Disposal, Site Restoration

Estimated project duration is 34 days (7 weeks), based on the following task durations:

| | |
|---|---|
| Mobilization | 5 days |
| Includes equipment and personnel mobilization, utility connection, site survey | |
| Excavation (100 cy/day) | 12 days |
| Backfill (200 cy/day) | 6 days |
| Storm sewer pipe removal | 3 days |
| Demobilization | 3 days |
| Includes vegetation, equipment and personnel demobilization | |

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

Minimal surveying would be necessary.

Soil and sediment 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.

Material would be excavated and loaded into trucks for immediate off-site disposal. Roll-off boxes would not be used.

For site/stream restoration, fill and vegetative cover soil volumes would be sufficient to replace the volume of excavated material. The disturbed areas would be vegetated upon completion.

Alternative No. 4 – Containment (Multi-Layer Cover)

Estimated project duration is 46 days (10 weeks), based on the following task durations:

| | |
|---|---|
| Mobilization | 5 days |
| Includes equipment and personnel mobilization, utility connection, site survey | |
| Backfill/Channel Reconstruction | 7 weeks |
| Storm sewer pipe removal | 3 days |
| Demobilization | 3 days |
| Includes vegetation, equipment and personnel demobilization | |

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

Minimal surveying would be necessary.

Soil placement to shape channel bottom would be performed in Level B. Remaining earthwork would be performed at Level D personal protective equipment (addition of tyvek coverall). Labor costs were

increased by 18% for Level D to account for decreases in efficiency due to the PPE, and increased by 42% for Level B.

Banks along the channel to be cleared and grubbed with tree removal for channel reconstruction and site access. Channel reconstruction to consist of hand placement and compaction of common fill to shape channel, placement of geotextile over shaped channel bottom, 18-inch thick layer of cover soil, 6-inch thick layer of topsoil, and vegetation.

The disturbed areas would be vegetated upon completion.

NSWC - WHITE OAK
SILVER SPRING, MARYLAND
SITE 47 - BUILDING 90 DRAINAGE
ALTERNATIVE 2 - EXCAVATION, ON-SITE TREATMENT, OFF-SITE LANDFILL DISPOSAL, SITE RESTORATION

| Item | Quantity | Unit | Unit Cost | | | | Extended Cost | | | | Subtotal | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Subcontract | Material | Labor | Equipment | Subcontract | Material | Labor | Equipment | | |
| **1 MOBILIZATION/DEMOBILIZATION** | | | | | | | | | | | | |
| 1.1 Office Trailer (1) | 2 | mo | $345.00 | | | | $690 | $0 | $0 | $0 | $690 | (a) |
| 1.2 Field Office Support | 2 | mo | | $135.00 | | | $0 | $270 | $0 | $0 | $270 | (a) |
| 1.3 Storage Trailer (1) | 2 | mo | $85.00 | | | | $170 | $0 | $0 | $0 | $170 | (a) |
| 1.4 Utility connections (electric and phone) | 1 | ls | $1,500.00 | | | | $1,500 | $0 | $0 | $0 | $1,500 | (b) |
| 1.5 Site utilities - usage | 2 | mo | | $240.00 | | | $0 | $480 | $0 | $0 | $480 | (a) |
| 1.6 Personnel mobilization/demobilization | 10 | ea | | | $500.00 | | $0 | $0 | $5,000 | $0 | $5,000 | (b) |
| 1.7 Equipment mobilization/demobilization | 1 | ls | $2,000.00 | | | | $2,000 | $0 | $0 | $0 | $2,000 | (b), trailers, excavator, FEL |
| 1.8 Per diem | 70 | mn dy | | | $165.00 | | $0 | $0 | $11,550 | $0 | $11,550 | (b) |
| **2 DECONTAMINATION** | | | | | | | | | | | | |
| 2.1 Decontamination Trailer | 2 | mo | $2,275.00 | | | | $4,550 | $0 | $0 | $0 | $4,550 | (a) |
| 2.2 Equipment Decon Pad | 1 | ls | | $500.00 | $450.00 | $155.00 | $0 | $500 | $450 | $155 | $1,105 | (b) |
| 2.3 Decon Water | 2000 | gal | | $0.20 | | | $0 | $400 | $0 | $0 | $400 | (b) |
| 2.4 Decon Water Storage Tank, 6,000 gallon | 2 | mo | $600.00 | | | | $1,200 | $0 | $0 | $0 | $1,200 | (a) |
| 2.5 Clean Water Storage Tank, 4,000 gallon | 2 | mo | $540.00 | | | | $1,080 | $0 | $0 | $0 | $1,080 | (a) |
| 2.6 PPE (5 p * 5 days * 6 weeks) | 150 | day | | $30.00 | | | $0 | $4,500 | $0 | $0 | $4,500 | (a) |
| 2.7 Disposal of Decon Waste (liquid & solid) | 2 | mo | $900.00 | | | | $1,800 | $0 | $0 | $0 | $1,800 | (b) |
| 2.8 Pressure washer | 2 | mo | | | | $510.00 | $0 | $0 | $0 | $1,020 | $1,020 | (a) |
| 2.9 Waste profile decontamination water | 1 | ls | $1,000.00 | | | | $1,000 | $0 | $0 | $0 | $1,000 | (b) |
| **3 SITE PREPARATION** | | | | | | | | | | | | |
| 3.1 Construction survey | 1 | ls | $1,000.00 | | | | $1,000 | $0 | $0 | $0 | $1,000 | (b) |
| 3.2 Clear and grub | 0.25 | acre | | | $41.00 | $80.50 | $0 | $0 | $10 | $20 | $30 | (a) |
| 3.3 Removal of Abandoned Storm Sewer | 3 | day | | | $577.20 | $500.00 | $0 | $0 | $1,732 | $1,500 | $3,232 | (a), 2 laborers, equip op, FEL |
| **4 EXCAVATION** | | | | | | | | | | | | |
| 4.1 Excavator /w operator to excavate/load contaminated soil | 12 | day | | | $514.95 | $1,017.00 | $0 | $0 | $6,179 | $12,204 | $18,383 | (a) |
| 4.2 Haul material to be treated to treatment unit | 12 | day | | | $162.24 | $475.00 | $0 | $0 | $1,947 | $5,700 | $7,647 | (a), 1 dump truck w/ driver |
| 4.3 Confirmatory sampling and analysis | 40 | ea | $500.00 | $20.00 | | | $20,000 | $800 | $0 | $0 | $20,800 | (b), PCBs, SVOCs |
| 4.4 Laborers | 12 | day | | | $420.08 | | $0 | $0 | $5,041 | $0 | $5,041 | (a), 2 laborers duration of excav/trea |
| **5 ON-SITE TREATMENT** | | | | | | | | | | | | |
| 5.1 Mobilize and demobilize treatment unit | 1 | ls | $350,000.00 | | | | $350,000 | $0 | $0 | $0 | $350,000 | (b) |
| 5.2 Permitting/engineering for treatment unit | 1 | ls | $37,131.00 | | | | $37,131 | $0 | $0 | $0 | $37,131 | (a) |
| 5.3 Front end loader w/ operator | 12 | day | | | $272.34 | $500.00 | $0 | $0 | $3,268 | $6,000 | $9,268 | (a), move soil around at treatment u |
| 5.4 On-site thermal desorption | 1540 | ton | $153.75 | | | | $236,775 | $0 | $0 | $0 | $236,775 | (a), 1.3 tons/cubic yard |
| **6 OFF-SITE LANDFILL DISPOSAL** | | | | | | | | | | | | |
| 6.1 T & D of Concrete Pipe to Subtitle C Landfill (15 tons) | 1 | load | $1,328.80 | | | | $1,329 | $0 | $0 | $0 | $1,329 | (a), 22 tons/truck |
| 6.2 Transport treated soil & sediment to MSWLF (77 trucks@50 mi) | 3850 | trk-mi | $3.00 | | | | $11,550 | $0 | $0 | $0 | $11,550 | (a), 20 tons/truck |
| 6.3 Dispose of material at MSW landfill | 1540 | ton | $35.00 | | | | $53,900 | $0 | $0 | $0 | $53,900 | (a), 1.3 tons/cubic yard |
| 6.4 Waste disposal application fee | 1 | ls | $1,000.00 | | | | $1,000 | $0 | $0 | $0 | $1,000 | (b) |
| **7 SITE/STREAM RESTORATION** | | | | | | | | | | | | |
| 7.1 Remove decon pad and dispose | 100 | ton | $35.00 | | | | $3,500 | $0 | $0 | $0 | $3,500 | (b), haul to and dispose at MSW lan |
| 7.2 Import fill material | 900 | cy | | $8.25 | | | $0 | $7,425 | $0 | $0 | $7,425 | (a) |
| 7.3 Place, grade, and compact fill material | 900 | cy | | | $0.27 | $0.51 | $0 | $0 | $243 | $459 | $702 | (a) |
| 7.4 Import vegetative cover soil | 280 | cy | | $15.55 | | | $0 | $4,354 | $0 | $0 | $4,354 | (a) |
| 7.5 Place, grade vegetative cover soil | 280 | cy | | | $0.32 | $0.81 | $0 | $0 | $90 | $227 | $316 | (a) |
| 7.6 Vegetate site | 4.2 | msf | | $29.00 | $7.40 | $7.85 | $0 | $122 | $31 | $33 | $186 | (a), utility mix w/ mulch and fertilizer |
| 7.7 Disconnect utilities | 1 | ls | $500.00 | | | | $500 | $0 | $0 | $0 | $500 | (b) |
| **8 OFFICE SUPPORT/FIELD SUPPORT** | | | | | | | | | | | | |
| 8.1 Site Supervisor | 6 | week | | | $980.00 | | $0 | $0 | $5,880 | $0 | $5,880 | (b) |
| 8.2 Job Foreman | 6 | week | | | $674.00 | | $0 | $0 | $4,044 | $0 | $4,044 | (b) |
| 8.3 Project Accountant | 6 | week | | | $550.00 | | $0 | $0 | $3,300 | $0 | $3,300 | (b) |
| 8.4 Health and Safety Officer | 6 | week | | | $647.00 | | $0 | $0 | $3,882 | $0 | $3,882 | (b) |
| 8.5 Site Engineer | 6 | week | | | $663.00 | | $0 | $0 | $3,978 | $0 | $3,978 | (b) |

