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VERIFICATION SAMPLING AND ANALYSIS PLAN FOR SITE 41/ UXO 32 NSWC INDIAN HEAD MD

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TETRA TECH

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JANUARY 2007

VERIFICATION SAMPLING AND ANALYSIS PLAN FOR UXO 32 (SITE 41) - SCRAP YARD

NAVAL SUPPORT FACILITY, INDIAN HEAD INDIAN HEAD, MARYLAND

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

Submitted to:
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1314 Harwood Street, SE
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Submitted by:
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CONTRACT NUMBER N62472-03-D-0057
CONTRACT TASK ORDER 047

JANUARY 2007

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ACRONYM LIST

mg/kg	milligrams per kilogram
µg/kg	micrograms per kilogram
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CLEAN	Comprehensive Long-Term Environmental Action Navy
COC	contaminant of concern
COPC	contaminant of potential concern
CTO	Contract Task Order
CV	coefficient of variation
DQA	data quality assessment
EA	exposure area
FS	Feasibility Study
HASP	Health and Safety Plan
IDW	investigation derived waste
IHIRT	Indian Head Installation Restoration Team
MDE	Maryland Department of the Environment
MRP	Munitions Response Program
NPL	National Priorities List
NSF-IH	Naval Support Facility Indian Head
PAH	polynuclear aromatic hydrocarbon
PCB	polychorinated biphenyl
PPE	personal protective equipment
PRG	preliminary remediation goal
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
RAC	Remedial Action Contractor
RAO	remedial action objective
RBC	Risk-Based Concentration
RD	remedial design
RI	remedial investigation
ROD	Record of Decision
SI	Site Investigation
SOP	standard operating procedure
SSG	soil screening guidance

SSL	soil screening level
TCE	trichloroethene
TSD	treatment, storage and disposal
TtNUS	Tetra Tech NUS, Inc.
USEPA	United States Environmental Protection Agency
VOC	volatile organic compound
VSAP	Verification Sampling and Analysis Plan

1.0 INTRODUCTION

This Verification Sampling and Analysis Plan (VSAP) was prepared by Tetra Tech NUS, Inc. (TtNUS) under Contract Task Order (CTO) 047 of the Comprehensive Long-Term Environmental Action Navy (CLEAN) Contract Number N62472-03-D-0057. Under this CTO, TtNUS prepared this VSAP to perform post-excavation verification sampling activities at UXO 32 - Scrap Yard (formerly known as Site 41) at the Naval Support Facility, Indian Head (NSF-IH) located in Indian Head, Maryland.

A Remedial Investigation (RI) (TtNUS, 1999) and a Feasibility Study (FS) (TtNUS, 2001) have been conducted to determine the limits of contamination at UXO 32. The selected remedy for UXO 32 includes the removal and excavation of contaminated soils, transportation of soil to an approved off-site treatment, storage, and disposal (TSD) facility, land use controls that restrict the use of land and shallow groundwater, and monitoring. In addition, the remedy includes the removal of abandoned railroad tracks and site restoration. The restoration includes re-establishing road systems, providing new security fencing around the Scrap Yard's concrete pad, and revegetating the disturbed area. Based on the materials to be excavated for off-site TSD and the anticipated future land use for UXO 32, post-removal verification sampling is proposed as discussed in Section 2.0. The purpose of this VSAP is to present the procedures to be followed to confirm that soil contaminants at concentrations greater than preliminary remediation goals (PRGs) have been removed from UXO 32 outside the limits of the UXO 32 concrete pad. Procedures dealing with contaminants within the limits of the concrete pad are presented under separate cover [Concrete Pad Sampling Work Plan UXO 32 (Site 41) - Scrap Yard].

1.1 SITE DESCRIPTION

NSF-IH is located in northwestern Charles County, Maryland, approximately 25 miles southwest of Washington, DC, as shown on Figure 1-1. NSF-IH is a military facility consisting of the Main Area on Cornwallis Neck and the Annex on Stump Neck. The Main Area is bounded by the Potomac River to the northwest, west, and south, Mattawoman Creek to the south and east, and the Town of Indian Head to the northeast (Figure 1-2). Stump Neck Annex is located across Mattawoman Creek and is not contiguous with the Main Area. The primary mission of NSF-IH is to provide services in energetics, ordnance devices and components, and other related ordnance engineering standards, including chemicals, propellants and their propulsion systems, explosives, pyrotechnics, warheads, and simulators. NSF-IH was added to the National Priorities List (NPL) by the United States Environmental Protection Agency (USEPA) in September 1995, pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980. UXO 32 is one of the Munitions Response Program (MRP) sites included in the NSF-IH MRP.

UXO 32 covers an area of approximately 3 acres. The concrete pad, or Scrap Yard portion of the site, is approximately 750 feet long and varies from 75 to 100 feet wide (1.5 acres). The site features are shown on Figure 1-3. The Scrap Yard is enclosed with a chain-link fence. A concrete pad is present within most of the fenced area. During the RI and FS, the pad was covered with soil in some places. A dirt and gravel access road and abandoned railroad tracks are located between the concrete pad and Mattawoman Creek. The area north of the concrete pad is wooded. The site area is flat, and surface runoff tends to pond and infiltrate. In some areas, runoff flows toward Mattawoman Creek. The site is currently an active scrap yard used to store materials that will be recycled or reused.

Subsurface soil were classified at the site during the installation of soil borings and monitoring wells during the Site Investigation (SI). The subsurface materials generally consist of clayey sand interlayered with clayey gravel and sand lenses underlain by green-gray clay or brown sandy clay. The clay maximum was encountered at a depth of approximately 15 feet below ground surface (bgs) and extended to the maximum depths of the borings. Layers of slag and coal that were 2 to 5 feet thick were encountered at the ground surface outside the fenced area at locations 41MW01, 41MW02, and 41SB02. The slag and coal did not extend into the fenced portion of the site (TtNUS, 2001).

1.2 NATURE AND EXTENT OF CONTAMINATION

UXO 32 is estimated to contain approximately 1,500 cubic yards of contaminated soil. Soil, sediment, and groundwater samples were collected and analyzed to determine the extent of contamination. Contaminants of concern (COCs) in soils include the polynuclear aromatic hydrocarbons (PAHs) benzo(a)pyrene and dibenzo(a,h)anthracene, the polychlorinated biphenyls (PCB) Aroclor-1260, and the metals arsenic, cadmium, and lead. There were no COCs for surface water or sediment based on protection of human health or ecological receptors.

Most of the surface soil within the fenced boundary of the Scrap Yard (soil on the concrete pad) is contaminated. Contamination is more sporadic outside the fenced area, and there is no pattern to the detections. The concentrations and locations of the COCs detected in surface soil are shown on Figure 4-1 (0 to 6 inches deep) and Figure 4-2 (12 to 18 inches deep) of the FS.

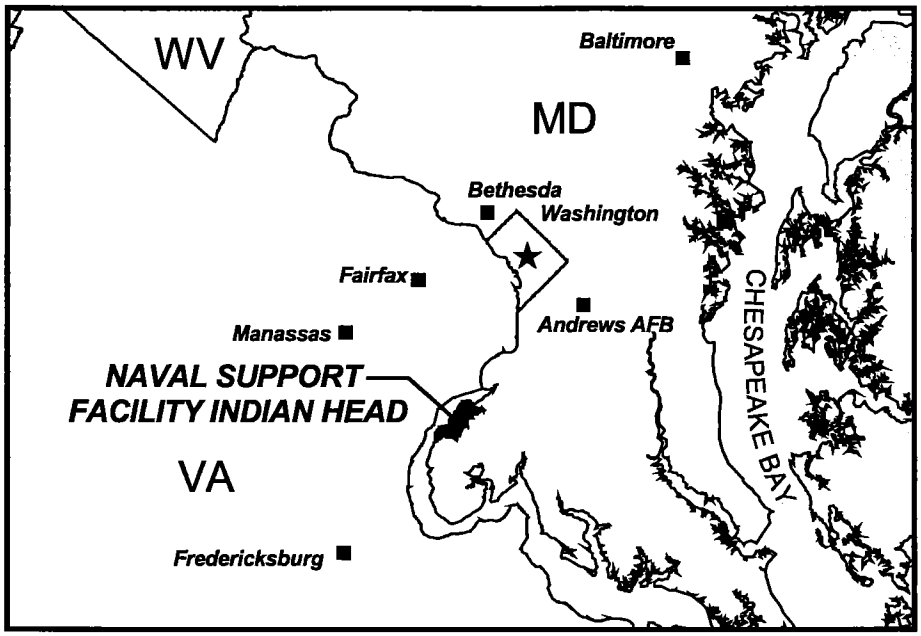
The only area of concern with respect to subsurface soil is the maximum concentration of arsenic (328 mg/kg) at soil boring 41SB02 at a depth of 8 feet (see Figure 1-4). This is the only area of subsurface soil that results in unacceptable risks to human health under the anticipated future non-residential land use for the site (TtNUS, 2001).

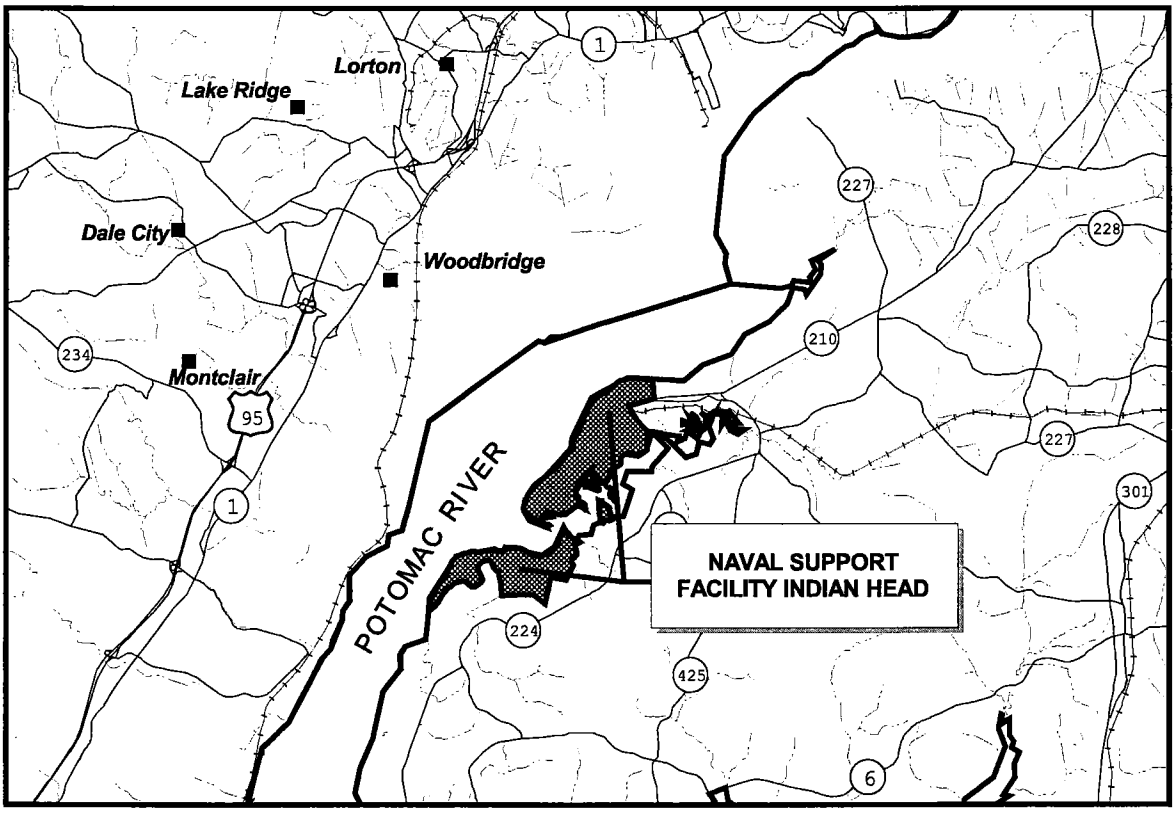
Because of the number of sample locations where COC concentrations exceed PRGs, the remedial design includes bulk excavation rather than multiple isolated excavations east, south, and west of the

concrete pad and isolated excavation north of the concrete pad. This approach was selected over the isolated excavations based on the cost of sampling the multiple isolated excavation areas and the likelihood that verification samples from the isolated excavation areas would indicate the requirement to perform additional excavation. Therefore, to reduce the cost of construction and verification sampling and to assure the removal of all the COC concentrations exceeding PRGs the Indian Head Installation Restoration Team (IHIRT) favors this approach. Figure 1-5 presents the extent of excavation.

1.3 VSAP CONTENTS

Section 1.0 is this introduction. Section 2.0 details the scope of work to be conducted under this VSAP. Section 3.0 details the field sampling procedures. Appendix A contains the project Health and Safety Plan (HASP), Appendix B contains the project-specific Quality Assurance Project Plan (QAPP), and Appendix C contains field forms.

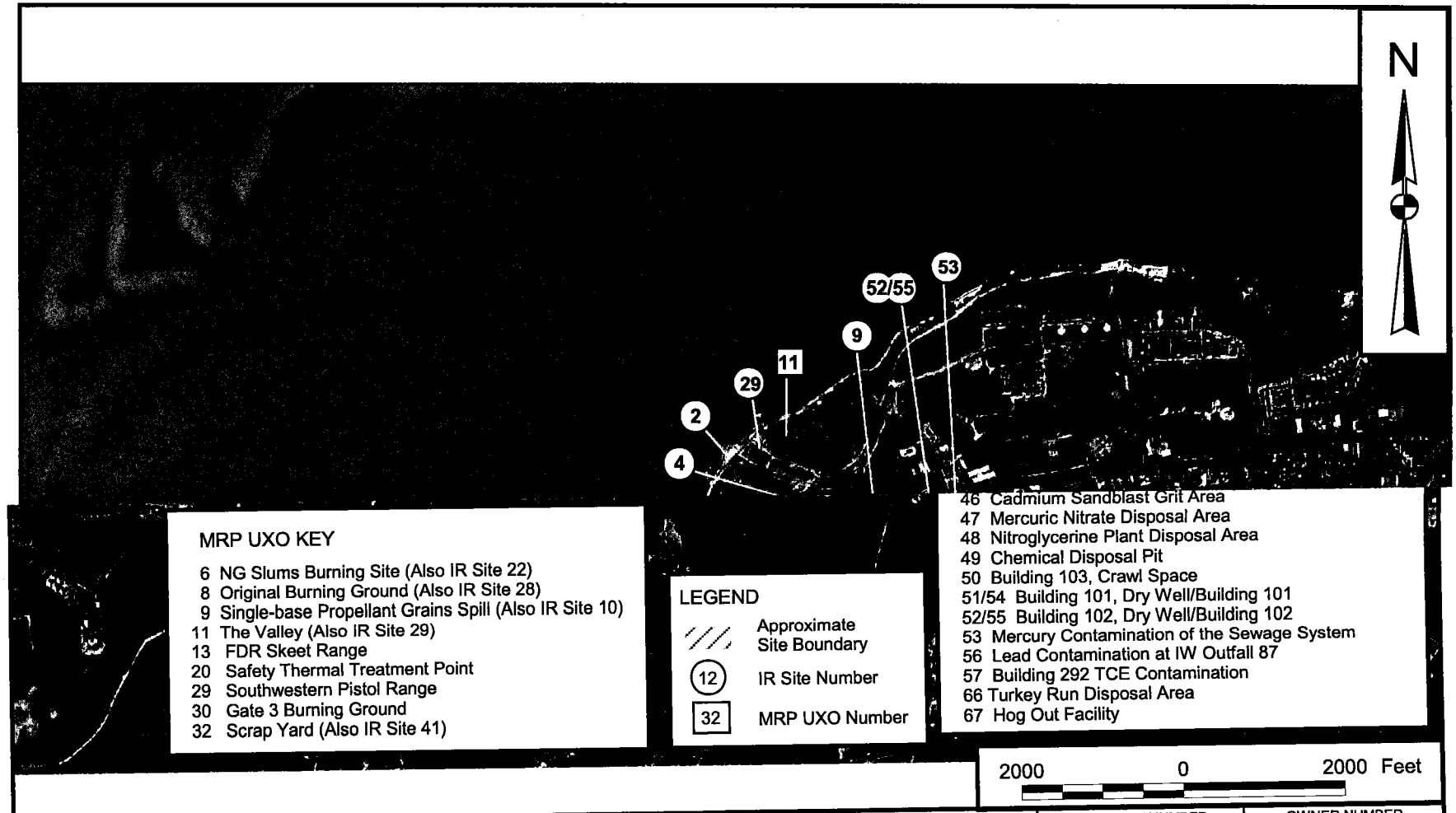




DRAWN BY: K. PEILA — DATE: 8/08/02	Tetra Tech NUS, Inc.	CONTRACT NUMBER: 0307	OWNER NO.: 0047
CHECKED BY: T. SMITH — DATE: 1/08/07	VICINITY MAP UXO 32 - SCRAP YARD NAVAL SUPPORT FACILITY - INDIAN HEAD INDIAN HEAD, MARYLAND	APPROVED BY: GJL — DATE: 1/08/07	
COST/SCHEDULE-AREA		APPROVED BY: — — DATE: —	
SCALE: AS NOTED		DRAWING NO.: FIGURE 1-1	REV: 0

P:\GIS\INDIAN_HEAD_NSW\CAPR\SITE_LOCATION SITE 41.APR SITE LOCATION MAP 1/08/07 JEE

P:\GIS\INDIANHEAD_NSWC\APR\SITEMANAGEMENTPLAN.APR UPDATED CRP-SITE LOCATIONS-MAIN SITE LAYOUT 01/18/07 JEE



MRP UXO KEY

6 NG Slums Burning Site (Also IR Site 22)
8 Original Burning Ground (Also IR Site 28)
9 Single-base Propellant Grains Spill (Also IR Site 10)
11 The Valley (Also IR Site 29)
13 FDR Skeet Range
20 Safety Thermal Treatment Point
29 Southwestern Pistol Range
30 Gate 3 Burning Ground
32 Scrap Yard (Also IR Site 41)

LEGEND

Approximate Site Boundary
(12) IR Site Number
[32] MRP UXO Number

46 Cadmium Sandblast Grit Area
47 Mercuric Nitrate Disposal Area
48 Nitroglycerine Plant Disposal Area
49 Chemical Disposal Pit
50 Building 103, Crawl Space
51/54 Building 101, Dry Well/Building 101
52/55 Building 102, Dry Well/Building 102
53 Mercury Contamination of the Sewage System
56 Lead Contamination at IW Outfall 87
57 Building 292 TCE Contamination
66 Turkey Run Disposal Area
67 Hog Out Facility

2000 0 2000 Feet

DRAWN BY K. PEILA	DATE 7/26/02	Tetra Tech NUS, Inc.	CONTRACT NUMBER 2193 / OWNER NUMBER —
CHECKED BY T. SMITH	DATE 1/18/07	SITE LOCATION MAP UXO 32 - SCRAP YARD NAVAL SUPPORT FACILITY, INDIAN HEAD INDIAN HEAD, MARYLAND	APPROVED BY GJL / DATE 12/29/06
COST/SCHEDULE-AREA			APPROVED BY — / DATE —
SCALE AS NOTED			DRAWING NO. FIGURE 1 - 2 / REV 0

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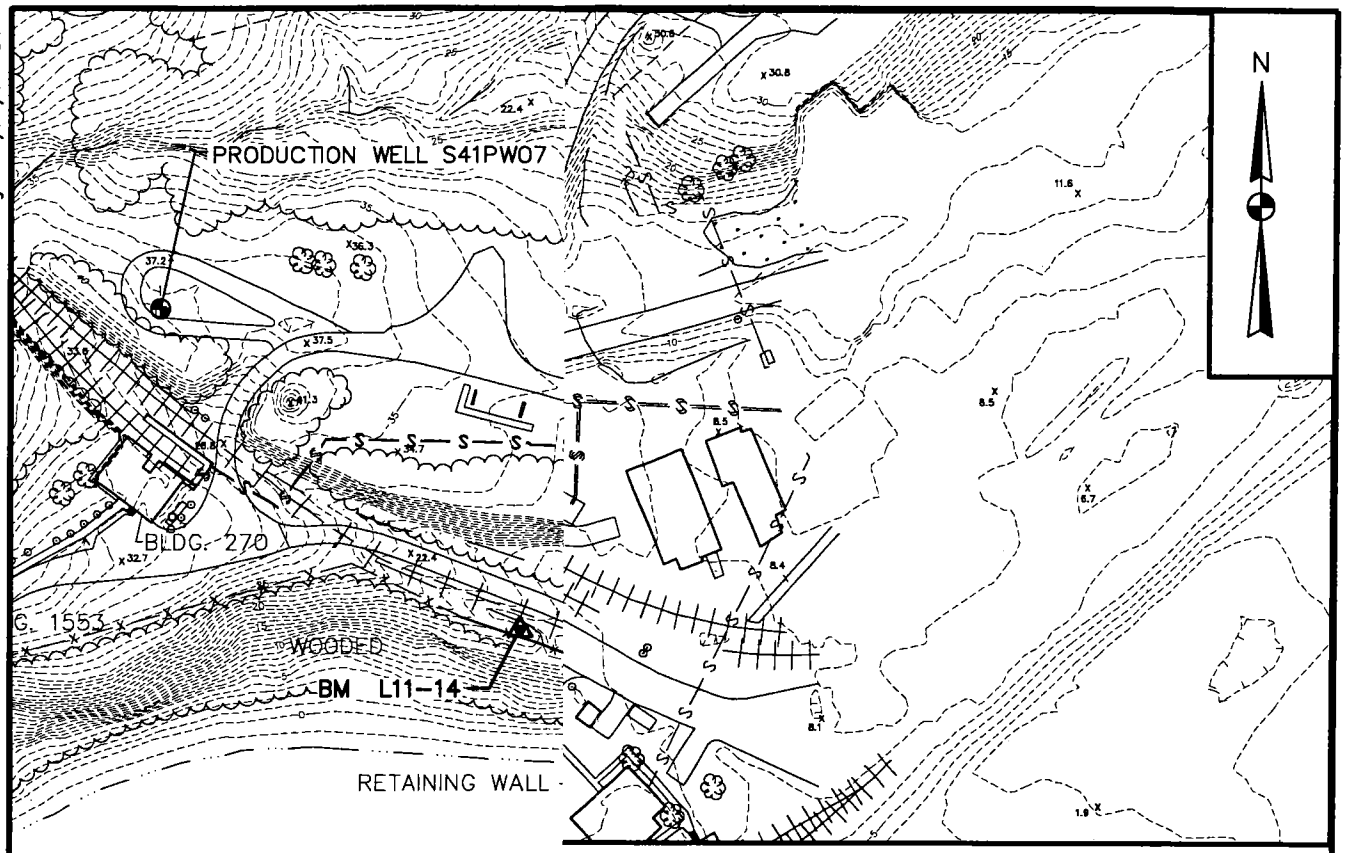

LEGEND:

1MW01	MONITORING WELL
X 7.3	SPOT ELEVATION
	TREELINE
-S—S—S—	ABOVE GROUND STEAM LINE
-E—E—E—e	OVER HEAD ELECTRIC (WITH UTILITY POLE)
x—x—x—x—	EXISTING FENCE
	STREAM/ EDGE OF WATER
	RAILROAD TRACKS
	REMOVED RAILROAD TRACKS
	LIMIT OF DISTURBANCE
	LIMIT OF REMEDIATION
10	EXISTING SURFACE ELEVATION CONTOUR
	DELINEATED WETLANDS

0 120 240

GRAPHIC SCALE IN FEET

SITE LAYOUT MAP
UXO 32 - SCRAP YARD
-IH, INDIAN HEAD, MARYLAND

CONTRACT NO. 0307	
OWNER NO. 0047	
APPROVED BY KCF	DATE 1/25/07
DRAWING NO. FIGURE 1-3	REV. 0

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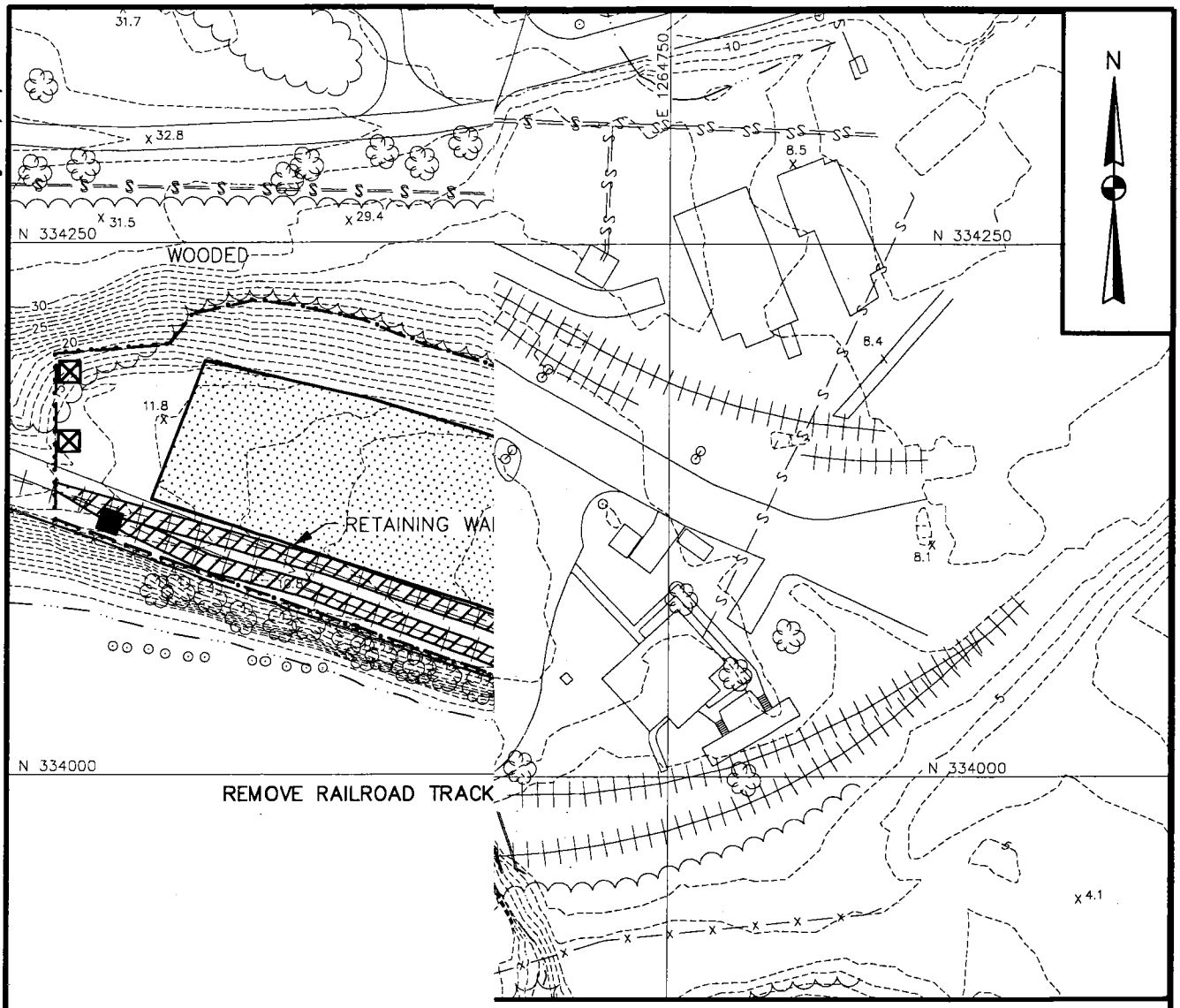

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LEGEND:

REFER TO FIGURE 1-3 FOR GENERAL LEGEND INFORMATION

- RAILROAD TRACK REMOVAL AREA (SEE NOTE 1)
- SURFACE SOIL CONTAMINATION (6-INCH DEPTH, 10' x 10')
- SUBSURFACE SOIL CONTAMINATION (18-INCH DEPTH, 10' x 10')
- SUBSURFACE SOIL CONTAMINATION (8-FOOT DEPTH, 10' x 10')
- LIMITS OF CONCRETE PAD (SEE NOTE 2)

0 80 160

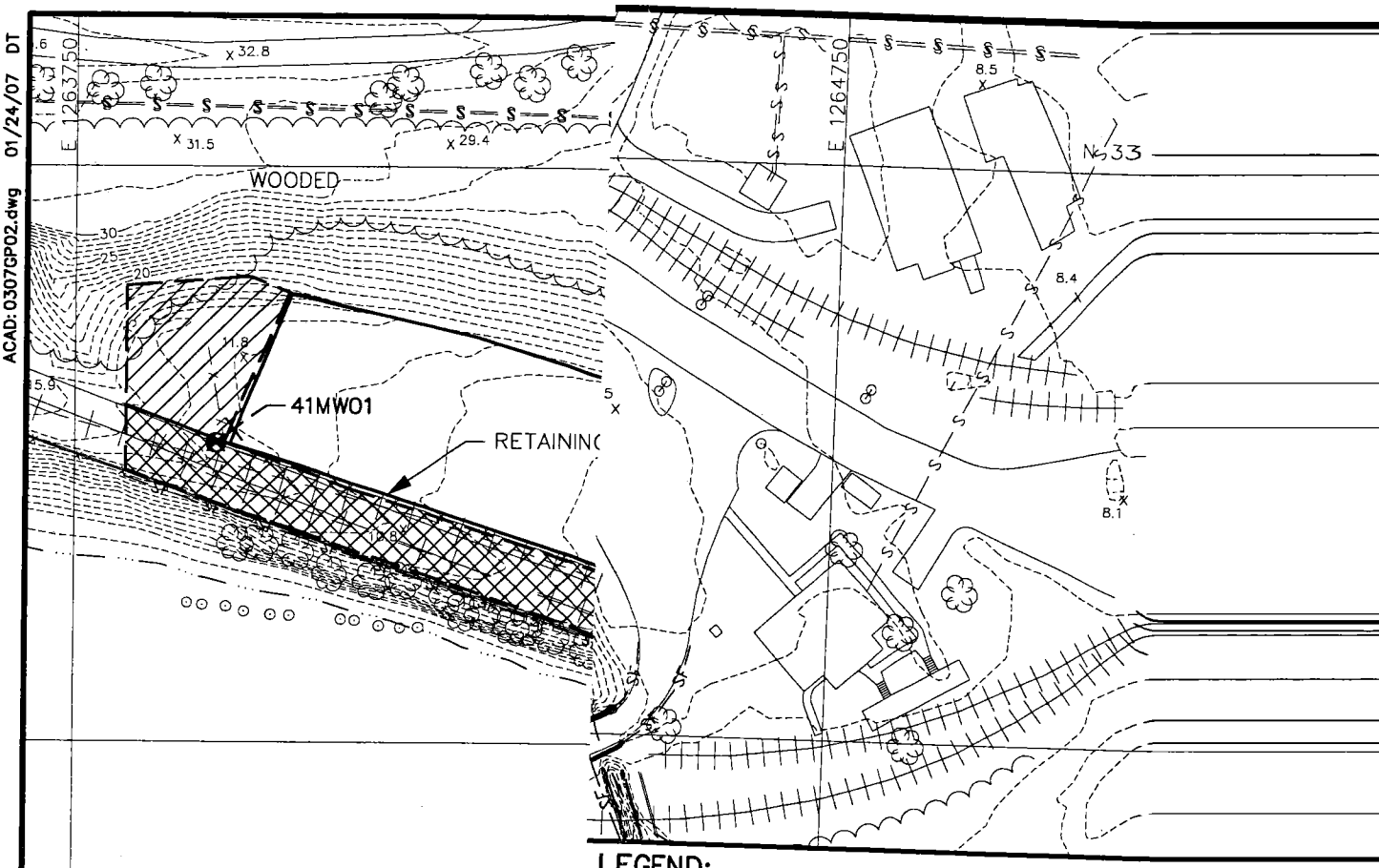
GRAPHIC SCALE IN FEET

NOTE: 1. THE REMOVAL OF RAILROAD RAIL, ...ONS WHERE COCs EXCEED PRGs IS NOT RELATED TO ENVIRONMEN...

2. SAMPLING ACTIVITIES WITHIN LIMIT... ARE ADDRESSED IN A SEPARATE

UXO 32 - SCRAP YARD
...H, INDIAN HEAD, MARYLAND

CONTRACT NO. 0307	
OWNER NO. 0047	
APPROVED BY KCT	DATE 1/25/07
DRAWING NO. FIGURE 1-4	REV. 0



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LEGEND:

41MW01	EXISTING MONITORING WELL TO BE ABANDONED
+ + + +	REMOVED RAILROAD TRACKS
— — —	LIMIT OF REMEDIATION
	6–INCH EXCAVATION DEPTH
	18–INCH EXCAVATION DEPTH
B	8–FOOT EXCAVATION DEPTH 10' x 10' EXCAVATION FLOOR AR
	INITIAL HOT SPOT EXCAVATION AREAS (6–INCH DEPTH)

NOTE:

REMOVE RAILROAD RAIL AND TIES WITHIN LIMIT OF REMEDIATION.

0 80 160

GRAPHIC SCALE IN FEET

E 1263750

TENT OF SOIL EXCAVATION
UXO 32 - SCRAP YARD
IH, INDIAN HEAD, MARYLAND

CONTR 03

OWNE 00

APPROVED BY RCT

DRAWING NO. FIGURE 1

FORM CADD NO. TTNUS-BH.DWG - REV 1 - 9/10/98

2.0 SCOPE OF WORK

2.1 SAMPLING OBJECTIVES

The purpose of this VSAP is to establish when sufficient excavation has been performed to render the site, outside the limits of the concrete pad, protective of human health and the environment. This VSAP presents criteria and procedures to obtain and evaluate sampling data to determine the acceptability of the residual contaminant concentrations (if any) within the soil excavation areas outside of the concrete pad limits following excavation.

Based on the RI/FS for Site 41, unacceptable concentrations of contaminants in soil have been identified that require removal [Data Quality Objective (DQO) process Step 1: State the Problem]. To determine whether enough contaminated soil has been removed during the remedial action, verification samples need to be collected following excavation (DQO process Step 2: Identify the Decision).

Inputs required to determine whether enough soil has been excavated include: verification sampling results, PRGs, background soil concentrations, final proposed land use in the area of the excavation, and final thickness of cover soil in the area of the excavation (DQO process Step 3: Identify Inputs to the Decision).

2.2 SCREENING LEVELS

Table 2-1 provides the PRGs for the soil excavation areas. Results from the verification samples collected from within the soil excavation area outside of the concrete pad will be compared to these PRGs. Table 2-1 also contains the maximum detected concentrations of COCs in the basewide background surface and subsurface soil data sets presented in the RI. The table also presents the USEPA Region III residential soil Risk-Based Concentrations (RBCs), the USEPA soil to groundwater generic soil screening levels (SSLs) based on a dilution attenuation factor (DAF) of 20, and USEPA Region III the industrial soil RBCs. These additional criteria are provided for information purposes.

2.3 SAMPLE AREAS - DQO PROCESS STEP 4: DEFINE THE STUDY BOUNDARIES

The remedial design (RD) for UXO 32 includes the excavation and off-site TSD of contaminated soil. All areas within the limit of remediation as shown on Figure 1-5 will be subjected to verification sampling as identified in this plan to assure protection of human health and the environment. It is anticipated that the contaminated soil will be excavated to the horizontal and vertical limits identified in Figure 1-5, and then verification sampling will be conducted to ascertain whether PRGs have been met. Excavation will not extend beyond the limits of remediation identified in Figure 1-5 as agreed upon by the IHIRT. The limits of

remediation were established because NSF-IH had concerns that arsenic could be present along the railroad tracks as a result of past application of arsenic-based pesticides and not as a result of past and/or current activities at the Scrap Yard.