**NSWC - WHITE OAK**
**SILVER SPRING, MARYLAND**
**SITE 47 - BUILDING 90 DRAINAGE**
**ALTERNATIVE 2 - EXCAVATION, ON-SITE TREATMENT, OFF-SITE LANDFILL DISPOSAL, SITE RESTORATION**

| Item | Quantity | Unit | Unit Cost | | | | Extended Cost | | | | Subtotal | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Subcontract | Material | Labor | Equipment | Subcontract | Material | Labor | Equipment | | |
| 8.6 Project Manager (office - 1/2 time) | 3 | week | | | $1,158.00 | | $0 | $0 | $3,474 | $0 | $3,474 | (b) |
| 8.7 Project Engineer (office - 1/2 time) | 3 | week | | | $999.00 | | $0 | $0 | $2,997 | $0 | $2,997 | (b) |
| **9 PROJECT DOCUMENTATION** | | | | | | | | | | | | |
| 9.1 Pre- and post-construction submittals/permitting | 250 | hours | | | $40.00 | | $0 | $0 | $10,000 | $0 | $10,000 | (b) |
| 9.2 Post-removal survey | 1 | ls | $1,000.00 | | | | $1,000 | $0 | $0 | $0 | $1,000 | (b) |
| **Subtotal** | | | | | | | $731,675 | $18,851 | $73,096 | $27,318 | $850,939 | |
| **Local Area Adjustments** | | | | | | | 100.0% | 103.5% | 91.0% | 91.0% | | |
| **Subtotal** | | | | | | | $731,675 | $19,511 | $66,517 | $24,859 | $842,562 | |
| Overhead on Labor Cost @ 30% | | | | | | | | | $19,955 | | $19,955 | |
| G & A on Labor Cost @ 10% | | | | | | | | | $6,652 | | $6,652 | |
| G & A on Material Cost @ 10% | | | | | | | | $1,951 | | | $1,951 | |
| G & A on Subcontract Cost @ 10% | | | | | | | $73,167 | | | | $73,167 | |
| **Total Direct Cost** | | | | | | | $804,842 | $21,462 | $93,124 | $24,859 | $944,287 | |
| Indirects on Total Direct Cost @ 30% | | | | | | | | | | | $283,286 | |
| Profit on Total Direct Cost @ 10% | | | | | | | | | | | $94,429 | |
| **Subtotal** | | | | | | | | | | | $1,322,002 | |
| Health & Safety Monitoring @ 2% | | | | | | | | | | | $26,440 | |
| **Total Field Cost** | | | | | | | | | | | $1,348,442 | |
| Contingency on Total Field Cost @ 15% | | | | | | | | | | | $202,266 | |
| Engineering on Total Field Cost @ 5% | | | | | | | | | | | $67,422 | |
| **TOTAL COST** | | | | | | | | | | | **$1,618,131** | |

(a) ECHOS Environmental Restoration Unit Cost Book, 2000 / Means Site Work and Landscape Cost Data, 2000.
(b) Previous cost estimates / past experience / other sources.

**NSWC - WHITE OAK**
**SILVER SPRING, MARYLAND**
**SITE 47 - BUILDING 90 DRAINAGE**
**ALTERNATIVE 3 - EXCAVATION, OFF-SITE LANDFILL DISPOSAL, SITE RESTORATION**

| Item | Quantity | Unit | Unit Cost | | | | Extended Cost | | | | Subtotal | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Subcontract | Material | Labor | Equipment | Subcontract | Material | Labor | Equipment | | |
| **1 MOBILIZATION/DEMOBILIZATION** | | | | | | | | | | | | |
| 1.1 Office Trailer (1) | 2 | mo | $345.00 | | | | $690 | $0 | $0 | $0 | $690 | (a) |
| 1.2 Field Office Support | 2 | mo | | $135.00 | | | $0 | $270 | $0 | $0 | $270 | (a) |
| 1.3 Storage Trailer (1) | 2 | mo | $85.00 | | | | $170 | $0 | $0 | $0 | $170 | (a) |
| 1.4 Utility connections (electric and phone) | 1 | ls | $1,500.00 | | | | $1,500 | $0 | $0 | $0 | $1,500 | (b) |
| 1.5 Site utilities - usage | 2 | mo | | $240.00 | | | $0 | $480 | $0 | $0 | $480 | (a) |
| 1.6 Personnel mobilization/demobilization | 10 | ea | | | $500.00 | | $0 | $0 | $5,000 | $0 | $5,000 | (b) |
| 1.7 Equipment mobilization/demobilization | 1 | ls | $2,000.00 | | | | $2,000 | $0 | $0 | $0 | $2,000 | (b), trailers, excavator, FEL |
| 1.8 Per diem | 70 | mn dy | | | $165.00 | | $0 | $0 | $11,550 | $0 | $11,550 | (b) |
| **2 DECONTAMINATION** | | | | | | | | | | | | |
| 2.1 Decontamination Trailer | 2 | mo | $2,275.00 | | | | $4,550 | $0 | $0 | $0 | $4,550 | (a) |
| 2.2 Equipment Decon Pad | 1 | ls | | $500.00 | $450.00 | $155.00 | $0 | $500 | $450 | $155 | $1,105 | (b) |
| 2.3 Decon Water | 2000 | gal | | $0.20 | | | $0 | $400 | $0 | $0 | $400 | (b) |
| 2.4 Decon Water Storage Tank, 6,000 gallon | 2 | mo | $600.00 | | | | $1,200 | $0 | $0 | $0 | $1,200 | (a) |
| 2.5 Clean Water Storage Tank, 4,000 gallon | 2 | mo | $540.00 | | | | $1,080 | $0 | $0 | $0 | $1,080 | (a) |
| 2.6 PPE (5 p * 5 days * 6 weeks) | 150 | day | | $30.00 | | | $0 | $4,500 | $0 | $0 | $4,500 | (a) |
| 2.7 Disposal of Decon Waste (liquid & solid) | 2 | mo | $900.00 | | | | $1,800 | $0 | $0 | $0 | $1,800 | (b) |
| 2.8 Pressure washer | 2 | mo | | | | $510.00 | $0 | $0 | $0 | $1,020 | $1,020 | (a), duration of excav and disposa |
| 2.9 Waste profile decontamination water | 1 | ls | $1,000.00 | | | | $1,000 | $0 | $0 | $0 | $1,000 | (b) |
| **3 SITE PREPARATION** | | | | | | | | | | | | |
| 3.1 Construction survey | 1 | ls | $1,000.00 | | | | $1,000 | $0 | $0 | $0 | $1,000 | (b) |
| 3.2 Clear and grub | 0.25 | acre | | | $41.00 | $80.50 | $0 | $0 | $10 | $20 | $30 | (a) |
| 3.3 Removal of Abandoned Storm Sewer | 3 | day | | | $577.20 | $500.00 | $0 | $0 | $1,732 | $1,500 | $3,232 | (a), 2 laborers, equip op, FEL |
| **4 EXCAVATION** | | | | | | | | | | | | |
| 4.1 Excavator /w operator to excavate/load contam. soil | 12 | day | | | $514.95 | $1,017.00 | $0 | $0 | $6,179 | $12,204 | $18,383 | (a) |
| 4.2 Confirmatory sampling and analysis | 40 | ea | $500.00 | $20.00 | | | $20,000 | $800 | $0 | $0 | $20,800 | (b), PCBs, SVOCs |
| 4.3 Laborers | 12 | day | | | $210.04 | | $0 | $0 | $2,520 | $0 | $2,520 | (a), 1 laborer duration of excavatic |
| **5 OFF-SITE LANDFILL DISPOSAL** | | | | | | | | | | | | |
| 5.1 T & D of Concrete Pipe to Subtitle C Landfill (15 tons) | 1 | load | $1,328.80 | | | | $1,329 | $0 | $0 | $0 | $1,329 | (b), 22 tons/truck |
| 5.2 Transportion and Disposal of Soil to Subtitle C Landfill | 1540 | ton | $166.40 | | | | $256,256 | $0 | $0 | $0 | $256,256 | (b), 1.3 tons/cy |
| 5.3 Waste disposal application fee | 1 | ls | $1,000.00 | | | | $1,000 | $0 | $0 | $0 | $1,000 | (b) |
| **6 SITE/STREAM RESTORATION** | | | | | | | | | | | | |
| 6.1 Remove decon pad and dispose | 100 | tons | $35.00 | | | | $3,500 | $0 | $0 | $0 | $3,500 | (b), haul to and dispose at MSWLF |
| 7.2 Import fill material | 900 | cy | | $8.25 | | | $0 | $7,425 | $0 | $0 | $7,425 | (a) |
| 7.3 Place, grade, and compact fill material | 900 | cy | | | $0.27 | $0.51 | $0 | $0 | $243 | $459 | $702 | (a) |
| 7.4 Import vegetative cover soil | 280 | cy | | $15.55 | | | $0 | $4,354 | $0 | $0 | $4,354 | (a) |
| 7.5 Place, grade vegetative cover soil | 280 | cy | | | $0.32 | $0.81 | $0 | $0 | $90 | $227 | $316 | (a) |
| 7.6 Vegetate site | 4.2 | msf | | $29.00 | $7.40 | $7.85 | $0 | $122 | $31 | $33 | $186 | (a), utility mix w/ mulch and fertiliz . |
| 6.7 Disconnect utilities | 1 | ls | $500.00 | | | | $500 | $0 | $0 | $0 | $500 | (b) |
| **7 OFFICE SUPPORT/FIELD SUPPORT** | | | | | | | | | | | | |
| 7.1 Site Supervisor | 6 | week | | | $980.00 | | $0 | $0 | $5,880 | $0 | $5,880 | (b) |
| 7.2 Job Foreman | 6 | week | | | $674.00 | | $0 | $0 | $4,044 | $0 | $4,044 | (b) |
| 7.3 Project Accountant | 6 | week | | | $550.00 | | $0 | $0 | $3,300 | $0 | $3,300 | (b) |
| 7.4 Health and Safety Officer | 6 | week | | | $647.00 | | $0 | $0 | $3,882 | $0 | $3,882 | (b) |
| 7.5 Site Engineer | 6 | week | | | $663.00 | | $0 | $0 | $3,978 | $0 | $3,978 | (b) |
| 7.6 Project Manager (office - 1/2 time) | 3 | week | | | $1,158.00 | | $0 | $0 | $3,474 | $0 | $3,474 | (b) |
| 7.7 Project Engineer (office - 1/2 time) | 3 | week | | | $999.00 | | $0 | $0 | $2,997 | $0 | $2,997 | (b) |
| **8 PROJECT DOCUMENTATION** | | | | | | | | | | | | |
| 8.1 Pre- and post-construction submittals | 100 | hours | | | $40.00 | | $0 | $0 | $4,000 | $0 | $4,000 | (b) |

**NSWC - WHITE OAK**
**SILVER SPRING, MARYLAND**
**SITE 47 - BUILDING 90 DRAINAGE**
**ALTERNATIVE 3 - EXCAVATION, OFF-SITE LANDFILL DISPOSAL, SITE RESTORATION**

| Item | Quantity | Unit | Unit Cost | | | | Extended Cost | | | | Subtotal | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Subcontract | Material | Labor | Equipment | Subcontract | Material | Labor | Equipment | | |
| 8.2 Post-removal survey | 1 | ls | $1,000.00 | | | | $1,000 | $0 | $0 | $0 | $1,000 | (b) |
| 8.3 Sampling and waste characterization | 1 | ls | $2,500.00 | $250.00 | $500.00 | $500.00 | $2,500 | $250 | $500 | $500 | $3,750 | (b) |
| **Subtotal** | | | | | | | $301,075 | $19,101 | $59,860 | $16,118 | $396,154 | |
| **Local Area Adjustments** | | | | | | | 100.0% | 103.5% | 91.0% | 91.0% | | |
| **Subtotal** | | | | | | | $301,075 | $19,769 | $54,473 | $14,667 | $389,984 | |
| Overhead on Labor Cost @ 30% | | | | | | | | | $16,342 | | $16,342 | |
| G & A on Labor Cost @ 10% | | | | | | | | | $5,447 | | $5,447 | |
| G & A on Material Cost @ 10% | | | | | | | | $1,977 | | | $1,977 | |
| G & A on Subcontract Cost @ 10% | | | | | | | $30,107 | | | | $30,107 | |
| **Total Direct Cost** | | | | | | | $331,182 | $21,746 | $76,262 | $14,667 | $443,858 | |
| Indirects on Total Direct Cost @ 30% | | | | | | | | | | | $133,157 | |
| Profit on Total Direct Cost @ 10% | | | | | | | | | | | $44,386 | |
| **Subtotal** | | | | | | | | | | | $621,401 | |
| Health & Safety Monitoring @ 2% | | | | | | | | | | | $12,428 | |
| **Total Field Cost** | | | | | | | | | | | $633,829 | |
| Contingency on Total Field Cost @ 15% | | | | | | | | | | | $95,074 | |
| Engineering on Total Field Cost @ 5% | | | | | | | | | | | $31,691 | |
| **TOTAL COST** | | | | | | | | | | | **$760,595** | |

(a) ECHOS Environmental Restoration Unit Cost Book, 2000 / Means Site Work and Landscape Cost Data, 2000.
(b) Previous cost estimates / past experience / other sources.

**NSWC-WHITE OAK**
**SILVER SPRING, MARYLAND**
**SITE 47 - BUILDING 90 DRAINAGE**
**ALTERNATIVE 4 - CONTAINMENT**
**Capital Cost**