Following the attainment reduction of PRGs to acceptable levels, the site will be restored. Site restoration outside the concrete pad will include returning the site to existing grades and installing a new bituminous concrete paved access road, gravel paved access roads, and topsoil. Areas receiving topsoil will also be revegetated. Following revegetation, erosion and sediment control devices will be removed.

2.4 DEVELOP DECISION RULE - DQO PROCESS STEP 5

After NSF-IH environmental department personnel visually verify that the Remedial Action Contractor (RAC) has removed all contaminated soil from the areas identified in the RD, TtNUS field personnel will collect verification samples. After the verification sampling results have been received, the following decision rule will be applied to determine whether or not additional excavation is required:

If the concentration of the sample area (SA) composite sample or discrete samples from isolated excavation areas are less than the appropriate criteria for each COC and the Data Quality Objectives (DQOs) are met, then the SA/excavation area will be considered acceptable and no further excavation will be required. The appropriate criteria are presented in Table 2-1 (background concentrations will be considered for soil excavation areas). The IHIRT may consider whether any exceedances of the criteria or non-compliance with DQOs require additional excavation through risk management. For instance, if only one COC marginally exceeds its respective PRG in a particular exposure area (EA) or isolated excavation area, and the rest of the COCs are below PRGs. the IHIRT could consider whether additional soil excavation is necessary. Figure 2-1 presents a flow chart that shows the process for evaluating the verification sampling data and the decisions to be made in the evaluation. See Section 2.6 for the defined EAs and SAs.

If verification sample results indicate that the remaining contaminant levels outside the concrete pad are unacceptable, additional soil may be removed from the appropriate SA(s) and/or isolated excavation areas subject to interpretation by the IHIRT as described above. In the event that additional excavation is required, TtNUS field personnel will collect an additional verification sample consistent with Section 2.6.

2.5 SPECIFY LIMITS ON DECISION ERRORS - DQO PROCESS STEP 6

2.5.1 Isolated Excavation Areas

Upon receiving the analytical data, results will be directly compared to the PRGs presented in Table 2-1. The direct comparison of these data will determine if additional excavation is required.

2.5.2 Bulk Excavation Areas

Upon receiving the analytical data from enough SAs to make up an EA (each EA consists of 6 SAs), the results will be statistically evaluated to determine if the data collected from each SA is representative of the EA. The statistical evaluation performed is similar to the Max Test outlined in the Soil Screening Guide (SSG) User's Guide (USEPA, 1996a). However, because of the modification of the sampling methodology from the SSG as described in Section 2.6, the statistical evaluation will be referred to as the SA Mean Test. The analysis accounts for the variability in the sample data when comparing concentrations from each SA sample to a screening level. The following is excerpted from the SSG User's Guide:

> "In theory, an exposure area would be screened from further investigation when the true mean of the population of contaminant concentrations falls below the established screening level.
>
> However, EPA recognizes that data obtained from sampling and analysis are never perfectly representative and accurate, and that the cost of trying to achieve perfect results would be quite high. Consequently, EPA acknowledges that some uncertainty in data must be tolerated, and focuses on controlling the uncertainty which affects decisions based on those data. Thus, in the Soil Screening Guidance, EPA has developed an approach for surface soils to minimize the chance of incorrectly deciding to:
>
> - Screen out areas when the correct decision would be to investigate further (Type 1 error); or
> - Decide to investigate further when the correct decision would be to screen out the area (Type II error).
>
> The approach sets limits on the probabilities of making such decision errors, and acknowledges that there is a range (i.e., gray region) of contaminant levels around the screening level where the variability in the data will make it difficult to determine whether the exposure area average concentration is actually above or below the screening level."

The gray region for the maximum mean concentration of each COC will be set from 0.5 times the SSL to 2.0 times the SSL. The PRGs presented in Table 2-1 will be used as the SSL for each analyzed parameter. This gray region is the range of contaminant levels near the SSL where variability in the data makes the decision too close to call. The value for the probability of a Type I error (i.e., the chance of recommending no further action when contamination still exists) will be fixed at $\alpha \leq 5\%$, and the value for a Type II error (i.e., the chance of determining contamination when none exists) will be set to $\beta = 20\%$. These are the default values suggested by USEPA's SSG (USEPA, 1996b) and supported by USEPA's Guidance for the DQO Process (USEPA, 1994). However, because the sampling methodology of this plan differs from the SSG and because the PRGs are based on site-specific data, the results of the composite samples will be compared to 1.0 times the SSLs. The change in screening criteria effectively reduces the possibility of not investigating further an SA with a true mean concentration greater than the screening level (Type I error). The consequences of a Type I error are potential public health; therefore, by reducing the Type I error, the methodology is more protective of receptors.

The SA Mean Test will be applied for each constituent analyzed at each SA. The following multiple hypothesis testing will be used:

A null hypothesis (H_0) of:

H_0: composite concentration of a given chemical $\geq$ 1.0 x SSL
and > the background concentration

will be tested versus the alternative hypothesis (H_A) of:

H_A: composite concentration of a given chemical < 1.0 x SSL

If the null hypothesis is accepted (i.e., a composite concentration is greater than one times the PRG and background concentration), and the DQOs were met, then further remediation is required at the SA in which the exceedance was found. If the null hypothesis is rejected in favor of the alternative hypothesis (i.e., a composite concentration is less than 1.0 times the PRG), and the DQOs were met, then the PRGs within the SA will be considered attained.

If all composite sample concentrations are less than 1.0 times the PRG (i.e., the null hypothesis is rejected for all COCs at all SAs), a DQO statistical analysis will be carried out as defined by the SSG protocol to determine if the coefficient of variation (CV) estimate of 2.5[1] was adequate for screening surface soils. Six adjacent SAs will be combined to create an EA. As a result, a minimum of 7 EAs (40 SAs) will be evaluated.

For a composite sample with a concentration less than 1.0 times the PRG, the CV for the EA being evaluated will be calculated using the following equation:

$$CV = \frac{C^{1/2} Sx}{\overline{X}}$$

where: C = number of grab samples per composite
Sx = sample standard deviation
$\overline{X}$ = sample mean

Concentration variability in an SA should be less than the variability across an EA, which comprises 6 SAs, based on spatial considerations alone. Thus, the CV computed in this manner is assumed to be a conservative estimate of the CV for each EA.

The CVs will be checked against the allowable CV of 2.5 to determine if the sampling size is adequate to meet the DQOs for the sampling effort. If sampling DQOs are not met, consideration will be given to supplementary sampling to achieve DQOs. The parties involved in making considerations will include the Navy, USEPA, and Maryland Department of the Environment (MDE). Considerations will include:

- A review of mean SA concentrations relative to PRGs.
- An evaluation of which SA concentrations are definitively greater than or less than PRGs.
- A review of expected contaminant mobility.

In addition, if the CV exceeds 2.5 and all the composite concentrations for the EA are less than PRGs, the composite concentrations can be compared to the value given by the expression $SSL/C^{1/2}$. If the maximum composite sample concentration is less than the value given by this equation, then the sample

[1] The CV of 2.5 matches the default CV recommended in the SSG Users Guide. The default CV actually results in a α = 8% and β = 21% (Exhibit 7, SSG Users Guide EPA, 1996a). To reduce the α closer to the goal of 5% 6 grabs per composite were chosen for this sampling plan. Based on Table 23 SSG Technical Background Document (EPA, 1996b), the α for 6 grabs per composite and 6 composites per EA equals 6% and the β equals 14%.

size will be assumed to be adequate (in accordance with the SSG User's Guide). Figure 2-1 provides a flow chart for the evaluation of verification sample results.

2.6 OPTIMIZE THE DESIGN FOR OBTAINING DATA - DQO PROCESS STEP 7

2.6.1 Sampling Approach for Isolated Excavation Areas

Due to the physical size and depth of the proposed isolated excavation areas north of the UXO 32 concrete pad (10 feet long by 10 feet wide by 6 inches deep), discrete samples will be collected to verify attainment of PRGs. At each isolated excavation area, five discrete verification samples will be collected (one from the excavation floor and one from each of the four excavation side walls). The locations of these discrete samples will be determined using a random number generator that selects a percent "X" and a percent "Y" distance from an origin. In each isolated excavation area, the origin for the floor samples will be the southwestern corner of the excavation, and the origin for the side wall samples will be the bottom left corner of each side wall (looking toward the excavation side wall from within the excavation area).

Figure 2-2A and 2-2B present the locations of the discrete samples. The identified locations are presented for information purposes only. After removal of contaminated soils and before the collection of verification samples, the actual locations of the discrete samples will be selected randomly within each isolated excavation area.

The soil samples collected from the isolated excavation areas will be analyzed for the COCs. With three isolated excavation areas, a minimum of 12 discrete verification samples will be collected as shown on Figures 2-2A and 2-2B. Table 2-2 provides a summary of the samples and analyses to be conducted for each isolated excavation area.

If verification sample results from soil samples collected from isolated excavation areas indicate that remaining contaminant levels are unacceptable, additional soil may be removed from the subject excavation area or the subject excavation area may be enlarged. Dimensions of increased excavations will be determined based on the results of the verification samples; gross remnant contamination will result in a larger increased excavation size than will slight remnant contamination. Considering a variety of factors, review of the analytical results from each isolated excavation area may indicate that the presence of a contaminant at concentrations greater than its PRG may be acceptable and no additional soil removal will be necessary. Such risk management decisions will be made by the IHIRT.

2.6.2 Sampling Approach for Bulk Excavation Area

According to the USEPA's SSG User's Guide (USEPA, 1996a), sites should be divided into EAs no greater than 0.5 acre in size. Each EA is further divided into quadrants. The SSG recommends obtaining six composite soil samples from each EA, with one of the four grabs per composite coming from each of the EA quadrants. This sampling approach (based strictly on the SSG) does not allow for differentiation within the entire 1/2-acre EA if one of the composite sample results exceeds the screening level. To more clearly define the areal extent of residual contamination following excavation, the concept of SAs was developed.

The SA concept subdivides the 1/2-acre EA into six relatively equally sized SAs. Within each SA, six grab samples are collected and used to create a composite sample (i.e., all grab samples that comprise a single composite sample are collected from a single SA). Therefore if a single composite sample result exceeds a screening criterion, the area requiring additional excavation/investigation is limited to the smaller SA area. Because there are six composite samples (and therefore six SAs) per EA, each SA should be approximately 1/12 of an acre (0.083 acre) in size.

One composite sample will be obtained from each SA and will consist of six grab samples collected from locations throughout the SA. Because the objective of the screening is to estimate mean contaminant concentrations, the physical "averaging" that occurs during composite sampling is consistent with the intended use of the data, and is therefore an acceptable technique that is consistent with the guidelines presented in the USEPA's Soil Screening Guidance: Technical Background Document (USEPA, 1996b). Although four grab samples per composite is the standard, six grabs per composite sample is an acceptable sampling strategy as outlined in the SSG Users Guide (USEPA, 1996a) and should result in a more representative composite from the SA. It also favors a greater level of decision making confidence than a composite comprising fewer grab samples.

The grab sample locations shown on Figures 2-2A and 2-2B were selected using a random number generator that selects a percent "X" and percent "Y" distance from an origin. The origin for each SA is the southwesternmost corner of the SA. These sample locations are presented for information purposes only. After removal of contaminated soils and before collecting the verification samples, the actual location of the grab points will be selected randomly within each SA.

Because the horizontal limits of the bulk excavation area have been established and will not be increased, aside from the deep excavation location, no side wall confirmation samples will be collected from the bulk excavation area.

The soil samples collected from the bulk excavation area will be analyzed for COCs. The bulk excavation area has been divided into 19 SAs as shown on Figures 2-2A and 2-2B. Table 2-2 provides a summary of the samples and analyses to be conducted for each SA.

If verification sample results from soil samples collected within the bulk excavation area indicate that remaining contaminant levels are unacceptable, additional soil may be removed from the subject SA. In the event that additional excavation is required in one or more SAs, TtNUS field personnel will collect an additional composite sample consisting of six grab sample locations within each SA where additional excavation occurs. Considering a variety of factors, review of the analytical results from each SA may indicate that a contaminant concentration greater than the PRG may be acceptable and no additional soil removal will be necessary. Such risk management decisions will be made by the IHIRT.

2.7 SAMPLE ANALYSES

The proposed sample analyses are based on the COCs from the FS. All excavation areas identified in the RD will be analyzed for the list of analytes presented in Tables 2-2 and 3-1.

In addition, rinsate blanks and field duplicates will be analyzed for quality control (QC) purposes as outlined in the QAPP included as Appendix B.

Although samples will be analyzed with a 3-day turnaround time and preliminary data will be provided by the laboratory, the results will not be considered final and the DQO process will not be completed until the data has been fully validated.

TABLE 2-1

SUMMARY OF CRITERIA FOR
COMPARISON TO VERIFICATION SAMPLE RESULTS
UXO 32 - SCRAP YARD
NSF-IH
INDIAN HEAD, MARYLAND

Chemical of Concern	CAS #	Preliminary Remediation Goals		USEPA Region III Residential Soil Risk Based Criteria[1]	USEPA Region III Soil to GW SSL (DAF = 20)[1]	Max. Background Surf./Subsurf. Detection[2]	USEPA Region III Industrial Soil Risk Based Criteria[1]
		Ecological PRG (0 to 6 inches)	Human Health PRG (> 6 inches)				
PCBs (ug/kg)							
Aroclor 1260 (Soil)	11096-82-5	1,000	1,000	320	---	---	1,400
INORGANICS (mg/kg)							
Arsenic	7440-38-2	15	29	0.43	0.026	3.3/10.4	1.8
Cadmium	7440-43-9	5	---	39	27	0.26/0.27	510
Lead[3]	7439-92-1	480	480	400	---	149/25.5	---
PAHs (ug/kg)							
Benzo(a)pyrene	50-32-8	330	330	22	120	---	390
Dibenzo(a,h)anthracene	53-70-3	330	330	22	460	---	390

1 USEPA, 2006
2 Background Investigation Report (B&R Environmental 1997). These values have been updated since the completion of the RI/FS Report for Site 41.
3 Lead level for residential and industrial exposures are based on USEPA Region 9 PRGs, November 2000.

DAF Dilution Attenuation Factor
SSL Soil Screening Level
NA Not Applicable
--- Not Available

Shaded values are the selected PRGs for the UXO 32 removal action.

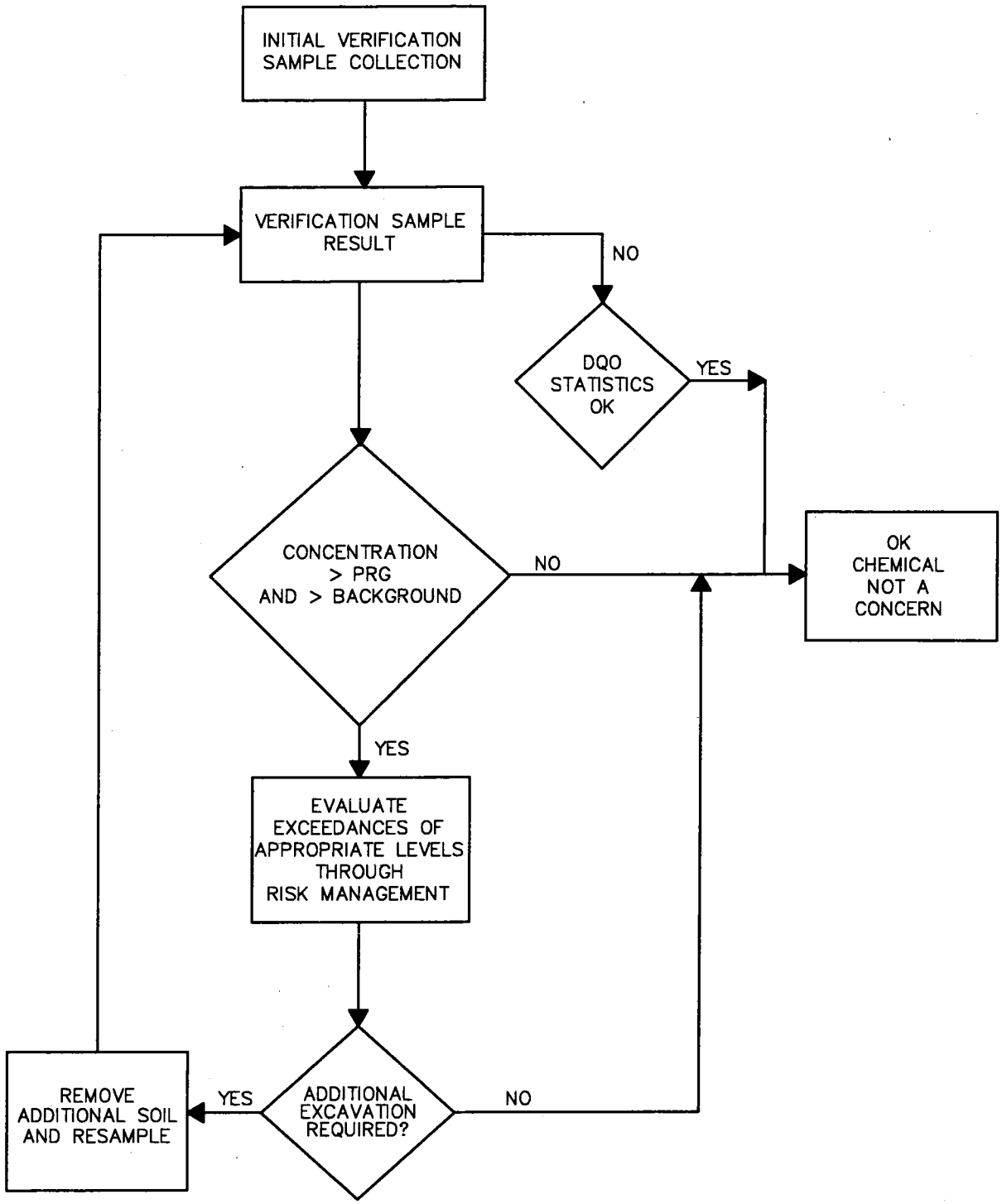
TABLE 2-2

SUMMARY OF PROPOSED VERIFICATION SAMPLING
UXO 32 - SCRAP YARD
NSF-IH, INDIAN HEAD, MARYLAND

Sample Identification	Method of Collection[1]	Sample Collection Depth (ft bgs)	Analysis		
			PCBs[1]	Inorganics[2]	PAHs[3]
SOIL SAMPLES FROM BULK EXCAVATION AREA					
U32SOS010101	Composite soil sample (floor)	0 to 1 foot	X	X	X
U32SOS020101	Composite soil sample (floor)	0 to 1 foot	X	X	X
U32SOS030101	Composite soil sample (floor)	0 to 1 foot	X	X	X
U32SOS040101	Composite soil sample (floor)	0 to 1 foot	X	X	X
U32SOS050101	Composite soil sample (floor)	0 to 1 foot	X	X	X
U32SOS060101	Composite soil sample (floor)	0 to 1 foot	X	X	X
U32SOS070101	Composite soil sample (floor)	0 to 1 foot	X	X	X
U32SOS080101	Composite soil sample (floor)	0 to 1 foot	X	X	X
U32SOS090101	Composite soil sample (floor)	0 to 1 foot	X	X	X
U32SOS100101	Composite soil sample (floor)	0 to 1 foot	X	X	X
U32SOS110101	Composite soil sample (floor)	0 to 1 foot	X	X	X
U32SOS120101	Composite soil sample (floor)	0 to 1 foot	X	X	X
U32SOS130101	Composite soil sample (floor)	0 to 1 foot	X	X	X
U32SOS140101	Composite soil sample (floor)	0 to 1 foot	X	X	X
U32SOS150101	Composite soil sample (floor)	0 to 1 foot	X	X	X
U32SOS160101	Composite soil sample (wall)	0 to 1 foot	X	X	X
U32SOS170101	Composite soil sample (wall)	0 to 1 foot	X	X	X
U32SOS180101	Composite soil sample (wall)	0 to 1 foot	X	X	X
U32SOS190101	Composite soil sample (wall)	0 to 1 foot	X	X	X
SOIL SAMPLES FROM ISOLATED EXCAVATION AREAS					
U32SOS20FL0101	Discrete soil sample (floor)	0 to 1 foot	X	X	X
U32SOS20WL0101	Discrete soil sample (wall)	0 to 1 foot	X	X	X
U32SOS20WL0201	Discrete soil sample (wall)	0 to 1 foot	X	X	X
U32SOS20WL0301	Discrete soil sample (wall)	0 to 1 foot	X	X	X
U32SOS20WL0401	Discrete soil sample (wall)	0 to 1 foot	X	X	X
U32SOS21FL0101	Discrete soil sample (floor)	0 to 1 foot	X	X	X
U32SOS21WL0101	Discrete soil sample (wall)	0 to 1 foot	X	X	X
U32SOS21WL0201	Discrete soil sample (wall)	0 to 1 foot	X	X	X
U32SOS21WL0301	Discrete soil sample (wall)	0 to 1 foot	X	X	X
U32SOS21WL0401	Discrete soil sample (wall)	0 to 1 foot	X	X	X
U32SOS22FL0101	Discrete soil sample (floor)	0 to 1 foot	X	X	X
U32SOS22WL0101	Discrete soil sample (wall)	0 to 1 foot	X	X	X
U32SOS22WL0201	Discrete soil sample (wall)	0 to 1 foot	X	X	X
U32SOS22WL0301	Discrete soil sample (wall)	0 to 1 foot	X	X	X
U32SOS22WL0401	Discrete soil sample (wall)	0 to 1 foot	X	X	X
RINSATE BLANKS[4]					
U32RBXXXXXXX	Rinse Blank	--	X	X	X
DUPLICATE SAMPLES[5]					
U32SODUPXXXX	Discrete or Composite	0 to 1 foot	X	X	X

1 Parameter includes Aroclor 1260.
2 Parameters include arsenic, cadmium, and lead.
3 Parameters include benzo(a)pyrene and dibenzo(a,h)anthracene.
4 One rinsate blank will be collected each day soil sampling occurs. A rinse blank collected on March 26, 2007 would be identified as U32RB032607.
5 Duplicate samples will be collected at a rate of 1 for every 10 samples collected.

ACAD:0307KF01.dwg 01/24/07 DT



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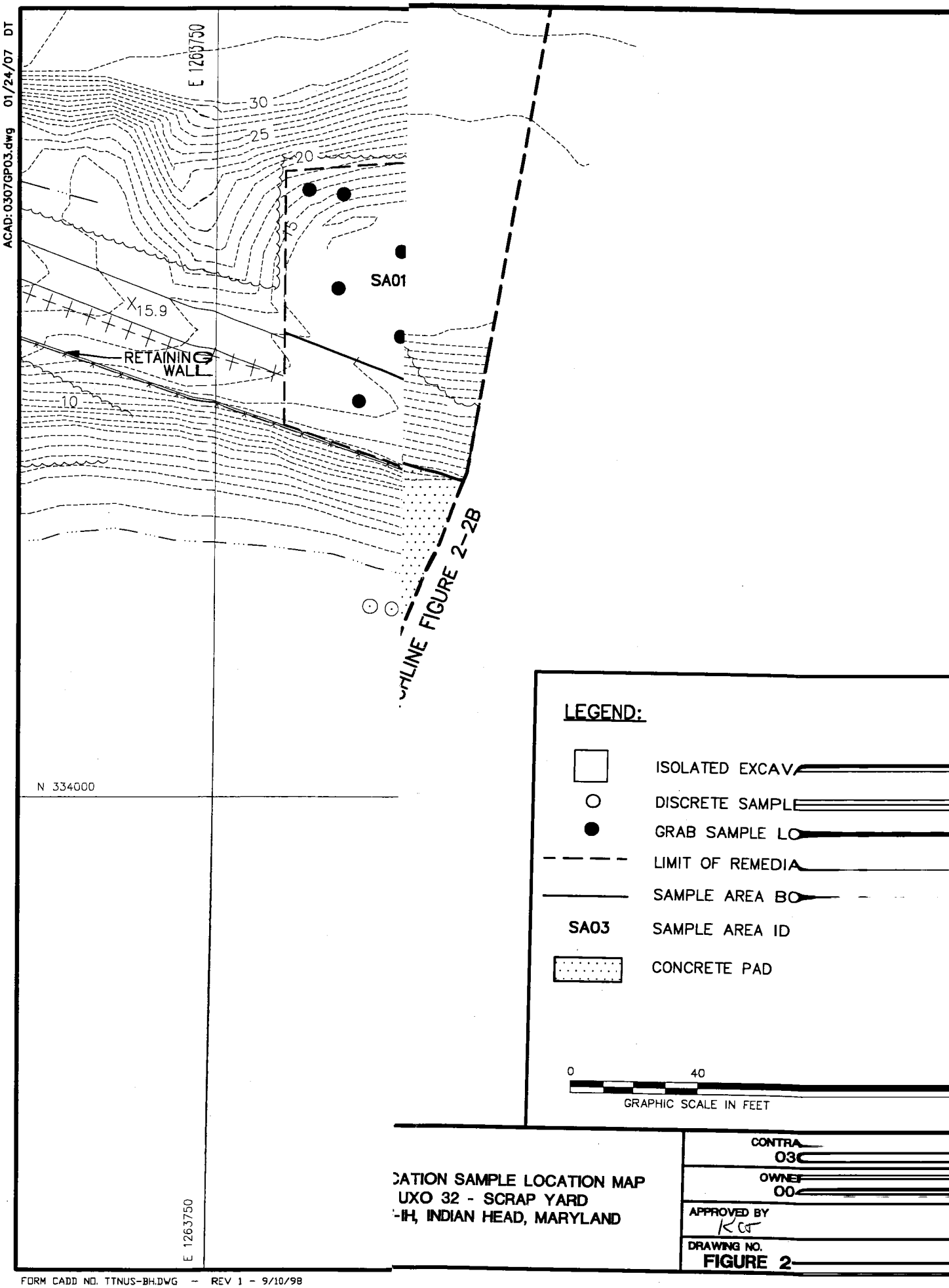
CHECKED BY DATE 1/24/07			OWNER NO. 0047
REVISED BY DATE			APPROVED BY KCT DATE 1/25/07
SCALE NOT TO SCALE			DRAWING NO. FIGURE 2-1 REV. 0

FORM CADD NO. TTNUS-AV.DWG - REV 1 -9/10/98



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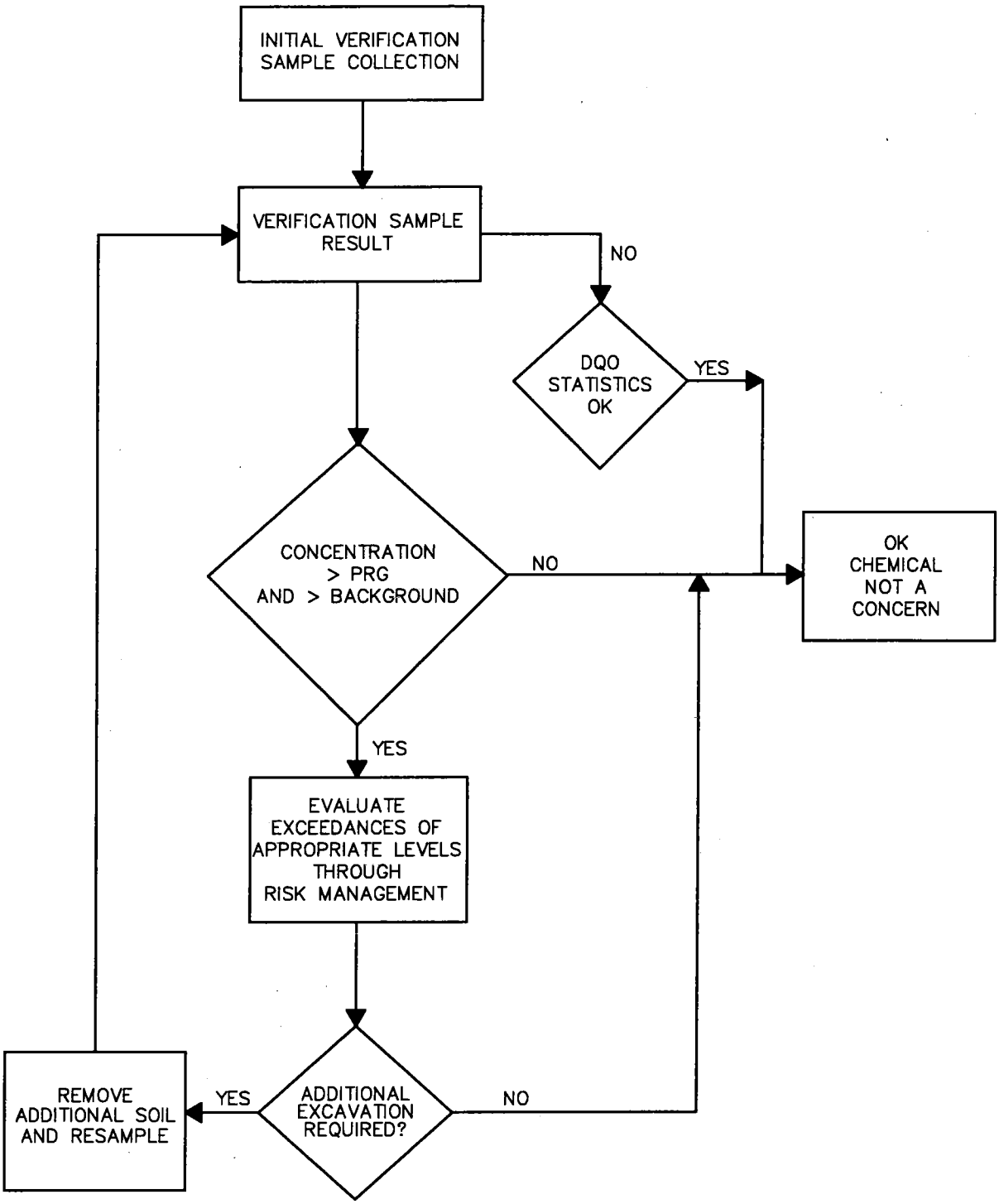
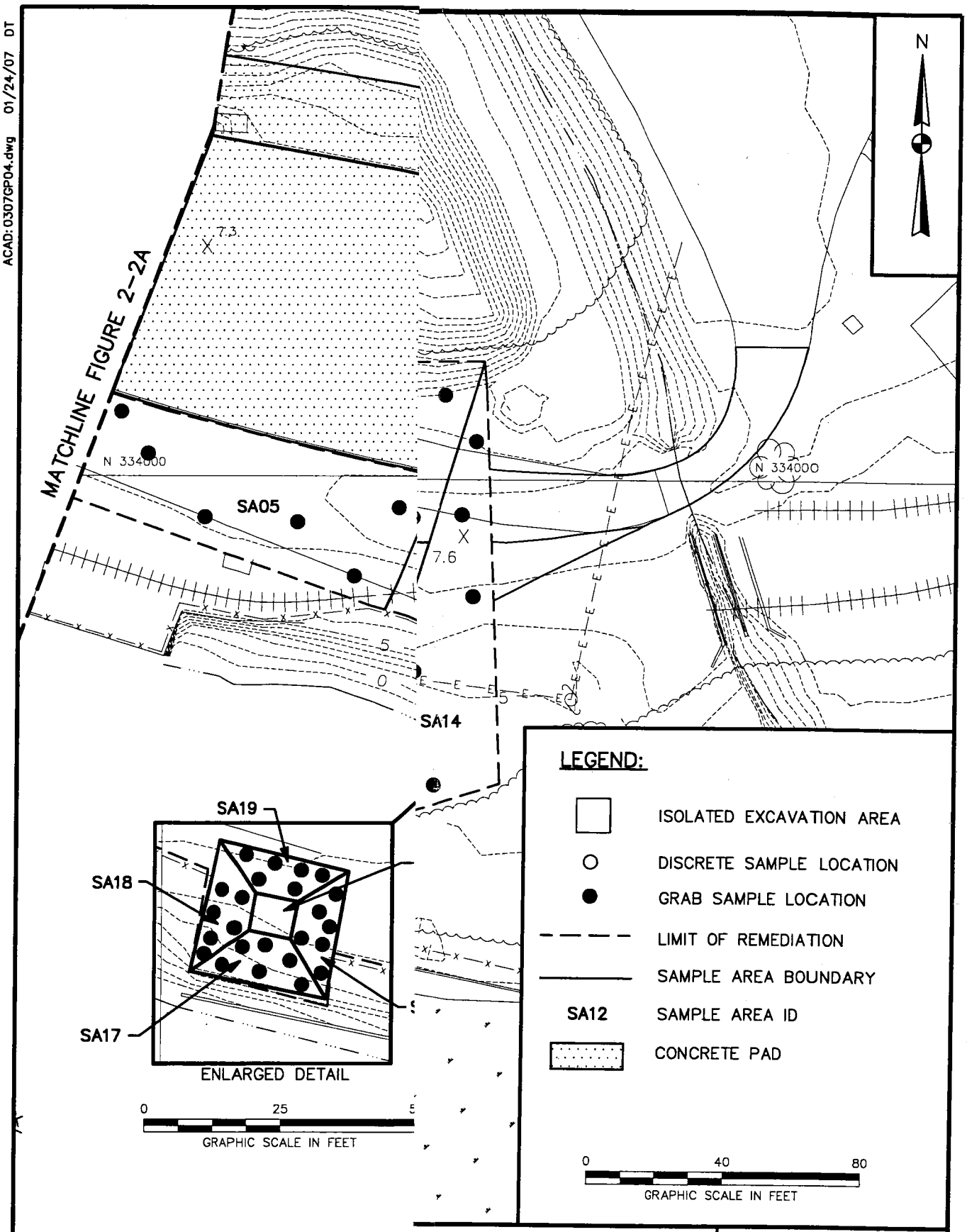


DRAWN BY HJB DATE 1/5/07	Tetra Tech NUS, Inc.	DATA EVALUATION FLOW CHART UXO 32 - SCRAP YARD NSF-IH, INDIAN HEAD, MARYLAND	CONTRACT NO. 0307
CHECKED BY DATE 1/24/07			OWNER NO. 0047
REVISED BY DATE			APPROVED BY KCT DATE 1/25/07
SCALE NOT TO SCALE			DRAWING NO. FIGURE 2-1 REV. 0

FORM CADD NO. TTNUS-AV.DWG - REV 1 -9/10/98



ATION SAMPLE LOCATION MAP
UXO 32 - SCRAP YARD
IH, INDIAN HEAD, MARYLAND

CONTRACT NO. 0307	
OWNER NO. 0047	
APPROVED BY KCG	DATE 1/25/07
DRAWING NO. FIGURE 2-2B	REV. 0

3.0 FIELD ACTIVITIES AND PROCEDURES

Summary tables and corresponding figures have been developed to identify the locations, identification numbers, analytical requirements, analytical methods, volumes, and holding times for each of the proposed samples.

The sample identification numbers, methods of collection, depths, and required analyses for the samples proposed at UXO 32 are provided in Table 2-2. A summary of the analytical methods and bottleware, preservation, and holding time requirements is provided in Table 3-1.