| Item | Quantity | Unit | Unit Cost Subcontract | Unit Cost Material | Unit Cost Labor | Unit Cost Equipment | Total Cost Subcontract | Total Cost Material | Total Cost Labor | Total Cost Equipment | Subtotal | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1 MOBILIZATION/DEMOBILIZATION** | | | | | | | | | | | | |
| 1.1 Office Trailer (1) | 3 | mo | $345.00 | | | | $1,035 | $0 | $0 | $0 | $1,035 | (a) |
| 1.2 Field Office Support | 3 | mo | | $135.00 | | | $0 | $405 | $0 | $0 | $405 | (a) |
| 1.3 Storage Trailer (1) | 3 | mo | $85.00 | | | | $255 | $0 | $0 | $0 | $255 | (a) |
| 1.4 Utility connections (electric and phone) | 1 | ls | $1,500.00 | | | | $1,500 | $0 | $0 | $0 | $1,500 | (b) |
| 1.5 Site utilities - usage | 2 | mo | | $240.00 | | | $0 | $480 | $0 | $0 | $480 | (a) |
| 1.6 Personnel mobilization/demobilization | 4 | ea | | | $500.00 | | $0 | $0 | $2,000 | $0 | $2,000 | (b) |
| 1.7 Equipment mobilization/demobilization | 1 | ls | $2,000.00 | | | | $2,000 | $0 | $0 | $0 | $2,000 | (b) |
| 1.8 Per diem | 70 | mn dy | | | $165.00 | | $0 | $0 | $11,550 | $0 | $11,550 | (b) |
| **2 DECONTAMINATION** | | | | | | | | | | | | |
| 2.1 Decontamination Trailer | 3 | mo | $2,275.00 | | | | $6,825 | $0 | $0 | $0 | $6,825 | (a) |
| 2.2 Equipment Decon Pad | 1 | ls | | $500.00 | $450.00 | $155.00 | $0 | $500 | $450 | $155 | $1,105 | (b) |
| 2.3 Decon Water | 3000 | gal | | $0.20 | | | $0 | $600 | $0 | $0 | $600 | (b) |
| 2.4 Decon Water Storage Tank, 6,000 gallon | 3 | mo | $600.00 | | | | $1,800 | $0 | $0 | $0 | $1,800 | (a) |
| 2.5 Clean Water Storage Tank, 4,000 gallon | 3 | mo | $540.00 | | | | $1,620 | $0 | $0 | $0 | $1,620 | (a) |
| 2.6 PPE (4 p * 5 days * 12 weeks) | 240 | day | | $30.00 | | | $0 | $7,200 | $0 | $0 | $7,200 | (a) |
| 2.7 Disposal of Decon Waste (liquid & solid) | 3 | mo | $900.00 | | | | $2,700 | $0 | $0 | $0 | $2,700 | |
| 2.8 Pressure Washer | 2 | mo | | | | $510.00 | $0 | $0 | $0 | $1,020 | $1,020 | (a), duration of excav and disp. |
| 2.9 Waste Profile Decontamination Water | 1 | ls | $1,000.00 | | | | $1,000 | $0 | $0 | $0 | $1,000 | (b) |
| **3 SITE PREPARATION** | | | | | | | | | | | | |
| 3.1 Pre-Construction Survey | 1 | ls | $1,000.00 | | | | $1,000 | $0 | $0 | $0 | $1,000 | (b) |
| 3.2 Clear and grub | 3 | acre | | | $41.00 | $80.50 | $0 | $0 | $123 | $242 | $365 | (a) |
| 3.3 Remove Trees, 8" to 12" diameter | 20 | ea | | $169.00 | $166.00 | | $0 | $3,380 | $3,320 | $0 | $6,700 | (a) |
| 3.4 Remove Trees, 14" to 24" diameter | 20 | ea | | $189.00 | $184.00 | | $0 | $3,780 | $3,680 | $0 | $7,460 | (a) |
| 3.5 Site Access | 1 | ls | | | $5,000.00 | $1,000.00 | $0 | $0 | $5,000 | $1,000 | $6,000 | (b) |
| 3.6 Erosion and Sediment Control | 1 | ls | $2,000.00 | | | | $2,000 | $0 | $0 | $0 | $2,000 | (b) |
| **4 COVER SYSTEM/STREAM RESTORATION** | | | | | | | | | | | | |
| 4.1 Delineation of Impacted Area | 40 | sample | $500.00 | | | | $20,000 | $0 | $0 | $0 | $20,000 | (b), PCB Analysis, quick turnaround |
| 4.2 Import Fill | 3000 | cy | | $6.00 | | | $0 | $18,000 | $0 | $0 | $18,000 | (b) |
| 4.3 Backfill and Compact, By Hand, Level B | 3000 | cy | | | $50.83 | | $0 | $0 | $152,500 | $0 | $152,500 | (a) |
| 4.4 Geotextile | 12600 | sy | | $1.30 | $0.22 | | $0 | $16,380 | $2,772 | $0 | $19,152 | (a) |
| 4.5 Import Cover Soil | 6300 | cy | | $8.25 | | | $0 | $51,975 | $0 | $0 | $51,975 | (a) |
| 4.6 Backfill, 900' haul | 6300 | cy | | | $2.91 | $2.55 | $0 | $0 | $18,333 | $16,065 | $34,398 | (a) |
| 4.7 Compact w/Roller in 6" Layers, Operator Walking | 6300 | cy | | $3.20 | $0.94 | | $0 | $20,160 | $5,922 | $0 | $26,082 | (a) |
| 4.8 Import Topsoil | 2100 | cy | | $15.55 | | | $0 | $32,655 | $0 | $0 | $32,655 | (a) |
| 4.9 Place by hand, no compaction | 2100 | cy | | | $12.70 | | $0 | $0 | $26,670 | $0 | $26,670 | (a) |
| 4.10 Vegetate Site | 113.4 | msf | | $29.00 | $7.40 | $7.85 | $0 | $3,289 | $839 | $890 | $5,018 | (a), utility mix w/ mulch and fertilizer |
| **5 OFF-SITE LANDFILL DISPOSAL** | | | | | | | | | | | | |
| 5.1 T & D of Concrete Pipe to Subtitle C Landfill (15 tons) | 1 | load | $1,328.80 | | | | $1,329 | $0 | $0 | $0 | $1,329 | (b), 22 tons/truck |
| **6 SITE RESTORATION** | | | | | | | | | | | | |
| 6.1 Remove Decon pad and dispose | 100 | tons | $35.00 | | | | $3,500 | $0 | $0 | $0 | $3,500 | (b) |
| 6.2 Disconnect Utilities | 1 | ls | $500.00 | | | | $500 | $0 | $0 | $0 | $500 | (b) |
| **7 OVERSIGHT** | | | | | | | | | | | | |
| 7.1 Site Engineer | 12 | wk | | | $663.00 | | $0 | $0 | $7,956 | $0 | $7,956 | (b) |
| 7.2 Site Supervisor | 12 | wk | | | $980.00 | | $0 | $0 | $11,760 | $0 | $11,760 | (b) |
| 7.3 Health and Safety Officer | 12 | wk | | | $647.00 | | $0 | $0 | $7,764 | $0 | $7,764 | (b) |

**NSWC-WHITE OAK**
**SILVER SPRING, MARYLAND**
**SITE 47 - BUILDING 90 DRAINAGE**
**ALTERNATIVE 4 - CONTAINMENT**
**Capital Cost**

| Item | Quantity | Unit | Unit Cost Subcontract | Unit Cost Material | Unit Cost Labor | Unit Cost Equipment | Total Cost Subcontract | Total Cost Material | Total Cost Labor | Total Cost Equipment | Subtotal | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7.4 Project Manager (office - 1/2 time) | 6 | wk | | | $1,158.00 | | $0 | $0 | $6,948 | $0 | $6,948 | (b) |
| 7.5 Project Engineer (office - 1/2 time) | 6 | wk | | | $999.00 | | $0 | $0 | $5,994 | $0 | $5,994 | (b) |
| 8 **PROJECT DOCUMENTATION** | | | | | | | | | | | | |
| 8.1 Pre- and post-construction submittals/permitting | 250 | hours | | | $40.00 | | $0 | $0 | $10,000 | $0 | $10,000 | (b) |
| 8.2 Post-construction survey | 1 | ls | $1,000.00 | | | | $1,000 | $0 | $0 | $0 | $1,000 | (b) |
| **Subtotal** | | | | | | | $48,064 | $158,804 | $283,581 | $19,372 | $509,820 | |
| **Local Area Adjustments** | | | | | | | 100.0% | 103.5% | 91.0% | 91.0% | | |
| **Subtotal** | | | | | | | $48,064 | $164,362 | $258,059 | $17,628 | $488,113 | |
| Overhead on Labor Cost @ 30% | | | | | | | | | $77,418 | | $77,418 | |
| G & A on Labor Cost @ 10% | | | | | | | | | $25,806 | | $25,806 | |
| G & A on Material Cost @ 10% | | | | | | | | $16,436 | | | $16,436 | |
| G & A on Subcontract Cost @ 10% | | | | | | | $4,806 | | | | $4,806 | |
| **Total Direct Cost** | | | | | | | $52,870 | $180,798 | $361,282 | $17,628 | $612,579 | |
| Indirects on Total Direct Cost @ 30% | | | | | | | | | | | $183,774 | |
| Profit on Total Direct Cost @ 10% | | | | | | | | | | | $61,258 | |
| **Subtotal** | | | | | | | | | | | $857,610 | |
| Health & Safety Monitoring @ 2% | | | | | | | | | | | $17,152 | |
| **Total Field Cost** | | | | | | | | | | | $874,762 | |
| Contingency on Total Field Cost @ 15% | | | | | | | | | | | $131,214 | |
| Engineering on Total Field Cost @ 10% | | | | | | | | | | | $87,476 | |
| **TOTAL COST** | | | | | | | | | | | **$1,093,453** | |

(a) ECHOS Environmental Restoration Unit Cost Book, 2000 / Means Site Work and Landscape Cost Data, 2000.
(b) Previous cost estimates / past experience / other sources.

NSWC-WHITE OAK
SILVER SPRING, MARYLAND
SITE 47 - BUILDING 90 DRAINAGE
ALTERNATIVE 4 - CONTAINMENT
Operation and Maintenance Costs per Year

| | Item | Quantity | Unit | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| **1** | **COVER MAINTENANCE (YEARS 1 TO 30)** | | | | |
| 1.1 | General Cover Repairs - Soil Erosion | 1 | ls | 4,000.00 | $4,000 |
| 1.2 | Vegetation Replacement | 1 | ls | 500.00 | $500 |
| | | | | | $4,500 |

NSWC-WHITE OAK
SILVER SPRING, MARYLAND
SITE 47 - BUILDING 90 DRAINAGE
ALTERNATIVE 4 - CONTAINMENT
Annual Sampling Cost

| Item | Cost per Sampling Round Years 1 thru 30 | Item Cost per 5 Years |
|---|---|---|
| Site Inspection and Sample Collection | $920 | $920 |
| Sediment Analysis | $800 | $2,000 |
| Monitoring Report | $2,500 | $2,500 |
| Report for Review of Data and Evaluation | | $7,000.00 |
| TOTALS | $4,220 | $12,420 |