The field activities will include the following tasks:

- Mobilization/demobilization
- Soil sampling
- Sample handling
- Documentation of sample custody

3.1 MOBILIZATION/DEMOBILIZATION

TtNUS will prepare specifications and obtain a subcontractor for the laboratory analyses. All field team members will review this VSAP, the project HASP, and the QAPP prior to the initiation of verification sampling and analysis field activities. The project-specific HASP is provided in Appendix A, and the QAPP is provided in Appendix B. In addition, a field team orientation meeting will be held at UXO 32 to familiarize personnel with the scope of the field activities.

3.2 SAMPLING

3.2.1 Soil Sampling

Soil sampling operations will be conducted as described in the NSF-IH SOP SA-1.3 (TtNUS, 2004). A stainless-steel or disposable trowel will be used to collect the grab soil samples from a depth of 0 to 1 foot bgs. The grab soil samples will be composited in a stainless-steel or disposable bowl. The trowel and bowl will be decontaminated between each sample area in accordance with NSF-IH SOP SA-7.1 (TtNUS, 2004). All pertinent field data will be recorded on a sample log form and in the field logbook. Sample field logs are provided in Appendix C.

3.3 PERSONAL PROTECTIVE EQUIPMENT

Personal protective equipment (PPE) and other miscellaneous trash visibly free of soil will be double bagged and disposed in a designated trash receptacle. Decontamination fluids will be containerized and disposed off site. No other investigation-derived waste (IDW) will be generated during the course of this work. It is anticipated that the IDW will be disposed by the RAC with the decontamination fluids generated by the RAC during construction activities.

3.4 SAMPLE HANDLING

Sample handling includes the field-related consideration of the selection of sample containers, preservatives, and allowable holding times. Sample identification, packaging, and shipping are outlined in NSF-IH SOP SA-6.1 (TtNUS, 2004). Summaries of sample containers, volume requirements, preservatives, allowable holding times, and requested analysis as it applies to UXO 32 are provided in Tables 2-2 and 3-1.

3.4.1 Field Documentation

Sample documentation consists of the completion of chain-of-custody reports and matrix-specific log sheets. Chain-of-custody reports are detailed in Section 5.0 of the project-specific QAPP in Appendix B. In addition, the Master Site Logbook, filled out in accordance with NSF-IH SOP SA-6.3 (TtNUS, 2004), serves as the overall record of field activities. Information included daily in the Master Site Logbook includes weather conditions, identity and arrival and departure times of personnel, management issues, etc.

3.4.2 Sample Nomenclature

Each collected sample will be assigned a unique sample tracking number. The sample tracking number will consist of a 12-digit alpha-numeric code, in accordance with NSF-IH SOP CT-04 (TtNUS, 2004). Any other pertinent information regarding sample identification will be recorded in the field logbook and on the sample log sheet. Table 2-2 summarizes the sample identification numbers to be used during this investigation.

The alpha-numeric code to be used in the sample system is as follows:

Character Type:

A	=	Alpha
N	=	Numeric
E	=	Either alpha or numeric

(ANN)	(AA)	(EEE)	(NN)	(NN)
[Site]	[Sample Type]	[Sample Location]	[Sample Depth]	[Sample Round]

No dashes are to be used in the sample number.

Site:

U32 - UXO 32

Sample Type:

SO = Soil Sample

This field may also be used for the quality assurance (QA) and QC designation:

RB = Rinsate blank

Sample Location:

S03 = Sample location identifier. The example indicates the sample is collected for SA 03. QA/QC samples will be numbered sequentially in the order of collection, beginning with 001. An example sample number for the third rinsate blank collected during the first field effort at UXO 32 is "U32RB0030001"

Sample Depth:

NN = Number sequentially in the order the sample is collected from a single location and representing a unique sampling depth. The depth interval will be recorded in the field logbook. As an example, 01 would indicate a sample collected after the required excavation. In the event additional excavation is required, and additional samples are collected, this number will increase to 02.

Sampling Round:

01 = The sampling round refers to the field event for the site being investigated. This investigation is the first investigation for UXO 32. Therefore, all sample IDs will end in "01."

Duplicate samples will be reported blind to the laboratory. The three-digit sample location identifier field will be assigned the designation "DUP." The sample depth field will be assigned the duplicate number collected for that specific matrix. For example, the second duplicate soil sample will be labeled

U32SODUP0201. The time designated on the sample label and the chain-of-custody form will be 0000 hours. The location at which the duplicate is collected will be noted on the sample log sheet and in the field notebook. Additional guidance is provided in the NSF-IH SOP CT-04 (TtNUS, 2004).

For the isolated excavation areas, both excavation floor and excavation side wall samples will be collected. Therefore, the sample nomenclature for these samples will differ from the sample nomenclature for samples collected from the bulk excavation area. This change is being made because of the importance to designate the difference between floor and side wall samples. As an example, the sample number U32SOS21WL0201 indicates the sample is a soil sample collected from UXO 32 in excavation area 21 from side wall 2 during the first round of sampling.

3.4.3 Sample Preservation

The existence of some chemical constituents in some environmental matrices is unstable. Therefore, these types of samples must be "stabilized" using preservatives and/or special handling procedures. These preservation techniques prevent degradation of the sample to ensure that the sample is representative of actual site conditions. Preservation requirements for samples to be collected at UXO 32 are presented in Table 3-1.

3.4.4 Documentation, Sample Packaging, and Shipping

Samples will be packaged and shipped in accordance with NSF-IH SOP SA-6.1 (TtNUS, 2004).

3.5 DOCUMENTATION OF SAMPLE CUSTODY

Custody of samples must be maintained and documented at all times. The chain-of-custody process begins with the collection of the samples in the field and ends with disposal by the laboratory. The project-specific QAPP (Appendix B) and NSF-IH SOP SA-6.3 (TtNUS, 2004) further detail chain-of-custody procedures.

TABLE 3-1

REQUIREMENTS FOR BOTTLEWARE, PRESERVATION, AND HOLDING TIMES
UXO 32 - SCRAP YARD
NSF-IH, INDIAN HEAD, MARYLAND

Analysis	Method [1]	Sample Volume	Container Material	Preservation	Holding Time [2] [3]
SOIL SAMPLES					
Metals [4]	CLP SOW ILM04.1	4 oz.	Wide-mouth glass jar	Cool to 4° C	6 months to analysis
PCBs [5]	SW846 8082	4 oz.	Wide-mouth glass jar	Cool to 4° C	7 days to extract; 40 days to analysis
PAHs [6]	SW846 8310	4 oz.	Wide-mouth glass jar	Cool to 4° C	7 days to extract; 40 days to analysis
AQUEOUS SAMPLES					
Metals [4]	CLP SOW ILM04.1	500 ml	HDPE	HNO_3 to pH<2	6 months to analysis
PCBs [5]	W846 8082	1 L	Amber glass	Cool to 4° C	7 days to extract; 40 days to analysis
PAHs [6]	SW846 8310	1 L	Amber glass	Cool to 4° C	7 days to extract; 40 days to analysis

1 Method number shall be indicated on the chain-of-custody.
2 Holding time is measured from time of sample collection.
3 All samples will be analyzed within a 3-day turnaround time.
4 Metals include arsenic, cadmium, and lead.
5 PCBs include Aroclor-1260.
6 PAHs include benzo(a)pyrene and dibenzo(a,h)anthracene.

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APPENDIX A

PROJECT HEALTH AND SAFETY PLAN

Project Specific
Health and Safety Plan
for
UXO 32 (Site 41) – Scrap Yard
Naval Support Facility, Indian Head
Indian Head, Maryland

Naval Facilities Engineering Command
Washington
Contract No. N62472-03-D-0057
Contract Task Order 0047

January 2007

PROJECT SPECIFIC HEALTH AND SAFETY PLAN FOR UXO 32 (SITE 41) – SCRAP YARD

NAVAL SUPPORT FACILITY, INDIAN HEAD INDIAN HEAD, MARYLAND

COMPREHENSIVE LONG-TERM ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

Submitted to:
Naval Facilities Engineering Command Washington
1314 Harwood Street, SE
Washington Navy Yard, D.C. 20374-5018

Submitted by:
Tetra Tech NUS, Inc.
600 Clark Avenue, Suite 3
King of Prussia, PA 19406-1433

CONTRACT NO. N62472-03-D-0057
CONTRACT TASK ORDER 0047

JANUARY 2007

PREPARED UNDER THE SUPERVISION OF:

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APPROVED FOR SUBMITTAL BY:

Matthew M. Soltis

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FIGURES

1.0 INTRODUCTION

The objective of this Health and Safety Plan (HASP) is to provide the minimum safety practices and procedures for Tetra Tech NUS, Inc. (TtNUS) and subcontractor personnel engaged in proposed site activities that are to be conducted at UXO 32 – Scrap Yard (formerly Site 41) at the Naval Support Facility, Indian Head (NSF-IH), located in Indian Head, Maryland.

In order to accomplish the objective, this HASP has been constructed using the latest available information regarding known or suspected chemical contaminants and potential and foreseeable physical hazards associated with the proposed work at the sites identified at the NSF-IH. This HASP has been designed to be used in accordance with the TtNUS Health and Safety Guidance Manual. The Guidance Manual provides detailed information pertaining to procedures to be performed on site as directed by the HASP, as well as TtNUS standard operating procedures. Both the HASP and the Health and Safety Guidance Manual must be present at the site to comply with the requirements stipulated in the Occupational Safety and Health Administration (OSHA) standard 29 CFR 1910.120.

This HASP has been written to support proposed tasks and techniques associated with the scope of work as presented in Section 4.0. Should the proposed work site conditions and/or suspected hazards change, or if new information becomes available, this document will be modified. Changes to the HASP will be made with the approval of the TtNUS CLEAN Health and Safety Manager (HSM) and the Project Manager (PM). The PM will notify the affected personnel of the changes.

The elements of this HASP are in compliance with the requirements established by OSHA 29 CFR 1910.120, "Hazardous Waste Operations and Emergency Response" (HAZWOPER) and sections of 29 CFR 1926, "Safety and Health Regulations for Construction."

1.1 AUTHORITY

This Contract Task Order (CTO) 0047 and the requirements set forth represent an integral part of an overall effort conducted under the Comprehensive Long - Term Environmental Action Navy (CLEAN) contract, administered through the U.S. Navy Naval Facilities Engineering Command Atlantic, as defined under Contract No. N62472-03-D-0057.

1.2 KEY PROJECT PERSONNEL AND ORGANIZATION

This section defines responsibility for site safety and health for TtNUS and subcontractor employees engaged in on site activities. Personnel assigned to these positions shall exercise the primary

responsibility for the on site health and safety. These persons will be the primary point of contact for any questions regarding the safety and health procedures and the selected control measures.

- The TtNUS Project Manager (PM) is responsible for the overall direction and implementation of health and safety for this project.

- The TtNUS Field Operations Leader (FOL) is responsible for implementation of this HASP with the assistance of an appointed Site Safety Officer (SSO). The FOL manages field activities, executes the work plan, and enforces safety procedures, as applicable to the work plan.

- The SSO supports site activities by advising the FOL on the aspects of health and safety on site. These duties may include the following:

    - Coordinates health and safety activities with the FOL.
    - Selects, inspects, implements, and maintains personal protective equipment.
    - Establishes work zones and control points.
    - Directs and assists in the development of decontamination areas and procedures.
    - Implements air monitoring program in support of on site activities.
    - Verifies training and medical status of on site personnel status in relation to site activities.
    - Implements hazard communication, respiratory protection, and other associated safety and health programs, as necessary.
    - Coordinates emergency services.
    - Provides site-specific training for on site personnel.

- Compliance with these requirements is monitored by the Project Health and Safety Officer (PHSO) and is coordinated through the Health and Safety Manager.

1.3 SITE INFORMATION AND PERSONNEL ASSIGNMENTS

Site Name: Naval Support Facility Indian Head **Address:** Indian Head, Maryland

Site Point of Contact: Shawn Jorgensen **Phone Number:** (301) 744-2263 or 6745

Navy Remedial Project Manager Joseph Rail, P.E. **Phone Number:** (202) 685-3105

Scheduled Activities: This activity will be divided into a multi-task operation performed sequentially through the execution of the elements as defined in the scope of work (See Section 4.0)

Proposed Dates of Work: June 2007

Project Team:

TtNUS Management Personnel:	**Discipline/Tasks Assigned:**
Kim Turnbull	Project Manager (PM)
TBD	Field Operations Leader (FOL)
TBD	Field Geologist
Matthew M. Soltis, CIH, CSP	Health and Safety Manager (HSM)
TBD	Site Safety Officer (SSO)
Clyde Snyder	Project Health and Safety Officer (PHSO)

Non-TtNUS Personnel	**Affiliation/Discipline/Tasks Assigned**

Hazard Assessment (for purposes of 29 CFR 1010.132) for HASP preparation has been conducted by:
Clyde Snyder

2.0 EMERGENCY ACTION PLAN

2.1 INTRODUCTION

This section has been developed as part of a planning effort to direct and guide field personnel in the event of an emergency. Site activities will be coordinated with the client contact, Shawn Jorgensen. In the event of an emergency which cannot be mitigated using onsite resources, personnel will evacuate to a safe place of refuge and the appropriate emergency response agencies will be notified. It has been determined that the majority of potential emergency situations would be better supported by outside emergency responders. Based on this determination, TtNUS and subcontractor personnel will not provide emergency response support beyond the capabilities of onsite response. Workers who are ill or who have suffered a non-serious injury may be transported by site personnel to nearby medical facilities, provided that such transport does not aggravate or further endanger the welfare of the injured/ill person. The emergency response agencies listed in this plan are capable of providing the most effective response, and as such, will be designated as the primary responders. These agencies are located within a reasonable distance from the area of site operations, which ensures adequate emergency response time. Navy contact Shawn Jorgensen will be notified anytime outside response agencies are contacted. This Emergency Action Plan conforms to the requirements of 29 CFR 1910.38(a), as allowed in 29 CFR 1910.120(l)(1)(ii).

TtNUS will, through necessary services, provide the following emergency action measures:

- Initial stage fire fighting support and prevention
- Initial spill control and containment measures and prevention
- Removal of personnel from emergency situations such as confined space entry
- Initial medical support for injuries or illnesses requiring basic first-aid
- Site control and security measures as necessary

2.2 EMERGENCY PLANNING

Through the initial hazard/risk assessment effort, it is anticipated that emergencies resulting from chemical, physical, or fire hazards are unlikely given the nature of site activities.

To minimize and eliminate the potential for any emergency situations, emergency planning activities will include the following (which are the responsibility of the FOL):

- Coordinating with local Emergency Response personnel to ensure that TtNUS emergency action activities are compatible with existing emergency response procedures. Base Fire Protection and Emergency Services will be notified of scheduled events and activities.

- Establishing and maintaining information at the project staging area (support zone) for easy access in the event of an emergency. This information will include the following:

  - Chemical Inventory (of chemicals used onsite), with Material Safety Data Sheets.
  - Onsite personnel medical records (Medical Data Sheets).
  - A log book identifying personnel onsite each day.
  - Hospital route maps with directions (these should also be placed in each site vehicle).
  - Emergency Notification - phone numbers.

The TtNUS FOL will be responsible for the following tasks:

- Identifying a chain of command for emergency action.

- Educating site workers to the hazards and control measures associated with planned activities at the site, and providing early recognition and prevention, where possible.

- Periodically performing practice drills to ensure site workers are familiar with incidental response measures.

- Providing the necessary equipment to safely accomplish identified tasks.

2.3 EMERGENCY RECOGNITION AND PREVENTION

2.3.1 Recognition

Emergency situations that may be encountered during site activities will generally be recognized by visual observation. To adequately recognize chemical exposures, site personnel must have a clear knowledge of signs and symptoms of exposure associated with site contaminants. This information is provided in Table 6-1. Tasks to be performed at the site, potential hazards associated with those tasks and the recommended control methods are discussed in detail in Sections 5.0 and 6.0. Additionally, early recognition of hazards will be supported by periodic site surveys to identify any situation predisposed to an emergency. The FOL will be responsible for performing surveys of work areas prior to initiating site operations and periodically while operations are being conducted. Survey findings will be documented by the FOL in the site logbook, however, site personnel will be responsible for reporting hazardous situations.

Where potential hazards exist, TtNUS will initiate control measures to prevent adverse effects to human health and the environment.

The above actions will provide early recognition for potential emergency situations, and allow TtNUS to initiate necessary control measures. However, if the FOL determines that control measures are not sufficient to eliminate the hazard, TtNUS will withdraw from the site and notify the appropriate response agencies listed in Table 2-1.

2.3.2 Prevention

TtNUS and subcontractor personnel will minimize the potential for emergencies by following this HASP, the Health and Safety Guidance Manual, and applicable OSHA regulations. Periodic site surveys of work areas and correction of any identified deficiencies prior to the commencement of that day's activities by the FOL will also assist in prevention of illness/injuries when hazards are recognized early and control measures initiated.

2.4 EVACUATION ROUTES, PROCEDURES, AND PLACES OF REFUGE

An evacuation will be initiated whenever recommended hazard controls are insufficient to protect the health, safety or welfare of site workers. Specific examples of conditions that may initiate an evacuation include, but are not limited to the following: severe weather conditions; fire or explosion; and evidence of personnel overexposure to potential site contaminants.

In the event of an emergency requiring evacuation, personnel will immediately stop activities and report to the designated safe place of refuge unless doing so would pose additional risks. When evacuation to the primary place of refuge is not possible, personnel will proceed to a designated alternate location and remain until further notification from the TtNUS FOL. Safe places of refuge will be identified prior to the commencement of site activities by the FOL and will be conveyed to personnel as part of the pre-activities briefing session. This information will be reiterated during daily safety meetings and indicated on the Safe Work Permits. Whenever possible, the safe place of refuge will also serve as the telephone communications point for that area. During an evacuation, personnel will remain at the refuge location until directed otherwise by the TtNUS FOL or the on-site Incident Commander of the Emergency Response Team. The FOL will perform a head count at this location to account for and to confirm the location of site personnel. Emergency response personnel will be immediately notified of any unaccounted personnel. The FOL will document the names of personnel onsite (on a daily basis) in the site Health and Safety Logbook. This information will be utilized to perform the head count in the event of an emergency.

Evacuation procedures will be discussed during the pre-activities training session, prior to the initiation of project tasks. Evacuation routes from the site and safe places of refuge are dependent upon the location at which work is being performed and the circumstances under which an evacuation is required. Additionally, site location and meteorological conditions (i.e., wind speed and direction) may dictate evacuation routes. As a result, assembly points will be selected and communicated to the workers relative to the site location where work is being performed. Evacuation should always take place in an upwind direction from the site and away from water bodies.

2.5 EMERGENCY ALERTING AND ACTION/RESPONSE PROCEDURES

TtNUS personnel will likely be working in close proximity to each other during planned site activities. Site personnel will initiate emergency notification to onsite personnel by voice commands, hand signals, vehicle horns, or line of site communication to alert site personnel of an emergency. When project tasks are performed simultaneously on different sites, radios will be used to communicate emergency situations and request assistance. The Fire Department will provide rescue services, if needed, during confined space entry operations. The details for notification must be documented in the permit.

If an emergency warranting evacuation occurs, the following procedures are to be initiated:

- Initiate the evacuation via appropriate and/or available communication method (hand signals, voice commands, etc.).
- Report to the designated refuge point.
- Once non-essential personnel are evacuated, appropriate response procedures will be enacted to control the situation.
- Describe to the FOL (serving as the Incident Coordinator) pertinent incident details.

In the event that site personnel cannot mitigate the hazardous situation, the FOL will enact emergency notification procedures to secure additional assistance in the following manner:

Contact pertinent emergency contacts listed in Table 2-1 and report the incident. Give the emergency operator the location of the emergency, the type of emergency, the number of injured, and a brief description of the incident. Stay on the phone and follow the instructions given by the operator. The operator will then notify and dispatch the proper emergency response agencies.

2.6 EMERGENCY CONTACTS

Prior to initiating field activities, personnel will be thoroughly briefed on the emergency procedures to be followed in the event of an accident. Table 2-1 provides a list of emergency contacts and their associated

telephone numbers. This table must be posted where it is readily available to site personnel. Facility maps should also be posted showing potential evacuation routes and designated meeting areas.

TABLE 2-1
EMERGENCY REFERENCE
UXO 32 (SITE 41) – SCRAP YARD
NSF-IH, INDIAN HEAD, MARYLAND

AGENCY	TELEPHONE
EMERGENCY (fire, ambulance, rescue, police)	(301) 744-4333
Hospital: Civista Medical Center	(301) 609-4000
Hospital: Fort Washington Hospital	(301) 292-7000
National Capital Poison Center	(800) 222-1222
Chemtrec	(800) 424-9300
National Response Center	(800) 424-8802
Site Point of Contact Shawn Jorgensen	(301) 744-2263
Navy Remedial Project Manager Jeff Morris	(202) 685-3279
TtNUS, Pittsburgh Office	(412) 921-7090
Health and Safety Manager Matthew M. Soltis, CIH, CSP	(412) 921-8912
Project Health and Safety Officer James K. Laffey	(412) 921-8678
Project Manager Kim Turnbull	(412) 921-8945

2.7 EMERGENCY ROUTES TO HOSPITALS

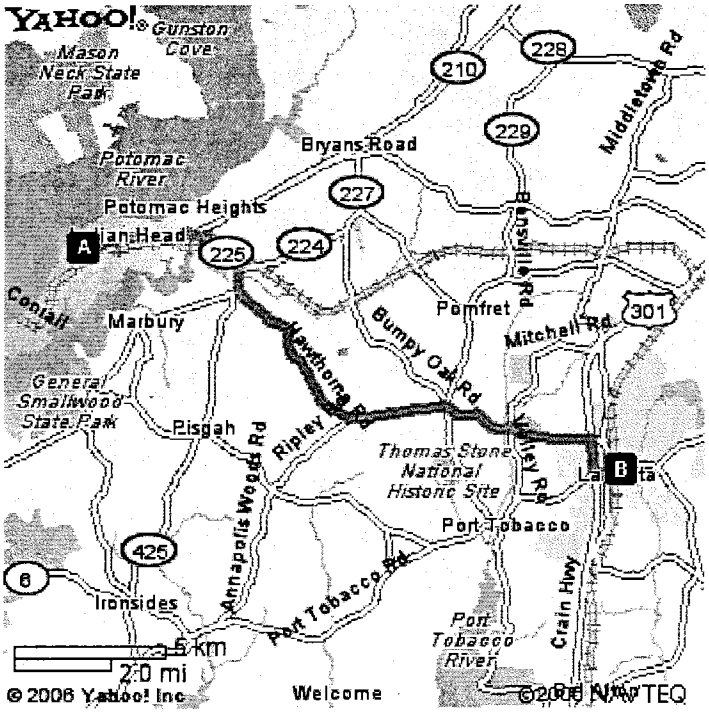
The closest hospital to the NSF-IH is the Civista Medical Center in La Plata, Maryland. The alternate hospital is Fort Washington Hospital in Fort Washington, Maryland. Maps showing the proximity of the NSF-IH to both of the hospitals are included as Figure 2-1 and 2-1.1. Directions and maps to both Civista Medical Center and Fort Washington Hospital are provided below:

Civista Medical Center
701 East Charles Street,
La Plata, MD 20646
(301) 609-4000

- Exit the facility and proceed east on MD Route 210 (Indian Head Highway) for 0.4 miles.
- Turn RIGHT on Route 228 (Hawthorne Road) and follow the road for 10.4 miles.
- Turn RIGHT on Route 301 South (Crane Highway) and follow the road for 0.7 mile.
- Turn LEFT on Route 6 (Charles Street) and follow the road for 0.6 mile.
- Turn RIGHT into the hospital.

FIGURE 2-1

Route to Civista Medical Center

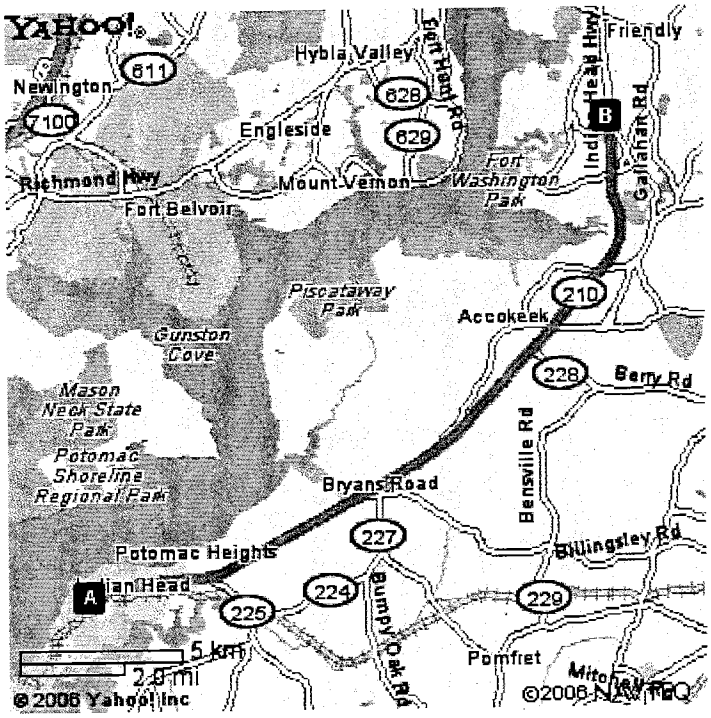


Fort Washington Hospital
11711 Livingston Road
Fort Washington, MD 20744
(301) 292-7000

- Exit the facility and proceed east on MD Route 210 (Indian Head Highway) for 14.5 miles.
- Turn LEFT on Swan Creek Road East (Hawthorne Road) and follow the road for less than 0.1 mile.
- Turn RIGHT on Livingston Road and follow the road for 0.2 mile.
- Turn LEFT into the hospital.

FIGURE 2-1.1

Route to Fort Washington Hospital Center



2.8 DECONTAMINATION PROCEDURES / EMERGENCY MEDICAL TREATMENT

During any site evacuation, decontamination procedures will be performed only if doing so does not further jeopardize the welfare of site workers. Decontamination will not be performed if the incident warrants immediate evacuation. However, it is unlikely that an evacuation would occur which would require workers to evacuate the site without first performing the necessary decontamination procedures.

TtNUS personnel will perform removal of personnel from emergency situations and may provide initial medical support for injury/illnesses requiring only first-aid level support. Medical attention above that level will require assistance and support from the designated emergency response agencies. Attachment I provides the procedure to follow when reporting an injury/illness, and the form to be used for this purpose. If the emergency involves personnel exposures to chemicals, follow the steps provided in Figure 2-2.

2.9 INJURY AND ILLNESS REPORTING

Any pertinent information regarding allergies to medications or other special conditions will be provided to medical service personnel. This information is listed on Medical Data Sheets filed onsite. If an exposure to hazardous materials has occurred, provide hazard information from Table 6-1 to medical service personnel. As soon as possible, Navy contact Shawn Jorgensen must be informed of any incident or accident that requires medical attention.

2.10 PPE AND EMERGENCY EQUIPMENT

A first-aid kit, eye wash units (or bottles of disposable eyewash solution) and a fire extinguisher will be maintained onsite and shall be immediately available for use in the event of an emergency. This equipment will be located in the field office or site vehicle. Personnel identified within the field crew with bloodborne pathogen and first-aid training will be the only personnel permitted to offer first-aid assistance.

FIGURE 2-2
POTENTIAL EXPOSURE PROTOCOL

The purpose of this protocol is to provide guidance for the medical management of injury situations.

In the event of a personnel injury or accident:

- Rescue, when necessary, employing proper equipment and methods.
- Give attention to emergency health problems -- breathing, cardiac function, bleeding, and shock.
- Transfer the victim to the medical facility designated in this HASP by suitable and appropriate conveyance (i.e. ambulance for serious events)
- Obtain as much exposure history as possible (a Potential Exposure report is attached).
- If the injured person is a Tetra Tech NUS employee, call the medical facility and advise them that the patient(s) is/are being sent and that they can anticipate a call from the WorkCare physician. WorkCare will contact the medical facility and request specific testing which may be appropriate. WorkCare physicians will monitor the care of the victim. Site officers and personnel should not attempt to get this information, as this activity leads to confusion and misunderstanding.
- Call WorkCare at 1-800-455-6155 and enter Extension 109, being prepared to provide:
  - Any known information about the nature of the injury.
  - As much of the exposure history as was feasible to determine in the time allowed.
  - Name and phone number of the medical facility to which the victim(s) has/have been taken.
  - Name(s) of the involved Tetra Tech NUS, Inc. employee(s).
  - Name and phone number of an informed site officer who will be responsible for further investigations.
  - Fax appropriate information to WorkCare at (714) 456-2154.
- Contact Corporate Health and Safety Department (Matt Soltis) and Human Resources Department (Marilyn Duffy) at 1-800-245-2730.

As data is gathered and the scenario becomes more clearly defined, this information should be forwarded to WorkCare.

WorkCare will compile the results of data and provide a summary report of the incident. A copy of this report will be placed in each victim's medical file in addition to being distributed to appropriately designated company officials.

Each involved worker will receive a letter describing the incident but deleting any personal or individual comments. A personalized letter describing the individual findings/results will accompany this generalized summary. A copy of the personal letter will be filed in the continuing medical file maintained by WorkCare.

FIGURE 2-2 (continued)
WORKCARE

POTENTIAL EXPOSURE REPORT

Name: _____ Date of Exposure: _____

Social Security No.: _____ Age: _____ Sex: _____

Client Contact: _____ Phone No.: _____

Company Name: _____

I. Exposing Agent

Name of Product or Chemicals (if known):_____

_____

Characteristics (if the name is not known)

Solid Liquid Gas Fume Mist Vapor

II. Dose Determinants

What was individual doing?_____

How long did individual work in area before signs/symptoms developed? _____

Was protective gear being used? If yes, what was the PPE? _____

Was their skin contact? _____

Was the exposing agent inhaled?_____

Were other persons exposed? If yes, did they experience symptoms? _____

III. Signs and Symptoms (check off appropriate symptoms)

Immediately With Exposure:

Burning of eyes, nose, or throat
Tearing
Headache
Cough
Shortness of Breath
Chest Tightness / Pressure
Nausea / Vomiting
Dizziness
Weakness

Delayed Symptoms:

Weakness
Nausea / Vomiting
Shortness of Breath
Cough
Loss of Appetite
Abdominal Pain
Headache
Numbness / Tingling

IV. Present Status of Symptoms (check off appropriate symptoms)

Burning of eyes, nose, or throat
Tearing
Headache
Cough
Shortness of Breath
Chest Tightness / Pressure
Cyanosis
Nausea / Vomiting
Dizziness
Weakness
Loss of Appetite
Abdominal Pain
Numbness / Tingling

Have symptoms: (please check off appropriate response and give duration of symptoms)
Improved: _____ Worsened: _____ Remained Unchanged: _____

V. Treatment of Symptoms (check off appropriate response)

None: _____ Self-Medicated: _____ Physician Treated: _____

3.0 SITE BACKGROUND

3.1 FACILITY HISTORY

The NSF-IH is located in northwestern Charles County, Maryland, approximately 25 miles southwest of Washington, DC. The NSF-IH is a military facility consisting of the main area on the Cornwallis Neck Peninsula and the Annex on Stump Neck. The main area is bounded by the Potomac River to the northwest, west, and south, Mattawoman Creek to the south and east, and the town of Indian Head to the northeast. Stump Neck Annex is located across Mattawoman Creek is not contiguous with the main area. The primary mission of NSF-IH is to provide services in energetics, ordnance devices and components, and other related ordnance engineering standards, including chemicals, propellants, and their propulsion systems, explosives, pyrotechnics, warheads, and simulators. The United States Environmental Protection Agency (EPA) added NSF-IH to the National Priorities List (NPL) in September 1995, pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980. There are several sites at the main facility currently included in the NSF-IH Installation Restoration (IR) Program. Activities conducted under this HASP will occur at UXO 32 – Scrap Yard.

3.2 SITE 41- SCRAP YARD

UXO 32 – Scrap Yard is a fenced scrap yard located in the southeastern portion of NSF-IH, adjacent to Mattawoman Creek. The scrap yard is approximately 750 feet long and 75 to 100 feet wide. The area is flat and surface runoff tends to pond and infiltrate, although in some areas runoff is toward Mattawoman Creek. A concrete pad is present within most of the fenced area; however, the pad is buried under soil in some places. Around a portion of the scrap yard, the fence is above a concrete wall. The scrap yard is active and is used to store metal materials and scraps, including storage drums and furniture. The materials are eventually sold to be recycled or reused.

The site has been a scrap yard since at least the 1960s. During an inspection in 1981, 17 transformers were identified as either containing or contaminated with polychlorinated biphenyls (PCBs). These transformers were believed to have leaked and contaminated the soil in the western portion of the site. In addition, lead-acid batteries were stored in the scrap yard. The batteries may have released lead to the surface soil. No transformers or batteries are currently stored in the western portion of the site, although large stains were observed where the transformers were stored.

UXO 32 covers an area that is approximately 3 acres. The concrete pad, or scrap yard portion of the site is approximately 750 feet long and varies from 75 to 100 feet wide (1.5 acres). The scrap yard is enclosed with a chain-link fence and a concrete pad is present within the fenced area. The concrete pad is covered

with soil that varies in depth (6-inches to 2-feet). A dirt and gravel access road and an abandoned railroad line lies along the southern perimeter of the scrap yard. Drawings indicate that two sections branch off the main line south of the scrap yard. Portions of the rail line are hidden, buried or removed. The area north of the site is wooded. The site area is flat, and surface runoff tends to pond and infiltrate. Surface water that does not infiltrate runs off toward Mattawoman Creek. The site is currently an active scrap yard that is used to store materials that will be recycled or reused.

4.0 SCOPE OF WORK

This section of the HASP addresses proposed activities that are to be conducted at UXO 32 NSF-IH. The selected method is removing and disposing contaminated soil off site by the Remedial Action Contractor (RAC) and chip and core sampling of the concrete pad. The activities to be conducted as part of the scope of work include mobilization/demobilization, multi-media sampling including chip and core concrete sampling, and decontamination activities. Table 5-1 provides information related to each of these tasks that are to be performed as part of the scope of work. If other tasks, other than those identified, are to be performed at the site, this HASP will be modified.

- Mobilization/demobilization
- Verification sampling (surface soils)
- Decontamination of sampling equipment
- IDW management which includes the containerization, labeling, staging, monitoring, and final deposition of Investigation Derived Wastes (IDW).

4.2 SOIL REMOVAL/EXCAVATION

All soil removal or excavation at Site 41 will be conducted by a Remedial Action Contractor (RAC). Soil identified as having sufficient concentrations of chemicals of concern will be characterized and disposed at an approved off-site treatment and/or disposal facility. Excavation of soil will be complete when data evaluation determines that verification samples are below acceptable levels. In addition, sediments removed from the erosion and sediment control devices during the excavation will be disposed off site, along with excavated soil.

4.3 MULTI MEDIA SAMPLING

Verification samples will be collected by TtNUS personnel following excavation of soil from designated areas. Sampling and chemical analytical data evaluation procedures are provided in the VSAP.

For more detailed description of the associated tasks, refer to the Work Plan.

5.0 TASKS/HAZARDS/ASSOCIATED CONTROL MEASURES

Table 5-1 of this section lists the potential hazards, by task, and their associated control measures for the work addressed by this site specific HASP. This table will assist project personnel in the recognition of hazards and recommended procedures necessary to minimize potential exposure or injuries related to those hazards. The table also assists field team members in determining which personal protective equipment (PPE) and decontamination procedures to be used, as well as, appropriate air monitoring techniques and other requirements/restrictions. The evaluation of each task provides detailed information including anticipated hazards, recommended control measures, air monitoring recommendations, required PPE, and decontamination measures. This table will be updated if the scope of work, contaminants of concern, or pertinent conditions change.

This HASP, including Table 5-1, is meant to be used in conjunction with the TtNUS Health and Safety Guidance Manual. This manual is designed to further explain supporting elements for any site-specific operations as required by 29 CFR 1910.120. The Guidance Manual should be referenced for additional information regarding air monitoring instrumentation, decontamination activities, emergency response, hazard assessments, hazard communication and hearing conservation programs, medical surveillance, PPE, respiratory protection, site control measures, standard work practices, and training requirements. Many of TtNUS's SOPs are also provided in the Guidance Manual.

A Safe Work Permit (SWP) will be issued for each onsite task. To the extent possible, task specific SWPs have been developed by the PHSO and are included in Attachment III of this HASP. These SWPs are to be completed by the FOL/SSO to include current site conditions and reviewed during the pre-task tail gate briefings as described in Section 9.4 of this plan. In situations where the SWP is more conservative than the direction provided in Table 5-1 due to the incorporation of site-specific elements, the SWP will be followed.

5.1 GENERAL SAFE WORK PRACTICES

In addition to the task-specific work practices identified on Table 5-1, follow these safe work practices when conducting work involving known and unknown site hazards. These safe work practices establish a pattern of general precautions and measures for reducing risks associated with hazardous site operations.

- Eating, drinking, chewing gum or tobacco, or taking medication, is permitted in the support zone only.
- Smoking is prohibited within the NSF-IH restricted area.

- Wash hands and face thoroughly upon leaving a contaminated or suspected contaminated area. A thorough shower and washing must be conducted as soon as possible if excessive skin contamination occurs.

- Avoid contact with unknown or unidentified objects. UXO concerns can be an issue at this site. Pin Flag and seek assistance in the identification of any articles of this nature that may impact the established work area.

- Be aware of the location of the nearest telephone and emergency telephone numbers. Only approved communication devices are permitted within the NSF-IH restricted area. Cell phones and pagers are prohibited within the restricted area.

- Attend briefings on anticipated hazards, equipment requirements, Safe Work Permits, emergency procedures, and communication methods before going on site.

- Immediately report injuries, illnesses, and unsafe conditions, practices, and equipment to the Site Safety Officer (SSO).

- Observe coworkers for signs of toxic exposure and heat or cold stress.

- Inform co-workers of potential symptoms of illness, such as headaches, dizziness, nausea, or blurred vision.

TABLE 5-1
TASKS/HAZARDS/CONTROL MEASURES
NAVAL SUPPORT FACILITY, INDIAN HEAD, MARYLAND

Tasks/Operation/ Locations	Anticipated Hazards	rotective Equipment *s are deemed optional as the FOL or SSO require)*	Decontamination Procedures
Mobilization/ Demobilization	***Physical hazards:*** 1) Lifting (strain/muscle pulls) 2) Pinches and compressions 3) Slip, trips, and falls 4) Heavy equipment hazards (rotati equipment, hydraulic lines, etc.) 5) Vehicular and foot traffic 6) Ambient temperature extremes ***Natural hazards:*** 7) Insect/animal bites and stings	im Requirements) ttire (Sleeved shirt; long shoes *overhead hazards exists, or* *eration requirement)* *for high traffic areas* *ion for high noise areas, or* *operation by operation*	Not required
Verification Sampling (Surface Soils)	***Chemical hazards:*** 1) Previous investigations conducte 41 of the NSF-IH have indicated the of Metals, arsenic and lead; the polychlorinated biphenyl (PCB) aroc the polynuclear aromatic hydrocarb (PAHs), dibenzo(a,h)anthracene; ar trichloroethene (TCE). See Table 6-1 for more information chemicals of concern. 2) Transfer of contamination into cl or onto persons ***Physical hazards:*** 3) Heavy Equipment 4) Lifting (strain/muscle pulls) 5) Slips, trips, and falls 6) Vehicular and foot traffic 7) Ambient temperature extremes 8) Noise ***Natural hazards:*** 9) Insect/animal bites and stings, p plants, etc. 10) Inclement weather	erations are to be initiated in n. Level D protection llowing minimum protection ttire (Sleeved shirt; long shoes/boots on near heavy equipment noise areas as directed by leather gloves with surgical *and disposable boot covers* *nation is present or if the* *r soiling work attire.* Work Permit(s) for this task V) will be issued at the day to address the tasks ay. As part of this task, ay be assigned to reflect site- s or special considerations or ated with any identified task.	**Personnel Decontamination** - Will consist of a soap/water wash and rinse for reusable protective equipment (e.g., gloves). This function will take place at an area adjacent to the drilling operations bordering the support zone. This decontamination procedure for Level D protection will consist of - Equipment drop - Soap/water wash and rinse of reusable outer gloves, as applicable - Outer coveralls, boot covers, and/or outer glove removal - Removal, segregation, and disposal of non-reusable PPE in bags/containers provided - Wash hands and face, leave contamination reduction zone.

TABLE 5-1
TASKS/HAZARDS/CONTROL MEASURES
NAVAL SUPPORT FACILITY, INDIAN HEAD, MARYLAND

Tasks/Operation/ Locations	Anticipated Haza	tive Equipment *deemed optional as OL or SSO require)*	Decontamination Procedures
IDW management	***Chemical hazards:*** 1) Previous investigations conducte NSF-IH have indicated the presenc and lead; the polychlorinated biphe 1260; the polynuclear aromatic hyc dibenzo(a,h)anthracene; and trichl See Table 6-1 for more informatior of concern. 2) Transfer of contamination into c ***Physical hazards:*** 3) Noise in excess of 85 dBA 4) Lifting (strain/muscle pulls) 5) Pinches and compressions 6) Slip, trips, and falls 7) Vehicular and foot traffic ***Natural hazards:*** 8) Ambient temperature extremes 9) Insect/animal bites and stings	utilized for the initiation rements) sleeve shirt; long ork gloves with surgical *l hazards exists, or* *quirement)* *raffic areas* *osable boot covers if* *resent or if the potential* *s.* *gh noise areas, or as* *y operation scenario.* *ed optional as* *SSO dictate.)*	**Personnel Decontamination** will consist of a soap/water wash and rinse for reusable outer protective equipment (boots, gloves, PVC splash suits, as applicable). The decon function will take place at an area adjacent to the site activities. This procedure will consist of: - Equipment drop - Soap/water wash and rinse of outer boots and gloves, as applicable - Soap/water wash and rinse of the outer splash suit, as applicable - Disposable PPE will be removed and bagged.

TABLE 5-1
TASKS/HAZARDS/CONTROL MEASURES
NAVAL SUPPORT FACILITY, INDIAN HEAD, MARYLAND

Tasks/Operation/ Locations	Anticipated Hazard	tive Equipment *(deemed optional as OL or SSO require)*	Decontamination Procedures
Decontamination of sampling equipment	***Chemical hazards:*** 1) Previous investigations conducte the NSF-IH have indicated the pres arsenic and lead; the polychlorinate (PCB) aroclor 1260; the polynuclear hydrocarbons (PAHs), dibenzo(a,h) trichloroethene (TCE). See Table 6-1 for more information chemicals of concern. 2) Decontamination fluids - Liquino acetone or isopropanol ***Physical hazards:*** 3) Lifting (strain/muscle pulls) 4) Slips, trips, and falls ***Natural hazards:*** 5) Ambient temperature extremes	trowels, MacroCore ıe following PPE is nents - ng sleeve shirt; long of decontamination or PE or PVC coated	**Personnel Decontamination** will consist of a soap/water wash and rinse for reusable outer protective equipment (boots, gloves, PVC splash suits, as applicable). The decon function will take place at an area adjacent to the site activities. This procedure will consist of: - Equipment drop - Soap/water wash and rinse of outer boots and gloves, as applicable - Soap/water wash and rinse of the outer splash suit, as applicable - Disposable PPE will be removed and bagged. **Sampling Equipment Decontamination** will follow the requirements in the Sampling and Analysis Plan and/or Work Plan. MSDS for any decon solutions (Alconox, isopropanol, etc.) will be obtained and used to determine proper handling / disposal methods and protective measures (PPE, first-aid, etc.). All equipment used in the exclusion zone will require a complete decontamination between locations and prior to removal from the site. The FOL or the SSO will be responsible for evaluating equipment arriving onsite and leaving the site. No equipment will be authorized access or exit without this evaluation.

6.0 HAZARD ASSESSMENT

This section provides information regarding the chemical and physical hazards associated with UXO 32 and the activities that are to be conducted as part of the scope of work. Table 6-1 provides various information related to the chemical hazards that may be present at the site. Specifically, toxicological information, exposure limits, symptoms of exposure, physical properties, and air monitoring and sampling data are also discussed in that table.

6.1 CHEMICAL HAZARDS

It is estimated that approximately 1,540 cubic yards of contaminated soil will be excavated at UXO 32. While previous investigations conducted at UXO 32 have indicated the presence of the metals, arsenic and lead; the polychlorinated biphenyl (PCB) Aroclor-1260; the polynuclear aromatic hydrocarbons (PAHs), dibenzo(a,h)anthracene; and trichloroethene (TCE), this sampling effort will occur after the contaminated soil is removed. Levels of contamination will be significantly lower.

Information on the toxicological, chemical, and physical properties of other potential contaminants of concern is addressed in Table 6-1 of this HASP. It is anticipated that the greatest potential for exposure to site contaminants is during activities in which contact with potential contaminated media exists (soil boring, monitoring well installations, sampling activities, etc.).

6.2 PHYSICAL HAZARDS

In addition to the chemical hazards discussed above, the following physical hazards may be present during the performance of site activities.

- Heavy Equipment
- Slips, trips, and falls
- Strain from heavy lifting.
- Pinch / compression points.
- Noise in excess of 85 decibels (dBA).
- Inclement weather
- Natural Hazards (contact with poisonous plants and disease carrying animals and insects).

TABLE 6-1
CHEMICAL, PHYSICAL, AND TOXICOLOGICAL DATA
SITE 41 – SCRAP YARD
NSF-IH, INDIAN HEAD, MARYLAND

Substance	CAS No.	Monitoring	Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information
Arsenic	7440-38-2	Particulate form - This substance is unable to be detected by PID/FID.	OSHA: Organic compounds 0.5 mg/m³ Inorganic compounds 0.01 mg/m³ NIOSH: (Ceiling) 0.002 mg/m³ ACGIH: 0.01 mg/m³ IDLH: 5 mg/m³ as arsenic	No identifiable warning properties to indicate presence and thereby detection. **Recommended APR Cartridge:** Suitable for dust and fume. Organic vapor acid gases with HEPA filter. This substance may be presented as a pesticide, therefore a cartridge suitable for pesticides (MSA-GMP). **Recommended Gloves:** This is in the particulate form. Therefore any glove suitable to prevent skin contact (Nitrile has been the one most widely used for the other substances).	**Boiling Pt:** sublimation @ 1134°F; 612°C **Melting Pt:** 1497°F; 814°C @ 36 atm **Solubility:** Insoluble in water; soluble in nitric acid **Flash Pt:** Nonflammable, however, airborne in the form of a dust this substance will support combustion **LEL/LFL:** Nonflammable **UEL/UFL:** Nonflammable **Vapor Density:** Not available **Vapor Pressure:** 1 mmHg @ 372°C (sublimes) **Specific Gravity:** 5.73 **Incompatibilities:** Oxidizers, halogens, zinc, lithium, azides, and acetylides **Appearance and odor:** Gray to black, brittle, crystalline, amorphous, odorless.	Overexposure to this substance through inhalation or ingestion may result in ulceration of the nasal septum, GI disturbances resulting in violent purging and vomiting, hoarse voice, sore throat, excessive salivation, peripheral neuropathy (numbness and burning sensations beginning at the extremities followed by motor weakness), respiratory irritation leading to possible pulmonary edema. Skin or eye contact may result in irritation, conjunctiva, dermatitis, and hyperpigmentation (darkening of the areas exposed) of the skin. This substance has been judged to be a Human carcinogen by NTP, and IARC.
Lead	7439-92-1	Particulate form - Unable to be detected by either PID or FID.	OSHA: 0.05 mg/m³ ACGIH: 0.15 mg/m³ NIOSH: 0.10 mg/m³ IDLH: 100 mg/m³ as lead	The use of an air purifying, full-face respirator with high efficiency particulate air filter for up to 2.5 mg/m³. **Recommended gloves:** This is in the particulate form. Therefore any glove suitable to prevent skin contact (Nitrile has been the one most widely used for the other substances).	**Boiling Pt:** 3164°F; 1740°C **Melting Pt:** 621°F; 327°C **Solubility:** Insoluble **Flash Pt:** Not applicable (Airborne dust may burn or explode when exposed to heat, flame, or incompatible chemicals) **LEL/LFL:** Not applicable **UEL/UFL:** Not applicable **Vapor Density:** Not available **Vapor Pressure:** 0 mmHg **Specific Gravity:** 11.34 **Incompatibilities:** Strong oxidizers, peroxides, sodium acetylide, zirconium, and acids **Appearance and Odor:** Metal: A heavy ductile, soft gray solid.	Overexposure to this substance via ingestion or inhalation may result in metallic taste in the mouth, dry throat, thirst, Gastrointestinal disorders (burning stomach pain, nausea, vomiting, possible diarrhea sometimes bloody or black, accompanied by severe bouts of colic), CNS effects (muscular weakness, pain, cramps, headaches, insomnia, depression, partial paralysis possibly coma and death. Extended exposure may result in damage to the kidneys, gingival lead line, brain, and anemia.

TABLE 6-1
CHEMICAL, PHYSICAL, AND TOXICOLOGICAL DATA
SITE 41 – SCRAP YARD
NSF-IH, INDIAN HEAD, MARYLAND

Substance	CAS No.	Monitoring	Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information
Dibenzo(a,h)anthracene	53-70-3	PID: Ionization potential unknown. FID: This material is combustible, however, the relative response ratio and detection using the FID is unknown.	OSHA; ACGIH: 0.2 mg/m^3 NIOSH: none	No identifiable warning properties to indicate presence and thereby detection. **Recommended APR Cartridge:** Wear a NIOSH- approved half face respirator equipped with a combination filter cartridge, i.e. organic vapor/acid gas/HEPA (specific for organic vapors, HCl, acid gas, SO2 and a high efficiency particulate filter). **Recommended glove:** Nitrile acceptable for incidental contact Other options include PVA, silver shield, and Viton	**Boiling Pt:** °F; 524°C **Melting Pt:** °F; 266°C **Solubility:** **Flash Pt:** 180°F; 82°C **LEL/LFL:** Not available **UEL/UFL:** Not available **Vapor Density:** Not available **Vapor Pressure:** 0.0000000001 mm **Specific Gravity:** 1.282 **Incompatibilities:** Strong oxidizers **Appearance and Odor:** White crystals	No commercial production or use is known. It occurs as a component of coal tars, shale oils, and sots and has been detected in gasoline engine exhaust, coke oven emissions, cigarette smoke, charcoal broiled meats, vegetation near heavily traveled roads, and surface water and soils near hazardous waste sites. There are no human data that link exposure to human cancers, it is a component of mixtures that is associated with human cancer. This compound is harmful if swallowed or inhaled. It may cause irritation. When heated to decomposition it emits acrid smoke, irritating fumes and toxic fumes of carbon monoxide and carbon dioxide.
Aroclor-1260 (Polychlorinated Biphenyl, PCB) This substance is representative of the more common isomers Aroclor - 1242, 1254, which may be encountered.	11096-82-5 53469-21-9 (42%) 11097-69-1 (54%)	Substance is not volatile (VP=0.00006 mmHg), I.P. is unknown however is anticipated to be elevated, therefore, PID is not anticipated to detect this substance. Substance is non combustible and as a result will not be detected by FID.	OSHA; ACGIH: 0.5 mg/m^3 (skin) NIOSH: 0.001 mg/m^3 IDLH: 5 mg/m^3	Inadequate - However due to the low volatility it is assumed unless agitated this substance does not present a volatile vapor or gas respiratory threat. For dusty conditions where this material may cling to particulates, use a HEPA filter. APRs are approved for escape only when concentrations exceed the exposure limits. Concentrations greater than the exposure limits require PAPR or supplied air respirators. **Recommended glove:** Butyl rubber >24 hrs; Neoprene rubber >24.00 hrs; Silver shield or Viton (for pure product).	**Boiling Pt:** distillation range 689- 734°F; 365-390°C **Melting Pt:** -2 to 50°F; -19 to 10°C **Solubility:** Insoluble **Flash Pt:** Not applicable **LEL/LFL:** Not applicable **UEL/UFL:** Not applicable Nonflammable liquid, however, exposure to fire results in black soot containing PCBs, dibenzofurans, & chlorinated dibenzo-p-dioxins **Vapor Density:** Not available **Vapor Pressure:** 0.00006 - 0.001 mmHg **Specific Gravity:** 1.566 @ 60°F; 15.5°C **Incompatibilities:** Strong oxidizers **Appearance and Odor:** Colorless to pale yellow, viscous liquid or solid (Aroclor 54 below 50°F) with a mild, hydrocarbon odor	This substance is irritating to the eyes and skin. Chronic effects of overexposure may include potential to cause liver damage, chloracne, and reproductive effects. Recognized as possessing carcinogenic properties by NIOSH, and NTP.

TABLE 6-1
CHEMICAL, PHYSICAL, AND TOXICOLOGICAL DATA
SITE 41 – SCRAP YARD
NSF-IH, INDIAN HEAD, MARYLAND

Substance	CAS No.	Monitoring	Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information
Trichloroethylene	79-01-6	PID: I.P. 9.45 eV, High response with PID and 10.2 eV lamp. FID: 70% Response with FID.	OSHA: 50 ppm; 200 ppm (Ceiling) ACGIH: 50 ppm; 100 ppm STEL NIOSH: 25 ppm IDLH: 1000 ppm	Inadequate - Odor threshold 82 ppm. APRs with organic vapor/acid gas cartridges may be used for escape purposes. Exceedances over the exposure limits require the use of positive pressure-demand supplied air respirator. **Recommended gloves:** PV Alcohol unsupported >16.00 hrs; Silver shield >6.00 hrs; Teflon >24.00 hrs; or Viton >24.00 hrs; Nitrile (Useable time limit 0.5 hr, complete submersion for the nitrile selection)	**Boiling Pt:** 188°F; 86.7°C **Melting Pt:** -99°F; -73°C **Solubility:** 0.1% @ 77°F; 25°C **Flash Pt:** 90°F; 32°C **LEL/LFL:** 8% @ 77°F; 25°C **UEL/UFL:** 10.5 @ 77°F; 25°C **Vapor Density:** 4.53 **Vapor Pressure:** 100 mmHg @ 90°F; 32°C **Specific Gravity:** 1.46 **Incompatibilities:** Strong caustics and alkalis, chemically active metals (barium, lithium, sodium, magnesium, titanium, and beryllium) **Appearance and Odor:** Colorless liquid with a chloroform type odor. Combustible liquid, however, burns with difficulty.	Central nervous system effects including euphoria, analgesia, anesthesia, paresthesia, headaches, tremors, vertigo, and somnolence. Damage to the liver, kidneys, heart, lungs, and skin have also been reported. Contact may result in irritation to the eyes, skin, and mucous membranes. Ingestion may result in GI disturbances including nausea, and vomiting NIOSH lists this substance a potential human carcinogen.

These physical hazards and their applicability to each site task are discussed in detail in Table 5-1. Additionally, each of these physical hazards is discussed in detail in the TtNUS Health and Safety Manual.

6.2.1 Power Hand Tools

Inspect tools before using them - Check for cracked casings, dents, missing or broken parts, and contamination (oil, moisture, dirt, corrosion). Damaged tools must be removed from service and properly tagged. These tools should not be used until they are repaired and tested.

Use the right tool correctly—Use tools correctly and for their intended purposes. Follow the safety instructions and operating procedures recommended by the manufacturer.

Use double-insulated tools—Portable electrical tools are classified by the number of insulation barriers between the electrical conductors in the tool and the worker. Only use portable tools only if they have been approved by Underwriter's Laboratories (UL Listed). Equipment that has two insulation barriers and no exposed metal parts is called double insulated. When used properly, double-insulated tools provide reliable shock protection without the need for a third ground wire. Power tools with metal housings or only one layer of effective insulation must have a third ground wire and three-prong plug.

6.2.2 Slip, Trip and Fall Hazards

Various potential slip, trip, and fall hazards may be encountered during the performance of planned site activities. These hazards are associated with working out doors where uneven or wet terrain may be encountered, or near the edge of bodies of water, as well as on boat decks and docks. To minimize the potential for worker injury from these hazards, the following requirements must be observed:

- Maintain proper housekeeping in work areas.
- Preview and inspect work areas to identify and eliminate slip, trip, or fall hazards. In outdoor locations, pay particular attention to sink holes or other depressions that may be encountered.
- Any work that is to be done on structures that are more than 6-feet above floor or ground level will require fall protection training and the use of 100% fall protection equipment.
- Cover, guard, barricade, and/or place warning postings over/at holes or openings that personnel may fall or step into.

- For traversing steep, slippery, or sloped terrain establish rope ladders to control ascent and descent to sampling areas or use alternative pathways.

6.2.3 Strains/Muscle Pulls

To prevent injuries due to improper lifting and carrying methods observe the following:

- Estimate the weight and configuration of the load (i.e., is it bulky or hard to safely grasp/lift/control).
- The use of mechanical lifting devises is always preferable over manual lifting.
- Bend at the knees (not at the waist) when attempting a lift.
- Get a firm hold is obtained, and keep the load as close to the body as possible.
- Lift the load using your legs, and not the back.
- Avoid turning or twisting while holding a load.
- Preview the path of travel to identify and eliminate tripping hazards.
- Do not carry loads that obstruct the line of sight.
- When setting a load down use the leg muscles and do not bend at the waist.
- Divide heavier loads into smaller amounts.

6.3 NATURAL HAZARDS

Insect/animal bites and stings, poisonous plants, and inclement weather are natural hazards that may be present given the location of activities to be conducted. In general, avoidance of areas of known infestation or growth will be the preferred exposure control for insects/animals and poisonous plants. Specific discussion on principle hazards of concern follows:

6.3.1 Insect Bites and Stings

Insect bites and stings are difficult to control given the climate and environmental setting of NSF-IH. However, in an effort to minimize this hazard the following control measures will be implemented where possible.

- Commercially available bug sprays and repellents will be used whenever possible.

- Products such as DEET should be applied over clothing articles, not directly applied to the skin.

- Where possible, loose-fitting and light-colored clothing with long sleeves should be worn.

- Pant legs should be secured to the work-boots using duct tape to prevent access by ticks.

- Field crew members who are allergic to bites should have their emergency kit containing antihistamine and a preloaded syringe of epinephrine readily available.

- Any allergies (insect bites, bee stings, etc.) must be reported on the Medical Data Sheet and to the SSO.

Tick-Borne Disease

During warm months (spring through early fall), tick-borne lyme disease may pose a potential health hazard in Maryland which is listed as an area for lyme disease. The longer a disease carrying tick remains attached to the body, the greater the potential for contracting the disease. Wearing long sleeved shirts and long pants (tucked into boots). As well as performing frequent body checks will prevent long term attachment. Site first aid kits should be equipped with medical forceps and rubbing alcohol to assist in tick removal. For information regarding tick removal procedures, and symptoms of exposure consult the health and safety guidance manual.

Mosquito-Borne Illness

Mosquitoes in Maryland may carry diseases including St. Louis encephalitis, Eastern Equine encephalitis, La Crosse encephalitis and West Nile virus. The symptoms for mosquito-borne illnesses may include headache, moderate to high fever, stiff neck and confusion. In serious cases coma, seizures or paralysis can result. Symptoms usually appear between 5 to 15 days after exposure to infected mosquitoes. Mosquito-borne illnesses may be mild or serious and can lead to death.

Precautions include:

- Limit outdoor activities during peak mosquito times – at dusk and dawn.
- Avoid standing water
- Wear long-sleeved shirts and long pants whenever you are outdoors.
- Apply insect repellent according to manufacturers instruction to exposed skin.
- Spray clothing with repellents containing permethrin or DEET, mosquitoes may bite through thin clothing.

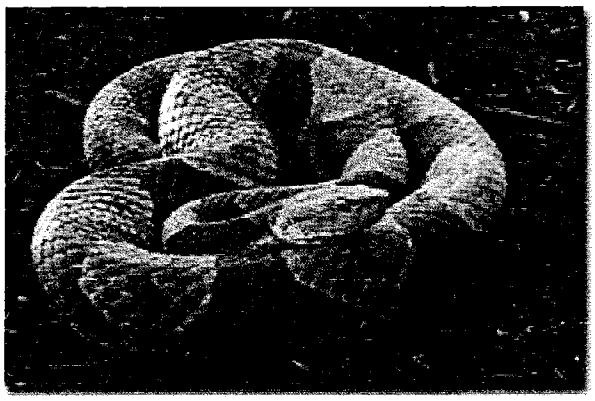
An effective repellent will contain 20% to 30% DEET (N,N-diethyl-meta-toluamide). Avoid products containing more than 30% DEET.

6.3.2 Snakes and Other Wild Animals

Indigenous animals including snakes (only two poisonous and approximately 27 non-poisonous varieties in Maryland), raccoons, and other animals native to the region may be present at the site. These animals may be encountered if work locations encroach on nesting or territories claimed by these animals.

The only poisonous snake indigenous to this part of the State of Maryland is the Northern Copperhead. It is important to remember that snakes are rarely aggressive towards humans. If you encounter a snake simply maintain a safe distance and move away from it, or allow it to move away.

Northern Copperhead (Agkistrodon contortrix mokasen)



The color is a rich, reddish, brown with a series of darker hourglass markings down its back. Its head is usually a bright copper color and its belly is pinkish. It seldom exceeds three feet in length. It has a single anal plate and keeled scales. This is the only Maryland snake that has dark dorsal markings which are narrow on the back and broad on the sides. Copperheads exist throughout the State in remote rocky, wooded areas where they feed on small rodents and other warm-blooded prey. Occasionally, they will feed on aquatic animals. Females give birth to approximately 12 live young which are 8-10 inches in length.

Prevention

To avoid the obvious hazards conveyed as part of a direct encounter, the following actions will be taken to minimize impact on the field crews and/or operations. The FOL/SSO will preview access routes and work locations for nesting areas or signs of animal activities (tracks, foraging areas, etc.). The identified suspect areas will be communicated to the field crews. Snake chaps will be required as a precaution.

Snake Bites

Initial efforts will be directed to avoid, where possible, nesting and territorial areas. However, should field personnel come in contact with these animals and receive a bite, the following actions are necessary.

- Obtain a detailed description of the snake. This and the bite mark will enable medical personnel administering medical aid to provide prompt and correct antidotes, as necessary.

- Immobilize the bite victim to the extent possible. Physical exertion will mobilize the toxins (if poisonous varieties) from the bite point systemically through the body.

- Apply a pressure wrap (for extremities), just above and over the bite area. With a couple wraps of the pressure wrap in place over the bite area, apply a splint, and continue the application of the pressure wrap. The purpose for the splint is to restrict the movement of the extremity, this along with the pressure wrap will aid in restricting the toxins from leaving the site of the bite.

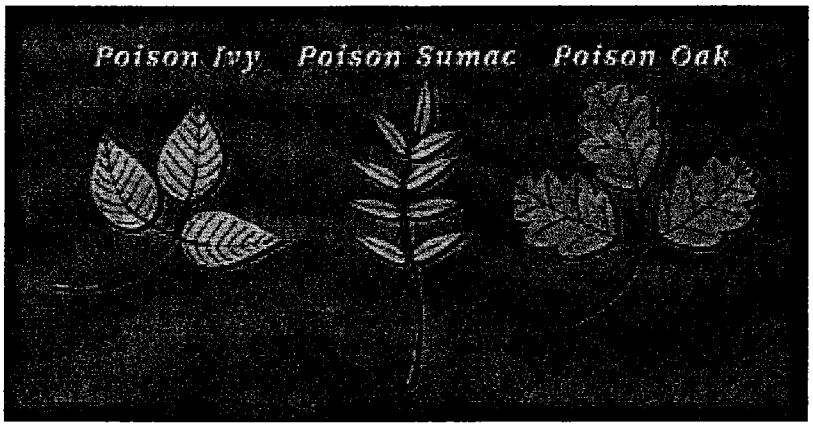
- Seek medical attention immediately.

6.3.3 Poisonous Plants

Various plants which can cause allergic reactions may be encountered during field work. These include, poison ivy, poison oak, and poison sumac. Contact with these plants may occur when clearing vegetation for access to work areas, or as a result of movement through these plants. An irritating, allergic reaction can occur after direct contact with the plant or indirect contact through some piece of equipment or clothing article. Oils are transferred from the plant to exposed skin, clothing, or piece of equipment. The degree of the irritating, allergic reaction can vary significantly from one person to the next.

Protective measures to control and minimize the effects of this hazard may include, but not be limited to, the following:

- Identify plants for field personnel.
  - Poison Ivy - Characterized by climbing vines, three leaf configuration ovate to elliptical in shape, deep green leaves with a reddish tint, greenish flowers, and white berries.
  - Poison Sumac - Characterized as a tall bush of the sumac family bearing compound leaves (7-13 entire leaflets), branched from a central axis, drooping, with axillary clusters of white fruit: However, these white fruits and berries may exist only during pubescent stages.
  - Poison oak - Characterized as similar to poison ivy consisting of a shrub, stems erect, 0.3 to 2.0 meters tall, leaflets consist of broad thick lobes coarsely serrated configuration, denser at the base, less so than the top.



- Protective measures may include wearing disposable garments such as Tyvek when clearing brush. These may be carefully removed and disposed of along with any oils accumulated from the plants.

- Personal Hygiene - The oils obtained from the plants will only elicit an allergic response when the person's bare skin layer is contacted. This can be aggravated when skin pores are open (perspiring), or through breaks in the skin such as cuts, nicks, scratches, etc. This can also be accomplished when using excessively hot water for cleaning the skin, which also causes pores to open. Prior to break time, lunchtime, etc. personnel should wash with cool water and soap to remove as much of the oils as possible. In heavily vegetated areas of these plants, additional measures including barrier creams and blocks may be used to prevent the oils from accessing and penetrating the skin.

These plants present an airborne sensitization hazard when burned. This is not to occur as part of this scope of work and therefore will not be addressed.

6.3.4 Inclement Weather

Project tasks under this Scope of Work will be performed outdoors and near water. As a result, inclement weather may be encountered. In the event that adverse weather conditions arise (electrical storms, hurricanes, etc.), the FOL and/or the SSO will be responsible for temporarily suspending or terminating activities until hazardous conditions no longer exist.

7.0 AIR MONITORING

Direct reading instruments will be used at the site to detect and evaluate the presence of site contaminants and other potentially hazardous conditions. As a result, specific air monitoring measures and requirements are established in Table 5-1 pertaining to the hazards and tasks of an identified operation. Additionally Section 1.0, the Health and Safety Guidance Manual contains detailed information regarding direct reading instrumentation, as well as general calibration procedures of various instruments.

7.1 INSTRUMENTS AND USE

Instruments will be used primarily to monitor source points and worker breathing zone areas while observing instrument action levels. Action levels are discussed in Table 5-1 as they may apply to a specific task or location.

7.1.1 Photoionization Detector and Flame Ionization Detector

To accurately monitor for any substances that may present an exposure potential to site personnel, a Photoionization Detector (PID) using a lamp energy of 10.6 electron volts (eV) or higher will be used. This instrument will be used to monitor potential source areas and to screen the breathing zones of employees during site activities. The PID has been selected because it is capable of detecting the organic vapors of concern (Note: A Flame Ionization Detector [FID] may be used as an alternative to the PID). This instrument will only detect the presence of ionizing contaminants. This instrument will not detect the explosive compounds and metals.

Before starting any field activities, the background levels of the site must be determined and noted. Daily background readings will be taken away from any areas of potential contamination. These readings, any influencing conditions (weather, temperature, humidity, etc.), and site location must be documented in the field operations logbook or other site documentation (e.g., sample log sheet).

7.1.2 Hazard Monitoring Frequency

Table 5-1 presents the frequencies in which hazard monitoring will be performed as well as the action levels that will initiate the use of elevated levels of protection. The SSO may decide to increase these frequencies based on instrument responses and site observations. The frequency in which monitoring is performed will not be reduced without the prior consent of the PHSO or HSM.

7.2 INSTRUMENT MAINTENANCE AND CALIBRATION

Hazard monitoring instruments will be maintained and pre-field calibrated by the TtNUS Equipment Manager. Operational checks and field calibration will be performed on the instruments each day before use. Field calibration will be performed on instruments according to manufacturer's recommendations (for example, the PID must be field calibrated daily and an additional field calibration must be performed at the end of each day to determine any significant instrument drift). These operational checks and calibration efforts will be performed in a manner that complies with the employees health and safety training, the manufacturer's recommendations, and with the applicable manufacturer SOP (copies of which can be found in the Health and Safety Guidance Manual that will be maintained onsite for reference). Calibration efforts must be documented. Figure 7-1 is provided for documenting these calibration efforts. This information may instead be recorded in a field operations logbook, provided that the information specified in Figure 7-1 is recorded. This required information includes the following:

- Date calibration was performed
- Individual calibrating the instrument
- Instrument name, model, and serial number
- Any relevant instrument settings and resultant readings (before and after) calibration
- Identification of the calibration standard (lot no., source concentration, supplier)
- Any relevant comments or remarks

7.3 DOCUMENTING INSTRUMENT READINGS

The SSO is responsible for ensuring that air monitoring instruments are used in accordance with the specifications of this HASP and with manufacturer's specifications/recommendations. In addition, the SSO is also responsible for ensuring that the instrument use is documented. This requirement can be satisfied either by recording instrument readings on the sampling log sheets or in a field log book.

This includes the requirement for documenting instrument readings that indicate no elevated readings above noted daily background levels (i.e., no-exposure readings). At a minimum, the SSO must document the following information for each use of an air monitoring device:

- Date, time, and duration of the reading
- Site location where the reading was obtained
- Instrument used (e.g., PID, FID, LEL/0_2 meter, etc.)
- Personnel present at the area where the reading was noted
- Other conditions that are considered relevant to the SSO (such as weather conditions, possible instrument interferences, etc.)

FIGURE 7-1

DOCUMENTATION OF FIELD CALIBRATION

SITE NAME: _____ PROJECT NO.:_____

Date of Calibration	Instrument Name and Model	Instrument I.D. Number	Person Performing Calibration	Instrument Settings		Instrument Readings		Calibration Standard (Lot Number)	Remarks/ Comments
				Pre-Calibration	Post-Calibration	Pre-Calibration	Post-Calibration		

8.0 TRAINING/MEDICAL SURVEILLANCE REQUIREMENTS

8.1 INTRODUCTORY/REFRESHER/SUPERVISORY TRAINING

This section specifies health and safety training and medical surveillance requirements for both Tetra Tech NUS and other personnel participating in on-site activities.

8.1.1 Requirements for Field Personnel

The Tetra Tech NUS and other personnel who will engage in field associated activities as described in this HASP must have:

- Completed 40 hours of introductory hazardous waste site training or equivalent work experience as defined in OSHA Standard 29 CFR 1910.120(e).

- Completed 8-Hour Refresher Training, if the identified persons had introductory training more than 12 months, prior to this site work.

- Completed 8-hour Supervisory training in accordance with 29 CFR 1910.120(e) (4), if their assigned function will involve the supervision of subordinate personnel.