NSWC-WHITE OAK
SILVER SPRING, MARYLAND
SITE 47 - BUILDING 90 DRAINAGE
ALTERNATIVE 4 - CONTAINMENT
Present Worth Analysis

| Year | Capital Cost | Operation and Maintenance Cost | Annual Cost | Total Year Cost | Annual Discount Rate at 7% | Present Worth |
|---|---|---|---|---|---|---|
| 0 | $1,093,453 | | | $1,093,453 | 1.000 | $1,093,453 |
| 1 | | $4,500 | $4,220 | $8,720 | 0.935 | $8,153 |
| 2 | | $4,500 | $4,220 | $8,720 | 0.873 | $7,613 |
| 3 | | $4,500 | $4,220 | $8,720 | 0.816 | $7,116 |
| 4 | | $4,500 | $4,220 | $8,720 | 0.763 | $6,653 |
| 5 | | $4,500 | $12,420 | $16,920 | 0.713 | $12,064 |
| 6 | | $4,500 | $4,220 | $8,720 | 0.666 | $5,808 |
| 7 | | $4,500 | $4,220 | $8,720 | 0.623 | $5,433 |
| 8 | | $4,500 | $4,220 | $8,720 | 0.582 | $5,075 |
| 9 | | $4,500 | $4,220 | $8,720 | 0.544 | $4,744 |
| 10 | | $4,500 | $12,420 | $16,920 | 0.508 | $8,595 |
| 11 | | $4,500 | $4,220 | $8,720 | 0.475 | $4,142 |
| 12 | | $4,500 | $4,220 | $8,720 | 0.444 | $3,872 |
| 13 | | $4,500 | $4,220 | $8,720 | 0.415 | $3,619 |
| 14 | | $4,500 | $4,220 | $8,720 | 0.388 | $3,383 |
| 15 | | $4,500 | $12,420 | $16,920 | 0.362 | $6,125 |
| 16 | | $4,500 | $4,220 | $8,720 | 0.339 | $2,956 |
| 17 | | $4,500 | $4,220 | $8,720 | 0.317 | $2,764 |
| 18 | | $4,500 | $4,220 | $8,720 | 0.296 | $2,581 |
| 19 | | $4,500 | $4,220 | $8,720 | 0.277 | $2,415 |
| 20 | | $4,500 | $12,420 | $16,920 | 0.258 | $4,365 |
| 21 | | $4,500 | $4,220 | $8,720 | 0.242 | $2,110 |
| 22 | | $4,500 | $4,220 | $8,720 | 0.226 | $1,971 |
| 23 | | $4,500 | $4,220 | $8,720 | 0.211 | $1,840 |
| 24 | | $4,500 | $4,220 | $8,720 | 0.197 | $1,718 |
| 25 | | $4,500 | $12,420 | $16,920 | 0.184 | $3,113 |
| 26 | | $4,500 | $4,220 | $8,720 | 0.172 | $1,500 |
| 27 | | $4,500 | $4,220 | $8,720 | 0.161 | $1,404 |
| 28 | | $4,500 | $4,220 | $8,720 | 0.150 | $1,308 |
| 29 | | $4,500 | $4,220 | $8,720 | 0.141 | $1,230 |
| 30 | | $4,500 | $12,420 | $16,920 | 0.131 | $2,217 |
| | | | | | **TOTAL PRESENT WORTH** | **$1,219,339** |

## B.5 SAMPLE LOG SHEETS

Tetra Tech NUS, Inc.

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: White Oak Site 47-Building 90 Drainage
Project No.: CTO 298

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 0047-SS-01
Sample Location: White Oak
Sampled By: G. Efotte, R. Miley
C.O.C. No.:

Type of Sample:
[] Low Concentration
[] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 11/1/00<br>Time: 0815<br>Method: Grab disposable<br>Monitor Reading (ppm): 0.0 total | 0-6" | greyish brown | Dry silt |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| Method: | | | | |
| Monitor Readings (Range in ppm): | | | N/A | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| SVOCs ~~TCL Pesticides~~/PCBs | 250ml Wide mouth jar | X | |

**OBSERVATIONS / NOTES:**

**MAP:**

See sketch

**Circle if Applicable:**

| MS/MSD | Duplicate ID No.: |
|---|---|
| — | — |

**Signature(s):** Lima Tinez

Tetra Tech NUS, Inc.

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: White Oak Site 47-Building 90 Drainage
Project No.: CTO 298

Sample ID No.: 0047-SS-02
Sample Location: White Oak
Sampled By: G. Efotte, R. Miley
C.O.C. No.:

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[] Low Concentration
[] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 11/01/09<br>Time: 0820<br>Method: Grab Disposable Trowel<br>Monitor Reading (ppm): 0.0 | 0-6" | grayish Brown | Dry Silt |

**COMPOSITE SAMPLE DATA:**

| | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| Date: | | | | |
| Method: | | | | |
| Monitor Readings (Range in ppm): | | | N/A | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| SW8466 ~~TCL Pesticides~~/PCBs | 250ml wide mouth jar | X | |

**OBSERVATIONS / NOTES:**

**MAP:**

See Sketch

**Circle if Applicable:**

| MS/MSD | Duplicate ID No.: |
|---|---|
| — | — |

**Signature(s):** Lina Miley

Tetra Tech NUS, Inc.

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: White Oak Site 47-Building 90 Drainage
Project No.: CTO 298

Sample ID No.: 00-47-SS-03
Sample Location: White Oak
Sampled By: G. Efotte, R. Miley
C.O.C. No.:

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[] Low Concentration
[] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 11/1/00<br>Time: 0855<br>Method: Disposable trowel<br>Monitor Reading (ppm): 0.0 | 0-6" | Grayish Brown | Sand, moist |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| | | | | |
| Method: | | | | |
| | | | N/A | |
| Monitor Readings (Range in ppm): | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| SW846 ~~TCL Pesticides~~/PCBs | 250ml wide mouth jar | X | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

**OBSERVATIONS / NOTES:**

**MAP:**

See sketch

**Circle if Applicable:**

| MS/MSD | Duplicate ID No.: |
|---|---|
| — | — |

**Signature(s):** Rina Miley

Tetra Tech NUS, Inc.

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: White Oak Site 47-Building 90 Drainage
Project No.: CTO 298

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 0047-SS-04
Sample Location: White Oak
Sampled By: G. Efotte, R. Miley
C.O.C. No.:

Type of Sample:
[] Low Concentration
[] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 11/1/00 | 0-6" | Gray | Silty |
| Time: 0930 | | | |
| Method: Disposable trowel | | | |
| Monitor Reading (ppm): 0.0 | | | |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| | | | | |
| Method: | | | | |
| | | | | |
| Monitor Readings (Range in ppm): | | | N/A | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| SW846 ~~TCL~~ Pesticide/PCBs | 250ml wide mouth jar | X | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

**OBSERVATIONS / NOTES:**

**MAP:**

See sketch

**Circle if Applicable:**

| MS/MSD | Duplicate ID No.: |
|---|---|
| — | — |

**Signature(s):** Rima Miley

Tetra Tech NUS, Inc.

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: White Oak Site 47-Building 90 Drainage
Project No.: CTO 298

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 0047-SS-05
Sample Location: White Oak
Sampled By: G. Efotte, R. Miley
C.O.C. No.:

Type of Sample:
[] Low Concentration
[] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 11/1/99<br>Time: 1000<br>Method: Disposable trowel<br>Monitor Reading (ppm): 0.0 | 0-6" | Gray-Brown | Sandy-silty |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| | | | | |
| Method: | | | | |
| | | | N/A | |
| Monitor Readings (Range in ppm): | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| SW846 ~~TCL Pesticides~~/PCBs | 250ml wide mouth jar | X | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

**OBSERVATIONS / NOTES:**

**MAP:**

See sketch

**Circle if Applicable:**

| MS/MSD | Duplicate ID No.: |
|---|---|
| — | — |

**Signature(s):** Rima Miley

Tetra Tech NUS, Inc.

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: White Oak Site 47-Building 90 Drainage
Project No.: CTO 298

Sample ID No.: 0047-SS-06
Sample Location: White Oak
Sampled By: G. Efotte, R. Miley
C.O.C. No.:

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[] Low Concentration
[] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 11/1/99<br>Time: 1025<br>Method: disposable trowel<br>Monitor Reading (ppm): 0.0 | 0-6" | Dark Gray | silt |

**COMPOSITE SAMPLE DATA:**

| | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| Date: | | | | |
| Method: | | | | |
| Monitor Readings (Range in ppm): | | | N/A | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| SW846 ~~TCL Pesticide~~/PCBs | 250ml wide mouth jar | X | |

**OBSERVATIONS / NOTES:**

**MAP:**

See sketch

**Circle if Applicable:**

| MS/MSD | Duplicate ID No.: |
|---|---|
| — | — |

**Signature(s):** Rina Miley

Tetra Tech NUS, Inc.