Documentation of introductory training or equivalent work experience, supervisory, and refresher training, as well as, site-specific training will be maintained at the site. Copies of certificates or other official documentation will be used to fulfill this requirement and to track site personnel's training status. The SSO shall be responsible for insuring training qualifications through review of training documentation and for monitoring the status of on-site personnel to insure during the course of this project site personnel do not cycle outside of their training compliance status. The documentation supporting training compliance and status shall be maintained at the project site and be made available, upon request.

8.2 SITE-SPECIFIC TRAINING

Tetra Tech NUS SSO will provide site-specific training to Tetra Tech NUS employees and other personnel who will perform work on this project.

Figure 8-1 will be used to document the provision and content of the project-specific and associated training. Site personnel will be required to sign this form prior to commencement of site activities. This training documentation will be employed to identify personnel who through record review and attendance of the site-

specific training are cleared for participation in site activities. This document shall be posted to maintain an active list of cleared site personnel.

TtNUS will conduct a pre-activities training session prior to initiating site work. Additionally, a brief meeting may be held daily to discuss operations planned for that day as well as, a short meeting may be held at the end of the day to discuss the operations completed and any problems encountered. This activity will be supported through the use of a Safe Work Permit System (See Section 9.4) and/or documented in the Project Logbook.

8.3 MEDICAL SURVEILLANCE

Tetra Tech NUS and other personnel participating in project field activities will have had a physical examination. Physical examinations shall meet the minimum requirements of paragraph (f) of OSHA 29 CFR 1910.120. The physical examinations will be performed to ensure that personnel are medically qualified to perform hazardous waste site work using respiratory protection.

Documentation for medical clearances will be maintained at the job site and made available, as necessary. A letter from an officer of the company or a medical clearance authorized by the physician can be used as documentation. Documentation must indicate that clearance provided are in accordance with medical surveillance as determined by 29 CFR 1910.120 (f).

The SSO shall be responsible for ensuring that personnel participating in this project provide documentation regarding their medical qualifications. Personnel associated with this project will maintain a current status regarding medical surveillance as determined by 29 CFR 1910.120 (f) or the prescribed interval as determined by the Licensed Occupational Health Care Provider. Documentation supporting medical surveillance compliance and status shall be made available, upon request.

8.3.1 Medical Data Sheet

Each field team member, including visitors, entering the exclusion zone(s) shall be required to complete and submit a copy of the Medical Data Sheet (see Attachment II). This shall be filled out and collected, reviewed and maintained by the SSO. The purpose of this document is to provide site personnel and emergency responders with additional information that may be necessary in order to administer medical attention.

FIGURE 8-1

SITE-SPECIFIC TRAINING DOCUMENTATION

My signature below indicates that I am aware of the potential hazardous nature of performing remedial investigation activities at Naval Support Facility Indian Head and that I have received site-specific training which included the elements presented below:

- Names of designated personnel and alternates responsible for site safety and health
- Safety, health, and other hazards present on site
- Use of personal protective equipment
- Safe use of engineering controls and equipment
- Medical surveillance requirements
- Signs and symptoms of overexposure
- Contents of the Health and Safety Plan
- Emergency response procedures (evacuation and assembly points)
- Incipient response procedures
- Review of the contents of relevant Material Safety Data Sheets
- Review of the use of Safe Work Permits

I have been given the opportunity to ask questions and my questions have been answered to my satisfaction. The dates of my training and medical surveillance indicated below are accurate.

Name (Printed and Signature)	Site-Specific Training Date	40-Hour Training (Date)	8-Hour Refresher Training (Date)	8-Hour Supervisory Training (Date)	Medical Exam

9.0 SITE CONTROL

This section outlines the means by which TtNUS will delineate work zones and use these work zones in conjunction with decontamination procedures to prevent the spread of contaminants into previously unaffected areas of the site. It is anticipated that a three-zone approach will be used during work at this site, including an Exclusion Zone, a Contamination Reduction Zone, and a Support Zone. It is also anticipated that this control measure will be used to control access to site work areas. Use of such controls will restrict the general public, minimize potentials for the spread of contaminants and to protect individuals who are not cleared to enter the work areas.

9.1 EXCLUSION ZONE

The Exclusion Zone will be considered those areas of the site of known or suspected contamination. It is not anticipated that significant amounts of surface contamination are in the proposed work areas of this site. It is anticipated that this will remain so until/unless contaminants are brought to the surface by intrusive activities such as drilling. Furthermore, once such activities have been completed and surface contamination has been removed, the potential for exposure is again diminished and the area can then be reclassified as part of the Contamination Reduction Zone. Therefore, the Exclusion Zones for this project will be limited to those areas if the site where active work is being performed plus an established safety zone depending on the task for surface soils and wipe samples maintain a five foot radius surrounding the sample collection point.

9.2 CONTAMINATION REDUCTION ZONE

The Contamination Reduction Zone (CRZ) will be a buffer area between the Exclusion Zone and any area of the site where contamination is not suspected. This area will also serve as a focal point in supporting Exclusion Zone activities. This area will be delineated using barrier tape, cones, and postings to inform and direct facility personnel. Decontamination will be conducted at a central location. Equipment potentially contaminated will be bagged and taken to that location for decontamination.

9.3 SUPPORT ZONE

The Support Zone for this project will include a staging area where site vehicles will be parked, equipment will be unloaded, and where food and drink containers will be maintained. The Support Zones will be established at areas of the site where exposure to site contaminants would not be expected during normal working conditions or foreseeable emergencies.

9.4 SAFE WORK PERMITS

Exclusion Zone work conducted in support of this project will be performed using Safe Work Permits to guide and direct field crews on a task by task basis. An example of the Safe Work Permit to be used is illustrated in Figure 9-1. Partially completed Permits for the work to be performed are included in Attachment IV. The daily meetings conducted at the site will further support these work permits. This effort will ensure site-specific considerations and changing conditions are incorporated into the planning effort. Permits will require the signature of the FOL and SSO. Use of these permits will provide the communication line for reviewing protective measures and hazards associated with each operation. This HASP will be used as the primary reference for selecting levels of protection and control measures. The work permit will take precedence over the HASP when more conservative measures are required based on specific site conditions.

9.5 SITE VISITORS

Site visitors for the purpose of this document are identified as representing the following groups of individuals:

- Personnel invited to observe or participate in operations by TtNUS
- Regulatory personnel (DOD, OSHA, EPA, MDE, etc.)
- Navy Personnel
- Other authorized visitors

It is not anticipated that this operation will result in a large number of site visitors. However, as some visitors can reasonably be expected, the following requirements will be enforced:

- Site visitors will be routed to the FOL, who will sign them in to the field logbook.

- Information to be recorded in the logbook will include the individual's name (proper identification required), who they represent, and purpose for the visit.

Site visitors will be required to produce the necessary information supporting clearance onto the site. This includes information attesting to applicable training (40-hours of HAZWOPER training required for Navy personnel) and medical surveillance, as stipulated in Section 8 of this document. In addition, to enter the site's operational zones during planned activities, visitors will be required to first go through site-specific training covering the topics stipulated in Section 8.2 of this document.

FIGURE 9-1

SAFE WORK PERMIT

Permit No. _____ Date: _____ Time: From _____ to _____

I. **Work limited to the following (description, area, equipment used):** _____

II. **Primary Hazards:** Potential hazards associated with this task include _____

III. **Field Crew:** _____

IV. **On-site Inspection conducted** ☐ Yes ☐ No Initials of Inspector _____ TtNUS
Equipment Inspection required ☐ Yes ☐ No Initials of Inspector _____ TtNUS

V. **Protective equipment required**
Level D ☐ Level B ☐
Level C ☐ Level A ☐
Modifications/Exceptions: _____

Respiratory equipment required
Yes ☐ Specify on the reverse
No ☐

VI.

Chemicals of Concern	Hazard Monitoring	Action Level(s)	Response Measures

Primary Route(s) of Exposure/Hazard: _____

(Note to FOL and/or SSO: Each item in Sections VII, VIII, and IX must be checked Yes, No, or NA)

VII. **Additional Safety Equipment/Procedures**

Hard-hat	☐ Yes	☐ No	Hearing Protection (Plugs/Muffs)	☐ Yes	☐ No
Safety Glasses	☐ Yes	☐ No	Safety belt/harness	☐ Yes	☐ No
Chemical/splash goggles	☐ Yes	☐ No	Radio/Cellular Phone	☐ Yes	☐ No
Splash Shield	☐ Yes	☐ No	Barricades	☐ Yes	☐ No
Splash suits/coveralls	☐ Yes	☐ No	Gloves (Type –)	☐ Yes	☐ No
Impermeable apron	☐ Yes	☐ No	Work/rest regimen	☐ Yes	☐ No
Steel toe Work shoes or boots	☐ Yes	☐ No	Chemical Resistant Boot Covers	☐ Yes	☐ No
High Visibility vest	☐ Yes	☐ No	Tape up/use insect repellent	☐ Yes	☐ No
First Aid Kit	☐ Yes	☐ No	Fire Extinguisher	☐ Yes	☐ No
Safety Shower/Eyewash	☐ Yes	☐ No	Other	☐ Yes	☐ No

Modifications/Exceptions: _____

VIII. **Site Preparation**

	Yes	No	NA
Utility Locating and Excavation Clearance completed	☐	☐	☐
Vehicle and Foot Traffic Routes Established/Traffic Control Barricades/Signs in Place	☐	☐	☐
Physical Hazards Identified and Isolated (Splash and containment barriers)	☐	☐	☐
Emergency Equipment Staged (Spill control, fire extinguishers, first aid kits, etc).	☐	☐	☐

IX. **Additional Permits required** (Hot work, confined space entry, excavation etc.). ☐ Yes ☐ No
If yes, SSO to complete or contact Health Sciences, Pittsburgh Office (412) 921-7090

X. **Special instructions, precautions:** _____

Permit Issued by: _____ Permit Accepted by: _____

NOTE: Site visitors will be escorted while at the site.

Following this, the site visitor will be permitted to enter the site and applicable operational areas. Visitors are required to observe the protective equipment and site restrictions in effect at the area of their visit. Visitors not meeting the requirements as stipulated in this plan for site clearance will not be permitted to enter the site operational zones during planned activities. Any incidence of unauthorized site visitation will cause onsite activities to be terminated until that visitor can be removed. Removal of unauthorized visitors will be accomplished with support from the NSF–IH contact, if necessary.

9.6 SITE SECURITY

Site security will be accomplished using TtNUS field personnel. TtNUS will retain complete control over active operational areas. Exclusion Zone barriers, and any existing barriers at the site will be used to restrict the general public. The second line of security will take place at the work site referring interested parties to the FOL or designee. The FOL will serve as a focal point for non-project interested parties, and serve as the final line of security and the primary enforcement contact.

9.7 SITE MAP

Once the areas of contamination, access routes, topography, and dispersion routes are determined, a site map will be generated and adjusted as site conditions change. When possible, these maps will be posted to illustrate up-to-date collection of contaminants and adjustment of zones and access points.

9.8 BUDDY SYSTEM

Personnel engaged in on-site activities will practice the "buddy system" to ensure the safety of personnel involved in this operation.

9.9 MATERIAL SAFETY DATA SHEET (MSDS) REQUIREMENTS

TtNUS and subcontractor personnel will provide MSDSs for the chemicals brought on site. The contents of these documents will be reviewed by the SSO with the user(s) of the chemical substances prior to any actual use or application of the substances on site. A chemical inventory of the chemicals used on site will be developed using the Health and Safety Guidance Manual. The MSDSs will then be maintained in a central location (i.e., temporary office) and will be available for anyone to review upon request.

9.10 COMMUNICATION

As personnel will be working in proximity to one another during field activities, a supported means of communication between field crews members will not be necessary. External communication will be accomplished by using the telephones at predetermined and approved locations. External communication will primarily be used for the purpose of resource and emergency resource communications. Prior to the commencement of activities, the FOL will determine and arrange for telephone communications.

10.0 SPILL CONTAINMENT PROGRAM

10.1 SCOPE AND APPLICATION

It is not anticipated that bulk hazardous materials (over 55-gallons) will be handled at any given time, or that any cylinders or containers will be unearthed, as part of this scope of work. It is also not anticipated that such spillage of Investigative Derived Wastes (IDW) would constitute a danger to human health or the environment. However, as the job progresses, the potential may exist for accumulating (IDW) such as decontamination fluids, soil cuttings, and purge and well development waters, in a central staging area. Once these fluids and other materials have been characterized, they can be removed from this area and properly disposed.

10.2 POTENTIAL SPILL AREAS

Potential spill areas will be periodically monitored in an ongoing attempt to prevent and control further potential contamination of the environment. Currently, limited areas are vulnerable to this hazard including:

- Resource deployment
- Waste transfer
- Central staging
- Concrete Coring Operations

It is anticipated that the IDW generated as a result of this scope of work will be containerized, labeled, and staged to await further analyses. The results of these analyses will determine the method of disposal.

10.3 LEAK AND SPILL DETECTION

During coring operations absorbent socks will be placed around coring location to contain water run-off.

To establish an early detection of potential spills or leaks, a periodic walk-around by the personnel staging or disposing of drums or in the resource deployment area will be conducted during working hours to visually determine that storage vessels are not leaking. If a leak is detected, the contents will be transferred, using a hand pump, into a new vessel. The leak will be collected and contained using absorbents such as Oil-Dry, vermiculite, or sand, which are stored at the vulnerable areas in a conspicuously marked drum. This used material, too, will be containerized for disposal pending analysis. Inspections will be documented in the project logbook.

It is not anticipated that any cylinders or containers will be unearthed during site activities. Should a cylinder or container be uncovered, however, work will immediately be stopped and personnel will retreat to a safe area until directed by the FOL or SSO.

10.4 PERSONNEL TRAINING AND SPILL PREVENTION

Personnel will be instructed in the procedures for incipient spill prevention, containment, and collection of hazardous materials in the site-specific training. The FOL and the SSO will serve as the Spill Response Coordinators for this operation, should the need arise.

10.5 SPILL PREVENTION AND CONTAINMENT EQUIPMENT

The following represents the minimum equipment that may be maintained (depending on anticipated need) at the staging areas for the purpose of supporting this Spill Prevention/Containment Program.

- Sand; clean fill, vermiculite, or other non-combustible absorbent (Oil-dry)
- Drums (55-gallon U.S. DOT 17-E or 17-H)
- Shovels, rakes, and brooms
- Absorbent Socks (for water containment during coring operations

10.5.1 PPE for Spill Control

Minimal PPE for spill control will be employed as needed. These materials may include:

- Nitrile work and inner gloves
- Tyvek coveralls
- Hard Hat
- Steel toed shoes with neoprene boot covers

10.6 SPILL CONTROL PLAN

This section describes the procedures the TtNUS field crewmembers will use upon the detection of a spill or leak.

- Notify the SSO or FOL immediately upon detection of a leak or spill. Activate emergency alerting procedures for that area to remove non-essential personnel.

- Employ the personal protective equipment stored at the staging area. Take immediate actions to stop the leak or spill by plugging or patching the container or raising the leak to the highest point in the vessel. Spread the absorbent material in the area of the spill, covering it completely.

- Transfer the material to a new vessel; collect and containerize the absorbent material. Label the new container appropriately. Await analyses for treatment and disposal options.

- Re-containerize spills, including top cover impacted by the spill. Await test results for treatment or disposal options.

It is not anticipated that a spill will occur that the field crew cannot handle. Should this occur, notification of the appropriate Emergency Response agencies will be carried out by the FOL or SSO in accordance with the procedures discussed in Section 2.0 of this HASP.

11.0 CONFINED-SPACE ENTRY

Personnel under the provisions of this HASP are not allowed, under any circumstances, to enter confined spaces. A confined space is defined as an area that has one or more of the following characteristics:

- Is large enough and so configured that an employee can bodily enter and perform assigned work.
- Has limited or restricted means for entry or exit (for example, tanks, manholes, sewers, vessels, silos, storage bins, hoppers, vaults, and pits are spaces that may have limited means of entry).
- Is not designed for continuous employee occupancy.

Additionally, a Permit-Required Confined Space may also have one or more of the following characteristics:

- Contains or has a potential to contain a hazardous atmosphere.
- Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly caving walls or by a floor that slopes downward and tapers to a smaller cross-section.
- Contains any other recognized, serious, safety or health hazard.

For further information on confined space operations, consult the Health and Safety Guidance Manual or call the HSM. Any activity that may be considered a confined-space entry shall require modifications of this HASP and shall result in the immediate notification of the Project Health and Safety Officer. This determination shall be made by the FOL and SSO.

12.0 MATERIALS AND DOCUMENTATION

The TtNUS FOL shall ensure the following materials/documents are taken to the project site and used when required.

- A complete copy of this HASP
- Health and Safety Guidance Manual
- Incident Reports
- Medical Data Sheets (multiple copies)
- Material Safety Data Sheets for the chemicals brought on site, including decon solutions, fuels, lime, sample preservatives, calibration gases, etc.
- A full-size OSHA Job Safety and Health Poster (See Attachment VI)
- Training/Medical Surveillance Documentation Form (Blank) (multiple copies)
- Emergency Reference Information (Section 2.0, extra copy for posting)

12.1 MATERIALS TO BE POSTED OR MAINTAINED AT THE SITE

The following documentation is to be posted or maintained at the site for quick reference purposes. In situations where posting of these documents is not feasible (such as no office trailer), these documents should be filed in a transportable file container and immediately accessible. The file should remain in the FOL's possession.

Chemical Inventory Listing (posted) - This list represents the chemicals brought on site, including decontamination solutions, sample preservatives, fuel, calibration gases, etc.. This list should be posted in a central area.

Material Safety Data Sheets (MSDSs) (maintained) - The MSDSs should also be in a central area accessible to site personnel. These documents should match the listings on the chemical inventory list for substances employed on site. It is acceptable to have these documents within a central folder and the chemical inventory as the table of contents.

The OSHA Job Safety & Health Protection Poster (posted) - This poster, as directed by 29 CFR 1903.2 (a)(1), should be conspicuously posted in places where notices to employees are normally posted. Each FOL shall ensure that this poster is not defaced, altered, or covered by other material.

Site Clearance (maintained) - This is found within the training section of the HASP (See Figure 8-1). This list identifies site personnel, dates of training (including site-specific training), and medical surveillance and indicates not only clearance but also status. If personnel do not meet these requirements, they do not enter the site while site personnel are engaged in activities.

Emergency Phone Numbers and Directions to the Hospital(s) (maintained) - This list of emergency numbers and hospital directions will be maintained at phone communications points and in each site vehicle.

Medical Data Sheets/Cards (maintained) - Medical Data Sheets will be filled out by onsite personnel and filed in a central location. The Medical Data Sheet will accompany any injury or illness requiring medical attention to the medical facility. A copy of this sheet or a wallet card will be given to personnel to be carried on their person.

Investigative Derived Waste Inventory Log (maintained) – The FOL and/or the SSO shall log collected containers of IDW. An updated inventory will be submitted to the Base POC at the termination of each shift.

13.0 GLOSSARY

ACGIH	American Conference of Governmental Industrial Hygienists
CFR	Code of Federal Regulations
CIH	Certified Industrial Hygienist
CNS	Central Nervous System
CRZ	Contamination Reduction Zone
CSE	Confined Space Entry
CSP	Certified Safety Professional
CTO	Contract Task Order
dBA	Decibels average
DOD	Department of Defense
DOT	Department of Transportation
EPA	Environmental Protection Agency
eV	electron Volts
FID	Flame Ionization Detector
FOL	Field Operations Leader
HASP	Health and Safety Plan
HAZWOPER	Hazardous Waste Operations and Emergency Response
HEPA	High Efficiency Particulate Air
HSM	Health and Safety Manager
IDW	Investigative Derived Waste
LEL	Lower Explosive Limit
MSDS	Material Safety Data Sheet
N/A	Not Available
NIOSH	National Institute Occupational Safety and Health
NSF-IH	Naval Support Facility-Indian Head
OSHA	Occupational Safety and Health Administration (U.S. Department of Labor)
PAH	Polynuclear Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyl
PE	Professional Engineer
PEL	Permissible Exposure Limit
PHSO	Project Health and Safety Officer
PID	Photo Ionization Detector
PM	Project Manager
PPE	Personal Protective Equipment
PVC	Poly Vinyl Chloride

RAC	Remedial Action Contractor
SOP	Standard Operating Procedure
SSO	Site Safety Officer
STEL	Short Term Exposure Limit
TBD	To Be Determined
TCE	Trichloroethylene
TPH	Total Petroleum Hydrocarbons
TtNUS	Tetra Tech NUS, Inc.
TWA	Time Weighted Average
UEL	Upper Explosive Limit
UV	Ultraviolet

ATTACHMENT I

INJURY/ILLNESS PROCEDURE

AND REPORT FORM

TETRA TECH, INC.
Safety Excellence

TETRA TECH, INC.
INCIDENT REPORT

Report Date	Report Prepared By	Incident Report Number

INSTRUCTIONS:

All incidents (including those involving subcontractors under direct supervision of Tetra Tech personnel) must be documented on the IR Form.

Complete any additional parts to this form as indicated below for the type of incident selected.

TYPE OF INCIDENT (Check all that apply)	Additional Form(s) Required for this type of incident
Near Miss (No losses, but could have resulted in injury, illness, or damage)	☐ Complete IR Form Only
Injury or Illness	☐ Complete Form IR-A; Injury or Illness
Property or Equipment Damage, Fire, Spill or Release	☐ Complete Form IR-B; Damage, Fire, Spill or Release
Motor Vehicle	☐ Complete Form IR-C; Motor Vehicle

INFORMATION ABOUT THE INCIDENT

Description of Incident

_____

_____

_____

_____

Date of Incident	Time of Incident
	_____ AM ☐ PM ☐ *OR* Cannot be determined ☐
Weather conditions at the time of the incident	**Was there adequate lighting?**
	_____ Yes ☐ No ☐

Location of Incident

_____ Was location of incident within the employer's work environment? Yes ☐ No ☐

Street Address	City, State, Zip Code and Country
Project Name	**Client:**
Tt Supervisor or Project Manager	**Was supervisor on the scene?**
	Yes ☐ No ☐

WITNESS INFORMATION (attach additional sheets if necessary)

Name	Company
Street Address	**City, State and Zip Code**

Telephone Number(s)

CORRECTIVE ACTIONS

Corrective action(s) immediately taken by unit reporting the incident:

_____

_____

_____

_____

Corrective action(s) still to be taken (by whom and when):

_____

_____

_____

_____

ROOT CAUSE ANALYSIS LEVEL REQUIRED

Root Cause Analysis Level Required: Level - 1 ☐ Level - 2 ☐ None ☐

Root Cause Analysis Level Definitions

Level - 1	**Definition:** A Level 1 RCA is conducted by an individual(s) with experience or training in root cause analysis techniques and will conduct or direct documentation reviews, site investigation, witness and affected employee interviews, and identify corrective actions. Activating a Level 1 RCA and identifying RCA team members will be at the discretion of the Corporate Administration office. The following events may trigger a Level 1 RCA: ▪ Work related fatality ▪ Hospitalization of one or more employee where injuries result in total or partial permanent disability ▪ Property damage in excess of $75,000 ▪ When requested by senior management
Level - 2	**Definition:** A Level 2 RCA is self performed within the operating unit by supervisory personnel with assistance of the operating unit HSR. Level 2 RCA will utilize the 5 Why RCA methodology and document the findings on the tools provided. The following events will require a Level 2 RCA: ▪ OSHA recordable lost time incident ▪ Near miss incident that could have triggered a Level 1 RCA ▪ When requested by senior management

Complete the Root Cause Analysis Worksheet and Corrective Action form. Identify a corrective action(s) for each root cause identified within each area of inquiry.

NOTIFICATIONS

Title	Printed Name	Signature	Telephone Number	Date
Project Manager or Supervisor				
Site Safety Coordinator or Office H&S Representative				
Operating Unit H&S Representative				
Other: _____				

The signatures provided above indicate that appropriate personnel have been notified of the incident.

INSTRUCTIONS:

Complete all sections below for incidents involving injury or illness.
Do NOT leave any blanks.
Attach this form to the IR FORM completed for this incident.

Incident Report Number: (From the IR Form)	

EMPLOYEE INFORMATION

Company Affiliation

Tetra Tech Employee? ☐ TetraTech subcontractor employee (directly supervised by Tt personnel)? ☐

Full Name	**Company (if not Tt employee)**
Street Address, City, State and Zip Code	**Address Type**
_____	Home address (for Tt employees) ☐
_____	Business address (for subcontractors) ☐

Telephone Numbers

Work: _____ Home: _____ Cell: _____

Occupation (regular job title)	**Department**
Was the individual performing regular job duties?	**Time individual began work**
Yes ☐ No ☐	_____ AM ☐ PM ☐ *OR* Cannot be determined ☐

Safety equipment

Provided? Yes ☐ No ☐

Used? Yes ☐ No ☐ If no, explain why

_____

_____

_____

Type(s) provided:

- ☐ Hard hat
- ☐ Protective clothing
- ☐ Gloves
- ☐ High visibility vest
- ☐ Eye protection
- ☐ Fall protection
- ☐ Safety shoes
- ☐ Machine guarding
- ☐ Respirator
- ☐ Other (list)

_____

NOTIFICATIONS

Name of Tt employee to whom the injury or illness was first reported	**Was H&S notified within one hour of injury or illness?**
	Yes ☐ No ☐
Date of report	**H&S Personnel Notified**
Time of report	**Time of Report**

If subcontractor injury, did subcontractor's firm perform their own incident investigation?

Yes ☐ No ☐ If yes, request a copy of their completed investigation form/report and attach it to this report.

INJURY / ILLNESS DETAILS

What was the individual doing just before the incident occurred? Describe the activity as well as the tools, equipment, or material the individual was using. Be specific. Examples: "Climbing a ladder while carrying roofing materials"; "Spraying chlorine from a hand sprayer"; "Daily computer key-entry"

What Happened? Describe how the injury occurred. Examples: "When ladder slipped on wet floor and worker fell 20 feet"; "Worker was sprayed with chlorine when gasket broke during replacement"; Worker developed soreness in wrist over time"

Describe the object or substance that directly harmed the individual: Examples: "Concrete floor"; "Chlorine"; "Radial Arm Saw". If this question does not apply to the incident, write "Not Applicable".

MEDICAL CARE PROVIDED

Was first aid provided at the site: Yes ☐ No ☐ If yes, describe the type of first aid administered and by whom?

Was treatment provided away from the site: Yes ☐ No ☐ If yes, provide the information below.

Name of physician or health care professional	**Facility Name**
Street Address, City State and Zip Code	**Type of Care?**
	Was individual treated in emergency room? Yes ☐ No ☐
	Was individual hospitalized overnight as an in-patient? Yes ☐ No ☐
Telephone Number	Did the individual die? Yes ☐ No ☐ If yes, date:
	Will a worker's compensation claim be filed? Yes ☐ No ☐

NOTE: Attach any police reports or related diagrams to this report.

SIGNATURES

I have reviewed this report and agree that all the supplied information is accurate

Affected individual (print)	**Affected individual (signature)**	**Telephone Number**	**Date**

This form contains information relating to employee health and must be used in a manner that protects the confidentiality of the employee to the extent possible while the information is being used for occupational safety and health purposes.

INSTRUCTIONS:

Complete all sections below for incidents involving property/equipment damage, fire, spill or release.
Do NOT leave any blanks.
Attach this form to the IR FORM completed for this incident.

Incident Report Number: (From the IR Form)	

TYPE OF INCIDENT (Check all that apply)

Property Damage ☐ Equipment Damage ☐ Fire or Explosion ☐ Spill or Release ☐

INCIDENT DETAILS

Results of Incident: Fully describe damages, losses, etc.

Response Actions Taken:

Responding Agency(s) (i.e. police, fire department, etc.)	**Agency(s) Contact Name(s)**

DAMAGED ITEMS (List all damaged items, extent of damage and estimated repair cost)

Item:	**Extent of damage:**	**Estimated repair cost**

SPILLS / RELEASES (Provide information for spilled/released materials)

Substance	**Estimated quantity and duration**	**Specify Reportable Quantity (RQ)**
		_____ Exceeded? Yes ☐ No ☐ NA ☐

FIRES / EXPLOSIONS (Provide information related to fires/explosions)

Fire fighting equipment used? Yes ☐ No ☐ If yes, type of equipment: _____

NOTIFICATIONS

Required notifications	**Name of person notified**	**By whom**	**Date / Time**
Client: _____ Yes ☐ No ☐			
Agency: _____ Yes ☐ No ☐			
Other: _____ Yes ☐ No ☐			

Who is responsible for reporting incident to outside agency(s)? Tt ☐ Client ☐ Other ☐ Name: _____

Was an additional written report on this incident generated? Yes ☐ No ☐ If yes, place in project file.

INSTRUCTIONS:

Complete all sections below for incidents involving motor vehicle accidents. Do NOT leave any blanks. Attach this form to the IR FORM completed for this incident.

Incident Report Number: (From the IR Form)	

INCIDENT DETAILS

Name of road, street, highway or location where accident occurred	Name of intersecting road, street or highway if applicable

County	City	State

Did police respond to the accident?	Did ambulance respond to the accident?
Yes ☐ No ☐	Yes ☐ No ☐
Name and location of responding police department	**Ambulance company name and location**
Officer's name/badge #	

Did police complete an incident report? Yes ☐ No ☐ If yes, police report number: _____
Request a copy of completed investigation report and attach to this form.

VEHICLE INFORMATION

How many vehicles were involved in the accident? _____ (Attach additional sheets as applicable for accidents involving more than 2 vehicles.)

Vehicle Number 1 – Tetra Tech Vehicle		Vehicle Number 2 – Other Vehicle	
Vehicle Owner / Contact Information		**Vehicle Owner / Contact Information**	
Color		**Color**	
Make		**Make**	
Model		**Model**	
Year		**Year**	
License Plate #		**License Plate #**	
Identification #		**Identification #**	
Describe damage to vehicle number 1		**Describe damage to vehicle number 2**	
Insurance Company Name and Address		**Insurance Company Name and Address**	
Agent Name		**Agent Name**	
Agent Phone No.		**Agent Phone No.**	
Policy Number		**Policy Number**	

DRIVER INFORMATION

Vehicle Number 1 – Tetra Tech Vehicle		Vehicle Number 2 – Other Vehicle	
Driver's Name		Driver's Name	
Driver's Address		Driver's Address	
Phone Number		Phone Number	
Date of Birth		Date of Birth	
Driver's License #		Driver's License #	
Licensing State		Licensing State	
Gender	Male ☐ Female ☐	Gender	Male ☐ Female ☐
Was traffic citation issued to Tetra Tech driver? Yes ☐ No ☐		Was traffic citation issued to driver of other vehicle? Yes ☐ No ☐	
Citation #		Citation #	
Citation Description		Citation Description	

PASSENGERS IN VEHICLES (NON-INJURED)

List all non-injured passengers (excluding driver) in each vehicle.
Driver information is captured in the preceding section.
Information related to persons injured in the accident (non-Tt employees) is captured in the section below on this form.
Injured Tt employee information is captured on FORM IR-A

Vehicle Number 1 – Tetra Tech Vehicle		Vehicle Number 2 – Other Vehicle	
How many passengers (excluding driver) in the vehicle? _____		How many passengers (excluding driver) in the vehicle? _____	
Non-Injured Passenger Name and Address		Non-Injured Passenger Name and Address	
Non-Injured Passenger Name and Address		Non-Injured Passenger Name and Address	
Non-Injured Passenger Name and Address		Non-Injured Passenger Name and Address	

INJURIES TO NON-TETRATECH EMPLOYEES

Name of injured person 1				Address of injured person 1		
Age	**Gender**	**Car No.**	**Location in Car**	**Seat Belt Used?**	**Ejected from car?**	**Injury or Fatality?**
	Male ☐ Female ☐			Yes ☐ No ☐	Yes ☐ No ☐	Injured ☐ Died ☐
Name of injured person 2				**Address of injured person 2**		
Age	**Gender**	**Car No.**	**Location in Car**	**Seat Belt Used?**	**Ejected from car?**	**Injury or Fatality?**
	Male ☐ Female ☐			Yes ☐ No ☐	Yes ☐ No ☐	Injured ☐ Died ☐

OTHER PROPERTY DAMAGE

Describe damage to property other than motor vehicles	
Property Owner's Name	**Property Owner's Address**

COMPLETE AND SUBMIT DIAGRAM DEPICTING WHAT HAPPENED

ATTACHMENT II

MEDICAL DATA SHEET

MEDICAL DATA SHEET

Project: Naval Support Facility, Indian Head, Maryland

Name: _____ Address: _____

Telephone Numbers: Home: _____ Work: _____ Cell: _____

Age: _____ Height: _____ Weight: _____

Name of Next of Kin: _____

Telephone Numbers: Home: _____ Work: _____ Cell: _____

Address: _____

_____

Drug or other Allergies: _____

Particular Sensitivities: _____

Do You Wear Contacts? _____

Do you have any medical restrictions? _____

Past Medical History/Review of Systems (Check if you have had positive history)

- ☐ Heart Conditions (chest pains, angina, heart attacks)
- ☐ Gastrointestinal Conditions (ulcers, liver, GI bleeding)
- ☐ Pulmonary (Difficult breathing, coughing, asthma, etc)
- ☐ Neurological (Headaches, dizziness, strokes)
- ☐ Kidney/Urological Disorder (kidney stones, renal failure)
- ☐ Endocrine (thyroid, diabetes)
- ☐ Hematological (clotting, anemia)
- ☐ Cancer
- ☐ Muscular/Skeleton (arthritis, fractures, etc.)
- ☐ Other (recent illness, weight loss, fever, etc.)

Comments: (Explain positive history): _____

_____

_____

Immunization History: Last Tetanus Shot or Booster (Date): _____ Pneumonia Vaccination (Date): _____

Flu Vaccination (Date): _____ Other: _____

Name, Address, and Phone Number of personal physician: _____

_____

I am the individual described above. I have read and understand this HASP.

_____ _____

Signature Date

ATTACHMENT III

SAFE WORK PERMITS

SAFE WORK PERMIT
DECONTAMINATION ACTIVITIES
NSF-IH INDIAN HEAD, MARYLAND

Permit No. _____ Date: _____ Time: From _____ to _____

SECTION I: General Job Scope

I. **Work limited to the following (description, area, equipment used):** Decontamination of sampling equipment

II. **Primary Hazards:** Lifting; noise; flying projectiles; struck by; slips, trips and falls; and inclement weather

III. **Field Crew:** _____

IV. **On-site Inspection conducted** ☐ Yes ☐ No Initials of Inspector _____TtNUS
Equipment Inspection required ☒ Yes ☐ No Initials of Inspector _____TtNUS

SECTION II: General Safety Requirements (To be filled in by permit issuer)

V. **Protective equipment required**
Level D ☒ Level B ☐
Level C ☐ Level A ☐

Respiratory equipment required
Yes ☐ Specify on the reverse
No ☒

Modifications/Exceptions: None anticipated

VI. **Chemicals of Concern** | **Hazard Monitoring** | **Action Level(s)** | **Response Measures**
Liquinox (soap) | None Required | None | Eye irritant/flush with clean water

Primary Route of Exposure/Hazard: Soap – Contact - Eye irritant; ingestion- nausea possible vomiting, diarrhea.

(Note to FOL and/or SSO: Each item in Sections VII, VIII, and IX must be checked Yes, No, or NA)

VII. **Additional Safety Equipment/Procedures**

Hard-hat	☒	☐	Hearing Protection (Plugs/Muffs)	☒	☐
Safety Glasses	☒	☐	Safety belt/harness	☐	☒
Chemical/splash goggles	☐	☒	Radio/Cellular Phone	☐	☒
Splash Shield	☒	☐	Barricades	☐	☐
Splash suits/coveralls	☒	☐	Gloves (Type – Nitrile)	☒	☐
Impermeable apron	☐	☐	Work/rest regimen	☐	☒
Steel toe work shoes/boots	☒	☐	Chemical Resistant Boot Covers	☒	☐
High Visibility vest	☐	☐	Tape up/use insect repellent	☐	☒
First Aid Kit	☒	☐	Fire Extinguisher	☐	☐
Safety Shower/Eyewash	☐	☒	Other	☐	☐

(Yes / No)

Modifications/Exceptions: _____

VIII. **Site Preparation**

	Yes	No	NA
Utility Locating and Excavation Clearance completed	☐	☐	☒
Vehicle and Foot Traffic Routes Established/Traffic Control Barricades/Signs in Place	☐	☐	☐
Physical Hazards Identified and Isolated (Splash and containment barriers)	☐	☐	☐
Emergency Equipment Staged (Spill control, fire extinguishers, first aid kits, etc)	☐	☐	☐

IX. **Additional Permits required** (Hot work, confined space entry, excavation etc.) ☐ Yes ☒ No
If yes, SSO to complete or contact Health Sciences, Pittsburgh Office (412)921-7090

X. **Special instructions, precautions:** Suspend site activities in the event of inclement weather (storms, high winds,etc.). Use proper lifting techniques. Follow directions provided in the MSDSs for any decontamination solvents/solutions used in the decontamination procedure.

Permit Issued by:_____ Permit Accepted by:_____

SAFE WORK PERMIT
MOBILIZATION/DEMOBILIZATION ACTIVITIES
NSF-IH INDIAN HEAD, MARYLAND

Permit No. _____ Date: _____ Time: From _____ to _____

SECTION I: General Job Scope

I. **Work limited to the following (description, area, equipment used):** Mobilization and demobilization activities. These activities include site reconnaissance/site characterization, site preparation including the layout of sampling locations, and identifying/isolating physical hazards; secure, construct, or equip IDW storage facilities to support the field activities.

II. **Primary Hazards:** Lifting; pinches and compressions; slips, trips, and falls; heavy equipment hazards; vehicular and foot traffic; and insect and animal bites

III. **Field Crew:** _____

IV. **On-site Inspection conducted** ☐ Yes ☐ No Initials of Inspector _____ TtNUS
Equipment Inspection required ☒ Yes ☐ No Initials of Inspector _____ TtNUS

SECTION II: General Safety Requirements (To be filled in by permit issuer)

V. **Protective equipment required**
Level D ☒ Level B ☐

Respiratory equipment required
Yes ☐ See Reverse
No ☒

Modifications/Exceptions: None anticipated

VI. Chemicals of Concern	Hazard Monitoring	Action Level(s)	Response Measures
None anticipated	NA	NA	NA

Primary Route of Exposure/Hazard: None

(Note to FOL and/or SSO: Each item in Sections VII, VIII, and IX must be checked Yes, No, or NA)

VII. Additional Safety Equipment/Procedures

Hard-hat	☐ Yes ☐ No	Hearing Protection (Plugs/Muffs)	☐ Yes ☐ No
Safety Glasses	☐ Yes ☐ No	Safety belt/harness	☐ Yes ☒ No
Chemical/splash goggles	☐ Yes ☒ No	Radio/Cellular Phone	☐ Yes ☐ No
Splash Shield	☐ Yes ☐ No	Barricades	☐ Yes ☐ No
Splash suits/coveralls	☐ Yes ☐ No	Gloves (Type – Leather/Cotton)	☐ Yes ☐ No
Impermeable apron	☐ Yes ☐ No	Work/rest regimen	☐ Yes ☒ No
Steel toe work shoes/boots	☒ Yes ☐ No	Chemical Resistant Boot Covers	☐ Yes ☐ No
High Visibility vest	☐ Yes ☐ No	Tape up/use insect repellent	☐ Yes ☐ No
First Aid Kit	☒ Yes ☐ No	Fire Extinguisher	☐ Yes ☐ No
Safety Shower/Eyewash	☐ Yes ☐ No	Other	☐ Yes ☐ No

Modifications/Exceptions: If you have to raise your voice to be heard by someone within 2-feet of you hearing protection is required (i.e., equipment); If overhead hazards or bump hazards or you are working near operating equipment hard hats will be worn. If you are working in or near heavy equipment traffic patterns then wear high visibility vests.

VIII. Site Preparation

	Yes	No	NA
Utility Locating and Excavation Clearance completed	☐	☐	☐
Vehicle and Foot Traffic Routes Established/Traffic Control Barricades/Signs in Place	☐	☐	☐
Physical Hazards Identified and Isolated	☐	☐	☐
Emergency Equipment Staged (Spill control, fire extinguishers, first aid kits, etc)	☐	☐	☐

IX. **Additional Permits required** (Hot work, confined space entry, excavation etc.) ☐ Yes ☒ No
If yes, SSO to complete or contact Health Sciences, Pittsburgh Office (412)921-7090

X. **Special instructions, precautions:** Suspend site activities in the event of inclement weather. Employ proper lifting techniques as described on Table 5-1 for this task.

Permit Issued by: _____ Permit Accepted by: _____

SAFE WORK PERMIT
VERIFICATION SAMPLING
NSF-IH INDIAN HEAD, MARYLAND

Permit No. _____ Date: _____ Time: From _____ to _____

SECTION I: General Job Scope

I. **Work limited to the following (description, area, equipment used):** Verification Surface soil sampling.

II. **Primary Hazards:** chemical; transfer contamination; lifting; slips, trips and falls; ambient temperature extremes; vehicular and foot traffic; insect/animal bites and stings, poisonous plants, etc; and inclement weather

III. **Field Crew:** _____

IV. **On-site Inspection conducted** ☐ Yes ☐ No Inspector Initials _____ TtNUS

Equipment Inspection required ☒ Yes ☐ No Inspector Initials _____ TtNUS

SECTION II: General Safety Requirements (To be filled in by permit issuer)

V. **Protective equipment required**
Level D ☒ Level B ☐
Level C ☐ Level A ☐

Respiratory equipment required
Yes ☐ See Reverse
No ☒

Modifications/Exceptions: _____

VI.	**Chemicals of Concern**	**Hazard Monitoring**	**Action Level(s)**	**Response Measures**
	Metals, PCBs, PAHs & TCE	PID w/10.6 eV lamp or FID	any sustained reading above background	leave area until readings return to background levels

Primary Route of Exposure/Hazard: _____

(Note to FOL and/or SSO: Each item in Sections VII, VIII, and IX must be checked Yes, No, or NA)

VII. **Additional Safety Equipment/Procedures** (Note to FOL and/or SSO: Each item must be checked Yes or No)

Hard-hat	☒ Yes ☐ No	Hearing Protection (Plugs/Muffs)	☒ Yes ☐ No
Safety Glasses	☒ Yes ☐ No	Safety belt/harness	☐ Yes ☒ No
Chemical/splash goggles	☐ Yes ☒ No	Radio/Cellular Phone	☐ Yes ☐ No
Splash Shield	☐ Yes ☒ No	Barricades	☒ Yes ☐ No
Splash suits/coveralls	☐ Yes ☐ No	Gloves (Type – See Note)	☒ Yes ☐ No
Impermeable apron	☐ Yes ☐ No	Work/rest regimen	☐ Yes ☒ No
Steel toe work shoes/boots	☒ Yes ☐ No	Chemical Resistant Boot Covers	☐ Yes ☐ No
High Visibility vest	☐ Yes ☐ No	Tape up/use insect repellent	☐ Yes ☐ No
First Aid Kit	☒ Yes ☐ No	Fire Extinguisher	☒ Yes ☐ No
Safety Shower/Eyewash	☒ Yes ☐ No	Other	☐ Yes ☐ No

Modifications/Exceptions: _____

VIII. **Site Preparation**

	Yes	No	NA
Utility Locating and Excavation Clearance completed	☐	☐	☐
Vehicle and Foot Traffic Routes Cleared and Established	☐	☐	☐
Physical Hazards Barricaded and Isolated	☐	☐	☐
Emergency Equipment Staged	☐	☐	☐

IX. **Additional Permits required** (Utility Locating and Excavation Clearance) ☒ Yes ☐ No
If yes, SSO complete permit or contact Health Sciences, Pittsburgh Office(412) 921-7090

X. **Special instructions, precautions:** Personnel decontamination will consist of disposing of single use PPE and washing hands and face prior to breaks or meals.

Permit Issued by: _____ Permit Accepted by: _____

SAFE WORK PERMIT
IDW MANAGEMENT ACTIVITIES
NSF-IH INDIAN HEAD, MARYLAND

Permit No. _____ Date: _____ Time: From _____ to _____

SECTION I: General Job Scope

I. **Work limited to the following (description, area, equipment used):** IDW management activities includes containerization, staging, monitoring for leaks of IDW accumulated wastes. Wastes types include soil cutting, and decontamination wash waters.

II. **Primary Hazards:** Lifting; noise; pinches and compressions; slips, trips, and falls; insect/animal bites and stings; and inclement weather

III. **Field Crew:** _____

IV. **On-site Inspection conducted** ☐ Yes ☐ No Initials of Inspector _____TtNUS
Equipment Inspection required ☐ Yes ☐ No Initials of Inspector _____TtNUS

SECTION II: General Safety Requirements (To be filled in by permit issuer)

V. **Protective equipment required**
Level D ☒ Level B ☐
Level C ☐ Level A ☐

Respiratory equipment required
Yes ☐ See Reverse
No ☒

Modifications/Exceptions: None anticipated

VI. Chemicals of Concern	Hazard Monitoring	Action Level(s)	Response Measures
None anticipated	Not Required		

Primary Route of Exposure/Hazard: None

(Note to FOL and/or SSO: Each item in Sections VII, VIII, and IX must be checked Yes, No, or NA)

VII. **Additional Safety Equipment/Procedures**

Hard-hat	☐ Yes	☐ No	Hearing Protection (Plugs/Muffs)	☐ Yes	☒ No
Safety Glasses	☐ Yes	☐ No	Safety belt/harness	☐ Yes	☒ No
Chemical/splash goggles	☐ Yes	☒ No	Radio/Cellular Phone	☐ Yes	☐ No
Splash Shield	☐ Yes	☒ No	Barricades	☐ Yes	☐ No
Splash suits/coveralls	☐ Yes	☒ No	Gloves (Type – See Note)	☒ Yes	☐ No
Impermeable apron	☐ Yes	☒ No	Work/rest regimen	☐ Yes	☒ No
Steel toe work shoes/boots	☒ Yes	☐ No	Chemical Resistant Boot Covers	☐ Yes	☒ No
High Visibility vest	☐ Yes	☒ No	Tape up/use insect repellent	☐ Yes	☐ No
First Aid Kit	☒ Yes	☐ No	Fire Extinguisher	☐ Yes	☐ No
Safety Shower/Eyewash	☐ Yes	☒ No	Other	☐ Yes	☐ No

Modifications/Exceptions: If you are using pneumatic/electric power to open drums – Safety glasses are required; If power equipment is employed to move drums or you are working near operating equipment hard hats will be employed. Wear leather or cotton gloves when physically handling drums. Wear nitrile examination gloves when sampling drums.

VIII. **Site Preparation**

	Yes	No	NA
Utility Locating and Excavation Clearance completed	☐	☐	☒
Vehicle and Foot Traffic Routes Established/Traffic Control Barricades/Signs in Place	☐	☐	☐
Physical Hazards Identified and Isolated	☐	☐	☐
Emergency Equipment Staged (Spill control, fire extinguishers, first aid kits, etc)	☐	☐	☐

IX. **Additional Permits required** (Hot work, confined space entry, excavation etc.) ☐ Yes ☒ No
If yes, SSO to complete or contact Health Sciences, Pittsburgh Office (412)921-7090

X. **Special instructions, precautions:** Suspend site activities in the event of inclement weather. Use proper lifting techniques described in Table 5-1 for this task. When/where possible use heavy equipment to move and place containers. When placing drums – Place the label and retention ring nut on the outside where it is readily visible..

Permit Issued by:_____ Permit Accepted by:_____

ATTACHMENT IV

EQUIPMENT INSPECTION

Heavy Equipment Inspection Checklist

Company:_____ **Unit/Serial No#:**_____

Inspection Date: ____/____/____ **Time:**_____:_____ **Equipment Type:**_____
(e.g, earthmoving equipment - tractors backhoes, bulldozers, etc.)

Project Name:_____ **Project No#:**_____

Yes	No	NA	Requirements	Comments
☐ ☐	☐ ☐	☐ ☐	Seat Belts • Are available for intended operator and passengers (where applicable) • Seat Belts are operational?	
☐	☐	☐	Roll-Over Protection (ROPS) • Roll-over protection structures (ROPS) are provided on vehicles and heavy equipment (including scrapers, tractors, loaders, bulldozers, carryalls, etc.)	
☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐	Brakes • Brake systems capable of stopping and holding fully loaded equipment • Parking Brake functions properly • Wheel Chocks available (where and as applicable)	
☐ ☐	☐ ☐	☐ ☐	Access • Non-slip steps • Grab Handles (3-Point Grab/Step Mounting Points)	

Heavy Equipment Inspection checklist
Page 2

Unit/Serial No#:_____ Inspection Date: _____/_____/_____

Yes	No	NA	Requirements	Comments
☐	☐	☐	Audible Alarms • Audible alarms – All bidirectional machines, such as rollers, compacters, front-end loaders, bulldozers, and similar equipment, shall be equipped with a horn, distinguishable from the surrounding noise level, which shall be operated as needed when the machine is moving in either direction. - Back up Alarms – All self propelled equipment with an obstructed view to the rear will be equipped with a reverse gear signal alarm distinguishable from the surrounding noise level. • Horn functioning properly	
☐	☐	☐	Highway Use • Fenders for equipment that can exceed 15mph	
☐	☐	☐	• Fire Extinguisher	
☐	☐	☐	• Are exhaust emissions directed away from the Operator?	
☐	☐	☐	• Cab	
☐	☐	☐	- Clean, free from debris, tools or equipment that can interfere with foot Control.	
☐	☐	☐	- Free from storage of flammable material/solvents	
☐	☐	☐	• Mirrors,	
☐	☐	☐	• Safety glass	
☐	☐	☐	- Equipped with defrosters	
☐	☐	☐	- Windshield wipers	
☐	☐	☐	• Turn signals, lights, brake lights, etc. (front/rear) for equipment approved for highway use?	
☐	☐	☐	• Gauges functioning properly	
☐	☐	☐	• Tires (Tread) or tracks	
☐	☐	☐	• Steering (standard and emergency)	
☐	☐	☐	• Are tools and material secured to prevent movement during transport?	

Unit/Serial No#:_____ Inspection Date: ____/____/____

Yes	No	NA	Requirements	Comments
☐ ☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐ ☐	Fluid Levels: • Engine oil • Transmission fluid • Brake fluid • Cooling system fluid • Hoses and belts • Hydraulic oil	
☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐	Fueling • Fueling of vehicles and heavy equipment is done with the engine off. • No smoking is permitted at or near the fuel storage or refueling area. A sign is posted stating: NO SMOKING WITHIN 50 FEET. • No sources of ignition are present near the fuel storage or refueling area. • A dry chemical or carbon dioxide fire extinguisher (rated 6:BC or larger) is in a location accessible to the fueling area, no closer than 50-feet. • Safety cans available?	
☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐	Safety Guards – • Around rotating apparatus (belts, pulleys, sprockets, spindles, drums, flywheels, chains) all points of operations protected from accidental contact? • Hot pipes and surfaces are protected from accidental contact? • High pressure pneumatic lines have safety cable to prevent thrashing should it become disconnected?	
☐	☐	☐	Attachments • Have the attachments designed for use (as per manufacturer's recommendation) with this equipment been inspected and are considered suitable for use?	

Unit/Serial No#:_____ Inspection Date: ____/____/____

Yes	No	NA	Requirements	Comments
☐	☐	☐	Operator Qualifications • Does the operator have proper licensing where applicable, (e.g., CDL)?	
☐	☐	☐	• Does the operator, understand the equipment's operating instructions?	
☐	☐	☐	• Is the operator experienced with this equipment?	
☐	☐	☐	• Is the operator 21 years of age or more?	
☐	☐	☐	PPE Required • Hardhat	
☐	☐	☐	• Safety glasses	
☐	☐	☐	• Work gloves	
☐	☐	☐	• Chemical resistant gloves_____	
☐	☐	☐	• Steel toed Work Boots	
☐	☐	☐	• Chemical resistant Boot Covers	
☐	☐	☐	• Apron	
☐	☐	☐	• Coveralls Tyvek, Saranex, cotton)_____	
☐	☐	☐	Key(s)?	
☐	☐	☐	Operating Manual?	
☐	☐	☐	Other Hazards • Excessive Noise Levels _____dBA	
☐	☐	☐	• Chemical hazards (Drilling supplies - Sand, bentonite, grout, fuel, etc.)	
☐	☐	☐	- MSDSs available?	

Approved for Use ☐ Yes ☐ No ☐ See Comments

_____ _____

Site Health and Safety Officer Operator

APPENDIX B

QUALITY ASSURANCE PROJECT PLAN

Quality Assurance Project Plan for UXO 32 (Site 41) – Scrap Yard

Naval Support Facility, Indian Head

Indian Head, Maryland

Naval Facilities Engineering Command Washington

Contract Number N62472-03-D-0057

Contract Task Order 047

January 2007

REVISION 0
JANUARY 2007

QUALITY ASSURANCE PROJECT PLAN
FOR
VERIFICATION SAMPLING
UXO 32 (SITE 41) - SCRAP YARD

NAVAL SUPPORT FACILITY, INDIAN HEAD
INDIAN HEAD, MARYLAND

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

Submitted to:
Naval Facilities Engineering Command Washington
1314 Harwood Street, SE
Washington Navy Yard, D.C. 20374-5018

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

CONTRACT NUMBER N62472-03-D-0057
CONTRACT TASK ORDER 047

JANUARY 2007

PREPARED UNDER THE DIRECTION OF:

Kim C. Turnbull

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PITTSBURGH, PENNSYLVANIA

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TABLES

SECTION

FIGURES

SECTION

ACRONYMS

%R	Percent Recovery
µg/kg	micrograms/kilogram
BTAG	Biological Technical Assistance Group
CFR	Code of Federal Regulations
CLEAN	Comprehensive Long-Term Environmental Action Navy
CLP	Contract Laboratory Program
C-O-C	Chain-of-Custody
CRDL	Contract Required Detection Limit
CTO	Contract Task Order
DAF	Dilution and Attenuation Factor
FOL	Field Operations Leader
FR	Federal Register
FTMR	Field Task Modification Request
GC	Gas Chromatograph
GC/MS	Gas Chromatograph/Mass Spectrometry
HASP	Health and Safety Plan
HPLC	High Performance Liquid Chromatography
HSM	Health and Safety Manager
ICP	Inductively Coupled Plasma
IDL	Instrument Detection Limit
ILM	Inorganic Laboratory Method
LCS	Laboratory Control Sample
MDL	Method Detection Limit
mg/kg	milligrams/kilogram
MS	Matrix Spike
MSD	Matrix Spike Duplicate
NFESC	Naval Facilities Engineering Service Center
NIST	National Institute of Standards and Technology
NSF-IH	Naval Support Facility, Indian Head
OSHA	Occupational Safety and Health Administration
PAHs	polynuclear aromatic hydrocarbons
PCBs	polychlorinated biphenyls
PDS	Post-Digestion Spikes
PE	Performance Evaluation
PID	photoionization detector

PM	Project Manager
QA	quality assurance
QAM	Quality Assurance Manager
QAO	Quality Assurance Officer
QAPP	Quality Assurance Project Plan
QC	quality control
RA	Remedial Action
RBC	Risk-Based Concentration
RL	Reporting Limit
RPD	Relative Percent Difference
RPM	Remedial Project Manager
SDG	Sample Delivery Group
SIM	Selective Ion Monitoring
SOP	Standard Operating Procedure
SOW	Statement of Work
SSL	Soil Screening Level
SSO	Site Safety Officer
TAL	Target Analyte List
TCL	Target Compound List
TtNUS	Tetra Tech NUS, Inc.
U.S. Navy	United States Navy
USEPA	United States Environmental Protection Agency
VSAP	Verification Sampling and Analysis Plan

1.0 PROJECT DESCRIPTION

1.1 INTRODUCTION

This Quality Assurance Project Plan (QAPP) outlines the organization, objectives, planned activities, and Quality Assurance/Quality Control (QA/QC) procedures associated with verification sampling activities at Site 41 Scrap Yard (Site 41) at the Naval Support Facility, Indian head (NSF-IH) located in Indian Head, Maryland. This QAPP, along with the Health and Safety Plan (HASP) are provided as Attachments to the Verification Sampling and Analysis Plan (VSAP) and constitute the planning documents for verification sampling and analysis activities. This QAPP addresses specific protocols for sample collection, sample handling and storage, chain-of-custody, laboratory and field analyses, data validation, and data reporting.

This QAPP has been prepared by Tetra Tech NUS, Inc. (TtNUS) on behalf of the United States Navy (U.S. Navy) under the Comprehensive Long-Term Environmental Action Navy (CLEAN) Contract Number N62472-03-D-0057, Contract Task Order (CTO) 047. This QAPP was generated for and will comply with applicable State of Maryland and United States Environmental Protection Agency (USEPA) Region III requirements, regulations, guidance, and technical standards.

1.2 SITE DESCRIPTION

A discussion of Site 41, including its location, surrounding area, operational history, and nature and extent of contamination is provided in Sections 1.1 and 1.2 of the VSAP.

1.3 PROJECT OBJECTIVES

The primary objectives of the verification sampling and analysis activities are to obtain sufficient data to confirm that no further removal of contaminated soil is required following the Remedial Action (RA) associated with the Scrap Yard. Details regarding the project scope of work are contained in Section 2.0 of the VSAP.

1.3.1 Project Target Parameters and Intended Data Uses

This section discusses the field screening and laboratory analytical information to be generated during implementation of verification sampling and analysis activities at the NSF-IH. Field screening procedures are discussed in Section 1.3.1.1. Laboratory parameters and intended data uses are discussed in Section 1.3.1.2.

1.3.1.1 Field Screening

The selection of exact soil sampling locations is discussed in Section 2.3 and shown in Figures 2-2a and 2-2b of the VSAP. All potential polynuclear aromatic hydrocarbon (PAH) sample locations will be monitored with a Photoionization Detector (PID) instrument.

1.3.1.2 Laboratory Parameters

The methods shown in Table 1-1 of this QAPP will be used to analyze samples collected during implementation of verification sampling and analysis activities at NSF-IH. Required analyses of the environmental samples are presented in Table 2-2 of the VSAP.

Table 1-2 of this QAPP provides a summary of the laboratory target parameters and their associated reporting limits [selected PAHs and Target Compound List (TCL) polychlorinated biphenyls (PCBs)] and Contract Required Detection Limits (CRDL) [selected Target Analyte List (TAL) metals]. Method Detection Limits (MDLs) for the selected PAHs and TCL PCBs and Instrument Detection Limits (IDLs) for the selected TAL metals are also provided. The MDLs/IDLs were provided by Severn Trent Laboratories, Inc. The MDLs/IDLs are presented to provide typical values. When an analytical laboratory is procured for Site 41 analyses, its IDLs/MDLs will be submitted and reviewed. For comparison purposes, ecological screening criteria are included in Table 1-2. Quantitation and detection limits are further discussed in Section 7.0 of this QAPP.

TABLE 1-1

ANALYTICAL METHODS SUMMARY GC/MS PREP FOR SOIL
SITE 41 SCRAP YARD
NSF-IH, INDIAN HEAD, MARYLAND

Parameter – Solid Matrices[1]	Preparation Method	Analytical Method
Selected PAHs	SW-846 3550 or 3540	SW-846 8310 or 8270C SIM
Selected TCL PCBs	SW-846 3540	SW-846 8082
Selected TAL Metals	CLP ILM04.1[2]	CLP ILM04.1

1 Aqueous QA samples consisting of field blanks and rinse blanks will also be submitted for analysis using the same analytical methods. No aqueous environmental samples will be collected.

2 USEPA, 2000a. Contract Laboratory Program (CLP) Statement of Work for Inorganics Analysis, Multi-Media, Multi-Concentration, ILM04.1.

CLP = Contract Laboratory Program
TAL = Target Analyte List
ILM = Inorganic Laboratory Method
SIM = Selective Ion Monitoring

TABLE 1-2

ANALYTICAL DETECTION LIMITS VS. CRITERIA
SITE 41 SCRAP YARD
NSF-IH
INDIAN HEAD, MARYLAND

Chemical	Laboratory Detection Limits[1]		USEPA Region III Soil RBC[2]		USEPA Generic SSL[3]				USEPA Region III BTAG Screening Levels[4]
							Migration to Groundwater		
	MDL/IDL	RL/ CRDL	Industrial	Residential	Ingestion	Inhalation	DAF = 1	DAF = 20	Soil
PCBs - SW846-8082 (mg/kg)	**Soil Samples**								
Aroclor 1260	0.00085	1.0	1.4	0.32	1^{-5}	--	--	0.41	<0.1
Metals - CLP SOW ILM04.1 (mg/kg)	**Soil Samples**								
Arsenic	1	15	1.9	0.43	0.4	750	1	29	328
Cadmium	1	5	510	39				27	
Lead	1	480	750 [7]	400 [6]	400	--	--	--	0.01
PAHs - SW846-8310 or 8270C SIM	**Soil Samples**								
Benzo(a)pyrene	0.01	0.33	0.39	0.022	0.09	--	0.4	8	0.01
Dibenzo(a,h)anthracene	0.01	0.33	0.39	0.022	0.09	--	0.08	2	0.01

Note: MDLs/IDLs that are shaded exceed the associated shaded criteria.

BTAG Biological Technical Assistance Group
CLP Contract Laboratory Program
DAF Dilution and Attenuation Factor
CRDL Contract Required Detection Limit
MDL Method Detection Limit
RBC Risk-Based Concentration Limit
RL Reporting Limit
IDL Instrument Detection Limit
SOW Statement of Work
mg/Kg Milligram per Kilogram
SSL Soil Screening Level
ILM Inorganic Laboratory Method
USEPA United States Environmental Protection Agency

1 Analytical detection limits provided by Severn Trent Laboratories (STL). MDLs/IDLs are provided to present typical values. MDLs/IDLs are laboratory specific.
2 USEPA, 2006.
3 USEPA, 1996.
4 USEPA, 1995.
5 A preliminary remediation goal of 1 mg/kg has been set for PCB based on Guidance on Remedial Actions for Superfund Sites with PCB Contamination.
6 Office of Solid Waste and and Emergency Response (OSWER) soil screening level for residential land use. Value was developed using the USEPA Integrated Exposure Uptake Biokinetic Model (USEPA, 1994).
7 USEPA screening level for industrial land use. Value was derived using adult lead Model (USEPA, 1996).

2.0 PROJECT ORGANIZATION

This section presents project management and organization information for Site 41 verification sampling and analysis activities. The project organization chart for the Navy/TtNUS team is provided in Figure 2-1. The various QA and management responsibilities of the Navy and key TtNUS project personnel are defined in the following paragraphs.

2.1 PROJECT MANAGEMENT

The management and all aspects of the QA organization are the ultimate responsibilities of the Navy and NSF-IH. Each contractor assigned to individual tasks has the responsibility to fulfill the objectives of each task and ensure the quality of the data generated by the task. At the direction of the Navy, TtNUS has overall responsibility for the implementation of verification sampling and analysis activities to be performed at NSF-IH.

2.1.1 U.S. Navy Remedial Project Manager

The U.S. Navy Remedial Project Manager (RPM) is responsible for overall QA of the project. The U.S. Navy RPM has the responsibility for the following specific activities:

- Responsible for implementation of the non-time-critical removal action in accordance with the Action Memorandum
- Serve as lead contact person with the regulatory agencies and regulatory oversight contractor, if applicable
- Initiate and chair meetings
- Responsible for facilitating resolution to issues during the planning and implementation stages
- Assure adequate resources are provided to complete RA activities in accordance with the approved plans, on schedule, and within budget
- Assure compliance with QA policies and procedures

The U.S. Navy RPM is Mr. Jeffery Morris.

2.1.2 CLEAN Program Manager

The TtNUS Navy Mid-Atlantic/Atlantic CLEAN Program Manager provides operations, technical, and administrative leadership, and oversees and supports quality policies. The TtNUS Program Manager is responsible for the execution of all contractual obligations. He serves as the primary program point of contact for the client and provides an interface between the Navy and the project staff. The TtNUS Program Manager is Mr. John Trepanowski, P.E. Mr. Trepanowski may delegate authority to the Deputy Program Manager, Mr. Garth Glenn, P.E.

2.1.3 TtNUS Project Manager

The TtNUS Project Manager (PM) is responsible for project performance, budget, and schedule and for ensuring the availability of necessary personnel, equipment, subcontractors, and services. The TtNUS PM will direct the development of the field program, the evaluation of findings, the determination of conclusions and recommendations, and the preparation of the technical report. The TtNUS PM is selected based upon technical experience, project needs, and previous NSF-IH experience. Additional responsibilities include:

- Ensuring timely resolution of project-related technical, quality, safety, or waste management issues
- Functioning as primary interface with the RPM and NSF-IH Site Manager, field and office personnel, and subcontractor points-of-contact
- Monitoring and evaluating subcontractor laboratory performance
- Coordinating and overseeing work performed by field and office technical staff (including data validation, statistical evaluations, and report preparation)
- Coordinating and overseeing maintenance of all project records
- Coordinating and overseeing review of project deliverables
- Preparing and issuing final deliverables to the Navy
- Approving the implementation of corrective action

The TtNUS PM is Mr. George Latulippe, P.E.

2.1.4 TtNUS Health and Safety Manager

The TtNUS Health and Safety Manager (HSM) is responsible for the following:

- Overseeing the development and review of the Site Security and HASP
- Implementing the Site Security and HASP
- Assigning the Site Safety Officer (SSO) and supervising his/her performance
- Conducting Health and Safety audits
- Preparing Health and Safety reports for management

The TtNUS HSM is Mr. Matthew Soltis.

2.2 QUALITY ASSURANCE

This section identifies the QA responsibilities for verification sampling and analysis activities. Responsibilities of TtNUS and the analytical laboratory are discussed.

2.2.1 TtNUS Quality Assurance Manager

The TtNUS Quality Assurance Manager (QAM) is responsible for overall QA for the project, and reports directly to the TtNUS Program Manager. The QAM has the responsibility for the following specific activities:

- Developing, maintaining, and monitoring QA policies and procedures
- Providing training to TtNUS staff in QA/QC policies and procedures
- Conducting systems and performance audits to monitor compliance with environmental regulations, contractual requirements, QAPP requirements, and corporate policies and procedures
- Auditing project records
- Monitoring subcontractor quality controls and records
- Assisting in the development of corrective action plans; ensuring correction of nonconformances reported in internal or external audits
- Overseeing the implementation of the QAPP

- Overseeing and reviewing the development and revision of the QAPP
- Overseeing the responsibilities of the TtNUS Site QA/QC Advisor
- Preparing QA reports for management

The TtNUS QAM is Ms. Kelly Carper.

2.2.2 TtNUS Project QA Advisor

The TtNUS Project QA Advisor provides support in preparation and review of the QAPP, coordination of work performed by office technical staff, and performance of data assessment. The Project QA Advisor communicates directly with the QAM on matters of QA/QC.

2.2.3 Laboratory Responsibilities

The subcontracted laboratory is responsible for analyzing all samples in accordance with the analytical methods and additional requirements specified in this QAPP. It also will be the analytical laboratory's responsibility to properly dispose of unused sample aliquots. Responsibilities of key laboratory personnel are outlined in the following paragraphs.

Laboratory Project Manager

The Laboratory Project Manager will report directly to the TtNUS PM and will:

- Ensure that method and project-specific requirements are properly communicated and understood by laboratory personnel
- Ensure that all laboratory resources are available on an as-required basis
- Monitor analytical and project QA requirements
- Review data packages for completeness, clarity, and compliance with project requirements
- Inform the TtNUS PM of project status and any sample receipt or analytical problems

Laboratory Director

Responsibilities of the Laboratory Director include the following:

- Support the QA program within the laboratory
- Provide management overview of both production and quality-related laboratory activities
- Maintain adequate staffing to meet project analytical and quality objectives
- Approve all laboratory Standard Operating Procedures (SOPs) and QA documents
- Supervise in-house chain-of-custody (C-O-C) documentation
- Oversee the preparation of and approve final analytical reports prior to submittal to TtNUS

Laboratory Quality Assurance Officer

The Laboratory QA Officer (QAO) has the overall responsibility for data after it leaves the laboratory. The Laboratory QAO will be independent of the laboratory but will communicate data issues through the Laboratory Project Manager. In addition, the Laboratory QAO will:

- Oversee laboratory QA
- Oversee QA/QC documentation
- Conduct detailed data reviews
- Determine whether to implement laboratory corrective actions
- Define appropriate laboratory QA procedures
- Prepare laboratory SOPs

Independent QA will be provided by the Laboratory Project Manager and QAO prior to release of all data to TtNUS.

Laboratory Sample Custodian

The Laboratory Sample Custodian will report to the Laboratory Director. Responsibilities of the Laboratory Sample Custodian include the following:

- Receive and inspect the incoming sample containers
- Record the condition of the incoming sample containers
- Sign appropriate documents
- Verify C-O-Cs
- Notify laboratory manager and laboratory supervisor of sample receipt and inspection

- Assign a unique identification number and customer number, and enter each into the sample receiving log
- With the help of the laboratory manager, initiate transfer of the samples to appropriate lab sections
- Control and monitor access/storage of samples and extracts

Laboratory Technical Staff

The Laboratory Technical Staff will be responsible for sample analysis and identification of corrective actions. The staff will report directly to the Laboratory Director.

2.3 VERIFICATION SAMPLING AND ANALYSIS ACTIVITIES

TtNUS will be responsible for all field activities related to verification sampling and analysis activities. The TtNUS field team will be organized according to the activities planned. Field team members will be selected based on the type and extent of effort required. All team members will be appropriately skilled and trained for the tasks they are assigned to perform. The team will consist of a combination of the following personnel:

- Field Operations Leader (FOL)
- Site QA/QC Advisor
- Site Safety Officer
- Field Technical Staff

2.3.1 Field Operations Leader

The FOL is responsible for coordinating all onsite personnel and for providing technical assistance, when required. The FOL, or designee, will coordinate and lead all sampling activities and will ensure the availability and maintenance of all sampling materials/equipment. The FOL is responsible for the completion of all sampling, field and C-O-C documentation, will assume custody of all samples, and will ensure the proper handling and shipping of samples. The FOL is a highly experienced environmental professional who will report directly to the TtNUS PM. Specific FOL responsibilities include the following:

- Function as communications link between field staff members, the Site QA/QC Advisor, SSO, the NSF-IH Site Manager, and the PM

- Oversee the mobilization and demobilization of all field equipment and subcontractors

- Coordinate and manage the Field Technical Staff

- Adhere to the work schedules provided by the PM
- Bear responsibility for maintenance of the site logbook, field logbook, and field recordkeeping
- Initiate field task modification requests when necessary
- Identify and resolve problems in the field; resolve difficulties in consultation with the NSF-IH Site Manager; implement and document corrective action procedures and provide communication between the field team and upper management

2.3.2 Site QA/QC Advisor

The FOL (or designee) will act as the Site QA/QC Advisor, who is responsible for ensuring adherence to all QA/QC guidelines as defined in the QAPP. Strict adherence to these procedures is critical to the collection of acceptable and representative data. The following is a summary of the Site QA/QC Advisor's responsibilities:

- Ensure that field duplicates and field QC blanks are collected with the proper frequency
- Ensure that additional volumes of sample are supplied to the analytical laboratory with the proper frequency to accommodate laboratory QA/QC analyses
- Ensure that measuring and test equipment are calibrated, used, and maintained in accordance with applicable procedures
- Act as liaison between site personnel, laboratory personnel and the QAM
- Manage bottleware shipments and oversee field sample preservation

2.3.3 Site Safety Officer

The FOL (or designee) will also serve as the SSO. The duties of the SSO are detailed in the HASP. The SSO has stop-work authority, which can be executed upon the determination of an imminent safety hazard.