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: White Oak Site 47-Building 90 Drainage
Project No.: CTO 298

Sample ID No.: 0047-SS-07
Sample Location: White Oak
Sampled By: G. Efotte, R. Miley
C.O.C. No.:

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[] Low Concentration
[] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 11/1/00<br>Time: 1300<br>Method: disposable trowel<br>Monitor Reading (ppm): 0.0 | 0-6" | Brown | Dry sandy silt some gravels |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| | | | | |
| Method: | | | | |
| | | | | |
| Monitor Readings (Range in ppm): | | | N/A | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| SW846 ~~TCL Pesticide~~/PCBs | 250 ml wide mouth jar | X | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

**OBSERVATIONS / NOTES:**

**MAP:**

See sketch

**Circle if Applicable:**

| MS/MSD | Duplicate ID No.: |
|---|---|
| — | — |

**Signature(s):** Rima Miley

Tetra Tech NUS, Inc.

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: White Oak Site 47-Building 90 Drainage
Project No.: CTO 298

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 0047-SS-08
Sample Location: White Oak
Sampled By: G. Efotte, R. Miley
C.O.C. No.:

Type of Sample:
[] Low Concentration
[] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 11/1/00<br>Time: 1305<br>Method: disposable trowel<br>Monitor Reading (ppm): 0.0 | 0-6" | Brown | Dry silty |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| | | | | |
| Method: | | | | |
| | | | | |
| Monitor Readings (Range in ppm): | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| SW8460 ~~[illegible]~~/PCBs | 250ml wide mouth jar | X | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

**OBSERVATIONS / NOTES:**

**MAP:**

See sketch

**Circle if Applicable:**

| MS/MSD | Duplicate ID No.: |
|---|---|
| — | 0047-SS-09 (of 08) |

**Signature(s):** Lima Miley

Tetra Tech NUS, Inc.

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: White Oak Site 47-Building 90 Drainage
Project No.: CTO 298

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 0047-SD-01
Sample Location: White Oak
Sampled By: G. Efotte, R. Miley
C.O.C. No.:

Type of Sample:
[] Low Concentration
[] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 11/1/96<br>Time: 0840<br>Method: hispasuck trowel<br>Monitor Reading (ppm): 0.0 | 0-6" | Maroon Brown | Pebbles, sandy w/ gravel, wet |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| | | | | |
| Method: | | | | |
| | | | N/A | |
| Monitor Readings (Range in ppm): | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| SVOCs ~~TCL Pesticides~~/PCBs | 250ml wide mouth jar | X | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

**OBSERVATIONS / NOTES:**

**MAP:**

See sketch

**Circle if Applicable:**

| MS/MSD | Duplicate ID No.: |
|---|---|
| — | — |

**Signature(s):** Rima L. Miley

Tetra Tech NUS, Inc.

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: White Oak Site 47-Building 90 Drainage
Project No.: CTO 298

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: Ø47-SD-Ø2
Sample Location: White Oak
Sampled By: G. Efotte, R. Miley
C.O.C. No.:

Type of Sample:
[] Low Concentration
[] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 11/1/00<br>Time: 0910<br>Method: hand auger<br>Monitor Reading (ppm): 0.0 | 15-16" | Medium Brown | Wet ~~Moist~~, sandy gravel |

**COMPOSITE SAMPLE DATA:**

| | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| Date: | | | | |
| Method: | | | | |
| Monitor Readings (Range in ppm): | | | N/A | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| SW846 ~~Tot Pesticide~~/PCBs | 250ml Wide mouth Jar | X | |

**OBSERVATIONS / NOTES:**

**MAP:**

See Sketch

**Circle if Applicable:**

| MS/MSD | Duplicate ID No.: |
|---|---|
| — | — |

**Signature(s):** Rina Miley

Tetra Tech NUS, Inc.

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: White Oak Site 47-Building 90 Drainage
Project No.: CTO 298

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 0047-SD-03
Sample Location: White Oak
Sampled By: G. Efotte, R. Miley
C.O.C. No.:

Type of Sample:
[] Low Concentration
[] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 11/1/00<br>Time: 0945<br>Method: Hand auger<br>Monitor Reading (ppm): 0.0 | 18" | Medium Brown | Wet ~~Moist~~ (RW), sandy, gravel |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| | | | | |
| Method: | | | | |
| | | | N/A | |
| Monitor Readings (Range in ppm): | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| SW846 ~~TCL Pesticide~~/PCBs | 250 ml wide mouth jar | X | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

**OBSERVATIONS / NOTES:**

**MAP:**

See sketch

**Circle if Applicable:**

| MS/MSD | Duplicate ID No.: |
|---|---|
| — | — |

**Signature(s):** Rima Miley

Tetra Tech NUS, Inc.

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: White Oak Site 47-Building 90 Drainage
Project No.: CTO 298

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 0047-SD-04
Sample Location: White Oak
Sampled By: G. Efotte, R. Miley
C.O.C. No.:

Type of Sample:
[] Low Concentration
[] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 11/1/04<br>Time: 1010<br>Method: hand auger<br>Monitor Reading (ppm): 0.0 | 16-18" | Medium Brown | Wet ~~Moist~~ Raw, sandy gravel |

**COMPOSITE SAMPLE DATA:**

| | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| Date: | | | | |
| Method: | | | | |
| Monitor Readings (Range in ppm): | | | N/A | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| SW8446 ~~TCL Pesticide~~/PCBs | 250ml wide mouth jar | X | |

**OBSERVATIONS / NOTES:**

**MAP:**

See Sketch

**Circle if Applicable:**

| MS/MSD | Duplicate ID No.: |
|---|---|
| — | — |

**Signature(s):** Ronald Miley

Tetra Tech NUS, Inc.

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: White Oak Site 47-Building 90 Drainage
Project No.: CTO 298

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 0047-SD-05
Sample Location: White Oak
Sampled By: G. Efotte, R. Miley
C.O.C. No.:

Type of Sample:
[] Low Concentration
[] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 11/1/00<br>Time: 1035<br>Method: hand auger<br>Monitor Reading (ppm): 0.9 | 18" | Gray | Wet ~~Moist~~ silt some clay |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| | | | | |
| Method: | | | | |
| | | | N/A | |
| Monitor Readings (Range in ppm): | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| SW846 ~~TCL Pesticide~~/PCBs | 250 ml wide mouth jar | X | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

**OBSERVATIONS / NOTES:**

Slight sulfur odor

**MAP:**

See Sketch

**Circle if Applicable:**

| MS/MSD | Duplicate ID No.: |
|---|---|
| — | — |

**Signature(s):**

[illegible]

Tetra Tech NUS, Inc.

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: White Oak Site 47-Building 90 Drainage
Project No.: CTO 298

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 0947-SD-010
Sample Location: White Oak
Sampled By: G. Efotte, R. Miley
C.O.C. No.:

Type of Sample:
[] Low Concentration
[] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 11/1/00<br>Time: 1045<br>Method: Hand auger<br>Monitor Reading (ppm): 0.0 | 18" | Gray | Wet ~~Moist~~ Silty, some clay |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| | | | | |
| Method: | | | | |
| | | | | |
| Monitor Readings (Range in ppm): | | | N/A | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| SW8240 ~~TCL Pesticide~~/PCBs | 250 ml wide mouth jar | X | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

**OBSERVATIONS / NOTES:**

Slight sulfur odor

**MAP:**

See sketch

**Circle if Applicable:**

| MS/MSD | Duplicate ID No.: |
|---|---|
| — | — |

**Signature(s):** Rick Miley

Tetra Tech NUS, Inc.

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: White Oak Site 47-Building 90 Drainage
Project No.: CTO 298

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 0047-SD-07
Sample Location: White Oak
Sampled By: G. Efotte, R. Miley
C.O.C. No.:

Type of Sample:
[] Low Concentration
[] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 1/11/04<br>Time: 1335<br>Method: hand auger<br>Monitor Reading (ppm): 0.0 | 10-12" | Brown | Sandy gravel, Wet |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| | | | | |
| Method: | | | | |
| | | | | |
| Monitor Readings (Range in ppm): | | | N/A | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| SW846 ~~TCL Pesticide~~/PCBs | 250ml wide mouth jar | X | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

**OBSERVATIONS / NOTES:**

**MAP:**

See Sketch

**Circle if Applicable:**

| MS/MSD | Duplicate ID No.: |
|---|---|
| — | — |

**Signature(s):** Rima Miley

Tetra Tech NUS, Inc.

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: White Oak Site 47-Building 90 Drainage
Project No.: CTO 298

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 0047-SD-08
Sample Location: White Oak
Sampled By: G. Efotte, R. Miley
C.O.C. No.:

Type of Sample:
[] Low Concentration
[] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 11/1/00<br>Time: 1345<br>Method: Handauger<br>Monitor Reading (ppm): 0.0 | 6" | Brown | wet ~~Moist~~ (PM) sand |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| | | | | |
| Method: | | | | |
| | | | | |
| Monitor Readings (Range in ppm): | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

N/A

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| SW846 ~~TCL Pesticide~~/PCBs | 250ml widemouth jar | x | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

**OBSERVATIONS / NOTES:**

**MAP:**

See Sketch

**Circle if Applicable:**

| MS/MSD | Duplicate ID No.: |
|---|---|
| — | — |

**Signature(s):** R. Miley

Tetra Tech NUS, Inc.