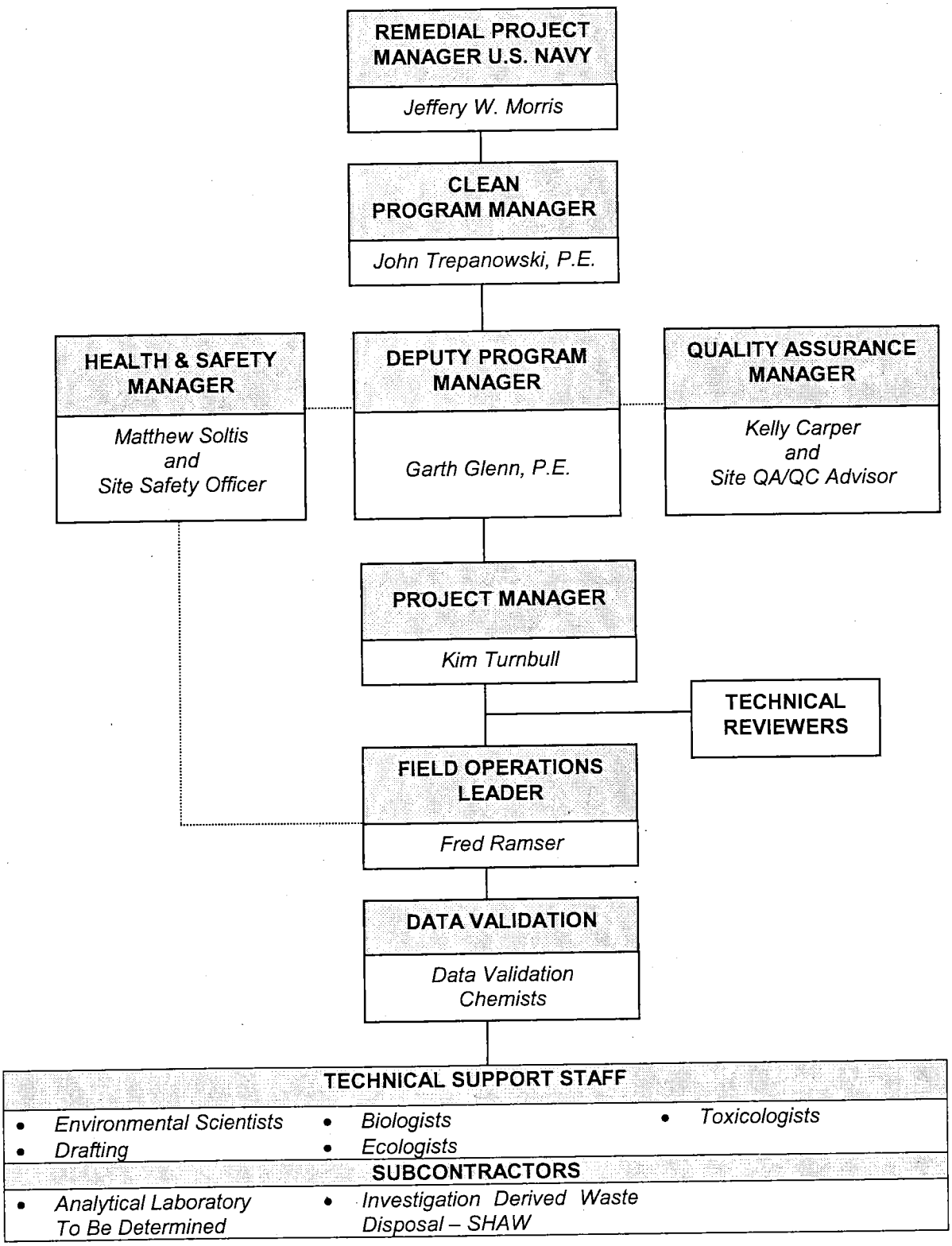
2.3.4 Field Technical Staff

The Field Technical Staff for this project will be drawn from TtNUS's pool of qualified personnel. All of the designated field team members will be experienced professionals who possess the degree of specialization and technical competence required to effectively and efficiently perform the required work. Field staff are responsible for complying with field-related requirements as presented in the QAPP.

2.4 SPECIAL TRAINING REQUIREMENTS AND CERTIFICATIONS

All field personnel will have appropriate training to conduct the field activities to which they are assigned. Additionally, each site worker will be required to have completed a 40-hour course in Health and Safety Training as described under Occupational Safety and Health Administration (OSHA) 29 Code of Federal Regulations (CFR) 1910.120(b)(4). As well as the requirements/training and certifications outlined in the project specific HASP.

FIGURE 2-1
PROJECT ORGANIZATION
SITE 41 SCRAP YARD
NSF-IH, INDIAN HEAD, MARYLAND



3.0 QUALITY ASSURANCE OBJECTIVES FOR MEASUREMENT DATA

The overall QA objective for this project is to develop and implement procedures for field sampling, C-O-C, laboratory analysis, data management and reporting that will yield results sufficient to support the attainment of the project objectives specified in Section 1.0. Intended data uses, including the list of project target parameters, are described in Section 1.3 of this QAPP. How decision-making will be based on data comparisons is described in Section 12.4. Specific procedures for sampling, C-O-C, laboratory instrument calibration, laboratory analysis, internal QC, reporting of data, audits, preventive maintenance of laboratory equipment, data management, corrective action, and reporting to management are described in the remaining sections of this QAPP. Overall QC level of effort is described in Section 3.6.

The PARCC parameters (precision, accuracy, representativeness, comparability, and completeness) are qualitative and quantitative statements regarding the quality characteristics of the data used to support project objectives and ultimately, environmental decisions. These parameters are presented in the remainder of this section. QC samples used to evaluate performance and their frequencies of use are described in Section 8.1 (field QC) and Section 8.2 (laboratory QC). Equations used to compute accuracy, precision, and completeness values are provided in Sections 12.1 through 12.3. Assessment of the data using PARCC parameters and the results of the data validation process is discussed in Section 12.4.

3.1 PRECISION

Precision is a measure of the degree to which two or more measurements are in agreement and describes the reproducibility of measurements of the same parameter for samples analyzed under similar conditions. A fundamental tenet of using precision measurements for QC is that precision will be bounded by known limits. Results outside these predetermined limits trigger corrective actions. The equation used to calculate precision is provided in Section 12.2.

Because of the inherent and unknown heterogeneity of soil samples, the precision of soil field duplicate samples will not be used for QC, but will be compared to laboratory precision estimates to gain a perspective on the natural heterogeneity of the soil. Precision acceptance criteria for soil duplicate samples are presented in Tables 3-1. Aqueous environmental samples will not be collected during verification sampling and analysis activities.

Results outside of these precision acceptance limits will trigger corrective actions, which are presented in Table 3-2.

3.1.1 Field Precision Objectives

Field precision is assessed by collecting and measuring field duplicates at a rate of 1 duplicate per 10 environmental samples. Acceptance limits for field duplicate precision are provided in Table 3-1. This precision estimate encompasses the combined uncertainty associated with sample collection, homogenization, handling, laboratory and field storage, digestion or extraction, and analysis. In contrast, precision estimates obtained from analyzing duplicate laboratory samples incorporate only homogenization, subsampling, digestion or extraction, laboratory storage, and analysis uncertainties. Consequently, the field precision estimates (i.e., relative percent difference [RPD] values) should equal or exceed the laboratory precision estimates, on average, for each analyte. If field duplicate precision is significantly different from laboratory duplicate precision, the underlying cause will be investigated to determine whether the observed difference could be artifacts of sampling and analysis. Considerations given to this effort include:

- The scale of subsampling for laboratory precision estimates relative to the scale of field duplicate sample size.
- Analytical measurement precision.
- Precision for repeat analysis of the same solid laboratory control sample (LCS).
- Estimated environmental sample grain size relative to LCS grain size.
- Potential natural sample heterogeneity.

When performing comparisons to Preliminary Remedial Goals or statistics, the value used to represent the concentration of a duplicate pair (i.e., the original and duplicate samples) will be the average of the original and duplicate sample. In the event that one of the two results in the duplicate pair is a non-detect, 1/2 the detection limit of the non-detect will be used to determine the average. However, if one of the two results is non-detect and the average exceeds the positive detection, the positive detection will be used to represent the concentration of the duplicate pair.

3.1.2 Laboratory Precision Objectives

Laboratory precision QC samples (i.e., laboratory duplicates for inorganic chemicals and matrix spike duplicates [MSDs] for organic chemicals) will be analyzed with a minimum frequency of 5 percent (i.e., 1 QC sample per 20 environmental samples). Laboratory precision is measured by comparing RPD values with precision control limits specified in Table 3-1.

3.2 ACCURACY

Accuracy is the degree of agreement between an observed value and an accepted reference value. This parameter is assessed by measuring spiked samples (e.g., surrogate spikes or matrix spikes [MSs]) or well-characterized samples of certified analyte concentrations (e.g., LCSs) and by measuring blanks. Accuracy measurements are designed to detect biases resulting from the sample handling and analysis processes. The equations for determining accuracy of an individual MS and a surrogate spike or LCS for this project are provided in Section 12.1. For blank samples, acceptance criteria are designed to limit the tolerable amount of contamination while recognizing that non-zero results for blanks are likely, if only because of random error in the measurement process. The bias computations for individual MSs, LCSs, and method blanks will be used to control the analysis process by triggering corrective actions as specified in Table 3-3.

3.2.1 Field Accuracy Objectives

Accuracy requirements for field measurements are typically ensured through control over the sample collection and handling and through routine instrument calibration. Accuracy is also typically monitored through the use of blanks to detect cross-contamination and by monitoring adherence to procedures that prevent sample contamination or degradation. Accuracy also shall be assured qualitatively through adherence to all sample handling, preservation, and holding time requirements.

3.2.2 Laboratory Accuracy Objectives

Accuracy in the laboratory is measured through the comparison of a MS, MSD sample or LCS result to a known or calculated value and is expressed as a percent recovery (%R). For organics, it is also assessed by monitoring the analytical recovery of select surrogate compounds added to samples that are analyzed by organic chromatographic methods. MS, MSD (organics only) and surrogate compound analyses measure the combined accuracy effects of the sample matrix, sample preparation and sample measurement. LCSs are used to assess the accuracy of laboratory operations with minimal sample matrix effects. For inorganics, post-digestion spikes (PDSs) are used to assess the accuracy of the analytical measurement on the sample extract or digestate. The parameters to be included in spiking mixes are presented in Table 3-3. LCS and MS analyses are performed at a frequency no less than 1 per 20 associated samples of like matrix. Laboratory accuracy is assessed via comparison of calculated %R values to accuracy control limits specified in Table 3-3.

3.3 COMPLETENESS

Completeness is a measure of the amount of usable, valid analytical data obtained compared to the amount expected to be obtained. Completeness is expressed as a percentage. The equation used to calculate completeness is provided in Section 12.3.

3.3.1 Laboratory Completeness Objectives

Laboratory completeness is a measure of the amount of usable, valid laboratory measurements per matrix obtained for each of the target analytes. Usable, valid results are those that are judged, after data assessment, to represent the sampling populations and to have not been rejected for use through data validation or data assessment. The laboratory completeness objective is 90% for each target analyte per matrix. Qualifications on the use of data caused by incomplete data sets will be documented in the verification sampling and analysis activities report.

3.4 REPRESENTATIVENESS

Representativeness is an expression of the degree to which the data accurately and precisely represent a characteristic of a population or environmental condition existing at the site. Adherence to the project planning documents and use of standardized sampling, handling, preparation, analysis, and reporting procedures ensures that the final data accurately represent the desired populations.

3.4.1 Measures to Ensure Representativeness of Field Data

Representativeness depends upon the proper design of the sampling program and will be satisfied by ensuring that the project planning documents are followed and by ensuring that proper sampling techniques are used.

3.4.2 Measures to Ensure Representativeness of Laboratory Data

Representativeness in the laboratory is ensured by using the proper analytical procedures, meeting sample holding times, and analyzing and evaluating field duplicate samples relative to laboratory duplicates.

3.5 COMPARABILITY

Comparability is defined as the confidence with which one data set can be compared to another (e.g., between sampling points; between sampling events). Comparability is achieved by using standardized sampling and analysis methods and data reporting formats (including use of consistent units of measure),

and by ensuring that reporting and detection limits are sufficient to satisfy project detection and quantitation criteria for the duration of the project. The detection limits anticipated for this project are presented in Table 1-2 of this QAPP.

3.5.1 Measures to Ensure Comparability of Field Data

Comparability depends upon the proper design of the sampling program and will be satisfied by ensuring that the project planning documents are followed and by ensuring that proper sampling techniques are used. The sample network and rationale for verification sampling and analysis activities are addressed in Section 2.0 of the VSAP.

3.5.2 Measures to Ensure Comparability of Laboratory Data

Planned analytical data will be comparable when similar sampling and analytical methods are used and documented. Results will be reported in units that ensure comparability with previous data. The units used for the laboratory measurements are further explained in Section 9.1.2 of this QAPP.

3.6 LEVEL OF QUALITY CONTROL EFFORT

Several QC samples will be analyzed for this project to provide a means to assess field and laboratory performance. Field QC samples consist of field duplicates, rinsate blanks, and temperature blanks. These QC checks are described in Section 8.1. Each type of field QC sample, with exception to temperature blanks, undergoes the same preservation, analysis, and reporting procedures as the related environmental samples. Frequencies of field QC sample collection and analysis are presented in Table 3-2.

Laboratory QC encompasses a host of other checks performed during sample preparation and analysis, as described in Section 8.2. Frequencies for laboratory QC checks are provided in Table 3-2.

TABLE 3-1

QUALITY CONTROL LIMITS
FIELD AND LABORATORY DUPLICATES
SOIL MATRIX – INORGANIC AND ORGANIC PARAMETERS
SITE 41 SCRAP YARD
NSF-IH
INDIAN HEAD, MARYLAND

Parameter	Field Duplicate Precision (RPD)[1]	Laboratory Duplicate or MS/MSD Precision (RPD)[1]
Selected TAL Inorganics CLP ILM04.1		
Arsenic	50	20
Cadmium	50	20
Lead	50	20
Selected TCL PCBs SW-846 8082		
Aroclor 1260	50	33
Selected PAHs SW-846 8310 or 8270C SIM		
Benzo(a)pyrene	50	25
Dibenzo(a,h)anthracene	50	28

MS/MSD = Matrix Spike/Matrix Spike Duplicate
RPD = Relative Percent Difference
TAL = Target Analyte List
PAHs = Polynuclear Aromatic Hydrocarbons
TCL = Target Compound List
ILM = Inorganic Laboratory Method
CLP = Contract Laboratory Program
PCBs - Polychlorinated Biphenyls
SIM = Selective Ion Monitoring

1 The values are presented to provide typical values. Once a laboratory is selected to provide analytical services these numbers will be updated if required.

TABLE 3-2

NON-CALIBRATION QC SAMPLE USAGE FREQUENCIES, ACCEPTANCE LIMITS AND CORRECTIVE ACTIONS SITE 41 SCRAP YARD NSF-IH, INDIAN HEAD, MARYLAND

QC Sample Type	Collection Frequency	Acceptance Limits	Corrective Action
Field Duplicate	1 per 10 investigative samples collected.	See Table 3-1	Investigate to determine the cause of the large RPD. Qualify data according to data validation requirements if the observed RPD is correct.
Equipment Rinsate Blank, Field Blank	One rinsate blank of each media sampling equipment will be collected and analyzed per decontamination event. One field blank of decontamination water will also be analyzed.	< RL	Identify source of contamination if possible. Qualify data according to validation criteria. Qualify use of data set if contamination appears to have adversely affected the data usability.
Laboratory Control Sample	1 per 20 environmental samples	All Analyses	Laboratory action taken per applicable laboratory SOP. TtNUS action taken per validation protocols.
Laboratory Duplicate	1 per 20 environmental samples. Analyzed for inorganic target analytes.	See Table 3-1	Laboratory action taken per applicable laboratory SOP. TtNUS action taken per validation protocols.
Laboratory Method Blank	1 per 20 environmental samples or per preparation batch, whichever is more frequent	< RL	Laboratory action taken per applicable laboratory SOP. TtNUS action taken per validation protocols.
Matrix Spike(1)	1 per 20 environmental samples	See Table 3-3	Laboratory action taken per applicable laboratory SOP. TtNUS action taken per validation protocols.
Matrix Spike Duplicate(1)	1 per 20 environmental samples analyzed for organic target analytes.	See Table 3-3	Laboratory action taken per applicable laboratory SOP. TtNUS action taken per validation protocols.
Post-digestion Spike	Only if out-of-control matrix spike exists (metals only)	100 ± 20%	Laboratory action taken per applicable laboratory SOP. TtNUS action taken per validation protocols.
Surrogate Compound	At least one per sample organic analyses.	Table 3-3	Laboratory action taken per applicable laboratory SOP. TtNUS action taken per validation protocols.
Temperature Blank	One blank per sample cooler.	4 ± 2 °C	Laboratory action taken per applicable laboratory SOP. TtNUS action taken per validation protocols.

1 Matrix Spikes are not analyzed in the field, but additional sample material must be collected in the field to ensure that the laboratory has enough material for spiking and duplicate analysis.

QC = Quality Control
RL = Reporting Limit
RPD = Relative Percent Difference
SOP = Standard Operating Procedure

TABLE 3-3

QUALITY CONTROL LIMITS
MATRIX SPIKE MATRIX SPIKE DUPLICATE SAMPLES
SOIL MATRIX – INORGANIC AND ORGANIC PARAMETERS
SITE 41 SCRAP YARD
NSF-IH, INDIAN HEAD, MARYLAND

Parameter	Accuracy (MS%R)(1)
Selected TAL Metals CLP OLM04.1	
Arsenic	75 - 125
Cadmium	75 - 125
Lead	75 - 125
Selected TCL PCBs SW-846 8082 or 8270C SIM	
Aroclor 1260	37 - 138
PAHs SW-846 8310	
Benzo(a)pyrene	32 - 125
Dibenzo(a,h)anthracene	38 - 173

1 The values are presented to provide typical values. Once a laboratory is selected to provide analytical services these numbers will be updated if required.

4.0 SAMPLING AND ANALYSIS PLAN DESIGN AND RATIONALE

Only soil environmental samples will be collected during verification sampling and analysis activities. Sampling procedures and field operations are addressed in detail in Section 3.0 of the VSAP. This section provides some general information and references the VSAP as applicable. The mechanics of sample collection, handling, preservation, and shipping are also described.

Site-specific health and safety concerns and processes used to govern the protection of worker health and safety are described in the HASP.

4.1 SAMPLING DESIGN AND RATIONALE

Details covering field activities and procedures are presented in Section 3.0 of the VSAP. Composited grab samples and discrete samples will be collected for all constituents within the excavation areas.

4.2 SAMPLE IDENTIFICATION SYSTEM

Each sample collected will be assigned a unique sample tracking number. The sample tracking number is a multi-segment, alpha-numeric code that identifies the location and sample medium. Any other pertinent information regarding sample identification will be recorded in the field logbooks and/or sample logsheets. MS and laboratory duplicate samples will be designated on the field documentation forms and sample labels. Details regarding the sample identification system are provided in Section 2.4 of the VSAP.

4.3 SAMPLE HANDLING, PRESERVATION AND SHIPPING

Sample handling includes the field-related considerations connected with selecting sample containers, preservatives, allowable holding times, and analyses requested. Samples may be unstable and therefore require preservation to prevent changes in either the concentration or the physical condition of the constituent(s) requiring analysis. The sample preservatives required for each of the chemicals of interest are provided in Table 3-1 of the VSAP.

The following procedures will be followed when shipping samples for laboratory analysis:

- All samples require cooling to 4°C ± 2°C and will be promptly chilled with ice and packaged in an insulated cooler for transport. Each cooler shipped to the laboratory will include a temperature blank. Ice will be sealed in containers to prevent water leakage and samples will not be frozen. Each sample container will be placed in a zip-lock bag to prevent contamination. The zip-lock bag will be

placed in a bubble-wrap sleeve to protect from breakage. The temperature of the cooler will be measured using the temperature blank and then recorded in the appropriate section of the chain-of-custody form.

- Only shipping containers that meet all applicable state and Federal standards for safe shipment will be used.

- Shipping containers will be sealed with nylon strapping tape, and custody seals will be signed, dated, and affixed in a manner that will allow the receiver to quickly identify any tampering that may have occurred during transport to the laboratory.

- The field C-O-C document will be taped to the top inside cover of the shipping container in a sealed plastic envelope.

- Shipment will be made by a public courier within 24 hours of sample collection.

The FOL will be responsible for ensuring the completion of the following forms:

- Sample Labels
- Chain-of-custody Forms
- Chain-of-custody Seals for Coolers
- Shipping Labels for Coolers
- Public Courier Air Bills

4.4 SAMPLE CUSTODY

Custody of samples must be maintained and documented at all times. Chain-of-custody begins with the collection of samples in the field. Chain-of-custody procedures are discussed in Section 5.0.

4.5 QUALITY CONTROL SAMPLES

Field QC samples will be collected or generated during environmental sampling activities. Field QC samples are addressed in more detail in Section 8.1.

4.6 RECORD KEEPING

In addition to chain-of-custody records, certain standard forms will be completed for sample description and documentation. These forms shall include sample log sheets, daily activity records, and logbooks. A

bound, weatherproof notebook shall be maintained by the FOL. All information related to sampling or field activities will be recorded in the field notebook. This information will include, but is not limited to, sampling time, weather conditions, unusual events, and field measurements. Field notebooks should also contain qualitative or semi-quantitative information on sample conditions such as odor and color.

5.0 CUSTODY PROCEDURES

Documented sample custody is one of several factors that are necessary for the admissibility of environmental data as evidence in a court of law. Custody procedures help to satisfy the two major requirements for admissibility: relevance and authenticity. Sample custody is addressed in three parts: field sample collection, laboratory analysis, and final evidence files. Final evidence files, including all original laboratory reports and purge files, are maintained under document control in a secure area. A sample or evidence file is under custody when any one of the following conditions is satisfied:

- The item is in the actual physical possession of an authorized person.
- The item is in view of the person after being in his or her possession.
- The item was placed in a secure area to prevent tampering.
- The item is in a designated and identified secure area with access restricted to authorized personnel only.

The chain-of-custody report is a multi-part, standardized form used to summarize and document pertinent sample information, such as sample identification and type, sample matrix, date and time of collection, preservation, and requested analyses. Furthermore, through the sequential signatures of various sample custodians (e.g., sampler, airbill number, laboratory sample custodian), the chain-of-custody report documents sample custody and tracking. Laboratory custody procedures will ensure that sample integrity is not compromised from the time of receipt at the laboratory until final data are reported to TtNUS. This requires that the laboratory control all sample handling and storage conditions and circumstances. Custody procedures apply to all environmental and associated field QC samples obtained as part of the data collection system.

5.1 FIELD CUSTODY PROCEDURES

The FOL (or designee) is responsible for the care and custody of the samples collected until they are relinquished to the laboratory or entrusted to a commercial courier. Chain-of-custody forms are completed to the fullest extent possible for each sample cooler used for shipment. The forms are legibly completed with waterproof ink, and are signed (and dated) by the sampler. Chain-of-custody forms will include the following information: project name, sample number, time collected, designated analysis, type of sample, preservative, and name of sampler. Pertinent notes or comments are also indicated on the C-O-C form.

Information similar to that contained in the chain-of-custody form is provided on the sample label, which is securely attached to the sample bottle. Sample labels will include, at a minimum, the following

information: sample number, date and time of collection, analysis required for the sample aliquot in the associated sample container, and a space for the laboratory sample number. Sample nomenclature to be used in this project is detailed in Section 3.3 of the VSAP.

Site conditions during sampling and the care with which samples are handled may factor into the degree to which samples represent the media from which they are collected. This, in turn, could affect the ability of decision-makers to make accurate and timely decisions concerning the contamination status of the site. As appropriate, logbooks are assigned to, and maintained by, key field team personnel. The logbooks are used to record daily conditions/activities such as weather conditions, dates/times of significant events, level of personal protection equipment used, drilling activities, actual sample collection locations, photographs taken, problems encountered during field activities and corrective actions taken to overcome problems. In addition, the names of site visitors and the purposes of their visits shall be recorded. Field logbook assignments shall be recorded in the Site Logbook or other central file whose location is known by the FOL and the PM. Together, field logbooks and sample documentation, including C-O-C forms, provide a record that should allow a technically qualified individual to reconstruct significant field activities for a particular day without resorting to memory. The FOL is responsible for the maintenance and security of all field records at the end of each workday during field activities. At the completion of field activities, the FOL will forward all field records to the TtNUS PM. All sample records are eventually docketed into the final evidence file.

A temperature blank shall be included in each cooler for use by the laboratory upon receipt. Each cooler shall be taped shut with strapping tape in at least two places to prevent tampering. Custody seals shall be attached so that the seals must be broken to open the cooler. Samples for chemical analysis will be sent (for next-day receipt) to the laboratory within 24 hours of collection.

The following procedures will be used when transferring custody of samples. As previously noted, individual custody records will accompany each sample cooler. The methods of shipment, courier name, and other pertinent information will be entered in the remarks section of the custody record. When transferring samples, the individuals relinquishing and receiving the samples will sign, date, and note the time on the C-O-C record. The original record (top copy of the multi-part form) will accompany the shipment and the field sampler will retain a copy. This record documents the sample custody transfer from the sampler to the laboratory, often through another person or agency (common courier). After C-O-C records have been placed within sealed shipping coolers, the signed courier airbills will serve to document chain-of-custody. Upon arrival at the laboratory, internal laboratory sample custody procedures will be followed (see Section 5.2).

5.2 LABORATORY CUSTODY PROCEDURES

Upon laboratory receipt of a shipment of samples, the laboratory's sample custodian will verify that the correct number of coolers has been received. The custodian will examine each cooler's custody seal to verify that it is intact and that the integrity of the environmental samples has been maintained. The custodian will then open each cooler and measure its internal temperature by measuring the temperature of the temperature blank. The temperature reading will be documented in the comments column of the chain-of-custody form or on an internal laboratory form. The sample custodian will then sign the chain-of-custody form and examine the contents of the cooler. Identification of broken sample containers or discrepancies between the chain-of-custody form and sample labels will be recorded. The laboratory will retain the original field chain-of-custody forms, providing copies of the forms with the final data package deliverable. All problems or discrepancies noted during this process will be promptly reported to the TtNUS PM. Samples will be logged into the laboratory information management system.

5.3 FINAL EVIDENCE FILES

The TtNUS Central File will be the repository for all documents that constitute evidence relevant to sampling and analysis activities as described in this QAPP. TtNUS will be the custodian of the evidence file and will maintain the contents of these files, including all relevant records, reports, logs, field notebooks, pictures, subcontractor reports, and data reviews in a secure, limited-access location and under custody of the TtNUS QAM. The control file will include at a minimum:

- Field logbooks
- Field data and data deliverables
- Photographs and negatives
- Drawings
- Laboratory data deliverables
- Data validation reports
- Data assessment reports
- Progress reports, QA reports, interim project reports, etc.
- All custody documentation (tags, forms, airbills, etc.)
- Sample log sheets
- Field task modification request forms
- Corrective actions documentation.

Upon completion of the contract, all files associated with this investigation will be relinquished to the custody of the Navy.

6.0 CALIBRATION PROCEDURES AND FREQUENCY

All instrumentation used to perform chemical measurements must be properly calibrated prior to use in order to obtain valid and usable results. Instruments used in the laboratory will be calibrated according to the procedures governing the use of the instruments.

6.1 FIELD INSTRUMENT CALIBRATION

Specific calibration procedures to be performed in the field are as described in the manufacturers specifications. All calibrations will be documented on an Equipment Calibration Log. During calibration, an appropriate maintenance check will be performed on each piece of equipment. If damage or defective parts are identified during the maintenance check and it is determined that the damage could have an impact on instrument performance, the instrument will be removed from service until the defective parts are repaired or replaced.

6.2 LABORATORY INSTRUMENT CALIBRATION

Laboratory calibration procedures and frequency of calibration will be per laboratory SOP which is based on the required analytical method. The following is a general description of these procedures.

Calibration procedures for metals analyses by inductively coupled plasma (ICP) and mercury (cold vapor) begin with a periodic establishment of the useful linear response range followed by routine daily calibrations. The daily calibrations consist of at least one blank and one calibration standard, an initial calibration verification, and continuing calibration verification standards/blanks, with each batch of samples analyzed. In all cases, an independently prepared standard (i.e., from a second source or a different lot number from the primary source) will be used as a calibration verification solution or as the MS spiking mix.

Organic chemical analyses begin with an initial calibration of the instrument that establishes the instrument responses as functions of analyte concentration. The initial calibration curves incorporate a calibration blank and a series of calibration standards for the target compounds and any applicable surrogate compounds. On a routine basis, a continuing calibration is performed in which the validity of the calibration curve is checked with a known chemical standard. This continuing calibration standard contains the target compounds of interest and applicable surrogate compounds. The surrogate compounds provide a means to assess the efficiency of analyte extraction and analysis for each sample.

All standards used to calibrate analytical instruments must be obtained from the National Institute of Standards and Technology (NIST) or through a reliable commercial supplier with a proven record for quality standards. In cases where documentation is not available, the laboratory will analyze the standard and compare the results to an USEPA-known or previous NIST-traceable standard.

Calibrations and associated documentation are required for all laboratory instruments. The documentation for calibrations performed in-house shall identify the person performing the calibration, the instrument being calibrated, the standards used for calibration and their concentration values or other pertinent calibration values, the source of the calibration standards, and the date of calibration. Certain instruments (e.g., balances) may be calibrated by a third party. In those cases the details of calibration as described above and a certification of acceptable performance shall be obtained from the third party. The period during which the calibration is valid may appear in the calibration record or may be governed by laboratory SOP.

Calibration procedures, frequency requirements, acceptance criteria, and conditions that require recalibration will be described for each analytical procedure in the laboratory SOPs and analytical methods.

7.0 ANALYTICAL PROCEDURES

7.1 LABORATORY ANALYTICAL AND MEASUREMENT PROCEDURES

Table 1-1 of this QAPP provides a summary of the laboratory preparation and analytical methods to be used during verification sampling and analysis activities.

7.1.1 List of Project Target Compounds and Detection Limits

A list of the laboratory target analytes and laboratory-specific MDLs (PAH and PCB parameters) and IDLs (metals parameters) are provided in Table 1-2. The MDLs/IDLs were provided by Severn Trent Laboratories. The MDLs shown have been determined experimentally using the procedures based on the method provided in CFR Part 136 Appendix B (Federal Register [FR] Vol. 49, No. 209, pages 198-199). The IDLs provided for metal parameters have been experimentally determined based on the procedure for IDL determination as specified in the USEPA CLP ILM04.1 (USEPA, 2000). All CLP data will be reported to the CRDL. CRDLs will be adjusted on a sample-by-sample basis, as necessary, based on dilutions and percent moisture. For organic parameters (PAHs and PCBs), positive results below the reporting limit but greater than the MDL will be reported by the laboratory and flagged as estimated, "J". Inorganics will be reported to the IDL.

7.1.2 List of Associated Quality Control Samples

Laboratory QC samples to be analyzed in support of this project are identified in Section 8.0.

8.0 INTERNAL QUALITY CONTROL CHECKS

During implementation of the Site 41 verification sampling and analysis activities, field and laboratory QC samples will be analyzed routinely to evaluate overall data quality. This section provides information regarding those internal QC checks. Laboratory QC samples are addressed in Sections 6.0 and 8.2 of this QAPP. Section 6.0 addresses instrument calibrations; Section 8.2 addresses non-calibration analytical QC. Table 3-2 summarized the routine field and laboratory non-calibration QC sample analysis frequencies and associated corrective actions. Table 2-2 of the VSAP presents the total number of soil samples that are anticipated to be collected in the field.

8.1 FIELD QUALITY CONTROL CHECKS

TtNUS has established a QC program that is designed to monitor and assess the quality of field work performed during environmental investigations. That program includes the use of various types of QC samples as indicated in Table 3-2. Some of the samples in Table 3-2 are identified as requiring additional sample material to be collected in the field even though the actual QC check is performed in the laboratory.

The field QC samples consist of field duplicates, rinsate blanks, and temperature blanks. Temperature blanks will be included in each cooler submitted to the laboratory to monitor sample storage conditions prior to arrival at the laboratory. Each type of field QC sample, with the exception to the temperature blank, undergoes the same preservation, analysis, and reporting procedures as the related environmental samples. The types of field QC to be used for this project are described in Sections 8.1.1 through 8.1.3. Target precision and accuracy values as applicable for field QC are presented in Tables 3-1 and 3-3 of this QAPP.

8.1.1 Field Duplicates

Field duplicates will be collected and analyzed for chemical constituents to measure the cumulative uncertainty (i.e., precision) of the sample collection, handling, storage, preparation and analysis operations, as well as natural sample heterogeneity that is not eliminated through simple mixing in the field. Field duplicates for all constituents are provided by mixing a volume of sample and splitting it into two separate sample containers that are labeled as individual field samples. Field duplicates are labeled as individual environmental samples and are not identified to the laboratory as duplicate samples.

8.1.2 Rinsate Blanks

Rinsate blanks or field blanks will be obtained under representative field conditions by collecting the rinse water generated by running analyte-free water, provided by the laboratory, through sample collection equipment after sampling and decontamination and before use. Rinsate blanks for verification sampling and analysis activities will be collected on all soil sampling equipment. These blanks will be collected to indicate the potential for sample cross-contamination through the use of improperly cleaned sampling equipment.

8.1.3 Temperature Blanks

Temperature blanks are vials of water inserted into each sample cooler prior to shipment from the field. The temperature of the blank is measured upon receipt at the laboratory to assess whether samples were properly cooled during transit.

8.2 LABORATORY QUALITY CONTROL CHECKS

A subcontracted laboratory which operates a QC program that ensures the reliability and validity of the analyses performed at the laboratory will be used for Site 41 analyses. The laboratory's QA Plan will describe the policies, organization, objectives, QC activities, and specific QA functions employed by the laboratory. All analytical procedures will be documented in writing as SOPs. Each analytical SOP will specify the minimum QC requirements for the procedure.

Internal laboratory analytical QC requirements beyond those used for instrument calibration QC are highlighted in the remainder of this section. Additional QC requirements, which are specific to the Naval Facilities Engineering Service Center (NFESC) QA Program (NFESC, 1999), and are therefore requirements for this project, are also specified, as applicable, for each of the QC checks. Target precision and accuracy values (control limits) are presented in Tables 3-1 and 3-3. Section 6.0 addressed calibration QC measures.

8.2.1 Laboratory Control Samples

LCSs serve to monitor the overall performance of each step during the analysis, including the sample preparation. These are solid samples (for soil analyses) or blank spikes (for water analyses) that contain concentrations of analytes that are known with a specified degree of certainty.

Based on the requirements of the NFESC QA Program, LCSs for metals and organics analyses must contain all analytes of interest.

Based on NFESC QA Program requirements, if recovery of a LCS falls outside the control limits (see Tables 3-1 and 3-3), the laboratory will reject the data for the analytical batch and take corrective action. The associated samples, extracts, or digestates may be reanalyzed a single time, and if the LCS recoveries meet acceptance criteria, the data will be reported. If LCS analyte recovery is still outside the acceptance limits, the associated samples in the preparation batch will be reprocessed if sufficient sample is available and holding times have not lapsed. If re-preparation or reanalysis is not possible, the data will be flagged and the sample delivery group (SDG) narrative will include details of the failed LCS.

8.2.2 Laboratory Duplicates

Laboratory duplicates will be analyzed for inorganic parameters to measure the cumulative uncertainty (i.e., precision) of the sample handling, subsampling, preparation, laboratory storage, and analysis operations within the laboratory, as well as sample heterogeneity that is not eliminated through simple mixing in the laboratory. Laboratory duplicates are two subsamples obtained by the laboratory analyst after mixing the sample. If RPD values exceed QC limits for laboratory duplicates (Table 3-1), the analytical process will be investigated to assess whether the observed RPD value is an indication of a deficient analytical system or an indication of excess sample heterogeneity.

8.2.3 Laboratory Method Blanks

Laboratory method blanks or preparation blanks are an analyte-free matrix prepared and analyzed in accordance with the analytical method employed to determine whether contaminants originating from laboratory sources have been introduced and have affected environmental sample analyses. Deionized water is used as a blank for water analyses. A method blank for organic soil analysis consists of an aliquot of sand (or in some cases sodium sulfate) that is subjected to the same preparation and analysis procedures as the environmental samples undergoing analysis. The solid method blank results are presented on a dry weight basis assuming 100 percent solids. Native soils devoid of acid-leachable metals do not exist. Therefore, a method blank for inorganic soil sample analysis consists of an aliquot of analyte-free water that is subjected to the same preparation and analysis procedures as the environmental samples undergoing analysis. The aqueous results are normalized to a fictitious soil sample and presented on a dry weight basis assuming 100% solids.

Under no circumstances are laboratory method blank contaminant values subtracted from environmental sample analysis results.

8.2.4 Matrix Spikes

MSs are environmental samples to which known quantities of analytes are added prior to sample preparation. These samples provide information about the heterogeneity of the samples as well as the effect of the sample matrix on the sample digestion and measurement methodology.

Matrix spikes will contain the analytes listed in Tables 3-1 and 3-2. If the MS recovery is not within applicable control limits, the laboratory will assess the batch to determine whether the spike results are attributable to a matrix effect or are the result of other problems in the analytical process. Based on NFESC requirements, if all the batch QC elements which are not affected by the sample matrix are in control (e.g., method blank, LCS, calibration checks) and if there is no evidence that spiking was not properly performed, the poor spike recovery may be attributed to matrix effects. In this case, the associated data will be flagged, but re-preparation and re-analysis will not be required. If any of the batch QC elements which are not affected by the sample matrix are out of control, or if there is any evidence that spiking may have been improperly performed, the MS sample will be re-processed through the entire analytical sequence. If there is insufficient sample available, or if holding times have passed, the laboratory will flag the associated data. Details of noncompliant and laboratory duplicate results will be included in the SDG narrative.

8.2.5 Matrix Spike Duplicates

MSD samples are duplicates of MS and are used for estimating the precision of organic target analyte analyses. They are used in lieu of simple duplicate samples because native environmental samples frequently do not exhibit detectable levels of organic target analytes, which otherwise prevents the calculation of RPD values.

8.2.6 Post Digestion Spikes

PDSs are similar to MSs except that the sample digestate, rather than the original sample, is spiked. These spikes are only analyzed for metal target analytes if the matrix spike recovery falls outside control limits. Comparing %Rs for PDSs and MSs helps to identify where in the analytical process accuracy problems are occurring. PDSs will contain all target analytes of interest and will be used to assist in determining whether unacceptable MS recoveries are a result of matrix effects.

8.2.7 Surrogates

Surrogates are organic compounds (typically brominated, fluorinated, or isotopically labeled) that are similar in nature to the compounds of concern and are not likely to be present in the environmental media. They are spiked into each sample, standard, and method blank before analysis, and are used in organic

chromatographic analysis procedures as a check of method effectiveness. Surrogate recoveries will be evaluated against the control limits provided in Table 3-3. Details of non-compliant surrogate recoveries will be included in the SDG narrative.

8.2.8 Additional Laboratory QC Checks

Additional internal laboratory QC checks include second-column confirmation for gas chromatographic analysis. Specific QC requirements for this QC check is provided in the applicable analytical method.

9.0 DATA REDUCTION, VALIDATION, AND REPORTING

This section describes the procedures to be used for data reduction, validation, and reporting for samples collected during verification sampling and analysis activities. All data generated during the course of the proposed activities will be maintained in hardcopy form by TtNUS in the Naval Facilities Engineering Command Mid-Atlantic/Atlantic central files located in Pittsburgh, Pennsylvania.

In addition to the central files, photocopies of all hardcopy data (as well as electronic data) will be maintained in the Chemistry/Toxicology/Risk Assessment Department database records files located in Pittsburgh. Upon completion of the contract, all files will be relinquished to the Navy as per CLEAN Contract requirements.

9.1 DATA REDUCTION

Field and laboratory data reduction procedures are described in the following subsections

9.1.1 Field Data Reduction Procedures

All field logs containing observations will be inspected and approved by the FOL. All field observations will be recorded in the logs immediately after observations are made.

If errors are made in recording or transcribing observations, erroneous observations will be legibly crossed out using a single line, initialed, dated by the field member, and corrected in a space adjacent to the crossed-out entry. The FOL has responsibility to assure that errors are identified and assessed relative to the intent of the VSAP.

Errors judged to affect the utility of the sample results within the context of this investigation shall be brought to the immediate attention of the PM.

9.1.2 Laboratory Data Reduction Procedures

Data reduction for laboratory analytical data generated via the USEPA CLP analytical methods will be completed in accordance with ILM04.1 for inorganics. Laboratory data reduction of PAH and PCB results generated via Methods SW-846 8310/8270C SIM and 8082 will be completed as specified in the analytical method and in a CLP-like format.

Laboratory analytical data will be reported using standard concentration units to ensure comparability with previous analytical results. Soil sample results will be reported on a dry weight basis in units of

micrograms per kilogram (µg/kg) for organic parameters and milligrams/kilogram (mg/kg) for inorganic parameters. Aqueous quality control samples will be reported in units of micrograms per liter (µg/L)

9.2 DATA VALIDATION

Validation of laboratory analytical data are presented in this section.

9.2.1 Procedures Used to Validate Laboratory Data

One hundred percent of the laboratory analytical data will be subjected to data validation to ensure that the data are of evidentiary quality. Validation of analytical data will be completed by the TtNUS Environmental Chemistry/Toxicology Department located in TtNUS's Pittsburgh office. Final review and approval of validation deliverables will be completed by the Data Validation Manager.

Analytical results will be validated versus the applicable analytical methods and the requirements of this QAPP. Validation of these data will conform to the "USEPA Region III Modifications to the Laboratory Data Validation Function Guidelines for Evaluating Inorganic Analyses" (USEPA, 1993) and to the "Region III Modifications to National Function Guidelines for Organic Data Review" (USEPA, 1994). Validation of PAH and PCB results will conform to the USEPA Organic Regional Guidelines as well as method-specific criteria to the greatest extent practicable. Data validators will review the chemical analytical data packages submitted by the laboratory. The data validators will check that the data were obtained using approved methodology, that the appropriate level of QC and reporting was conducted, and that the results are in conformance with QC criteria.

On the basis of the data validation results, the data validator will generate a report describing detected data qualifications and limitations, which will be reviewed internally by the Data Validation Manager prior to submittal to the PM. Data review will be extended beyond this routine validation as appropriate, to examine the data for anomalies (See Section 12.4). This additional review may result in more detailed inspections of the data to determine the cause of, and to rectify, individual anomalies. The impact of data qualifiers on data usability will also be assessed.

The data validation process will provide an estimate of the number of usable data points. This completeness check will be effected by computing the number of data points that are rejected relative to the total number of data points for a given analyte (see Section 12.3).

9.3 DATA REPORTING

The reporting of data collected in the field and laboratory as well as the resultant project reports are discussed in the following subsections.

9.3.1 Field Data Reporting

Field data will be transferred manually from the site logbook or sample logsheets to the electronic database and will be reviewed for accuracy by an independent reviewer.

All records regarding field measurements (i.e., field logbooks, sampling logbooks, and sample logsheets) will be placed in the TtNUS central files upon completion of the field effort. Entry of these results in the database will require removal of these records from the files. Outcards (date, person, subject matter) will be used to document the removal of any such documentation from the files.

9.3.2 Laboratory Data Reporting

To achieve the investigation objectives, a confirmational level of analytical quality is needed. This provides the highest level of data quality necessary to address potential risks. These analyses require full documentation of the chosen analytical methods and sample preparation steps, data packages, and data validation sufficient to provide defensible data. QC must be sufficient to define the overall precision and accuracy of these procedures. Therefore, all laboratory data will be reported in a CLP-like reporting format. Hard copy data deliverables shall be generated at the time of analysis. All pertinent QC data including raw data and summary forms for blanks, standards analysis, calibration information, etc., will be provided for all analyses. Case narratives will be provided for each SDG.

Validation will be completed using the hard copy data. Upon completion of validation on a SDG and review by the Data Validation Manager, the validation qualifiers will be entered in the electronic database and will be subjected to independent review for accuracy. During this review process, the electronic database printout also will be compared with the hard copy data to ensure that the hard copy data and electronic data are consistent.

9.3.3 Project Reports

A verification sampling and analyses activities report will be issued summarizing the findings of the investigation when data collection, analysis, and validation are completed.

9.4 DATA ACQUISITION REQUIREMENTS AND DATA MANAGEMENT

Data acquisition and management begins with the identification and collection of past data and newly acquired project samples. The samples are labeled, packaged for shipment, and shipped to the analytical laboratory in accordance with IHDIV SOP SA-12 (TtNUS, 2004). The samples are received at the laboratory and analyzed, the analytical results are reported by the analyst along with quality control check data, and the data are reviewed within the laboratory, according to laboratory SOPs. Data are then transmitted from the laboratory in both hardcopy and electronic formats according to laboratory SOPs. The data deliverable requirements are specified in TtNUS's Master Services Agreement with analytical laboratories. This agreement requires the analytical laboratory to provide data in both hardcopy and electronic form. Upon receipt by TtNUS, the data are validated, analyzed, assessed, and ultimately archived.

The electronic database will include pertinent sampling information such as sample number, sampling date, sample point location, as well as analytical information. Sample-specific reporting limits will be reported for nondetected analytes. Units will be clearly summarized in the database and will conform to those identified in Section 9.1.2. The original electronic diskettes and data validation reports for this investigation will be maintained in TtNUS central files.

10.0 PERFORMANCE AND SYSTEM AUDITS

Performance and system audits will be conducted periodically to ensure that work is being implemented in accordance with the approved project plans and in an overall satisfactory manner. Some examples of pertinent audits are:

- The FOL will supervise and check daily that the field observations are made accurately, equipment is thoroughly decontaminated, samples are collected and handled properly, and fieldwork is documented accurately and neatly.

- The PM will maintain contact with the FOL and Data Validation Manager to ensure that management of the acquired data proceeds in an organized and expeditious manner.

Details regarding additional audit responsibilities, frequency, and procedures are provided in the remainder of this section. Field performance and system audits are addressed in Section 10.1. Laboratory performance and system audits are addressed in Section 10.2.

10.1 FIELD PERFORMANCE AND SYSTEM AUDITS

This section presents the responsibilities, frequencies, and procedures associated with internal and external field performance and system audits.

10.1.1 Internal Field Audits

In addition to the daily checks performed by the FOL, the TtNUS QAM or designee may conduct an independent performance and system audit of field activities. If a formal field audit is conducted for this study, the QAM (or designee) will be responsible for ensuring that sample collection, handling, and shipping protocols, as well as equipment decontamination and field documentation procedures, are being performed in accordance with the approved project plans and SOPs. Details regarding potential field audits are described in the following subsections.

10.1.1.1 Internal Field Audit Frequency

A formal audit of the field sampling procedures may be conducted by the TtNUS QAM or designee in addition to the auditing that is an inherent part of the daily project activities. Individual projects are selected for audit by the QAM without the involvement of the PM.

10.1.1.2 Internal Field Audit Procedure

Internal field audits will be conducted in accordance with the following procedure:

- Prior to an audit, the auditor will prepare a detailed checklist to be used as an auditing guide.
- Upon arrival at the audit location, the auditor shall conduct a pre-audit meeting with the responsible management of the organization or project to be reviewed.
- Field audits will include a review of required project documentation (logbooks, sample log sheets, etc.) and field operations (sample C-O-C, sample handling, etc.) to evaluate completeness and compliance with applicable SOPs.
- The audit checklist will be used to record observations including any noted non-conformances.
- A formal post-audit debriefing will be conducted, and potential immediate corrective actions will be discussed.
- The auditor will generate a formal audit report that will address corrective actions. The auditor will provide this report to the PM.
- The PM will ensure that all corrective actions are addressed and will provide written verification of corrective action implementation to the auditor.
- The auditor will manage corrective action verification and audit closure.
- The following audit records will be maintained by the QAM:
  - Audit checklists
  - Audit reports
  - Response evaluations
  - Verification of corrective actions
  - Follow-up checklists and audit reports

10.1.2 External Field Audits

USEPA Region III may conduct external field audits and these audits may be conducted at any time during field activities at the discretion of USEPA Region III. If an audit is to be conducted, scheduling should be coordinated through the TtNUS QAM to ensure that personnel and equipment are available as

necessary. Personnel being audited may or may not be informed of the impending audit at the discretion and request of the auditing body. External audit procedures are at the discretion of USEPA Region III.

10.2 LABORATORY PERFORMANCE AND SYSTEMS AUDITS

This section presents the responsibilities, frequencies, and procedures associated with internal and external laboratory performance and system audits.

10.2.1 Internal Laboratory Audits

The QA Officer or appropriate designee of the subcontracted laboratory performs routine internal audits of the laboratory. The Navy, through the NFESC, also conducts internal laboratory audits. TtNUS holds no responsibility for such audits. Performance and system audits of laboratories are coordinated through the NFESC by an independent QA contractor. It is the responsibility of the NFESC and its contractor to ensure that the subcontracted laboratory complies with good laboratory practices and the general requirements of all analytical services provided by the laboratory. The frequency in which these internal audits as well as audit procedures are addressed in the following subsections.

For the chemical analysis required for implementation of verification sampling and analyses activities, TtNUS will subcontract a laboratory that has successfully completed a NFESC audit.

10.2.1.1 Internal Laboratory Audit Frequency

Performance and system audits for the laboratory will be performed regularly by the subcontracted laboratory's QA staff in accordance with the laboratory QA Plan.

10.2.1.2 Internal Laboratory Audit Procedures

Internal systems audits are conducted by the subcontracted laboratory in accordance with the laboratory QA Plan to detect any problems in sample flow, analytical procedures, or documentation and to ensure adherence to laboratory SOPs.

10.2.2 External Laboratory Audits

USEPA Region III may perform external audits at their discretion and may conduct an external laboratory audit prior to or during sampling and analysis activities. The subcontracted laboratory is also involved in various other external audits and performance evaluation studies throughout the year, as required, to maintain certifications and/or approvals by other regulatory agencies or programs. Additionally, the Navy

completes internal laboratory performance and system audits for each contracted laboratory on an 18-month schedule.

External audit procedures are at the discretion of USEPA Region III and may include (but are not limited to) review of laboratory analytical procedures, laboratory onsite audits, and/or submission of PE samples to the laboratory for analysis. Navy laboratory audit procedures, as performed by a Navy contractor, include a pre-screening process which requires review of the laboratory's QA Plan, analysis of performance evaluation (PE) samples, generation of data deliverables for those samples, an onsite technical systems audit of the laboratory, and satisfactory resolution of all deficiencies and findings.

11.0 PREVENTIVE MAINTENANCE PROCEDURES

Measuring equipment used in environmental monitoring or analysis for verification sampling and analysis activities shall be maintained in accordance with the manufacturer's operation and maintenance manuals. Equipment and instruments shall be calibrated in accordance with the procedures, and at the frequency, discussed in Section 6.0 (Calibration Procedures and Frequency). Preventive maintenance for field and laboratory equipment is discussed in the remainder of this section.

11.1 FIELD EQUIPMENT PREVENTIVE MAINTENANCE

TtNUS has established a program for the maintenance of field equipment to ensure the availability of equipment in good working order when and where it is needed. This program consists of the following elements:

- The TtNUS equipment manager keeps an inventory of the equipment in terms of items (model and serial number), quantity, and condition. Each item of equipment is signed out when in use, and its operating condition and cleanliness checked upon return.

- The equipment manager conducts routine checks on the status of equipment and is responsible for the stocking of spare parts and equipment readiness. The equipment manager also maintains the equipment manual library.

- The FOL is responsible for working with the equipment manager to make sure that the equipment is tested, cleaned, charged, and calibrated in accordance with the manufacturer's instructions and IHDIV SOP SA-12 (IHDIV, 1996) before being taken to the job site and during field activities.

- During calibration, an appropriate maintenance check is performed on each piece of equipment. Any problems encountered while operating the instrument will be recorded in the field logbook, including a description of the symptoms and corrective actions taken.

- If a problem is detected or if service is required, the equipment should be logged, tagged, and segregated from equipment in proper working order. Use of the instrument will not be resumed until the problem is resolved or service completed.

11.2 LABORATORY INSTRUMENT PREVENTIVE MAINTENANCE

Proper maintenance of laboratory instruments and equipment is essential. Depending on manufacturers' recommendations, maintenance intervals are established for each instrument. All instruments will be labeled with a model number and serial number, and a maintenance logbook will be maintained for each instrument. Personnel will be alert to the maintenance status of the equipment they are using at all times.

The use of manufacturer-recommended grades or better of supporting supplies and reagents is also a form of preventive maintenance. For example, gases used in the ICP instruments must be of sufficient grade to minimize fouling of the instrument. The routine use of other supporting supplies from reputable manufacturers will assist in averting unnecessary periods of instrument downtime. An inventory of critical spare parts will also be maintained by the laboratory to minimize instrument downtime.

11.2.1 Major Instruments

Table 11-1 provides a summary of typical preventive maintenance procedures for key analytical instruments and equipment associated with this project.

Maintenance of key instruments is often covered under service contracts with external firms. These contracts provide for periodic routine maintenance to help guard against unexpected instrument downtime. The contracts also provide for quick response for unscheduled service calls when malfunctions are observed by the operator.

11.2.2 Refrigerators/Ovens

The temperatures of refrigerators used for sample storage and drying ovens will be monitored a minimum of once daily. The acceptable range for refrigerator temperatures is 4°C ± 2°C. Required temperatures of ovens will vary based on the analytical methods for which they are used. The temperatures will be recorded on temperature logs. The logs will contain the date, temperature, and initials of person performing the check.

Maintenance of the logs is typically the responsibility of the sample custodian. However, assignment of responsibilities for temperature monitoring to specific personnel does not preclude the participation of other laboratory personnel. If unusual temperature fluctuations are noted, it is the responsibility of the observer to immediately notify the person in charge of the discrepancy before the condition of the samples is compromised.

Unstable or fluctuating temperatures may be indicative of malfunctions in the cooling or heating system. However, the instability may be due to frequent opening of the door. Regardless of the cause, such an observation must be investigated, and modifications must be made to access procedures or repairs to equipment must be made to prevent jeopardizing the integrity of the samples.

11.3 INSPECTION/ACCEPTANCE REQUIREMENTS FOR SUPPLIES AND CONSUMABLES

All field equipment shall be inspected prior to use to ensure that necessary parts are available. Most equipment planned for use in this project is simple with few to no moving parts. Therefore a visual inspection prior to use shall be sufficient to ensure that the equipment is suitable for use. This visual inspection shall occur during mobilization and during each use by the person using the equipment.

Laboratory inspection and acceptance requirements must be outlined in the laboratory QA Plan and should include the following specifications for inspection and acceptance of supplies and consumables:

- Requirements to follow individual SOP specifications for grades of chemicals necessary to achieve acceptable analytical performance. SOPs are required to detail the necessary grade of chemicals, including compressed gases.

- Requirements to obtain primary chemical standards from reliable sources that use calibrated glassware in the preparation of the standards and to maintain all certificates supplied with the standards. Emphasis is on obtaining NIST-traceable standards where possible.

- Storage of chemical standards in accordance with applicable SOPs and in a manner that preserves their integrity.

- Routine monitoring of de-ionized water and other solvents to ensure that analytical systems, samples, and standards are not contaminated.

- Requirements to record the date received and the date opened on each container of chemical used for analysis.

TABLE 11-1

TYPICAL PREVENTIVE MAINTENANCE FOR ANALYTICAL INSTRUMENTS
SITE 41 SCRAP YARD
NSF-IH, INDIAN HEAD, MARYLAND

Instrument	Preventive Maintenance	Maintenance Frequency
ICP and Mercury Analyzer	Change sample introduction tubing, clean nebulizer, clean spray chamber, clean torch, manual profile, and automatic profile optics.	As required.
GC	Replace solvent washes and clean syringe, clip column, clean injection port, replace liner, and bake oven.	Daily. As required.
HPLC	Change frit in mixer. Change column pre-filter. Change pump seals. Rinse water pump with methanol, filter water, sonicate water intake filter frit.	As needed (when pressure builds up). Approximately weekly.
GC/MS	Change pump oil Change Septum Clean source, rod, check power supplies Clean inside and outside printer, general cleaning of instrument Service in accordance with manufacturer specifications	Every 46 months As needed As needed As needed

ICP = Inductively Coupled Plasma
GC = Gas Chromatograph
GC/MS = Gas Chromatograph/Mass Spectrometry
HPLC = High Performance Liquid Chromatography

12.0 SPECIFIC ROUTINE PROCEDURES USED TO ASSESS DATA PRECISION, ACCURACY, AND COMPLETENESS

Compliance with quantitative QC objectives for laboratory precision and accuracy as outlined in Tables 3-1 and 3-3 will be evaluated during data validation (Section 9.0). Compliance with completeness objectives for field and laboratory data will also be computed manually. Sections 12.1 and 12.2 present equations to be used for computing accuracy and precision values, respectively. Section 12.3 describes the means and presents the equation for determining completeness. Section 12.4 addresses the overall data assessment process.

In general, data validation requires that data be evaluated batch-by-batch based on the results of quality indicators for the respective batches. Section 12.4 presents additional data quality considerations to be evaluated after data validation. These considerations are designed to incorporate data quality factors that extend beyond evaluation of the simple quantitative estimators for precision, accuracy and completeness.

12.1 ACCURACY ASSESSMENT

Sample collection accuracy cannot be evaluated because there is no standard by which to judge such accuracy. Instead of a quantitative evaluation of sample collection accuracy, compliance with field SOPs is used to determine whether the samples have been collected appropriately.

Sample analysis accuracy will be assessed through the use of surrogate spikes, MSs, MSDs, PDSs, LCSs, calibration check standards, and blanks. Blanks will be used to infer the potential for positive biases because of contamination. To assure the accuracy of the analytical procedures, prior to preparation for analysis at least 1 of every 20 environmental samples will be spiked with known amounts of target analytes (i.e., MSs). The spiked samples will be analyzed and the concentrations of each target analyte observed in the spiked sample compared to the reported value of the analyte in the unspiked sample to determine the %R of the analyte. Control charts are plotted by the laboratory for each target analyte and kept on matrix and analyte-specific bases. The %R for a spiked sample is calculated by using the following formula:

$$\%R = \frac{\text{Amount in Spiked Sample} - \text{Amount in Sample}}{\text{Known Amount Added}} \times 100\,\%$$

As discussed in Section 3.2.2, LCSs and surrogate spikes are also analyzed to assess accuracy. The %R calculation for LCSs and surrogate spikes is:

$$\%R = \frac{\text{Experimental Concentration}}{\text{Certified Concentration}} \text{ X } 100\,\%$$

12.2 PRECISION ASSESSMENT

As presented in Section 3.1.2, laboratory duplicate samples (for inorganic analyses) and MSD samples (for organic analyses) will be prepared and analyzed at a minimum frequency of 1 per every 20 environmental samples per matrix. As described in Section 3.1.1, field duplicate samples also will be collected at a minimum frequency of one per 10 environmental samples per matrix. The RPD between a sample (Sample 1) and its duplicate or MSD (Sample 2) is calculated using to the following formula:

$$RPD = \frac{|\text{Amount in Sample 1} - \text{Amount in Sample 2}|}{0.5\,(\text{Amount in Sample 1} + \text{Amount in Sample 2})} \text{ X } 100\,\%$$

12.3 COMPLETENESS ASSESSMENT

Completeness for this project will be determined based on the number of sample results for each target analyte and each sample type that are usable as determined through data validation and data assessment. Data values rejected during data validation (indicated by an "R" flag) will be considered unusable unless additional review and documentation by one or more technical team members demonstrates that the rejection is erroneous. To monitor completeness, the number of usable, valid results for each sample type and analyte will be counted and compared to the completeness objective in Section 3.3.2. Percent completeness will be calculated using the following equation:

$$\%\,\text{Completeness} = \frac{(\text{number of valid measurements})}{(\text{number of measurements planned})} \text{ x } 100\%$$

12.4 DATA ASSESSMENT

The assessment of data obtained from this investigation is a critical part of determining what the next step in decision making should be. It must be determined if the data are of appropriate type, quality, quantity and representativeness to support the project objectives. The effect of the loss of data deemed unacceptable for use, for whatever reason, will be evaluated.

12.4.1 Reconciliation with Data Quality Objectives

Laboratory data will be examined upon receipt from the laboratory in a cascading series of evaluations. The first step will be a data verification and validation as described in Section 9.0.

After data validation, the data will be reconciled with project objectives to determine whether sufficient data of acceptable quality are available for decision making. In addition to the evaluations described in Section 12.1 through 12.3, a series of inspections will be performed. These inspections will be designed to:

- Identify deviations, if any, from the field sampling SOPs.
- Identify deviations, if any, from the laboratory analytical SOPs.
- Identify deviations, if any, from the project planning documents.
- Identify deviations, if any, from the data validation process.
- Identify and explain the impacts of elevated reporting limits.
- Identify unusable data (i.e., data qualified as "R").
- Evaluate project assumptions such as "field duplicate RPD > laboratory duplicate RPD".
- Evaluate effects of deviations from planned procedures and processes on the interpretation and utility of the data.
- Identify the existence of remaining data gaps.

The overall objective of the data reviews will be to obtain an assessment of the reasonableness of the data sets and to evaluate whether project objectives have been achieved. The PM shall bear ultimate responsibility to ensure that data are evaluated in a manner consistent with project objectives.

13.0 CORRECTIVE ACTION

Under the TtNUS QA/QC program, it is required that any and all personnel noting conditions adverse to quality should report these conditions immediately to the PM and QAM. These parties, in turn, are responsible for determining the cause of the adverse conditoins and implementing appropriate corrective action in a timely manner. It is ultimately the responsibility of the QAM to document all findings and corrective actions taken and to monitor the effectiveness of the corrective measures performed. A brief summary of corrective actions for some specific field and laboratory QC check samples is presented in Section 3.0, Table 3-2.

13.1 FIELD CORRECTIVE ACTION

Field nonconformances or conditions adverse to quality must be identified and corrected as quickly as possible so that work integrity or product quality is not compromised. The need for corrective action may arise based on deviations from project plans and procedures, adverse field conditions, or other unforeseen circumstances. Corrective action needs may become apparent during the performance of daily work tasks or as a consequence of internal or external field audits.

Corrective action may include resampling and may involve amending previously approved field procedures. Minor modifications to field activities, such as the collection of additional samples, will be initiated at the discretion of the FOL, subject to onsite approval by NSF-IH personnel. Major modifications, such as the elimination of a sampling point or other situations that affect compliance with or achievement of project objectives, must be approved and documented via a Field Task Modification Request (FTMR). Approval of the modification will be obtained from the Navy. The FOL is responsible for initiating FTMRs. A FTMR will be prepared for all deviations from the project planning documents, as applicable. An example of a FTMR is provided in Figure 13-1.

13.2 LABORATORY CORRECTIVE ACTION

In general, laboratory corrective actions are warranted whenever an out-of-control event or potential out-of-control event is noted. The specific corrective action taken depends on the specific analysis and the nature of the event. Generally, the following occurrences alert laboratory personnel that corrective action may be necessary:

- QC data are outside established warning or control limits
- Method blank analyses yield concentrations of target analytes above acceptable levels
- Undesirable trends are detected in spike %Rs or in duplicate RPDs
- There is an unexplained change in compound detection capability

- Inquiries concerning data quality are received
- Deficiencies are detected by laboratory QA staff during audits or from PE sample test results

Any corrective action taken above the analyst level that cannot be performed immediately at the instrument will be documented. Corrective actions typically are documented for out-of-control situations on a Corrective Action Form or an Out-of-Control Event Form.

Laboratory corrective actions must be documented and included as part of the Final Evidence File. Major corrective actions that do not bring non-conformances into conformance with project objectives shall be identified to the TtNUS PM who will advise all levels of project management in accordance with Section 14.0 of this QAPP.

13.3 CORRECTIVE ACTION DURING DATA VALIDATION AND DATA ASSESSMENT

The need for corrective action may become apparent during data validation, interpretation, or presentation activities. The performance of rework (i.e., resampling or reanalysis), the institution of a change in work procedures, or the provision of additional/refresher training are possible corrective actions relevant to data evaluation activities. The PM will be responsible for approving the implementation of a corrective action and ensuring that it is documented appropriately. Analytical data may be qualified during data validation to alert data users to the potential that particular analysis results are potentially deficient relative to expected performance standards. Such validation practices are described in Section 9.2. When conducting data assessment for project decision making, a number of situation-dependent qualifications on data or decisions are possible. The number of possible situations or conditions precludes enumeration of all possible corrective actions, however the approach used to identify and impose such qualifications is described in Section 12.4.

FIGURE 13-1

TETRA TECH NUS
FIELD TASK MODIFICATION REQUEST FORM

Client Identification Number _____ Project Number _____ TMR _____

To _____ Location _____ Date _____

Description:

_____
_____
_____
_____

Reason for Change:

_____
_____
_____
_____

Recommended Disposition:

_____
_____
_____
_____

_____
Field Operations Leader (Signature, if applicable) Date

Disposition:

_____
_____
_____
_____

_____
Project Manager (Signature, if required) Date

_____

Distribution:
Program Manager
Quality Assurance Officer
Project Manager
Field Operations Leader

Others as required _____
_____
_____
_____

14.0 QUALITY ASSURANCE REPORTS TO MANAGEMENT

QA reports to management will be provided in four primary formats during the course of verification sampling analysis activities: data validation reports, reports summarizing accomplishments and QA/QC issues during the verification sampling analysis activities, project-wide progress reports, and laboratory QA reports. The frequencies of report generation, report content, report preparer, and report recipient(s) are summarized in Table 14-1.

Data validation reports will address all major and minor laboratory noncompliances as well as noted sample matrix effects. In the event that major problems occur with the analytical laboratory (e.g., repeated or extreme holding time exceedances or calibration noncompliances, etc.), the Data Validation Manager will notify the PM, QAM, Technical Coordinator, and Laboratory Services Coordinator. Such notifications (if necessary) are typically provided via internal memoranda and are placed in the project file. These reports contain a summary of the noncompliance, a synopsis of the impact on individual projects, and recommendations regarding corrective action and compensation adjustments. Corrective actions for major noncompliances are initiated at the program level.

The FOL will provide the PM with daily oral field progress reports during the course of the sampling event. These reports will explain accomplishments, deviations from the project planning documents, upcoming activities, and a QA summary. The PM provides a monthly progress report to the Navy which addresses the project budget, schedule, accomplishments, planned activities, and QA/QC issues and intended corrective actions.

The subcontracted analytical laboratories will provide a QA report to TtNUS if significant plan deviations result from unanticipated circumstances.

TABLE 14-1

SUMMARY OF REPORTS
SITE 41 SCRAP YARD
NSF-IH, INDIAN HEAD, MARYLAND

Report	Content	Preparer	Frequency of Submittal	Recipient(s)
Data Validation Report	All major and minor laboratory noncompliances as well as noted sample matrix effects.	Data Validation Manager or designee	Per SDG	PM, project file
Major Analysis Problem Identification Report (internal memorandum)	Notification of persistent or major problems with analytical laboratory performance. Summary of the noncompliance(s), a synopsis of the impact on the project, and recommendations regarding corrective action and compensation adjustments.	Data Validation Manager or designee	When persistent analysis problems are detected	PM, QAM, Technical Coordinator, Laboratory Services Coordinator, project file
Project Monthly Progress Report	Summary of the project budget, schedule, accomplishments, planned activities, and QA/QC issues and intended corrective actions.	PM	Monthly for duration of project	Navy, project file
Field Progress Reports	Explain accomplishments, deviations from the project planning documents, upcoming activities, and a QA summary.	FOL	Daily, oral, during the course of sampling	PM
Laboratory QA Report	Summary of updated QC limits or significant deviations from planned activities/performance.	Subcontracted laboratories	When significant plan deviations result from unanticipated circumstances	TtNUS, project file

SDG = Sample Delivery Group
QA = Quality Assurance
QC = Quality Control
PM = Project Manager
FOL = Field Operations Leader
QAM = Quality Assurance Manager

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APPENDIX C

FIELD FORMS

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: _____
Project No.: _____

Sample ID No.: _____
Sample Location: _____
Sampled By: _____
C.O.C. No.: _____

[] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other: _____
[] QA Sample Type: _____

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

GRAB SAMPLE DATA:

Date: / Time: / Method: / Monitor Reading (ppm):	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)

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

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

EQUIPMENT CALIBRATION LOG

PROJECT NAME : ____________________ INSTRUMENT NAME/MODEL: ____________________

SITE NAME: ____________________ MANUFACTURER: ____________________

PROJECT No.: ____________________ SERIAL NUMBER: ____________________

Date of Calibration	Instrument I.D. Number	Person Performing Calibration	Instrument Settings		Instrument Readings		Calibration Standard (Lot No.)	Remarks and Comments
			Pre-calibration	Post-calibration	Pre-calibration	Post-calibration		

TETRA TECH NUS
FIELD TASK MODIFICATION REQUEST FORM

Project/Installation Name _____ CTO & Project Number _____ Task Mod. Number _____

Modification To (e.g. Work Plan) _____ Site/Sample Location _____ Date _____

Activity Description: _____

Reason for Change: _____

Recommended Disposition: _____

Field Operations Leader (Signature) _____ Date _____

Approved Disposition:

Project/Task Order Manager (Signature) _____ Date _____

Distribution:

Program/Project File –
Project/Task Order Manager –
Field Operations Leader –

Other: _____