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: White Oak Site 47-Building 90 Drainage
Project No.: CTO 298

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 0047-SD-09
Sample Location: White Oak
Sampled By: G. Efotte, R. Miley
C.O.C. No.:

Type of Sample:
[] Low Concentration
[] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 11/1/00<br>Time: 1400<br>Method: Hand auger<br>Monitor Reading (ppm): 0.0 | 18-17" | Brownish Gray | Sandy Silt Some gravel wet ~~moist~~ (PM) |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| | | | | |
| Method: | | | | |
| | | | | |
| Monitor Readings (Range in ppm): | | | N/A | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| SW846 ~~TCL Pesticide~~/PCBs | 250ml wide mouth jar | X | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

**OBSERVATIONS / NOTES:**

slight sulfur odor

**MAP:**

See Sketch

**Circle if Applicable:**

| MS/MSD | Duplicate ID No.: |
|---|---|
| — | — |

**Signature(s):** [illegible]

Tetra Tech NUS, Inc.

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: White Oak Site 47-Building 90 Drainage
Project No.: CTO 298

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 0047-SD-10
Sample Location: White Oak
Sampled By: G. Efotte, R. Miley
C.O.C. No.:

Type of Sample:
[] Low Concentration
[] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 11/2/00<br>Time: 0810<br>Method: Hand auger<br>Monitor Reading (ppm): 0.0 | 0-6" | Black | Silt, some clay, moist not wet |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| | | | | |
| Method: | | | | |
| | | | N/A | |
| Monitor Readings (Range in ppm): | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| SW 8446 ~~TCL Pesticide~~/PCBs | 250 ml wide mouth jar | X | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

**OBSERVATIONS / NOTES:**

To obtain sample from drop inlet we had to use a hand auger however, the depth is 0-6"

**MAP:**

See sketch

**Circle if Applicable:**

MS/MSD —

Duplicate ID No.: 0047-SD-11 (Dup. of 10)

at 0815

**Signature(s):** Rima Miley

Tetra Tech NUS, Inc.

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: White Oak Site 47-Building 90 Drainage
Project No.: CTO 298

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 0047-SD-12
Sample Location: White Oak
Sampled By: G. Efotte, R. Miley
C.O.C. No.:

Type of Sample:
[] Low Concentration
[] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 11/2/00<br>Time: 0905<br>Method: disposable travel<br>Monitor Reading (ppm): 0.0 | 0-6" | Medium-Dark Brown | Sand, wet |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| | | | | |
| Method: | | | | |
| | | | N/A | |
| Monitor Readings (Range in ppm): | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| SW846 ~~TCL Pesticide~~/PCBs | 250ml wide mouth jar | X | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

**OBSERVATIONS / NOTES:**

**MAP:**

See sketch

**Circle if Applicable:**

MS/MSD

0047-SD-MS/MSD

Duplicate ID No.: ——

**Signature(s):** Rima Miley

Tetra Tech NUS, Inc.

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: White Oak Site 47-Building 90 Drainage
Project No.: CTO 298

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 0047-SD-13
Sample Location: White Oak
Sampled By: G. Efotte, R. Miley
C.O.C. No.:

Type of Sample:
[] Low Concentration
[] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 11/2/00<br>Time: 0930<br>Method: disposable trowel<br>Monitor Reading (ppm): 0.0 | 0-6" | medium dark Brown | sand, wet |

**COMPOSITE SAMPLE DATA:**

| | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| Date: | | | | |
| Method: | | | | |
| | | | N/A | |
| Monitor Readings (Range in ppm): | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| SW846 ~~TCL Pesticide~~/PCBs | 250ml wide mouth jar | X | |

**OBSERVATIONS / NOTES:**

**MAP:**

See sketch

**Circle if Applicable:**

| MS/MSD | Duplicate ID No.: |
|---|---|
| — | — |

**Signature(s):** Rima Miley

Tetra Tech NUS, Inc.

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: White Oak Site 47-Building 90 Drainage
Project No.: CTO 298

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 0047-SD-14
Sample Location: White Oak
Sampled By: G. Efotte, R. Miley
C.O.C. No.:

Type of Sample:
[] Low Concentration
[] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 11/2/00<br>Time: 0930<br>Method: disposable trowel<br>Monitor Reading (ppm): 0.0 | 0-6" | Medium Dark Brown | Sand, wet |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| | | | | |
| Method: | | | | |
| | | | | |
| Monitor Readings (Range in ppm): | | | N/A | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| SW846 ~~TCL Pesticide~~/PCBs | 250ml wide mouth jar | X | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

**OBSERVATIONS / NOTES:**

**MAP:**

See Sketch

**Circle if Applicable:**

| MS/MSD | Duplicate ID No.: |
|---|---|
| — | — |

**Signature(s):** Rina Miley

Tetra Tech NUS, Inc.

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: White Oak Site 47-Building 90 Drainage
Project No.: CTO 298

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 0047-SD-15
Sample Location: White Oak
Sampled By: G. Efotte, R. Miley
C.O.C. No.:

Type of Sample:
[] Low Concentration
[] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 11/2/00<br>Time: 0959<br>Method: disposable trowel<br>Monitor Reading (ppm): 0.0 | 0-6" | Medium-dark brown | Sandy wet |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| | | | | |
| Method: | | | | |
| | | | N/A | |
| Monitor Readings (Range in ppm): | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| SW 846 ~~TCL Pesticides~~/PCBs | 250ml wide mouth jar | X | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

**OBSERVATIONS / NOTES:**

**MAP:**

See Sketch

**Circle if Applicable:**

| MS/MSD | Duplicate ID No.: |
|---|---|
| — | — |

**Signature(s):** Rina Miley

Tetra Tech NUS, Inc.

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: NSWC ~~CRANE~~ WHITE OAK KS
Project No.: CTO 298 JOB# 7687

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 11SD200
Sample Location: SITE 11
Sampled By: SIMPSON / PRYOR
C.O.C. No.: 050200

Type of Sample:
[X] Low Concentration
[] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 5.2.00<br>Time: 1108<br>Method: PLASTIC TROWEL<br>Monitor Reading (ppm): — | 0-2" | TAN | SILT w F. SAND, WET |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| Method: | | | | |
| Monitor Readings (Range in ppm): | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| TOC | 2 oz w/m GLASS | ✓ | |
| PCB | 4 oz w/m GLASS | ✓ | |

**OBSERVATIONS / NOTES:**

STREAM FLOW ≈ 3 GPM

**MAP:**

UPSTREAM OF 11SD100 ≈ 12'

ON N. SIDE OF STREAM

≈ 2' PAST END OF RIP RAP

**Circle if Applicable:**

| MS/MSD | Duplicate ID No.: |
|---|---|
| — | — |

**Signature(s):**

Tetra Tech NUS, Inc.

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: NSWC WHITE OAK
Project No.: CTO 298 JOB# 7687

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 11SD 201
Sample Location: SITE 11
Sampled By: SIMPSON, PRYOR
C.O.C. No.: 0502200

Type of Sample:
[X] Low Concentration
[] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 5-2-00<br>Time: 1116<br>Method: PLASTIC TROWEL<br>Monitor Reading (ppm): — | 0-3" | BRN | WET SILT W SOME ORGANIC MATERIAL |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| Method: | | | | |
| Monitor Readings (Range in ppm): | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| TOC | 2 oz w/m glass | ✓ | |
| KS ~~PEST~~ PCBs | 4 oz w/m glass | ✓ | |

**OBSERVATIONS / NOTES:**

**MAP:**

BETWEEN 11SD100 & 11SD 101
ON S. SIDE OF STREAM

SEE FIG 1

**Circle if Applicable:**

| MS/MSD | Duplicate ID No.: |
|---|---|
| — | — |

**Signature(s):**

Tetra Tech NUS, Inc.

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: NSWC WHITE OAK
Project No.: CTO 293 JOB #7687

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 11SD 202
Sample Location: SITE 11
Sampled By: SIMPSON/PRYOR
C.O.C. No.: 0502200

Type of Sample:
[X] Low Concentration
[] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 5.2.00<br>Time: 1126<br>Method: PLASTIC TRAWEL<br>Monitor Reading (ppm): — | 0-3" | BRN | WET, SILT & F. SAND W. ORGANIC MATERIAL |

**COMPOSITE SAMPLE DATA:**

| | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| Date: | | | | |
| Method: | | | | |
| Monitor Readings (Range in ppm): | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| TOC | 2 oz W/M GLASS | ✓ | |
| PCB | 4 oz W/M GLASS | ✓ | |

**OBSERVATIONS / NOTES:**

**MAP:**

BETWEEN 11SD101 & 11SD104

100'± DOWN STREAM OF 11SD 201

SEE FIG 1.

**Circle if Applicable:**

| MS/MSD | Duplicate ID No.: |
|---|---|
| — | — |

**Signature(s):**

Tetra Tech NUS, Inc.

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: NSWC WHITE OAK
Project No.: CTO 298 JOB# 7687

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 11SD203
Sample Location: SITE 11
Sampled By: SIMPSON / PRYOR
C.O.C. No.: 050200

Type of Sample:
[X] Low Concentration
[] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 5-2-00<br>Time: 1310<br>Method: S. STEEL TRAMEL<br>Monitor Reading (ppm): — | 0 - 2" | BRN | F. TO MED. SAND, WET, TR. SILT |

**COMPOSITE SAMPLE DATA:**

| | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| Date: | | | | |
| Method: | | | | |
| Monitor Readings (Range in ppm): | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| TOC | 2 oz W/M GLASS | ✓ | |
| PCB | 4 oz W/M GLASS | ✓ | |

**OBSERVATIONS / NOTES:**

**MAP:**

@ "OLD" 11SD104

SEE FIG 1

**Circle if Applicable:**

| MS/MSD | Duplicate ID No.: |
|---|---|
| — | — |

**Signature(s):**

Tetra Tech NUS, Inc.

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: NSWC WHITE OAK
Project No.: CTO 298 JOB # 7687

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 11SD204
Sample Location: SITE 11
Sampled By: SIMPSON / PRYOR
C.O.C. No.: 050200

Type of Sample:
[X] Low Concentration
[] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 5-2-00<br>Time: 1330<br>Method: PLASTIC TROWEL<br>Monitor Reading (ppm): — | 0 - 3" | BRN | WET, F. SAND & SILT SOME ORGANIC MATERIAL |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| Method: | | | | |
| Monitor Readings (Range in ppm): | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| TOC | 2 oz W/M GLASS | ✓ | |
| PCB | 4 oz W/M GLASS | ✓ | |

**OBSERVATIONS / NOTES:**

**MAP:**

@ "OLD" SAMPLE LOCATION
11SD105

SEE F191

**Circle if Applicable:**

| MS/MSD | Duplicate ID No.: |
|---|---|
| — | FD 050200-02 |

**Signature(s):** [illegible] S. Simpson

Tetra Tech NUS, Inc.

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: NSWC WHITE OAK
Project No.: CTO 298 JOB # 7687

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 11SD205
Sample Location: SITE 11
Sampled By: SIMPSON/PRYOR
C.O.C. No.: 050200

Type of Sample:
[X] Low Concentration
[] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 5.2.00<br>Time: 1340<br>Method: PLASTIC TROWEL<br>Monitor Reading (ppm): — | 0 - 3'' | BRN | WET SILT & F. SAND<br>TR F. GRAVEL<br>TR ORGANIC MATERIAL |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| | | | | |
| Method: | | | | |
| | | | | |
| Monitor Readings (Range in ppm): | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| TOC | 2 oz w/M GLASS | ✓ | |
| PCB | 4 oz w/M GLASS | ✓ | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

**OBSERVATIONS / NOTES:**

**MAP:**

@ "OLD" 11SD106

SEE FIG. 1

**Circle if Applicable:**

| MS/MSD | Duplicate ID No.: |
|---|---|
| — | — |

**Signature(s):**

Tetra Tech NUS, Inc.

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: NSWC WHITE OAK
Project No.: CTO 298 JOB # 7687

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 11SD206
Sample Location: SITE 11
Sampled By: SIMPSON/PRYOR
C.O.C. No.: 050200

Type of Sample:
[X] Low Concentration
[] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 5.2.00<br>Time: 1346<br>Method: PLASTIC TROWEL<br>Monitor Reading (ppm): — | 0-3" | BRN | WET, SILT SOME F. SAND, TR. ORGANIC MATERIAL |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| Method: | | | | |
| Monitor Readings (Range in ppm): | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| TOC | 2 oz w/M GLASS | ✓ | |
| PCB | 4 oz w/M GLASS | ✓ | |

**OBSERVATIONS / NOTES:**

**MAP:**

@ OLD 11SD107

SEE FIG. 1

**Circle if Applicable:**

| MS/MSD | Duplicate ID No.: |
|---|---|
| — | — |

**Signature(s):**

Tetra Tech NUS, Inc.

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: NSWC WHITE OAK
Project No.: CTO 298 JOB # 7687

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 11 SD 207
Sample Location: SITE 11
Sampled By: SIMPSON/PRYOR
C.O.C. No.: 050200

Type of Sample:
[X] Low Concentration
[] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 5.2.00<br>Time: 1356<br>Method: PLASTIC TROWEL<br>Monitor Reading (ppm): — | 0-3 | BRN | SILT & F. SAND, WET, TR. ORGANIC MATERIAL |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| | | | | |
| Method: | | | | |
| | | | | |
| Monitor Readings (Range in ppm): | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| TOC | 2 oz w/M GLASS | ✓ | |
| PCB | 4 oz w/M GLASS | ✓ | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

**OBSERVATIONS / NOTES:**

**MAP:**

@ "OLD" 11SD108

SEE A91

**Circle if Applicable:**

| MS/MSD | Duplicate ID No.: |
|---|---|
| — | — |

**Signature(s):**

K. S. Simp

Tetra Tech NUS, Inc.

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: NSWC WHITE OAK
Project No.: CTO 298 JOB# 7687

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 11SD208
Sample Location: SITE 11
Sampled By: SIMPSON / PRYOR
C.O.C. No.: 050200

Type of Sample:
[X] Low Concentration
[] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 5.3.00<br>Time: 0750<br>Method: S. STEEL TRUCK<br>Monitor Reading (ppm): — | 0 - 2" | BRN | SILT W F. SAND, WET, SOME ORGANIC MATERIAL |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| Method: | | | | |
| Monitor Readings (Range in ppm): | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| TOC | 2 oz W/M GLASS | ✓ | |
| PCB | 4 oz W/M GLASS | ✓ | |

**OBSERVATIONS / NOTES:**

**MAP:**

≈ 50' DOWNSTREAM FROM ROAD

≈ 20' FROM CULVERT

SEE FIG. 1

**Circle if Applicable:**

| MS/MSD | Duplicate ID No.: |
|---|---|
| — | — |

**Signature(s):**

Tetra Tech NUS, Inc.

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: NSWC WHITE OAK
Project No.: CTO298 JOB# 7687

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 11SD209
Sample Location: SITE 11
Sampled By: SIMPSON / PRYOR
C.O.C. No.: 050200

Type of Sample:
[X] Low Concentration
[] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 5-3-08<br>Time: 0740<br>Method: PLASTIC TRUWA<br>Monitor Reading (ppm): — | 0-2" | BRN. | WET, F. SAND W SILT, TR. ORGANIC MATERIAL |

**COMPOSITE SAMPLE DATA:**

| | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| Date: | | | | |
| Method: | | | | |
| Monitor Readings (Range in ppm): | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| TOC | 2 oz W/M GLASS | — | |
| PCB | 4 oz W/M GLASS | — | |

**OBSERVATIONS / NOTES:**

**MAP:**

SEE FIG. 1

**Circle if Applicable:**

| MS/MSD | Duplicate ID No.: |
|---|---|
| — | — |

**Signature(s):**

Tetra Tech NUS, Inc.

# SOIL & SEDIMENT SAMPLE LOG SHEET



Project Site Name: NSWC WHITE OAK
Project No.: CTO 298 JOB# 7687

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 11SD210
Sample Location: SITE 11
Sampled By: SIMPSON/PRYOR
C.O.C. No.: 050200

Type of Sample:
[X] Low Concentration
[] High Concentration

**GRAB SAMPLE DATA:**

| | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|
| Date: 5.3.00<br>Time: 0725<br>Method: PLASTIC TRUCEL<br>Monitor Reading (ppm): — | 0-2" | BRN | F. SAND W. SILT, WET, SOME ORGANIC MATERIAL |

**COMPOSITE SAMPLE DATA:**

| Date: | Time | Depth | Color | Description (Sand, Silt, Clay, Moisture, etc.) |
|---|---|---|---|---|
| Method: | | | | |
| Monitor Readings (Range in ppm): | | | | |

**SAMPLE COLLECTION INFORMATION:**

| Analysis | Container Requirements | Collected | Other |
|---|---|---|---|
| TOC | 2 oz W/M GLASS | ✓ | |
| PCB | 4 oz W/M GLASS | ✓ | |

**OBSERVATIONS / NOTES:**

**MAP:**

11SD210 FAR EAST (RIGHT) SIDE ON FIG 1
SEE FIG. 1

**Circle if Applicable:**

| MS/MSD | Duplicate ID No.: |
|---|---|
| — | — |

**Signature(s):**